Black Rascal Creek Watershed Plan and Environmental Assessment Black Rascal Creek Watershed, California

Final

October 2023

Natural Resources Conservation Service and
Merced County, California

Black Rascal Creek Watershed Plan and Environmental Assessment for Management of Flood Flows in the Black Rascal Creek Watershed Merced County, California

Prepared By: U.S. Department of Agriculture, Natural Resources Conservation Service

In Cooperation With: County of Merced and Merced Streams Group

AUTHORITY

The Black Rascal Creek Flood Control Project (Project) is authorized under Public Law 83-566 (as amended) and by the following funding authorities; County of Merced and City of Merced.

ABSTRACT

The Project includes the construction and operation of a detention basin within the Black Rascal Creek watershed to provide flood prevention and reduce floodwater and related damages to Merced and surrounding areas. The Project would be located approximately 2 miles east of Merced in Merced County, California, which is situated in the northern San Joaquin Valley, west of the Sierra Nevada Mountains. In the last century, Merced has flooded in 1937, 1950, 1955, 1969, 1997, 1998, 2001, 2002, 2005, and 2006 (FEMA, 2010; Patchett, 2012). The most damaging flood in Merced County in recent history occurred in 2006. The Project consists of a flood control detention basin created by an external embankment aligned adjacent to the Merced Irrigation District's Fairfield Canal, East Yosemite Avenue, and North Arboleda Drive. The detention basin would temporarily store flow during periods of heavy rain and limit flow in the Black Rascal Creek diversion channel to 3,000 cubic feet per second, thereby reducing peak flows into Bear Creek (to which Black Rascal Creek is a tributary). Embankment and associated facility construction would occur within an approximately 300-acre Project footprint to accommodate less than 2,500 acre-feet of water[1] during a 200-year flood event in compliance with the Central Valley Flood Protection Act of 2008.[2]

The Watershed Project Plan Environmental Assessment (Plan EA) fully evaluates the No-Action Alternative (Future-Without-Project) and the Preferred Alternative. The Preferred Alternative was determined on net Project benefits based on an incremental analysis for five Project alternatives, to include a non-structural alternative. The Project would not have any significant impacts on the environment with the implementation of environmental commitments (ECs) and mitigation measures identified in the Plan EA. The Project would substantially reduce downstream flooding along Bear Creek and provide flood protection for public safety, particularly in disadvantaged communities (for example, Franklin-Beachwood); minimize property damage caused by flooding on residential and prime agricultural lands; and improve water quality by minimizing erosion and sedimentation.

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[1] Hydraulic modeling results indicate approximately 1,700 acre-feet water detention basin water storage capacity for a peak 200-year flood event.

[2] A 100-year flood has a 1 percent annual exceedance probability in any 1 year and an average recurrence interval of 100 years (U.S. Geological Survey, 2016). A 200-year flood has an average recurrence interval of once every 200 years.

COMMENTS AND INQUIRIES

Submit comments and inquiries to:

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State Conservationist, USDA/NRCS
Attn: Black Rascal Creek Watershed Plan EA
NRCS-CA State Office
430 G Street Davis, CA 95616

Or call and leave a voicemail at (530) 792-5642 (Attn: Small Watershed Program Black Rascal Creek).

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Acronyms and Abbreviations

§	Section (for codes and laws)
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
AB	Assembly Bill
APE	area of potential effect
ASCE	American Society of Civil Engineers
BMP	best management practice
BPS	best performance standard
CA	California
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	*Code of Federal Regulations*
cfs	cubic feet per second
CN	curve number
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2-equivalent
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CSSC	California species of special concern
CTS	California tiger salamander
CWA	Clean Water Act
DAC	disadvantaged community
DOC	California Department of Conservation

DSOD	California Division of Safety of Dams
DWR	California Department of Water Resources
EA	Environmental Assessment
EAD	expected annual damage
EC	Environmental Commitment
EFH	essential fish habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EM	engineer manual
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FE	federal endangered
FEMA	Federal Emergency Management Agency
FMMP	Farmland Mapping and Monitoring Program
FMP	Fishery Management Plan
FOE	Finding of Effect
FT	federal threatened
FWOP	Future-without-Project
GHG	greenhouse gas
GIS	geographic information system
IRWMP	Integrated Regional Water Management Plan
Jacobs	Jacobs Engineering Group Inc.
MAGPI	Merced Area Groundwater Pool Interests
MBTA	Migratory Bird Treaty Act
MCAG	Merced County Association of Governments
mg/L	milligram(s) per liter
MID	Merced Irrigation District
MMP	mitigation and monitoring plan
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NED	national economic development
NEPA	National Environmental Policy Act of 1969

NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWIS	National Weather Information System
NWPM	National Watershed Program Manual
O&M	operations and maintenance
O_3	ozone
PFMC	Pacific Fishery Management Council
PL	Public Law
Plan EA	Watershed Project Plan Environmental Assessment
PM_{10}	particulate matter less than 10 micrometers in aerodynamic diameter
$PM_{2.5}$	particulate matter less than 2.5 micrometers in aerodynamic diameter
PMF	probable maximum flood
ppm	part(s) per million
RCPP	NRCS Regional Conservation Partnership Program
RWQCB	Regional Water Quality Control Board
SE	state endangered
SHPO	State Historic Preservation Officer
SJRFCPA	San Joaquin River Flood Control Project Agency
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SR	State Route
ST	state threatened
STA	Station
State Plan	State Plan of Flood Control
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TR	Technical Release
U.S.C.	United States Code

UC	University of California
URS	URS Corporation
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USJR RFMP	Upper San Joaquin River Regional Flood Management Plan
VOC	volatile organic compound
WDL	Water Data Library
WPCP	Water Pollution Control Program
WRC	Water Resources Council

Black Rascal Creek Watershed Plan and
Environmental Assessment
for
Black Rascal Creek Watershed
Merced County, California
16th Congressional District of California

1. Summary

Authorization: Public Law 83-566 Stat. 666 as amended (16 U.S.C. Section [§] 1001 et. Seq.) 1954

Sponsors: County of Merced and the Merced Streams Group (a partnership of Merced County, the Merced Irrigation District [MID], and City of Merced)

Description of Recommended Plan: The Black Rascal Creek Watershed Project Plan Environmental Assessment (Plan EA) would consist of the Black Rascal Creek Flood Control Project (Project) to construct a new embankment system to create a flood control detention basin that includes habitat restoration (secondary and tributary habitat channels) immediately upstream from the relocated diversion channel. The detention basin would temporarily detain a 200-year storm event and limit flow in the diversion channel to 3,000 cubic feet per second (cfs), thereby reducing peak flows in Bear Creek and the flooding along the old Black Rascal Creek channel that flows through the city of Merced. The Project is designed to contain up to the 200-year flood event in compliance with the Central Valley Flood Protection Act of 2008.

Purpose and Need for Action: The purpose of the Project is to provide much-needed flood attenuation during winter storm events to reduce flooding impacts from the Black Rascal Creek drainage and watershed into the City of Merced and other downstream communities and agricultural lands. The Purpose and Need for the Action is detailed in Section 2.1.

Environmental Commitments: The following features or provisions, presented as Environmental Commitments (ECs) (which are condensed here, but described more fully in Section 6) are proposed as part of this Project to mitigate losses and other adverse effects, or to avoid or reduce Project impacts to threatened and endangered species, water resources, and public health and safety. Merced County conducted a California Environmental Quality Act (CEQA) review of the Project in 2017 (Merced County, 2017) to identify and analyze the anticipated environmental impacts of the proposed Project. The ECs included in this Plan EA are required based on commitments made in the Final Environmental Impact Report (EIR):

- Implement compensatory habitat mitigation from an approved conservation bank or other restoration/enhancement measures as determined necessary with U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife (USFWS), and California Department of Fish and Wildlife (CDFW).
- Prepare and implement a storm water pollution prevention plan (SWPPP).
- Implement best management practices (BMPs) to protect water quality and to reduce indirect impacts.

- Reduce indirect wetland impacts by installing fencing along perimeter of wetlands adjacent to Project footprint.
- Avoid and minimize impacts on freshwater marsh and aquatic habitats.
- Conduct preconstruction surveys for special-status species.
- Avoid and preserve special-status plants to the extent feasible.
- Avoid and minimize impacts on vernal pools and special-status brachiopods and amphibians.
- Implement avoidance buffers for nesting raptors and other native birds.
- Implement passive relocation of burrowing owls during the non-nesting season.
- Conduct tree removal after September 1 if roosting bats are identified in Project footprint.
- Implement construction minimization measures such as observing speed limits, cover holes and trenches, conduct daily inspection of construction equipment, and implement an employee awareness program.
- Revegetate disturbed soils.
- Merced County will obtain all appropriate encroachment permits and submit a traffic control plan to address emergency responder access and management of local traffic.
- An environmental education program will be presented to construction crews by a qualified biologist.
- No construction debris, sediment, silt, sawdust, cement, petroleum, or other materials generated from construction will enter aquatic or wetland habitats.
- Standard erosion control and slope stabilization measures will be installed in areas for work where runoff could enter wetland areas.
- Machinery will be refueled at least 50 feet from any wetland habitat, and a spill prevention and response plan will be maintained onsite during all construction using motorized equipment.
- Construction of the Project would comply with regulations to control fugitive dust emissions to minimize dust and effects on water quality.
- If cultural resources are discovered during ground-disturbing activities, the procedures included in Part 601.29 of the Natural Resources Conservation Service (NRCS) National Cultural Resources Procedures Handbook.

Resource Information:

Latitude and Longitude: Latitude 37°19’56.27”N/longitude 120°23’39.45”W

Climate and Topography: The Project would be located within the San Joaquin Valley, which is within the southern half of the California Central Valley. The valley is bordered by the Sierra Nevada Mountains to the east (8,000 to more than 14,000 feet in elevation), the Coast Ranges to the west (averaging 3,000 feet in elevation), and the Tehachapi Mountains to the south (6,000 to 7,981 feet in elevation).

The San Joaquin Valley is in a Mediterranean climate zone and is typically arid in the summer; cool temperatures and tule fog (i.e., a dense ground fog) are prevalent in the winter and fall. Average high temperatures in the summer are in the mid 90 degrees Fahrenheit (°F) range; average low temperatures in winter are in the high 40°F range. January is typically the wettest month of the year, with an average of approximately 2 inches of rain.

Watershed Size: 34,067 acres

Land Use Benefited Area (acres): Approximately 5,800 acres (3,100 acres of agricultural lands)

Land Ownership (within Project footprint): Private

Population and Demographics: Demographic statistics for the City and County of Merced are summarized in Table 1-1.

Table 1-1. Demographic Statistics
Black Rascal Creek Watershed, CA

Statistic	City of Merced	Merced County
Population estimate (July 2019)	83,676	277,680
Median household income (2015-2019)	$45,232	$53,672
Median house value (2015-2019)	$237,500	$252,700
Percentage minority residents	46.3	17.8
Percentage 65 and over	10.1	11.4
Percentage of persons in poverty	29.3	17.0

Source: U.S. Census Bureau, 2021

Alternative Plans Considered: Merced County initiated a *Feasibility Study, Black Rascal Creek Flood Control Project* (Merced County Feasibility Study) (2009). The Merced County Feasibility Study evaluated four alternatives to provide flood protection during 200-year flood events. Merced County identified the Project alternative, a detention basin at the same location as the Preferred Alternative, as the most feasible alternative. In addition, a proposed Haystack Reservoir within the Black Rascal Creek watershed alternative was previously evaluated (USACE, 1980). An EIR (Merced County, 2017) evaluated an alternative embankment configuration based on the Project alternative in the Merced County Feasibility Study, for the proposed Project.

No-Action Alternative (Future-without-Project [FWOP]): The No-Action Alternative assumes the Project would not be implemented and Black Rascal Creek would continue to be unmanaged. The No-Action Alternative would result in continued flooding and flood-related damage in wetter years downstream from the Project.

Preferred Alternative: Under the Preferred Alternative, the Project would include the construction of a new embankment system to create a flood control detention basin that includes habitat restoration (secondary and tributary habitat channels) immediately upstream from the relocated diversion channel. The Project consists of a detention basin, spillways, channel modifications to Black Rascal Creek, habitat enhancements, and drainage facilities. The detention basin would temporarily detain a 200-year storm event and limit flow in the diversion channel to 3,000 cfs, thereby reducing peak flows in Bear Creek and the flooding along the old Black Rascal Creek channel that flows through the City of Merced.

The detention basin would have a principal and an auxiliary spillway. The principal spillway would serve as the detention basin outlet. The auxiliary spillway is intended to supplement the principal spillway to safely pass floods that exceed the 200-year principal spillway design flood.

The Project includes restoration and enhancement of aquatic, riparian, and upland habitats in the footprint of the proposed detention basin. These activities would be located in areas currently used for agricultural pasture and orchard.

A new channel would be graded through the agricultural pasture to restore a tributary of Black Rascal Creek. A wide, shallow secondary channel would be graded in the detention basin to provide topographic diversity and habitat heterogeneity. Drainage facilities (culverts with flap gates, headwalls, and end treatments) would be included at three locations.

Incremental Economic Benefit/Cost Analysis: The Preferred Alternative was determined based on net Project benefits, after conducting an incremental economic benefit/cost analysis carried out for five Project alternatives. These include the No-Action Alternative, the single detention basin design at three levels of protection, as well as one non-structural alternative to identify the preferred project. A single detention basin design at the 50-year, 100-year, and 200-year levels of protection are used in the incremental analysis. The non-structural alternative evaluates the relocation of all structures within the 50-year inundation area.

Project Costs (estimated):

Public Law (PL) 83-566 Funds: $10,000,000

State and Local Partner Funds: $25,761,703

TOTAL COSTS: $35,761,703

Number of Direct Beneficiaries: 3,587 residences, 165 commercial and industrial spaces, and agricultural lands in the communities of the City of Merced and Franklin-Beachwood. The benefit to agricultural and rural communities comprises 22 percent of total Project benefits.

National Economic Development (NED) Benefits and NED Costs:

Construction Costs: $17,761,012 including planning, permitting, and mitigation; $14,691,829 including only construction of the detention basin levee and inlet/outlet structure

Total Costs: $35,761,703

Average Annual Costs: $1,103,332

Annual Benefits: $5,017,012

Benefit to Cost Ratio: 4.5

Funding Schedule (budget year +5):

Federal Funds: $10,000,000

Non-federal Funds: $25,761,703

Period of Analysis: 101.5 years (including anticipated 18-month implementation period)

Project Life: 100 years

Environmental Effects, impacts: No significant impacts on the environment were identified assuming the implementation of ECs and mitigation measures identified in this Plan EA.

Major Conclusions: The Project would substantially reduce downstream flooding along Bear Creek and provide flood protection for public safety, particularly in disadvantaged communities (for example, Franklin-Beachwood); minimize property damage caused by flooding; and improve water quality by minimizing erosion and sedimentation.

Areas of Controversy and Controversial Issues: There are no known areas of controversy.

Evidence of Unusual Congressional or Local Interest: No

Is this report in compliance with executive orders, public laws, and other statues governing the formulation of water resource projects? **Yes** _X_ **No** __

2. Purpose and Need for Action

2.1 Purpose and Need for Action

The purpose of the Project is to provide flood prevention to the City of Merced and disadvantaged communities within Merced County downstream of Black Rascal Creek. The overall purpose of the Project is to temporarily detain floodwaters during periods of heavy precipitation, thereby limiting flow in the diversion channel and reducing peak diversion channel flows entering Bear Creek downstream of the Project.

The need for the Project is to protect life and property of residential communities within the City of Merced and Merced County, and surrounding agricultural properties by reducing the threat caused by uncontrolled runoff and flooding from Black Rascal Creek.

The primary goal for the Project is to provide flood protection to communities within the City of Merced and Merced County that are downstream of Black Rascal Creek. The primary objectives of the Project are as follows:

- Minimize property damage caused by flooding.
- Improve water quality by minimizing erosion and sedimentation.
- Provide aquatic and riparian habitat enhancement.

The Project would provide downstream agricultural lands, the City of Merced, and the community of Franklin-Beachwood with protection from frequent flooding. This increased flood protection would reduce the risk of inundation of local wastewater treatment facilities and benefit water quality as a result. The detention basin would attenuate future flood flows within Black Rascal Creek preventing overflows into the community of Franklin-Beachwood.

The Project is located in unincorporated Merced County, approximately 2 miles northeast of the intersection of East Yosemite Avenue and North Arboleda Drive. The Project is near the City of Merced in the U.S. Geological Survey 7.5-minute Merced quadrangle near latitude 37.332297° and longitude -120.394292° (S11 T7S R14E, S12 T7S R14E, S7 T7S R15E). Regional and Project vicinity maps are shown on Figures 2.1-1 and 2.1-2. The Project footprint shown on Figure 2.1-2 and discussed in this Plan EA is the location of the proposed works of improvement (i.e., the disturbance area that would be directly impacted by construction activities of the Preferred Alternative, including laydown and access road areas). A Project map showing the Black Rascal Creek watershed, regional water resources, the Preferred Alternative facilities, and the areas within Merced County that would be benefited by the proposed Project is included in Appendix B.

2.2 Problem and Opportunity Identification

The Project was initiated by the Merced Streams Group following flood events that occurred in 1998 and 2006 that severely inundated the City of Merced and the nearby community of Franklin-Beachwood. During the 2006 flood event, 3,400 citizens in these communities were evacuated. Property damage that resulted included 300 residences with flood damages of $18,250,538 and estimated agricultural damages of $3 million. A lawsuit was filed against the partners of the Merced Streams Group for flood damages, which incurred settlement and attorney fees of approximately $21 million. The 2006 event also endangered the Franklin Water District water system and caused untreated sewer system overflows resulting in water quality and public health concerns in the Franklin-Beachwood area. The Franklin-Beachwood areas are designated disadvantaged communities (DACs).[3]

The NRCS Regional Conservation Partnership Program (RCPP) promotes coordination of NRCS conservation activities with local partners to include addressing watershed and regional natural resource concerns. Partnership teams work with NRCS under the authority of the Watershed Protection and Flood Prevention Act (PL 83-566). The Merced Streams Group applied to NRCS for an RCPP grant to assist with funding for the Project, determined through evaluation of alternatives during the Merced County Feasibility Study process. The RCPP award was granted for the implementation of the Project.

2.2.1 Background

In the last century, the City of Merced flooded in 1937, 1950, 1955, 1969, 1997, 1998, 2001, 2002, 2005, and 2006 (FEMA, 2010; Patchett, 2012). Many of these floods occurred during periods of El Niño, which often brings higher than average levels of precipitation to many parts of California, resulting in increased risk and severity of flood events (NOAA, 2014). The most damaging flood in Merced County in recent history occurred in 2006, when two levees on Black Rascal Creek failed near the confluence of Bear Creek and consequently flooded several housing developments and farmland (DWR, 2013). Black Rascal Creek flood water attenuation has been the subject of review and consideration for many decades. The original Merced County Stream Group project was authorized by the Flood Control Act of 1944 as part of a comprehensive plan for flood control for the Sacramento River and San Joaquin River basins. That project, which was completed in 1957, comprises four flood control reservoirs in Merced County on Burns, Bear, Owens, and Mariposa creeks in addition to downstream improvements (Merced County, 2010).

The possibility of flooding during storm events and the likelihood of increased frequency and severity of El Niño events due to changing climatic conditions (Cai et al., 2014) require that more effective flood control measures be implemented throughout the county.

[3] DACs are communities with an annual median household income less than 80 percent of the California Statewide median household income as developed by California Environmental Protection Agency's Office of Environmental Health Hazard Assessment.

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FIGURE 2.1-1
Regional Map
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

FIGURE 2.1-2
Project Vicinity
Black Rascal Creek Flood Control Project

2.2.2 Environmental Studies

The Project is the culmination of several environmental studies initiated by the Merced Streams Group, including an EIS (USACE, 1980), a Merced County Feasibility Study (2009), and an EIR (Merced County, 2017). These studies evaluated numerous alternatives to provide flood protection during 200-year flood events while reducing potential environmental impacts. The following sections discuss the studies that evaluated numerous alternatives to provide flood protection during 200-year flood events while reducing potential environmental impacts.

In compliance with NEPA, an Environmental Impact Statement (EIS) (USACE, 1980) was completed in 1980; however, USACE later determined that environmental concerns potentially posed significant challenges for construction of the dam. As a result, while three projects approved under the 1970 authorization and investigated in the EIS were constructed, Haystack Reservoir was not constructed. Changes in population over the past several decades, development downstream, and new environmental compliance issues prompted the Merced County Feasibility Study (2009). The study was initially led by USACE to evaluate options for increasing flood prevention to more than a 50-year recurrence event along Black Rascal Creek and Bear Creek. However, the study was never initiated, due to a lack of federal funding.

2.2.2.1 Merced County Feasibility Study (2009)

In 2008, Merced County initiated the Merced County Feasibility Study (2009) to investigate whether reducing 100-year flood flows in Black Rascal Creek would reduce flooding downstream. The Merced County Feasibility Study evaluated several alternative detention basins on Black Rascal Creek and an alternative that would modify the operations of Lake Yosemite and existing irrigation infrastructure to reduce 100-year flood flows in Black Rascal Creek. Three alternative detention basin projects at four potential sites were analyzed. Alternative 4 in the Merced County Feasibility Study consisted of a single large detention basin at approximately the same location as the proposed Project footprint. It was determined that the remaining alternatives did not meet the Project objectives (Section 2.1), and were not environmentally superior to the Project. The Merced County Feasibility Study determined that reducing peak flows to approximately 3,000 cfs could be achieved through a 1,630-acre-foot detention basin at the Project site (Figure 2.1-2) with the least environmental impact when compared to other sites analyzed in the study. These alternatives are discussed in Section 5.

The Merced County Feasibility Study was modified in 2009 to include that the capacity of the proposed detention basin would contain up to the 200-year flood event to meet requirements of the Central Valley Flood Protection Act of 2008. Although flood protection was a primary objective, minimizing impacts on biologically sensitive areas was also a major consideration in the modified Merced County Feasibility Study, because of the designation of approximately 148,000 acres in Merced County (approximately 12 percent of Merced County's total area) as critical habitat (predominantly vernal pools) by USFWS in 2005.

The Merced County Feasibility Study evaluated four alternatives that included different configurations of four separate detention basins, some of which were proposed to be used in combination.

Since 2009, the Project's feasibility has been reevaluated and is still feasible. There are no insurmountable obstacles to implementing the Project, and the Project is economically viable.

2.2.2.2 Environmental Impact Report (2017)

Merced County subsequently conducted a CEQA review of the Project (Alternative 4 in the Merced County Feasibility Study [2009]) in 2017. An EIR (Merced County, 2017) was prepared under CEQA that concluded that the Project would result in impacts that would be less-than-significant with mitigation. Mitigation is proposed to be implemented to reduce impacts to biological resources, cultural resources, soils, and hydrology. These mitigation measures are incorporated, as ECs, as part of the Project in this Plan EA. The EIR also concluded that the Project would result in beneficial impacts to soils, water quality, and groundwater recharge. Public comment was solicited on the EIR from August 3, 2017, to September 18, 2017, as part of the CEQA process for the Project. Public hearings were held during two regularly scheduled Board of Supervisors meetings on December 13, 2017, and January 9, 2018.

3. Scope of the EA

The relevant items of concern evaluated in this Plan EA were determined by the technical specialists involved in the development of this document, and by concerns previously identified as part of the preparation of the EIR (Merced County, 2017). The concerns identified are summarized in Table 3.1-1. Table 3.1-1 also identifies the issues that were eliminated from detailed study that are not relevant to the alternatives evaluated and the rationale for their elimination. Issues eliminated from detailed study include those that were previously evaluated in the EIR and determined irrelevant due to lack of presence or potential impact.

Table 3.1-1. Resource Concerns for Scoping

Black Rascal Creek Watershed, CA

Resource	Item/Concern	Relevant to the Preferred Alternative?	Rationale
Soils and Geology	Upland Erosion/Sedimentation	Yes	Localized soil erosion, sedimentation, and inadvertent permanent soil loss in study area.
	Stream Bank Erosion/Destabilization	Yes	Project would minimize downstream flooding and erosion caused by excess flow.
	Seismic Risks	Yes	Because of the distance between the Project footprint and active and significant faults, the seismic hazards are minor.
	Prime and Unique Farmland	Yes	Permanent removal of Prime Farmland, and Grazing Land.
Water	Surface Water Quality	Yes	Construction would result in soil disturbance; therefore, leaks or spills of hazardous materials could occur. No underground utilities are known to exist except culverts through the State Plan of Flood Control levees and at Yosemite Avenue (Applegate Lateral), and irrigation piping in the orchards.
	Surface Water Quantity	No	Project would not provide surface water storage for the county.
	Groundwater Quantity and/or Quality	Yes	Project would result in an a beneficial, though unquantified, contribution to groundwater recharge.
	Clean Water Act (CWA)	Yes	The Project will require a USACE 404 permit.
	Regional Water Management Plans	Yes	Black Rascal Creek is included in the Merced Integrated Regional Water Management Plan (IRWMP) (RMC, 2013).
	Coastal Zone Management Areas	No	None present.
	Floodplain Management	Yes	Structures are located within floodplain (to include residential, commercial, industrial, and public structures); Project affects the regulatory floodplain.
	Wetlands	Yes	Wetlands are present in the Project footprint (the area of the proposed works of improvement).
	Wild and Scenic Rivers	No	None present.
Air Quality and Greenhouse Gases (GHGs)	Air Quality	Yes	Construction would cause short-term air pollutant emissions.

Resource	Item/Concern	Relevant to the Preferred Alternative?	Rationale
	Clean Air Act	Yes	Construction would cause short-term air pollutant emissions. The Project would be subject to review under General Conformity.
	GHGs	Yes	The action would have short-term GHG emissions that could be offset by the Project's long-term benefits.
Animals	Fish and Wildlife Habitat	Yes	The Project would create habitat for wildlife. The Project would result in both temporary and permanent impacts to wildlife during construction and operation. Black Rascal Creek does not support salmonids due to its inaccessibility. The Project is not expected to affect habitat quality for any fish species or habitats downstream from the Project.
	Wetlands	Yes	Wetlands are present in the Project footprint.
	Coral Reefs	No	There are no coral reefs present in California coastal waters.
	Endangered and Threatened Species	Yes	Potentially suitable habitat and potential for occurrence of special-status animals in the proposed action area. No federally listed fish species are known to occur in the proposed action area.
	Invasive Species	Yes	Invasive animal species present in the Project vicinity. No potential for introduction of new invasive species.
	Migratory Birds	Yes	Potential for migratory birds near the Project footprint.
	Essential Fish Habitat (EFH)	No	Black Rascal Creek to be affected by the Project is considered EFH; however, Project footprint does not contain suitable habitat.
Plants	Endangered and Threatened Species	Yes	Potential for special-status plants in the action area.
	Invasive Species	No	Non-native annual grassland existing in action area. No potential for introduction of new invasive species.
	Natural Areas	Yes	No designated natural areas within the Project footprint. East Merced Vernal Pool Grassland Preserve is located directly north of the Project.
	Riparian Areas	Yes	Cottonwood/willow riparian woodland occurs adjacent to the Project.
Human Environment	Public Health and Safety/Flood Damages	Yes	Activities associated with public health and safety regarding flood control and flood damage. Project to benefit public health and safety. Potential for temporary construction impacts regarding emergency access.
	Cost, Sponsor	Yes	Proposal must be within the economic capacity of the sponsor.
	Cost, national economic development (NED)	Yes	Required criteria by the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (WRC, 1983).

Resource	Item/Concern	Relevant to the Preferred Alternative?	Rationale
	Cultural Resources	Yes	Potential for discovery of archaeological resources during construction. Historical resources present in the Project area are being evaluated for National Register of Historic Places status.
	Socioeconomics and Environmental Justice	Yes	Project to benefit subject populations.
	Local and Regional Economy	Yes	Flooding effects on local and regional economy.
	Potable Water Supply	No	Not identified as a resource concern.
	Recreation	No	No opportunity for public recreation.
	Scenic Beauty and Parklands	No	No parklands would be affected. The Project does not occur in or within view of any state- or county-designated scenic vista point, scenic corridor, or public viewpoint.

4. Affected Environment

The Project would be located in Merced County (Figure 2.1-1), which is situated in the northern San Joaquin Valley, west of the Sierra Nevada Mountains. This section summarizes the anticipated affected environment by resource/issue area that would be impacted (both beneficially and potentially adversely) by the Project.

4.1 Soils and Geology

This section describes the affected environment for soils and geology, upland erosion, sedimentation and stream bank erosion and destabilization, seismic risk, and prime and unique farmland in the Project vicinity.

The Project would be located in the Merced Subbasin, within the San Joaquin Valley portion of the Great Valley Geomorphic Province. The Great Valley is a northwest-trending valley bordered by the Sierra Nevada Mountains to the east and south, the Coast Ranges to the west, and the Klamath Mountains to the north. The province consists of a deep sediment-filled, asymmetric structural trough that extends more than 400 miles from north to south and averages 50 to 80 miles wide. The trough has been filled with a thick sequence of predominantly alluvial sediments ranging in age from Jurassic to Recent (Bailey, 1966).

Geologic units in the Merced Subbasin include indurated rocks and unconsolidated continental deposits. The indurated rocks include the Ione, Valley Springs, and Mehrten Formations. The unconsolidated continental deposits have been accumulating since the Pliocene Epoch, including lacustrine, marsh, alluvial fan, older alluvium, younger alluvium, flood basin, terrace, and floodplain deposits.

In the Project vicinity, the predominant geologic formations consist of upper and lower Modesto Formation and Holocene alluvium. The Modesto Formation includes unconsolidated Pleistocene deposits of coarse alluvium in upper alluvial fans and terraces, stream channel deposits of the San Joaquin River, and inland basins. The Holocene alluvium includes alluvial sand, silt, and gravel associated with floodplains and low terraces. The mapped geologic formation boundaries in the Project footprint and surrounding vicinity are shown on Figure 4.1-1. These formations consist of gravel, sand, silt, and clay derived from heterogeneous, metamorphic, sedimentary, and volcanic rocks (Marchand and Allwardt, 1978).

Soil formations in the Project vicinity include alluvial fans, fan remnants, floodplains, and terraces. The alluvial materials are derived from a mix of igneous, metamorphic, and sedimentary rocks from the Sierra Nevada Mountains. Soils in the Project vicinity have been mapped by the NRCS, and are described in the soil survey of Merced Area (NRCS, 2016). Seven soil series are mapped within the Project footprint, as summarized in Table 4.1-1; select characteristics are listed, including erosion potential, gradation, plasticity, and suitability for embankment construction. Soils in the Project footprint and vicinity are shown on Figure 4.1-2.

Table 4.1-1. Soil Series within the Project Footprint
Black Rascal Creek Watershed, CA

Soil Series	Soil Type	Percentage of Project Footprint	Dike or Embankment Suitability	Erodibility, K Factor[a]	Liquid Limit	Plastic Limit	Percent Sand
Bear Creek	Loam, clay loam	16	Very limited	0.30	35	15	35
Corning	Gravelly loam	1	Somewhat limited	0.37	34	14	36
Honcut	Silty clay loam	15	Somewhat limited	0.32	35	15	18
Marguerit	Silty clay loam	5	Somewhat limited	0.43	31	11	47
Ryer	Clay loam	11	Somewhat limited	0.32	43	22	30
Wyman	Loam, clay loam	42	Somewhat limited	0.37	33	13	31
Yokohl	loam	10	Very limited	0.43	37	14	37

[a] 0.4 = high; 0.15 = low

4.1.1 Upland Erosion/Sedimentation and Stream Bank Erosion/Destabilization

The erodibility of most of the soil at and around the Project footprint is medium-high because of the low-cohesive nature of the coarse alluvium. The medium-high erodibility refers to the susceptibility of bare, cultivated soil to particle detachment and transport by rainfall or water flow (Merced County, 2017). The erodibility of the soil is highest along streambanks, where lateral erosion due to channel migration is evident. This is primarily evident in the area upstream from the Project footprint where channel gradient is steeper. Soils along the embankments have a lower risk of erodibility primarily because they would be constructed of engineered fill and subject to less fluvial activity than the streambanks and floodplains immediately adjacent to Black Rascal Creek (Merced County, 2017). Erosion and sedimentation as a result of changed land use conditions within the drainage area in the vicinity of the Project is unknown.

4.1.2 Seismic Risk

The nearest active and significant faults to Merced County are the San Andreas Fault, located approximately 72 miles southwest of the Project footprint, and the Bear Mountain Fault Zone, 5 miles east of and parallel to the Merced County's eastern border (Merced County, 2013). Because of the large distance between the Project footprint and these faults, seismic hazards are low. The Ortigalita Fault is located along the western quarter of the county, within the Coast Range Mountains approximately 48 miles southwest of the Project footprint. It is the only active fault identified in the county by the Alquist-Priolo Earthquake Fault Zoning Act. Surface rupture has been documented within the Holocene period (11,000 years before present) (Merced County, 2013).

4.1.3 Prime and Unique Farmland

The California Department of Conservation (DOC) Office of Land Conservation, maintains a statewide inventory of farmlands. These lands are mapped by the DOC Division of Land Resource Protection as part of the Farmland Mapping and Monitoring Program (FMMP). In 2014, more than 90 percent of the approximately 1.27 million acres inventoried in Merced County under the FMMP were designated for agricultural purposes (DOC, 2016). Approximately half of the agricultural lands are designated as Important Farmland, most of which is designated as Prime Farmland**.** Urban lands, such as incorporated cities, account for approximately 3 percent of the lands in the county. Between 2012 and 2014, Merced County experienced a net conversion of 749 acres of agricultural land to urban and built-up and other land; however, most of the land use conversions in the county were from one agricultural designation to another. Important farmlands in the Project footprint and vicinity are shown on Figure 4.1-3.

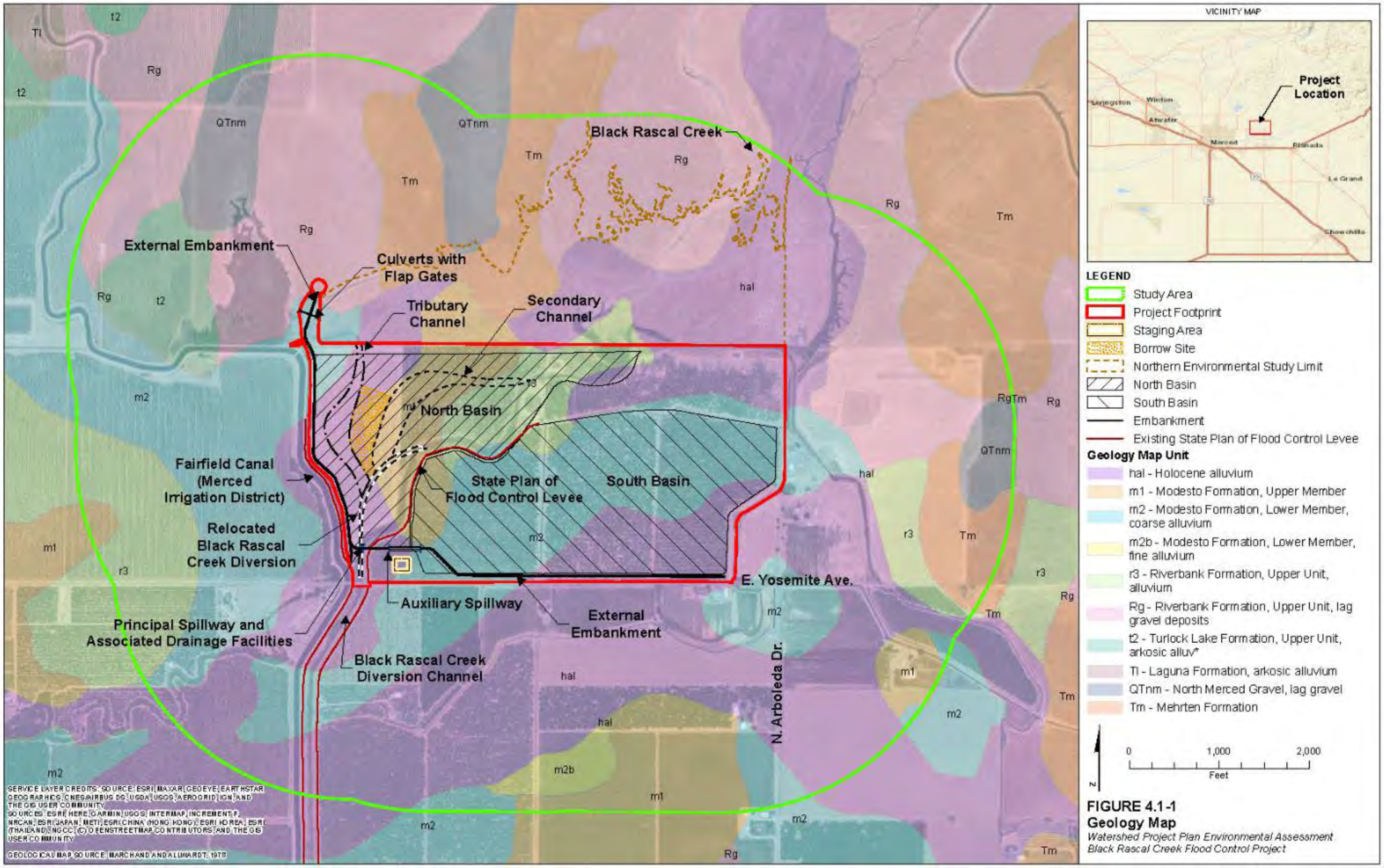


FIGURE 4.1-1
Geology Map
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

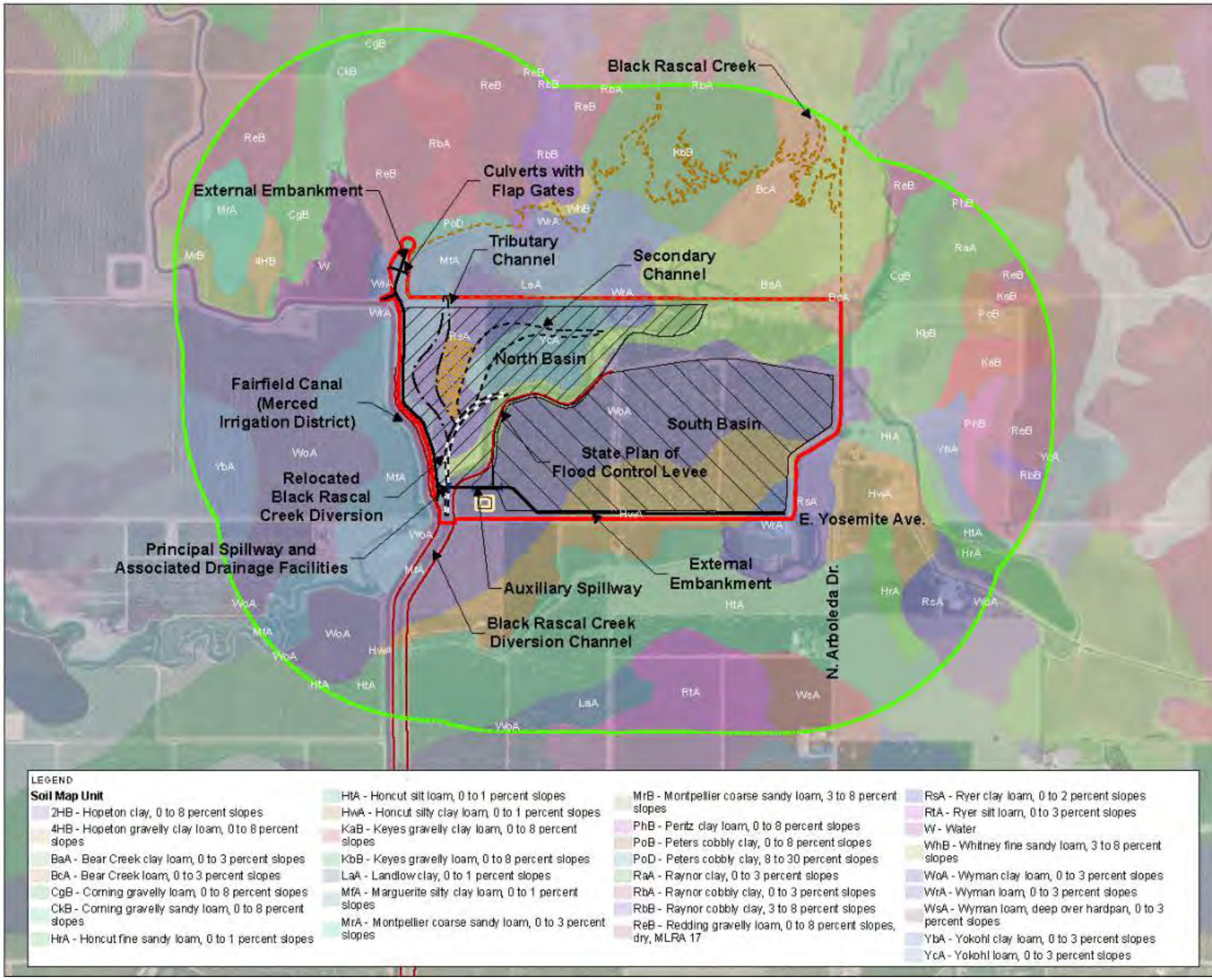


FIGURE 4.1-2
Soil Map
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

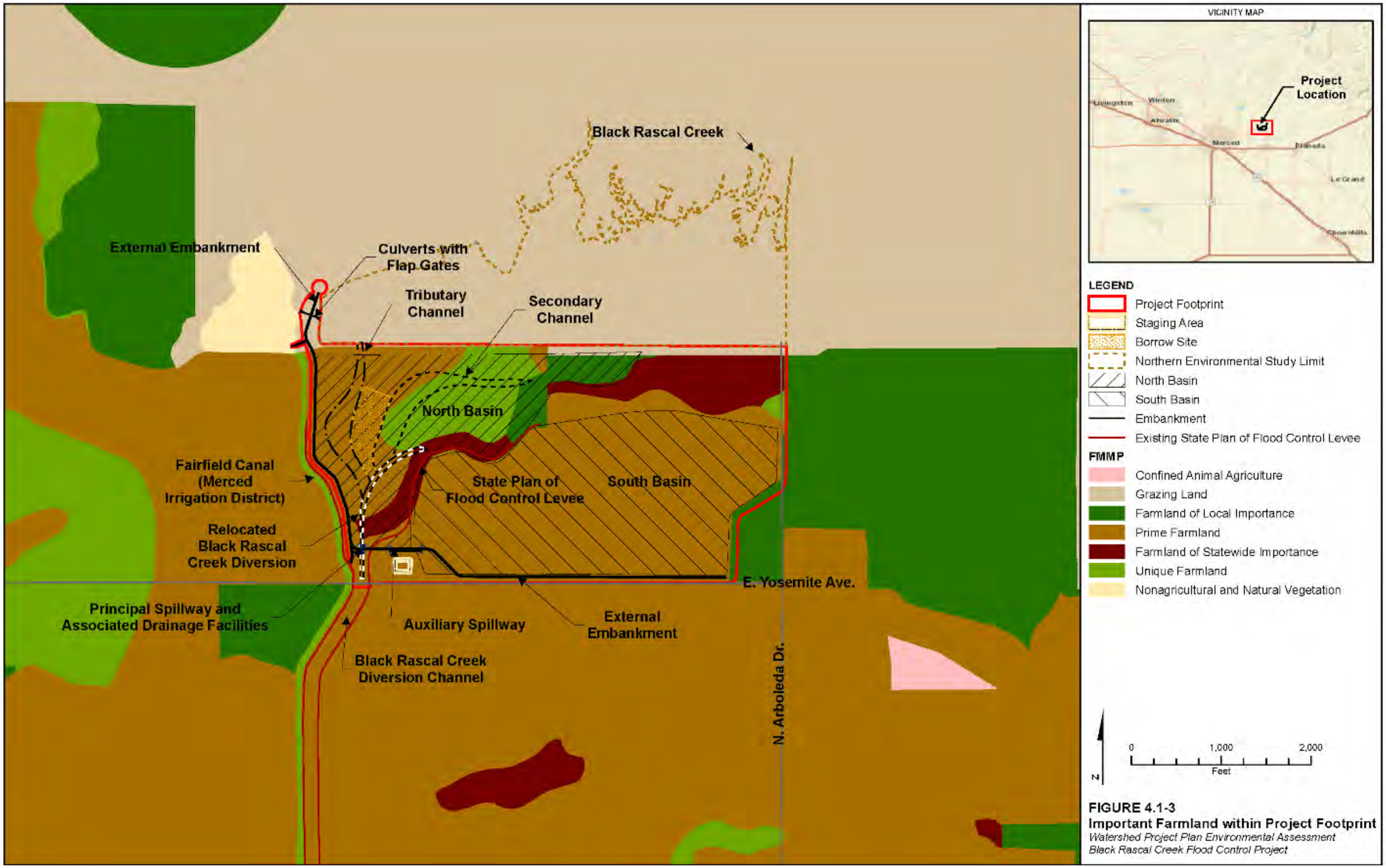


FIGURE 4.1-3
Important Farmland within Project Footprint
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

The Project would be situated on lands designated as agricultural, which provides for "cultivated agricultural practices that rely on good soil quality, adequate water availability, and minimal slopes." *2030 Merced County General Plan* (Merced County, 2013) land use designations adjacent to the Project footprint include Urban Community[4] to the west and Foothill Pasture[5] to the northeast.

4.2 Water

This section describes the affected environment for surface and ground water quality and supply, and floodplain management in the Project vicinity.

4.2.1 Surface Water Quality

The quality of surface water in Merced County varies spatially and is dependent upon factors such as climate, geology, and land use (RMC, 2013). Surface water quality generally decreases from east to west due to diversions (and other factors that decrease streamflow) and return flow from agricultural areas. Waterways in Merced County that are listed by the Central Valley Water Board as being impacted by elevated concentration of pesticides, *escherichia coli*, metals, temperature, electrical conductivity, or toxicity include Deadman Creek, Duck Slough, Miles Creek, the Merced River (McSwain Reservoir to the San Joaquin River), and the San Joaquin River (Mud Slough to Merced River).

4.2.2 Surface Water Quantity

Black Rascal Creek is hydrologically connected to Bear Creek at two locations. The reach upstream of East Yosemite Avenue is diverted directly into Bear Creek through the diversion channel that runs parallel to the Fairfield Canal from East Yosemite Avenue to the confluence of Bear Creek. The reach downstream of the diversion channel flows through the City of Merced and joins Bear Creek south of Highway 99. The headwaters of Bear Creek are impounded by Bear Reservoir 12 miles east of the Project footprint, and the creek is again impounded at the Crocker Dam, 9 miles west of the Project footprint. The creek runs east to west, discharging to the San Joaquin River approximately 20 miles west of the City of Merced (approximately 3.5 miles southeast of the community of Stevinson).

Table 4.2-1 provides stream flow data for several relatively smaller tributaries to the San Joaquin River in Merced County, including Bear Creek, Burns Creek, Owens Creek, and Black Rascal Creek. Like the Merced and Chowchilla Rivers, these streams have headwaters in the Sierra Nevada Mountains to the east, and their flow is managed by dams.

[4] Urban Community: Includes areas in unincorporated Merced County that have a range of housing densities, commercial uses, public sewer, water infrastructure, public services, or employment-generating land uses.

[5] Foothill Pasture: Provides for non-cultivated agricultural practices that typically require larger areas of land because of poor soil quality, limited water availability, and steeper slopes. This designation is typically applied to areas in the Sierra Nevada foothills and the Diablo Range on the eastern and western sides of the county.

Table 4.2-1. Summary of Measured Streamflow Data
Black Rascal Creek Watershed, CA

Stream	Gage Number/ Location	Data Site	Period of Record	Daily Minimum Flow (cfs)	Daily Maximum Flow (cfs)
San Joaquin River	11274000 Newman, California	NWIS	1912–2017	11	36,000
Merced River	11272500 Stevinson, California	NWIS	1940–2010	0	12,000
Bear Creek	B05525 Merced, California	WDL	1968–1991	0	5,450
Burns Creek	B56100 Planada, California	WDL	1980–1991	0	1,530
Owens Creek	B06151 Merced, California	WDL	1980–1991	0	540
Black Rascal Creek	Le Grand Canal	MID	2001–2016	0	645
Black Rascal Creek	E. Yosemite Ave Diversion	USACE	1956–2017	0	2,702

Sources: USGS (2017), DWR (2015a, 2015b, 2015c), USACE (2017), and Merced County (2017)

Notes:

NWIS = National Weather Information System (operated by USGS)

USGS = U.S. Geological Survey

WDL= Water Data Library (operated by DWR)

4.2.3 Groundwater Quantity and Quality

The Project overlies the Merced Subbasin of the San Joaquin Valley Groundwater Basin (Figure 4.2-1). Water-bearing units in the Merced Subbasin include, from oldest to youngest, bedrock units of the Mehrten, Valley Springs, and Ione Formations, continental deposits, lacustrine and marsh deposits, alluvium, and flood basin deposits (DWR, 2004). Three groundwater aquifers are identified in the Merced Subbasin: an unconfined aquifer, a confined aquifer, and an aquifer in consolidated rocks. The unconfined system occurs in the western half of the subbasin at depths ranging from about 50 to 200 feet (DWR, 1981) and extends from the water table to the base of fresh groundwater. The Corcoran Clay underlies the unconfined aquifer and provides a confining layer that consists mainly of lacustrine and marsh deposits that exhibit very low permeability. The base of fresh groundwater in the Merced Subbasin is approximately 1,200 feet below ground surface (MAGPI, 2008). The confined aquifer occurs in the unconsolidated deposits below the Corcoran Clay and extends down to the base of fresh water. The consolidated rock aquifer occurs in the eastern portion of the Merced Subbasin.

As shown on Figure 4.2-1, the Project is in the east/northeastern portion of the Merced Subbasin east of the mapped extent of the Corcoran Clay. As discussed in Section 4.1, geologic units underlying the Project include the upper and lower Modesto Formation, and Holocene alluvium. The mapped geologic formation boundaries in the Project footprint and surrounding vicinity are shown on Figure 4.1-1.

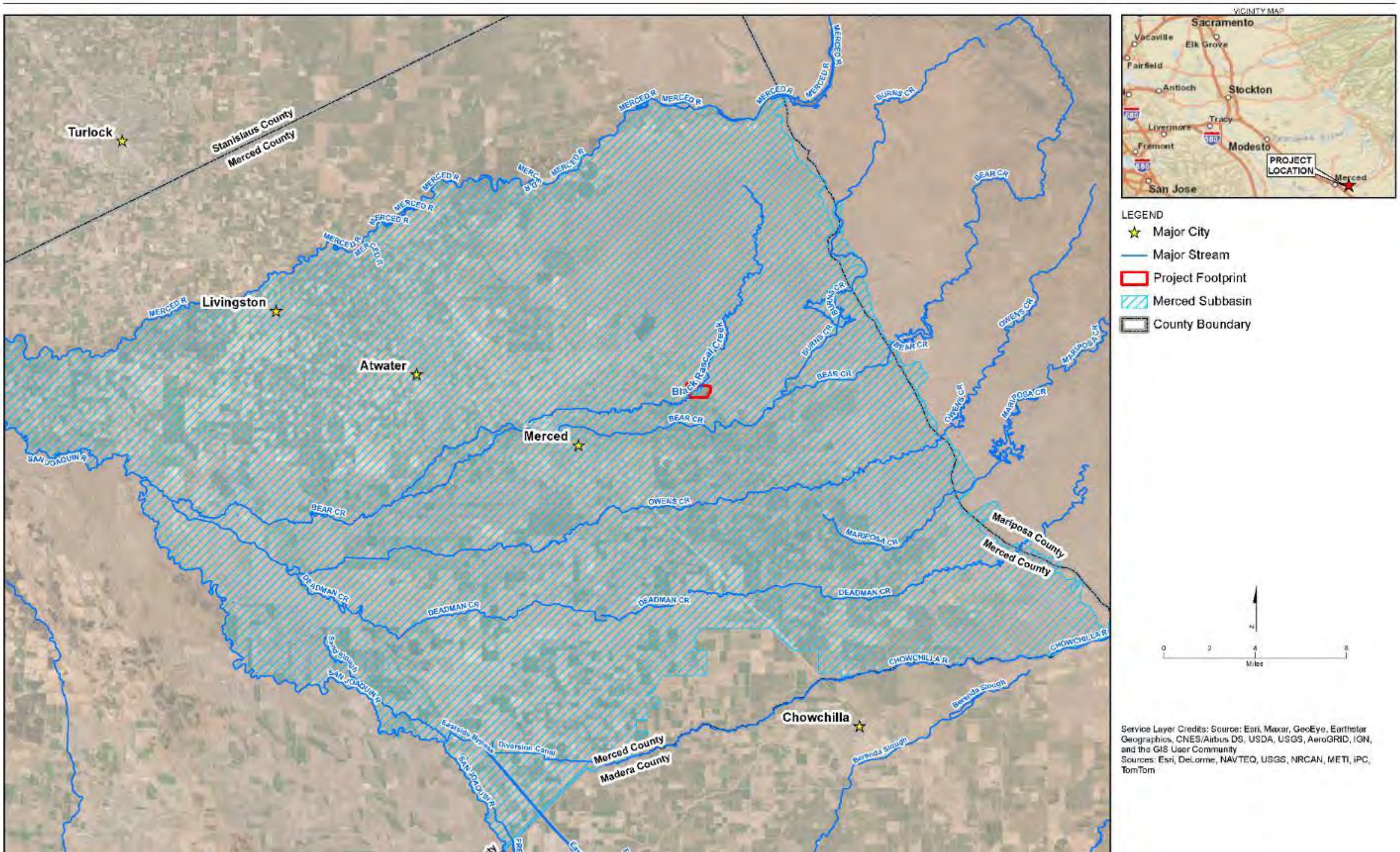


FIGURE 4.2-1
Merced Subbasin Location Map
Black Rascal Creek Flood Control Project

Groundwater flow directions in the Merced Subbasin are highly variable. Figure 4.2-2 presents groundwater elevation contours interpreted from data collected during the fall of 2015. These data show that in general, groundwater flows from the recharge areas in the east towards the primary discharge area, the San Joaquin River, in the west. Groundwater flow directions are influenced by local groundwater production (the “bullseye” pattern in the groundwater elevations on Figure 4.2-2). Figure 4.2-3 presents a comparison of spring 2004 to spring 2014 groundwater elevations. These data show that groundwater elevations have declined up to 60 feet in the Merced Subbasin and more than 120 feet in the Chowchilla Subbasin that occurs south of the Merced Subbasin.

Generally, groundwater quality in the Merced Subbasin is adequate for beneficial uses (most urban and agricultural uses) with only local impairments. For example, relatively higher levels of salinity (measured as total dissolved solids [TDS]) exist generally at depths between 400 and 800 feet below ground surface. TDS concentrations tend to increase from east to west and toward the south (Chowchilla River). The eastern two-thirds of the subbasin have TDS concentrations of fewer than 500 milligrams per liter (mg/L) (RMC, 2013). Historical TDS concentrations range from 100 to 3,600 mg/L, with a typical range of 200 to 400 mg/L (DWR, 2004). Deep marine deposits are thought to be the source of elevated salinity in these zones (MAGPI, 2008). This saltier water tends to migrate upwards into the shallower zone due to natural pressure gradients, but might also be exacerbated by groundwater pumping. In addition, some groundwater wells screen multiple aquifers causing hydraulic connectivity between the shallow and deep zones, which results in mixing of groundwater from different aquifers.

The shallow, unconfined aquifer is the most vulnerable to groundwater contamination by constituents introduced at the surface (such as fertilizers and pesticides). Nitrate, which is found naturally in some sedimentary rocks, is mostly introduced through human-made sources and occurs in high concentrations in many areas of the San Joaquin Valley. Sources of nitrate are agricultural fertilizers, sewer effluent, septic tank effluent, and animal wastes. Nitrate is of concern for drinking water supplies, but less so for agricultural supplies (Merced County, 2017).

4.2.4 Floodplain Management

The San Joaquin River flows through the western side of Merced County and is the largest river in the county. Several reservoirs including San Luis Reservoir, O’Neil Forebay, Castle Reservoir, and Lake Yosemite as well as an extensive network of creeks, streams, and canals contribute to the storage and conveyance of water throughout the county. Tributaries to the San Joaquin River include the Merced River, Bear Creek, Canal Creek, Fahrens Creek, and Black Rascal Creek, among others. These waterways are well-entrenched with relatively large channel capacities in the eastern foothills. However, their capacities rapidly diminish as these waterways approach the San Joaquin River. Because of the flat topography of the San Joaquin Valley, overflow generally spreads laterally covering large areas and converging with the overflow of adjacent streams during periods of high flow. Much of this overflow collects behind canal, highway, and railroad embankments. Floodwaters then typically slowly dissipate through evaporation and groundwater recharge (FEMA, 2010). Currently, dams and reservoirs regulate almost all major rivers and streams flowing within the county; however, some flow regulators are insufficient, resulting in areas that are prone to inundation. Black Rascal Creek is one of the few major streams near the City of Merced that is largely uncontrolled.

A map showing regional flood zones is included in Appendix C1. The following Federal Emergency Management Agency (FEMA) flood zones are located within the proposed Project benefited area that is the levee flood protection zone:

- FEMA Zone A – An approximate area of 1 percent annual chance flooding that has no base flood elevations determined and was not determined by detailed analyses.
- FEMA Zone AE – 1 percent annual chance of flood (100-year flood). Base flood elevations determined.
- FEMA Zone AE – 1 percent annual chance of flood (100-year flood). Flood depths of 1 to 3 feet (usually areas of ponding).
- FEMA Zone AO – 1 percent annual chance of flood (100-year flood). Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- FEMA Zone X – Areas of 0.2 percent annual chance flood (500-year flood) areas of 1 percent chance of flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1 percent chance annual chance flood.

Merced County is the lead agency for providing storm drain infrastructure in unincorporated areas of the county. Merced County enforces stormwater management and floodplain management controls to manage flow rates to existing drainage channels (Merced County, 2013a).

The headwaters of Black Rascal Creek are in the foothills of the Sierra Nevada approximately 11 miles north-northeast of the Project location. Historically, Black Rascal Creek flowed from the headwaters to the west-southwest, through the City of Merced, discharging to Bear Creek approximately 7 miles west-southwest of the City of Merced (Figure 4.2-1). Currently, flow from Black Rascal Creek is diverted to Bear Creek at the diversion channel at East Yosemite Avenue (which parallels the Fairfield Canal in this area). The approximately 10,000-foot long diversion channel, which includes levees on both sides of the channel, was constructed as part of the projects approved under Section 201 of the Flood Control Act of 1970 (Section 2.2) and is a designated State Plan of Flood Control facility. The diversion channel was constructed to limit the flow in the historical Black Rascal Creek channel to local inflow and control and manage flood flows upstream from the diversion channel. When flow in Black Rascal Creek exceeds approximately 3,000 cfs, stream flow overtops the diversion and follows the historic channel through the City of Merced. The historical channel has degraded flow capacity because it is a local drainage feature that has been encroached upon by development of a bike route that is maintained by the City of Merced; thereby reducing the flow capacity of the channel.

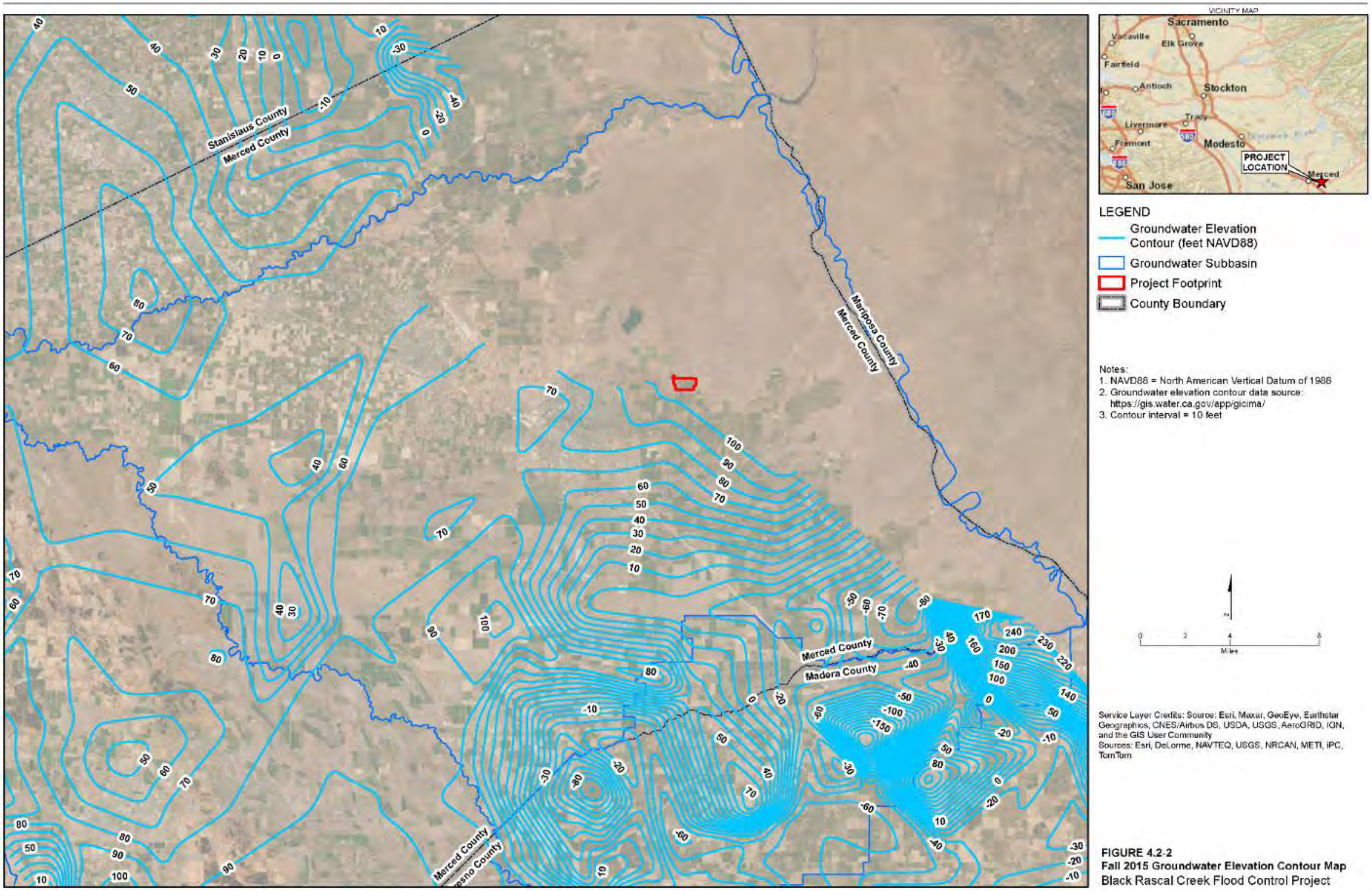


FIGURE 4.2-2
Fall 2015 Groundwater Elevation Contour Map
Black Rascal Creek Flood Control Project

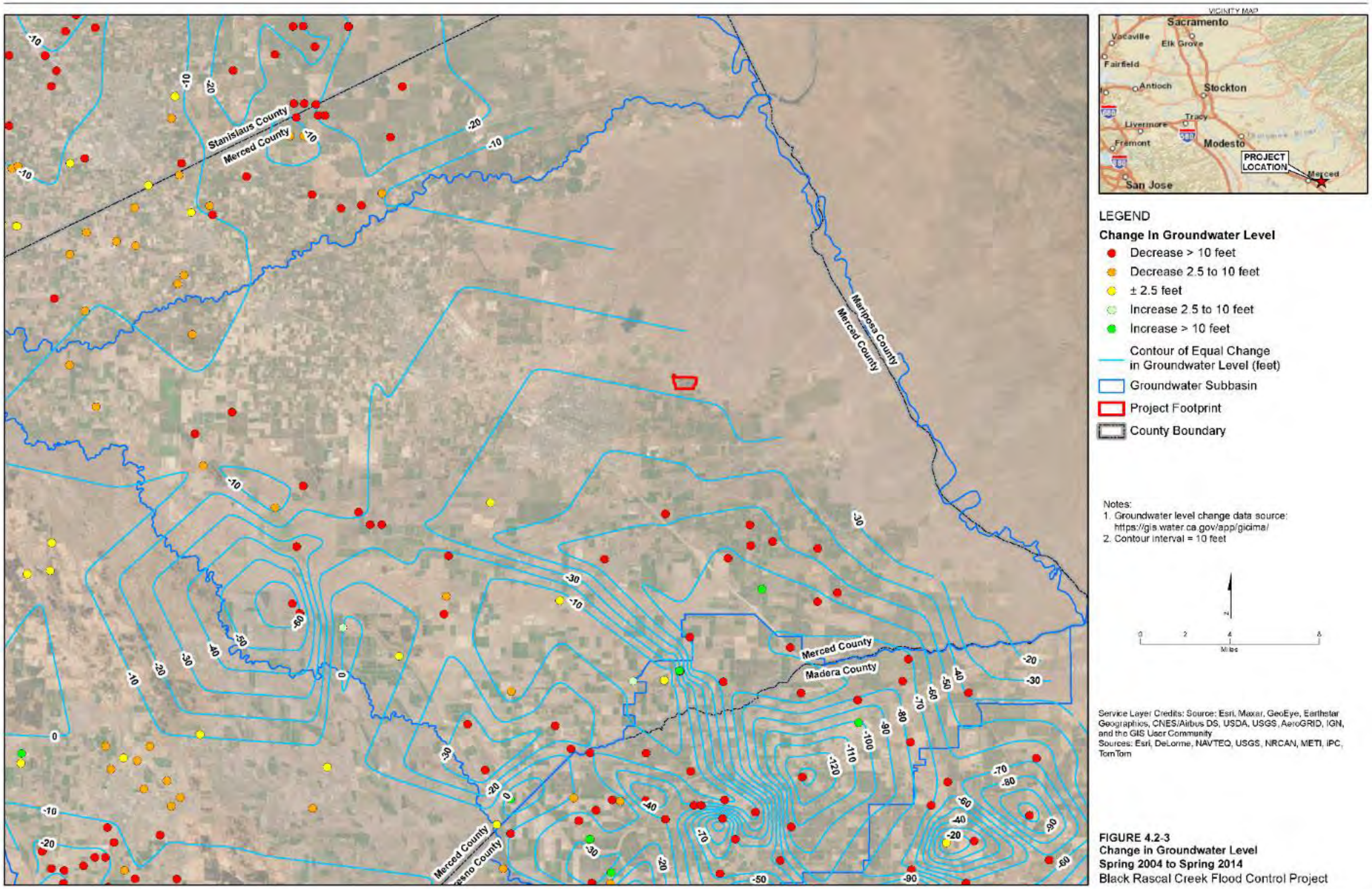


FIGURE 4.2-3
Change in Groundwater Level
Spring 2004 to Spring 2014
Black Rascal Creek Flood Control Project

4.3 Air Quality and Greenhouse Gases

4.3.1 Air Quality

The Project would be in the San Joaquin Valley Air Basin (SJVAB), bordered by the Sierra Nevada Mountains to the east, the Coast Ranges to the west, and the Tehachapi Mountains to the south.

The California Air Resources Board (CARB) maintains ambient air monitoring stations for criteria pollutants throughout California. The closest air monitoring station to the Project footprint is located approximately 4 miles to the southwest, at 385 South Coffee Street. The station monitors ambient concentrations of nitrogen dioxide (NO_2), ozone (O_3), and particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$). Data for particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}) were obtained from the Merced M Street Station, which is located approximately 5 miles southwest of the Project footprint. There are no carbon monoxide (CO) monitoring stations in Merced County. Table 4.3-1 summarizes the latest 3 years of available data from the two stations. As shown, multiple exceedances of the National and California Ambient Air Quality Standards (NAAQS and CAAQS, respectively), primarily for O_3 and particulate matter, have been recorded from 2017 to 2019 (CARB, 2021a).

Table 4.3-1. Ambient Criteria Pollutants Concentration Data at Air Quality Monitoring Stations Closest to the Project

Black Rascal Creek Watershed, CA

Pollutant	Parameter	2017	2018	2019
O_3	Maximum 1-hour concentration (ppm)	0.093	0.104	0.087
	Maximum 8-hour concentration (ppm)	0.084	0.083	0.076
	Days > NAAQS 8-hour standard of > 0.070 ppm	16	21	6
	Days > CAAQS 1-hour standard of > 0.09 ppm	0	4	0
NO_2	Maximum 1-hour concentration (ppm)	0.0389	0.0458	0.0387
	Annual average (ppm)	0.007	0.007	0.006
	Days > NAAQS 1-hour standard of > 0.100 ppm	0	0	0
	Days > CAAQS 1-hour standard of > 0.180 ppm	0	0	0
PM_{10} (respirable particulate matter)	Maximum 24-hour concentration (μg/m^3)	146.6	137	96.1
	Annual average (μg/m^3)	35.8	34.6	29.8
	Days > NAAQS 24-hour standard of > 150 μg/m^3	0	0	0
	Days > CAAQS 24-hour standard of > 50 μg/m^3	12	10	9
$PM_{2.5}$ (fine particulate matter)	Maximum 24-hour concentration (μg/m^3)	69.3	88.2	35.5
	Annual average (μg/m^3)	13.2	15.1	9.1
	Days > NAAQS 24-hour standard of >35 μg/m^3	18	21	1

Sources: CARB (2021)

Notes:

μg/m^3 = micrograms per cubic meter

ppm = part(s) per million

Attainment status for the Project footprint is summarized in Table 4.3-2. Under NAAQS, the area is currently designated as nonattainment for the O_3 and $PM_{2.5}$ standards. Merced County is a maintenance area for the federal PM_{10} standard. The area is in attainment for the federal NO_2 and SO_2 standards and is unclassified for lead. Under the CAAQS, the Project footprint is currently designated as nonattainment for O_3, PM_{10} and $PM_{2.5}$, and as attainment or unclassified for other pollutants. Because the Project is in an area that is designated as nonattainment under NAAQS, it is subject to general conformity requirements.

Table 4.3-2. Attainment Status for the Project Footprint
Black Rascal Creek Watershed, CA

Pollutant	NAAQS	CAAQS
O_3	Nonattainment/Extreme	Nonattainment
PM_{10}	Maintenance	Nonattainment
$PM_{2.5}$	Nonattainment/serious for 1997 and 2006 standards, moderate for 2012 standards	Nonattainment
Carbon Monoxide (CO)	Attainment/Unclassified	Unclassified
NO_2	Attainment/Unclassified	Attainment
SO_2	Attainment/Unclassified	Attainment
Lead (particulate)	Attainment/Unclassified	Attainment
Hydrogen Sulfide	No Standard	Unclassified
Sulfates	No Standard	Attainment
Visibility-reducing Particles	No Standard	Unclassified
Vinyl Chloride	No Standard	Unclassified

Sources: CARB (2021b) and U.S. Environmental Protection Agency (EPA) (2021)

4.3.2 Greenhouse Gases

GHGs include both naturally occurring and anthropogenic gases, such as carbon dioxide (CO_2), methane, nitrous oxide, hydro-chlorofluorocarbons, perfluorocarbons, and sulfur hexafluoride. GHGs absorb infrared radiation, trap the energy from the sun, and help maintain the temperature of Earth's surface, creating a process known as the "greenhouse effect." The accumulation of GHGs in the atmosphere influences the long-term range of average atmospheric temperatures. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce economic, physical, and social consequences across the globe.

In the United States, the main source of GHG emissions is electricity generation, followed by transportation. In California, however, transportation sources (passenger cars, light-duty trucks, other trucks, buses, and motorcycles) make up the largest category of GHG-emitting sources (CARB, 2020). In 2018, the annual California statewide GHG emissions were 425 million metric tons of CO_2-equivalent (CO_2e) (CARB, 2020). The transportation sector accounts for about 40 percent of the statewide GHG emissions inventory. Industrial and the electric power sectors account for 21 and 15 percent, respectively, of the total statewide GHG emissions inventory (CARB, 2020). The dominant GHG emitted is CO_2, primarily from fossil fuel combustion.

In Merced County, GHG emissions in 2010 were 3.651 million metric tons of CO_2e from the county's unincorporated areas, and 6.036 million metric tons of CO_2e emitted within all of Merced County. The greatest contributor to Merced County's unincorporated and total GHG emissions was agricultural activities. Transportation emissions were the second greatest contributor for both unincorporated area and total GHG emissions in Merced County (Merced County, 2012).

4.4 Animals

This section describes the affected environment for animal species in the study area. The study area is the Project footprint and the non-native annual grassland within the northern environmental study limit.

4.4.1 Fish and Wildlife Habitat

The proposed detention basin consists primarily of farmland and aquatic habitats (freshwater marsh, pond) within the northern portion of the Project footprint adjacent to Black Rascal Creek. Agricultural land uses within the proposed detention basin consist mostly of an almond orchard.

Cottonwood/willow riparian woodland occurs along the western levee of the Fairfield Canal (on the west border of the detention basin), which consists of a narrow, linear stand of mature trees. The dominant trees in the riparian woodland are Fremont's cottonwood (*Populus fremontii*) and willow (*Salix* spp.).

The area north of the proposed detention basin supports non-native annual grasses (e.g., annual bromes [*Bromus* spp.], barleys [*Hordeum* spp.], and fescues [*Festuca* spp.]) various annual herbs, and a vernal pool complex including pools, swales, and playa pool habitats. Most of the grassland vegetation consists of non-native annual grassland. Vernal pools and swales are continuously or intermittently inundated during winter and gradually dry during the spring.

Just north of the Project footprint, the East Merced Vernal Pool Grassland Preserve, Expansion 6, is a permanent conservation easement held by the California Rangeland Trust located in Merced County. This is considered a natural area where conditions are maintained with a minimum of human intervention. The easement is 3,207 acres and includes the land directly north of the proposed detention basin (National Conservation Easement Database, 2018). The conservation easement was established to conserve rolling grasslands with a high density of vernal pools and associated rare and endangered species. The conservation easement was established to ensure the existing habitat would continue to be managed in a manner that promotes endangered species, conserving significant natural landscapes and habitat areas.

4.4.2 Wetlands

Figure 4.4-1 provides wetland data within the Project vicinity from the USFWS National Wetlands Inventory Data (2017).

A complex of vernal pools (including swales and playa pools) occurs in the annual grasslands north of the proposed detention basin. Vernal pools form in Mediterranean climates where shallow depressions fill with rainwater during the rainy season and dry in the spring through evaporation. The pools form in areas where percolation is prevented by hard substrate, such as clay pan, hard pan, or volcanic material. Vernal pools often occur as complexes of pools, sometimes with many small pools or fewer larger pools. Specially adapted brachiopods can occupy some vernal pool complexes, and these species are often of conservation concern due to their use of a rare habitat type. Freshwater marsh occurs in scattered stands within portions of Black Rascal Creek (including the northern boundary of the basin) and in a drainage ditch that parallels the northern boundary of the almond orchards in the detention basin. These wetlands are dominated by broadleaf cattail (*Typha latifolia*) and common tule (*Schoenoplectus* [=*Scirpus*] *acutus*). Cattail/tule marshes occur in low-flow portions of drainages where scour is limited.

4.4.3 Endangered and Threatened Species

The presence of the special-status species is inferred based on database review and focused habitat assessments. Preconstruction surveys would be conducted as a requirement of ECs and permitting. The following is a summary of relevant potential species that are federally or state-listed as threatened or endangered, or are designated California species of special concern (CSSC).

Vernal pool fairy shrimp (*Branchinecta lynchii*; federal threatened [FT]) and vernal pool tadpole shrimp (*Lepidurus packardi*; federal endangered [FE]) have been recorded on the Project footprint in the vernal pool complex north of the proposed basin. Burrowing owl (*Athene cunicularia*; CSSC) was observed in the area north of the proposed basin during a December 2018 site visit. In addition to these species, several special-status wildlife species have potential to occur on the Project footprint, including California tiger salamander (CTS) (*Ambystoma californiense*; FT, state threatened [ST]), western spadefoot (*Spea hammondii*; CSSC), western pond turtle (*Actinemys* [=*Emys*] *marmorata*; CSSC), Swainson's hawk (*Buteo swainsoni*; ST), northern harrier (*Circus cyaneus*; CSSC), loggerhead shrike (*Lanius ludovicianus*; CSSC), tricolored blackbird (*Agelaius tricolor*; ST), western red bat (*Lasiurus blossevillii*), American badger (*Taxidea taxus*; CSSC), and San Joaquin kit fox (*Vulpes macrotis mutica*; FE, ST).

The reach of Black Rascal Creek to be affected by the Project is considered EFH under the Pacific Coast Salmon Fishery Management Plan (FMP) (PFMC, 2018); however, the Project footprint does not provide suitable spawning or migratory habitat for salmonids as the site lacks oxygen-rich, shaded stream habitats used by spawning salmonids. In addition, there are significant fish-passage barriers precluding salmonids from accessing the creek, including a concrete structure 1.2 miles south of the Project. Therefore, the portion of the creek affected by the Project (as well as the upstream portion) is not considered suitable habitat for salmonids and no occurrence of salmonids within the Project study area is expected due to the downstream fish barriers.

4.4.4 Migratory Birds

The Project footprint is located within the Pacific Flyway. Trees, shrubs, riparian woodlands, croplands, grassland, wetlands, streams, and waterways in the Project footprint provides suitable foraging and nesting habitat for numerous migratory birds. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds. Common bird species that are migratory that could occur in the Project vicinity include snow geese (*Chen caerulescens*), western meadowlark (*Sturnella neglecta*), savannah sparrow (*Passerculus sandwichensis*), and red-tailed hawk (*Buteo jamaicensis*). Special-status bird species that are also migratory that could occur in the Project vicinity include Swainson's hawk, loggerhead shrike, and northern harrier.

4.4.5 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to engage in consultation with National Marine Fisheries Service on projects that may impact EFH. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (72 *Federal Register* 19862).

Some creek habitats in the vicinity of the Project are considered EFH under the Pacific Coast Salmon FMP (PFMC, 2018). The habitat and trophic requirements of salmon species include offshore areas, as well as freshwater migratory corridors to spawning sites. EFH for the Pacific Coast Salmon FMP includes waters and substrate necessary for salmon production needed to support a long-term sustainable fishery.

The reach of Black Rascal Creek to be affected by the Project is considered EFH under the Pacific Coast Salmon FMP; however, the Project footprint does not provide suitable spawning or migratory habitat for salmonids as the site lacks oxygen-rich, shaded stream habitats used by spawning salmonids. In addition, there are significant fish-passage barriers precluding salmonids from accessing the creek, including a concrete structure 1.2 miles south of the Project. Therefore, the portion of the creek affected by the Project (as well as the upstream portion) is not considered suitable habitat for salmonids and no occurrence of salmonids within the Project study area is expected due to the downstream fish barriers. No ESA listed species under the jurisdiction of National Marine Fisheries Service are documented or known to occur in the action area; therefore, consultation with National Marine Fisheries Service did not occur.

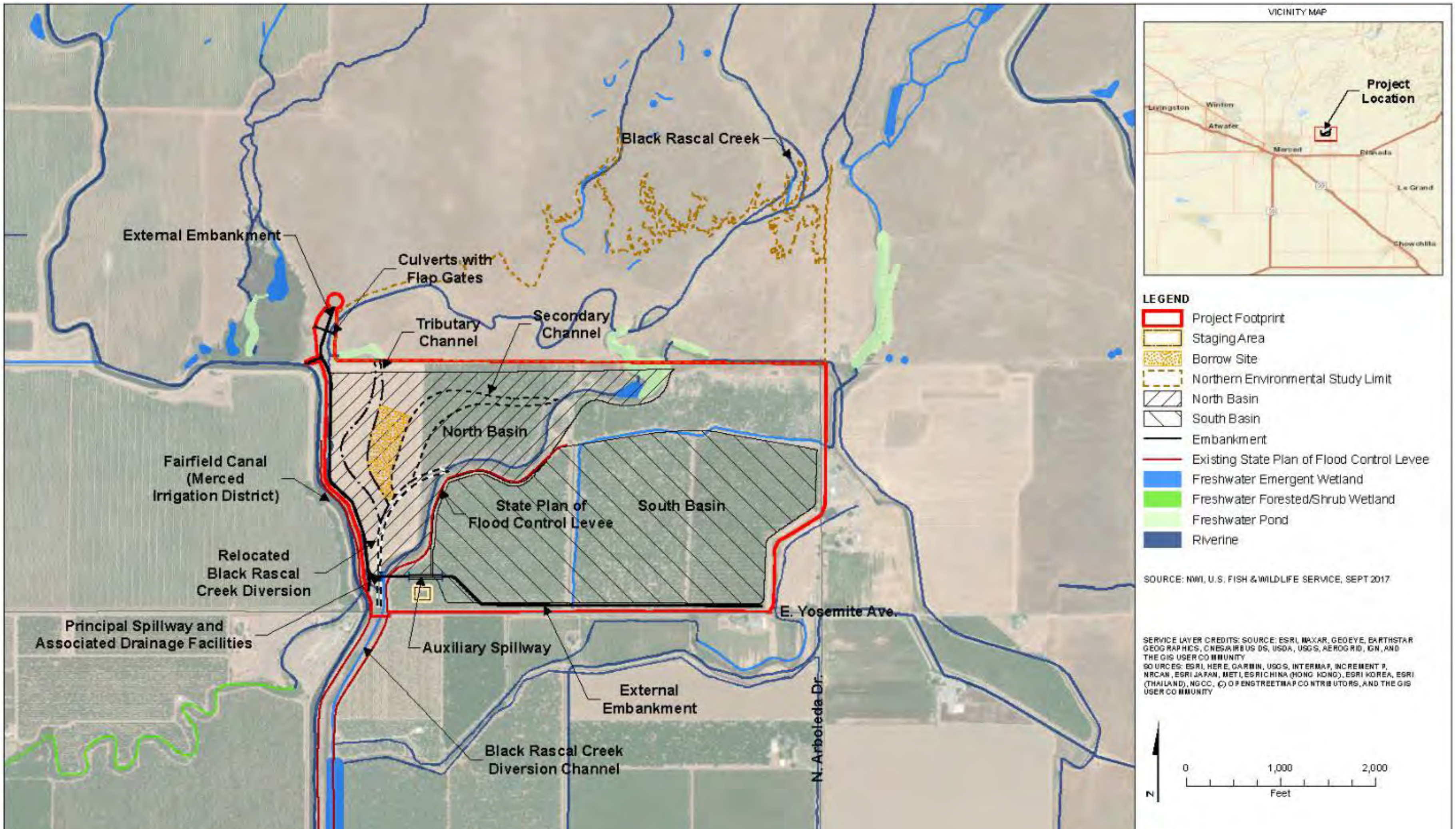


FIGURE 4.4-1
National Wetland Inventory
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

4.4.6 Invasive Species

Invasive species are organisms (plants, animals, or microbes) that are not native to an environment, and once introduced, they establish, quickly reproduce and spread, and cause harm to the environment, economy, and/or human health. A tributary to Black Rascal Creek flows east to west through the grassland/vernal pool complex in the northern portion of the study area. This feature originates as a vernal swale (wetlands), then transitions to a riverine feature. American bullfrogs (*Lithobates catesbeianus*) were observed in several locations along this channel (Jacobs, 2020). No other California invasive species as acknowledged by CDFW (CDFW, 2021) were identified in the study area.

No information on invasive microbes was identified relative to the proposed Project and existing environment.

4.5 Plants

This section describes the affected environment for endangered and threatened plant species in the study area. The study area is the Project footprint and the non-native annual grassland within the northern environmental study limit.

4.5.1 Endangered and Threatened Species

For this assessment, special-status plants include species that are federally or state-listed and California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) 1 or 2 species. San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*; FT, state endangered [SE], CRPR 1B), succulent owl's-clover (*Castilleja campestris* ssp. *Succulent*; CRPR 1B), and spiny-sepaled button-celery (*Eryngium spinosepalum*; CRPR 1B) have previously been found in vernal pools in the Project vicinity. Shining navarretia (*Navarretia nigelliformis* ssp. *radians*; CRPR 1B.2) has been recorded in proximity to the Project footprint; because of the presence of suitable vernal pool habitats there is high potential for its occurrence. Because of the presence of grassland, vernal pool, and emergent wetland habitats in the Project vicinity, there is some potential for the following special-status plants to occur: round-leaved filaree (*California macrophylla*; CRPR 1B.2), dwarf downingia (*Downingia pusilla*; CRPR 2B.2), Boggs Lake hedge-hyssop (*Gratiola heterosepala*; SE, CNPS list 1B.2), forked hare-leaf (*Lagophylla dichotoma*; CRPR 1B.1), pincushion navarretia (*Navarretia myersii* ssp. *myersii*; CRPR 1B.1), Colusa grass (*Neostapfia colusana*; FT, SE), hairy Orcutt grass (*Orcuttia pilosa*; FE, SE), Sanford's arrowhead (*Sagittaria sanfordii*; CRPR 1B.2), and Greene's tuctoria (*Tuctoria greenei*; FE, state-listed as rare).

4.5.2 Natural Areas

The East Merced Vernal Pool Grassland Preserve, Expansion 6, is a permanent conservation easement held by the California Rangeland Trust located in Merced County. The easement is 3,207 acres and includes the land directly north of the proposed detention basin (National Conservation Easement Database, 2018). The conservation easement was established to conserve rolling grasslands with a high density of vernal pools and associated rare and endangered species. The conservation easement was established to ensure the existing habitat would continue to be managed in a manner that promotes endangered species, conserving significant natural landscapes and habitat areas.

4.5.3 Invasive Species

Site reconnaissance (2016, 2018, 2019 through 2020) did not identify invasive plant species within the survey area. The survey area for the proposed Project was found to support natural and man-modified vegetation communities. Agricultural land in the study areas consist mostly of almond tree (*Prunus dulcis*) orchards, with one large field cultivated with pasture grasses. At the time of the 2019 survey, the pasture field was dominated by johnsongrass (*Sorghum halepense*). The non-native annual grasses identified adjacent to the vernal pool complex includes soft brome (*Bromus hordeaceus*), foxtail barley (*Hordeum murinum*), wild oats (*Avena* spp*.),* and annual fescues (*Festuca* spp.). Forbs common in this habitat include narrow tarplant (*Holocarpha virgata*), vinegar weed (*Trichostema lanceolatum*), and doveweed (*Croton setigerus*). Grasslands in the study area are grazed by livestock. No invasive plant species were identified during onsite reconnaissance and other biological field events.

4.5.4 Riparian Area

Cottonwood/willow riparian woodland occurs along the western levee of the Fairfield Canal where the vegetation community consists of a one-tree-wide linear stand of mature trees. The dominant trees in the vegetation community are Fremont's cottonwoods (*Populus fremontii*), but a substantial number of willows (*Salix* spp.) also contribute to the canopy in this stand. Agricultural canals and ditches in the study area vary considerably in character. The Fairfield Canal is a large canal with steep, unvegetated embankments. Smaller drainage and irrigation ditches occur throughout the study area. The drainage features generally flow in the wet season and the agricultural ditches are flooded during the irrigation season. Some of the larger drainage features support tall emergent vegetation; the smaller ditches are either bare ground or covered by weedy herbaceous species.

4.6 Human Environment

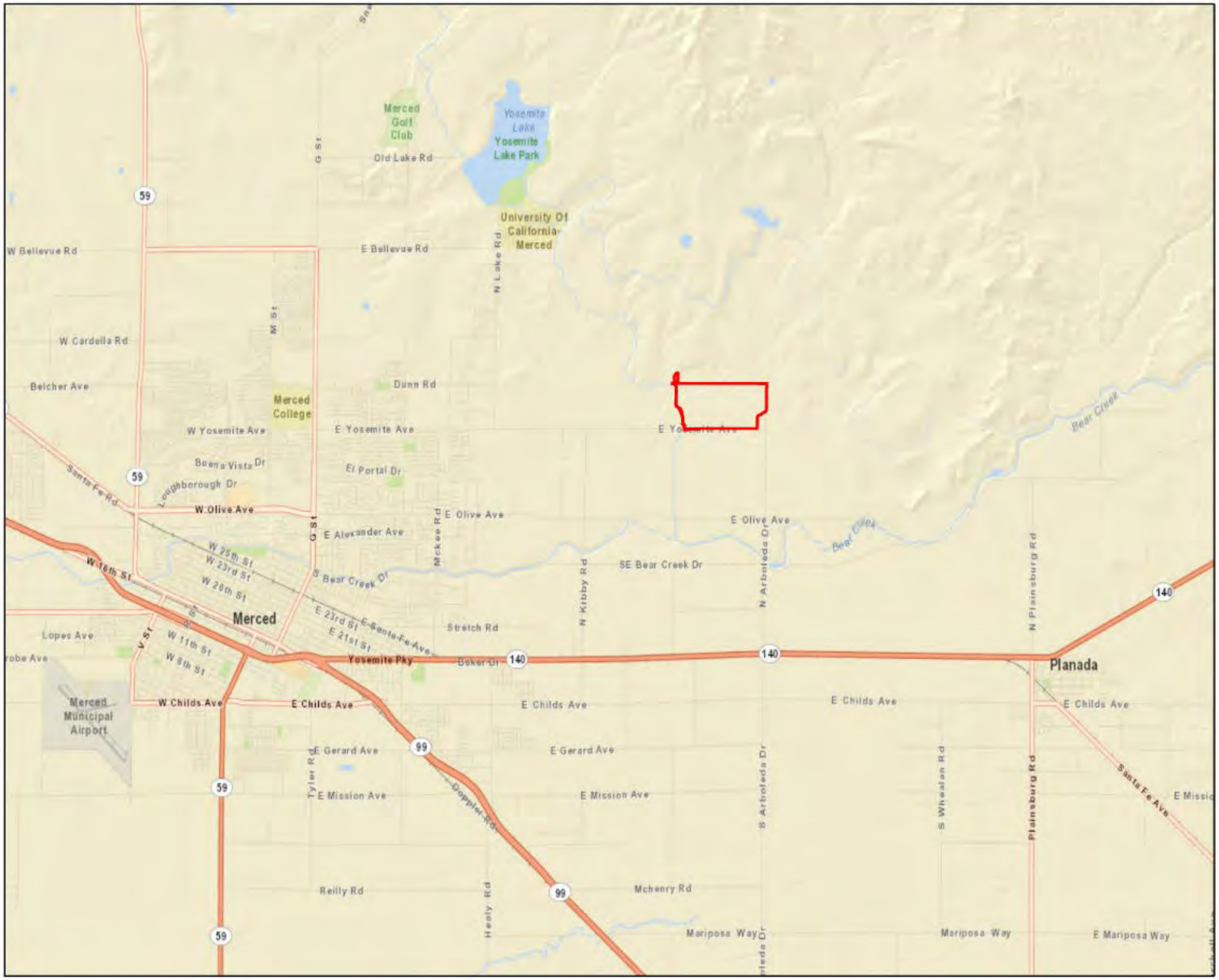
This section describes the affected environment regarding public health and safety and flood damages, costs related to flood damage, cultural resources, socioeconomics and environmental justice, and local and regional economy, and evaluates potential impacts that would result from development of the Project.

4.6.1 Public Health and Safety and Flood Damages

4.6.1.1 Transportation

The major regional and local roadways near the Project footprint include State Route (SR) 99, SR 140, East Yosemite Avenue, and North Arboleda Drive. Figure 4.6-1 presents the regional and local road network. Access routes would vary depending on the origin of the worker or truck, and the type and location of construction activity. It is anticipated that primary access to the Project footprint would be provided by the following major roads:

SR 140 begins at Interstate 5 near Gustine and runs 102 miles east to Yosemite National Park. SR 140 is generally four lanes with a median and shoulder within the limits of the City of Merced and narrows to a two-lane rural highway with no median and limited shoulders within the county limits. SR 140 is a designated Principal Arterial. SR 140 provides access to the site via North Arboleda Drive. The annual average daily traffic on SR 140 is 14,700 vehicles per day between SR 99 and Motel Drive, approximately 12,000 vehicles per day between Motel Drive and Santa Fe Avenue, and 7,400 vehicles per day between Santa Fe Avenue and Plainsburg Road (Caltrans, 2016).



Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, NRCAN, METI, iPC, TomTom

FIGURE 4.6-1
Regional and Local Road Network
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

East Yosemite Avenue is a two- to four-lane, east-west roadway; it is a designated major collector and is one of the busiest arterials in the City of Merced. East Yosemite Avenue is located between SR 59 on the west and Arboleda Drive on the east. This road has a peak average daily traffic of 12,190 vehicles per day near SR 59; traffic significantly decreases at the eastern end of the road. East Yosemite Avenue provides direct access to the Project footprint. East Yosemite Avenue is used for travel between SR 99 and the University of California (UC)-Merced campus, with the typical route being from SR 99 to North Arboleda Drive and then North Arboleda Drive to East Yosemite Avenue to return home and to the UC-Merced campus. There are also seasonal and daily peaks on these roads due to harvesting operations, at the UC-Merced campus, and the addition of traffic from the new Campus Parkway.

North Arboleda Drive is a two-lane, north-south roadway. It is a designated major arterial between East Le Grand Road (near SR 99) and East Olive Avenue and an unclassified road between East Olive Avenue and its northern terminus (immediately north of East Yosemite Avenue). North Arboleda Drive is a dirt road north of East Yosemite Avenue.

4.6.1.2 Flood Damages

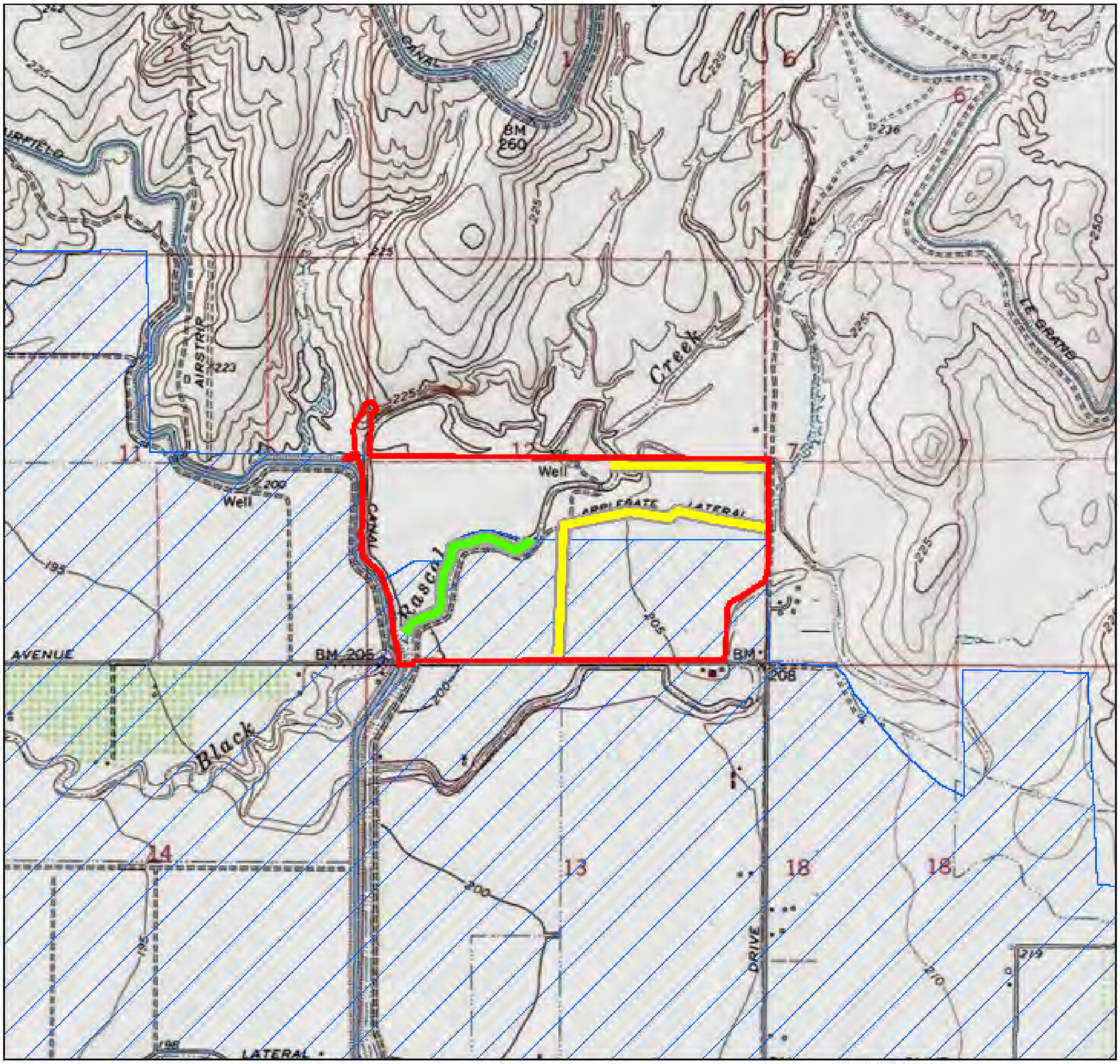
The area along Black Rascal Creek downstream of the Black Rascal Creek diversion channel has experienced severe flooding, with less severe flooding occurring on a regular basis (Section 2.2). Flood flows exceed the capacity of the diversion channel and spill into the historic creek channel that travels through the center of the City of Merced, into the DACs of Franklin-Beachwood, and over agricultural lands, including Prime Farmland. Black Rascal Creek is tributary to Bear Creek, and the DAC of Stevinson has experienced flooding due high flows in Bear Creek.

The City of Merced and DACs of Franklin-Beachwood were severely inundated twice during 1998 and 2006 storm events due to Black Rascal Creek flooding. In 2006, 3,400 citizens in these communities were evacuated. Resulting property damage included 300 residences. Section 4.6.3 contains additional information.

4.6.2 Cultural Resources

To analyze the Project’s potential impacts to cultural resources in accordance with Section 106 of the National Historic Preservation Act (NHPA), codified as 54 U.S.C. § 306101, an area of potential effect (APE) was established pursuant to 36 CFR 800.4(a)(1). The APE includes the maximum Project footprint and encompasses all areas that may be impacted by ground-disturbing activities related to Project construction, implementation, and operation. This also includes areas anticipated to be used as access roads, staging areas, turnaround areas, and laydown areas. The vertical extent of the APE ranges from 2.5 feet to 10 feet in depth, depending upon Project activities. The APE is shown on Figure 4.6-2.

Due to limited development surrounding the APE and the presence of the existing orchards and extensive vegetation in the area, a separate visual impacts APE was not established. Project improvements will not exceed more than 18 feet above the existing ground surface as part of the embankment construction, remaining consistent to the height of trees in the existing orchard, and will not cause a noticeable change in the area’s setting or viewsheds.



Area of Potential Effects (APE) - 303.7 Acres
Applegate Lateral
Black Rascal Creek Canal
Merced Irrigation District

VICINITY MAP

USGS Quad: Merced
Section: 7, 11, and 12
Township: 7S
Range: 14E & 15E

0 1,000 2,000
Feet

Figure 4.6-2
Area of Potential Effects Map
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

This section describes the affected environment for cultural resources in the APE. Cultural resources include prehistoric and historic archaeological sites; districts and objects; standing historic structures, buildings, districts, and objects; locations of important historic events; and sites of traditional and cultural importance to various groups.

A literature search of previously recorded cultural resources within the APE was conducted through the California Historical Resources Information System, which identified two previously recorded cultural resources (the MID Historic District and the Black Rascal Creek Canal).The MID Historic District refers to the previously recorded historic cultural resource that is comprised of the entirety of the MID and includes creeks, canals, ditches, wells, reservoirs, dams, and other water conveyance structures and features. Additional research using historical topographic maps and historic aerial imagery, followed by completion of a field survey, identified two newly recorded cultural resources (the Applegate Lateral and an Unnamed Ditch). The results of the background research and pedestrian survey are included in the *Cultural Resources Assessment for the Black Rascal Creek Flood Control Project, Merced County, California* (Cardenas et al. 2021).

4.6.2.1 Merced Irrigation District Historic District

The MID Historic District is comprised of the entirety of the MID system spanning over 900 square miles, and includes creeks, canals, ditches, wells, reservoirs, dams, other water conveyance structures, and related features. Based on review of maps from 1920, 1924, 1942, 1957, and 1973, the southern approximately 0.3 mile of the APE is located within the historical and current boundaries of the MID (Dice, 2010; Galloway, 1920; Unknown, 1924, 1942, 1957).

The MID Historic District was previously recorded in 2006-2007, 2010, 2011, and 2013. In 2012, the Bureau of Reclamation evaluated the system as ineligible for listing in the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR) as part of the *Section 106 Cultural Resources Assessment, McCoy Lateral Relining Project, Merced Irrigation District, Merced County, California* project. The State Historic Preservation Officer concurred with this determination in a letter dated April 17, 2012. (FirstCarbon Solutions, 2016; JRP Historical Consulting Services, 2007).

4.6.2.2 Black Rascal Creek Canal

Black Rascal Creek is a natural watercourse that bisects the APE. A 0.5-mile segment of the creek within the western part of the APE has been channelized and forms part of the Black Rascal Creek Canal (more commonly known as the Black Rascal Creek diversion channel). The segment is located within the historical and current boundaries of the MID and is the only MID component within the Project footprint. It is an earthen canal about 60 feet wide that was channelized in 1956 and extends through the APE in a southwest-northeast orientation, featuring vegetation growing in the channel and on its unlined banks (USACE, 1977). Immediately southwest of the APE, the Black Rascal Creek Canal turns to the south to divert water to Bear Creek, which feeds the MID system. Black Rascal Creek Canal has been previously recorded and evaluated as ineligible for listing in the NRHP and CRHR in 2007 and 2008. This study analyzed the segment of the canal in the APE and confirmed past eligibility determinations, finding it ineligible for listing in the NRHP and CRHR (Cardenas et al. 2021)

4.6.2.3 Applegate Lateral

The Applegate Lateral is an unlined earthen water conveyance feature. It receives water for agricultural use from an unnamed waterway connecting to LeGrand Canal to the northeast of the APE. The lateral initially runs east-west outside of the APE and then extends in a north-south alignment through the APE. The approximate width of the lateral is 15 feet, and the depth is estimated to be 4 feet.

The Applegate Lateral appears in a 1946 aerial, the earliest available image of the area (NETROnline, 2020). It is likely that the lateral was named after Lewis Hamer Applegate, an early landowner within the APE, though the ditch was developed years after he no longer owned property in the area. The resource is within a flood zone and has been impacted by flooding events. The lateral also has had continued maintenance and upkeep. A check dam is located in the easternmost extension of the lateral and it, too, has undergone continued maintenance. Concrete pipes have been removed, and the release door has been replaced. The east-west segment of the Applegate Lateral also contains concrete drains and irrigation pipes running parallel to the north side of the lateral within an orchard field; these features are no longer in use because the irrigation system has been upgraded.

The Applegate Lateral was evaluated as being ineligible for listing in the NRHP (and CRHR) as it is a ubiquitous property type found throughout the San Joaquin Valley and is not associated with any major events or themes that reflect the importance of agriculture or irrigation in the area; it does not possess a direct association with any person or represent the contributions of a significant individual; it has a simple earthen design similar to numerous other laterals throughout the county and is not illustrative of any major engineering achievements; and it does not have the potential to yield information important to the prehistory or history of the local area, California, or the nation (Cardenas et al., 2021). The NRHP and CRHR evaluation is pending NRCS consultation with the State Historic Preservation Officer (SHPO).

4.6.2.4 Unnamed Ditch

An unnamed, unlined earthen water conveyance ditch that receives water from Black Rascal Creek parallels the east-west segment of the Applegate Lateral approximately 645 feet to the north. The ditch extends through the northeastern portion of the APE in an east-west orientation and is approximately 20 feet wide. The unnamed ditch historically provided water to orchards within the APE, and historically has occupied the same parcel.

The ditch appears in a 1958 aerial but is not present in a topographic quadrangle from 1948; therefore, the structure was likely constructed sometime in between 1948 and 1958 (NETROnline, 2020; USGS, 1948). The 1961 topographic quadrangle depicts the ditch, which had been elongated by this time to turn to the south along the APE's eastern boundary and extend in a southeast orientation outside the APE (USGS, 1961). The ditch is unnamed in historic maps and other information. The ditch was recorded as part of this assessment and evaluated as being ineligible for listing in the NRHP (and CRHR), as it is a ubiquitous property type found throughout the San Joaquin Valley and is not associated with any major events or themes that reflect the importance of agriculture or irrigation in the area; it does not possess a direct association with any person or represent the contributions of a significant individual; it has a simple earthen design similar to numerous other ditches throughout the county and is not illustrative of any major engineering achievements; and it does not have the potential to yield information important to the prehistory or history of the local area, California, or the nation (Cardenas et al. 2021). The NRHP and CRHR evaluation is pending NRCS consultation with the SHPO.

4.6.2.5 Potential for Buried Archaeological Resources

A geoarchaeological analysis was completed for the Project and is included in the study report titled *Cultural Resources Assessment for the Black Rascal Creek Flood Control Project, Merced County, California* (Cardenas et al., 2021). Given the land use history of the APE, including channelization and realignment of Black Rascal Creek and extensive use of the APE as an orchard, soils on or near the surface of the APE are likely heavily disturbed, and there is a low potential for intact buried archaeological resources exist within the APE.

4.6.3 Social and Economic Conditions

Socioeconomic and demographic data were gathered to determine the existing demographic characteristics of the population potentially impacted by the alternatives. This section summarizes the demographic information for the City of Merced and Merced County, with a breakdown in Table 4.6-1.

In July 2019, Merced County had an estimated population of 277,680, and the City of Merced had an estimated population of 83,676. Between 2010 and 2019, the population of Merced County increased by approximately 8.6 percent (U.S. Census Bureau, 2021). Population growth is anticipated to result in a population of 417,200 persons by 2030 (Merced County, 2013). The cities of Merced, Atwater, and Livingston, located along the SR 99 corridor, account for over half of the county's total population. The Franklin-Beachwood area has an estimated population of 6,919 (April 2020) (U.S. Census Bureau, 2021). The Project would benefit populations within the City of Merced, Merced County, and the Franklin-Beachwood area.

Table 4.6-1. Demographic Statistics
Black Rascal Creek Watershed, CA

Statistic	City of Merced	Merced County
Population estimate (July 2019)	83,676	277,680
Median household income (2015-2019)	$45,232	$53,672
Median house value (2015-2019)	$237,500	$252,700
White alone, percent	53.7	82.2
Minority[a], percent	18.2	14.6
Hispanic or Latino, percent	55.2	61.0
White alone, not Hispanic or Latino, percent	25.8	26.5
Percentage 65 and over	10.1	11.4
Percentage of persons in poverty	29.3	17.0

[a] This category includes people who indicated their race as Black or African American, American Indian and Alaska Native, Asian, or Native Hawaiian and Other Pacific Islander.

Source: U.S. Census Bureau, 2021

Agriculture is considered one of the foundations of Merced County's economy. The county ranks as one of California's top producers of milk and cream, chickens, almonds, alfalfa, cattle and calves, silage, and tomatoes. Merced County has sustained growth in food processing and manufacturing over the past 20 years. One of the focuses of economic development in the *2030 Merced County General Plan* (Merced County, 2013) is to identify ways the County can diversify its economy to attract new industries while continuing to expand its agricultural industry (Merced County, 2012).

5. Alternatives

5.1 Introduction

This section summarizes the alternative identification and selection process, including the alternatives considered but eliminated from detailed study, and the alternatives carried forward for analysis in this Plan EA.

5.2 Formulation/Evaluation Process

As discussed in Section 2.2, Merced County conducted and completed the Merced County Feasibility Study to evaluate a range of alternatives potentially capable of providing up to a 200-year flood event flood protection associated with the Black Rascal Creek watershed. The alternative in the Merced County Feasibility Study, which consisted of a single large detention basin (at approximately the same location as the Project), was judged as best able to accommodate 200-year flood flows while minimizing potential environmental impacts in comparison to other alternatives (Merced County, 2009). This configuration became the basis of the Project alternatives evaluated in this Plan EA. Section 5.3 contains additional details related to the alternative evaluation process and configurations that were not considered feasible and were therefore eliminated from detailed study.

5.2.1 Incremental Cost-Benefit Analysis

An incremental cost-benefit analysis to determine the Preferred Alternative based on the NED plan is presented in this section. The NED plan is the alternative plan with the greatest net economic benefit consistent with protecting the nation's environment. The Preferred Alternative was determined based on net Project benefits, after conducting an incremental economic benefit/cost analysis per Section 500.4(C) of the Watershed Program Manual (NRCS, 2014a). A more detailed presentation of costs and benefits of the Preferred Alternative are presented in Chapter 8.

The incremental analysis was carried out for five project alternatives. These include the No-Action Alternative, the single detention basin design at three levels of protection, as well as one non-structural alternative. A single detention basin design at the 50-, 100-, and 200-year levels of protection are used in the incremental analysis. The non-structural alternative evaluates the relocation of all structures within the 50-year inundation area.

5.2.2 Project Alternative Estimated Costs

Project costs were estimated for the five project alternatives for the incremental analysis. For the single detention basin design at different levels of protection, the estimated Project costs include preconstruction activities such as permitting, design, and mitigation as well as land acquisitions and easements. For the non-structural alternative, the only cost is the cost of relocation. These cost estimates are discussed in more detail in this section.

DSOD has determined that the downstream hazard classification will be "extremely high" hazard. Extremely high-hazard dams must have auxiliary spillways capable of passing a probable maximum flood (PMF). The required minimum freeboard is whichever produces a higher dam crest: 4 feet of normal freeboard from the auxiliary spillway crest to the dam crest, or 1.5 feet of residual (minimum) freeboard above the maximum flood surcharge water surface elevation during the PMF. For the purpose of this evaluation, it was assumed that the top of embankment would be at elevation 214.5 irrespective of design storm (50-, 100-, or 200-year). Therefore, across the 50-, 100-, and 200-year levels of design, the main difference in cost is a result of the linear footage of embankment required and the land acquisition costs for the detention basin. Land acquisition costs are estimated at $15 million for the 100- and 200-year projects. The 50-year project would require significantly less acreage, estimated at approximately one-third the size of the larger projects. Land acquisition costs are estimated at $5 million for the 50-year project. The cost of the principal spillway, auxiliary spillway, drainage facilities, and habitat and restoration channels, are common features, irrespective of design storm. The annual O&M cost is estimated to be $50,000. These costs are summarized in Table 5.2-1.

For the non-structural alternative of relocating structures that are located in the 50-year inundation area, the costs are based on the assessed value of those buildings. In total, there are 1,735 structures located in the 50-year inundation area, including 1,658 residential structures, 72 commercial and industrial structures, and 5 public structures, based on a geographic information system (GIS) analysis of the impact area. Using Merced County assessments data, the total assessed value of those structures is $343.8 million. This is assumed to be a reasonable proxy for the amount that it would cost for occupants of those structures to procure comparable accommodations outside of the 50-year inundation area.

Table 5.2-1 summarizes the estimated costs for all five Project alternatives, including annual operations and maintenance.

Table 5.2-1 Project Alternative Estimated Project Costs[a]

Black Rascal Creek Watershed, CA

Alternative	Permitting, Design, and Mitigation	Land Acquisition and Easements	Construction	Administration, Project Management, and Coordination	Relocation	Total Project Cost	Annual Operations and Maintenance (O&M)
No-Action (FWOP)	$0	$0	$0	$0	$0	$0	$0
50-year flood protection facility	$4,600,693	$5,000,000	$13,641,829	$1,469,181	$0	$24,711,703	$50,000
100-year flood protection facility	$4,600,693	$15,000,000	$14,166,829	$1,469,181	$0	$35,236,703	$50,000
200-year flood protection facility (Preferred Alternative)	$4,600,693	$15,000,000	$14,691,829	$1,469,181	$0	$35,761,703	$50,000
Non-structural alternative- Relocation	$0	$0	$0	$0	$343,766,474	$343,766,474	$0

[a] Values are in 2020 U.S. dollars

There would be no immediate direct cost of the No-Action Alternative. However, the residents, business owners, and government agencies would be subject to additional cost from flood damages; and the partners of the Merced County Streams Group could be subject to additional litigation costs.

5.2.3 Project Alternative Damage Reduction Benefit

The annual NED benefits of the Project alternatives are based on estimating the reduction in expected annual damage (EAD) for each alternative relative to the No-Action Alternative (FWOP). The annual NED benefit was estimated in a flood damage analysis documented in Appendix D, Investigations and Analysis Report. The annual NED benefit, or EAD, was calculated across various structure inventory types identified and further described in Appendix D including residential, commercial, industrial, and public facilities. Original estimates of structure values are based on a 2019 database of structure assessed values from Merced County Assessor's office. Structure damage estimates have been inflated to 2020 values using Gross Domestic Product Deflator data from the St. Louis Federal Reserve (U.S. Bureau of Economic Analysis, 2021).

As shown in Table 5.2-2, the anticipated reduction in EADs range from $3.6 million under the non-structural alternative to $5 million under the 200-year protection alternative. The reduction in EADs is largely from residential structures with some benefits to the commercial, industrial, and public structure types in the study area.

Table 5.2-2. Expected Annual Damages by Structure Inventory Type[a]
Black Rascal Creek Watershed, CA

Alternative	Commercial	Industrial	Public	Residential	Total	Reduction in EAD Relative to No-Action
No-Action (FWOP)	$548,850	$336,359	$116,169	$4,347,008	$5,348,386	$0
50-year flood protection facility	$121,901	$49,523	$10,472	$924,551	$1,106,448	$4,241,938
100-year flood protection facility	$69,704	$25,515	$5,013	$512,636	$612,867	$4,735,518
200-year flood protection facility (Preferred Alternative)	$37,420	$14,290	$2,760	$276,900	$331,370	$5,017,016
Non-structural alternative--Relocation	$115,731	$34,001	$18,884	$1,582,249	$1,750,866	$3,597,520

[a] Values are in 2020 U.S. dollars

The most damaging flood in Merced County on record occurred in 2006, resulting in property damage estimated at approximately $18 million, primarily to rural residential areas and structures, as well as damage to agriculture (crop loss) estimated at approximately $3 million (Hemming Morse, Inc., 2011; Robinson, 2006). Implementation of the Preferred Alternative would reduce property damage to agriculture and rural communities, resulting in a direct economic benefit to these resources.

A projected annual damage reduction of $5 million per year to commercial, industrial, public and rural residential inventory types would occur with the implementation of the 200-year project. The vast majority of total Project benefits would result in economic benefits to agriculture and rural communities given that these inventory types account for approximately 50 percent of the area located within the Project's Flood Protection Zone (Appendix B Project Map) in addition to agricultural crop use within the same zone.

Table 5.2-3 compares the average annual damages with and without each Project alternative. Annual benefits are calculated as the reduction in EAD with each Project alternative. As discussed previously, the projected benefits of the alternatives are based on anticipated damage reduction based on a flood damage analysis consistent with the methods provided in the Principles and Guidelines (WRC, 1983). A detailed discussion on the Flood Damage Assessment modeling is provided in Appendix D, Investigations and Analysis Report.

Table 5.2-3. Estimated Average Annual Flood Damage Reduction Benefit[a]
Black Rascal Creek Watershed, CA

Alternative	Estimated Average Annual Damages Without-Project	Estimated Average Annual Damages With Project	Damage Reduction Benefit
No-Action (FWOP)	$5,348,386	n/a	$0
50-year flood protection facility	$5,348,386	$1,106,448	$4,241,938
100-year flood protection facility	$5,348,386	$612,867	$4,735,518
200-year flood protection facility (Preferred Alternative)	$5,348,386	$331,370	$5,017,016
Non-structural Alternative	$5,348,386	$1,750,866	$3,597,520

[a] Values are in 2020 U.S. dollars

5.2.4 Project Alternative Net Benefits and Benefit-Cost Ratio

Consideration was taken to characterize the costs and benefits for different levels of protection, so that the Preferred Alternative could be determined through incremental analysis. Based on the results summarized in Table 5.2-4, the 200-year flood protection facility was determined to be the NED plan as well as the Preferred Alternative.

The total Project costs from Table 5.2-1 were annualized over the 100-year life of the Project using the 2020 fiscal discount rate of 2.75 percent (NRCS, 2020). Annualized costs and annual expected benefits from Table 5.2-3 are then used to calculate net benefits and a benefit-cost ratio for each Project alternative. The structural alternatives have an annual net benefit ranging from $3.0 million to $3.5 million, with the greatest net benefit calculated for the 200-year flood protection facility. The non-structural alternative has a negative net benefit and a benefit-cost ratio of less than one, ruling it out for Project consideration.

Based on the net benefits summarized in Table 5.2-4, the 200-year flood protection facility is determined to be the NED plan and the Preferred Alternative and will therefore proceed as the Preferred Alternative in this Plan EA.

Table 5.2-4. Annualized Construction Costs, Benefits, and Benefit-Cost Ratios for Alternative Flood Protection Levels[a]
Black Rascal Creek Watershed, CA

Alternative	Annual Expected Benefit	Annual Expected Cost	Net Benefit	Benefit-Cost Ratio
No-Action (FWOP)	$0	$0	$0	
50-year flood protection facility	$4,241,938	$777,863	$3,464,075	5.5
100-year flood protection facility	$4,735,518	$1,087,868	$3,647,650	4.4
200-year flood protection facility	$5,017,016	$1,103,332	$3,913,684	4.5
Non-structural Alternative	$3,597,520	$10,125,358	($6,527,839)	0.4

[a] Values are in 2020 U.S. dollars, with the exception of the Benefit-Cost Ratio, which is unitless

5.3 Alternatives Eliminated from Detailed Study

Several other action alternatives were considered as part of the Merced County Feasibility Study (2009) but were determined to be environmentally inferior to the Project. In addition, the proposed Haystack Reservoir within the Black Rascal Creek watershed was previously evaluated by USACE and that evaluation process is also briefly summarized in the following sections. Alternatives eliminated from detailed study included the following:

1. Merced County Feasibility Study Alternative 1
2. Merced County Feasibility Study Alternative 2
3. Merced County Feasibility Study Alternative 3
4. Merced County Feasibility Study – Yosemite Lake Operation and Canal Improvements Alternative
5. Haystack Dam and Reservoir
6. 2017 EIR Proposed Project

5.3.1 Merced County Feasibility Study Alternatives

The Merced County Feasibility Study evaluated four alternatives that included different configurations of four separate detention basins (Sites A, B, C, and D), some of which were proposed to be used in combination. All alternatives were proposed to be located upstream from the Black Rascal diversion channel. Figure 5.3-1 shows the approximate location of each of the four sites evaluated in the Merced County Feasibility Study (2009). Each alternative included some form of detention basin that would consist of an impoundment structure(s) that would temporarily store runoff in Black Rascal Creek or one of its tributaries. All alternative facilities were proposed to release the stored water at a controlled rate of approximately 3,000 cfs, which would reduce flooding downstream from the diversion channel. Although most of the alternatives meet the Purpose and Need or the Project objectives, they were dismissed because it was determined that significantly more disturbance to biological resources would occur during construction, as further described below.

5.3.1.1 Merced County Feasibility Study Alternative 1

Alternative 1, presented in the Merced County Feasibility Study (2009), consisted of a single, large detention basin at Site C located approximately 1.4 miles north of the diversion channel. This alternative would have required construction of an approximately 1,439-acre-foot storage basin. The detention basin was proposed to consist of earthen levees that would span the natural channels and adjacent low-lying areas with a concrete outlet and spillway at the approximate location of the natural channel. The outlet structure was proposed to limit outflows to 3,000 cfs in Black Rascal Creek (Merced County, 2009). The alternative also included the construction of a new access road for construction and maintenance vehicle access and installation of up to 0.5 mile of power transmission lines to provide power to automate the control gate during the flood season.

Alternative 1 was judged to meet the Purpose and Need; however, because of its location, it would result in significantly more construction disturbances to biological resources and wetlands including vernal pools, as compared to the proposed Project. The Alternative 1 Site C embankment and inundation areas would have overlapped vernal pool habitat that may have been occupied by one or more listed and other special-status species. Aquatic habitat suitable for breeding CTS were located within 0.5 mile of several ponds and larger seasonal pools (Merced County, 2009). For these reasons, Alternative 1 was not carried forward for further analysis.

5.3.1.2 Merced County Feasibility Study Alternative 2

Alternative 2 consisted of three detention basins located at three different locations (Sites A, B, and C) Site A would have consisted of an approximate 319-acre-foot storage basin approximately 6.2 miles north of the diversion channel. Site B was proposed to consist of an approximate 487-acre-foot storage basin approximately 2 miles east of the diversion channel. Site C would have been smaller than the basin for Alternative 1 and would have consisted of an approximate 945-acre-foot storage basin approximately 1.4 miles north of the diversion channel (Merced County, 2009). Constructed features of these basins were proposed to be similar to those described for Alternative 1. This alternative also included construction of up to three new access roads for construction and maintenance vehicle access, and the installation of up to approximately 9 miles of power transmission lines to provide power to automate the control gate during the flood season.

Alternative 2 was judged to meet most Project objectives but would result in substantially more construction disturbance to biological resources and wetlands including vernal pools, as compared to the proposed Project. The Alternative 2 Site A embankment and inundation areas would overlap vernal pool habitat that may have been occupied by one or more listed and other special-status species. A pond that may have provided suitable aquatic habitat for breeding CTS was located within 0.6 mile west of the site; therefore, CTS may be present in upland areas during non-breeding seasons (Merced County, 2009). Alternative 2 Site B had at least five documented special-status species occurrences within 0.5 mile of the site, including conservancy fairy shrimp, western spadefoot, Colusa grass, and San Joaquin Orcutt grass. In addition, Alternative 2 would require substantially more access roads and transmission lines than all other alternatives, causing significantly more ground disturbance. Therefore, Alternative 2 was not carried forward for further analysis.

5.3.1.3 Merced County Feasibility Study Alternative 3

Alternative 3 consisted of a single large detention basin at approximately the same location as the Project footprint. Under Alternative 3, Site D was proposed to have a different levee configuration than the Project and would provide approximately 2,374 acre-feet of storage (Merced County, 2009). Constructed features of this basin would have been similar to those described for Alternative 1. The Alternative 3 embankment and inundation area may have overlapped vernal pool habitat occupied by one or more listed or special-status species. Aquatic habitat suitable for breeding CTS were located within 0.5 mile of several ponds and larger seasonal pools (Merced County, 2009). In addition, because the inundation area was proposed to extend farther north of the agricultural field, it was projected to result in more disturbance to biological resources and wetlands, including vernal pools, as compared to the Project. Therefore, Alternative 3 was not carried forward for further analysis.

5.3.1.4 Merced County Feasibility Study – Yosemite Lake Operation and Canal Improvements Alternative

The Merced County Feasibility Study also considered alternative operations at Lake Yosemite in conjunction with irrigation infrastructure modifications. The Merced County Feasibility Study concluded that releases at Yosemite Lake associated with winter flood operation do not significantly contribute to peak flows at the Black Rascal Creek diversion, and modifications to lake operations would not provide a significant benefit for flood relief from Black Rascal Creek (Merced County, 2009). This alternative was not considered viable and was not carried forward for further analysis.

5.3.2 Haystack Dam and Reservoir Alternative

Haystack Dam and Reservoir were previously evaluated by USACE as a potential flood control facility for Black Rascal Creek. The reservoir was proposed to be located on Haystack Mountain, approximately 4 miles upstream from the confluence with Bear Creek. The reservoir would have been contained by earthen levees to allow for a storage capacity of up to 5,800 acre-feet on 425 acres, with the dam spanning approximately 2,300 feet (USACE, 1980). This alternative would have required the construction of a new access road for construction and maintenance vehicle access, and the installation of up to 3.5 miles of power transmission lines to allow automation of the control gate during the flood season.

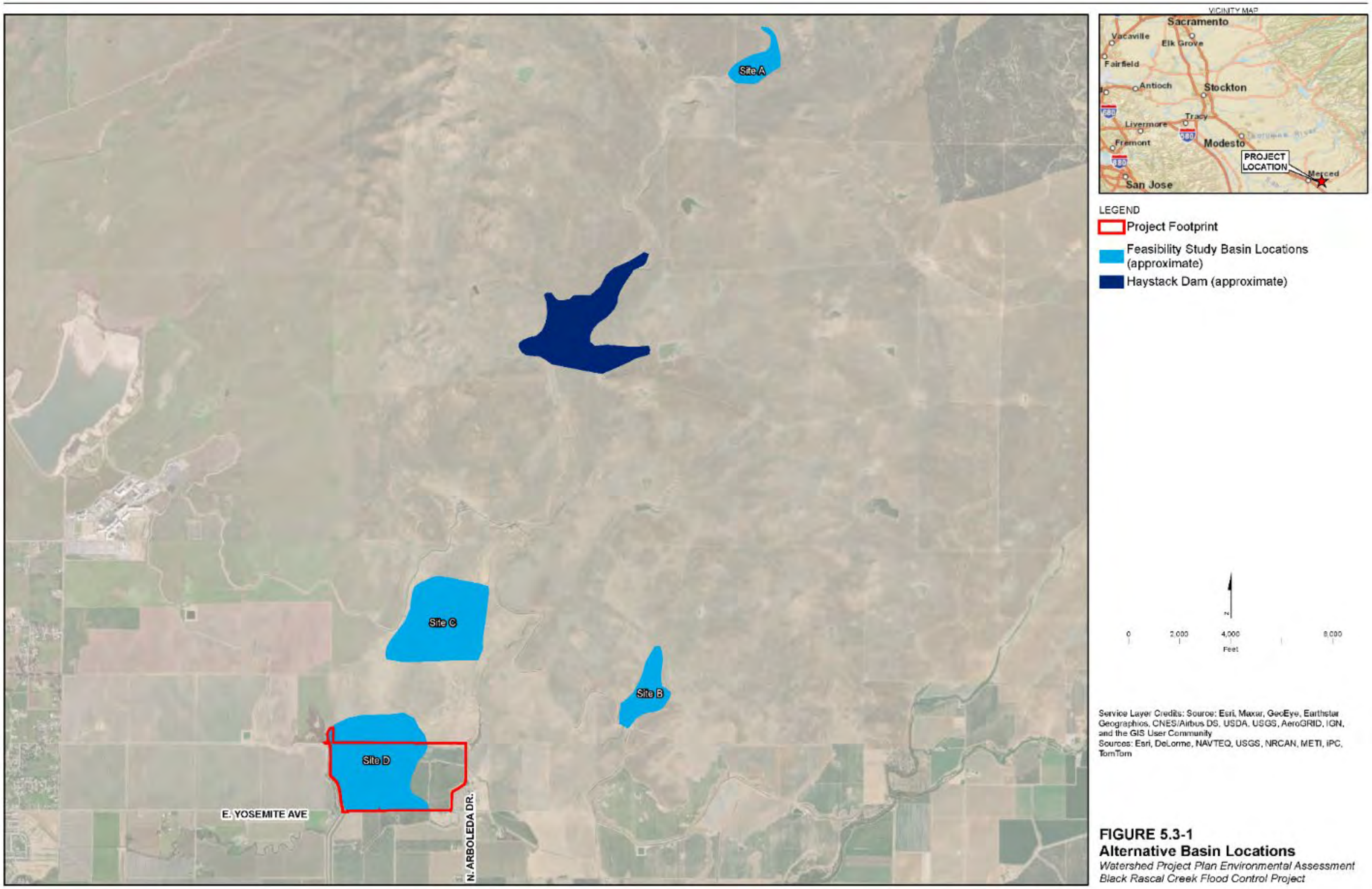


FIGURE 5.3-1
Alternative Basin Locations
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

Haystack Reservoir would meet most Project objectives but would result in substantially more construction disturbances to biological resources and wetlands, including vernal pools, from installation of new access roads and electrical transmission lines as compared to the Project. Therefore, this alternative was not carried forward for further analysis.

5.3.3 Environmental Impact Report (2017) Proposed Project and Alternatives/Options

Merced County conducted a CEQA review of the Project in 2017. The alternative evaluated in the EIR consisted of a perimeter levee, internal levee, and training levees to create a flood control detention basin and wetland area on Black Rascal Creek. The perimeter levee evaluated in the EIR would create an approximately 300-acre detention basin to accommodate less than 2,500 acre-feet of water[6] during a 200-year flood event and an internal levee that would accommodate flood flows up to a 50-year storm event to protect agricultural land (an almond orchard) that would be maintained within the larger basin. The detention basin outlet would include a series of reinforced-concrete box culverts sized to limit flows in the diversion channel to 3,000 cfs. A portion of the internal basin (50-year basin) would include a regulating reservoir to be operated by MID to temporarily store irrigation water from the Fairfield Canal and help increase system efficiency by balancing supply and demand within its system. The alternative also included training levees upstream from the proposed detention basin that would guide flows to the inlet of the detention basin and prevent floodwaters from spreading onto land north of the detention basin during periods when the basin is near full. This alternative included two offsite soil disposal sites for disposal of excess excavation materials from construction of the detention basin.

During development of the EIR, numerous iterations of embankment configurations were explored including options to minimize potential impacts to vernal pools and existing onsite agricultural uses. Various options and alternatives were ultimately eliminated to minimize impacts to property southeast of the Project site and upland vernal pools, while providing maximum flood protection within the proposed site constraints. The alignment determined to provide the greatest degree of flood control benefit was selected and evaluated within the EIR. The proposed Project carried forward in this Plan EA is based on the Project evaluated in the EIR and incorporates modifications to further decrease potential impacts (including to wetlands and vernal pools) identified and addressed in the EIR. The proposed Project is also within the range of alternatives and consistent with the range of potential impacts evaluated in the EIR. Accordingly, the Project evaluated in the EIR has been refined to lessen impacts and the original specific configuration eliminated from further consideration.

5.4 Alternative Descriptions

This section describes the Preferred Alternative, and the No-Action Alternative (FWOP).

5.4.1 No-Action Alternative (FWOP)

Under the No-Action Alternative, Merced County would not implement the Project. In the absence of federal funding, the Project would not be implemented. The No-Action Alternative would not provide flood protection to Disadvantage Communities, the City of Merced and Merced County, manage flood flows on Black Rascal Creek, minimize property damage caused by flooding, improve water quality, nor provide

[6] Hydraulic modeling results indicate approximately 1,700 acre-feet water detention basin water storage capacity for a peak 200-year flood event.

habitat enhancement. Flood events would be anticipated to occur at the same frequency and magnitude as historically experienced, and stormwater quality would continue to be negatively affected during these events (Section 2.2).

5.4.2 Preferred Alternative

5.4.2.1 Project Features

The Preferred Alternative consists of a new embankment system to create a flood control detention basin that includes habitat restoration (secondary and tributary habitat channels) immediately upstream from the relocated diversion channel.

The Project consists of a detention basin, spillways, channel modifications to Black Rascal Creek, habitat enhancements, and drainage facilities. The Project footprint consists of approximately 300 acres and is the location of the proposed works of improvement (such as the disturbance area that would be directly impacted by construction activities of the Preferred Alternative, including laydown and access road areas). The detention basin would be located within the Project footprint and extend north into an upstream area currently subject to flood flows. The locations and extents of these features are shown on Figure 5.4-1. The detention basin would temporarily detain less than 2,500 acre-feet of water[7] during a 200-year storm event and limit flow in the diversion channel to 3,000 cfs, thereby reducing peak flows in Bear Creek and the flooding along the old Black Rascal Creek channel that flows through the City of Merced. The Project features are discussed in detail in the following sections.

5.4.2.1.1 Detention Basin

The detention basin would be created by constructing embankments, within the Project footprint, on two sides of the proposed basin with the upstream extent open to flood flows. The western side of the basin would be bound by MID’s Fairfield Canal; the southern side of the basin would be bound by East Yosemite Avenue; and the eastern side of the basin would remain in its current condition and is bordered by North Arboleda Drive. The western embankment would extend to the north where it ties into existing grade. The southern embankment ends at a point where the embankment transitions into the existing grade near the intersection of East Yosemite Avenue and North Arboleda Drive. A total of 7,000 linear feet of embankment would be constructed to establish the detention basin. The embankment height would range from zero where it ties into existing ground at the northwestern corner to a maximum of approximately 21 feet above the Black Rascal Creek streambed at the principal spillway; most of the embankment length would be approximately 14 feet high. The embankments would have a 12-foot-wide gravel-surfaced top width with side slopes set at 3H:1V (horizontal to vertical slope). Project features are shown on Figure 5.4-1. Photos of the locations of proposed southern and western embankments are in Appendix E3.

The detention basin encompasses two subbasins: the north basin and south basin. The north and south basins are separated by Black Rascal Creek and a State Plan levee. This levee would be improved to allow floodwaters to enter the south basin (Figure 5.4-1). The Project improves the State Plan of Flood Control levee by providing taller setback embankments that enlarge, deepen, and formalize the current

[7] Hydraulic modeling results indicate approximately 1,700 acre-feet water detention basin water storage capacity for a peak 200-year flood event.

informal detention area upstream of East Yosemite Avenue while minimizing the existing risk of levee overtopping. Berms adjacent to an existing irrigation ditch (Applegate Lateral) in the south basin would also be removed to allow floodwaters to spread more uniformly across the basin.

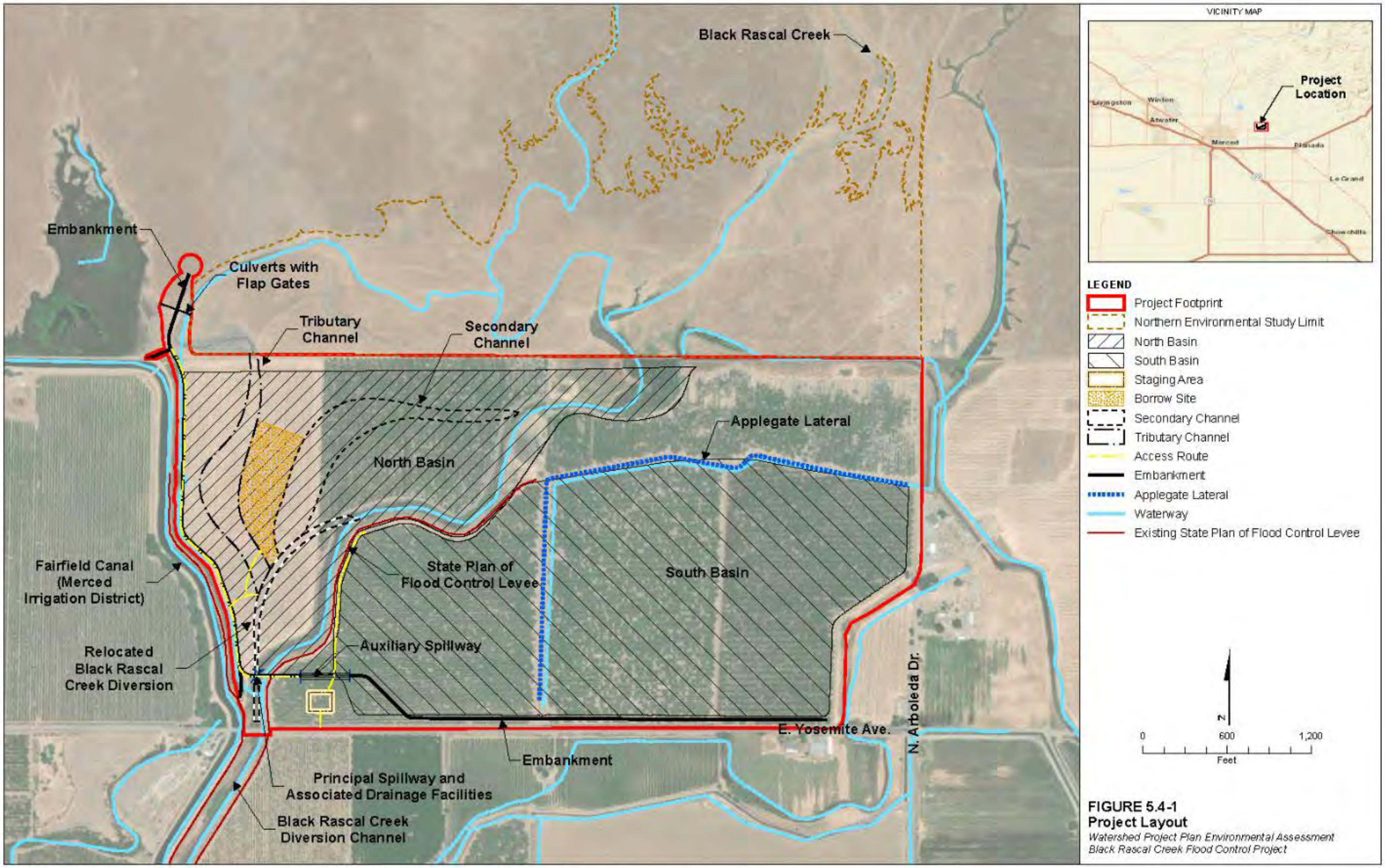


FIGURE 5.4-1
Project Layout
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

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The proposed detention basin consists primarily of farmland and aquatic habitats (freshwater marsh, pond) within the northern portion of the Project footprint adjacent to Black Rascal Creek. Agricultural land uses within the proposed detention basin consist mostly of an almond orchard (230 acres of the proposed detention basin site). Cottonwood/willow riparian woodland occurs along the western levee of the Fairfield Canal (on the west border of the detention basin).

The detention basin embankments would be constructed from material borrowed/removed from excavations in the north basin and removal of the State Plan levee. Topsoil would be stripped from the area beneath the embankment prior to fill placement. The exposed soil would then be moisture conditioned and compacted to prepare for fill placement. A key trench would be excavated beneath the embankment and backfilled with clay fill material. The key trench would allow observation of anomalies in the foundation conditions and limit underseepage by interrupting seepage paths beneath the embankment. The key trench would be 12 feet wide and 6 feet deep with maximum excavation slopes of 1H:1V. Stripped topsoil would be stockpiled and then replaced on embankment finished slopes. The embankment slopes would be seeded with native species to establish herbaceous (grasses and forbs) plant cover to prevent erosion.

5.4.2.1.2 Spillways

The detention basin would have a principal and an auxiliary spillway. The principal spillway would serve as the detention basin outlet. Lacking any obstruction (such as gates or a weir), it would not block or raise the Black Rascal Creek streambed; it would allow the detention basin to drain entirely by gravity and pass typical (non-flood) Black Rascal Creek flows without impoundment. Black Rascal Creek is seasonally dry, and the detention basin would be normally empty (fully drained). However, during floods, the principal spillway would function as a hydraulic constriction to restrict peak flood releases. Flood attenuation would be negligible or minor during smaller floods and more significant as flood flows increase. In this way, the principal spillway would generally pass in-channel Black Rascal Creek flows without impoundment but temporarily detain larger flood inflows that exceed the rated discharge rate of the principal spillway constriction.

The principal spillway would be a cast-in-place, reinforced-concrete structure that, together with the detention basin embankments, restricts the width of Black Rascal Creek and blocks overbank floodplain conveyance where the embankment dam would provide a barrier. The principal spillway would consist of a horizontal, at-grade concrete apron at the elevation of the creekbed to prevent scour through the constriction and to stabilize its rating curve (i.e., the apron will ensure the discharge rate for each headwater and tailwater combination remains unchanged and predictable over time); two vertical, concrete retaining sidewalls that rise from the creekbed to the adjacent embankment crest to constrict the channel and restrict peak discharge rates; and curved, converging headwalls that funnel approaching upstream flows into the spillway constriction. The principal spillway would be sized to limit peak 200-year flood flows to 3,000 cfs or less, which is the design capacity of the Black Rascal Creek diversion channel to which the principal spillway releases. Design details, including a rating curve, can be found in the Project Design Report and its hydrologic and hydraulic (Jacobs, 2020).

The auxiliary spillway would be a 350-foot-long, cast-in-place concrete structure with a concrete stilling basin and concrete sidewalls. The auxiliary spillway would be located near the proposed principal spillway, with sufficient space between to separate their discharge channels. The auxiliary spillway weir crest would be set 0.1 foot higher than the peak 200-year-flood elevation within the detention basin; therefore, it is intended to supplement the principal spillway to safely pass floods that exceed the 200-year principal spillway design flood.

The principal spillway exceeds NRCS design criteria to meet local design requirements. According to NRCS Technical Release (TR) 60 Earth Dams and Reservoirs (NRCS 2019), the principal spillway should pass the 100-year flood and drain at least 85 percent of the retarding pool within 10 days after the peak of the principal spillway hydrograph. In the case of the Black Rascal Creek detention basin, the principal spillway/outlet channel would pass the 200-year flood without activating the auxiliary spillway and can drain the detention basin within 10 days or less of the 24-hour, 200-year flood peak.

The auxiliary spillway was designed to exceed design requirements specified by NRCS for high-hazard dams to meet more stringent DSOD requirements for extremely high-hazard dams. According to NRCS TR-60, the auxiliary spillway should safely pass a flood event that is produced by probable maximum precipitation without overtopping the embankment dam and should provide at least 3 feet of normal freeboard. NRCS recognizes that state law may have stricter requirements. In this case, the California DSOD requires at least 4 feet of normal freeboard and 1.5 feet of residual freeboard at the peak of the PMF, which is produced by probable maximum precipitation in combination with additional, adverse flood conditions. The auxiliary spillway meets these stricter requirements.

5.4.2.1.3 Channel Modifications

An 1,845-foot section of Black Rascal Creek would be realigned, between DWR Levee Mile 0.30+/- (Unit No. 2 Levee – Left Bank) to DWR Levee Mile 0.65+/- (Unit No. 2 Levee – Right Bank), upstream of the principal spillway so that flood flows are conveyed to the principal spillway. The channel realignment consists of excavating a new alignment that would be approximately 50 feet wide at the upstream end and taper to 20 feet wide or less at the transition to the principal spillway structure. The existing Black Rascal Creek channel would be backfilled to match the elevation of adjacent agricultural lands.

Downstream of the principal spillway structure, the Black Rascal Creek channel would be re-graded to a uniform cross-section, and rock slope protection would be placed on the channel's bed and banks for scour protection. The re-graded section would be approximately 375 feet long. Approximately 910 cubic yards of Class III and 260 cubic yards of Class IV rock slope protection will be placed in the bed and banks, with an additional 830 cubic yards of bedding gravel.

5.4.2.1.4 Habitat Restoration and Enhancement

As part of the Project, Merced County would restore and enhance aquatic, riparian, and upland habitats in the footprint of the proposed detention basin (Figure 5.4-1). These activities would be located in areas currently used for agricultural pasture and orchard.

A new channel, identified as the tributary channel on Figure 5.4-1, would be graded through the agricultural pasture to restore a tributary of Black Rascal Creek. Historically, this tributary was straightened into a ditch on the western margin of the agricultural pasture. The new channel would convey flow through the proposed basin and connect with the realigned segment of Black Rascal Creek. The channel would be bounded by an inset floodplain that would be planted with wetland and riparian species. It is anticipated that approximately 2.08 acres of aquatic habitat would be restored in the basin, consisting of approximately 0.85 acre of intermittent streambed bounded by 1.23 acres of vegetated wetlands. The aquatic habitat would be bounded by 4.2 acres of riparian habitat.

A wide, shallow secondary channel would be graded in the detention basin to provide topographic diversity and habitat heterogeneity. It is expected that the secondary channel would be activated at flow in excess of an approximate 2-year storm event in Black Rascal Creek. The secondary channel and the remainder of the north basin would be seeded with native grasses and planted with widely spaced valley oak (*Quercus lobata*), interior live oak (*Quercus wislizeni*), and California black walnut (*Juglans hindsii*) trees. This is expected to convert approximately 56.4 acres of agricultural lands to oak savannah. A temporary irrigation system would be installed to aid in the establishment of the trees and shrubs planted in the north basin. The planting plan for the habitat restoration and enhancements is provided in the Aquatic Resource Compensatory Mitigation Plan (Jacobs, 2021) prepared for the Project.

5.4.2.1.5 Drainage Facilities

Drainage facilities (that is, culverts with flap gates, headwalls, and end treatments) would be included at three locations: upstream within the embankment in the northwest corner of the Project, the western bank of Black Rascal Creek downstream of the principal spillway structure, and the eastern bank of Black Rascal Creek downstream of the principal spillway structure.

Drainage facilities are described as follows:

- Three 36-inch-diameter cement mortar-lined and -coated steel pipe culverts with positive closure device and flap gates would be included at the northwestern corner of the Project to alleviate ponding on the northwestern side of the Project beyond the embankment. Headwalls would be constructed at the inlet and outlet. The invert elevations of the culverts would be at grade to allow flow into the basin by gravity once the basin water level attenuates following a flood event.
- One 36-inch-diameter reinforced-concrete pipe culvert with a headwall, positive closure device and flap gate at the outlet would be included on the western bank of Black Rascal Creek downstream of the principal spillway structure to allow for drainage from a swale that is between the western embankment and the Fairfield Canal to Black Rascal Creek. This culvert will replace the existing culvert identified at Levee Mile 1.32 (Unit No. 1 Levee – Right Bank) according to the Federal O&M Manual.
- One 24-inch-diameter reinforced-concrete pipe culvert with a headwall, positive closure device and flap gate at the outlet would be included on the eastern bank of Black Rascal Creek downstream of the principal spillway structure to allow for drainage from the area that is between East Yosemite Avenue and the auxiliary spillway to Black Rascal Creek.

The Project will demolish the existing culvert located at Levee Mile 0.73 (Unit No. 2 Levee – Left Bank), according to the Federal O&M Manual, because this culvert is located in the footprint of the proposed embankment.

5.4.2.2 Inundation Durations

During the rainy season, some portion of the north basin would impound water during a 2-year storm event, with inundation of the entire basin (north and south basin) occurring for storm events with a return period of 5 years or greater. Table 5.4-1 lists the approximate duration that flows would be detained and released from the detention basin(s) once filled, for different magnitude storm events.

Table 5.4-1. Anticipated Duration of Flood Retention by Storm Events

Black Rascal Creek Watershed, CA

Storm Event	North Basin	South Basin	Northern Study Area[a]
2-year	40 hours	No inundation	3 to 40 hours
5-year	42 hours	2 to 10 hours	8 to 41 hours
10-year	44 hours	3 to 14 hours	8 to 41 hours
25-year	48 hours	3 to 30 hours	16 to 41 hours
50-year	48 hours	4 to 31 hours	18 to 41 hours
100-year	48 hours	4 to 32 hours	20 to 41 hours
200-year	48 hours	6 to 33 hours	20 to 41 hours

[a] The northern study area represents the existing 200-year flood inundation area upstream of the proposed detention basin. Total temporary inundation associated with a 200-year flood event is anticipated to be up to approximately 475 acres.

5.4.3 Project Construction

This section discusses the elements of Project construction including construction activities, work areas, use and disposal of excavated material, construction personnel and equipment and construction schedule.

5.4.3.1 Construction Activities

The Project includes the following six primary activities:

- Mobilization and site preparation – Equipment and materials staging, BMP installation (to include ECs included in Section 6, Environmental Consequences), clearing, and grubbing.
- Excavation and channel modification – Topsoil stripping and excavation of embankment borrow material from the modified channel, and removal of existing drainage facilities.
- Embankment construction – Foundation preparation, embankment construction, and slope protection.
- Habitat enhancements – Grading of tributary and secondary channels, and vegetation planting.
- Spillway construction – Construction of the principal and auxiliary spillways, including concrete work.
- Drainage facilities – Installation of culverts with flap gates.

Rather than discrete phases of the Project, these activities are expected to overlap, with one or more activities occurring concurrently with others.

5.4.3.2 Work Areas

Work areas during construction would be limited to the approximately 300-acre Project footprint. Construction equipment would remain onsite during construction, and equipment staging would occur within the Project footprint. Access to the Project footprint would be via East Yosemite Avenue in Merced County.

5.4.3.3 Use and Disposal of Excavated Material

Excavation for habitat channels, relocation of Black Rascal Creek, and removal of the existing levee would provide borrow material for the embankment construction. A 6-acre borrow area between the proposed habitat channels would be used to provide necessary material for construction. Stripped topsoil would be stockpiled and then replaced on embankment slopes and graded areas outside of drainage channels. Table 5.4-2 shows the approximate earthwork quantities.

Table 5.4-2. Approximate Earthwork Quantities
Black Rascal Creek Watershed, CA

Description	Quantity (cubic yards)
Stripping	79,300
Borrow Area (6 acres) Cut	25,600
Habitat Channel Excavation	103,800
Relocated Black Rascal Creek Excavation	38,500
Total Embankment Required	174,000
Gravel Surfacing	1,700

Material generated from the Project that is not suitable for embankment construction (strippings/organics) would be disposed of on the completed engineered embankment slopes. Offsite disposal would not be required.

5.4.3.4 Construction Personnel and Construction Equipment

A maximum of 30 workers would be onsite during Project construction, with the majority of workers anticipated to be local residents. Construction activities, personnel, and equipment required for the Project are listed in Table 5.4-3.

Table 5.4-3. Construction Duration, Workforce, and Equipment
Black Rascal Creek Watershed, CA

Activity	Duration	Personnel Required	Equipment Required
Site Preparation	3 months	8 to 10	1 Loader 2 Dozers 1 Excavator 4 Dump trucks
Excavation and channel modification, embankment construction, and habitat enhancements	12 months	20 to 30	4 Scrapers 4 Bulldozers 2 Excavators 2 Graders 4 Compactors 4 Dump trucks
Spillway construction and drainage facility construction	3 months	8 to 10	1 Grader 1 Roller 1 Backhoe 1 Dump Truck
Dust Control	18 months	2	2 Water trucks

5.4.3.5 Construction Schedule

Construction is anticipated to commence in spring 2024 and be completed by fall 2025, with construction of the detention basin limited to the dry season and a total active duration of approximately 18 months during that 2-year period. All work is expected to occur on weekdays between 7:00 a.m. and 5:00 p.m. No night work is anticipated.

5.4.4 Maintenance Activity

The Project would not result in any significant changes to hydrology in the watershed upstream of the detention basin and does not include any infrastructure that would result in a change in the distribution or magnitude of erosion or sediment transport into the Project detention basin. However, the detention basin structure would temporarily impound inflows during storm events and serve to reduce flow velocities, potentially inducing minor amounts of sediment deposition in the basin during high flow events.

Following Project construction, maintenance activities would include vegetation management, embankment and structure maintenance and inspection activities, and management of sediment and debris deposited in the basin, as needed. Sediment would be removed during dry periods when rubber or tracked earth-moving equipment can access the detention basin. An approved location within the Project limits, (such as on the embankments) would be used for sediment disposal.

5.4.5 Required Permits and Approvals

The following permits and approvals are anticipated to be required for construction of the Project:

- Federal
  - USACE – Section 404/Section 10 Individual Permit and Section 408 Permit
  - USACE- CWA Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230)

  - USFWS – Consultation under Section 7 of the federal Endangered Species Act (ESA)
  - SHPO – Consultation under Section 106 of the NHPA.
- State
  - Central Valley Regional Water Quality Control Board – (RWQCB) – Section 401 Water Quality Certification
  - Central Valley Flood Protection Board – Encroachment Permit
  - Central Valley RWQCB – National Pollutant Discharge Elimination System, General Construction Permit
  - CDFW– Section 2081 Management Agreement under Section 2081 California Fish and Game Code
  - CDFW – Lake or Streambed Alteration Agreement
- Local and Regional
  - San Joaquin Valley Air Pollution Control District (SJVAPCD) – Indirect Source Review
  - Merced County Department of Public Works – Grading Permit
  - Merced County Department of Public Works – Encroachment Permit
  - Merced County Department of Public Works – Transportation Permit

5.5 Summary and Comparison of Alternative Plans

Table 5.5-1 summarizes the environmental impacts presented in Section 6 of the Plan EA and the proposed ECs (also detailed in Section 6) that would avoid or reduce impacts.

Table 5.5-1. Summary and Comparison of Alternative Plans
Black Rascal Creek Watershed, CA

Issue	Resource	Level of Anticipated Impact No-Action Alternative	Level of Anticipated Impact Preferred Alternative (NED) (Recommended)
Soils and Geology	Upland Erosion/ Sedimentation and Stream Bank Erosion/ Destabilization	No impact	Moderate; ground disturbance during construction. No significant changes to hydrology in watershed upstream of detention basin.
	Stream Bank Erosion/Destabilization	No impact	The Project would not include any infrastructure that would result in a change in the distribution or magnitude of erosion of the existing stream channel bed or banks.
	Seismic Risk	No impact	The Project would be designed and constructed to withstand the effects of anticipated earthquake loading.
	Prime and Unique Farmland	No impact	Minor within Project footprint. Beneficial impact downstream of the Project.
Water	Surface Water Quality	No impact	Moderate with implementation of EC-1a; potentially beneficial.
	Surface Water Quantity	No impact	Beneficial impact; Project would detain floodwaters and reduce risk of downstream flooding.
	Groundwater Quantity/Quality	No impact	Beneficial impact from temporary impoundment of water during storm events
	Floodplain Management	No impact; unaltered from present condition	Beneficial impact with implementation of EC-1b/ Significant floodplain management benefit.

Issue	Resource	Level of Anticipated Impact No-Action Alternative	Level of Anticipated Impact Preferred Alternative (NED) (Recommended)
Air Quality and Greenhouse Gases	Air Quality	No impact	Minor; Project would not cause substantial air quality impacts.
	GHGs	No impact	Minor GHG emissions during Project operation. BMPs would be implemented during construction minimizing emissions.
Animals	Special-status Amphibians	No impact	Moderate impact to special-status amphibians with implementation of EC 2a.
	Western Pond Turtle	No impact	Moderate impact to Western pond turtle with implementation of EC 2b.
	San Joaquin Kit Fox and American Badger	No impact	Moderate impact to San Joaquin kit fox and American badger with implementation of EC 2c.
	Burrowing Owl	No impact	Moderate impact to burrowing owl with implementation of EC 2d.
	Swainson’s Hawk, Nesting Raptors, Eagles, and Other Native Birds	No impact	Moderate impact to birds with implementation of EC 2e.
	Tricolored Blackbirds, Loggerhead Shrikes, and Other Nesting Birds	No impact	Moderate impact to birds with implementation of EC 2e.
	Special-status Bats	No impact	Moderate impact to special-status bats with implementation of EC 2f.
	Vernal Pool Habitat and Associated Species	No impact	Moderate impact to vernal pool habitats with implementation of EC 2g.
	Essential Fish Habitat	No impact	Minor impacts on EFH due to temporary water quality impacts during construction.
	Natural Areas, Riparian Areas, and Invasive Species	No impact	BMPs and other ECs included as part of the Project would limit or manage the potential transport of invasive species during construction. Minimal effects to natural areas.
Plants	Endangered and Threatened Plant Species	No impact	Moderate with implementation of EC 3a.
	Natural Areas	No impact	Moderate with implementation of EC 3b.
	Invasive Species	No impact	BMPs, including equipment washing prior to entering the site and upon departure, as well as other ECs included as part of the Project, would limit or avoid the potential transport of invasive species during construction
	Riparian Area	No impact	Result in improved or expanded riparian communities in the Project vicinity.
Human Environment	Public Health and Safety (Transportation)	No impact	Moderate with implementation of EC 4a/ Minor during operation.
	Flood Damages	Continued flooding and damage, public safety and health risks	Beneficial impact. Reduce flood damage within the benefited area up to a 200-year flood event.
	Cultural Resources	No impact	Moderate with implementation of EC 5a/No impact during operation.

Issue	Resource	Level of Anticipated Impact No-Action Alternative	Level of Anticipated Impact Preferred Alternative (NED) (Recommended)
	Social and Economic Conditions	Continued flooding and damage, resulting in adverse social and economic impacts	Substantial beneficial impact. Local economic gains attributable to reduced future impacts caused by flood damage and reduced risk of costly lawsuits.
Installation Cost	Installation Cost	$0	$35,522,703
NED Account	Annual Benefits	$0	$5,017,012
	Average Annual (Expected) Costs	$0	$1,095,968
	Annual Net Benefits	$0	$ 3,921,048

6. Environmental Consequences

This section identifies potential impacts in the context of a number of resources and issue areas. Existing conditions, the No-Action Alternative (FWOP), and the Preferred Alternative are discussed for each of the resource areas. ECs included as part of the Project as described in Section 5.4.2 are listed and are intended to minimize potential environmental impacts. An EIR was previously prepared under CEQA by Merced County. The EIR concluded that the Project would result in impacts that would be less-than-significant, or less-than-significant with implementation of mitigation measures (Merced County, 2017). These mitigation measures were used as the basis for many of the ECs. The following sections describe potential effects as having no impact or minor, moderate, significant but mitigatable with the implementation of ECs under NEPA, or significant effects. The descriptions for the intensity of impacts in this evaluation are defined as follows and are used as appropriate within each section for a given impact:

- No impact: An environmental impact could occur, but impact might not be perceptible.
- Minor (defined as a negligible impact in the EIR): A perceptible adverse environmental impact that would clearly not be significant.
- Moderate (defined as a less-than-significant impact in the EIR): An environmental impact could occur and is readily detectable but is clearly less-than-significant or would be considered less-than-significant with implementation of ECs.
- Significant but Mitigatable (defined as less-than-significant with mitigation in the EIR): A significant impact is anticipated, but implementation of mitigation measures would reduce the adverse impacts to moderate or less-than-significant.
- Significant: An adverse environmental impact which, given the context and intensity, would substantially alter the function or character of the resource.

In addition, this section analyzes cumulative impacts or potential impacts of the Project in conjunction with those of other development proposals in the Project surroundings. The cumulative analysis for the Project relies on a list of past, present, and reasonably foreseeable future projects. Projects included in the list of reasonably foreseeable projects are proposed by formal public notices (e.g., Notices of Preparation), have pending environmental documents, or are in the process of regulatory review. The cumulative impact area includes projects within unincorporated Merced County within 10 miles of the Project footprint, with a focus on projects within approximately 3 miles of the Project footprint. However, for some resource areas such as air quality and greenhouse gas, the area under consideration is much larger, as is discussed in the following sections. The cumulative Project information is based on the information presented in the EIR (Merced County, 2017). Table 6.0-1 lists the projects that were identified.

Table 6.0-1. Reasonably Foreseeable Future Projects in the Project Vicinity
Black Rascal Creek Watershed, CA

Project Name	Community	Project Size (acres)	Description	Distance from Proposed Project (miles)	Status
Sussex Estates Subdivision Project	Near Atwater	7	Divide existing agricultural parcel into four residential lots	10.25	Initial Study 2016
San Joaquin Valley Christian School	Near Atwater	54	Construction of a prekindergarten – 12th grade private school on former agricultural land in rural residential area	7.5	Conditional use permit granted
Templo La Hermosa	Bear Creek	5.5	Construction of new house of worship on formerly agricultural parcel	3	Conditional use permit granted
Meirinho Dairy Expansion	North of Planada	78	To convert 78 acres of active cropland to expansion of dairy facilities on property	8.25	Conditional use permit granted

6.1 Soils and Geology

6.1.1 Existing Conditions

Existing geologic and soil conditions occurring within the Project footprint and within the vicinity of the Project footprint are documented in Section 4.

6.1.2 No-Action Alternative (FWOP)

Under the No-Action Alternative, Merced County would not implement the Project. Black Rascal Creek would continue to be unmanaged, and the Project Purpose and Need would not be met. Ongoing geologic and soil conditions would be unaltered from the present condition.

6.1.3 Preferred Alternative

6.1.3.1 Upland Erosion/Sedimentation and Stream Bank Erosion/Destabilization

The Project would involve some earth-moving activities including embankment construction. Construction activities would result in moderate ground disturbance and could result in localized soil erosion, sedimentation, and inadvertent permanent soil loss within the study area. During construction, BMPs and other ECs included as part of the Project would limit the potential for soil loss during construction of the Project.

The Project would not result in any significant changes to hydrology in the watershed upstream of the detention basin and does not include any infrastructure that would result in a change in the distribution or magnitude of erosion or sediment transport into the Project detention basin. However, the detention basin structure would temporarily impound inflows during storm events and serve to reduce flow velocities, potentially inducing minor amounts of sediment deposition in the basin during high flow events. Considering that the detention basin would be periodically maintained to remove excess sedimentation, direct impacts from sedimentation deposition are anticipated to be moderate.

6.1.3.2 Stream Bank Erosion/Destabilization

As described, the Project would not result in any significant changes to hydrology in the watershed upstream of the detention basin and does not include any infrastructure that would result in a change in the distribution or magnitude of erosion of the existing stream channel bed or banks. Operation of the detention basin would allow better control of creek flows downstream of the Project footprint, effectively reducing the potential for indirect effects to channel erosion downstream of the Project footprint during high flow events. Therefore, impacts from stream bank erosion / destabilization would be moderate.

6.1.3.3 Seismic Risk

Like much of the Central Valley, the Project footprint has and will continue to be subject to occasional ground shaking generated by activity on local and regional faults, as previously described. Because the site is underlain by recent alluvial soil, liquefaction may be possible, depending on the depth to groundwater, the density of the alluvial soil, and the severity of an earthquake. The Project footprint is not in an area identified as unstable or there is a significant hazard of liquefaction or associated effects. Subsurface investigations would be performed to verify that the foundation can support the proposed embankments for any hazards of liquefaction that may be identified. The area within the Project footprint is gently sloped and is not subject to landslides. Project features would not include habitable structures or bridges. The Project would be designed and constructed to withstand the effects of anticipated earthquake loading, based on the site-specific detailed geotechnical investigation of the Project footprint; therefore, impacts from seismic activity would be minor.

6.1.3.4 Prime and Unique Farmland

The Project would be located on approximately 300 acres mapped by the FMMP as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, or Grazing Land. Table 6.1-1 summarizes the designations of FMMP lands for each Project feature and the acreage that would be permanently removed from FMMP lands.

Project facilities would result in the permanent conversion of approximately 12 acres of Prime Farmland, and 1 acre of Grazing Land. The land conversion would be to accommodate the embankment system. Although these lands would be converted to nonagricultural uses, they comprise a small percentage of the agricultural land in Merced County (less than 0.001 percent of all designated farmlands); therefore, the Project would result in a minor impact.

Table 5.4-1 lists the approximate duration that flows would be detained and released from the detention basin(s) once filled, for different magnitude storm events; for the orchard, the area could be inundated for up to 48 hours. Although the orchard could be inundated due to flood waters, the Preferred Alternative would result in improved flood protection that would benefit farmland downstream. Therefore, it is anticipated that the potential impacts of this duration of inundation to the orchard within the Project footprint would be minor. Because the Project will better manage flood flows, it is anticipated that impacts to farmland areas downstream of the Project footprint would be beneficial by reducing risk associated with unpredictable flooding.

Table 6.1-1. FMMP Acreage of Project Features and Permanent Removal of FMMP Lands
Black Rascal Creek Watershed, CA

Project Feature	FMMP Designation	Project Feature (acres)	Permanently Removed (acres)
Project footprint (areas outside of north and south basins)	Prime Farmland	20	0
	Unique Farmland	2	0
	Farmland of Statewide Importance	23	0
	Farmland of Local Importance	4.79	0
	Grazing Land	4	0
North Basin	Prime Farmland	40	0
	Unique Farmland	26	0
	Farmland of Statewide Importance	10	0
	Farmland of Local Importance	11	0
	Grazing Land	1	0
South Basin	Prime Farmland	136	0
	Unique Farmland	0	0
	Farmland of Statewide Importance	Less than 1	0
	Farmland of Local Importance	Less than 1	0
	Grazing Land	0	0
Embankments	Prime Farmland	12	12
	Unique Farmland	0	0
	Farmland of Statewide Importance	0	0
	Farmland of Local Importance	0	0
	Grazing Land	1	1

6.1.3.5 Cumulative Impacts

The Project would comply with building codes, including design and construction to withstand the effects of earthquake loading based on site-specific geotechnical analysis, and would implement ECs described in Section 6.2.4 to reduce soil erosion and the loss of topsoil to a moderate level; therefore, the Project would not create a cumulatively considerable impact on soils and geology.

Under the Preferred Alternative, approximately 13 acres of agricultural lands would be permanently lost to construction. Operation of the detention basin would allow better control of creek flows downstream of the Project footprint, effectively reducing the potential for channel erosion downstream of the Project footprint during high flow events and protecting approximately 3,100 acres of agricultural lands. Although the Project would result in the permanent conversion of a limited amount of agricultural lands, the Project would improve conditions downstream for approximately 3,100 acres of existing agricultural lands by protecting them from floods. Therefore, the Project would improve conditions and not create a cumulatively considerable impact on land use or agriculture.

6.2 Water

6.2.1 Existing Conditions

Existing hydrologic, surface water, and groundwater conditions occurring within the Project footprint and within the vicinity of the Project footprint are documented in Section 4. A map showing regional floodplains is included in Appendix C1.

The Merced IRWMP was completed in August 2013 (RMC, 2013). The Merced IRWMP covers the Merced Region, which generally encompasses the northeast portion of Merced County, and includes Black Rascal Creek. The Project is listed as a flood risk management strategy to protect DACs from chronic flooding issues.

The Upper San Joaquin River Regional Flood Management Plan (USJR RFMP), completed in February 2015, identifies needed flood improvements and evaluates opportunities for developing potential multi-benefit projects in this portion of Merced County (SJRFCPA, 2015). The Project is identified as a high priority in the USJR RFMP documents.

The proposed detention basin and associated water management facilities will provide downstream agricultural lands and local communities with protection from frequent flooding and will be designed to contain up to the 200-year flood event in compliance with the Central Valley Flood Protection Act of 2008.

The inundation of the detention basin would contribute water to the local aquifer through percolation and release of flows for contribution to downstream groundwater management and recharge projects. This increased flood protection would reduce the risk of inundation of local wastewater treatment facilities and directly benefit water quality as a result.

6.2.2 No-Action Alternative (FWOP)

Under the No-Action Alternative, Merced County would not implement the Project. Black Rascal Creek would continue to be unmanaged, and the Project purpose, need and objectives would not be met. Surface water and groundwater resources would be unaltered from the present condition.

As discussed in Section 4.2.1, Black Rascal Creek is generally of good surface water quality and is not listed as an impaired waterway; therefore, short-term effects to water quality under the No-Action Alternative are negligible. As discussed in Section 4.2.4, when flow in Black Rascal Creek exceeds approximately 3,000 cfs, the stream flow overtops the Black Rascal Creek diversion channel and follows the historic channel through the City of Merced and into the Franklin-Beachwood area. Under the No-Action Alternative, continued flooding of Black Rascal Creek could result in long-term adverse impacts to water quality due to erosion and sedimentation.

6.2.3 Preferred Alternative

The CWA (Title 33 U.S.C. Section 1251 et seq.) is the primary federal law governing surface water quality. The goal of the CWA is to restore and maintain the physical, chemical, and biological integrity of the waters of the United States. The CWA guides restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. CWA Section 401, 402, and 404 requirements specifically apply to construction projects that might affect jurisdictional wetlands and waters of the United States. If a project discharges into waters of the United States, Section 401 specifies that RWQCB certification must be obtained verifying that the project complies with the CWA and state water quality standards.

6.2.3.1 Surface Water Quality

As described in Section 5.4.2, construction of the Project would include site clearing, grubbing, and topsoil stripping; excavation within the detention basin; embankment construction; construction of the spillway; and installation of outlet infrastructure. The use of heavy equipment is anticipated during portions of the work. It is possible that the operation and maintenance of construction equipment could result in a direct impact from hazardous materials spills if materials are misused or improperly handled and stored. Leaks and spills could enter the soil and potentially contaminate groundwater or runoff into nearby surface water features, causing a significant impact on water quality. EC 1a involves the development and implementation of a SWPPP and BMPs to minimize the potential for spills or site runoff. With implementation of EC 1a, the impact would be moderate.

The development and implementation of a SWPPP and BMPs would minimize the potential for spills or site runoff. The SWPPP will emphasize proper hazardous materials storage and handling procedures; will outline spill containment, cleanup, and reporting procedures; and will limit refueling and other hazardous activities to designated areas. Signs prohibiting refueling will be posted in sensitive areas. Equipment will be inspected prior to use each day to ensure that hydraulic hoses are tight and in good condition. Additionally, the contractor will employ BMPs, consistent with the guidance in *Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide* (Caltrans, 2003), to reduce runoff from the Project footprint to nearby surface water features. These may include but are not limited to temporary soil stabilization (such as proper grading and covering of soil stockpiles) and temporary sediment control (such as silt fences, fiber rolls, or sandbag barriers), and permanent soil stabilization (such as installing sediment barriers, vegetative buffer strips, and reseeding disturbed areas). Other appropriate BMPs, such as use of concrete washout basins and proper waste management, securely locating and maintaining portable toilets, will be used to prevent discharge of possible contaminants and chemicals associated with construction or operations activities to reduce potential impacts to a moderate level.

Project operations would involve periodic inundation of portions of the detention basin during storm events. As discussed in Section 4.2.1, Black Rascal Creek is generally of good surface water quality and is not listed as an impaired waterway. Additionally, temporary impoundment of surface water during storm events would allow for settling of suspended sediments within Black Rascal Creek, thereby improving surface water quality downstream. Therefore, construction and operation of the Project would result in a moderate to potentially beneficial impact on surface water quality.

6.2.3.2 Surface Water Quantity

The Project would detain floodwaters and reduce the risks of flooding downstream of the Project footprint during the non-irrigation season. No direct diversions of surface waters would occur. As noted in the next section, localized groundwater recharge may increase as a result of the Project. This water would provide benefits for regional water management to local aquifers and associated water users who depend on groundwater supplies, as aquifers in this region have been steadily declining for many decades. Therefore, the Project would result in beneficial impacts related to groundwater recharge benefits and regional water management.

6.2.3.3 Groundwater Quantity/Quality

Operation of the Project would result in temporary impoundment of surface water from Black Rascal Creek within the detention basin at the frequencies and durations specified in Table 5.4-1. The temporary impoundment of water within the detention basin during storm events is anticipated to result in a beneficial, although unquantified, contribution to groundwater recharge.

Construction of the embankment system is not anticipated to reduce groundwater recharge due to the relatively small surface area of the embankments. Because the land use of these areas would not change, reduction in groundwater recharge is not anticipated. The elimination of applied water over this area would result in a negligible reduction to groundwater recharge.

6.2.3.4 Floodplain Management

The Project is designed to temporarily impound the surface water of Black Rascal Creek during flood events to minimize the potential for downstream flooding (as has occurred historically). Because operation of the Project would minimize downstream flooding and erosion caused by excess flow, the risk of flooding would be reduced in the areas downstream of the Project, providing a significant floodplain management benefit for the City of Merced and nearby community of Franklin-Beachwood.

The Project is designed to contain up to the 200-year flood event in compliance with the Central Valley Flood Protection Act of 2008 and would be constructed in accordance with established Project standards and requirements.

The Black Rascal Creek Flood Control Project facilities are being designed in accordance with California Code of Regulations Title 23, the USACE engineer manuals (EMs) and standards (including the principal ones listed here), and NRCS minimum requirements and design criteria for earthen dams and reservoirs. Where there are discrepancies between the different regulations or standards, the more stringent requirements or criteria govern.

Applicable USACE EMs include the following:

- EM 1110-2-1901, Seepage Analysis and Control for Dams
- EM 1110-1-1905, Bearing Capacity of Soils
- EM 1110-2-1913, Evaluation, Design, and Construction of Levees
- EM 1110-2-2100, Stability Analysis of Concrete Structures
- EM 1110-2-2502, Floodwalls and other Hydraulic Retaining Walls
- EM 1110-2-2902, Conduits, Pipes, and Culverts Associated with Dams and Levee Systems

The total temporary inundated area associated with a 200-year flood event is anticipated to be approximately 475 acres. Given the purpose of the Project is to decrease the potential for downstream flooding; the Project would result in beneficial impacts for the City of Merced and nearby community of Franklin-Beachwood.

Operation of the Project reducing flooding potential is anticipated to necessitate the need to revise floodplain mapping and zoning designations downstream of the proposed improvements. Merced County would comply with National Flood Insurance Program regulation 44 CFR 65.3 regarding submittal of new technical data to FEMA regarding necessary changes to flood zone determinations resulting from the Project.

6.2.3.5 Cumulative Impacts

The Project would result in earth-moving to accommodate Project features. However, as discussed above, impacts on water quality resulting from construction activities would be reduced to a moderate level by implementing measures described in EC 1a. Additionally, the temporary impoundment of surface water during storm events would allow for settling of suspended sediments within Black Rascal Creek, thereby improving surface water quality and providing a beneficial impact on water quality within and downstream from Black Rascal Creek.

The embankment system would be designed to contain flood flows resulting from a 200-year event with adequate freeboard, and would be constructed in accordance with established Project standards and requirements, thereby reducing flood flows downstream from the Project footprint and reducing the potential of embankment failure during major storms. Therefore, because impacts would either be beneficial or reduced to less-than-significant, the Project would not cause a cumulatively considerable impact on hydrology and water quality.

The Project would result in flood control for up to a 200-year storm event within the Black Rascal Creek watershed, resulting in flood protection for residential communities within the City of Merced and Merced County, and surrounding agricultural properties. By reducing the threat caused by uncontrolled runoff and flooding from Black Rascal Creek, the potential for future development could occur as determined by future planning efforts within the City of Merced and Merced County.

6.2.4 Environmental Commitments

The following EC would be implemented to reduce impacts to water resources associated with Project activities:

EC 1a, Develop and Implement SWPPP and BMPs:

The construction contractor(s) will prepare and implement a SWPPP consistent with the guidance provided in the *Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual* (Caltrans, 2011) or similar. The SWPPP will emphasize proper hazardous materials storage and handling procedures; will outline spill containment, cleanup, and reporting procedures; and will limit refueling and other hazardous activities to designated areas. Signs prohibiting refueling will be posted in sensitive areas. Equipment will be inspected prior to use each day to ensure that hydraulic hoses are tight and in good condition. Additionally, the contractor will employ BMPs, consistent with the guidance in *Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide* (Caltrans, 2003), to reduce runoff from the Project footprint to nearby surface water features. These may include, but are not limited to temporary soil stabilization (such as proper grading and covering of soil stockpiles) and temporary sediment control (such as silt fences, fiber rolls, or sandbag barriers), and permanent soil stabilization (such as installing sediment barriers, vegetative buffer strips, and reseeding disturbed areas).

Other appropriate BMPs, such as use of concrete washout basins and proper waste management, securely locating and maintaining portable toilets, will be used to prevent discharge of possible contaminants and chemicals associated with construction or operations activities to reduce potential impacts to a moderate level.

6.3 Air Quality and Greenhouse Gases

This section describes the regulatory and environmental setting of air quality in the Project vicinity, and evaluates potential impacts that would result from development of the Project.

6.3.1 Existing Conditions

As discussed in Section 4.3.1, attainment status for the Project footprint is summarized in Table 4.3-2. Under the NAAQS, the area is currently designated as nonattainment for the O_3 and $PM_{2.5}$ standards. Merced County is a maintenance area for the federal PM_{10} standard. The area is in attainment for the federal NO_2 and SO_2 standards and is unclassified for lead. Under the CAAQS, the Project footprint is currently designated as nonattainment for O_3, PM_{10}, and $PM_{2.5}$, and as attainment or unclassified for other pollutants.

Global climate change is a cumulative impact; therefore, an individual project is not expected to generate enough GHG emissions to significantly influence global climate change. Currently, no federal agency has adopted a quantitative threshold to evaluate the significance of an individual project's contribution to GHG emissions in the context of NEPA. Nevertheless, GHG emissions were estimated for Project construction and operation in terms of CO_2e.

6.3.2 No-Action Alternative (FWOP)

Under the No-Action Alternative, construction would not occur, and air pollutant emissions associated with construction would not be generated. Emissions from vehicles, stationary sources, and mobile sources operations would not change from current conditions. No additional air quality impacts are expected from No-Action.

6.3.3 Preferred Alternative

6.3.3.1 Air Quality

Construction of the Project would cause short-term direct air pollutant emissions. Construction emissions include engine exhaust from vehicle trips traveled by construction workers, delivery trucks, concrete trucks, and off-road construction equipment. The construction emission analysis assumes that construction would take a total of 18 months in 2024 and 2025. The total area of disturbance is anticipated to be up to 300 acres. Excavated soil would either be reused onsite, or disposed of at a nearby site by using dump trucks. Additional importing or exporting of soil are not expected for Project construction. Two water trucks will be used onsite to control the fugitive dust emissions from exposed areas. Appendix E2 provides the California Emissions Estimator Model (CalEEMod) output files showing the detailed construction assumptions and emissions.

The Project is in nonattainment for O_3 and $PM_{2.5}$ under NAAQS; thus general conformity rule applies. Table 6.3-1 compares the estimated Project construction emissions to the general conformity de minimis thresholds to determine whether the Project would require a conformity determination.

Table 6.3-1. Estimated Maximum Annual Construction Emissions (tons per year) for the Project
Black Rascal Creek Watershed, CA

Construction Year	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
2024	5.47	7.38	0.85	0.018	2.27	1.28
2025	3.71	4.98	0.58	0.012	1.93	1.06
General Conformity De Minimis Thresholds	Not applicable	10	10	70	100	70

VOC = volatile organic compound

As shown in Table 6.3-1, emissions of NO_x, VOCs, SO_2, $PM_{2.5,}$ and PM_{10} during construction would be below the applicable general conformity de minimis thresholds. On the basis of the conformity applicability criteria, the Project is assumed to conform to the most recent EPA-approved State Implementation Plan; therefore, the Project would not cause direct or indirect substantial air quality impacts, and would not require further conformity analysis or demonstration.

Construction of the Project would comply with SJVAPCD Regulation VIII requirements to control fugitive dust emissions. Emission control measures would include but not limited to the following:

- Apply water to unpaved surfaces and areas.
- Use nontoxic chemical or organic dust suppressants on unpaved roads and traffic areas.
- Limit or reduce vehicle speed on unpaved roads and traffic areas.
- Maintain areas in a stabilized condition by restricting vehicle access.
- Install wind barriers.
- During high winds, cease outdoor activities that disturb the soil.
- Keep bulk materials sufficiently wet when handling.
- Store and handle materials in a three-sided structure.
- When storing bulk materials, apply water to the surface or cover the storage pile with a tarp.
- Do not overload haul trucks; overloaded trucks are likely to spill bulk materials.
- Cover haul trucks with a tarp or other suitable cover, or wet the top of the load enough to suppress visible dust emissions.
- Clean the interior of cargo compartments of emptied haul trucks before leaving a site.
- Prevent track-out by installing a track-out control device.

- Clean up track-out at least once each day; if the road is along a busy road or highway, clean up track-out immediately.
- Monitor dust-generating activities and implement appropriate measures for maximum dust control.

The construction emissions of NO_x would be greater than 2 tons per year; therefore, the Project NO_x emissions would exceed the SJVAPCD Rule 9510 trigger level. The Project would comply with Rule 9510 to reduce the NO_x emissions through either onsite emission reduction, offsite emission offset, or a combination of the two. Onsite emission reduction measures would include using less polluting construction equipment, which would be achieved by using add-on controls, cleaner fuels, or newer, low-emissions equipment.

Temporary exhaust emissions from construction equipment would contain toxic air contaminants, such as diesel particulate matter, which have the potential to cause cancer because of long-term exposure. Although there are sparsely located residential units near the construction site, most of the sensitive receptors are miles away from the construction site. Construction activities would be limited to a relatively small area where only a few pieces of construction equipment would operate at any one time. Exposures to the toxic air contaminant emissions from the construction activities would be indirect and short-term, and long-term exposure to diesel particulate matter from construction would not occur. In addition, the Project construction would implement BMPs to minimize exposure of nearby sensitive receptors to the construction-related pollutants.

Operation of the Project would require minimal equipment and vehicle use for maintenance purposes each year; therefore, operational emissions from the Project would be minor and would not exceed the general conformity de minimis thresholds.

Construction and operation of the Project would not have substantial adverse air quality impacts; therefore, mitigation is not required.

6.3.3.2 Greenhouse Gases

GHG emissions would occur during Project construction, and would include emissions from fuel combustion in construction equipment, haul trucks, and worker commute vehicles. CO2e emissions from construction equipment and vehicles were estimated using the California Emission Estimator Model (California Air Pollution Control Officers Association, 2016) with Project-specific phasing, equipment usage, and vehicle miles traveled. Estimated GHG emissions for Project construction are presented in Table 6.3-2. Details of the emission calculations are in Appendix E2.

Table 6.3-2. Estimated Construction Emissions of Greenhouse Gases
Black Rascal Creek Watershed, CA

Construction Year	Emissions of CO_2e (metric tons/year)
2024	1,555
2025	1,096
Amortized over 50-year Lifetime	**88**

GHG emissions from construction would be temporary, because construction is only expected to last approximately 18 months. Total GHG emissions from Project construction would be approximately 2,651 metric tons of CO_2e. The annual GHG emissions, amortized over the Project's 50-year lifetime, would be 88 metric tons per year.

The Project would implement BMPs during construction, such as minimizing unnecessary construction vehicle trips and idling time, which would reduce GHG emissions and make the overall construction emissions even lower.

Ongoing maintenance activities of the Project footprint would continue once construction is completed. The Project would have occasional equipment usage during maintenance. Maintenance activity levels would be similar to existing operations. Therefore, GHG emissions would be minor during Project operations.

Currently, there are no quantitative GHG emission thresholds applicable to Merced County. On December 17, 2009, SJVAPCD adopted the *Guidance for Valley Land-Use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* (2009). According to the guidance, projects complying with an approved GHG emission reduction plan or GHG mitigation program would be determined to have a less-than-significant individual and cumulative impact for GHG emissions. For other projects, the guidance relies on the use of performance-based standards, otherwise known as best performance standards (BPSs), to assess significance of project-specific GHG emissions on global climate change. Otherwise, a project needs to demonstrate a 29 percent reduction in GHG emissions from business-as-usual conditions to conclude that a project would have a less-than-significant impact.

Although SJVAPCD's guidance recommends approaches for evaluating the significance of GHG impacts, the guidance does not limit a lead agency's authority to establish its own process and guidance for determining significance (SJVAPCD, 2009). The Project is consistent with the *2030 Merced County General Plan's* (Merced County, 2013) flood control strategies, but there is no applicable local GHG reduction plan. Therefore, the first criterion in SJVAPCD's GHG guidance does not apply to the Project. SJVAPCD publishes a list of BPSs for land development projects, and each BPS has a corresponding GHG reduction percentage that can be applied to Project emissions to meet the 29 percent emission reduction criterion. However, the current BPSs focus on measures to reduce GHG emissions from residential or commercial development projects with long-term GHG operational emissions. There are no applicable BPSs for short-term construction activities. Because the Project would only have one-time, short-term emissions of GHG from construction and negligible long-term operational GHG emissions, the criteria requiring use of BPSs, demonstration of 29 percent GHG emission reduction, or both, are not applicable to the Project.

SJVAPCD's recommended guidance and significance criteria are not applicable to the Project; therefore, impacts of the GHG emissions that would result from the Project were evaluated based on the short-term nature of the construction activities, the potential long-term benefits of the Project, and whether the Project GHG emissions would hinder or delay California's ability to meet the statewide GHG reduction targets set in Assembly Bill (AB) 32 and Senate Bill 32.

Because the Project would improve the resilience of the region to withstand more severe storm and flood events, personal injury and property damage associated with flooding events would be reduced. As a result, the Project would have long-term benefits, reducing direct and indirect GHG emissions from activities associated with flood control and flood damage. These long-term GHG reduction benefits would be expected to offset the short-term GHG construction emissions.

6.3.3.3 Cumulative Impacts

As discussed, the Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is nonattainment under an applicable federal or state ambient air quality standard. EPA classifies Merced County as nonattainment with the NAAQS for O_3 and $PM_{2.5}$. The CARB classifies the county as nonattainment with the CAAQS for O_3, PM_{10}, and $PM_{2.5}$. Construction emissions would be temporary and less than the SJVAPCD air quality emissions threshold. Operation emissions would be negligible, and the Project is in a rural area, miles away from other stationary or mobile emission sources. Therefore, the Project would not create a cumulatively considerable impact on air quality.

GHG emissions from an individual project are generally insignificant when considered in the context of global climate impacts. However, every project that emits GHG contributes to a cumulative increase in global atmospheric concentrations of GHG.

For the Project, GHG impacts were evaluated on the basis of whether emissions from the Project would hinder or delay California's ability to meet GHG reduction targets set in AB 32. Nearly all GHG emissions associated with this Project would be generated during construction. Operation emissions would be negligible. The Project would not create a cumulatively considerable impact on GHG emissions.

6.4 Animals

6.4.1 Existing Conditions

The Project footprint currently provides potentially suitable habitat for special-species that include CTS, western spadefoot, western pond turtle, San Joaquin kit fox, American badger, burrowing owl, and Swainson's hawks, as well as other nesting raptors and other native birds. These species and others are protected through a number of federal and state regulations including:

- ESA of 1973 (42 U.S.C. 4321 et seq.) and subsequent amendments provide guidance for conserving federally listed species and the ecosystems upon which they depend.

- The Fish and Wildlife Coordination Act of 1934, as amended (16 U.S.C. Section 661 et seq.) is intended to promote conservation of fish and wildlife resources by preventing their loss or damage, and to provide for development and improvement of fish and wildlife resources in connection with water projects. As part of the Project, Merced County would restore and enhance aquatic, riparian, and upland habitats in the footprint of the proposed detention basin (Section 5.4.2.1.4, Habitat Restoration and Enhancement).

- The Migratory Bird Treaty Act (MBTA) (16 U.S.C. Sections 703 to 712) protects selected species of birds that cross international boundaries (i.e., species that occur in more than one country at some point during their life cycle). The law prohibits the take of such species, including the removal of nests, eggs, and feathers.

- The Bald and Golden Eagle Protection Act (16 U.S.C. Sections 668 to 668d, 54 Statute 250) prohibits the destruction of bald and golden eagles and their occupied and unoccupied nests.

- Executive Order 13112 as amended by Executive Order 13751—Invasive Species requires federal agencies to work cooperatively to prevent and control the introduction and spread of invasive plants and animals.

- The California Endangered Species Act (CESA) conserves and protects plant and animal species at risk of extinction. CDFW works with agencies, organizations, and other interested persons to study, protect, and preserve CESA-listed species and their habitats.

- Animal or habitat surveys that have been conducted in the Project location include biologic reconnaissance surveys for special-status species suitable habitat (2016 and 2017) and an aquatic resources delineation (February, March and September 2019). Special-status species preconstruction surveys will be conducted prior to ground disturbance or vegetation clearing as appropriate.

The following provides a summary of existing conditions associated with the Project footprint by species and category.

6.4.1.1 Special-status Amphibians

CTS is known to occur regionally and has potential to occur within the Project footprint. There are numerous occurrence records for CTS associated with grazed grassland and vernal pool habitats, and stock ponds to the northwest, north, and northeast of the Project footprint. The nearest occurrence is 2.6 miles to the northwest and is associated with habitats comprising grazed grassland, vernal pools, and California ground squirrel (*Otospermophilus beecheyi*) burrows. There are several other similar records within approximately 3.5 miles of the Project footprint, with some breeding sites associated with stock ponds rather than vernal pools. All the known occurrences are from areas beyond the expected maximum dispersal distance for the species (approximately 1 mile), and CTS from known breeding sites are unlikely to occur within the Project footprint. However, there is ostensibly suitable breeding habitat north of the proposed detention basin and, if present, individuals may disperse into adjacent upland areas and take refuge in burrows or other forms of refugia. Vernal pools are present adjacent to the northern end of the west embankment. California ground squirrel burrows were observed in this area (north of the detention basin and in agricultural/pasture land) and other small mammal burrows; thus, this area appears to provide suitable habitat for breeding and dispersal. The potential for subterranean refugia (i.e., in the burrows) in the vernal pool area around the west embankment is low. Other wetlands in the area, including seasonal or perennial wetlands, may also be used by breeding individuals, but the presence of American bullfrogs (*Lithobates catesbeianus*), which were observed in seasonal and perennial wetlands, reduces the likelihood of CTS breeding in these areas. In the absence of focused surveys for the species, CTS are assumed to be present within the Project footprint and surrounding areas. Because the species may occur in aquatic habitat in the Project footprint, individuals may disperse across uplands and could take refuge in upland areas that have burrows or other refugia.

6.4.1.2 Western Spadefoot

Western spadefoot are known to occur in the Project vicinity. Although there are no recordings within the Project footprint, there is a record for western spadefoot approximately 0.7 mile to the northeast of the Project footprint, near the Le Grand Canal. This species has similar habitat requirements to CTS; it breeds in vernal pools during the wet season and is mainly terrestrial in the dry season, burrowing in sandy or gravelly soils. Potentially suitable breeding and upland habitat is present in the area north of the proposed detention basin.

6.4.1.3 Western Pond Turtle

Western pond turtles have been documented in the Project vicinity and may occur within the Project footprint, in Black Rascal Creek, and adjacent habitats, including as dispersants during wet periods. Western pond turtles may also occur year-round in portions of the creek that support open water, including the largest ponded area near the north end of the Project footprint. Western pond turtles may also occur in aquatic habitats associated with the nearby Fairfield Channel to the west. Densely vegetated and seasonally ponded portions of the creek are not expected to support the species in the dry season.

6.4.1.4 San Joaquin Kit Fox and American Badger

San Joaquin kit fox and American badgers are unlikely to use the proposed detention basin area for denning and reproduction. Most of the proposed basin would be within agricultural areas that are largely unsuitable for denning because of incompatible land use practices and frequent human disturbances. However, these and surrounding areas may be used for foraging and as a movement corridor. Most of the proposed detention basin consists of almond orchard, which represents low-quality foraging habitat for both species, which prefer to hunt in open areas mainly for ground-dwelling rodents. Although they could occur, neither species is likely to occur regularly in the orchard. The hay field within the detention basin represents more suitable foraging habitat for both species, because those habitats are open and likely support forage species. The proximity of these agricultural areas to adjacent grasslands greatly increases the probability that either species could occur on the Project footprint.

The undeveloped annual grasslands to the north represent higher-quality habitat for both species. Denning is unlikely to occur in the footprint of the embankments, north of the proposed basins in the annual grassland/vernal pool complex, or near the creek in general because of regular flooding; San Joaquin kit fox and American badgers have a greater potential to den in adjacent hilly areas. There are two occurrences of San Joaquin kit fox north of the Project footprint. One is approximately 0.5 mile north of the basin near the northeastern extent of the Project footprint. This record also includes an American badger observation from the same area. Another record of a foraging San Joaquin kit fox occurs approximately 1 mile north of the basin. There are other records in the Project vicinity that further suggest both species may occur on the Project footprint, most likely as occasional foragers or while moving through the area.

6.4.1.5 Burrowing Owl

The Project footprint represents suitable habitat for burrowing owls. Although burrowing owls are unlikely to forage in the almond orchards or other areas with tree canopy, which encompasses most of the Project footprint, the open grasslands and channel edges represent suitable foraging habitat. Areas supporting

California ground squirrels are potentially suitable nesting and shelter locations. California ground squirrel burrows have been observed in the Project vicinity (Section 6.4.1.1). A burrowing owl was observed north of the proposed detention basin during a January 27, 2017, reconnaissance survey; California ground squirrel burrows were also observed during the survey in this location, suggesting the individual may have occupied a burrow. There are also clusters of ground squirrel burrows located adjacent to horse pasture, east of the detention basin. Hayfields are also suitable foraging habitats for burrowing owls, and if burrows are present, the species could nest in those locations; however, in areas that are regularly disked, suitable burrows are less likely to occur.

6.4.1.6 Swainson’s Hawks, Nesting Raptors, Eagles, and Other Native Birds

Swainson’s hawks have been observed nesting southwest of the Project footprint in the riparian woodland west of the Fairfield Canal. An individual was also observed soaring over the Project footprint during the July 2016 reconnaissance-level survey. Swainson’s hawks are listed as threatened under the CESA, although through conservation efforts the Central Valley’s Swainson’s hawk population has increased (CDFW, 2016), and they have become locally common in portions of the San Joaquin Valley. During the survey, no evidence of prior nesting activity was observed in the woodland or on the Project footprint. In addition to the riparian woodland, there are other tall trees that may be suitable for nesting in the Project vicinity, including some cottonwoods along the Fairfield Canal west of the hay field, a large valley oak west of the detention basin, and a cluster of large eucalyptus trees north of the horse pasture on the eastern side of the detention basin. These trees represent potential nesting sites for Swainson’s hawks, and the adjacent alfalfa/hay field and annual grasslands are likely used by foraging individuals, even if not breeding in the area. In addition to Swainson’s hawks, red-tailed hawks and other more common raptors may also nest in the trees that are adjacent to the site. Northern harriers are a unique raptor, because they nest on the ground in tall grass or wetland vegetation; this species may also nest in the Project vicinity, particularly in the expansive annual grassland/vernal pool complex to the north, and especially in taller and denser vegetation, if present. The species may forage in the annual grasslands, hay crops, and other open habitats in the Project vicinity. Because these species occur in low densities, only one or two pairs (at most) are likely to breed near the Project footprint. It is expected that eagle use of the area is limited to foraging in the onsite grassland during the nesting season (the nearest nesting habitat is located in the eastern Merced County foothills).

6.4.1.7 Tricolored Blackbirds, Loggerhead Shrikes, and Other Nesting Birds

Tricolored blackbirds are not known to nest in the Project vicinity, but the species was observed onsite during the July 2016 reconnaissance-level survey. Emergent marsh with suitable vegetation structure (i.e., cattail and bulrush species) and nesting habitat is limited within the Project footprint. Emergent marsh cattail stands are found along Black Rascal Creek that may provide suitable habitat for tricolored blackbirds (1.15 acres). This section of the creek appears to be modified and potentially dredged in the past. This area supports dense growth of tall emergent vegetation including broadleaf cattail (*Typha latifolia*) and common tule (*Schoenoplectus acutus* = *Scirpus acutus*).

A total of 4.53 acres of emergent wetlands were delineated within the study area in 2019; 1.155 acres are associated with cattail tule community type (as described previously), and the remainder (3.375 acres) are dominated by smaller emergent vegetation, typically *Juncus effusus* (or *J. balticus*) or common spikerush (*Eleocharis macrostachya*). Emergent marsh wetlands onsite are dominated by smaller emergent vegetation do not provide suitable or high-quality nesting habitat for tricolored blackbirds.

An emergent wetland community immediately west of the Project footprint could potentially support this species and other marsh-nesting birds. A large emergent wetland occurs on the western boundary of the study area just north of the Fairfield Canal (EM-01, 2.67 acres within the delineation study area). This wetland appears to be formed, to some degree, by the Fairfield Canal embankment impounding a natural drainage. The wetland receives natural drainage as well as drainage from irrigation runoff, as evidenced by substantial outflow observed in late summer 2019. This wetland is perennial flooded and dominated by common rush (*Juncus effusus*).

If loggerhead shrikes occur in the Project site, they likely occur in low densities. Suitable nesting habitat includes the small blackberry (*Rubus* sp.) bramble at the northwestern corner of the proposed detention basin and other shrubs scattered in the area. In addition, these special-status species and a variety of common birds, such as western meadowlarks (*Sturnella neglecta*) and savannah sparrows (*Passerculus sandwichensis*), could potentially nest within open grasslands in the Project vicinity. Numerous common tree-nesting birds, such as American robins (*Turdus migratorius*) could nest in the almond orchards around the site. A colony of cliff swallows (*Petrochelidon pyrrhonota*) occurs on the bridge crossing the Fairfield Canal on the northwestern portion of the Project footprint and other species may use artificial structures in the area, including a barn west of the Project footprint or the bridge on East Yosemite Avenue at the southwestern portion of the Project footprint.

6.4.1.8 Special-status Bats

Western red bats and other foliage-roosting bats may use the almond orchard and riparian habitats to the west of the Fairfield Channel (west of the Project), as well as other trees in the area, for roosting. Western red bats likely occur in the Project vicinity primarily during migration and winter, when they roost solitarily in the foliage of trees in a variety of habitats. The species is more likely to breed in dense riparian areas. Nonetheless, there is potential for roosting to occur in the orchard and in other potential roost sites in the Project footprint. There is some potential for bats to roost in structures, if suitable roost sites are present. A barn west of the Project footprint may support bats, and the bridges crossing Fairfield Canal and East Yosemite Avenue may support bat species, such as Yuma myotis (*Myotis yumanensis*), if suitable crevices are present.

6.4.2 No-Action Alternative (FWOP)

Under the No-Action Alternative, Merced County would not implement the Project. The No-Action Alternative would result in continued flooding and flood-related damage in and downstream from the Project footprint. Storm events would occur at approximately the same frequency and magnitude as historically experienced, and stormwater quality would continue to be negatively affected during these events. Potentially suitable habitat for special-status species and natural and riparian areas would continue to persist as they do under existing conditions and would not be temporarily or permanently affected. Under the No-Action Alternative protected bird species including eagles and birds protected under the MBTA would persist as they do under existing conditions and would not be temporarily or permanently affected.

6.4.3 Preferred Alternative

Most Project impacts would be temporary, resulting from Project construction. Where identified, the Project would result in some direct permanent impacts due to the permanent loss of habitat to accommodate the Project features. In many cases, the Project would result in both indirect temporary and direct permanent impacts during construction and operation; therefore, the following impact descriptions differ from other resource sections and do not specifically distinguish between Project construction and operation impacts. To the extent possible, the impacts assessment quantifies all permanent impacts that would result from the Project.

6.4.3.1 Special-status Amphibians

As previously described, it is unknown whether CTS or western spadefoot use the vernal pools or other wetland habitats on the Project footprint or in the adjacent areas (i.e., within dispersal distance/suitable habitat). Based on records of nearby occurrences and the presence of potentially suitable habitat, there is potential for their occurrence. Without conducting focused surveys, their presence cannot be discounted. The Project is expected to result in a small permanent loss of riverine habitats because of the construction of the western embankment and backfilling a section of Black Rascal Creek where tributary enhancement would occur. Potential upland/dispersal habitat would be permanently disturbed because of embankment construction, including approximately 4 acres of annual grassland habitats in areas within the detention basin area. During construction and ongoing O&M, increased mortality could occur due to equipment and vehicular traffic. Grading of areas where CTS or western spadefoot are taking refuge underground could result in mortality, and noise and vibration may cause individuals to disperse from adjacent areas. If present, the Project could indirectly impact these species by reducing dispersal capabilities and changing the existing hydrology due to the placement of embankments around the detention basin, particularly in the vernal pool complex to the north. Water quality of vernal pools and other wetlands adjacent to construction may be affected because of the fugitive dust and through the generation of runoff, resulting in a short-term, indirect temporary reduction of habitat quality for both species.

Focused habitat assessments and surveys are included as part of the Project to determine if these species are present, to what extent they use habitats in the area, if present, and to determine the extent of mitigation is necessary. Alternatively, presence could be assumed in all potentially suitable vernal pools and other wetlands and dispersal refugia habitat, as determined by a qualified biologist. Habitat acreages would be assessed based on formal wetland delineations and focused habitat assessments/surveys. Habitat mitigation ratios and other requirements for CTS would be determined through agency consultation. EC (including EC 2a) included as part of the Project would also compensate for direct impacts on CTS and western spadefoot. EC 2a would be implemented to reduce impacts to a moderate level (Section 6.4.4).

6.4.3.2 Western Pond Turtle

Potential Project impacts on western pond turtles include direct impacts (potential loss or injury of individuals during construction, loss of nesting breeding, and temporary disturbance to dispersal habitat). There is potential for indirect impacts to occur associated with long-term habitat alterations due to changes in flooding regime. The creation of a flood detention basin would alter the hydrology in the creek such that episodic flooding would occur in areas that may not flood to that extent under existing conditions. However, the creation of the flood control basin is not expected to permanently alter the long-term habitat suitability of the creek for pond turtles, and the site would still be available as a dispersal corridor for the species. Episodic flooding may result in temporary losses of suitable habitat, including basking sites, but those short-term impacts are not expected to reduce the suitability of Black Rascal

Creek for the species. Because of the potential for direct impacts to occur during construction, EC 2b, Western Pond Turtle Protection Measures, would be implemented to reduce the potential for construction-related impacts to moderate levels (Section 6.4.4).

6.4.3.3 San Joaquin Kit Fox and American Badger

As previously discussed, there is a low probability that either San Joaquin kit fox or American badger would den within the Project footprint. The Project footprint, particularly the undeveloped grassland areas, supports foraging habitat for both species; thus, individuals may regularly or periodically occur on the site. Although unlikely, construction, operation, and maintenance of the Project could result in mortality, injury, and harassment of San Joaquin kit fox and American badgers that may occur in the area. Most likely, these species would not forage in the area during active construction because they are mainly nocturnal. A reduction in foraging resources may occur as a result of habitat disturbance. The Project would also result in the permanent or temporary loss or degradation of San Joaquin kit fox and American badger foraging habitat through the development of the detention basin, including the construction of embankments. This construction would result in the permanent loss of approximately 4 acres of grassland because of the placement of embankments and other infrastructure, and it would result in temporary loss of low-quality foraging habitat during flood period. The most likely source of direct mortality could occur if dens in the Project footprint are destroyed by grading or other construction activities. However, with the implementation of EC 2c, San Joaquin Kit Fox and American Badger Protection Measures, potential direct impacts on these species would be moderate (Section 6.4.4).

6.4.3.4 Burrowing Owl

The Project would result in the temporary loss of potential foraging and breeding habitat during construction and the permanent loss of foraging and potential nesting habitat after embankment construction. In particular, the areas associated with the proposed embankments could provide potentially suitable foraging and nesting habitat. These areas may not support the species after the embankments are built, or burrowing owls may recolonize some portion of the remaining habitat (as they are known to occur along channels and embankments). Additionally, flood waters associated with the flood detention basin may seasonally inundate currently suitable habitat, making those areas temporarily unsuitable during floods; however, under existing conditions, these areas may be subject to seasonal flooding. Although the embankments may result in the loss of some habitat, there would be no substantial impacts on the locally and regionally available habitat for burrowing owl.

If active burrowing owl nests are present in the Project footprint during construction, construction-related ground disturbance could result in direct injury or mortality of an owl. In addition, disturbance from machinery or the presence of humans could lead to the indirect abandonment of a burrow, including the incidental loss of fertile eggs or nestlings. Even if not breeding in the Project footprint, construction could result in injury or mortality of an owl if an occupied burrow is filled or compacted during construction and would result in a significant impact. Further, burrowing owls are protected under the MBTA and California Fish and Game Code. Implementation of EC 2d, Burrowing Owls, (preconstruction surveys and avoidance/relocation) would reduce impacts to moderate (Section 6.4.4).

6.4.3.5 Swainson's Hawks, Nesting Raptors, Eagles, and Other Native Birds Protected by the Migratory Bird Treaty Act

If any Swainson's hawks, other raptors, golden eagles, or birds protected by MBTA are breeding in or near the Project footprint, there is potential for nesting or foraging habitat to be affected through habitat loss or modification during construction activities. It is expected that eagle use of the area is limited to foraging in the onsite grassland during the nesting season (nearest nesting habitat is located in the eastern Merced County foothills).

No large trees that could potentially be used for nesting are proposed for removal. Seasonal flooding that would occur within the north basin would reduce foraging opportunities for raptors. However, the temporary loss of foraging habitat would also represent a relatively small area compared to the regionally available foraging habitat in adjacent areas. Therefore, direct and indirect impacts associated with permanent and temporary habitat loss, including loss of potential foraging areas, would not be considered significant.

During the breeding season, construction disturbance could potentially lead to the abandonment of an active nest, if present in or adjacent to the Project footprint. It is unknown how much disturbance can occur around a given raptor nest before abandonment occurs, but it is likely dependent on the level of ambient disturbance during nest initiation and other factors related to habitat quality. Given the potential for raptor species to occur within the Project footprint and for short-term construction disturbance (i.e., grading, vegetation removal, excavation, levee construction, noise) to impact nesting raptors and other birds protected by MBTA, there is potential for loss of a nesting territory resulting in a significant impact. Further, all native birds including raptors are protected under the MBTA and California Fish and Game Code, and the Fish and Game Code also protects bird nests from activities that cause abandonment. Therefore, EC 2e, Protection for Nesting Raptors and Other Native Birds, would be implemented to reduce impacts on raptors and other nesting birds to a moderate level (Section 6.4.4). No direct long-term effect to raptors and birds protected by the MBTA are expected to result from the Project due to the implementation of the preconstruction surveys and construction buffers included in EC 2e.

6.4.3.6 Tricolored Blackbirds, Loggerhead Shrikes, and Other Nesting Birds

If Project activities occur during the nesting season (February 1 to August 31), nests with eggs or young may be lost during vegetation removal, or embankment construction. Disturbance associated with Project activities may indirectly cause the abandonment of nests. The loss of a small number of common nesting birds through Project implementation would represent a moderate impact; however, the loss of a large number of more common nesting birds (e.g., western meadowlarks and cliff swallows) would represent a potentially significant impact. The loss of the nest of a special-status species would be considered significant. Short-term effects on birds protected by the MBTA would include construction disturbance (noise, vegetation removal, and ground disturbance). Due to the riparian and habitat tributary improvements associated with the north basin, habitat effects are expected to be short-term, and over the long term, habitat will be improved with native plantings of cottonwood, oaks, and willows adjacent to the constructed tributaries and riparian habitat improvements. All native birds are protected under the MBTA and California Fish and Game Code, and the Fish and Game Code also protects bird nests from activities that cause abandonment. Therefore, EC 2e, Protection for Nesting Raptors and Other Native Birds, would be implemented to reduce Project-related disturbance to nesting birds and reduce impacts to a moderate level (Section 6.4.4).

6.4.3.7 Special-status Bats

If bats occur in the Project footprint, the timing of vegetation removal could affect bats that use vegetation for roosting or as foraging substrate. California Fish and Game Code Section 4150 states that all non-game mammals or parts thereof may not be taken or possessed except as provided otherwise in the code or in accordance with regulations adopted by CDFW. Activities resulting in mortality or disturbances that cause the loss of maternity colonies of bats may be considered "take" by CDFW. The take of a small number of common species would result in a moderate impact; however, the loss of a maternity colony or the loss of special-status species, such as the western red bat, would be potentially significant. Implementation of EC 2f, Roosting Bats, would reduce direct impacts on roosting bats to a moderate level (Section 6.4.4).

6.4.3.8 Vernal Pool Habitat and Associated Species

Formal wetland delineations will be compared to final Project designs to estimate the spatial extent of vernal pool impacts. Based on initial delineation surveys, an estimated 1.15 acre of emergent wetland and no vernal pool habitat occurs within the Project footprint. Adjacent to and north of the Project construction footprint, 12.06 acres of vernal pool wetlands have been delineated. Some vernal pools would be indirectly impacted by embankment construction, thereby temporarily reducing their habitat quality. The final extent of impact evaluation and necessary compensation would occur during the permitting and resource agency consultation phase of the Project for impacts on regulated habitats and listed species.

Vernal pool fairy shrimp and vernal pool tadpole shrimp are known to occur in the vernal pool complex and are likely to be affected by the Project, although it is currently unknown to what extent they occupy wetlands. For the purposes of this analysis, it is inferred that all vernal pool wetlands are occupied by both species, and as such impacts on special-status brachiopods would be commensurate with the vernal pool indirect impacts associated with adjacent embankment construction including potential indirect impacts associated with changed hydrology and water quality. In addition, degradation of adjacent habitats would occur due to fragmentation of upland habitat and impacts on soils in adjacent areas due to construction access. Because of the regional rarity of vernal pool complexes and special-status brachiopods associated with vernal pools, potential impacts are considered significant. To reduce impacts to moderate levels, loss and degradation of vernal pools would be minimized to the extent feasible, water quality measures would be implemented to protect adjacent wetlands, and compensatory mitigation for wetland impacts and vernal pool brachiopod impacts would be implemented as part of the Project. Construction of the Project would comply with SJVAPCD Regulation VIII requirements to control fugitive dust emissions to minimize dust and effects on water quality (Section 6.3.3.1 Air Quality). The amount and location of compensatory mitigation would be determined through agency coordination during the permitting processes but would likely occur through the purchase of credits from an approved offsite mitigation bank or other compensatory actions. Implementation of EC 2g, Vernal Pools and Special-status Brachiopods, would reduce direct impacts on vernal pools and brachiopods to a moderate level (Section 6.4.4).

6.4.3.9 Essential Fish Habitat

Because Black Rascal Creek does not support salmonids due to its inaccessibility (i.e., due to fish-passage barriers) and unsuitable habitat, it does not currently support the functions defined by EFH.

There would be habitat modifications to the creek and changes to the hydrological regime due to the creation of a flood control basin; however, those changes are not expected to affect habitat quality for EFH or any fish species or habitats downstream from the Project. Temporary water quality impacts could occur during embankment construction, dewatering, or other work in or near the creek bed. These activities could increase erosion and in-stream turbidity, or otherwise degrade habitat quality. Direct short-term impacts on water quality are expected to be reduced to minimal levels through the implementation of water quality ECs described in Section 6.2.4. With the implementation of those commitments, impacts on EFH would be minor.

6.4.3.10 Natural Areas, Riparian Areas, and Invasive Species

The Project would involve some earth-moving activities including embankment construction. Construction activities would result in moderate ground disturbance and could result in loss of agriculture/pasture and agriculture/orchard habitat types within the study area. Minimal effects to natural areas are anticipated (no impacts to vernal pool complex and small area of impacts are expected within non-native grasslands north of the Project footprint). No impacts to cottonwood or willow riparian areas adjacent to the Fairfield Canal would occur. During construction, BMPs and other ECs included as part of the Project would limit or manage the potential transport of invasive species during construction of the Project. Measures that would be taken to ensure invasive species are not transported onto or off of the site would be specified in permit requirements and would include equipment cleaning prior to arrival and departure.

6.4.3.11 Cumulative Impacts

As discussed, the Project would potentially have impacts on biological resources. Implementation of ECs discussed below in Section 6.4.4 and Section 6.5.4 would reduce impacts associated with biological resources to a moderate level. Additionally, while some of the projects listed in Table 6.0-1 would have similar impacts on the same biological resources such as Swainson’s hawk, vernal pools, and San Joaquin kit fox, the projects would also implement measures to reduce impacts on biological resources to a moderate level; therefore, impacts would not be cumulatively considerable.

6.4.4 Environmental Commitments

The Project has been designed to avoid and minimize impacts on regulated habitats, special-status species, and other biological resources to the extent feasible. Proposed measures are not final until consultation is complete with the appropriate wildlife agencies. The following draft ECs would avoid or substantially lessen potentially significant impacts on special-status animals:

6.4.4.1 EC 2a, Special-status Amphibians:

To reduce impacts on CTS and western spadefoot, measures described in the following sections will be implemented. Proposed measures are not final until consultation is complete with the appropriate wildlife agencies.

6.4.4.1.1 Preconstruction Surveys

Because potentially suitable aquatic and upland habitat occurs in the Project footprint, and absence may be difficult to demonstrate without substantial survey effort, presence may be assumed and construction-related avoidance and minimization measures will be implemented for CTS and western spadefoot.

Additionally, compensatory habitat mitigation for CTS will be required, with the mitigation sites and habitat ratios determined through agency consultation and informed by habitat assessments and/or surveys.

Alternatively, if the presence of CTS and western spadefoot is not assumed, focused surveys would be conducted to assess presence/absence. Surveys for CTS would be consistent with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS, 2003) or in accordance with the latest agency guidance. Surveys adhering to the guidance for CTS would be adequate to assess habitat suitability (and potential presence) in the Project footprint for western spadefoot. Survey methods and results would need to be approved and accepted by USFWS and CDFW. If CTS are assumed to be present or are determined to be present during surveys, the County will consult with CDFW for issuance of an Incidental Take Permit, in accordance with Section 2081(b) of the California Fish and Game Code, and with USFWS, in accordance with Section 7 of the ESA.

6.4.4.1.2 Avoidance and Minimization Measures

If CTS or western spadefoot are assumed to be present or are determined to be present during surveys, the following avoidance and minimization measures are proposed for implementation during construction:

- Potentially suitable breeding habitat will be avoided to the extent feasible during construction to minimize the potential loss of breeding sites for CTS and western spadefoot.
- Measures to protect water quality, as described in Section 3.7.4.2, will be implemented to reduce habitat degradation in adjacent areas.
- A temporary barrier, in the form of a silt fence or other suitable materials, will be placed along the limits of impact areas to reduce the potential of dispersing amphibians entering the Project footprint. A USFWS-approved biologist will demarcate the limits of the fence line. The barrier will be inspected and repaired at least weekly to ensure it remains in place during construction.
- A biological monitor will survey suitable habitat prior to grading or filling. If either species is located during surveys, it will be moved to an approved offsite location in coordination with USFWS and CDFW.
- Other measures as required by USFWS and CDFW during consultation processes for Section 7 of the ESA and for the issuance of an Incidental Take Permit, respectively.

6.4.4.1.3 Compensatory Habitat Mitigation

If breeding or upland dispersal habitat for the CTS is permanently affected by the Project, then compensatory habitat mitigation will be necessary. Habitat mitigation could include the preservation and management of currently occupied habitat for CTS. To the extent feasible, mitigation credits from an approved conservation bank will be used to compensate for the loss of special-status plants and wetlands (EC 3a and EC 3b), as well as CTS. If credits are unavailable, other conservation lands will be guaranteed through a conservation easement, fee title purchase, or other appropriate mechanism. Impacts on breeding habitat will be assessed based on formal wetland delineations described in EC 2g, Vernal Pools and Special-status Brachiopods/Amphibians, and habitat assessments/surveys conducted by a qualified (agency-approved) herpetologist. The amount of upland dispersal/refugia habitat will also be assessed by a herpetologist in consultation with agency staff.

A Biological Opinion was issued by USFWS for the Project on September 28, 2023 (USFWS 2023). Mitigation for 1.6 acres of temporary impacts to upland dispersal habitat (non-native annual grassland) and 0.198 acre of permanent impacts to Riverine Predictive Ecosystem will be purchased from a USFWS approved mitigation or conservation bank. The following are the proposed amounts and ratios of compensation: Permanent impacts on aquatic habitat (0.198 acre) will be mitigated at a ratio of 3:1 (0.594 acre); temporary impacts on upland habitat (1.6 acres) will be mitigated at a ratio of 0.5:1 (0.8 acre).

6.4.4.2 EC 2b, Western Pond Turtle Protection Measures

BMPs and other measures to protect water quality will minimize impacts on western pond turtle habitat. To reduce the potential take of individuals, a CDFW-approved biological monitor(s) will perform clearance surveys for western pond turtles and other aquatic or terrestrial wildlife immediately prior to dewatering or any other ground-disturbing activity at sensitive locations, including habitats adjacent to Black Rascal Creek. Any western pond turtle found within the construction area will be allowed to leave on its own volition or it will be captured by the qualified biologist and relocated out of harm’s way to the nearest suitable habitat immediately upstream or downstream from the Project footprint. If dewatering is necessary, pumps will be screened with wire mesh not larger than 5 millimeters (0.2 inch) to prevent wildlife from entering the pump system.

6.4.4.3 EC 2c, San Joaquin Kit Fox and American Badger Protection Measures

To reduce impacts on San Joaquin kit fox and American badger, the following proposed measures will be implemented.

6.4.4.3.1 Den Avoidance

Project modifications to protect San Joaquin kit fox will be implemented, to the extent feasible, and could include avoidance, minimization, restoration, preservation, or compensation measures. Preconstruction surveys for dens, burrows, or other subterranean structures (i.e., potential dens) that could be occupied will be conducted within no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities. Appropriate exclusion zones around potentially occupied subterranean habitat will then be observed, where feasible, as follows:

- Potential den – 50 feet
- Atypical den – 50 feet
- Known den – 100 feet
- Natal/pupping den – CDFW and USFWS must be contacted

Where it is infeasible to provide an exclusion zone, limited destruction of potential dens will be conducted. Destruction of potential dens will be accomplished by careful excavation until it is certain that no San Joaquin kit foxes are inside. The potential dens will be fully excavated, filled with dirt, and compacted to ensure that individuals cannot reenter or use the den during the construction period. If at any point during excavation, an individual is discovered inside the den, the excavation activities will cease immediately and monitoring of the den will be conducted. Destruction of the den will be completed when, in the judgement of the biologist, the individual has escaped, without further disturbance, from the partially destroyed den. Destruction of any known or natal/pupping den requires take authorization from CDFW and USFWS.

6.4.4.3.2 Construction Measures

Other proposed mitigation measures that address potential adverse effects to San Joaquin kit fox and American badger include the following:

- Project-related vehicles will observe a daytime speed limit of 20 miles per hour throughout the Project footprint and in all areas, except on county roads and state and federal highways.
- To prevent inadvertent entrapment of San Joaquin kit foxes or other animals during construction, all excavated, steep-walled holes or trenches more than 2 feet deep will be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen fill or wooden planks will be installed. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If at any time a trapped or injured San Joaquin kit fox is discovered, CDFW and USFWS will be immediately contacted.
- All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored at a construction site for one or more overnight periods will be thoroughly inspected for San Joaquin kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If necessary, and under the direct supervision of a qualified biologist, a pipe found to contain a San Joaquin kit fox may be moved only once to remove it from the path of construction activity, until the individual has escaped.
- All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in securely closed containers and removed at least once a week from the Project footprint.
- No firearms will be allowed on the Project footprint.
- No pets, such as dogs or cats, will be permitted on the Project footprint to prevent the harassment or mortality of San Joaquin kit foxes, or destruction of their dens.
- Rodenticides and herbicides in the Project footprint will be restricted. This is to prevent primary or secondary poisoning of individuals and the depletion of prey populations on which they depend. Uses of such compounds will observe label and other restrictions mandated by EPA, California Department of Food and Agriculture, and other state and federal legislation, as well as additional Project-related restrictions deemed necessary by CDFW and USFWS. If rodent control must be conducted, zinc phosphide will be used because of its proven lower risk to San Joaquin kit fox.
- A representative will be appointed by the applicant to be the contact source for any employee or contractor who might inadvertently kill or injure a San Joaquin kit fox, or who finds a dead, injured, or entrapped individual. The representative will be identified during the employee education program and their name and telephone number will be provided to CDFW and USFWS.
- An employee education program will be prepared and delivered to all contractors, their employees, applicant personnel, and/or agency personnel involved in the Project. The program will consist of a

brief presentation by persons knowledgeable in San Joaquin kit fox biology and legislative protection to explain endangered species concerns. The program, at a minimum, will include the following:

- Description of the San Joaquin kit fox and its habitat needs
- Description of known occurrences of San Joaquin kit fox in the Project vicinity
- Explanation of the status of the taxon and its protection under the ESA and CESA
- List of measures being taken to reduce adverse effects to the taxon during Project construction and implementation

A fact sheet conveying the above information will be prepared for distribution to the previously referenced people and anyone else who may enter the Project footprint.

- Upon completion of the Project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, will be recontoured if necessary and revegetated to promote restoration of the area to pre-Project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the Project, but after Project completion will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas will be determined on a site-specific basis in consultation with CDFW and USFWS.
- In the case of trapped animals, escape ramps or structures will be installed immediately to allow the animal(s) to escape, or CDFW and USFWS will be contacted for guidance.
- Any contractor, employee, or applicant or agency personnel who are responsible for inadvertently killing or injuring a San Joaquin kit fox shall immediately report the incident to their representative. The representative will contact CDFW immediately in the case of a dead, injured, or entrapped San Joaquin kit fox. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. They will contact the local warden.
- The Sacramento Fish and Wildlife Office and CDFW will be notified in writing within 3 working days of accidental death or injury to a San Joaquin kit fox during Project-related activities. Notification must include the date, time, and location of the incident or finding of a dead or injured individual and any other pertinent information. The USFWS contact is the Chief of the Division of Endangered Species.
- New sightings of San Joaquin kit fox will be reported to the California Natural Diversity Database. A copy of the reporting form and a topographic map clearly marked with the location where the San Joaquin kit fox was observed will also be provided to USFWS at the following address: Endangered Species Division, 2800 Cottage Way, Suite W2605, Sacramento, California 95825-1846.

6.4.4.4 EC 2d, Burrowing Owls

Preconstruction surveys will be conducted in suitable burrowing owl habitat of the Project footprint consistent with the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). The results of preconstruction surveys for burrowing owl, including negative findings, will be submitted to CDFW within 3 days of survey conclusion. If burrowing owls are found during the nesting season (i.e., February 15 to August 31), no ground disturbance will occur within 250 feet of occupied burrows until a qualified biologist determines that fledging has occurred (i.e., the juveniles are no longer dependent upon the nest burrows). If burrowing owls are found during the non-nesting season (i.e., September 1 to February 14), no ground disturbance will occur within 160 feet of occupied burrows.

Alternatively, during the non-nesting season, Merced County may retain a qualified biologist to conduct passive relocation of individuals from occupied burrows with one-way doors for a minimum of 3 consecutive days. Once the occupied burrows have been cleared, the applicant may backfill the burrows. If passive relocation is used, the applicant will also provide alternate natural or artificial burrows that are beyond 160 feet from the impact area and that are within or contiguous to a minimum of 6.5 acres of foraging habitat for each pair of relocated burrowing owls. One alternate natural or artificial burrow will be provided for each burrow excavated within the Project footprint. If artificial burrow creation is used, it will comply with the guidelines in the *Staff Report on Burrowing Owl Mitigation* (CDFW, 2012). Merced County will be responsible for reporting all observations of burrowing owl to the California Natural Diversity Database within 10 days of the sighting.

6.4.4.5 EC 2e, Protection for Nesting Raptors and Other Native Birds

The following measures will be implemented to ensure the Project complies with the MBTA and California Fish and Game Code and to avoid impacts on large numbers of common birds or any special-status birds:

6.4.4.5.1 Preconstruction Surveys

If construction during the breeding season (February 1 and August 31) is unavoidable, preconstruction surveys will be conducted by a qualified biologist no more than 7 days prior to the initiation of new disturbance in any given area. The biologist will inspect all potential nesting habitats in the Project footprint for active bird nests. Surveys will be conducted as appropriate corresponding to typical disturbance-free buffer zones (typically 300 feet for raptors and 100 feet for non-raptors), including areas adjacent to the Project (to the extent they are accessible).

6.4.4.5.2 Disturbance-free Buffers

If an active bird nest (of any native species) is located, a qualified biologist will establish a disturbance-free buffer zone around the nest until nesting is complete. Disturbance-free buffer zones are typically 300 feet for raptors and 100 feet for non-raptors, but other species-specific distances (e.g., for Swainson’s hawk) may be implemented through CDFW consultation. Nests will be considered active until surveys conducted by a qualified biologist confirm nesting is inactive.

Additionally, because Swainson’s hawks are known to occur in the area and a nest may occur near the Project, a protocol-level survey consistent with the *Recommended Timing and Methodology for Swainson’s Hawk Nesting Survey's in California's Central Valley* (Swainson’s Hawk Technical Advisory Committee, 2000, or current CDFW guidance) will be conducted along the Fairfield Canal and other suitable habitat up to 0.5 mile from Project footprint. If no Swainson’s hawk nests are located, no additional effort is required. If active Swainson’s hawk nests are detected during the survey, a no-disturbance buffer zone of 0.5 mile will be implemented while the nest is active (as determined through surveys) or until authorization is provided by CDFW to proceed. This may require a nest-monitoring plan to be developed in coordination with CDFW.

6.4.4.6 EC 2f, Roosting Bats

If vegetation removal occurs between May 1 and September 1 (the maternity season for bats), a qualified biologist will conduct a survey for roosting bats in tree foliage that is to be removed. In addition to looking for bats directly, suitable habitat within the Project footprint will be searched for signs of bat use, such as the presence of guano, stains, or insect parts. If there is strong evidence of bat usage during the maternity period, other surveys methods, such as acoustic surveys, may be performed by a qualified bat biologist. Vegetation removal will proceed after surveys indicate no roosting bats are present. If bat roosts are located, tree removal must occur after September 1 or must be otherwise approved through consultation with CDFW.

6.4.4.7 EC 2g, Vernal Pools and Special-status Brachiopods/Amphibians

Prior to construction commencing, Merced County shall submit an aquatic resources delineation to USACE for verification. If USACE determines that aquatic resources are present subject to federally protection, as defined by Section 404 of the CWA, the County will obtain a permit for fill under Section 404 for proposed impacts to aquatic resources. Mitigation for fill of the jurisdictional waters of the United States shall be included in the permit application and be a condition of the USACE permit. Merced County shall comply with all conditions of the permit. No impacts to vernal pools are proposed. In addition, the following mitigation measures will be implemented for protection of vernal pool habitats and special-status brachiopods indirectly affected by the Project.

6.4.4.7.1 Avoid and Minimize Impacts on Vernal Pools and Brachiopods/Amphibians

Prior to construction, a formal wetland delineation will be conducted to demarcate the boundaries of vernal pools and other regulated wetland habitats. The delineation results will inform the final design such that all wetlands will be avoided to the extent feasible while meeting engineering criteria for the Project. The delineation results will also be used to quantify the amount of vernal pool habitat (and potentially suitable brachiopod and amphibian habitat) indirectly affected by the Project.

6.4.4.7.2 Reduce Indirect Wetland Impacts

Prior to construction, environmentally sensitive area fencing and silt (i.e., erosion-control) fencing will be installed to protect wetlands from construction access and inadvertent runoff. The protected area will include a buffer of sufficient size to allow for fence installation and to prevent dust and runoff from entering wetlands. A qualified biologist will oversee fence installation and regularly inspect fencing to ensure it is effective during construction. The proposed east and west embankments will be located so as to minimize both permanent direct as well as indirect impacts associated with changes to hydrology/inundation while ensuring the feasibility of the Project.

To further minimize potential indirect impacts on wetland habitats, BMPs will be implemented. Relevant BMPs include, but are not limited to, the following:

- An environmental education program will be presented to construction crews by a qualified biologist. This program will consist of a “tailgate” training session for all personnel who work on the Project footprint. Printed training materials and briefings will include descriptions of regulated habitats (including vernal pools), special-status species, and other protected resources for which avoidance and minimization measures are required.

- No construction debris, sediment, silt, sawdust, cement, petroleum or other materials generated from construction will enter aquatic or wetland habitats.

- Standard erosion control and slope stabilization measures will be installed in areas for work where runoff could enter wetland areas.

- Machinery will be refueled at least 50 feet from any wetland habitat and a spill prevention and response plan will be maintained onsite during all construction using motorized equipment.

- Construction of the Project would comply with regulations to control fugitive dust emissions to minimize dust and effects on water quality.

6.4.4.7.3 Compensatory Mitigation

If verified vernal pool or other wetland habitats cannot be avoided and may be directly or indirectly affected by the Project, the amount of compensatory habitat mitigation needed will be determined in consultation with applicable resource agencies. No direct or permanent impacts to vernal pools are proposed. Through the Section 404 permitting process, a determination of appropriate compensatory mitigation will be determined, as necessary. Compensatory mitigation could include:

- The permanent protection and management of offsite mitigation lands through a conservation easement, fee title purchase, or other appropriate mechanism such as the purchase of credits at an approved conservation bank or in-lieu fee program, or other restoration/enhancement measures as determined necessary with USACE, USFWS, and CDFW, as well as other compensation and/or enhancement actions determined to be mutually agreeable.

- The purchase of credits at a conservation bank would need to include Merced County in its service area, such as the Drayer Ranch Conservation Bank. USFWS typically requires a 3:1 mitigation ratio, although specific mitigation ratios will be prescribed through the consultation process and would depend on habitat quality and occupancy, as determined through surveys and habitat assessments.

6.5 Plants

6.5.1 Existing Conditions

San Joaquin Valley orcutt grass, succulent owl’s-clover, and spiny-sepaled button-celery have been documented in the Project footprint along the northern portion of the detention basin, and shining navarretia has been documented close to the Project footprint (approximately 0.5 mile north of the proposed basin). These four species have a high potential to occur in the vernal pool complex on and adjacent to the Project footprint. As previously discussed, several other special-status plants associated with grasslands and/or vernal pools also have potential to occur on the Project footprint. To determine if plant populations are present, focused botanical surveys would need to be conducted for identification in areas where impacts could occur during the appropriate season, which is spring or early summer for most plants. Surveys would be conducted during the blooming period in accordance with the CDFW special-status plant survey protocol (CDFW, 2018).

A reconnaissance-level survey was conducted in 2016 for special-status plants, and an aquatic resources delineation was conducted in 2019. Preconstruction plant and habitat surveys will include preconstruction clearance surveys for special-status plant species in suitable habitats that are proposed to be impacted by Project activities.

6.5.2 No-Action Alternative (FWOP)

Under the No-Action Alternative, Merced County would not implement the Project. The No-Action Alternative would result in continued flooding and flood-related damage in and downstream from the Project footprint. Storm events would occur at approximately the same frequency and magnitude as historically experienced, and stormwater quality would continue to be negatively affected during these events. The same natural habitats, including freshwater marsh and aquatic habitats, and plant populations, including special-status species and those associated with vernal pools, and riparian areas in the vicinity of the proposed Project, would continue to persist as they do under existing conditions and would not be temporarily or permanently affected.

6.5.3 Preferred Alternative

As discussed in Section 6.4, the ESA and subsequent amendments provide guidance for conserving federally listed plant species. If special-status plants occur within the Project footprint, the Project could cause the loss of individual plants through direct impacts during construction (e.g., through crushing or trampling). Construction activities could also result in the temporary degradation of occupied or potentially suitable habitat in adjacent areas, reducing habitat quality in the areas subject to disturbance (e.g., mobilization of dust or debris). Because the species described are regionally rare, direct impacts are considered potentially significant. Implementation of EC 3a would reduce impacts on special-status plant species to moderate.

The Project would avoid impacts on freshwater wetland and aquatic habitats to the extent feasible. However, embankment construction associated with the proposed detention basin is expected to have permanent impacts on a portion of these habitats occurring along the Project’s embankment alignment. The construction of the embankment is expected to affect approximately 1 acre of freshwater marsh/ aquatic habitat associated with Black Rascal Creek and approximately 2.1 acres of freshwater marsh/ aquatic habitats associated with perimeter drainages ditches. The Project could also temporarily affect freshwater marsh/aquatic habitats, where excavation is adjacent to these habitats, through soil compaction or increased soil erosion that could transport sediment downslope.

The habitat quality of the wetlands is relatively low because this habitat occurs in small, discontinuous patches, particularly those associated with drainage ditches. Nonetheless, impacts would be considered significant because freshwater wetlands and aquatic habitats are a sensitive, regulated habitat that occurs at a relatively low abundance in the region. Implementation of EC 3b would reduce potential impacts on freshwater wetlands to a moderate level (Section 6.5.4).

Potential impacts to cottonwood/willow riparian areas would be avoided and minimized to the greatest extent possible. Willow and cottonwood communities outside of the proposed construction footprint would be fenced to avoid unplanned damage or impact to these communities. As part of the Preferred Alternative, riparian creation and secondary channel creation would increase vegetation structure from native willow and cottonwood plantings. The result of the Preferred Alternative on riparian communities would likely result in improved or expanded riparian communities in the Project vicinity.

No impacts on freshwater wetland and aquatic habitats in the natural area easement north of the Project footprint would occur.

The Project would involve some earth-moving activities, including embankment construction. Construction activities would result in moderate ground disturbance and could result in transport of invasive plant species onto the study area. During construction, BMPs, including equipment washing prior to entering the site and upon departure, as well as other ECs included as part of the Project, would limit or avoid the potential transport of invasive species during construction of the Project, mitigating potential impacts resulting from the spread of invasive species to a minor impact.

6.5.3.1 Cumulative Impacts

As discussed, the Project would potentially have impacts on special-status plants, wetland and aquatic habitats. Implementation of ECs discussed in Sections 6.4.4 and 6.5.4 would reduce impacts to a moderate level; therefore, impacts would not be cumulatively considerable.

6.5.4 Environmental Commitments

The Project has been designed to avoid and minimize impacts on regulated habitats, special-status species, and other biological resources to the extent feasible. The following ECs would avoid or substantially lessen potentially significant impacts on special-status plants and freshwater marsh and aquatic habitats:

6.5.4.1 EC 3a: Special-status Plants:

The following ECs are proposed for protection of special-status plant populations that may occur within the Project footprint. These measures include focused surveys to identify plant species, avoidance measures to protect known plant populations to the extent feasible, and offsite compensatory mitigation, if necessary.

6.5.4.1.1 Conduct Protocol-level Special-status Plant Surveys

Prior to construction in the vernal pool/grassland complex north of the detention basin and other locations within the Project footprint where suitable habitat occurs, a qualified botanist will conduct floristic surveys for all federal- and state-listed species and CNPS Rare Plant Rank 1 or 2 species, that may occur on the Project footprint. Protocol-level surveys will be conducted during the blooming periods for these plants, per CDFW special-status plant survey protocols (CDFW, 2018). If found, populations of special-status plant species will be mapped, and the number of individuals observed will be recorded.

6.5.4.1.2 Avoid and Preserve Special-status Plants

To the extent feasible, construction activities will avoid impacts on special-status plants and their potential habitats. All populations of these species identified during the preconstruction survey not directly affected by the Project will be avoided. Special-status plant populations shall be protected by a buffer zone established prior to construction. A qualified botanist will determine whether a buffer adequate to avoid impacts on the plant is feasible to implement. If a buffer cannot be established, the occurrence will be considered affected and compensatory mitigation will be implemented. If soils supporting special-status plants are to be affected, seeds and topsoil will be salvaged to the extent feasible for use in offsite mitigation areas.

6.5.4.1.3 Compensatory Mitigation Assessment

If one or more identified populations of special-status plant species cannot be avoided, and may be directly or indirectly affected by the Project, a species-specific impact determination will be made by a qualified botanist to determine if compensatory mitigation is necessary. If the Project would result in loss of more than 5 percent of the known population estimate of the entire species, then compensatory mitigation, as described below, will be necessary. If the population size of a given plant species is unknown, a qualified biologist will survey adjacent areas to estimate the local population size and to make an impact determination relative to the number of plants in areas where there are no impacts. If the impacts are determined to have little or no effect on the plant's localized population, no mitigation other than seed collection (as described above) will be necessary. If impacts will eliminate or substantially reduce the local population size, additional compensatory mitigation will be necessary. The impact assessment and mitigation approach (if conducted at the local level) would need CDFW approval.

6.5.4.1.4 Compensatory Mitigation

If after avoidance measures are implemented and impacts on special-status plants are determined to require compensatory mitigation, mitigation will be provided by offsite compensatory habitat mitigation. Measures could include but would not be limited to the following:

- The use of mitigation lands to compensate for the loss of wetlands, special-status plants, and special-status wildlife (described above and below).
- The purchase of credits from an approved conservation bank, or other restoration/enhancement measures as determined necessary with USACE, USFWS, and CDFW, that includes Merced County in its service area that may satisfy mitigation requirements for wetland impacts described above as well as affected special-status plant species.
- The guarantee of other conservation lands through a conservation easement, fee title purchase, or other appropriate mechanism. A Habitat Mitigation and Monitoring Plan would be developed and implemented for the mitigation lands, as appropriate for each affected species.

6.5.4.2 EC 3b: Freshwater Marsh and Aquatic Habitats

The following mitigation measures are proposed for protection of freshwater marsh and aquatic habitats that will be affected by the Project to ensure no net loss of wetlands.

6.5.4.2.1 Avoid and Minimize Impacts on Freshwater Marsh and Aquatic Habitats

Prior to Project implementation, a formal wetland delineation will be conducted to demarcate the boundaries of aquatic habitats, including freshwater wetlands and other regulated habitats. The delineation results will inform the final design such that all regulated habitats will be avoided to the extent feasible while still meeting engineering criteria for the Project. The delineation results will also be used to quantify the impacts on freshwater wetland/aquatic habitats for impact assessment during permitting phases. NRCS has a federal policy of no net loss of wetlands are to result from federal projects.

6.5.4.2.2 Reduce Indirect Wetland Impacts

As discussed for vernal pool habitats, BMPs associated with the Project's SWPPP will be implemented to reduce potential for indirect impact on freshwater wetland and aquatic habitats.

6.5.4.2.3 Revegetate Upslope Areas

Disturbed soils upslope of freshwater wetlands and aquatic habitats (e.g., embankment slopes and other disturbed areas) will be revegetated to minimize the transport of eroded soils into downslope wetlands. Revegetation work will comply with protocols described in the Project's SWPPP.

6.5.4.2.4 Compensatory Mitigation

As noted, the Project would have permanent impacts on freshwater wetland habitats with the placement of embankments to construct the detention basin. As mentioned above, the Section 404 permitting process will determine the appropriate compensatory habitat mitigation, as necessary. Compensatory mitigation could include but is not limited to the following:

- The purchase of credits at an approved mitigation bank or in-lieu fee program, as described above for mitigation proposed for impacts on vernal pools at an approved mitigation bank that services Merced County. Mitigation credits may also be used to satisfy mitigation requirements for other resources, such as those associated with special-status amphibians as described above.

- Permanent freshwater wetland impacts could potentially be mitigated onsite with in-kind wetland habitat restoration and/or creation (typically at a ratio of 1:1) that will ensure no net loss of habitat functions and values. It is anticipated that the restored and/or created wetlands would become fully functional in a period of a few years. For onsite mitigation to occur, the Project would need to develop a wetland mitigation and monitoring plan (MMP) prior to construction. The MMP would be prepared in accordance with current USACE guidelines and would also meet the requirements of USACE and the Central Valley RWQCB for compliance with CWA Sections 404 and 401. The MMP would be prepared by a qualified restoration ecologist and provide habitat impacts and mitigation requirements; location of onsite mitigation areas; construction schedule; site preparation and grading plan; maintenance plans; monitoring metrics; contingency measures and remedial actions; and reporting requirements.

6.6 Human Environment

6.6.1 Public Health and Safety and Flood Damages

6.6.1.1 Existing Conditions

6.6.1.1.1 Transportation

Construction of the Project would require up to 30 workers and a minimal number of offsite trucks. There would be a minimal number of truck trips associated with O&M of the facility. It is expected that there would be up to two trips per month during the irrigation season and up to four trips outside the irrigation season.

6.6.1.1.2 Flood Damages

Past flood events endangered domestic water system facilities and sewer ponds, and caused untreated sewer system overflows resulting in water quality and public health violations in the Franklin-Beachwood area. These communities have endured the long-term effects of repeated flooding and related public health issues. These problems will continue without the construction of the proposed Project. The Project is listed as a flood risk management strategy to protect the DAC of Franklin-Beachwood from chronic flooding issues.

6.6.1.1.3 Embankment Failure

Flood flows through an embankment breach currently spill into the historic channel of the Black Rascal Creek that runs through the central areas of the City of Merced and into the Franklin-Beachwood area. Similar flooding patterns were observed during the storm events experienced in 1998 and 2006. However, the proposed embankment system would be designed to contain flood flows resulting from a 200-year event with adequate freeboard and will be constructed in accordance with established Project standards and requirements. The Urban Levee Design Criteria established by DWR specify standards that incorporate factors of safety in the embankment design requirements to prevent failure from seepage, slope instability, and seismic vulnerability.

6.6.1.2 No-Action Alternative (FWOP)

Under the No-Action Alternative, continued flooding and damage are anticipated to occur potentially resulting in public safety and health risks.

6.6.2 Preferred Alternative

6.6.2.1.1 Transportation

Construction of the Project would not result in inadequate emergency access. During Project construction, potential traffic delays immediately adjacent to the Project footprint could affect emergency response times or access by private residents, and would be considered significant. Notifying local emergency service providers and residents near the Project footprint, prior to construction, would address impacts on emergency response times, thereby minimizing the potential impact from construction activities. Implementation of EC 4a would reduce potential impacts on emergency access along roadways in the Project vicinity. Therefore, construction of the Project would result in a moderate impact to emergency access.

Operation of the Project would not result in inadequate emergency access because operation would not affect access to roadways. The Project detention basin may require periodic maintenance, but vehicle use of the roadway to maintain service would be minimal. Therefore, operation of the Project would result in a minor impact to emergency access.

6.6.2.1.2 Flood Damages

Implementation of the Preferred Alternative would protect the community from flooding. The detention basin would attenuate future flood flows and prevent overflows into the community, preventing future water quality and public health violations and damages, which would be a beneficial impact.

6.6.2.2 Cumulative Impacts

Cumulative traffic impacts may occur when two or more projects have overlapping construction schedules and excessive construction-related traffic is generated. However, none of the Projects listed in Table 6.0-1 are close enough to the Project footprint to generate cumulative traffic impacts, even if construction schedules overlapped. By itself, the Project would have a minor effect on traffic, and implementation of a transportation management plan under EC 4a would reduce potential impacts on emergency access. Thus, this Project would not create a cumulatively considerable impact on transportation and traffic.

6.6.2.3 Environmental Commitments

To reduce impacts on emergency access, measure EC 4a, described further as follows, will be implemented.

6.6.2.3.1 EC 4a, Encroachment Permits and Traffic Control Plan

Merced County will obtain all appropriate encroachment permits and submit a traffic control plan to address emergency responder access and management of local traffic. The plan will follow local and state requirements for traffic control, including use of flaggers and signage. Traffic control measures will help ensure that the effects on traffic will not create unsafe conditions. In addition, the County will inform residents in the City of Merced and Merced County of construction activities and potential delays by use of the Merced County website and use of temporary roadway signs in the Project vicinity.

6.6.3 Cultural Resources

6.6.3.1 Existing Conditions

The survey and background research identified two previously recorded and two newly recorded cultural resources within the APE. The previously recorded cultural resources include a segment of the Black Rascal Creek Canal and the MID Historic District. The newly recorded cultural resources include the Applegate Lateral and an Unnamed Ditch. None of these resources within the APE are eligible for listing in the NRHP or CRHR.

The geoarchaeological analysis also concluded that given the land use history of the APE, including channelization and realignment of Black Rascal Creek and extensive use of the APE as an orchard, soils on or near the surface of the APE are likely heavily disturbed and there is a low potential for intact buried archaeological resources exist within the APE.

6.6.3.2 No-Action Alternative (FWOP)

Under the No-Action Alternative, the Project would not occur, and there would be no Project-related effects on cultural resources.

6.6.4 Preferred Alternative

Because the MID Historic District, Black Rascal Creek Canal, Applegate Lateral, and the unnamed ditch are ineligible for listing in the NRHP or CRHR, Project construction is not expected to directly or indirectly affect significant historical or archaeological resources. SHPO concurred on April 2, 2022, that there would be no historic properties affected as a result of the Project.

6.6.4.1 Cumulative Impacts

No direct or indirect impacts to cultural resources listed in or eligible for listing in the NRHP or CRHR were identified as a result of the alternatives analysis.

6.6.4.2 Environmental Commitments

EC 5a will be implemented during Project activities in the event of an inadvertent discovery.

6.6.4.2.1 EC 5a: Inadvertent Discoveries

If cultural resources are discovered during ground-disturbing activities, the procedures included in Part 601.29 of the NRCS National Cultural Resources Procedures Handbook will be followed, pursuant to 36 CFR 800.13(b)(3).

6.6.5 Social and Economic Conditions

6.6.5.1 Existing Conditions

The City of Merced and the DACs of Franklin-Beachwood were severely inundated twice during 1998 and 2006 storm events due to Black Rascal Creek flooding. In 2006, 3,400 citizens in these communities were evacuated. Resulting property damage included 300 residences with total flood damages of $18,250,538 and estimated agricultural damages of $3 million. This amounts to about $26 million when escalated to 2016 dollars based on the Consumer Price Index. A lawsuit filed against the partners of the Merced Streams Group for flood damages incurred settlement and attorney fees of about $21 million. The 2006 event also endangered the Franklin Water District water system and caused untreated sewer system overflows resulting in water quality and public health concerns in the Franklin-Beachwood area.

6.6.5.2 No-Action Alternative (FWOP)

The No-Action Alternative would result in continued flooding. The City and the Franklin-Beachwood community have endured the long-term effects of repeated flooding and related social and economic issues. These problems and associated damages would continue without the construction of the Project. This community is identified as a DAC by the State of California.

6.6.5.3 Alternative 1 (Proposed Project)

The proposed detention basin and associated water management facilities would provide local communities with protection from frequent flooding and would be designed to contain up to the 200-year flood event. Homes, businesses and community structures would be protected from flooding. Economic loss from flood damage would be reduced. Along with the City and local agricultural producers, the local DACs of Franklin-Beachwood and Stevinson would benefit from the proposed Project. The Project would result in local economic gains attributable to reduced future impacts caused by flood damage and reduced risk of costly lawsuits, which would be a substantial beneficial impact.

The Project would have a short-term beneficial impact on socioeconomic resources because it would provide for a temporary increase in construction workers in the local area. It is anticipated that there would be minor, direct short-term economic benefits to local convenience businesses because construction workers would purchase meals, gasoline, and other commodities near the Project footprint. The impacts on socioeconomic conditions from temporary employment during construction would be slightly beneficial but minor compared to the county's economy.

6.6.5.4 Cumulative Impacts

Social and economic conditions will benefit as the flooding is controlled. Cumulative impacts to social and economic conditions would be beneficial due to reduced future impacts caused by flood damage. The beneficial impacts would be received by a DAC.

6.7 Irreversible and Irretrievable Commitment of Resources

The National Environmental Policy Act (NEPA) (Section 101(2)(c)(v) and 40 CFR §1502.16) requires that the environmental analysis identify "any irreversible and irretrievable commitment of resources which would be involved in the action should it be implemented."

The Project would result in the irreversible and irretrievable commitment of the following resources during construction, operation, and maintenance:

- Construction materials, including such resources as wood, rocks, soil and metal
- Energy expended in the form of electricity, gasoline, diesel fuel, oil, and lubricants for construction equipment and vehicles, and construction worker vehicles that would be needed for Project construction, operation, and maintenance
- Construction labor
- Permanent changes in land use, including the conversion of Prime Farmland to other uses, due to land that would be committed to the embankment system of the detention basin
- Effects on biological resources (including habitat)

Some of the materials that would be used for the Project are nonrenewable resources and are considered irretrievably and irreversibly committed because reuse is not possible or is highly unlikely. Nonrenewable resources would be expected to account for a minimal portion of the region's resources; any of the Project's use of nonrenewable resources would not affect the availability of these resources for other needs within the region.

6.8 Relationship Between Local Short-term Uses and Long-term Productivity

The Council on Environmental Quality NEPA regulations (40 CFR 1502.16) require consideration of "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity." This consideration involves using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which humans and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans. This section of the NEPA regulations recognizes that short-term uses and long-term productivity of the environment are linked, and that opportunities that are acted upon have consequences that could have continuing effects well into the future.

The Project would include the construction of new facilities to include an embankment system, to create a flood control detention basin and habitat restoration and enhancement on Black Rascal Creek.

The long-term benefits to provide flood control of up to the 200-year storm event within the Black Rascal Creek watershed would outweigh the short-term and long-term adverse effects on the individual resources evaluated in this Plan EA.

6.9 Consistency with Local and Regional Plans

The Black Rascal Flood Control Project has been thoroughly coordinated with and has the support of NRCS, DWR, Merced County, and the Merced County Streams Group. As discussed in Section 2.2, the attenuation of Black Rascal Creek flood flows has been the subject of review and consideration for many decades.

The Project was included in the IRWMP as a Tier 1 highest priority project by the local stakeholders. After review, the DWR favored the Merced Region's projects and fully funded the request to prepare an EIR and perform preliminary engineering for the proposed Project.

The USJR RFMP also evaluated the Project and ranked it as a recommended high priority Tier 1 project (SJRFCPA, 2015). The USJR RFMP is part of implementation of the *Central Valley Flood Protection Plan*. DWR staff recently met with Merced County representatives and confirmed that the Black Rascal Creek Project has been selected for inclusion in the current 2017 update of the *Central Valley Flood Protection Plan* (DWR, 2017).

7. Consultation, Coordination, and Public Participation

7.1 General

7.1.1 Project Sponsors

Sponsors of the Project are Merced County, and the City of Merced. Merced County is the "lead Sponsor" being responsible for leading the planning process, providing assurances for land rights, and providing coordination of the Project with assistance from NRCS and secured grants from DWR.

7.1.2 Native American Consultation

7.1.2.1 Consultation under Assembly Bill 52

AB 52 is a state regulation that requires public agencies to consult with tribes during the CEQA process. Merced County, a Project Sponsor, was required to coordinate with tribes under AB 52. The Native American Heritage Commission was contacted on November 30, 2016, to request a Sacred Lands File Search that includes information about traditional cultural properties, such as cemeteries and sacred places in the Project vicinity. The Native American Heritage Commission responded on December 2, 2016, with a list of Native Americans interested in consulting. Each individual and group were contacted on February 8, 2017, with follow up calls on February 20, 2017. To date, no comments have been received and no tribes have requested AB 52 consultation with Merced County.

7.1.2.2 Consultation under Section 106

Consultation under Section 106 of the NHPA was completed by the NRCS pursuant to Section 106 regulations. On July 23, 2021, the following tribes were invited to review the Project and provide input regarding development of the Preferred Alternative and the APE; Amah Mutsun Tribal Band, North Valley Yokuts Tribe, Southern Sierra Miwuk Nation, and Tule River Indian Tribe as well as SHPO. A Finding of Effect (FOE) was sent to SHPO on December 16, 2021. Concurrence on the FOE was received from SHPO on April 2, 2022. The tribes were sent the FOE on April 14, 2023, requesting comment. One tribe responded on May 17, 2023, concurring with the FOE.

7.1.3 Other Consultation

Consultation with USFWS and USACE is occurring concurrently with the NEPA process. USFWS will be consulted pertaining to ESA species that have some potential to be affected by the Project including, but not limited to, CTS, Colusa grass, fleshy owl's-clover, hairy Orcutt grass, San Joaquin Valley Orcutt grass, vernal pool fairy shrimp, vernal pool tadpole shrimp, and San Joaquin Valley kit fox. A biological assessment has been prepared to evaluate the potential effects on these threatened and endangered species, and their critical habitat, that may occur as a result of proposed construction activities. A biological opinion was issued by USFWS on September 28, 2023 (USFWS 2023) (Appendix E4). The USFWS concurred with the determination that that the proposed project may affect but is not likely to adversely affect the kit fox; that the proposed project may affect but is not likely to adversely effect the listed vernal pool branchiopods; and that that the proposed project may affect, but is not likely to adversely affect Colusa grass, fleshy owl's clover, hairy Orcutt grass, or San Joaquin Valley Orcutt grass.

USFWS concluded that the Project as proposed, is not likely to jeopardize the continued existence of CTS.

USACE coordination will include Section 404 permitting for impacts to regulated aquatic resources. Consultation with the SHPO as part of Section 106 of the NHPA is complete. SHPO concurred on April 2, 2022, that there would be no historic properties affected as a result of the Project.

7.2 Public Participation

7.2.1 Environmental Impact Report

A Notice of Preparation of the Draft EIR for the Project was issued February 3, 2017, for a 30-day review and comment period. The Draft EIR was circulated for a 45-day public review from August 3, 2017, to September 18, 2017. Copies of the document were distributed to state, regional, and local agencies, as well as organizations for review and comment. Public comment letters and responses on the EIR (Merced County, 2017) are included in Appendix A.

Public hearings for the Project were held during two regularly scheduled Board of Supervisors meetings on December 13, 2017, and January 9, 2018. The Board of Supervisors ultimately certified the EIR and adopted the Project on January 9, 2018. The Merced IRWMP (RMC, 2013), USJR RFMP (SJRFCPA, 2015), and the EIR (Merced County, 2017) included significant stakeholder engagement and outreach components.

7.2.2 Draft Watershed Project Plan Environmental Assessment

Merced County circulated the Plan EA for review for 30 days from June 28 to July 27, 2023. During the 30-day public review period, the general public and responsible and trustee agencies were invited to submit comments on the Plan EA to NRCS and Merced County.

Notification letters were mailed directly to all adjacent landowners, nearby residents, and local, state, and federal agencies, on June 28, 2023. A Notice of Availability was published in the *Merced County Times* newspaper on June 29, 2023. Notification letters were mailed directly to local, state, and federal agencies and tribes on June 28, 2023. A copy of the Plan EA was made available to the public at the Merced County Public Works Office and electronically at the following website: https://www.countyofmerced.com/754/Creeks.

A public hearing for the Project was held during a regularly scheduled Merced County Board of Supervisors meeting on July 11, 2023. No comments were received during the public hearing. During the 30-day public circulation period, two comment submittals from USACE were received. Responses to those comments are included in Appendix A2.

The Finding of No Significant Impact for the Project is included in Appendix E5.

7.3 Distribution of the Draft Plan EA

An electronic copy of the document is available at the following website: https://www.countyofmerced.com/754/Creeks.

The following federal, state, and regional and local agencies were informed of availability of this Plan EA:

Federal Agencies

U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, California 94105

U.S. Army Corps of Engineers, Sacramento District
1325 J St
Sacramento, CA 95814

U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way
Sacramento, CA 95825

State Agencies

California Air Resources Board
1001 “I” Street
Sacramento, CA 95814

California Department of Fish and Wildlife, Region 4
Fresno, CA 93710

California RWQCB,
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

California Department of Water Resources
Division of Safety and Dams
P.O. Box 942836
Sacramento, CA 94236-0001

California Department of Parks and Recreation
Environmental Steward Section
1416 9th Street
Sacramento, CA 95814

California Highway Patrol
Special Projects Section
P.O. Box 942898
Sacramento, CA 92298

California Office of Emergency Services (Cal EMA)
3650 Schriever Avenue
Mather, CA 95655

California Public Utilities Commission
770 L St #1050,
Sacramento, CA 95814

Native American Heritage Commission
915 Capitol Mall, Room 364
Sacramento, CA 95814

State Historic Preservation Officer
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, CA 95816

Regional and Local Agencies

Central Valley Flood Protection Board
3310 El Camino Ave, Room 151
Sacramento, CA 95821

County of Merced
Department of Public Works
345 West 7th Street
Merced, CA 95341

City of Merced
Planning Division
678 West 18th Street
Merced, CA 95340

Merced Irrigation District
744 West 20th Street
Merced, CA 95340

8. The Preferred Alternative

8.1 Rationale for Plan Preference

An incremental cost-benefit analysis to determine the Preferred Alternative is presented in Section 5. The incremental analysis determined that the 200-year flood protection facility is the NED plan as well as the Preferred Alternative.

8.2 Measures to be Installed

The Preferred Alternative consists of a new embankment system to create a flood control detention basin that includes habitat restoration (secondary and tributary habitat channels) immediately upstream from the relocated diversion channel. The Preferred Alternative consists of a detention basin, spillways, channel modifications to Black Rascal Creek, habitat enhancements, and drainage facilities. The detention basin would temporarily detain a 200-year storm event and limit flow in the diversion channel to 3,000 cfs, thereby reducing peak flows in Bear Creek and the flooding along the old Black Rascal Creek channel that flows through the City of Merced. A profile of a typical embankment section is shown in Appendix C2. Section 5.4.2, contains a detailed description of the Preferred Alternative.

As discussed in Section 5.2.2, DSOD has determined that the downstream hazard classification will be “extremely high” hazard. Extremely high-hazard dams must have auxiliary spillways capable of passing a PMF. Although dam failure is not expected, there is always a remote possibility of failure and that failure, if it were to occur, could potentially endanger any development in the breach inundation area. The reservoir is empty except during floods; therefore, a “sunny day” failure apart from large inflows is not credible. Potential factors that could contribute to the possible failure of the dam include illegal blocking of the spillway, inflow flooding that exceeds the current PMF (perhaps due to climate change), or poor foundation conditions that were not detected during subsurface investigations. Design features that reduce this risk include a wide spillway, ample freeboard, a relatively short impoundment depth, a foundation cutoff-key, and a conservative design. Breach inundation maps have been included in Appendix C3.

8.3 Mitigation Features

Features or provisions (i.e. ECs) proposed as part of the Project to mitigate losses and other adverse effects, or to avoid or reduce impacts to threatened and endangered species, water resources, public health and safety, or cultural resources are described in detail in Section 6 Environmental Consequences. The ECs in Section 6 include a description of what the feature is mitigating or avoiding or reducing impacts to, in accordance with (40 CFR §1502.16[h]).

The Project includes monitoring requirements to reduce impacts to special-status species and wetland resources. Monitoring plans for special-status species to include Swainson’s hawk, and San Joaquin kit fox, would be implemented in coordination with CDFW. A Habitat Mitigation and Monitoring Plan would be developed and implemented for the mitigation lands, as appropriate for each affected species.

A Biological Opinion was issued by USFWS for the Project on September 28, 2023 (USFWS 2023) (Appendix E4). Mitigation for 1.6 acres of temporary impacts to upland dispersal habitat (non-native annual grassland) and 0.198 acre of permanent impacts to Riverine Predictive Ecosystem will be purchased from a USFWS approved mitigation or conservation bank. The following are the proposed amounts and ratios of compensation: Permanent impacts on aquatic habitat (0.198 acre) will be mitigated at a ratio of 3:1 (0.594 acre); temporary impacts on upland habitat (1.6 acres) will be mitigated at a ratio of 0.5:1 (0.8 acre).

Permanent freshwater wetland impacts could potentially be mitigated onsite with in-kind wetland habitat restoration and/or creation (typically at a ratio of 1:1) that will ensure no net loss of habitat functions and values. For onsite mitigation to occur, the Project would need to develop a wetland MMP prior to construction.

8.4 Permits and Compliance

The following permits and approvals are anticipated to be required for construction of the Project:

- Federal
  - USACE – Section 404/Section 10 Individual Permit and Section 408 Permit
  - USACE- CWA Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR 230)
  - USFWS – Consultation under Section 7 of the ESA. A biological opinion issued on September 28, 2023 (Appendix E4)
  - SHPO – Consultation under Section 106 of the NHPA
- State
  - Central Valley Flood Protection Board – Encroachment Permit
  - Central Valley RWQCB – Section 401 Water Quality Certification
  - Central Valley RWQCB – National Pollutant Discharge Elimination System, General Construction Permit
  - CDFW – Section 2081 Management Agreement under Section 2081 California Fish and Game Code
  - CDFW– Lake or Streambed Alteration Agreement
- Local and Regional
  - SJVAPCD – Indirect Source Review
  - Merced County Department of Public Works – Grading Permit
  - Merced County Department of Public Works – Encroachment Permit
  - Merced County Department of Public Works – Transportation Permit

As detailed in Section 7, cultural and special-status species consultation will be conducted prior to Project implementation.

8.5 Costs and Cost Sharing

The Black Rascal Flood Control Project Preferred Alternative would implement a 200-year flood control structure/facility on the Black Rascal Creek. Implementation of the Preferred Alternative would reduce property damage while minimizing anticipated environmental impacts to the degree possible. Annualized Project costs, annual flood damage reduction benefit, and the estimated benefit-cost ratio are presented in the Economic Tables in Section 8.8., per Section 506.1 of the Watershed Program Manual (NRCS, 2014a).

Project costs are proposed to be shared by the local partner as well as funds made available by the State of California through DWR and the federal contribution through NRCS. Approximately 38 percent of the total Project cost would be covered by the local partners, 30 percent by state funds, and 32 percent by federal funds. Permitting, design, mitigation, and construction costs are proposed to be cost shared using all cost share partners. The costs of land acquisition, easements, administration, Project management, and coordination would be paid for by the local partners and state through DWR funds. See Tables 8.8-1 and 8.8-2 for details.

The Merced Stream Group would provide up to an equal share of funding as well as landowner coordination, local outreach, municipal and agricultural planning, and engineering expertise through all Project phases. Final cost sharing portions will be finalized by the Merced Streams Group prior to full Project implementation.

8.6 Installation and Financing

8.6.1 Installation

The Project is proposed to be completed as described in the following planned sequence that also describes the responsibilities of the local partners, NRCS and cooperating agencies:

- **2016**: Merced County completed preparation of EIR, initiated preliminary design, and continued stakeholder engagement and outreach. This work was funded by a DWR Integrated Regional Water Management grant.

- **2017 to 2024**: The local partners are continuing to work with NRCS under the authority of the Watershed Protection and Flood Prevention Act (PL 83-566). After completion of a Partnership Agreement, Merced County will coordinate with NRCS staff to review existing environmental documentation and revise as needed to format and comply with NRCS National Watershed Program Manual and NRCS Handbook requirements. The City of Merced and Merced County will continue stakeholder engagement and outreach. Concurrently with and following NRCS review and acceptance of the Watershed Plan, the County will initiate Project permitting, design, and acquisition of land and easements. Project administration, Project management, and RCPP annual reporting requirements will be the responsibility of Merced County. During this and subsequent Project phases, the County and City of Merced will work in close coordination.

- **2024 through 2025**: Construction phasing will depend on the timing of future local and state funding availability. Construction will include inspection trench and backfill, spillway, gated outlet structure, gated inlet structure, topsoil evacuation, embankment and excavation.

- **Post 2025**: Continuing monitoring, performance tracking, and O&M will be conducted in coordination with Merced County and City of Merced after completion of the Project.

8.6.2 Responsibilities

The Merced Streams Group has coordinated to date on the planning elements of the Project including the development of the Merced County Feasibility Study and preparation of environmental documentation and permitting. Going forward into the design, implementation, and monitoring and evaluation phases of the Project, the County will continue to be the lead with close coordination and technical assistance from the City of Merced.

NRCS responsibilities include preparation environmental documentation under NEPA, consultation under Section 106 of the NHPA, and USFWS consultation under Section 7 of the ESA.

8.6.3 Contracting

The Project may be constructed through future Project agreements between NRCS and the local partner by means of federal contract, local contract, or division of work.

8.6.4 Land Rights

Merced County would be responsible for acquiring the land rights and rights of way necessary to install, operate and maintain the facility.

8.7 Operation, Maintenance, and Replacement

Merced County commits to conducting operation and maintenance for the proposed Project. Project operations would generally be limited to control of gate position (during the non-flood season) on the outlet structure, which is anticipated to be capable of local and remote control. Maintenance activities would include vegetation management, embankment and structure maintenance and inspection activities, and management of sediment and debris from the basin, as needed. Sediment would be removed during dry periods when rubber or tracked earth-moving equipment could access the detention basin and wetland area. Sediment would be disposed of in an approved location. The estimated average annual O&M costs would be approximately $50,000 per year (2020 U.S. dollars), subject to future changes in prevailing wages and permitting consultation costs.

8.8 Economic Tables

The costs and benefits of the proposed Project are summarized in the Economic and Structural Tables covered in Sections 8.8 and 8.9, per NWPM requirements (NWPM Part 506, Subpart B). Table formats follow the table examples in the NWPM, including table fields appropriate to the Project, and omitting items not applicable to the Project. All values are presented in 2020 U.S. dollars.

Throughout the Economic Tables, costs are broken down among two ‘works of improvement’ that comprise the proposed Project: Detention basin levee construction, and inlet/outlet structure construction. To the extent possible, costs and benefits are shown individually for these two works of improvement. However, where it is not possible to separate out the benefits or costs of the Project between the two components, total benefits are presented under the detention basin work of improvement as it is the main Project structure.

Table 8.8-1 summarizes the costs of the proposed Project, broken down between Public Law 83-566 Funds and partner contributions from Merced County. The table reflects that no part of the proposed Project is to be constructed on federal land. The total federal funding for the Project under PL 83-566 is

$10 million. The remaining $25.8 million of Project costs will be covered by other funding sources. Total Project costs are estimated at $35.8 million.

Table 8.8-2 shows installation costs for individual works of improvement, with cost categories broken out for construction, engineering, real property rights, and Project administration. Notes to the table provide additional detail on the cost categories that have been aggregated to the quantities presented in the table.

Table 8.8-1. Economic Table 1: Estimated Installation Cost[a]
Black Rascal Creek Watershed, CA

Works of Improvement	Number				Public Law 83-566 Funds			Other Funds—Merced County			Total
	Unit	Federal Land	Non-federal Land	Total	Federal Land	Non-federal Land	Total	Federal Land	Non-federal Land	Total	
Detention Basin Levee Construction	Lump Sum	0	1	1	0	9,500,000	9,500,000	0	24,125,462	24,125,462	33,625,462
Inlet/Outlet Structure Construction	Lump Sum	0	1	1	0	500,000	500,000	0	1,636,241	1,636,241	2,136,241
Total		**Not Applicable**	**Not Applicable**	**Not Applicable**	**0**	**10,000,000**	**10,000,000**	**0**	**25,761,703**	**25,761,703**	**35,761,703**

[a] Price Base: 2020 U.S. dollars

Prepared: 10/2021

Table 8.8-2. Economic Table 2: Estimated Cost Distribution[a]

Black Rascal Creek Watershed, CA

Works of Improvement	Installation Cost--Public Law 83-566						Installation Cost--Other Funds						Total
	Construction	Engineering	Real Prop. Rights	Relocation Payments	Project Admin	Total Public Law 566	Construction	Engineering	Real Prop. Rights	Relocation Payments	Project Admin	Total Other Funds	
Detention Basin Levee Construction	7,149,307	1,531,510[b]	0	0	0	**8,680,817**	5,406,281	0	15,000,000	0	1,469,181	**21,875,462**	30,556,279
	819,183[c]	0	0	0	0	**819,183**	2,000,000[d]	0	0	0	0	**2,000,000**	2,819,183
	0	0	0	0	0		250,000[e]	0	0	0	0	**250,000**	250,000
Inlet/Outlet Structure Construction	500,000	0	0	0	0	**500,000**	1,636,241	0	0	0	0	**1,636,241**	2,136,241
Total	**8,468,490**	**1,531,510**	**0**	**0**	**0**	**10,000,000**	**9,292,522**	**0**	**15,000,000**	**0**	**1,469,181**	**25,761,703**	**35,761,703**

[a] Price Basis: 2020 U.S. dollars Prepared: 10/2021

[b] Includes Geotechnical Investigation; NRCS Technical Assistance/Engineering; Preliminary and Final Design Standards, Specifications, and Approvals; Final As Built drawings

[c] Includes Final O&M plan ($69,183), NEPA Requirements and Approvals (Watershed Plan and Economic Analysis) ($550,000), management and acceptance of final bid for basin levee construction, final bid for structure construction ($200,000)

[d] Includes Environmental Mitigation

[e] Includes Permit Application costs

Table 8.8-3. Economic Table 4: Average Annual NED Costs summarizes Project costs on an annualized basis, including both capital costs and estimates of annual operation, maintenance, and replacement costs. Installation costs are amortized over the 100-year useful life of the Project at a discount rate of 2.75 percent, based on Treasury Annual Interest Rate Certification, per Water Resources Development Act of 1974 and rates for federal water projects, provided by NRCS Economics (USDA NRCS 2020). Total annualized capital costs are estimated at $1.0 million over the life of the Project, while O&M costs are estimated at $50,000 per year, subject to future changes in prevailing wages and permitting consultation costs. Total average annual NED costs are estimated at $1.1 million.

Table 8.8-3. Economic Table 4: Average Annual NED Costs[a]

Black Rascal Creek Watershed, CA

Works of Improvement	Project Outlays--Amortization of Installation Cost	Project Outlays--Operation, Maintenance and Replacement Cost	Other Direct Costs	Total
Detention Basin	990,410	50,000	0	**1,040,410**
Inlet/Outlet Structure Construction	62,921	0	0	**62,921**
Total	**1,053,332**	**50,000**	0	**1,103,332**

[a] Price base: 2020 amortized over 100 years useful life at a discount rate of 2.75%. Prepared: 10/2021

The annual NED benefits of the Project alternatives are based on estimating the reduction in EAD of the preferred Project relative to the No-Action Alternative (FWOP). The annual NED benefit was estimated in a flood damage analysis documented in Appendix D. The annual damage reduction benefit was calculated across various structure inventory types identified and further described in Appendix D including residential, commercial, industrial, and public facilities. Structure values are based on 2019 assessed property values from the Merced County Assessor's office. However, all avoided EAD benefits are inflated to 2020 U.S. dollars using a Gross Domestic Product Deflator from the St. Louis Federal Reserve to be comparable to Project costs, which are also in 2020 U.S. dollars.

The flood damage reduction benefits were calculated individually for agricultural and rural communities and for non-agricultural-related areas of the Project. Agricultural and Rural Communities were identified based on the definition in the National Watershed Program Manual, Part 606, which defines them as "All territories of a state that are not within the outer boundary of any city or town that has a population of 50,000 or more according to the latest decennial census of the United States." For the Project, this includes all areas not within the boundary of the City of Merced, including areas of unincorporated Merced County, and the community of Franklin-Beachwood. The community of Franklin-Beachwood is a small, disadvantaged community outside of the City of Merced.

Total EAD reduction benefits are estimated to total $5 million, with $3.9 million associated with structures located in the City of Merced, and $1.1 million associated with structures in agricultural and rural communities. The benefit to agricultural and rural communities comprises 22 percent of total Project benefits.

Table 8.8-4. Economic Table 5: Estimated Average Annual Flood Damage Reduction Benefits[a]
Black Rascal Creek Watershed, CA

Item	Without-Project		With Project		Damage reduction benefit	
	Agriculture-related[b]	Non-agriculture-related	Agriculture-related	Non-agriculture-related	Agriculture-related	Non-agriculture-related
Flood damage--Residential structures	1,052,331	3,294,677	148,452	128,449	903,880	3,166,228
Flood damage--Commercial structures	201,743	347,107	32,251	5,169	169,492	341,938
Flood damage--Industrial structures	14,890	321,469	62	14,228	14,827	307,242
Flood damage--Public structures	2,546	113,623	0	2,763	2,546	110,860
Total	**1,271,510**	**4,076,876**	**180,765**	**150,609**	**1,090,745**	**3,926,267**

[a] Price Base: 2020 U.S. dollars Prepared: 10/2021

[b] Agriculture-related damage includes damage to agricultural and rural communities.

Table 8.8-5. Economic Table 6: Comparison of NED Benefits and Costs, shows a summary of total benefits and costs of the preferred Project. Total annual expected benefits from Table 8.8-4 are shown for agriculture and non-agriculture-related communities, broken down by the type of structure (residential, commercial, and other) and total annualized costs from Table 8.8-3. Based on these estimates, the Project's benefit-cost ratio is estimated to be 4.5, indicating that every dollar of Project costs is associated with $4.60 in Project benefits. Note that Project benefits are associated with the entire Project as a whole and cannot be split into benefits associated with the detention basin and those associated with the inlet/outlet structure. To be consistent with Table 8.8-3, these works of improvement were both included in Table 8.8-5, but all Project benefits are included under the detention basin as the main Project structure.

Table 8.8-5. Economic Table 6: Comparison of NED Benefits and Costs[a]
Black Rascal Creek Watershed, CA

Works of Improvement	Agriculture-related			Non-agriculture-related			Average Annual Benefits	Average Annual Costs[b]	Benefit-Cost Ratio
	Residential	Commercial	Other	Residential	Commercial	Other			
Detention Basin[c]	903,880	169,492	17,373	3,166,228	341,938	418,101	5,017,012	1,103,332	4.5
Inlet/Outlet Structure Construction[c]	0	0	0	0	0	0	0	0	0
Total	**903,880**	**169,492**	**17,373**	**3,166,228**	**341,938**	**418,101**	**5,017,012**	**1,103,332**	**4.5**

[a] Price Base: 2020 U.S. dollars Prepared: 10/2021

[b] From Table 8.8-3. Economic Table 4.

[c] Project benefits are associated with the entire Project as a whole and cannot be split into benefits associated with the detention basin and those associated with the inlet/outlet structure. To be consistent with Table 8.8-3, these works of improvement were both included in Table 8.8-5, but all Project benefits are included under the detention basin as the main Project structure.

8.9 Structural Tables

The structural elements of the proposed Project are summarized in the Structural Tables presented in this section, per National Watershed Program Manual requirements (NWPM Part 506, Subpart B). Table formats follow the table examples in the National Watershed Program Manual, including table fields appropriate to the Project, and omitting tables and columns not applicable to the Project, where omission is allowed by the regulations.

Because the Project does include embankments that are capable of retaining water, the structural table for dams (Table 8.9-1) and the structural table for dikes (Table 8.9-2) are included in this Plan EA. The Project does not include channel work and therefore the structural table relevant to channel work is omitted.

The Project consists of a flood control detention basin (basin), created by an embankment (dike as referred to in Structural Table 3a), and spillways. It is adjacent to the MID Fairfield Canal and East Yosemite Avenue that would temporarily detain a 200-year flood event and limit flow in the diversion channel to 3,000 cfs. Table 8.9-1 summarizes the structural elements of the flood control detention basin, according to requirements in Section 506.1 of the Watershed Program Manual (NRCS, 2014a).

Table 8.9-1. Structural Table 3: Dams with Planned Storage Capacity
Black Rascal Creek Watershed, CA

Item	Unit	Structure Number[a]	Total
Class of structure		1	High
Seismic zone		1	Soil Site Class C [b]
Uncontrolled drainage area	square miles	1	31.5
Controlled drainage area	square miles	1	0.8
Total drainage area	square miles	1	31.5
Runoff curve No (1-day) (AMC II)		1	Not Applicable [c]
Time of concentration (Tc)	hours	1	14.8 [d]
Elevation top dam	feet	1	215
Elevation crest auxiliary spillway	Feet	1	210.3
Elevation crest high stage inlet	Feet	1	Not Applicable [d]
Elevation crest low stage inlet	Feet	1	Not Applicable [e]
Auxiliary spillway type		1	Reinforced-concrete ogee crest weir/spillway
Auxiliary spillway bottom width	Feet	1	350
Auxiliary spillway exit slope	Percent	1	125
Maximum height of dam	Feet	1	215
Volume of fill	Cubic yards	1	150,000
Total capacity (Crest of auxiliary spillway)	Acre-feet	1	1,700
Sediment submerged	Acre-feet	1	Not Applicable [f]
Sediment aerated	Acre-feet	1	Not Applicable [f]

Item	Unit	Structure Number[a]	Total
Beneficial use (identify use)	Acre-feet	1	Not Applicable [g]
Floodwater retarding	Acre-feet	1	1,700
Between high and low stage	Acre-feet	1	Not Applicable [h]
Surface area	Acres	1	479
Sediment pool	Acres	1	Not Applicable [i]
Beneficial use pool	Acres	1	Not Applicable [g]
Floodwater retarding pool (Crest of auxiliary spillway)	Acres	1	509 [j]
Principal spillway design		1	Reinforced-concrete ungated constriction
Rainfall volume (1-day)	Inches	1	3,966 [k]
Rainfall volume (10-day)	Inches	1	Not Applicable [l]
Runoff volume (10-day)	Inches	1	Not Applicable [l]
Capacity of low stage (maximum)	Cubic feet/second	1	Not Applicable [h]
Capacity of high stage (maximum)	Cubic feet per second	1	2,650 [m]
Dimensions of conduit	Feet/inch	1	Not Applicable [n]
Type of conduit		1	Not Applicable [n]
Frequency operation-auxiliary spillway	Percent chance	1	0.05 [o]
Auxiliary spillway hydrograph		1	
Rainfall volume	Inches	1	3,966
Runoff volume	Inches	1	2,855
Storm duration	Hours	1	24
Velocity of flow (Ve)	Feet/second	1	15.7
Maximum reservoir water surface elevation	Feet/second	1	212.6
Freeboard hydrograph		1	
Rainfall volume	Inches	1	Not Applicable [p]
Runoff volume	Inches	1	Not Applicable [p]
Storm duration	Hours	1	Not Applicable [p]
Maximum reservoir water surface elevation	Feet	1	210.24 [q]
Capacity equivalents	Acres	1	509
Sediment volume	Inches	1	Not Applicable [i]
Floodwater retarding volume	Acres	1	509
Beneficial volume (identify use)	inches	1	Not Applicable [g]

[a] Project consists of a single structure that includes embankments, storage areas, and spillways Prepared: 6/2023

[b] Soil site class is determined in accordance with the American Society of Civil Engineers (ASCE) Standard 7-16. (ASCE, 2017)

[c] There is no 1-day curve number (CN). Only one CN map was used for flood modeling.

[d] Based on equation 15-3b, on Part 630 Hydrology National Engineering Handbook (USDA NRCS, 2008)

[e] This item pertains to water collection ponds that are not part of the Project.

[f] This item pertains to the preservation of reservoir capacity due to sediment build up. Detention basins pass sediment downstream.

[g] The Project does not have beneficial use storage

[h] There is no high and low stage.

[i] The Project does not have a sediment pool. Sediment will be passed downstream.

[j] Area of flood water at the 200-year max water surface elevation of 210.24 feet

[k] 200-year, 24-hour, NOAA Atlas 14 Rainfall (NOAA, 2022)

[l] Not available because 24-hour duration rainfall was used

[m] There is no high and low stage. It is assumed that 'capacity of high stage' is referring to the capacity of the primary spillway.

[n] The primary spillway does not have any conduits. The Project uses welded steel pipe and reinforced-concrete pipe in other areas of the Project.

[o] Based on a 1-in-200 year event

[p] See table entries for the auxiliary spillway hydrograph.

[q] All elevations in the table are referenced to NAVD 88.

Construction of the embankments would occur within the 300-acre Project footprint (Figure 5.4-1). Table 8.9-2 summarizes the structural elements of these embankments, according to requirements in Section 506.1 of the Watershed Program Manual (NRCS, 2014a).

Table 8.9-2. Structural Table 3a: Dikes

Black Rascal Creek Watershed, CA

Dike	Stationing	Top Width (feet)	Average Side Slope	Average Height of Dike (feet)	100-Year Frequency Velocity (feet per seconds)	Dike Protection	Volume of Earth Fill (cubic yards)
"A" LINE	STA 68+00 to STA 102+65; STA 106+15 to STA 141+50	12	3H:1V	14	Not applicable	Vegetated	174,293

Prepared: 10/2021

9. References

American Society of Civil Engineers. 2017. ASCE/SEI 7-16: Minimum Design Loads and Associated Criteria for Buildings and Other Structures. American Society of Civil Engineers. Front Matter (ascelibrary.org)

Bailey, E.H. 1966. *Geology of Northern California*. California Division of Mines and Geology, Bulletin 190.

Baumgardner, Michael. 2018. Black Rascal Creek Flood Protection Project Biological Evaluation, Merced County, California. October 26.

Bureau of Labor Statistics. (2018). *Consumer price index - all urban consumers, 2006-2018 [Time series]*. http://data.bls.gov.

Cai, Wenju, Simon Borlace, Matthieu Lengaige, Peter van Rensh, Mat Collins, Gabriel Vecchi, Axel Timmerman, Agus Santoso, Michael J. McPhaden, Lixin Wu, Matthew H. England, Guojian Wang, Eric Guilyardi, and Fei-Fei Jin. 2014. "Increasing frequency of extreme El Niño events due to greenhouse warming." *Nature Climate Change* (4), pp. 111–116. January 19.

California Air Resources Board (CARB). 2020. *California Greenhouse Gas Emissions for 2000 to 2018*. 2020 Edition. https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2018/ghg_inventory_trends_00-18.pdf. Accessed February 2021.

California Air Resources Board (CARB). 2021a. *iADAM: Air Quality Data Statistics*. http://www.arb.ca.gov/adam/. Accessed February 2021.

California Air Resources Board (CARB). 2021b. *Summaries of Historical Area Designations for State Standards*. As of February 16, 2021. https://ww2.arb.ca.gov/our-work/programs/state-and-federal-area-designations/state-area-designations/summary-tables Accessed February 2021.

California Department of Conservation (DOC). 2016. *2014–2014 Land Use Conversion, Merced County*.

California Department of Fish and Wildlife (CDFW). 2012. *Staff Report on Burrowing Owl Mitigation.*

California Department of Fish and Wildlife (CDFW). 2016. *Five-Year Status Review for Swainson's Hawk (Buteo swainson).* https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=133622&inline.

California Department of Fish and Wildlife (CDFW). 2018. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959&inline. Accessed March 20, 2018.

California Department of Fish and Wildlife (CDFW). 2021. California's Invaders. https://wildlife.ca.gov/Conservation/Invasives/Species. Accessed March 2021.

California Department of Transportation (Caltrans). 2003. *Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide.* http://www.dot.ca.gov/hq/construc/stormwater/BMP_Field_Manual_Master_5x8_revision5.pdf.

California Department of Transportation (Caltrans). 2011. *Stormwater Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual.* CTSW-RT-11-255.08.01. June.

California Department of Transportation (Caltrans). 2016. Traffic Census Program. Traffic Data Branch. Available at: http://dot.ca.gov/trafficops/census/. Accessed October 24, 2016.

California Department of Water Resources (DWR). 1981. *Depth to Top of Corcoran Clay*.

California Department of Water Resources (DWR). 2004. "San Joaquin Groundwater Basin: Merced Subbasin." *California's Groundwater Bulletin 118*. Last update February 27, 2004.

California Department of Water Resources (DWR). 2008. *Flood Rapid Assessment Model (F-RAM) Development*. Developed by URS Corporation for DWR. November.

California Department of Water Resources (DWR). 2013. *California's Flood Future*. Attachment C: History of California Flooding. Public review draft. April.

California Department of Water Resources (DWR). 2015a. "Bear Creek at Mckee Road near Merced." *Water Data Library*. http://www.water.ca.gov/waterdatalibrary/docs/Hydstra/docs/B05525/POR/FLOW_DAILY_MEAN_DATA.CSV. Accessed December 30, 2015.

California Department of Water Resources (DWR). 2015b. "Burns Creek below Burns Dam near Planada." *Water Data Library*. http://www.water.ca.gov/waterdatalibrary/docs/Hydstra/docs/B56100/POR/FLOW_DAILY_MEAN_DATA.CSV. Accessed December 30, 2015.

California Department of Water Resources (DWR). 2015c. "Owens Creek at Merced ID West Boundary near Merced." *Water Data Library*. http://www.water.ca.gov/waterdatalibrary/docs/Hydstra/docs/B06151/POR/FLOW_DAILY_MEAN_DATA.CSV. Accessed December 30, 2015.

California Department of Water Resources (DWR). 2017. *Central Valley Flood Protection Plan Update*. https://water.ca.gov/Programs/Flood-Management/Flood-Planning-and-Studies/Central-Valley-Flood-Protection-Plan. August 2017.

California Environmental Protection Agency and State Water Resources Control Board (CalEPA/SWRCB). 2017. *Water-Quality Based Assessment Thresholds for Inland Surface Water*. http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/#thresholds.

Cardenas, Gloriella, Jeremy Hollins, Natalie Lawson, David Sheldon, and Kelly Morgan. 2021. *Cultural Resources Assessment for the Black Rascal Creek Flood Control Project, Merced County, California.* Report prepared by Jacobs Engineering, Inc. Report prepared for Merced County Department of Public Works.

Dice, Michael H. 2010. *P-24-001909. Merced Irrigation District.* Michael Brandman Associates. Ms on file with the Central California Information Center, California State University, Stanislaus.

Federal Emergency Management Agency (FEMA). 2010. Flood Insurance Study: Merced County, California and Incorporated Areas. September 15.

FirstCarbon Solutions. 2016. Draft Section 106 Cultural Resources Assessment, McCoy Lateral Relining Project, Merced Irrigation District, Merced County, California. Ms on file with the Merced Irrigation District, Merced.

Galloway, J.D. 1920. *Report on the Merced Irrigation District, Merced, California*. Report includes February 1920 map entitled *General Map, Merced Irrigation District*. The map was displayed at the Merced County Historical Museum as part of a Merced Irrigation District exhibit.

Hemming Morse, Inc. (2011) Expert Report of Daniel W. Ray, Abarca, et al. v. Merced Irrigation District, et al. United States District Court Case No. 1:07-CV-0388 OWW DLB.

Jacobs Engineering Group Inc. (Jacobs). 2020a. *Black Rascal Creek Flood Control Project, Merced County California, Draft Aquatic Resource Delineation Report*. August.

Jacobs Engineering Group Inc. (Jacobs). 2020b. *Black Rascal Creek Flood Control Project, Merced County, California, Project Design Report – 60 Percent Design.* November 2020.

Jacobs Engineering Group Inc. (Jacobs). 2021. *Aquatic Resource Compensatory Mitigation Plan.* Appendix A Planting Plan. September.

JRP Historical Consulting Services. 2007. *Historical Resources Inventory and Evaluation Report, Atwater-Merced Expressway Project, Merced County, California.* Ms on file with the Central California Information Center, California State University, Stanislaus.

Loftus, Shannon. 2011. *P-24-001909. Merced Irrigation District.* Ms on file with the Central California Information Center, California State University, Stanislaus.

Marchand, D.E. and Alan Allwardt. 1978. *Preliminary geologic map showing Quaternary deposits of the northeastern San Joaquin Valley, California*. U.S. Geological Survey. Miscellaneous Field Studies Map MF-945.

Merced Area Groundwater Pool Interests (MAGPI). 2008. *Merced Groundwater Basin Groundwater Management Plan Update*. Merced County, California. Prepared by AMEC Geomatrix. July.

Merced County Association of Government (MCAG). n.d. Merced County, CA: Streams Project, Funding Request.

Merced County. 2009. *Feasibility Study, Black Rascal Creek Flood Control Project*. https://www.countyofmerced.com/754/Creeks. Prepared by URS Corporation in June 2008 and amended in February 2009.

Merced County. 2010. Board of Supervisors Legislative Agenda. January 12.

Merced County. 2012. 2030 Merced County General Plan, Draft Program Environmental Impact Report. November.

Merced County. 2013. *2030 Merced County General Plan*. http://www.co.merced.ca.us/DocumentCenter/Home/View/6766. December 10.

Merced County. 2017. *Environmental Impact Report, Black Rascal Creek Flood Control Project.* Final. SCH# 2017021015. Prepared by CH2M HILL. December.

Merced County. 2019. Environmental Documents. https://www.co.merced.ca.us/414/Environmental-Documents. Accessed January 2019.

Merced Irrigation District (MID). 2013. Merced Integrated Regional Water Management Proposition 84 Round 2 Implementation Grant Proposal Attachment 8: Benefit and Cost Analysis. http://mercedirwmp.org/files/Proposition%2084%20Round%202%20Implementation%20Grant%20Application/Attachment%208.pdf.

National Oceanic and Atmospheric Administration (NOAA). 2014. *Fun with Statistics: El Niño and California Rainfall*. https://www.climate.gov/news-features/blogs/enso/fun-statistics-el-ni%C3%B1o-and-california-rainfall. Accessed January 21, 2016.

National Oceanic and Atmospheric Administration (NOAA). 2022. Precipitation Frequency Data Server. PF Data Server-PFDS/HDSC/OWP (noaa.gov).

National Water Quality Monitoring Council. 2017. *Black Rascal Creek @ Yosemite Rd (CEDEN-535BRCAYR) Site Data in the Water Quality Portal*. https://www.waterqualitydata.us/portal/. Accessed March.

Natural Resources Conservation Service (NRCS). 2014a. *390-National Watershed Program Manual*.

Natural Resources Conservation Service (NRCS). 2014b. *390-National Watershed Program Handbook*.

Natural Resources Conservation Service (NRCS). 2016. *Web Soil Survey*. U.S. Department of Agriculture. http://websoilsurvey.nrcs.usda.gov/.

Natural Resources Conservation Service (NRCS). 2018. NRCS National Bulletin 200-17-1 ECN - Normalized Prices and Discount Rate for FY 2018 Water Resources Planning and Evaluation. 2018. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/cntsc/?cid=nrcs143_009685.

Natural Resources Conservation Service (NRCS). 2019. Technical Release – 60 Earth Dams and Reservoirs. https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=43317.wba. March 2019.

NETROnline. 2020. 1946, 1958, 1998, 2005, 2009, 2010, 2012, 2014, and 2016 aerial images of Area of Potential Effects. Accessed June 15-18, 2020. https://www.historicaerials.com/viewer.

Pacific Fishery Management Council (PFMC). 2018. *Fishery Management Plan and Amendments: Current Salmon Fishery Management Plan.* February 28. https://www.pcouncil.org/salmon/fishery-management-plan/current-management-plan/.

Patchett, Jesse. 2012. *Merced Integrated Regional Water Management Plan: Existing Regional Flood Management Summary.* Peterson Brustad, Inc. August 13.

RMC. 2013. *Merced Integrated Regional Water Management Plan.* August.

Robinson, David. 2006. California County Agricultural Commissioner Disaster Report for March and April 2006.

San Joaquin River Flood Control Project Agency (SJRFCPA). 2015. *Upper San Joaquin River Regional Flood Management Plan*.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2009. *Guidance for Valley Land-Use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA.* https://www.valleyair.org/Programs/CCAP/12-17-09/3%20CCAP%20-%20FINAL%20LU%20Guidance%20-%20Dec%2017%202009.pdf. December 17.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015. *2015 $PM_{2.5}$ State Implementation Plan*. http://www.valleyair.org/Air_Quality_Plans/PM25Plans2015.htm. Accessed June 2018.

Unknown. 1924. *Map of Merced Irrigation District, Merced County, California.* University of California, Berkeley Library. Accessed June 15, 2020. https://www.lib.berkeley.edu/EART/CA/g4363m5j4_1924_m3.html.

Unknown. 1942. *Map of the Merced Irrigation District, California, Showing Ground Water Conditions.* University of California, Merced, University of California Cooperative Extension Archive. Accessed June 15, 2020. https://calisphere.org/item/ark:/86071/d21r1j/?order=0.

Unknown. 1957. *Eastern Merced County Water Plan, General Location of Surface Reservoirs, Main Canals & Ground Water Recharge Areas.* University of California, Merced, University of California Cooperative Extension Archive. Accessed June 15, 2020. https://calisphere.org/item/ark:/86071/d2vf3n/.

U.S. Army Corps of Engineers (USACE). 1977. Annual Report of the Chief of Engineers on Civil Works Activities. Volume II. Accessed June 22, 2020. https://www.google.com/books/edition/Annual_Report_of_the_Chief_of_Engineers/hiR5NuFdMeIC?hl=en&gbpv=0.

U.S. Army Corps of Engineers (USACE). 1980. Merced County Streams Flood Control Plan Environmental Impact Statement.

U.S. Army Corps of Engineers (USACE). 2005. Engineering and Design – EM 1110-2-2100 for Stability Analysis of Concrete Structures. December 1. https://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-2100.pdf?ver=2013-09-04-070815-903.

U.S. Army Corps of Engineers (USACE). 2017. Fromm, Jennifer, USACE personal communication with Heather Perry, CH2M HILL, Inc., regarding stream flow data for the Black Rascal Creek Diversion. March 23.

U.S. Bureau of Economic Analysis (2021) Gross Domestic Product: Implicit Price Deflator [GDPDEF], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/GDPDEF, November 4, 2021.

U.S. Census Bureau. 2021. QuickFacts, Merced County and City of Merced, California. Accessed April 2021.

USDA Natural Resources Conservation Service. 2008. National Engineering Handbook: Part 630-Hydrology. National Engineering Handbook (hydrocad.net)

USDA Natural Resources Conservation Service. 2020. Rate for Federal Water Projects|NRCS Economics. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/econ/prices/?cid=nrcs143_009685. Accessed October 25, 2021.

U.S. Environmental Protection Agency (EPA). 2021. *California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants*. https://www3.epa.gov/airquality/greenbook/anayo_ca.html. Accessed February 2021.

U.S. Fish and Wildlife Service. 2017. National Wetlands Inventory Data. Accessed September 2017.

U.S. Fish and Wildlife Service. 2023. Biological Opinion - Formal Consultation for the Black Rascal Creek Flood Control Project, Merced County, California. September 28, 2023.

U.S. Geological Survey (USGS). 1948. Merced, CA 7.5 Minute USGS quadrangle.

U.S. Geological Survey (USGS). 1961. Merced, CA 7.5 Minute USGS quadrangle.

U.S. Geological Survey (USGS). 2017. *National Water Information System.* USGS 11272500 Merced R NR Stevinson CA. https://waterdata.usgs.gov/nwis/inventory/?site_no=11272500&agency_cd=USGS&amp. Accessed January 2017.

Water Resources Council (WRC). 1983. Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. Washington, D.C.

10. List of Preparers

Jacobs preparers are listed in the following table.

Name	Present Title (Time in Job–Years)	Education Degree	Continued Education	Experience (Titles And Time In Job–Years)	Other (Licenses, etc.)
Robert Tull	Project Manager – 20	B.S. Environmental Policy Analysis and Planning	M.S. Environmental Engineering	Engineer – 33	Civil Engineer
Mark Oliver	Senior Planner and Reviewer – 33	B.S. Environmental Policy Analysis and Planning		Environmental Planner/Project Manager – 33	
Julie Petersen	Environmental Planner– 16	B.S. Biology		Environmental Planner – 16	
Kim Hein	Project Manager/Design Manager – 3	Mechanical Engineering		Engineer – 20	Civil and Mechanical Engineer
Brad Memeo	Project Manager – 16	B.S. Civil Engineering		Design Engineer – 5 Project Engineer – 5 Design Manager – 10 Project Manager – 8	
Tung Nguyen	Water Resources Modeler – 2.5	B.S., M.S., PhD Civil Engineering		Hydrologist – 3 Water Resources Modeler – 2.5	
Fatuma Yusuf	Principal Economist – 21	B.S. Range Management; M.A. Agricultural Economics; M.S. Statistics; Ph.D. Agricultural Economics		Associate Consultant – 5 Project Consultant – 4 Senior Economist – 10 Principal Economist – 2	
Liz Stryjewski	Economist – 10	M.S., Agricultural and Resource Economics		Economist – 10	
Mark Twede	Geotechnical Engineer – 28	B.S. M.S. Civil Engineering		Project Engineer – 10 Geotechnical Engineer – 18	Professional Geologist Professional Engineer
Heather Perry	Hydrogeologist – 19	B.S. Geology M.S. Hydrogeology		Hydrogeologist – 19	Professional Geologist
Brad Memeo	Project Manager – 16	B.S. Civil Engineering		Design Engineer – 5 Project Engineer – 5 Design Manager – 10 Project Manager – 8	
Hong Zhuang	Senior Environmental Engineer – Air Quality – 17	B.S. Chemistry and Environmental Engineering; M.S. Environmental Science and Engineering		Air Quality – 20	

Name	Present Title (Time in Job–Years)	Education Degree	Continued Education	Experience (Titles And Time In Job–Years)	Other (Licenses, etc.)
Kevin Fisher	Principal Wetland Scientist – 3.5	B.S. Environmental Health M.S. Ecology		Wetland Scientist/Ecologist – 21	Professional Wetland Scientist (#2107)
Gretchen Herron	Senior Wetland Ecologist and Regulatory Specialist – 22	B.S. Environmental Science M.S. Disturbed Land Restoration		Wetland Scientist – 22 Restoration Ecologist – 20	
Jeremy Hollins	Senior Architectural Historian – 18	B.A. History M.A. Public History		Archaeologist – 18	Register of Professional Archaeologists
Lindsay Kiel	Archaeologist – 1	A.A, B.A, M.A Anthropology	Section 106 Compliance	Archaeologist – 20	Register of Professional Archaeologists
Mark Bastasch	Acoustical Engineer – 24	B.S., M.S. Environmental Engineering		Environmental Engineer – 4 Acoustical Engineer – 20	Professional Engineering (Oregon), Institute of Noise Control Engineering Board Certified
Bryan Bell	Technical Editor	B.A.		Technical Editor – 23	
Ed Douglas	GIS Professional – 15	B.A. Geography		GIS Professional – 15	
Katie Schwartz	Accessibility Specialist/Technical Editor – 10	B.A.	TXDLA Digital Accessibility Certification	Editing – 12 Accessibility – 6	
Clarice Ericsson	Publishing Technician – 26	B.A.		Document Design – 26 Editing – 10	

California State NRCS staff provided document review.

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Appendix A
Comments and Responses

Response to Comments on the Draft Environmental Impact Report, Black Rascal Creek Flood Control Project

This section contains the comment letters received on the Draft Environmental Impact Report (DEIR) for the Black Rascal Creek Flood Control Project. Table A-1 lists all parties who submitted comments on the DEIR during the public review period. Comment responses were incorporated into the Final EIR for the Black Rascal Creek Flood Control Project (Merced County, 2017).

TABLE A-1
List of Commenters on the DEIR

Letter #	Commenter
1	California Department of Transportation
2	Erwin and Karen Davey
3	California Department of Fish and Wildlife

Letter 1, California Department of Transportation

Waldrop, Heather/RDD

From: Martinez, Steven R@DOT <Steven.R.Martinez@dot.ca.gov>
Sent: Tuesday, August 22, 2017 3:34 PM
To: Walejko, Mike
Cc: State.Clearinghouse@opr.ca.gov
Subject: Caltrans Local Development-Intergovernmental Review (LD-IGR) - Black Rascal Flood Control Project SCH# 2017021015

Mr. Walejko,

Thank you for the opportunity to review the above-referenced document, the Black Rascal Flood Control Project, SCH# 2017021015.

The Department does not believe the project, as described, will have significant impact on state facilities in the area. Please keep us updated if there are changes to the provided documents as the project develops. In that case we would like review and provide further comment. 1-1

Thank you,

Steven R. Martinez
Metropolitan Planning
Caltrans District 10
(209) 942-6092

TRANSPORTATION PLAN SLOW FOR THE CONE ZONE MOVE OVER MOVE OVER
Integrating California's Transportation Future

1

Response to Comment 1-1

Comment noted. No further response is required.

Letter 2, Erwin and Karen Davey

September 11, 2017

RECEIVED

SEP 14 2017

MERCED COUNTY
DEPT OF PUBLIC WORKS

County of Merced
Department of Public Works
345 West 7th St.
Merced, Ca 95341

Attn: Mike Walejko
Black Rascal Creek Flood Control Project

We own property and live at 3000 N. Arboleda. We have received the notice of the
Project and called Mike Walejko. We have not heard back since you said you would come talk to us in regards to our concerns.

We have owned property at Arboleda & Yosemite since 1974. We have lived in our current home 4/10 of a mile East of Arboleda since 1979.

We are very familiar with water issues & draining issues surrounding our property.
We see the origin of the creek that forms with heavy rain & watch it build & cover acres surrounding us.

We have two concerns that we want to address:

1. Our driveway has two 48" coverts that carry irrigation drainage as well as rain water. At times of heavy rain we are sometimes unable to drive through for a matter of a few hours. Our concern is the levee you are 2-1

Response to Comment 2-1

The proposed project site is located to the west in a different topographical area than the area that includes the property at 3000 N. Arboleda Drive. The project site (which is located within the Black Rascal Creek drainage area) is separated by a slight increase in elevation and is not hydraulically connected to the water channel that flows to the east toward the property at 3000 N. Arboleda Drive. As such, project implementation would not contribute additional flows to that waterway. Although it is possible that some existing natural and irrigation drainages in the vicinity could convey flow across the two watersheds, the training levees proposed as part of the project would be configured to maximize flow into the proposed detention basin, which would help reduce overall flow in the easterly direction. Additionally, as described in Section 2.1 of the DEIR, to prevent existing drainages from emptying into new waterways, "All existing drainages (including culverts used to convey rain and flood flows adjacent to the proposed project area) and irrigation conveyance facilities that cross or parallel the external levee would be maintained, as necessary, or modified to accommodate the project."

Letter 2, continued

planning will cause water to back up & make our access impossible and possibly wash out our road. 2-1

2. In reviewing the maps, it appears you are considering bringing dirt that is not suitable for the levees to the property adjoining ours & to the North. 2-2

Mr. Davey has COPD.
Although we live in an agriculture surrounding we maintain a clean environment.
Our yard, patio & windows are maintained to keep our home as dust free as possible. 2-3

We would appreciate our concerns be noted for public record. We would welcome a visit from Mr. Walejko as we discussed on the phone.

Regards,

Erwin R Davey
Karen Davey

Erwin & Karen Davey
3000 N. Arboleda Dr.
Merced, CA
209-722-2056

Response to Comment 2-2

The majority of the excavated soil from the detention basin is expected to be suitable for use on the proposed project levees that will contain the detention basin. However, as described in Chapter 3.5, Geology and Soils, in the DEIR, it is possible that some material may be imported to combine with native soils to create a suitable structure.

As described in Mitigation Measure (MM) WR-7 of the DEIR, all external levees will be designed to contain flood flows resulting from a 200-year event with adequate freeboard, and will be constructed to meet the design standards established by Department of Water Resource (DWR), Division of Safety of Dams. The Urban Levee Design Criteria established by DWR specify standards that incorporate factors of safety in the levee design requirements to prevent failure from seepage, slope instability, and seismic vulnerability. These design standards will minimize the chance of levee failure in an event of a major flood.

Response to Comment 2-3

As described in Impact GEO-2 of the DEIR, construction activities associated with the Project would result in moderate ground disturbance and could result in localized dust emissions within the Project area. Project construction is expected to last approximately 12 months, and when completed, the Project site would not be a source of fugitive dust or criteria pollutants.

Additionally, as discussed in Chapter 3.2, Air Quality, of the DEIR, the San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation VIII requires property owners, contractors, developers, equipment operators, farmers, and public agencies to control fugitive dust emissions from specified sources. Emission control measures would include but not limited to the following:

- Apply water to unpaved surfaces and areas.
- Use non-toxic chemical or organic dust suppressants on unpaved roads and traffic areas.

Response to Comment 2-3, continued

- Limit or reduce vehicle speed on unpaved roads and traffic areas.
- Maintain areas in a stabilized condition by restricting vehicle access.
- Install wind barriers.
- During high winds, cease outdoor activities that disturb the soil.
- Keep bulk materials sufficiently wet when handling.
- Store and handle materials in a three-sided structure.
- When storing bulk materials, apply water to the surface or cover the storage pile with a tarp.
- Do not overload haul trucks; overloaded trucks are likely to spill bulk materials.
- Cover haul trucks with a tarp or other suitable cover, or wet the top of the load enough to suppress visible dust emissions.
- Clean the interior of cargo compartments of emptied haul trucks before leaving a site.
- Prevent track-out by installing a track-out control device.
- Clean up track-out at least once each day; if the road is along a busy road or highway, clean up track-out immediately.
- Monitor dust-generating activities and implement appropriate measures for maximum dust control.

Response to Comment 2-3, continued

In addition, as described in Chapter 3.7, Hydrology and Water Quality, and as required by MM WR-1, best management practices (BMPs) that will be included in the Project's stormwater pollution prevention plan will be implemented to provide an effective combination of erosion and sediment controls, which will also minimize the potential for dust. BMPs may include, but are not limited to, temporary soil stabilization (such as proper grading and covering of soil stockpiles) and temporary sediment control (such as silt fences, fiber rolls, and sandbag barriers), and permanent soil stabilization (such as installing sediment barriers, vegetative buffer strips, and reseeding disturbed areas).

Compliance with MM WR-1 and adherence to SJVAPCD Regulation VIII, will minimize the potential for dust emissions in the Project area.

Letter 3, California Department of Fish and Wildlife

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Central Region
1234 East Shaw Avenue
Fresno, California 93710
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

September 14, 2017

Mike Walejko
Merced County
715 Martin Luther King Jr. Way
Merced, California 95341

Subject: Black Rascal Flood Control Project (Project); SCH#: 2017021015
Draft Environmental Impact Report

Dear Mr. Walejko:

The California Department of Fish and Wildlife (CDFW) received a Draft Environmental Impact Report (DEIR) from Merced County for the above-referenced Project pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources, and holds those resources in trust by statute for all the people of the State. (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a).) CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. (*Id.*, § 1802.) Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW is also submitting comments as a **Responsible Agency** under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381.) CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

Conserving California's Wildlife Since 1870

Letter 3, continued

Mike Walejko
Merced County
September 14, 2017
Page 2

alteration regulatory authority. (Fish & G. Code, § 1600 *et seq.*) Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 *et seq.*), related authorization as provided by the Fish and Game Code will be required.

CDFW had jurisdiction over actions with potential to result in the disturbance or destruction of active nest sites or the unauthorized take of birds. Fish and Game Code sections that protect birds, their eggs and nests include, sections 3503 (regarding unlawful take, possession or needless destruction of the nest or eggs of any bird), 3503.5 (regarding the take, possession or destruction of any birds-of-prey or their nests or eggs), and 3513 (regarding unlawful take of any migratory nongame bird).

PROJECT DESCRIPTION SUMMARY

Proponent: Merced County

Objective: Merced County is proposing to implement a flood control project immediately upstream of the Black Rascal Creek Diversion Channel. The proposed detention basin and wetland area would temporarily store flow during periods of heavy rain and limit flow in the Diversion Channel to 3,000 cubic feet per second (cfs). The proposed project would include the construction of a perimeter levee surrounding a 300-acre inundation area, to accommodate up to 2,800 acre-feet of water during a 200-year storm event, and an internal levee to protect agricultural land within the basin during more frequent storms, up to a 50-year event. The detention basin outlet would also include a series of reinforced concrete box culverts to limit flows in the diversion channel to 3,000 cfs.

Location: The Project is located at the northwest corner of Arboleda Drive and East Yosemite Avenue, northeast of the City of Merced.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist Merced County in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. Editorial comments or other suggestions may also be included to improve the document.

<u>**California tiger salamander:**</u>

Specific Impacts: California tiger salamander (*Ambystoma californiense*; CTS), a species listed as threatened pursuant to CESA, has been documented in the Project 3-1

Response to Comment 3-1

MM BIO-1a in the DEIR has been revised to clarify that if California tiger salamander is assumed to be present or is determined to be present during surveys, the County will consult with the California Department of Fish and Wildlife (CDFW) for issuance of an Incidental Take Permit.

Letter 3, continued

Mike Walejko
Merced County
September 14, 2017
Page 3

vicinity. CTS breed and develop in vernal and seasonal pools and stock ponds in grassland, woodland, and scrub habitat types. They require upland refuges (i.e. small mammal burrows) when not breeding. Potential Project-related impacts include loss of upland refugia and breeding sites. Any take of CTS without appropriate take authorization would be a violation of Fish and Game Code § 2080. CDFW provides the following recommendations to be incorporated into the DEIR:

Mitigation Measure (MM) Bio-1a: CDFW agrees with Section 2.3 of the DEIR, Required Permits and Approvals, lists Incidental Take Permit (ITP) in accordance with § 2081(b) of the California Fish and Game Code as a required approval. However, MM Bio-1a states, "Alternatively, if presence of California tiger salamander and western spadefoot is not assumed, focused surveys would be conducted to demonstrate absence from the Project area…," and requires the survey protocol to follow CDFW and the United States Fish and Wildlife Service's (USFWS) "Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander" (2003). This measure also requires that the survey method and results be approved by CDFW and the USFWS. MM Bio-1a also requires avoidance measures. 3-1

CDFW agrees with the required protocol and recommends consultation with CDFW prior to the start of any surveys to ensure that adequate methods are used and we can accept the results. In addition, some activities listed under avoidance measures may require an ITP because they may result in take of CTS (e.g., exclusion fencing). CDFW recommends that MM Bio-1a clearly state if CTS is detected during surveys, the Project will consult with CDFW for an ITP. As described as an alternative in the DEIR, the Project can also assume presence of CTS, acquire an ITP, and avoid the above reference surveys.

__Swainson's Hawk:__

Specific impacts: Swainson's hawk (*Buteo swainsoni*; SWHA), a species listed as threatened pursuant to CESA, has the potential to nest adjacent to the Project site. Potentially significant impacts that may result from Project-related activities include nest abandonment, loss of nest trees, loss of foraging habitat that would reduce nesting success (loss or reduced health or vigor of eggs or young), and direct mortality. Any take of SWHA without appropriate take authorization would be a violation of Fish and Game Code § 2080. 3-2

MM Bio-1e: MM Bio-1e requires preconstruction surveys for nesting raptors no more than 7 days prior the start of "new disturbance in a given area." CDFW recommends that a qualified wildlife biologist conduct surveys for nesting SWHA following the survey methodology developed by the Swainson's Hawk Technical Advisory Committee (SWHA TAC, 2000) prior to Project implementation in addition to the preconstruction

Response to Comment 3-2

MM BIO-1e in Chapter 3.3, Biological Resources, of the DEIR has been revised to extend the no-disturbance buffer for known Swainson's hawk nests from 0.25 mile to 0.5 mile.

As described in Chapter 3.3, no trees that would be considered suitable nesting trees for Swainson's hawk are proposed for removal for Project implementation.

Letter 3, continued

Mike Walejko
Merced County
September 14, 2017
Page 4

surveys. This survey protocol includes early season surveys, will maximize the opportunity to identify active SWHA nests prior to ground or vegetation disturbance, and will assist the Project proponent in implementing avoidance and minimization measures.

MM Bio-1e also requires a no-disturbance buffer of 0.25 mile from active SWHA nests unless authorized by CDFW. CDFW recommends that the buffer be extended to 0.5 mile to minimize the risk of authorized take of SWHA. If active SWHA nests are detected and a ½-mile buffer is not feasible, consultation with CDFW is warranted to discuss how to implement the Project and avoid take. If take cannot be avoided, take authorization through the issuance of an ITP, pursuant to Fish and Game Code § 2081(b) is necessary to comply with CESA. 3-2

In addition requirements listed in MM Bio-1e CDFW recommends impacts to known SWHA nest trees be avoided at all times of year. CDFW considers removal of SWHA nest trees, even outside of the nesting season, a potentially significant impact under CEQA because SWHA exhibit high nest-site fidelity year after year. Regardless of nesting status, if potential or known SWHA nest trees are removed, CDFW recommends they be replaced with an appropriate native tree species, planted at a ratio of 3:1, in an area that will be protected in perpetuity, to reduce impacts to Swainson's hawks from the loss of nesting habitat features.

Federally Listed Species:

CDFW recommends consulting with the USFWS on potential impacts to federally listed species including, but not limited to, CTS. Take under the Federal Endangered Species Act (FESA) is more broadly defined than CESA; take under FESA also includes significant habitat modification or degradation that could result in death or injury to a listed species by interfering with essential behavioral patterns such as breeding, foraging, or nesting. Consultation with the USFWS in order to comply with FESA is advised well in advance of any ground-disturbing activities. 3-3

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database that may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e).) Accordingly, please report any special status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data. The completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals. 3-4

Response to Comment 3-3

If there are any federally listed species or habitat within the Project site, the County will consult with the U.S. Fish and Wildlife Service in accordance with the Federal Endangered Species Act.

Response to Comment 3-4

Special-status species detected during Project surveys will be reported in accordance with Public Resources Code Section 21003 (e).

Letter 3, continued

Mike Walejko
Merced County
September 14, 2017
Page 5

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.) 3-5

CONCLUSION

CDFW appreciates the opportunity to comment on the DEIR to assist the Merced County in identifying and mitigating Project impacts on biological resources.

Questions regarding this letter or further coordination should be directed to Jim Vang, Environmental Scientist, at (559)243-4014 extension 254 or Jim.Vang@wildlife.ca.gov.

Sincerely,

Julie A. Vance
Regional Manager

cc: United States Fish and Wildlife Service
2800 Cottage Way, Suite W-2605
Sacramento, California 95825

Regional Water Quality Control Board
Central Valley Region
1685 "E" Street
Fresno, California 93706-2020

United States Army Corps of Engineers
San Joaquin Valley Office
1325 "J" Street, Suite #1350
Sacramento, California 95814-2928

ec: Bonna Newell, 1600 Unit
California Department of Fish and Wildlife

VANG/BAILEY/FERRANTI/VANCE:lm

Response to Comment 3-5

Filing fees will be paid by the County to CDFW upon filing of the Notice of Determination for the Project with the Merced County Clerk's office.

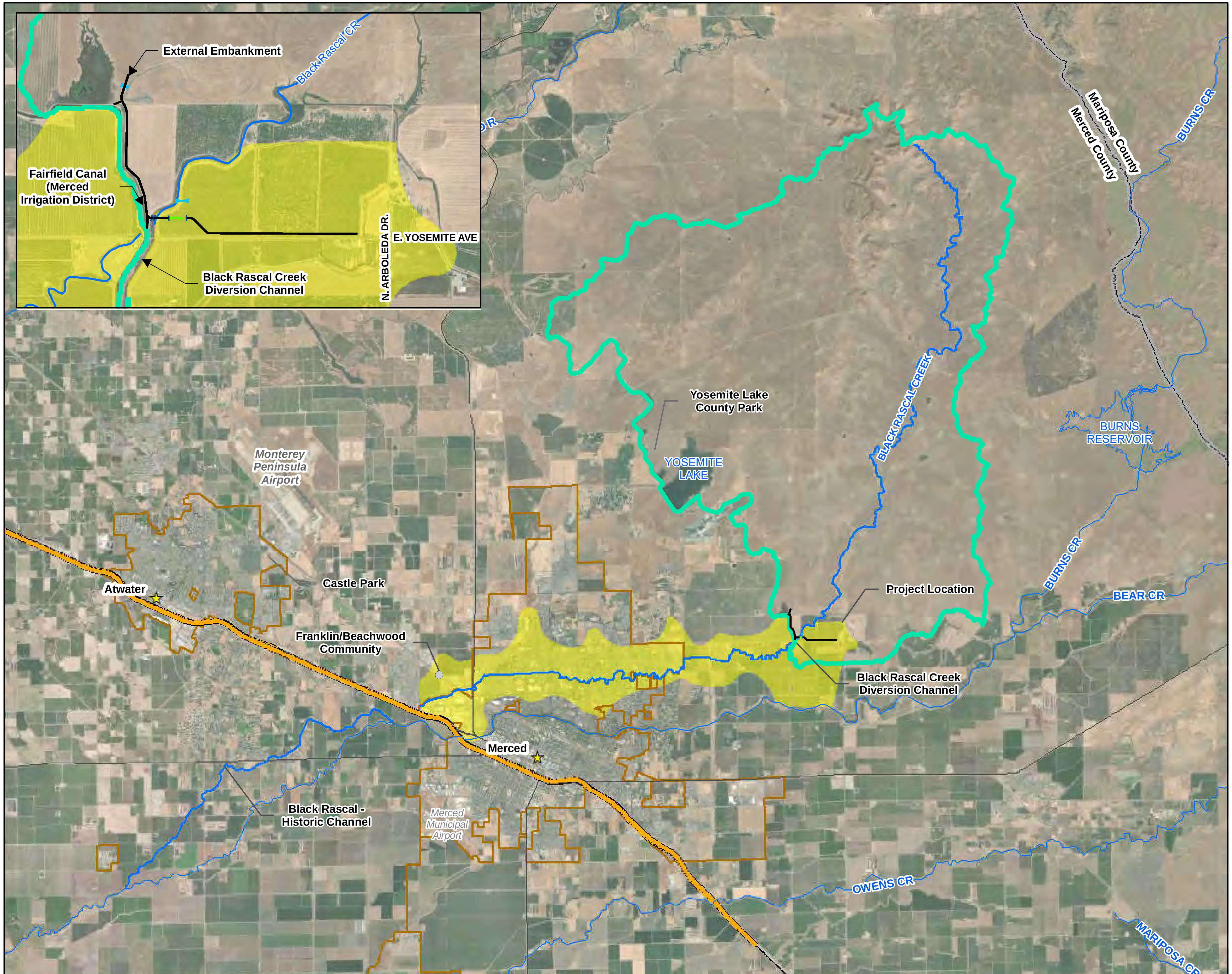
Mike Walejko
Merced County
September 14, 2017
Page 6

REFERENCES

CDFG, 2003. *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander*. California Department of Fish and Game. 2003.

SWHA TAC, 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley. Swainson's Hawk Technical Advisory Committee, May 31, 2000.

Appendix B
Project Map



VICINITY MAP

LEGEND

- External Embankment
- Outlet Structure
- Spillway
- Culverts with Flap Gates
- Levee Flood Protection Zone
- Black Rascal Creek Watershed
- City Limits

N

0 1,000 2,000 4,000
Feet

Source:
California Department of Water Resources - Levee Flood Protection Zones Layer https://gis.lfpz.water.ca.gov/lfpz

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User

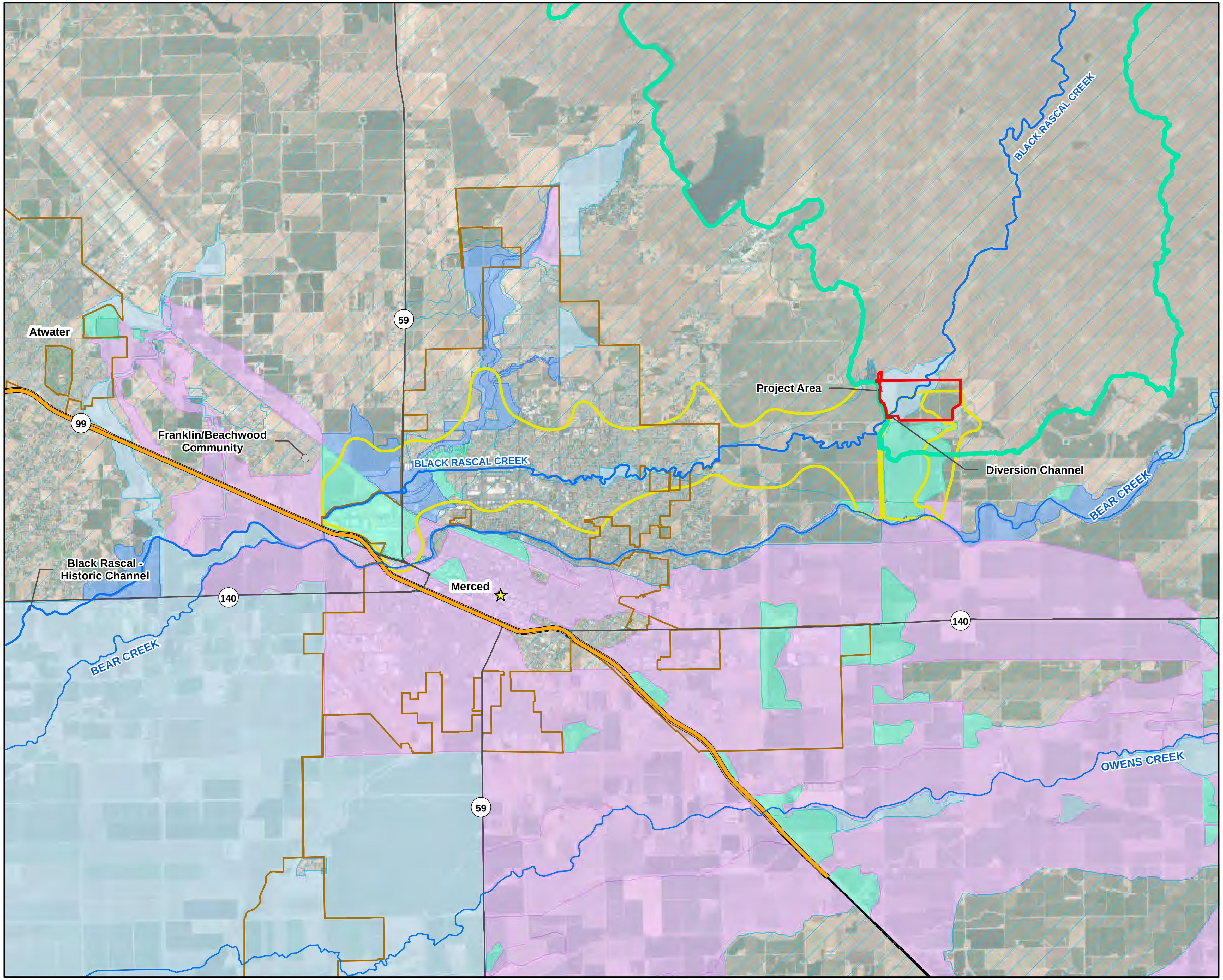
APPENDIX B
Project Map

Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

UNK \\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\TRANSFER\FROMSACSERVER\GIS\MAPFILES\WATERSHED_PLAN_EA\APPENDIX_B_PROJECTMAP_20221109.MXD KMINO 11/9/2022 10:06:19 AM

Appendix C
Support Maps

Appendix C1
Currently Effective Floodplain Zoning Map



VICINITY MAP

LEGEND

- ★ Major City
- Stream/River
- Project
- MercedCounty_CityLimits_2014
- Black Rascal Creek Watershed
- Levee Flood Protection Zone

Flood Zone

- A - 1 percent annual chance flood (100-year flood). No flood elevations determined
- AE - 1 percent annual chance flood (100-year flood). Base flood elevations determined.
- AE - 1 percent annual chance flood (100-year flood). Flood depths of 1 to 3 feet (usua lly areas of ponding).
- AO –1 percent annual chance flood (100-year flood). Flood depths o f 1 to 3 feet (usually sheet flow on sloping terra in); average depths determined.
- D - Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.
- X - Areas of 0.2 percent annual chance of flood (500-year flood); area s of 1 percent annual chance flood with a verage depths of less tha n 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1 percent annual chance flood.

N

0 1.25 2.5

Miles

Source:
Federal Emergency Management Agency (FEMA)
National Flood Hazard Layer (NFHL)
Published Date: 20150304
Accessed: 20210312
Version 1.1.1.0
https://www.floodmaps.fema.gov/NFHL/status.shtml

California Department of Water Resources -
Levee Flood Protection Zones Layer https://gis.lfpz.water.ca.gov/lfpz

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, DeLorme, NAVTEQ, USGS, NRCAN, METI, iPC, TomTom

APPENDIX C
Currently Effective Floodplain Zoning Map
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

UNK \\ODIN\GROUPS\ES\COMMONFILES\BLACKRASCALCREEK\MXD\APPENDIX_C_FEMA.MXD KMINO 12/29/2021 2:06:21 PM

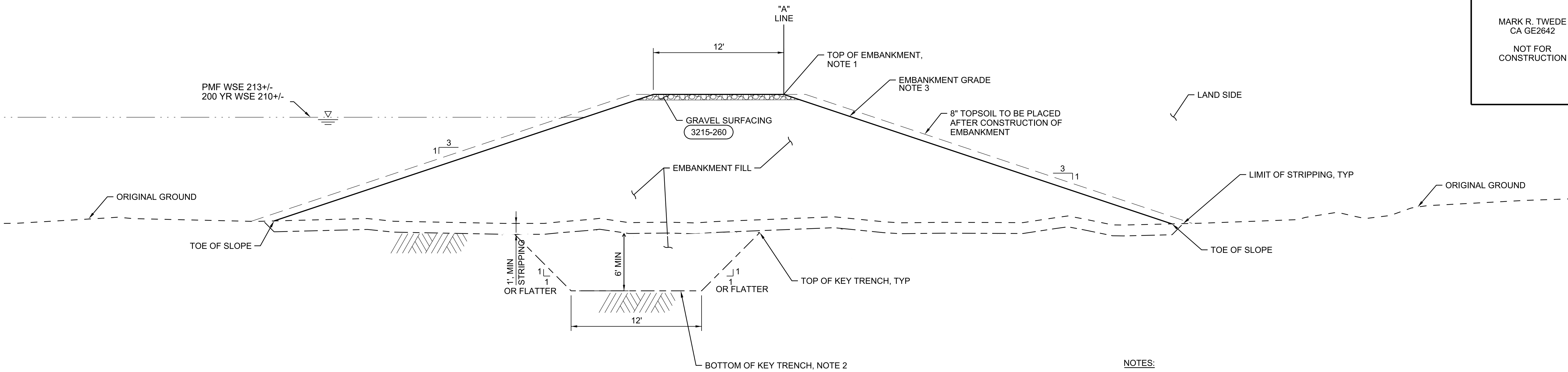
Appendix C2
Typical Embankment Section

MARK R. TWEDE
CA GE2642

NOT FOR
CONSTRUCTION

BECKY K. CHELONIS
CA C59851

NOT FOR
CONSTRUCTION



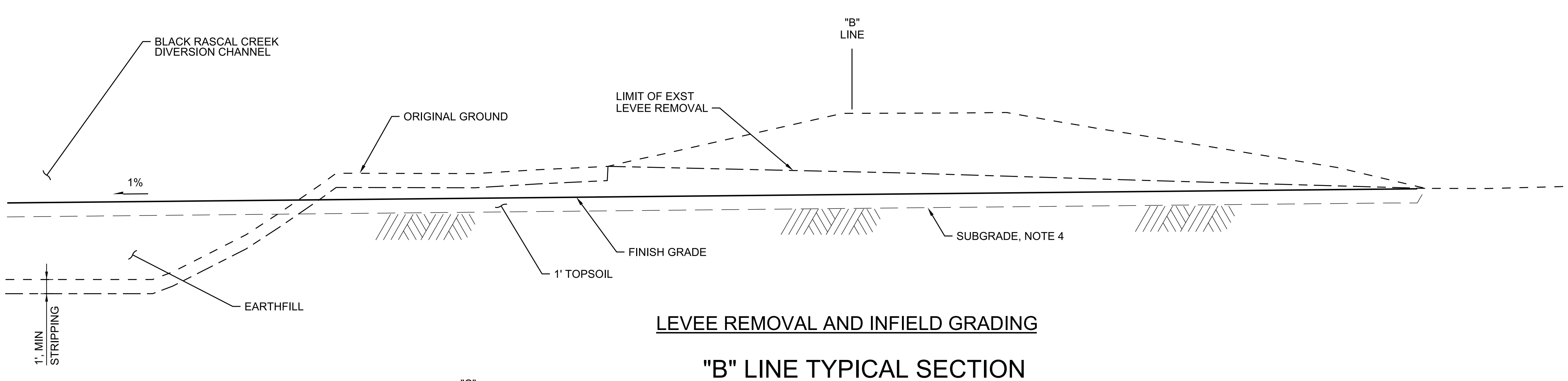
EMBANKMENT

"A" LINE TYPICAL SECTION

1"=5'

NOTES:

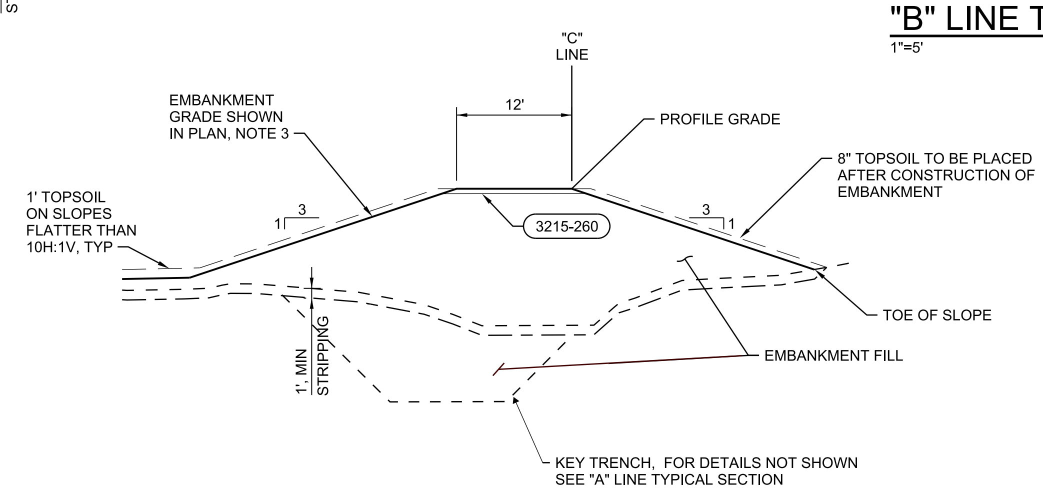
1. TOP OF EMBANKMENT ELEVATION INCLUDES 6" OF OVERBUILD TO ACCOUNT FOR SETTLEMENT. FOR ELEVATIONS, SEE PLAN AND PROFILE DRAWINGS.
2. FOR KEY TRENCH AND LIMITS OF STRIPPING, SEE EMBANKMENT SUBGRADE PLANS.
3. EMBANKMENT GRADE SHOWN MATCHES LINEWORK SHOWN IN PLAN. LINEWORK FOR TOPSOIL PLACED ABOVE EMBANKMENT GRADE IS NOT SHOWN IN PLAN.
4. TOPSOIL IS PLACED BELOW FINISH GRADE SHOWN IN PLAN WITHIN THE INFIELD GRADING AREA, WHICH IS DEFINED AS THE AREA NORTH AND EAST OF THE EXTERNAL EMBANKMENT TOE OF SLOPE.



LEVEE REMOVAL AND INFIELD GRADING

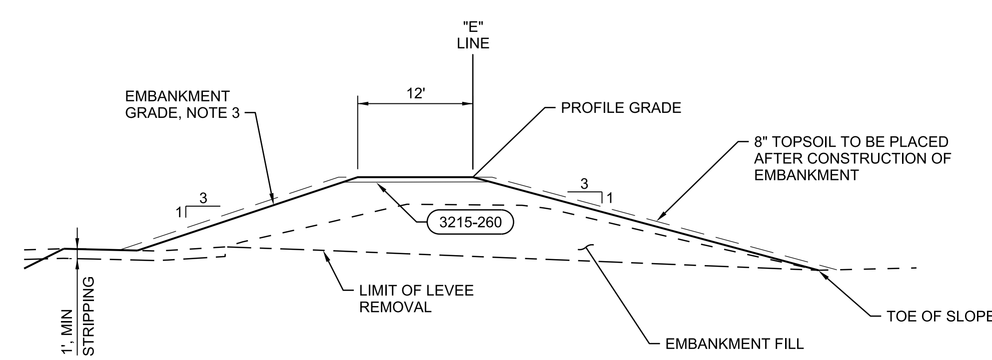
"B" LINE TYPICAL SECTION

1"=5'



"C" LINE TYPICAL SECTION

1"=10'



"E" LINE TYPICAL SECTION

1"=10'

NO.	DATE	REVISION	BY	APVD

DSGN B CHELONIS | DR J MESTEMACHER | CHK L ALLIGER | APVD B CHELONIS/M TWEDE

JACOBS
2525 AIRPARK DR
REDDING, CA 96001
(530) 243-5831

BLACK RASCAL CREEK
FLOOD CONTROL PROJECT
MERCED COUNTY
MERCED, CA

CIVIL

TYPICAL SECTIONS

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	SEPTEMBER 2021
PROJ	W8Y00700
DWG	05-C-3201
SHEET	33 of 60

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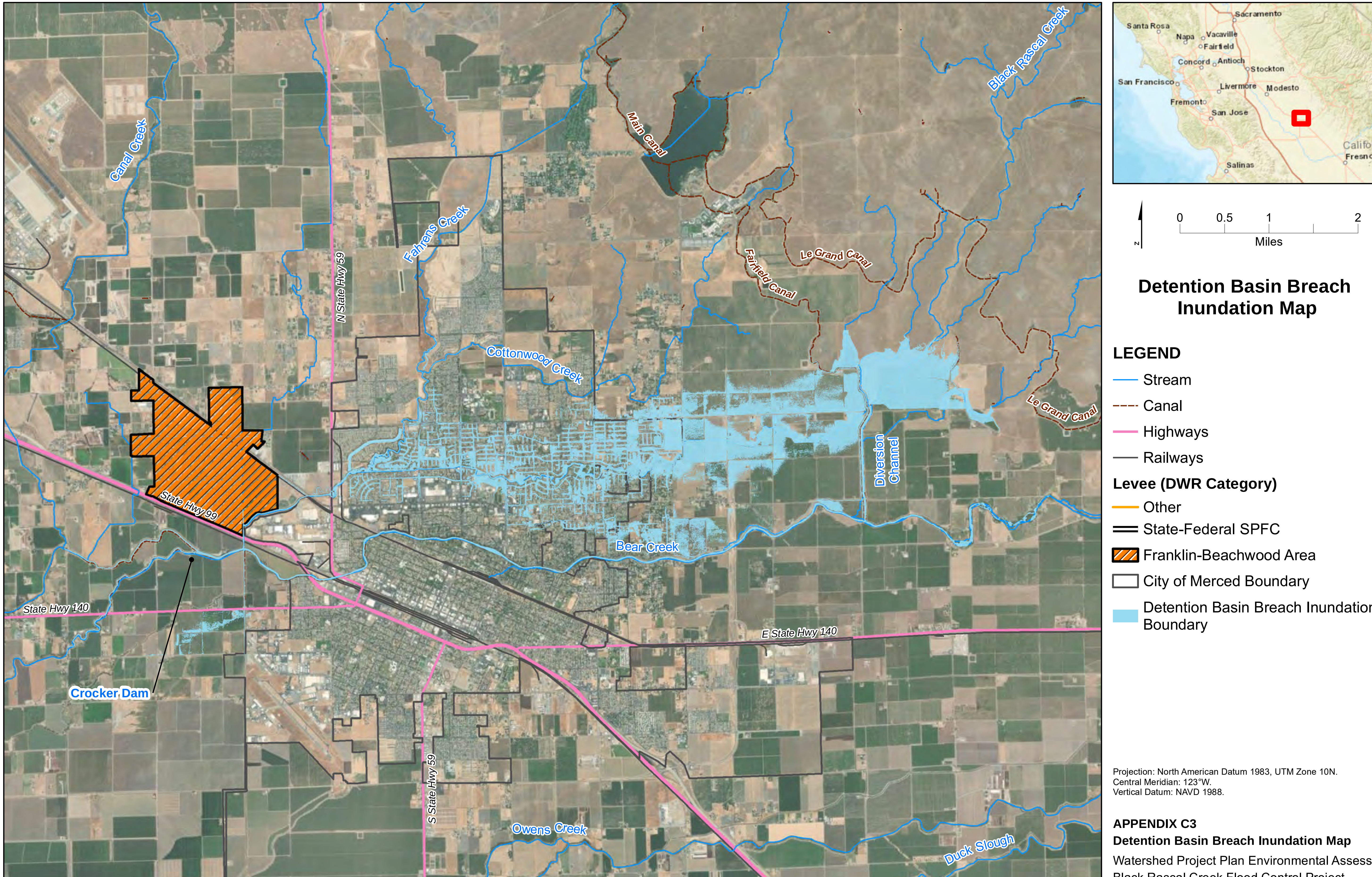
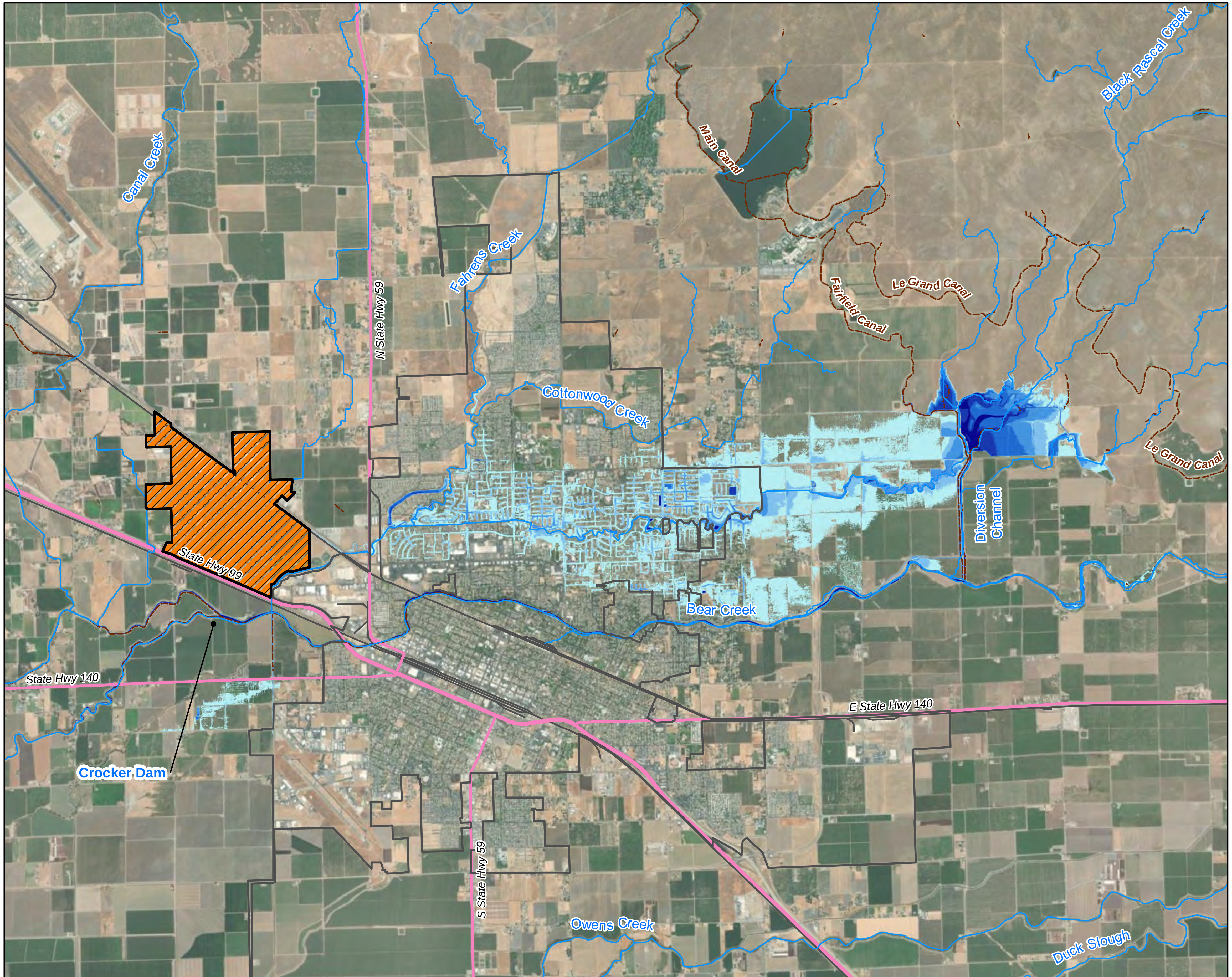
Appendix C3
Breach Inundation Map



Detention Basin Breach Inundation Map

Projection: North American Datum 1983, UTM Zone 10N.
Central Meridian: 123°W.
Vertical Datum: NAVD 1988.

APPENDIX C3
Detention Basin Breach Inundation Map
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project



N

0 0.5 1 2
Miles

Detention Basin Breach Maximum Flood Depth Map

LEGEND

Stream

Canal

Highways

Railways

Levee (DWR Category)

Other

State-Federal SPFC

Franklin-Beachwood Area

City of Merced Boundary

Maximum Flood Depth (ft)

< 1

1 - 2

2 - 4

4 - 6

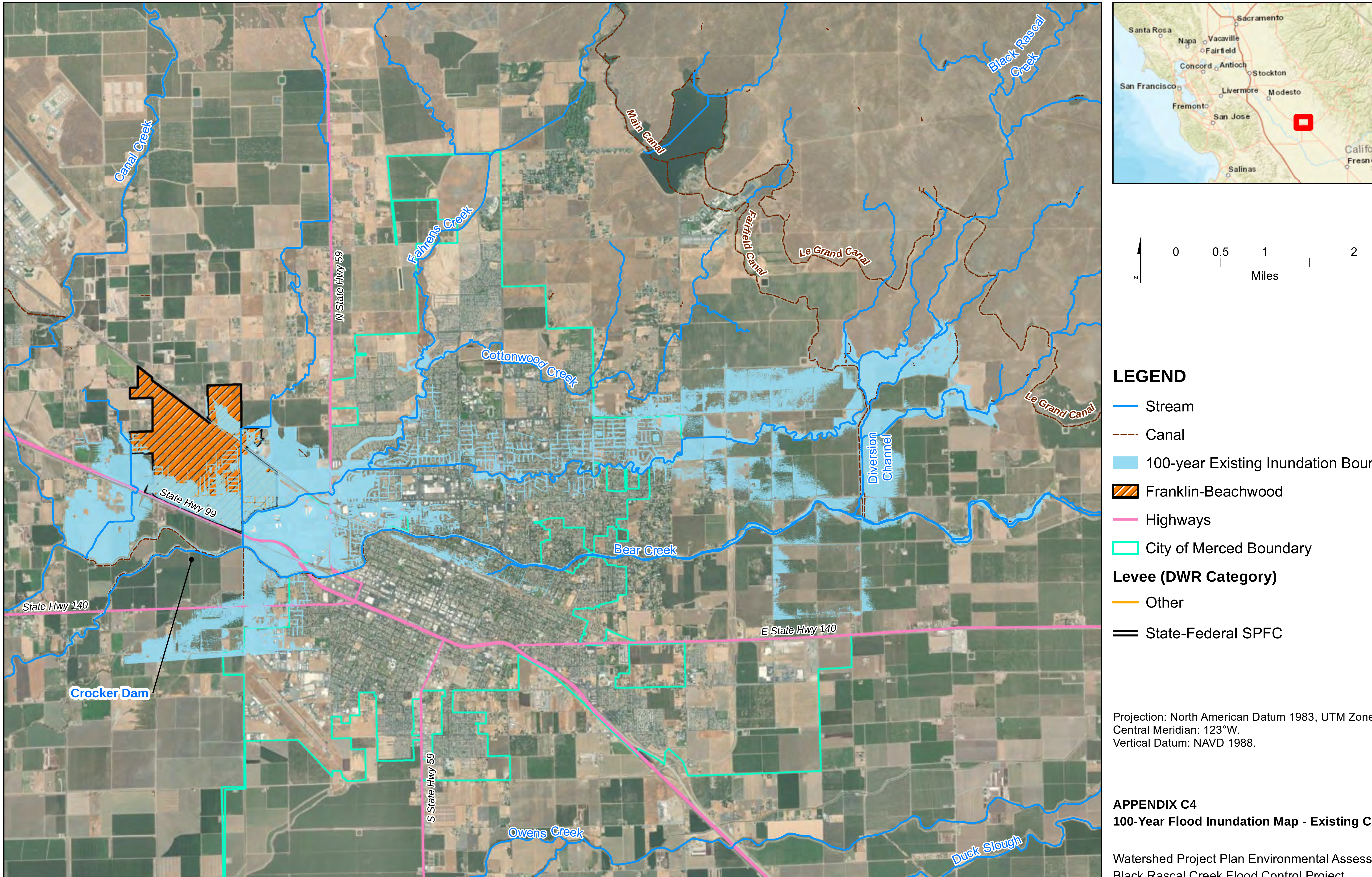
6 - 8

> 8

Projection: North American Datum 1983, UTM Zone 10N.
Central Meridian: 123°W.
Vertical Datum: NAVD 1988.

APPENDIX C3
Detention Basin Breach Maximum Flood Depth Map
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

Appendix C4
Floodplain Inundation Maps



LEGEND

- Stream
- Canal
- 100-year Existing Inundation Boundary
- Franklin-Beachwood
- Highways
- City of Merced Boundary

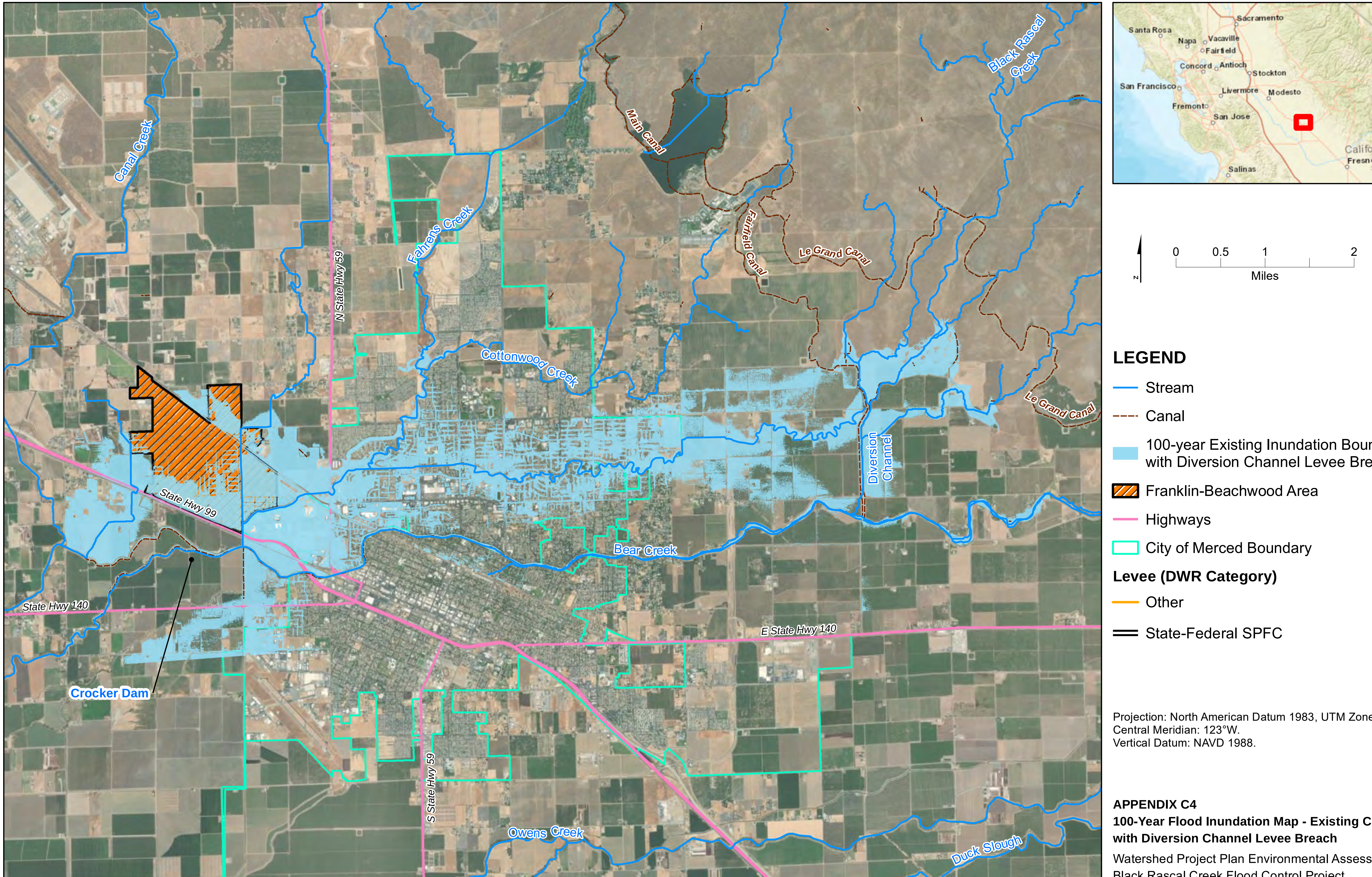
Levee (DWR Category)

- Other
- State-Federal SPFC

Projection: North American Datum 1983, UTM Zone 10N.
Central Meridian: 123°W.
Vertical Datum: NAVD 1988.

APPENDIX C4
100-Year Flood Inundation Map - Existing Condition

Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project



LEGEND

- Stream
- Canal
- 100-year Existing Inundation Boundary with Diversion Channel Levee Breach
- Franklin-Beachwood Area
- Highways
- City of Merced Boundary

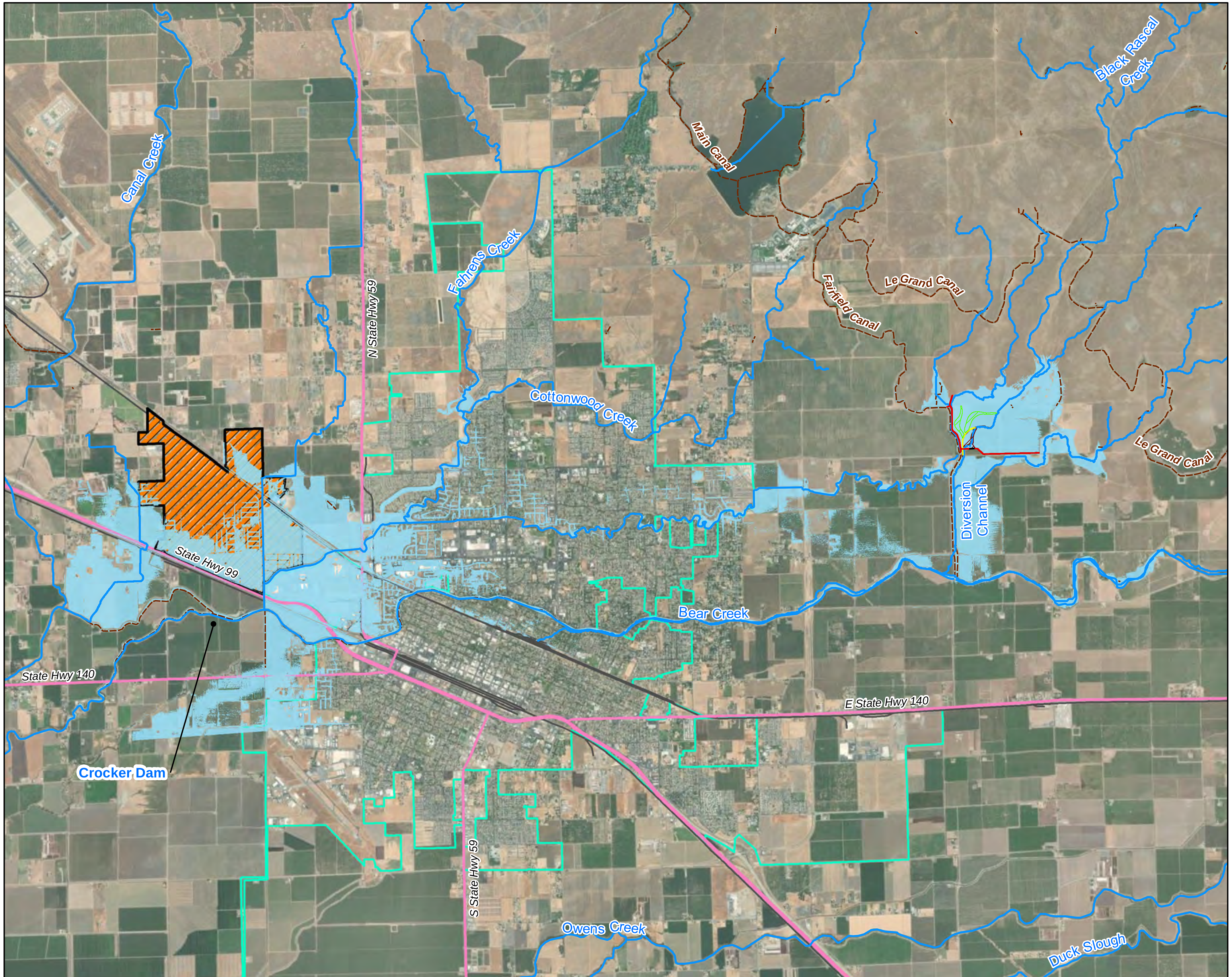
Levee (DWR Category)

- Other
- State-Federal SPFC

Projection: North American Datum 1983, UTM Zone 10N.
Central Meridian: 123°W.
Vertical Datum: NAVD 1988.

APPENDIX C4
100-Year Flood Inundation Map - Existing Condition with Diversion Channel Levee Breach

Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project



N

0 0.5 1 2
Miles

LEGEND

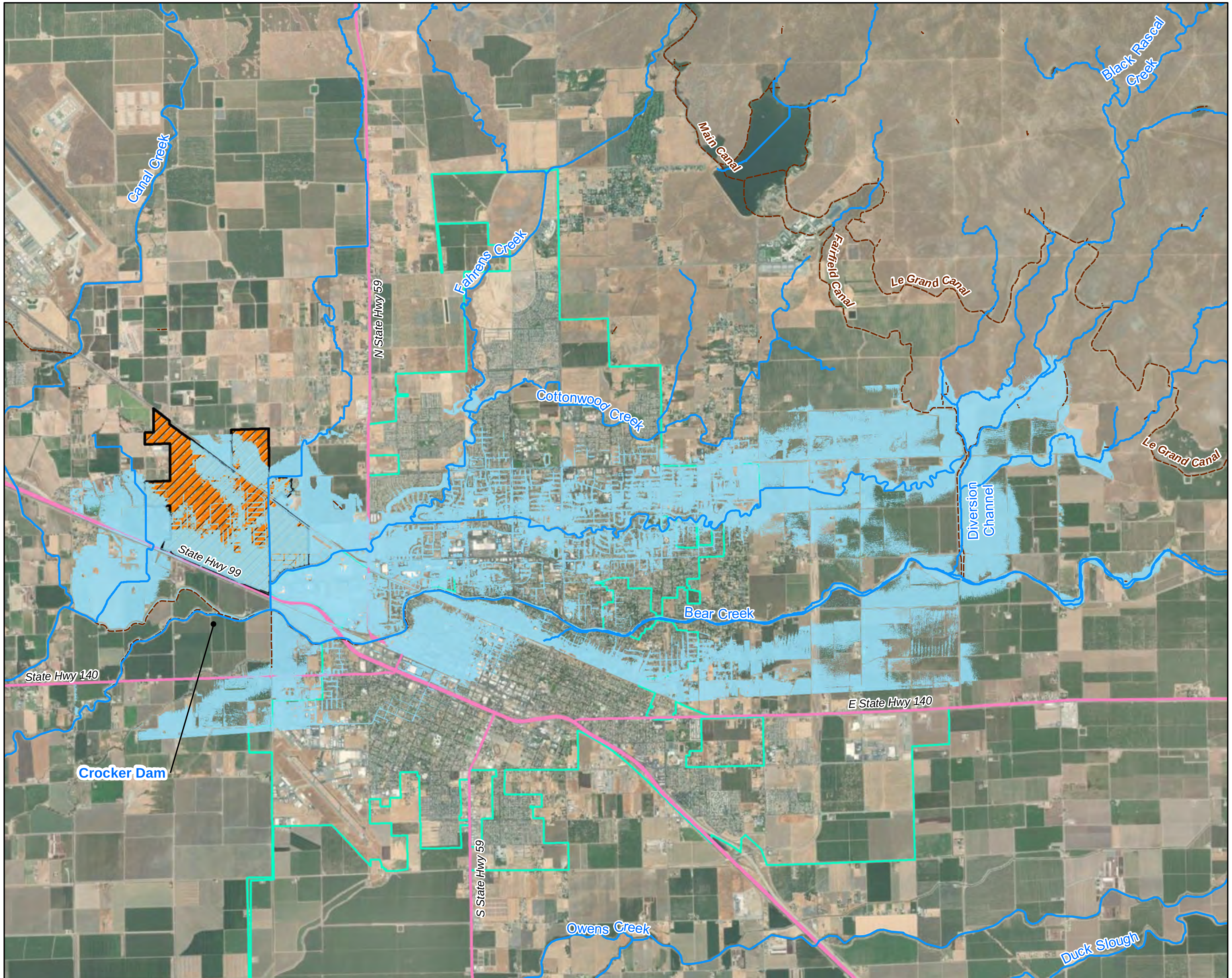
- External Embankment
- Auxiliary Spillway
- Habitat Channel
- Realigned Channel
- Regraded Area
- Stream
- Canal
- With-Project 100-year Inundation Boundary
- Franklin-Beachwood Area
- Highways
- Railways
- City of Merced Boundary

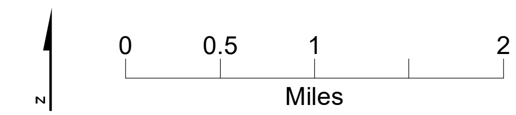
Levee (DWR Category)

- Other
- State-Federal SPFC

Projection: North American Datum 1983, UTM Zone 10N.
Central Meridian: 123°W.
Vertical Datum: NAVD 1988.

APPENDIX C4
100-Year Flood Inundation Map - With Project Condition
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project





LEGEND

- Stream
- Canal
- 500-year Existing Inundation Boundary
- Franklin-Beachwood
- Highways
- City of Merced Boundary

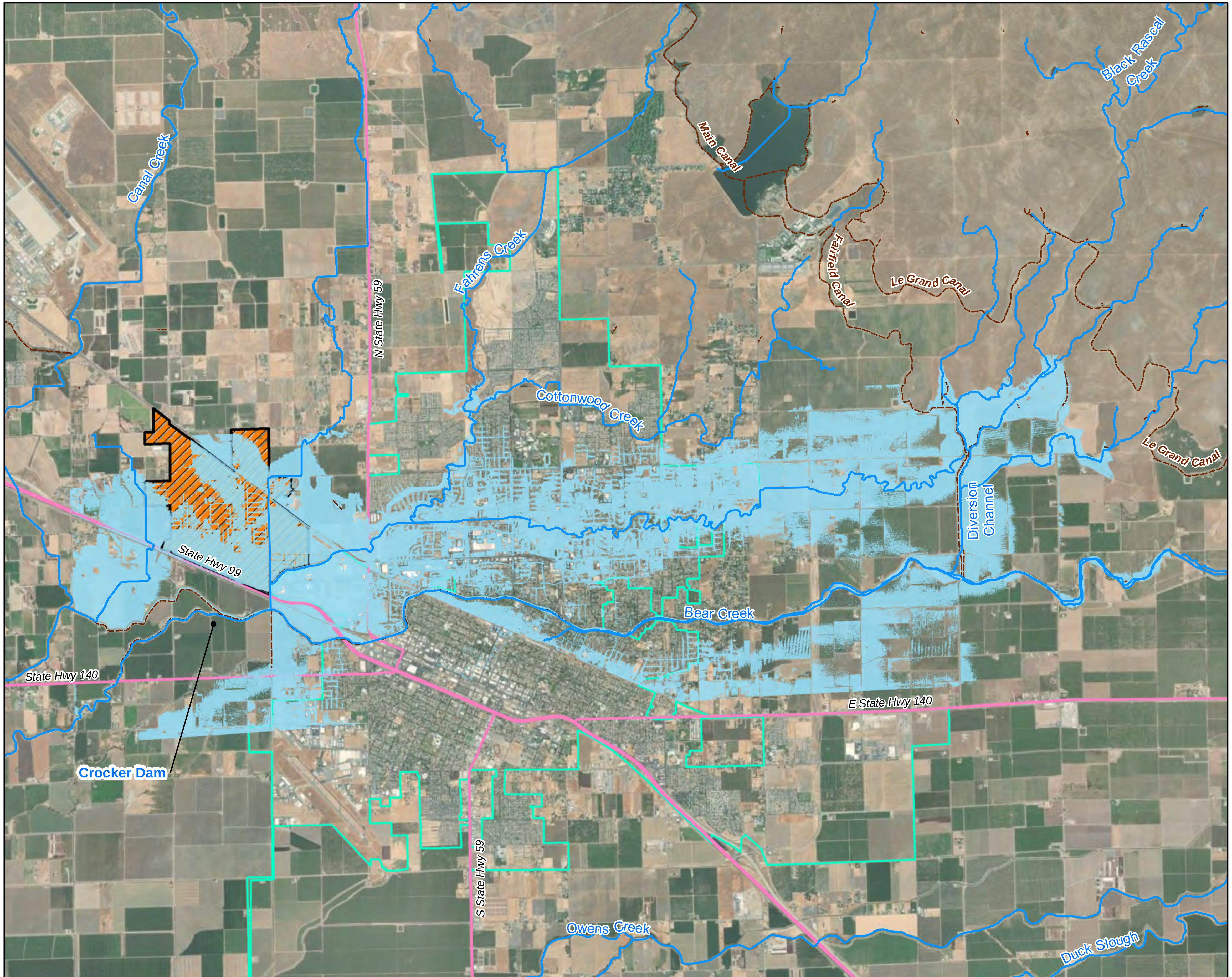
Levee (DWR Category)

- Other
- State-Federal SPFC

Projection: North American Datum 1983, UTM Zone 10N.
Central Meridian: 123°W.
Vertical Datum: NAVD 1988.

APPENDIX C4
500-Year Flood Inundation Map - Existing Condition

Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project



N

0 0.5 1 2
Miles

LEGEND

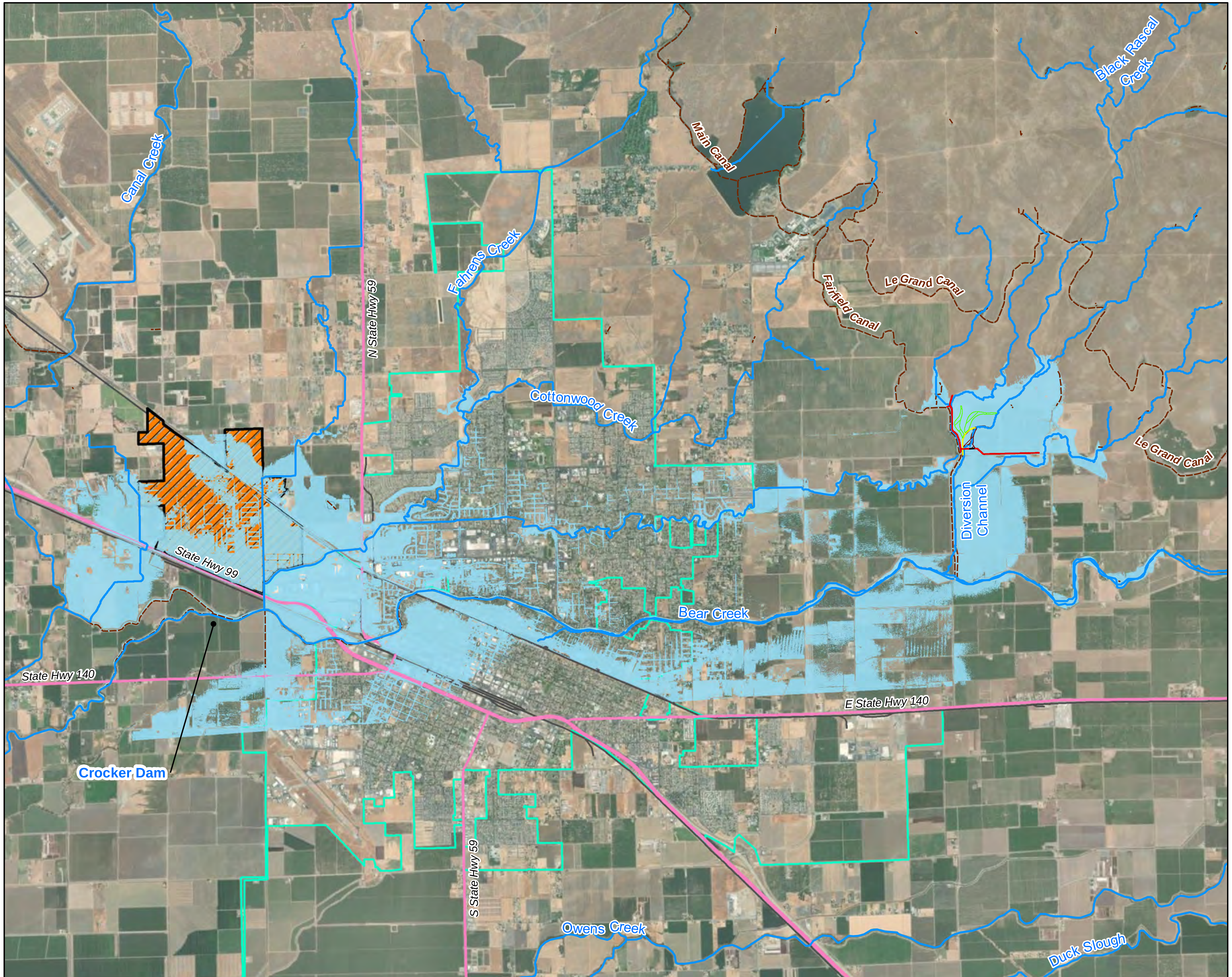
- Stream
- Canal
- 500-year Existing Inundation Boundary with Diversion Channel Levee Breach
- Franklin-Beachwood Area
- Highways
- City of Merced Boundary

Levee (DWR Category)

- Other
- State-Federal SPFC

Projection: North American Datum 1983, UTM Zone 10N.
Central Meridian: 123°W.
Vertical Datum: NAVD 1988.

APPENDIX C4
500-Year Flood Inundation Map - Existing Condition with Diversion Channel Levee Breach
Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project



N

0 0.5 1 2
Miles

LEGEND

- External Embankment
- Auxiliary Spillway
- Habitat Channel
- Realigned Channel
- Regraded Area
- Stream
- Canal
- With-Project 500-year Inundation Boundary
- Franklin-Beachwood
- Highways
- Railways
- City of Merced Boundary

Levee (DWR Category)

- Other
- State-Federal SPFC

Projection: North American Datum 1983, UTM Zone 10N.
Central Meridian: 123°W.
Vertical Datum: NAVD 1988.

APPENDIX C4
500-Year Flood Inundation Map - With Project Condition

Watershed Project Plan Environmental Assessment
Black Rascal Creek Flood Control Project

Appendix D
Investigation and Analysis Report

Appendix D. Investigation and Analysis Report

This Investigation and Analysis Report presents information that supports the formulation, evaluation and conclusions of the Watershed Project Plan Environmental Assessment (Plan EA). This information includes development and evaluation of technical information presented in the Environmental Impact Report prepared for the Black Rascal Creek Flood Control Project (Project). Potential impacts of the Project were assessed both qualitatively and quantitatively. Qualitative evaluations included assessment of Project design, construction and operational activities, and the use of professional judgement with respect to potential impacts. Quantitative evaluation was also to support the analysis process and required where specific information was available. Supporting data developed for this study are on file at the following office:

U.S. Department of Agriculture/Natural Resources Conservation Service
NRCS-CA State Office
430 G Street
Davis, CA 95616

D.1 Project Design

A number of engineering and environmental evaluations were conducted in the development of the Project based on the analysis of potential environmental, social and land use impacts the preferred alternative that satisfies the projects purpose and need, is the Preferred Alternative evaluated in the Plan EA. The Preferred Alternative was determined based on net project benefits, after conducting an incremental economic benefit/cost analysis per Section 500.4(C) of the Watershed Program Manual (NRCS, 2014) (Section D.7 Economic Analysis).

A Basis of Design Report (Jacobs, 2020a) was prepared to document the results of the studies summarized below, as well as evaluation conducted subsequent to the Basis of Design Report (also described below). Information summarizing procedures, approach, and methodology used to develop the Project is included in the following subsections (Jacobs, 2020a) as well as under separate cover as referenced.

D.1.1 Survey and Mapping

Jacobs surveyors performed field work to support the Project design process in June 2019. All work was performed in California Coordinate System, North American Datum 1983 (NAD83), 2011, State Plane Zone 3 (U.S. Survey Feet) based on static observations to three nearby National Geodetic Survey (NGS) Continuously Operating Reference Stations (CORS) P305, P306, and CMOD. The Project vertical datum is the North American Vertical Datum 1988 (NAVD 88) (Geoid 12B-Conus).

The following is a general summary of the field survey:

- Set and surveyed onsite survey control monuments 100 and 101 along East Yosemite Avenue.
- Made static observation of benchmark monument A 85 HS1152.
- Set and surveyed nine aerial panels.
- Surveyed 12 locations on flat ground with various vegetation coverage types for light detection and ranging (LiDAR) verification.
- Surveyed 23 culvert positions and inverts.

- Surveyed two bridges and one drainage drop structure, as well as cross sections of the diversion channel upstream and downstream from these structures.

D.1.2 Geotechnical Information

A geotechnical report summarizing field investigations, laboratory testing, site conditions, analyses, and recommendations was also prepared in support of Project design (Jacobs, 2020a).

The geotechnical investigations included the following:

- Advancing nine Cone Penetrometer Test soundings beneath the originally proposed embankments.
- Excavating six test pits within a proposed borrow area located in the north basin that will be the source of the embankment materials.
- Drilling seven soil borings around the perimeter of the property beneath the proposed perimeter embankment.
- Performing laboratory testing on selected soil samples from the potential borrow area to evaluate engineering properties of subsurface materials that will be used to construct the proposed embankments.
- Hand auger borings were advanced at each end of the spillway.

The investigation found that adequate clay material is present in the proposed borrow area to construct the embankments as a homogeneous section. The clay was found to have a very slight (Grade 2) dispersion potential and will make an excellent embankment material for temporary water retention.

The foundation soil beneath the embankments will consist of alluvial clay, silt, and sand. No faults have been identified beneath the proposed Project location, and the nearest active fault is approximately 46 miles away. No adverse foundation soil conditions, such as soil too weak to support the embankment or soil with a significant risk of liquefaction, were encountered. Seepage analyses were performed to verify that the proposed embankment section with key trench beneath has sufficiently low hydraulic gradients to prevent internal erosion or piping. Analyses of the geological risks, slope stability, seepage, and settlement of the embankment are summarized in the geotechnical report prepared for the Project (Jacobs, 2020b). The spillway structure was found to be stable in accordance with methodology in U.S. Army Corps of Engineers (USACE) guidance document EM 1110-2-2100 (2005).

D.1.3 Hydrology and Hydraulics

The *Hydraulic Study and Detention Basin 90 Percent Design Report* (Hydraulic Study) (Jacobs, 2022) supplements the Basis of Design Report (Jacobs, 2020a). The purpose of the Hydraulic Study was to perform hydrologic analysis to estimate design peak flow rates and volumes for Black Rascal Creek upstream of the Black Rascal Creek Diversion Channel near Yosemite Avenue. This report documents the hydrologic and hydraulic modeling work to support the detention basin design.

A Hydrologic Engineering Center’s Hydrologic Modeling System (HEC-HMS) hydrologic model was developed to calculate key design flows, existing conditions, and with the Project in place, including a 200-year storm event, and a probable maximum flood (PMF). The hydrologic models were linked with a Hydrologic Engineering Center’s River Analysis System (HEC-RAS) two-dimensional hydraulic model of the detention basin, downstream diversion channel, and downstream fields. The hydraulic model was used to evaluate several alternative options for embankment, outlet, and spillway configurations to aid in selecting the preferred configurations for final design (Jacobs, 2020a). The key results from the Hydraulic Study are presented below.

D.1.3.1 Detention Basis Inflow Hydrographs

200-year Storm Event

Exhibit D-1 shows HEC-RAS 2D flow output for the 200-year event based on HEC-HMS inflow hydrographs. The peak of the inflow hydrograph is 6,400 cubic feet per second (cfs). The duration of runoff generated from 24-hour, center-weighted rainfall events is less than 30 hours. The time to peak runoff is about five hours from peak rainfall, indicating that the Black Rascal Creek watershed generates short-duration and narrow peak runoff floods (Jacobs, 2022).

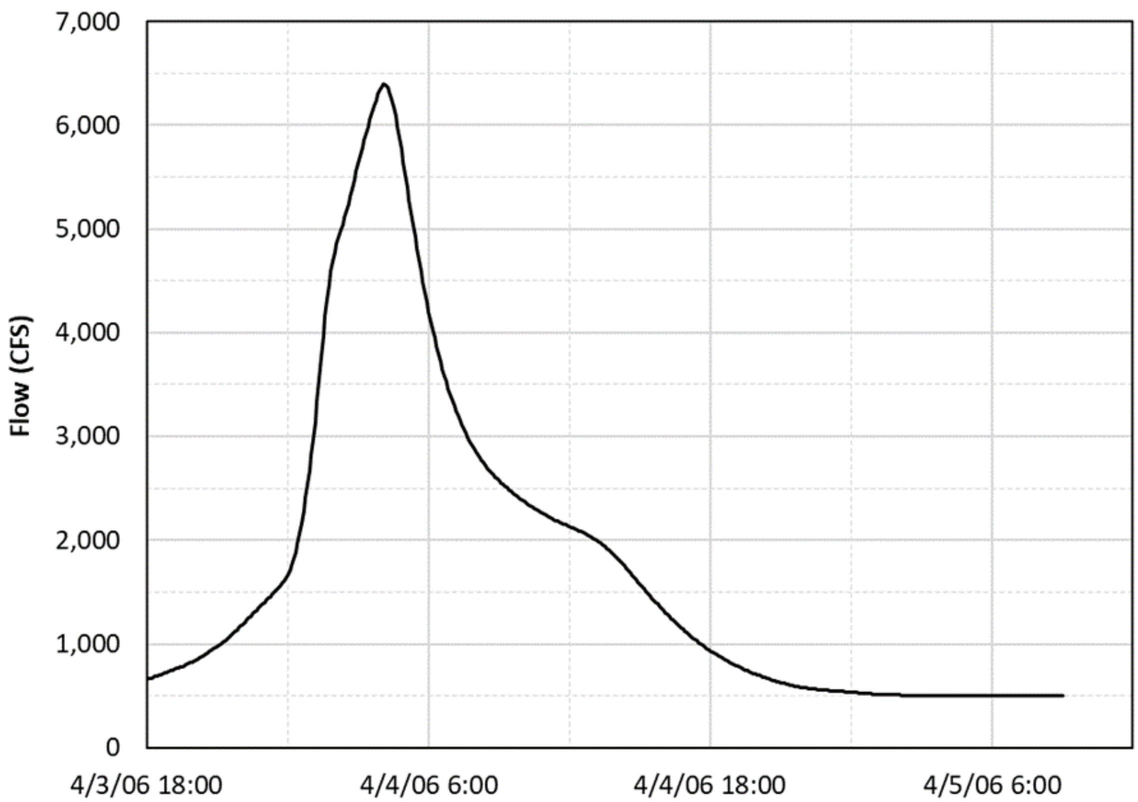


Exhibit D-1. 200-year Design Event Hydrograph with the Project (Jacobs, 2022)

Probable Maximum Flood (PMF)

The PMF base case developed using the Soil Conservation Service (SCS) Curve Number (CN) loss method, SCS unit hydrograph (UH) method, and distributed probable maximum precipitation PMP is the basis for sizing the auxiliary spillway and freeboard. This is consistent with the use of the PMF for alternatives analyses and iterative analysis during project development. The sensitivity of the computed PMF peak flows and runoff volumes to various loss methods, UH methods, and PMPs (general storm and local storm) were analyzed and presented in the Hydrology Study (Jacobs, 2022). A summary of the findings is presented in this appendix.

Two loss methods, 'SCS CN' and 'Initial and Constant,' were compared. The initial losses were set to zero for the two methods for consistency. In addition, zero initial losses help ensure conservatism, consistent with saturated moisture conditions prior to a PMF event. The simulated results are summarized in Table D-1 (Jacobs, 2022).

Table D-1. Summary of Probable Maximum Flood Sensitivity Analysis

No.	PMP	Soil Loss Method	Transform Method	Peak Q (cfs)	Runoff Volume (acre-feet)
1	General Storm 72-hr	SCS CN	SCS UH	13,604	25,537
2	General Storm 72-hr	Initial and Constant (f_c = 0.025 inch per hour)	SCS UH	13,587	25,564
3	General Storm 72-hr	Initial and Constant (f_c = 0.05 inch per hour)	SCS UH	13,262	23,708
4	General Storm 72-hr	SCS Curve Number	USBR UH	11,212	25,489

Notes:

f_c = maximum potential rate of precipitation loss
USBR = U.S. Bureau of Reclamation

Source: (Jacobs, 2022)

The peak runoff rate and flood volume show low sensitivity to the choice of loss rate. The SCS CN method produced a conservatively high peak inflow and comparable runoff volume. The SCS CN method was selected for consistency with the SCS UH method (Jacobs, 2022).

The baseline SCS UH method in Row 1 was compared with the USBR UH method in Row 4. The peak runoff rate shows high sensitivity to the choice of UH. The USBR UH method produced significantly lower PMP peak discharge than the SCS UH method. Without local gage records for calibration, there is limited information to use as a basis for selection between the two UH methods. Therefore, the more conservative and well-accepted SCS UH method was selected for the evaluation (Jacobs, 2022).

D.1.3.2 Hydrograph for Principal Spillway Design

The principal spillway capacity is sized to meet the following objectives:

1. Limit the 200-year discharge in the BRC Diversion Channel to less than 3,000 cfs,
2. Provide at least 1 foot clearance under Yosemite Avenue and Olive Avenue bridges, and
3. Minimize the 200-year WSE in the detention basin to reduce the required embankment height (that is, do not unnecessarily restrict principal spillway discharges beyond that required to meet objectives 1 and 2).

A 16-foot-wide principal spillway was chosen because it provided 1 foot of clearance under the bridges at a maximum discharge of 2,650 cfs. The inflow and outflow hydrographs for the 200-year storm are presented on Exhibit D-2. The exhibit indicates that the detention basin reduces the outflow peak (and subsequent potential for downstream flooding), extending the outflow duration for a 24-hour storm from about 30 hours to more than 36 hours (Jacobs, 2022).

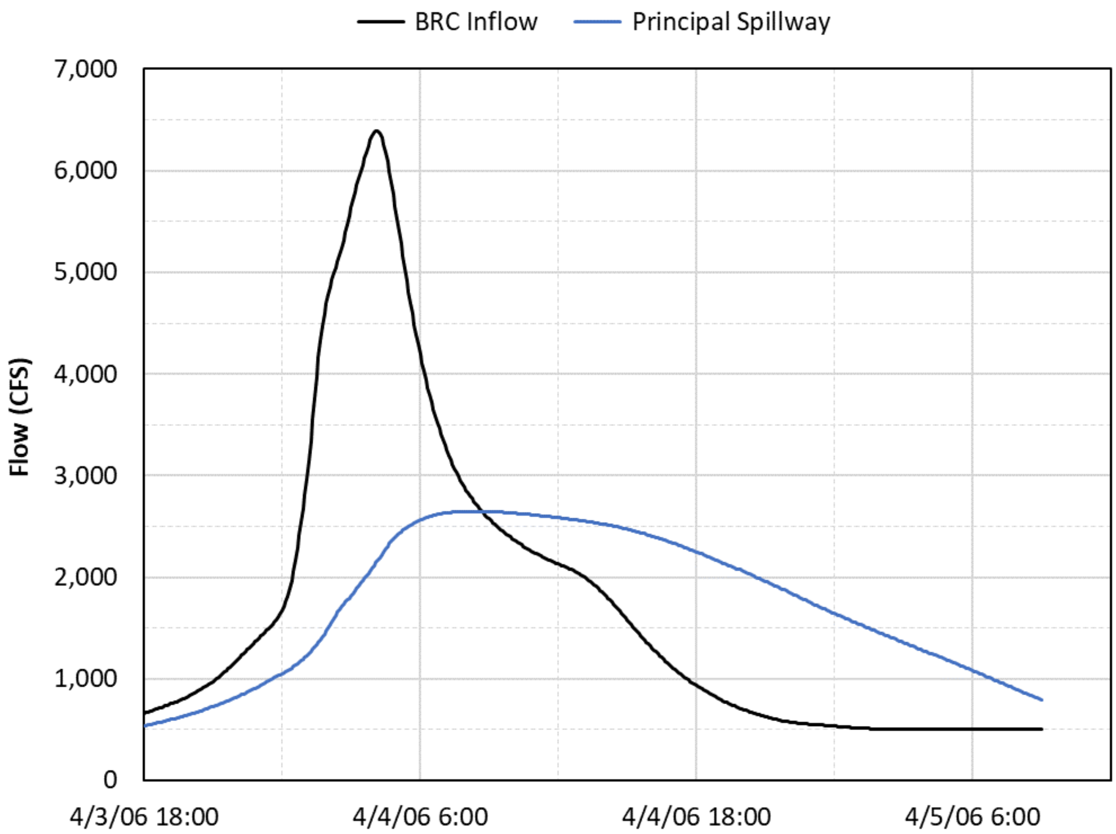


Exhibit D-2 200-year Design Event Hydrograph with the Project (Jacobs, 2022)

D.1.4 Probable Maximum Flood Hydrograph for Auxiliary Spillway Design

The overflow auxiliary spillway was sized to pass the PMF together with the ungated principal spillway. The auxiliary spillway length was selected to balance the auxiliary spillway size and embankment height. Exhibit D-3 presents the auxiliary spillway and principal spillway PMF outflow hydrograph. The Project reduced the existing peak PMF general storm (GS) and PMF local storm (LS) discharge from approximately 15,400 and 16,000 cfs to about 7,900 and 6,200 cfs through the two spillways, respectively. Additional PMF flows exit the detention basin and bypasses the detention basin where they pass over the paved road on East Yosemite Avenue at the eastern edge of the detention basin (Jacobs, 2022).

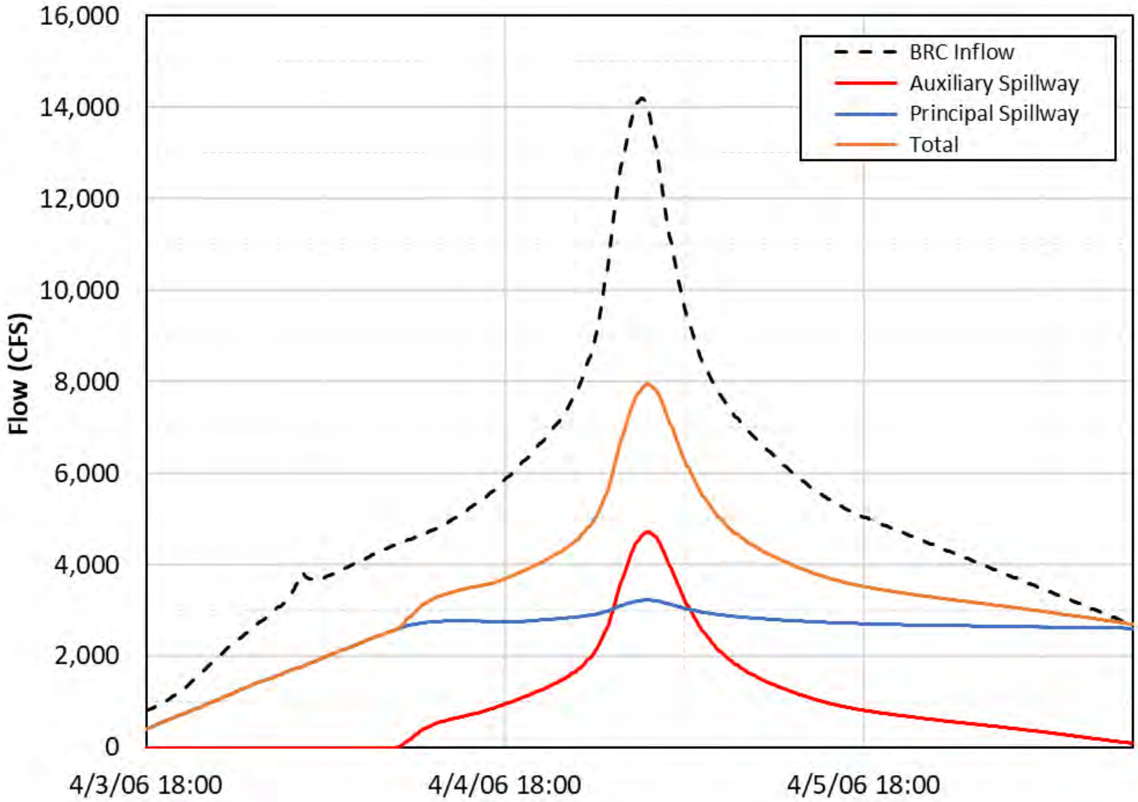


Exhibit D-3. Probable Maximum Flood General Storm Hydrographs for With Project Condition (Jacobs, 2022)

D.1.5 Inundation Maps

Floodplain inundation maps were generated using the HEC-RAS model outputs for Without-Project (Existing Conditions) and With Project scenarios.

D.1.5.1 100-Year Storm Event

Floodplain inundation maps were generated for the 100-year storm event for Without-Project (Existing Conditions with and without existing levee inundation) and With Project scenarios. Appendix C4 shows the maximum inundated area for the 100-year storm event without, and with the Project.

D.1.5.2 500-Year Storm Event

Floodplain inundation maps were generated for the 500-year storm event for Without-Project (Existing Conditions with and without existing levee inundation) and With Project scenarios. Appendix C4 shows the maximum inundated area for the 500-year storm event without, and with the Project.

D.1.6 Hydraulic Armoring

A Draft Hydraulic Armoring Report (Jacobs, 2020c) was developed to assist in Project hydraulic design and sizing of rock slope protection (riprap) downstream of the spillway stilling apron, upstream and downstream of the concrete outlet structure, and along a portion of the embankment adjacent to East Yosemite Avenue.

Riprap armoring will be placed in the following locations, beginning at the appurtenant structure indicated:

- Downstream of the spillway stilling basin endsill
- Upstream of the concrete outlet constriction (channel bed, banks, and overbank)
- Downstream of the concrete outlet constriction (channel bed and banks)
- Behind the outlet side walls on the upstream slope of the detention embankment
- On the downstream face and toe area of the detention embankment bend by East Yosemite Avenue

D.2 Soils and Geology

The Project embankments and outlet works will be designed and constructed to adequately perform and be stable under the design earthquake and flood conditions. A geotechnical investigation to collect data on subsurface conditions and soil material properties began in the fall of 2019. The scope of work completed includes the following:

- Advancing nine Cone Penetrometer Test soundings around the perimeter of the property beneath the proposed perimeter embankment.
- Excavating six test pits within a proposed borrow area located in the interior of the west portion of the proposed basin that will be the source of the embankment materials.
- Drilling seven soil borings around the perimeter of the property beneath the proposed perimeter embankment.
- Hand auger soil sample at proposed footprint of Spillway
- Performing laboratory testing on selected soil samples[1]

The soil beneath the Project footprint was predominately silt, clay, and fine sand. In the upper 10 to 15 feet, the soil was stiff clay and silt, or medium dense sand. Below 10 to 15 feet, the sand layers were dense to very dense, and the clay and silt were generally hard and overconsolidated. The soil was unsaturated, except for some free water perched above the hard clay layers around 10 to 15 feet depth.

The foundation soil has a medium expansion potential based on the plasticity laboratory test results, and a low potential for long-term consolidation settlement given the highly overconsolidated conditions and unsaturated conditions. The foundation soil is sufficiently strong to support the proposed embankment with a low risk of instability under both static and earthquake loading. The foundation soil has a low potential for liquefaction, given the dense to very dense conditions and absence of saturated soil materials.

[1] Laboratory test program used to evaluate characteristics of the soil samples included: Atterberg Limits (ASTM D4318); Sieve Analysis (ASTM D422); Percent Finer than No. 200 Sieve (ASTM D1140); Moisture Content (ASTM D2216); Moisture Density Relationship (ASTM D1557); Crumb Test (ASTM D-6572); Pinhole Dispersion (ASTM D-4647); Hydraulic Conductivity (ASTM D5084); Triaxial Shear, Consolidated Undrained (ASTM D-4767) and Specific Gravity (ASTM D-854)

The borrow materials for constructing the embankment were found to be lean clay soil with a low hydraulic conductivity. The clay was found to have a very slight dispersion potential, and will make an excellent embankment material for temporary water retention.

The geotechnical investigation and Project design has been reviewed by the California Department of Water Resources (DWR), Division of Safety of Dams (DSOD) to verify that the embankments and outlet works are designed in accordance with industry standards.

D.3 Water

D.3.1 Surface Water Quality and Quantity

Municipal, industrial, and agricultural water demands in the San Joaquin River Hydrologic Region are approximately 8.3 million acre-feet per year (ac-ft/yr) (DWR, 2013). Major water supplies in the San Joaquin River Hydrologic Region are provided through surface storage reservoirs, including San Luis Reservoir and O'Neill Forebay and Los Banos Creek Reservoir.

Approximately 6 sediment and 35 surface water quality samples have been collected from Black Rascal Creek between 2006 and 2014 by the State Water Resources Control Board (SWRCB) (National Water Quality Monitoring Council, 2017). Sediment data were analyzed for methods relating to toxicity with respect to freshwater invertebrates. Surface water samples were analyzed for a variety of pesticides/insecticides/herbicides, metals, and general chemistry (e.g., dissolved oxygen, nitrate/nitrite/ammonia, electrical conductivity, pH, and turbidity). A summary of available surface water quality data for Black Rascal Creek along with the minimum water quality-based assessment threshold (CalEPA/SWRCB, 2017) and associated drinking water standards (such as maximum contaminant levels) are included in Appendix E1. These data suggest that the water quality for Black Rascal Creek is generally good. Although the minimum assessment thresholds are exceeded for some parameters, maximum contaminant levels and agricultural water quality standards are not. Black Rascal Creek is not currently listed as an impaired waterway by the SWRCB.

The hierarchy of water supply in the San Joaquin River Hydrologic Region is met by local surface water supplies, imported surface water from the State Water Project or Central Valley Project (where insufficient local surface water exists), and groundwater (DWR, 2013).

D.4 Air Quality and Greenhouse Gases

The Project is in nonattainment for ozone (O_3) and particulate matter with aerodynamic diameter equal to or less than 2.5 micrometers ($PM_{2.5}$) under NAAQS. Therefore, the project is subject to general conformity requirements. Emissions of carbon (CO), nitrogen oxide (NO_x), reactive organic gases (ROGs), sulfur dioxide (SO_2), and particulate matter less than 10 or 2.5 micrometers in aerodynamic diameter (PM_{10} or $PM_{2.5}$) were estimated using the California Emission Estimator Model (CalEEMod Version 2020.4.0) and compared to applicable general conformity de minimis thresholds. If anticipated emissions are below the de minimis thresholds, the Project meets the general conformity requirements and the impacts would be considered less-than-significant. Table D-2 presents the applicable general conformity de minimis thresholds.

Table D-2. General Conformity De Minimis Thresholds (tons per year)
Black Rascal Creek Watershed, CA

Alternative	CO	NO_x	ROG	SO_2	PM_{10}	$PM_{2.5}$
General Conformity De Minimis Thresholds	Not available	10	10	70	100	70

Construction of the detention basin would be continuous over approximately 18 months. The total area of disturbance would be approximately 300 acres. Excavated soil would be reused onsite. Additional importing or exporting of soil is not expected to be required for Project construction. Two water trucks would be used onsite to control the fugitive dust emissions from exposed areas. Appendix E2 of the Plan EA provides the CalEEMod output files showing the detailed construction assumptions and emissions.

Emissions estimates were only prepared for construction activities as operational emissions are assumed to be negligible. Emissions from Project operation would be infrequent and minimal; air emissions are expected to be negligible; therefore, they are not quantified.

D.5 Animals and Plants

In accordance with Section 7(a)(2) of the federal Endangered Species Act of 1973, as amended (ESA), a BA was prepared to evaluate the potential effects on threatened and endangered species, and their critical habitat, that may occur as a result of proposed construction activities for the Black Rascal Creek Flood Control (Appendix E4). Consultation with the USFWS is ongoing to assure all mitigation measures identified in the EA will limit impacts to the extent possible.

A biological evaluation identifying potential biological constraints/issues associated with the proposed construction and operation of the Project was completed. As part of the biological evaluation, a standard nine-quadrangle California Natural Diversity Database/Rarefind 5 report was generated for the Project footprint and vicinity (i.e., query of the USGS 7.5-minute topographic quadrangle in which the Project footprint is found as well as the immediate eight surrounding topographic quadrangles. Merced and the surrounding Atwater, El Nido, Haystack Mtn., Plainsburg, Planada, Sandy Mush, Winton, and Yosemite Lake quads). The California Natural Diversity Database was utilized which contains records for special-status species, as well as sensitive natural communities, which have been reported to the California Department of Fish and Wildlife. Each of the species identified in the Rarefind 5 report (Baumgardner, 2018) were then evaluated in terms of their likelihood of occurrence within and immediately adjacent to the Project footprint (i.e., draft likelihood of occurrence analysis). A site survey was also conducted focusing on identifying and characterizing all sensitive biological resources (e.g., important habitats, vegetation communities, and species) that could be adversely affected by the proposed Project and potential impacts identified accordingly (Baumgardner, 2018).

D.6 Human Environment

D.6.1 Transportation

The traffic analysis to minimize associated potential impacts for the Project was conducted in accordance with the methodologies and procedures in the *Highway Capacity Manual* (Transportation Research Board, 2010), applicable provisions from CEQA, and policy guidance contained in the Merced County Circulation Element (Merced County, 2012a). Annual average daily traffic volumes were used to assess the level of service for the Project vicinity roadways. Annual average daily traffic information for 2014 was obtained from the Caltrans Traffic Data Branch (Caltrans, 2016) for State Routes 99 and 140 and average daily traffic were obtained from the *Merced County General Plan Revised Draft Background Report: Transportation and Circulation* (Merced County, 2012b) and Chapter 4 in the *Merced Vision 2030 General Plan* (Merced, 2015).

D.6.2 Cultural Resources

A cultural resources assessment was completed for the entirety of the Area of Potential Effects (APE), which comprised an approximately 320-acre area (Cardenas et. al, 2021). This cultural resources assessment included a review of previous studies covering the study area, which includes the APE and a 0.5-mile buffer around the APE, as well as a systematic archaeological pedestrian surface and standing structures survey of the APE.

To analyze the Project's potential impacts to cultural resources, an APE was established pursuant to regulations at 36 *Code of Federal Regulations* 800.4(a)(1). The APE includes the maximum project footprint and encompasses all areas that may be impacted by ground-disturbing activities related to the Project's construction, implementation, and operation. This also includes areas anticipated to be used as access roads, staging areas, and laydown areas, which are located within the Project footprint. Due to limited development surrounding the APE and the presence of the existing orchards and extensive vegetation in the area, a separate visual impacts APE was not established. The Project improvements will not exceed more than 18 feet above the existing ground surface as part of the embankment construction, remaining consistent to the height of trees in the existing orchard, and will not cause a noticeable change in the area's setting or viewsheds.

A literature search was requested in 2016 at the start of the project from the Central California Information Center of the California Historical Resources Information System (CHRIS), located at California State University, Stanislaus and results were received on October 14, 2016. The records search included a review of all recorded prehistoric and historic archaeological sites and historic architectural resources, as well as all known cultural resource survey and excavation reports documented in the National Archaeological Data Base. The study area consisted of the APE and a 0.5-mile radius around the APE. This project has been ongoing since 2016 and the records search results were used by project engineers to ensure the project avoided impacts to known cultural resources within the APE. Working in consultation with Merced County and landowners since 2016, it has been determined that no additional cultural resources investigations have taken place within the APE and no new cultural resources have been identified within the APE since the literature search was completed. Therefore, an updated CHRIS search was not required. In addition to the literature search, National Register of Historic Places, the California Register of Historical Resources (CRHR), California Historical Landmarks, and California Points of Historic Interest were all examined. Historic resources were also investigated through review of the following maps:

- 1854 General Land Office Township 7S Range 14E map
- 1914 Merced 7.5-minute USGS topographic quadrangle map
- 1918 Planada 7.5-minute USGS topographic quadrangle map
- 1948 Merced 7.5-minute USGS topographic quadrangle map (reprint of 1909)
- 1961 Planada 7.5-minute USGS topographic quadrangle map

- 1961 Planada 7.5-minute USGS topographic quadrangle map (photo revised 1987)

Survey methodology for prehistoric and historic cultural resources was performed using pedestrian transects spaced at 15-meter intervals throughout the entire survey area. The topography of the APE was flat with mild topographic elevations due to agricultural fields, orchards, alluvial channels, drainages, and irrigation features. Subsurface exposures, including rodent burrows and cut banks, were examined. Survey crews navigated via Trimble Geo XTH global positioning system (GPS) units. Each GPS unit contained the survey area shape files, all previously recorded site boundaries, and all previously recorded resources.

The survey and background research identified two previously recorded cultural resources within the APE. The previously recorded cultural resources included segments of the Black Rascal Creek Canal (P-24-002047) and the Merced Irrigation District (MID) Historic District (P-24-001909/P-22-003197). SHPO provided concurrence that the entire MID is not eligible for listing in the National Register of Historic Places (NRHP) and the CRHR in 2012. Segments of the Black Rascal Creek Canal located outside the boundaries of the APE have been previously recorded (though these portions are outside the APE and the CHRIS assigned P-24-002047 to the entirety of the linear resource) and have been recommended as not eligible for listing in the NRHP and CRHR in 2007 and 2008, respectively. The cultural resources analysis for the Project determined that the portions within the APE are not eligible for listing in the NRHP or CRHR, pending SHPO concurrence.

One newly identified cultural resource was identified within the APE: the Applegate Lateral, which was evaluated as being not eligible for listing in the NRHP (and CRHR) pending NRCS consultation with the SHPO.

Cultural resources were recorded on appropriate California Department of Parks and Recreation forms, mapped using a Trimble Geo XH GPS, and photographed. Information on the appearance and physical characteristics of the resources as well as the location of the resources was gathered. The survey was non-collection; all resources were mapped and photographed in-place. No artifacts were collected.

D.7 Economic Analysis

The economic analysis evaluated multiple levels of protection for the proposed facility, including a 50-year, 100-year, and 200-year level, as well as a non-structural alternative of relocating all structures that are situated within the 50-year inundation area. A benefit-cost analysis was conducted for each alternative to include the reduction in expected annual damage (EAD), consistent with methodologies for estimation of the National Economic Development (NED) account detailed in the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (79 Federal Register 77460). The reduction in EAD was estimated through a flood damage analysis model using the USACE Hydrologic Engineering Center - Flood Damage Reduction Analysis (HEC-FDA) modeling software. This model performed flood damage analysis to calculate EAD for the impact area of Black Rascal Creek. The model analyses characterized the NED benefits, or reduction in EAD, to compute benefit to cost ratios for each of the project alternatives. The methodology and results of the flood damage analysis conducted to support the Plan EA are presented in the Flood Damage Analysis Technical Memorandum (Attachment D1).

The Black Rascal Creek Flood Control Project Benefit-Cost Analysis compares results of the flood damage analysis for the No-Action (without-Project) alternative with results from each project alternative. The annual benefit of each level of project alternative is the reduction or change in EAD relative to the No-Action (without-Project) alternative. Reduction in EAD was calculated based on structure and structure content damages within the impact area. Structure types include commercial, industrial, public, and residential, with structures valued at their 2019 appraised values according to the Merced County Assessor's Office (2020). Values were subsequently inflated to 2020 dollars using a Gross Domestic Product deflator (U.S. Bureau of Economic Analysis, 2021). Although there is productive agricultural land within the impact area, agricultural structures, equipment, and crop values were not evaluated, resulting in a conservative estimate of project net benefits and benefit-cost ratio. The actual benefits of the project alternatives are higher than those estimated in this analysis. However, because benefits to residential and other structures alone exceed estimated costs and are considered representative of the geographic dispersion of benefits, the additional benefits to agricultural structures, equipment, and crops were not included. The preferred project meets the regulatory requirement that 20 percent of project benefits accrue to agriculture, including agricultural and rural communities. Defined as any benefit not within the boundary of a city with a population of 50,000 or more, rural and agricultural community benefits comprise 22 percent of the total avoided EAD benefits of the preferred project alternative.

The estimated reductions in EAD benefit for each project alternative are shown in Table D-3, based on flood damage analysis results, and separated by structure type. The largest total reduction in EAD relative to the No-Action alternative is the 200-year level of protection facility.

Table D-3. Expected Annual Damages (EAD) by Structure Inventory Type
Black Rascal Creek Watershed, CA

Alternative	Commercial	Industrial	Public	Residential	Total	Reduction in EAD Relative to No-Action
No-Action (without-Project)	$548,850	$336,359	$116,169	$4,347,008	$5,348,386	$0
50-year flood protection facility	$121,901	$49,523	$10,472	$924,551	$1,106,448	$4,241,938
100-year flood protection facility	$69,704	$25,515	$5,013	$512,636	$612,867	$4,735,518
200-year flood protection facility (Preferred Alternative)	$37,420	$14,290	$2,760	$276,900	$331,370	$5,017,016
Non-structural alternative	$115,731	$34,001	$18,884	$1,582,249	$1,750,866	$3,597,520

Note: Values are in 2020 U.S. dollars

Consideration was given to characterizing the costs for each of the different project alternatives. DODS has determined that the downstream hazard classification will be "extremely high" hazard. Extremely high-hazard dams must have auxiliary spillways capable of passing a PMF. The required minimum freeboard is whichever produces a higher dam crest: 4 feet of normal freeboard from the auxiliary spillway crest to the dam crest, or 1.5 feet of residual (minimum) freeboard above the maximum flood surcharge WSE during the PMF. For the purpose of this evaluation it is reasonable to assume the top of embankment would be at elevation 214.5 irrespective of design storm (50, 100, 200 yr). Therefore, across the 50-year, 100-year and 200-year levels of design, the main difference in cost is a result of the linear footage of embankment required and the land acquisition costs for the detention basin. Land acquisition costs are estimated at $15 million for the 100- and 200-year projects. The 50-year project would require significantly less acreage, estimated at approximately one-third the size of the larger projects. The cost of the principal spillway, auxiliary spillway, drainage facilities, and habitat and restoration channels, are common features, irrespective of design. For the non-structural alternative, the cost is estimated based on the assessed value of those structures. In total, there are 1,735 structures located in the 50-year inundation area, based on a GIS analysis of the impact area. Using Merced County assessments data, the total assessed value of those homes is $343.8 million. This is assumed to be a reasonable proxy for the amount that it would cost for occupants of those structures to procure comparable accommodations outside of the 50-year inundation area. The annual O&M cost is estimated to be $50,000 for the structural alternatives and $0 for the non-structural alternative. These costs are summarized in Table D-4.

Table D-4. Cost Breakdown for 200-year Level of Protection Facility
Black Rascal Creek Watershed, CA

Alternative	Permitting, Design, and Mitigation	Land Acquisition and Easements	Construction	Administration, Project Management, and Coordination	Relocation Cost	Total Project Cost	Annual Operations and Maintenance (O&M)
No-Action (without-Project)	$0	$0	$0	$0	$0	$0	$0
50-year flood protection facility	$4,600,693	$5,000,000	$13,641,829	$1,469,181	$0	$24,711,703	$50,000
100-year flood protection facility	$4,600,693	$15,000,000	$14,166,829	$1,469,181	$0	$34,236,703	$50,000
200-year flood protection facility (Preferred Alternative)	$4,600,693	$15,000,000	$14,691,829	$1,469,181	$0	$35,761,703	$50,000
Non-structural alternative	$0	$0	$0	$0	$343,766,474	$343,766,474	$0

Note: Values are in 2020 U.S. dollars

The federal procedure for evaluation includes calculating interest during construction (IDC). IDC characterizes the opportunity cost of capital incurred during the construction period and allows for costs and benefits to be evaluated on an equal time basis. IDC is calculated to include the Permitting, Design, Mitigation, Land Acquisition and Easements, Administration, Project Management, Coordination, and Construction costs. IDC was calculated using the 2020 fiscal discount rate of 2.75 percent (NRCS, 2020). The IDC is calculated to over a 5-year period from preconstruction activities starting in 2019 to construction completion in 2023. The cost-share breakdown in Chapter 8 of the EA does not include IDC, and solely reflects actual Project costs and the existing cost sharing between the various partners.

The start of operation for the proposed facility is 2025 and benefits would accrue over a 100-year planning horizon. Total project costs and project benefits are shown on an annual basis in Table D-5 along with resulting net benefits and benefit-cost ratio calculations. Annual costs are calculated for each alternative using the 2020 fiscal discount rate of 2.75 percent (NRCS, 2020).

Table D-5. Present Value Construction Costs, Benefits, and Benefit-Cost Ratios
Black Rascal Creek Watershed, CA

Alternative	Annual Expected Benefit	Annual Expected Cost	Annual Net Benefit	Benefit – Cost Ratio
No-Action (without-Project)	$0	$0	$0	
50-year flood protection facility	$4,241,938	$777,863	$3,464,075	5.5
100-year flood protection facility	$4,735,518	$1,087,868	$3,647,650	4.4
200-year flood protection facility	$5,017,016	$1,103,332	$3,913,684	4.5
Non-structural Alternative	$3,597,520	$10,125,358	($6,527,839)	0.4

Note: Values are in 2019 U.S. dollars

Following extensive efforts to formulate the plan, design, and evaluate the project alternatives, the economic analysis confirms that this facility also provides the largest NED economic benefit, based on annual net benefits shown in Table D-4. This economic analysis concludes that the 200-year level of protection facility provides the highest net benefit and will proceed as the preferred alternative in the Black Rascal Creek Flood Control Project Watershed Project Plan Environmental Assessment.

D.8 References

Baumgardner, Michael. 2018. Black Rascal Creek Flood Protection Project Biological Evaluation, Merced County, California. October 26.

California Department of Transportation (Caltrans). 2016. *Traffic Census Program*. Traffic Data Branch. Available at: http://dot.ca.gov/trafficops/census/. Accessed October 24, 2016.

California Department of Water Resources (DWR). 2004. "San Joaquin Groundwater Basin: Merced Subbasin." *California's Groundwater Bulletin 118*. Last update February 27, 2004.

City of Merced (Merced). 2015. *Merced Vision 2030 General Plan*. April.

Jacobs Engineering Group Inc. (Jacobs). 2020a. *Black Rascal Creek Flood Control Project, Merced County, CA Basis of Design Report – 60 Percent Design*. November 2020.

Jacobs Engineering Group Inc. (Jacobs). 2020b. *Black Rascal Creek Flood Control Project, Merced County, CA Draft Geotechnical Investigation Report. November 2020.*

Jacobs Engineering Group Inc. (Jacobs). 2020c. *Black Rascal Creek Flood Control Project, Merced County, CA Draft Hydraulic Armoring Report. November 2020.*

Jacobs. 2022. *Black Rascal Creek Flood Control Project, Merced County, CA Hydrologic and Hydraulic Report*. September 2022.

Merced County. 2012. *2030 Merced County General Plan, Draft Program Environmental Impact Report*. November.

Merced County, 2012a. Merced County General Plan Draft - Circulation Element. November 2012.

Merced County, 2012b. *Merced County General Plan Revised Draft Background Report: Transportation and Circulation Element. November 2012.*

Merced County. 2017. Final Environmental Impact Report, Black Rascal Creek Flood Control Project. SCH# 2017021015. Prepared by CH2M HILL, Inc. December.

Merced County Assessor. 2020. 2019 Merced County Assessment Roll dataset. Accessed from Merced County by request October, 2020.

Natural Resources Conservation Service (NRCS). 2020. Rate for Federal Water Projects. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/econ/prices/?cid=nrcs143_009685

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015. *Guidance for Assessing and Mitigating Air Quality Impacts*. March.

Transportation Research Board. 2010. *Highway Capacity Manual*.

U.S. Army Corps of Engineers (USACE). 2005. *Engineering and Design Stability Analysis of Concrete Structures.* December. https://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-2100.pdf?ver=2013-09-04-070815-903.

Natural Resources Conservation Service (NRCS). 2014. *390 – National Watershed Program Manual.*

Attachment D1
Flood Damage Analysis
Technical Memorandum

Jacobs

Memorandum

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Subject	**Flood Damage Analysis**
Project Name	Black Rascal Creek Flood Control Project
Attention	Rob Tull, Mark Oliver
From	Chakri Malakpet, PE, CFM; Jessie Hekl, PE; Steve Micko, PE
Date	October 11, 2021
Copies to	Julie Petersen

1. Introduction

This technical memorandum describes the methodology and results of the flood damage analysis and economic evaluation conducted to support the Black Rascal Creek Flood Control Project (Project), and the *Black Rascal Creek Watershed Plan Preliminary Draft Environmental Assessment*.

2. Methodology

This flood damage analysis evaluated a range of sizes for a proposed storm water detention basin facility on Black Rascal Creek. The detention basin sizes evaluated included 50-, 100-, and 200-year level flood protection projects. The Black Rascal Creek impact area is comprised of the region west of the existing Black Rascal Creek diversion channel which includes the City of Merced and the Franklin/Beachwood community. The location of the Project and the Black Rascal Creek impact area are shown on Figure 1. A benefit-cost ratio analysis was conducted for each basin size based on the reduction in computed expected annual damages (EADs) and estimated total costs for the Project. Reduction in EAD was computed for each basin size by subtracting the computed Project EAD from the existing condition (Without Project) EAD, which is characterized as expected annual benefits. The total estimated cost for the Project includes construction, permitting, and land acquisition costs.

The *Flood Damage Reduction Analysis* (HEC-FDA) (USACE 2017) modeling software was used for this flood damage analysis. This modeling software replaces Natural Resources Conservation Service (NRCS) flood damage assessment tools like ECON2 and URB1 and is the recommended tool for conducting risk-based Project benefits and performance analysis (NRCS 2020). HEC-FDA allows for performing Monte-Carlo simulations to estimate flood damages by synthesizing hydrologic, floodplain hydraulics, levee performance, structure and content values data using specified depth-damage functions.

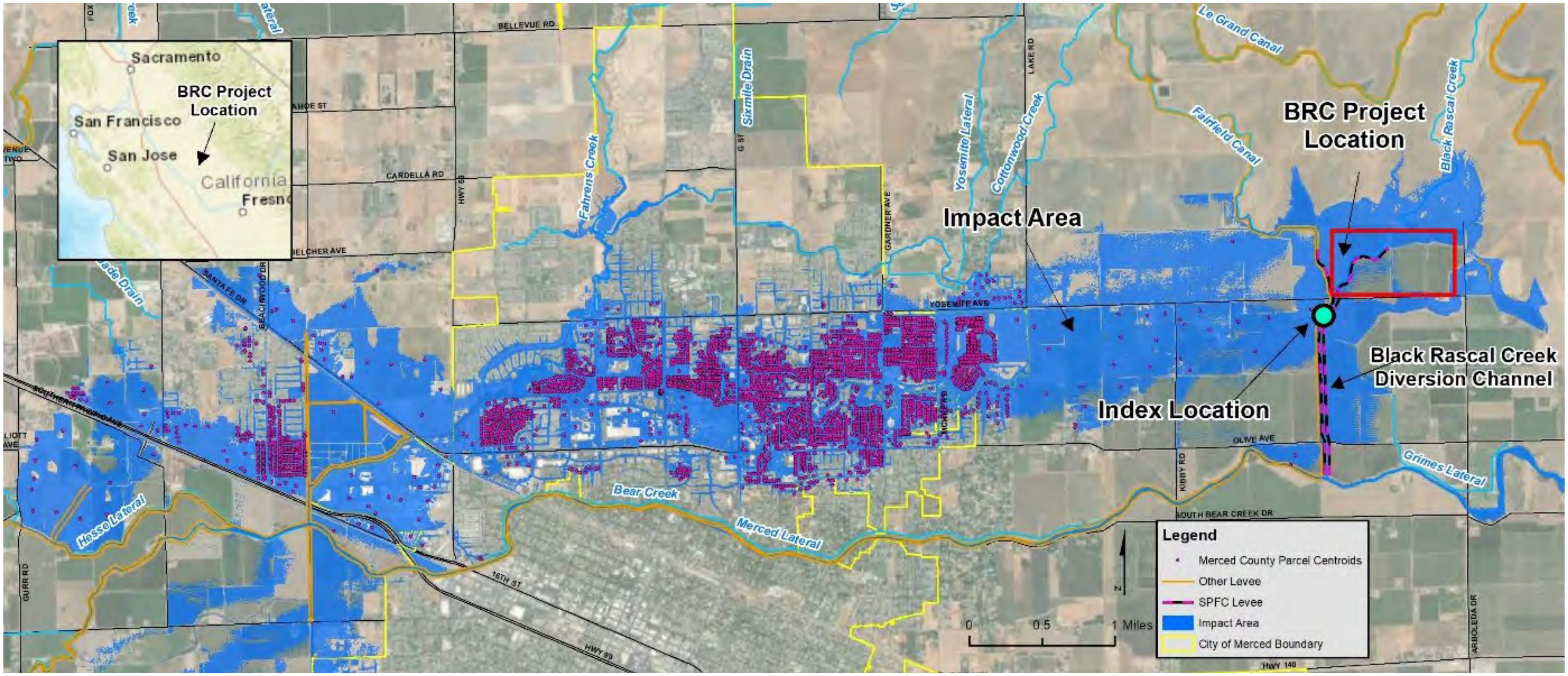

Figure 1. Black Rascal Creek Project Impact Area Map

2.1 Flood Damage Analysis Steps

The following steps were implemented for conducting the flood damage analysis. The models referenced in this section are described in Section 3.

1) Generate discharge-exceedance probability functions for the Black Rascal Creek index location using the HEC-HMS (Hydrologic Modeling System) and HEC-RAS (River Analysis System) models.
2) Generate stage-discharge functions for the Black Rascal Creek index location using the HEC-RAS model.
3) Generate relationships between the stage at the index location (exterior) and the stage in the floodplain (interior) for each of the eight exceedance probability flood events using the HEC-RAS model.
4) Generate levee-failure probability function for the Black Rascal Creek index location.
5) Generate structure inventory data including the structure values and category types from the Merced County parcel database.
6) Assign U.S. Army Corps of Engineers (USACE) depth-percentage damage functions to the structures and structure contents.
7) Compute EAD for Without Project and With Project conditions for both Merced County and Merced structures.

3. HEC-FDA Model Description

3.1 Index Location

A flooding source “index location” on the Black Rascal Creek diversion channel right bank levee was identified based on the 1997 and 2006 historical flooding information. The index location shown on Figure 1 was used as the basis of the anticipated source of flooding documented by Merced County during the 1997 and 2006 events which resulted in overtopping of the Black Rascal Creek right bank levee. This levee is critical as it protects Merced and the community of Franklin/Beachwood. The discharge-exceedance and stage-discharge functions were generated and used in the HEC-FDA model at the specified Black Rascal Creek levee index location.

3.2 Impact Area

The inundation boundary resulting from a simulated levee breach at the selected Black Rascal Creek index location for the projected 500-year flood event is defined as the Black Rascal Creek impact area for this study. The impact area shown on Figure 1 was determined by delineating the anticipated floodplain area using the 500-year flood event inundation results generated by the HEC-RAS two-dimensional (2D) model developed for this study. This inundation area encompasses the 200-, 100-, and 50-year inundation areas, which were also evaluated with respect to necessary facilities and Project costs.

3.3 HEC-GeoFDA Preprocessor

USACE's HEC-GeoFDA (2019) geospatial preprocessor was used to generate input files for the Black Rascal Creek index location and impact area evaluated in the HEC-FDA model. HEC-GeoFDA enables and streamlines preprocessing of 2D model hydraulic data, topographic data, and structure inventory data to develop water surface profile and depth to percent damage database tables that are imported into the HEC-FDA model.

3.4 Discharge-Exceedance Probability Functions

The discharge-exceedance probability functions for the Black Rascal Creek index location shown on Figure 2 were generated for the Without Project and three (50-, 100-, and 200-year level flood protection) Project sizes. These functions were generated using the HEC-HMS hydrologic model and HEC-RAS hydraulic model developed to support the 60 percent design of the Project (Jacobs 2020). The default set of eight flow exceedance values for each function required for the HEC-FDA model were generated using the HEC-HMS and HEC-RAS models used for the 60% Basis of Design Report (Jacobs 2020). These exceedance values are for the 0.50-, 0.20-, 0.10-, 0.04-, 0.02-, 0.01-, 0.005-, and 0.002-exceedance probability flood events that correspond to 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year annual recurrence intervals.

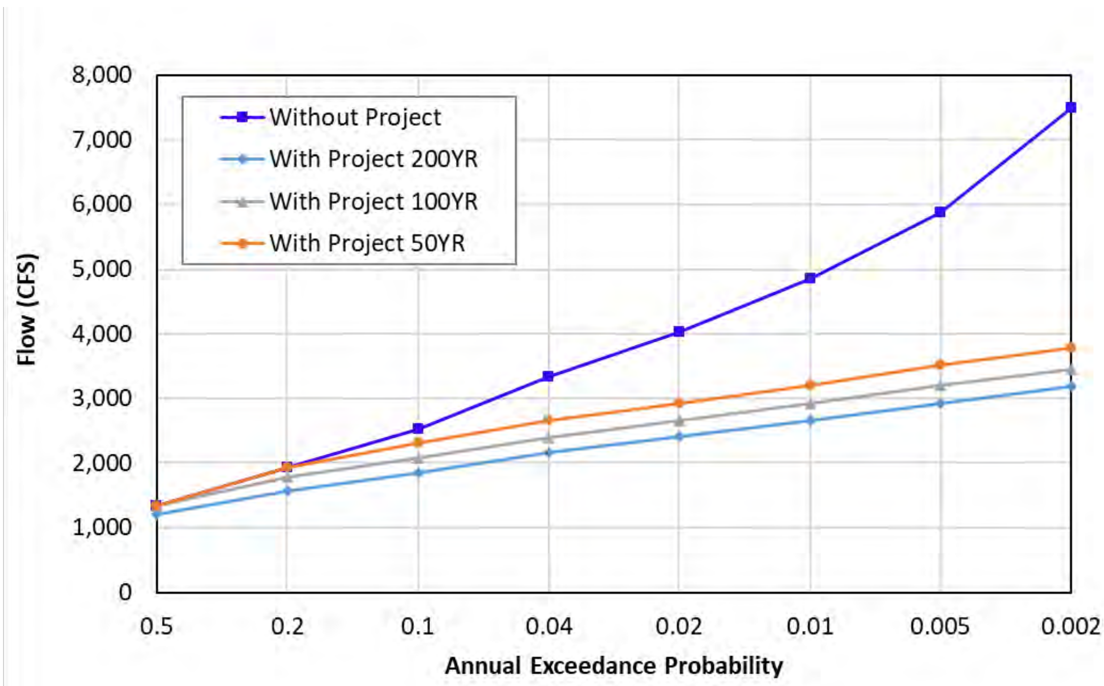

Figure 2. Black Rascal Creek Index Location Discharge-Exceedance Probability Functions

3.5 Stage-Discharge Function

The stage-discharge function for the Black Rascal Creek index location shown on Figure 3 was generated using the HEC-RAS hydraulic model described. This function is constant for the Without Project and the three With Project options because the geometry of the Black Rascal Creek diversion channel at the index location is unchanged with the Project. Figure 3 is included in this technical memorandum because it is a required input for the HEC-FDA model.

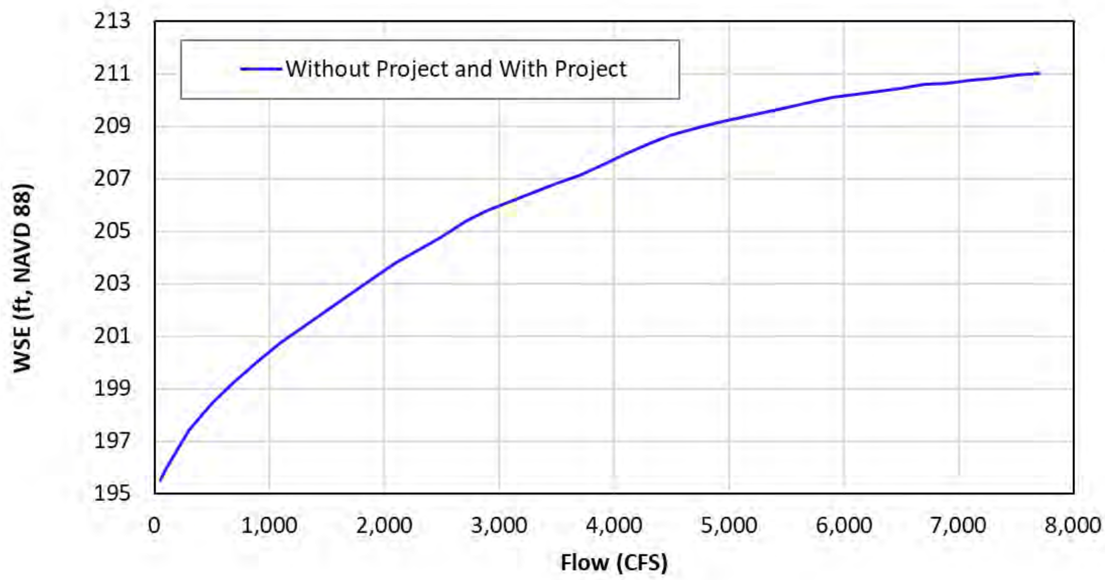

Figure 3. Black Rascal Creek Index Location Stage-Discharge Function

3.6 Exterior-Interior Stage Relationships

The exterior-interior relationships that define the relationship between the stage at the index location (exterior) and the stage in the floodplain (interior) for each of the eight exceedance probability flood events were generated. These relationships are unique for each structure in the floodplain and are tied to the index location with a specific station assigned to each structure in the HEC-FDA model. These relationships were developed by preprocessing the inundation results from the Black Rascal Creek impact area HEC-RAS 2D model and the structure inventory data using HEC-GeoFDA (USACE 2019).

3.7 Structure Inventory Data

The Merced County Assessor's (MCA's) Office provided the parcel GIS database containing 2019 tax year assessed land and structure values (Merced County 2020). This database also included physical characteristics of the structures for each parcel including land use type, year built, stories, units, building size (square feet), etc. A structure inventory was developed using this information by extracting parcels with geographical centroids within the Black Rascal Creek impact area for the HEC-FDA model and were designated as within Merced or outside the city limits.

The structures were categorized into occupancy types and damage categories for detailed evaluation of flood damages using the data describing the vulnerability of structures. The Federal Emergency Management Agency (FEMA) Hazards US building classification by occupancy type (FEMA 2013) was used to assign occupancy type and occupancy class (damage category) for the structure inventory.

The content values per structure were estimated based on the content structure value ratios (CSVRs) per Engineering Manual (EM) 1110-2-1619 (USACE 1996). For this study, a CSVR value of 1.0 was selected and applied to all occupancy types. Based on the review of structure physical characteristics, all residential structures were assumed to be structures without basements. A foundation height of 2 feet was assumed for all the structure types based on general guidance by the California Building Standards code.

The first-floor elevation (FFE) data for the structures was not available from the MCA parcel database. Therefore, it was estimated using the ground elevations extracted at the parcel centroids from the *Central Valley Floodplain Evaluation and Delineation (LiDAR) Data* (DWR 2012). The elevations from this dataset are referenced to the North American Vertical Datum of 1988 (NAVD 88). Foundation height of 2 feet was added to the extracted ground elevations to compute FFEs with exception of the homes in the Franklin/Beachwood Community. To better analyze the impact to the community, the FFE for the homes in this community is assumed to be at-grade. This more closely represents the typical bungalow style home found there.

The structure inventory and the estimated costs of the structures and contents in 2019 dollars within Merced and Merced County are summarized in the Table 1, 2 and 3

Table 1. Black Rascal Creek Impact Area Structure Inventory Data for Entire Merced County (City and County)

Structure Occupancy Type	Description	Damage Category	Structures Count	Structure Value ($1,000)	Contents Value ($1,000)	Total Value ($1,000)
COM4	Professional, Technical Services	Commercial	105	$96,516	$96,516	$193,032
IND1	Heavy Industrial	Industrial	56	$41,037	$41,037	$82,073
REL1	Religious	Public	7	$14,029	$14,029	$28,058
RES1-1SNB	Single Family, 1 Story No Basement	Residential	3,111	$453,076	$453,076	$906,151
RES1-2SNB	Single Family, 2 Stories No Basement	Residential	291	$62,051	$62,051	$124,101
RES2	Mobile Home	Residential	2	$2	$2	$4
RES3BI	Multi Family, 3-4 Units	Residential	159	$20,903	$20,903	$41,807
RES3CI	Multi Family, 5-9 Units	Residential	24	$52,711	$52,711	$105,422
Total			**3,755**	**$740,324**	**$740,324**	**$1,480,648**

Note:
Monetary values are in 2019 U.S. dollars.

Table 2. Black Rascal Creek Impact Area Structure Inventory Data within the City of Merced

Structure Occupancy Type	Description	Damage Category	Structures Count	Structure Value ($1,000)	Contents Value ($1,000)	Total Value ($1,000)
COM4	Professional, Technical Services	Commercial	81	$87,838	$87,838	$175,677
IND1	Heavy Industrial	Industrial	18	$36,456	$36,456	$72,913
REL1	Religious	Public	6	$13,708	$13,708	$27,415
RES1-1SNB	Single Family, 1 Story, No Basement	Residential	2,584	$391,703	$391,703	$783,406
RES1-2SNB	Single Family, 2 Stories, No Basement	Residential	276	$56,770	$56,770	$113,541
RES2	Mobile Home	Residential	1	$0.4	$0.4	$1
RES3BI	Multi Family, 3 to 4 Units	Residential	150	$19,455	$19,455	$38,910
RES3CI	Multi Family, 5 to 9 Units	Residential	24	$52,711	$52,711	$105,422
Total			**3,140**	**$658,642**	**$658,642**	**$1,317,284**

Note:
Monetary values are in 2019 U.S. dollars.

Table 3. Black Rascal Creek Impact Area Structure Inventory Data within Merced County (outside of City Limits)

Structure Occupancy Type	Description	Damage Category	Structures Count	Structure Value ($1,000)	Contents Value ($1,000)	Total Value ($1,000)
COM4	Professional, Technical Services	Commercial	24	$8,677	$8,677	$17,355
IND1	Heavy Industrial	Industrial	38	$4,580	$4,580	$9,160
REL1	Religious	Public	1	$322	$322	$643
RES1-1SNB	Single Family, 1 Story, No Basement	Residential	527	$61,373	$61,373	$122,746
RES1-2SNB	Single Family, 2 Stories, No Basement	Residential	15	$5,280	$5,280	$10,560
RES2	Mobile Home	Residential	1	$1	$1	$3
RES3BI	Multi Family, 3 to 4 Units	Residential	9	$1,448	$1,448	$2,897
RES3CI	Multi Family, 5 to 9 Units	Residential	0	$0	$0	$0
Total			**615**	**$81,682**	**$81,682**	**$163,364**

Note:
Monetary values are in 2019 U.S. dollars.

3.8 Levee-Failure Probability Function

The levee-failure probability function for the existing levee at the Black Rascal Creek index location was developed based on the uncertainty of levee performance guidance from EM 1110-2-1619 (USACE 1996). Figure 4 shows the probability of levee failure at the index location vs. water surface elevation in feet NAVD 88.

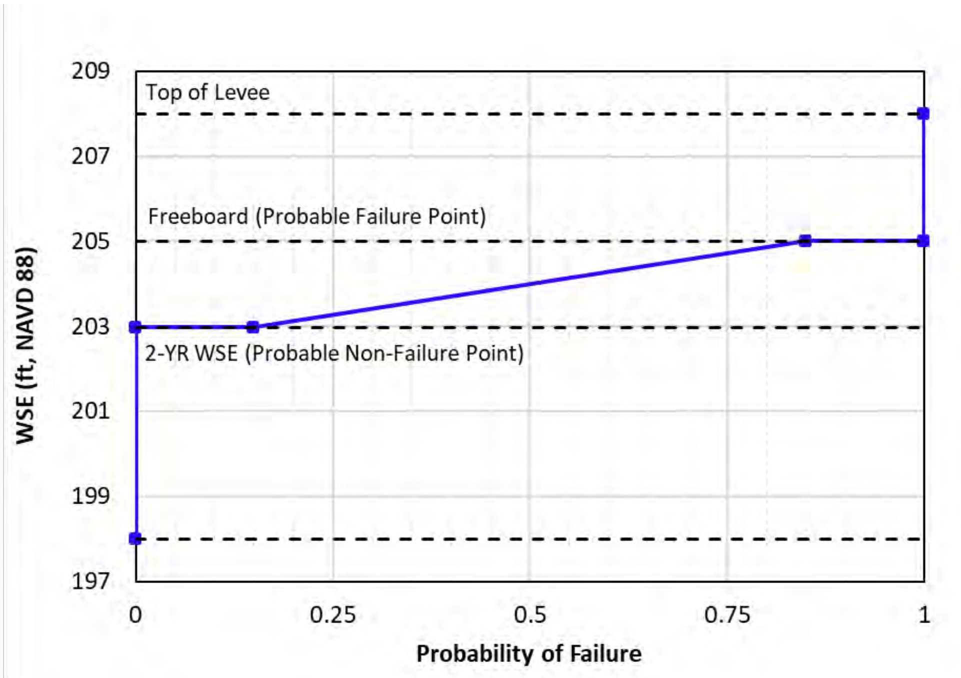

Figure 4. Black Rascal Creek Index Levee-Failure Probability Function

3.9 Depth-Percentage Damage Functions

The depth-percentage damage functions that define the damage caused to a structure and contents of the structure for a given depth of flooding were based on *Economic Guidance Memorandum (EGM) 04-01* (USACE 2003). Figures 5 and 6 show the relationships of flooding depth vs percentage damage for each occupancy type for the structures and structure contents.

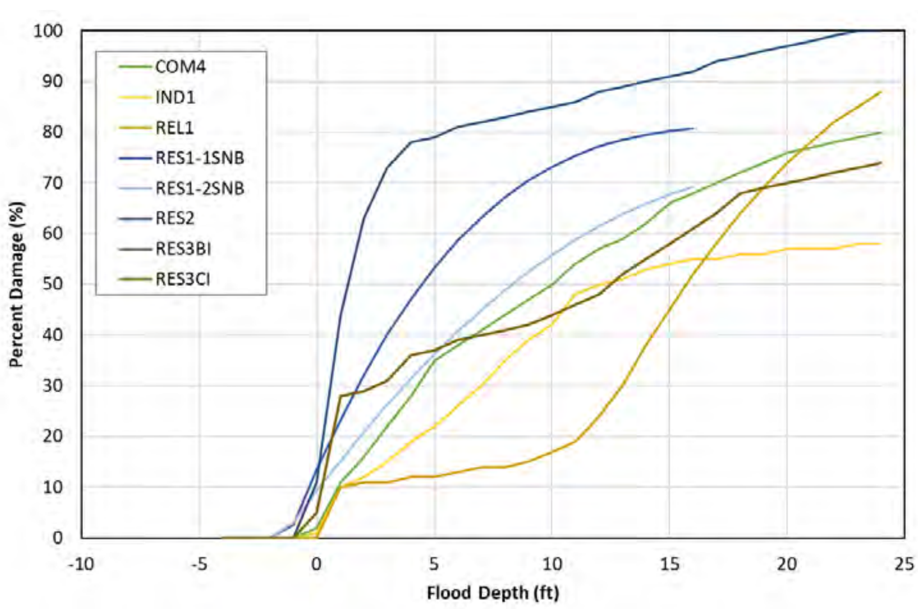

Figure 5. Depth-Percentage Damage Functions for Structures from EGM 04-01

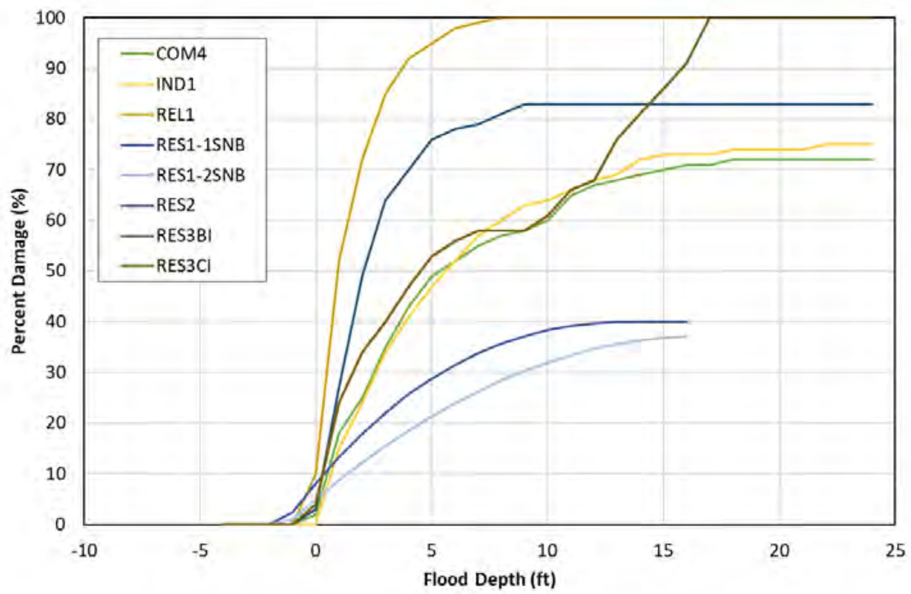

Figure 6. Depth-Percentage Damage Functions for Structure Contents from EGM 04-01

4. Results

The Black Rascal Creek HEC-FDA model computed EAD values for the Without Project and three With Project options are summarized in Table 4. The table presents computed EADs by damage category for each option within the Merced and Merced County. The total EAD within Merced County (city and county) for the Without Project option is approximately $5.3 million. The total EAD within Merced County (city and county) is reduced to $1.1 million, $606,000, and $327,000 for With Project 50-, 100- and 200-YR options respectively. The total EAD within Merced County outside the city limits for the Without Project option is greater than $1.2 million. The total EAD within Merced County outside of the City limits is reduced to $577,000, $336,000, and $179,000 for With Project 50-, 100- and 200-year options respectively. The highest reduction in EAD is achieved for the With Project 200-year option.

Table 4. Black Rascal Creek Impact Expected Annual Damages Summary

Option	Commercial ($1,000)	Industrial ($1,000)	Public ($1,000)	Residential ($1,000)	Total ($1,000)
Entire Merced County (City and County)					
Without Project	542	332	115	4,296	5,285
With Project 200-year	37	14	3	274	327
With Project 100-year	69	25	5	507	606
With Project 50-year	120	49	10	914	1093
Merced					
Without Project	343	318	112	3,256	4,029
With Project 200-year	5	14	3	127	149
With Project 100-year	9	25	5	230	270
With Project 50-year	20	48	10	439	517
Merced County (Outside of City Limits)					
Without Project	199	15	3	1,040	1,256
With Project 200-year	32	0	0	147	179
With Project 100-year	59	0	0	276	336
With Project 50-year	100	1	0	475	577

Note:
Monetary values are in 2019 U.S. dollars.

5. References

California Department of Water Resources (DWR). 2012. *Central Valley Floodplain Evaluation and Delineation Program, Light Detection and Ranging (LiDAR) Data*. California Department of Water Resources, California.

Federal Emergency Management Agency (FEMA). 2013. *Multi-hazard Loss Estimation Methodology, Earthquake, Hazards U.S. Multi-Hazard 2.1, Technical Manual*. Federal Emergency Management Agency.

Jacobs Engineering Group Inc. (Jacobs). 2020. *Black Rascal Creek Flood Control Project, Hydrologic Study and Detention Basin 60 Percent Design Report*.

Merced County. 2020. *Merced County Assessor Parcel GIS and 2019 tax year assessment data*, Merced County, California. https://maps.countyofmerced.com/server/rest/services/Assessor_Merced_County/Merced_County_Assessor_Parcel/MapServer

Natural Resources Conservation Service (NRCS). 2020. *Flood Damage Assessment Tools*, URL: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/econ/references/?cid=nrcs143_009725

U.S. Army Corps of Engineers (USACE). 1996. *Engineering and Design Risk-Based Analysis for Flood Damage Reduction Studies.* Engineering Manual (EM) No. 1110-2-1619. U.S. Army Corps of Engineers, Washington, DC. https://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-1619.pdf.

U.S. Army Corps of Engineers (USACE). 2003. *Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships for Residential Structures with Basements*. Washington, DC. October 10.

U.S. Army Corps of Engineers (USACE). 2017. *HEC-FDA Flood Damage Reduction Analysis, Release Notes, Version 1.4.2*. Hydrologic Engineering Center.

U.S. Army Corps of Engineers (USACE). 2019. *HEC-GeoFDA Geospatial Preprocessor for Flood Damage Reduction Analysis, User's Manual (HEC-FDA)*. Version 1.0. Hydrologic Engineering Center. October. https://www.hec.usace.army.mil/software/hec-geofda/documentation/CPD-72b_HEC-GeoFDA_UsersManual_Oct2019.pdf.

Appendix E
Other Supporting Documentation

Appendix E1
Surface Water Quality Summary

APPENDIX E1

Summary of Surface Water Quality Data for Black Rascal Creek

Environmental Impact Report for the Black Rascal Creek Flood Control Project

Parameter	Units	Minimum Value	Maximum Value	Average Value	Number of Samples	Reference Standard Value	Reference Source
Alkalinity, total	µg/L	18,000	91,000	44,984	61	None	
Ammonia	µg/L	0	610	91.4	28	490	USEPA National Recommended WQ Criteria, 4-day average, as Nitrogen; Toxicity – freshwater aquatic life
Arsenic	µg/L	0.7	3.2	2.2	6	(1) 0.004	(1) California Public Health Goal for Drinking Water
						(2) 10	(2) California Primary MCL
Boron	µg/L	8	21	17.3	6	700	Water Quality for Agriculture
Cadmium	µg/L	0.08	0.1	0.09	2	(1) 0.04	(1) California Public Health Goal for Drinking Water
						(2) 5	(2) California Primary MCL
Chlorpyrifos	µg/L	0	3.7	0.6	6	(1) 0.014	(1) California Department of Fish & Game WQ Criteria, 4-day average; Toxicity - freshwater aquatic life
						(2) 2	(2) USEPA, OPP Drinking Water Health Advisory - noncancer
Electrical Conductivity	µmhos/cm	52	273	126	97	700	Water Quality for Agriculture
Copper	µg/L	1.7	14	5.4	6	(1) 4.1	(1) California Toxics Rule (USEPA), 4-day average, dissolved; freshwater aquatic life
						(2) 1,300	(2) California Primary MCL
Cyanazine	µg/L	0.1	1	0.6	2	None	
Diazinon	µg/L	0.028	0.028	0.028	1	(1) 0.16	(1) California Department of Fish & Game WQ Criteria, 1-hour average; freshwater aquatic life
						(2) 1.2	(2) California DPH Notification Level for drinking water
Dissolved oxygen	µg/L	5,200	15,600	8,080	117	None	
Kjeldahl nitrogen	µg/L	930	2,300	1,622	6	None	
Lead	µg/L	0.1	5.5	1.5	12	(1) 0.2	(1) California Public Health Goal for Drinking Water
						(2) 15	(2) California Primary MCL
Nickel	µg/L	0.8	14	5.8	6	(1) 24	(1) California Toxics Rule (USEPA), 4-day average, dissolved; Toxicity freshwater aquatic life
						(2) 100	(2) California Primary MCL
Nitrate	µg/L	620	620	620	1	(1) 10,000 - as N	California Primary MCL
						(2) 45,000 - as NO_3	
Nitrite	µg/L	4	31	13.8	5	1,000 - as N	Primary MCL
Organic carbon	µg/L	2,400	16,000	8,686	21	None	
Paraquat	µg/L	0.6	0.6	0.6	1	None	
pH	None	7	10	8	131	6.5 - Minimum	USEPA Secondary MCL
						8.5 - Maximum	
Phosphorus	µg/L	190	460	330	6	None	
Selenium	µg/L	0.3	0.8	0.5	4	(1) 5	(1) National Toxics Rule (USEPA), 4-day average, total; freshwater aquatic life
						(2) 50	(2) California Primary MCL
Simazine	µg/L	0.7	0.7	0.7	1	(1) 4	(1) California Primary MCL
						(2) 10	(2) USEPA National Recommended WQ Criteria, instantaneous max; Toxicity freshwater aquatic life
Total dissolved solids	µg/L	45,000	180,000	101,190	21	450,000	Water Quality for Agriculture
Turbidity	NTU	11	140	58.7	22	None	

APPENDIX E1

Summary of Surface Water Quality Data for Black Rascal Creek

Environmental Impact Report for the Black Rascal Creek Flood Control Project

Parameter	Units	Minimum Value	Maximum Value	Average Value	Number of Samples	Reference Standard Value	Reference Source
Zinc	µg/L	4	26	9.5	6	(1) 54	(1) California Toxics Rule (USEPA), 1-hour average, dissolved ; Toxicity freshwater aquatic life
						(2) 5,000	(2) California Secondary MCL
						(3) 2,000	(3) Water Quality for Agriculture

Notes:

Data source: National Water Quality Monitoring Council (NWQMC). 2017. Black Rascal Creek @ Yosemite Rd (CEDEN-535BRCAYR) Site Data in the Water Quality Portal. https://www.waterqualitydata.us/portal/. Accessed March.

Data sample dates range from May 2006 through August 2014

MCL = maximum contaminant level

NTU = nephelometric turbidity unit

µg/L = micrograms per liter

µmhos/cm = micro mhos per centimeter

USEPA = United States Environmental Protection Agency

WQ = water quality

Appendix E2
California Emissions Estimator Model Output Data

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

BRC_Construction_Aug_2022

San Joaquin Valley Unified APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	300.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2025
Utility Company					
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - project data

Construction Phase - Project specific

Off-road Equipment - Project specific

Off-road Equipment - Project specific

Off-road Equipment - Project specific

Trips and VMT - Project specific

Grading - project specific

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Fleet Mix -

Consumer Products - project information

Area Coating -

Landscape Equipment -

BRC_Construction_Aug_2022 - San Joaquin Valley Unified APCD Air District, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Table Name	Column Name	Default Value	New Value
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstructionPhase	NumDays	4,650.00	65.00
tblConstructionPhase	NumDays	465.00	261.00
tblConstructionPhase	NumDays	180.00	65.00
tblConsumerProducts	ROG_EF	2.14E-05	0
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	0
tblConsumerProducts	ROG_EF_PesticidesFertilizers	5.152E-08	0
tblGrading	AcresOfGrading	1,827.00	300.00
tblGrading	AcresOfGrading	32.50	0.00
tblLandUse	LotAcreage	0.00	300.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	23.00	10.00
tblTripsAndVMT	WorkerTripNumber	50.00	30.00
tblTripsAndVMT	WorkerTripNumber	0.00	10.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2024	0.8478	7.3823	5.4672	0.0176	1.9773	0.2921	2.2694	1.0074	0.2690	1.2763	0.0000	1,542.9183	1,542.9183	0.4897	6.3000e-004	1,555.3482
2025	0.5826	4.9789	3.7128	0.0124	1.7368	0.1962	1.9330	0.8776	0.1807	1.0583	0.0000	1,087.2498	1,087.2498	0.3445	4.3000e-004	1,095.9902
Maximum	**0.8478**	**7.3823**	**5.4672**	**0.0176**	**1.9773**	**0.2921**	**2.2694**	**1.0074**	**0.2690**	**1.2763**	**0.0000**	**1,542.9183**	**1,542.9183**	**0.4897**	**6.3000e-004**	**1,555.3482**

Date: 8/30/2022 11:37 AM

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2024	0.8478	7.3823	5.4672	0.0176	1.9773	0.2921	2.2694	1.0074	0.2690	1.2763	0.0000	1,542.9165	1,542.9165	0.4897	6.3000e-004	1,555.3464
2025	0.5826	4.9789	3.7128	0.0124	1.7368	0.1962	1.9330	0.8776	0.1807	1.0583	0.0000	1,087.2486	1,087.2486	0.3445	4.3000e-004	1,095.9890
Maximum	**0.8478**	**7.3823**	**5.4672**	**0.0176**	**1.9773**	**0.2921**	**2.2694**	**1.0074**	**0.2690**	**1.2763**	**0.0000**	**1,542.9165**	**1,542.9165**	**0.4897**	**6.3000e-004**	**1,555.3464**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
9	4-1-2024	6-30-2024	1.0812	1.0812
10	7-1-2024	9-30-2024	3.8487	3.8487
11	10-1-2024	12-31-2024	3.2350	3.2350
12	1-1-2025	3-31-2025	2.7719	2.7719
13	4-1-2025	6-30-2025	2.8026	2.8026
		Highest	3.8487	3.8487

2.2 Overall Operational

Unmitigated Operational

BRC_Construction_Aug_2022 - San Joaquin Valley Unified APCD Air District, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Clearing	Site Preparation	4/1/2024	6/28/2024	5	65	
2	Earthwork	Grading	7/1/2024	6/30/2025	5	261	
3	Structure	Building Construction	7/1/2024	9/27/2024	5	65	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 300

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Clearing	Excavators	1	8.00	158	0.38
Site Clearing	Off-Highway Trucks	4	8.00	402	0.38
Site Clearing	Off-Highway Trucks	2	8.00	402	0.38
Site Clearing	Rubber Tired Dozers	1	8.00	247	0.40
Site Clearing	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Earthwork	Graders	2	8.00	187	0.41
Earthwork	Off-Highway Trucks	4	8.00	402	0.38
Earthwork	Off-Highway Trucks	2	8.00	402	0.38
Earthwork	Plate Compactors	4	8.00	8	0.43
Earthwork	Rubber Tired Dozers	4	8.00	247	0.40
Earthwork	Scrapers	4	8.00	367	0.48
Structure	Graders	1	8.00	187	0.41
Structure	Off-Highway Trucks	1	8.00	402	0.38
Structure	Off-Highway Trucks	2	8.00	402	0.38
Structure	Rollers	1	8.00	80	0.38
Structure	Tractors/Loaders/Backhoes	1	8.00	97	0.37

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Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Clearing	9	10.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Earthwork	20	30.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Structure	6	10.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Clearing - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1957	0.0000	0.1957	0.1076	0.0000	0.1076	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1300	0.9732	0.9143	3.1300e-003		0.0382	0.0382		0.0352	0.0352	0.0000	274.5243	274.5243	0.0888	0.0000	276.7440
Total	**0.1300**	**0.9732**	**0.9143**	**3.1300e-003**	**0.1957**	**0.0382**	**0.2339**	**0.1076**	**0.0352**	**0.1427**	**0.0000**	**274.5243**	**274.5243**	**0.0888**	**0.0000**	**276.7440**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2300e-003	8.5000e-004	0.0106	3.0000e-005	4.0400e-003	2.0000e-005	4.0600e-003	1.0700e-003	2.0000e-005	1.0900e-003	0.0000	3.0957	3.0957	7.0000e-005	8.0000e-005	3.1207
Total	**1.2300e-003**	**8.5000e-004**	**0.0106**	**3.0000e-005**	**4.0400e-003**	**2.0000e-005**	**4.0600e-003**	**1.0700e-003**	**2.0000e-005**	**1.0900e-003**	**0.0000**	**3.0957**	**3.0957**	**7.0000e-005**	**8.0000e-005**	**3.1207**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1957	0.0000	0.1957	0.1076	0.0000	0.1076	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1300	0.9732	0.9143	3.1300e-003		0.0382	0.0382		0.0352	0.0352	0.0000	274.5240	274.5240	0.0888	0.0000	276.7437
Total	**0.1300**	**0.9732**	**0.9143**	**3.1300e-003**	**0.1957**	**0.0382**	**0.2339**	**0.1076**	**0.0352**	**0.1427**	**0.0000**	**274.5240**	**274.5240**	**0.0888**	**0.0000**	**276.7437**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2300e-003	8.5000e-004	0.0106	3.0000e-005	4.0400e-003	2.0000e-005	4.0600e-003	1.0700e-003	2.0000e-005	1.0900e-003	0.0000	3.0957	3.0957	7.0000e-005	8.0000e-005	3.1207
Total	**1.2300e-003**	**8.5000e-004**	**0.0106**	**3.0000e-005**	**4.0400e-003**	**2.0000e-005**	**4.0600e-003**	**1.0700e-003**	**2.0000e-005**	**1.0900e-003**	**0.0000**	**3.0957**	**3.0957**	**7.0000e-005**	**8.0000e-005**	**3.1207**

3.3 Earthwork - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.7489	0.0000	1.7489	0.8911	0.0000	0.8911	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.6384	5.8461	3.9632	0.0125		0.2329	0.2329		0.2145	0.2145	0.0000	1,094.8206	1,094.8206	0.3523	0.0000	1,103.6275
Total	**0.6384**	**5.8461**	**3.9632**	**0.0125**	**1.7489**	**0.2329**	**1.9818**	**0.8911**	**0.2145**	**1.1056**	**0.0000**	**1,094.8206**	**1,094.8206**	**0.3523**	**0.0000**	**1,103.6275**

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Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-003	5.1700e-003	0.0648	2.1000e-004	0.0246	1.2000e-004	0.0247	6.5400e-003	1.1000e-004	6.6500e-003	0.0000	18.8597	18.8597	4.3000e-004	4.8000e-004	19.0122
Total	**7.5000e-003**	**5.1700e-003**	**0.0648**	**2.1000e-004**	**0.0246**	**1.2000e-004**	**0.0247**	**6.5400e-003**	**1.1000e-004**	**6.6500e-003**	**0.0000**	**18.8597**	**18.8597**	**4.3000e-004**	**4.8000e-004**	**19.0122**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.7489	0.0000	1.7489	0.8911	0.0000	0.8911	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.6384	5.8461	3.9632	0.0125		0.2329	0.2329		0.2145	0.2145	0.0000	1,094.8193	1,094.8193	0.3523	0.0000	1,103.6262
Total	**0.6384**	**5.8461**	**3.9632**	**0.0125**	**1.7489**	**0.2329**	**1.9818**	**0.8911**	**0.2145**	**1.1056**	**0.0000**	**1,094.8193**	**1,094.8193**	**0.3523**	**0.0000**	**1,103.6262**

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Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-003	5.1700e-003	0.0648	2.1000e-004	0.0246	1.2000e-004	0.0247	6.5400e-003	1.1000e-004	6.6500e-003	0.0000	18.8597	18.8597	4.3000e-004	4.8000e-004	19.0122
Total	**7.5000e-003**	**5.1700e-003**	**0.0648**	**2.1000e-004**	**0.0246**	**1.2000e-004**	**0.0247**	**6.5400e-003**	**1.1000e-004**	**6.6500e-003**	**0.0000**	**18.8597**	**18.8597**	**4.3000e-004**	**4.8000e-004**	**19.0122**

3.3 Earthwork - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.7128	0.0000	1.7128	0.8712	0.0000	0.8712	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.5758	4.9744	3.6543	0.0122		0.1961	0.1961		0.1806	0.1806	0.0000	1,069.4426	1,069.4426	0.3441	0.0000	1,078.0453
Total	**0.5758**	**4.9744**	**3.6543**	**0.0122**	**1.7128**	**0.1961**	**1.9088**	**0.8712**	**0.1806**	**1.0518**	**0.0000**	**1,069.4426**	**1,069.4426**	**0.3441**	**0.0000**	**1,078.0453**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.8000e-003	4.4600e-003	0.0585	1.9000e-004	0.0241	1.1000e-004	0.0242	6.3900e-003	1.0000e-004	6.4900e-003	0.0000	17.8073	17.8073	3.8000e-004	4.3000e-004	17.9450
Total	**6.8000e-003**	**4.4600e-003**	**0.0585**	**1.9000e-004**	**0.0241**	**1.1000e-004**	**0.0242**	**6.3900e-003**	**1.0000e-004**	**6.4900e-003**	**0.0000**	**17.8073**	**17.8073**	**3.8000e-004**	**4.3000e-004**	**17.9450**

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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.7128	0.0000	1.7128	0.8712	0.0000	0.8712	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.5758	4.9744	3.6543	0.0122		0.1961	0.1961		0.1806	0.1806	0.0000	1,069.4413	1,069.4413	0.3441	0.0000	1,078.0440
Total	**0.5758**	**4.9744**	**3.6543**	**0.0122**	**1.7128**	**0.1961**	**1.9088**	**0.8712**	**0.1806**	**1.0518**	**0.0000**	**1,069.4413**	**1,069.4413**	**0.3441**	**0.0000**	**1,078.0440**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.8000e-003	4.4600e-003	0.0585	1.9000e-004	0.0241	1.1000e-004	0.0242	6.3900e-003	1.0000e-004	6.4900e-003	0.0000	17.8073	17.8073	3.8000e-004	4.3000e-004	17.9450
Total	**6.8000e-003**	**4.4600e-003**	**0.0585**	**1.9000e-004**	**0.0241**	**1.1000e-004**	**0.0242**	**6.3900e-003**	**1.0000e-004**	**6.4900e-003**	**0.0000**	**17.8073**	**17.8073**	**3.8000e-004**	**4.3000e-004**	**17.9450**

3.4 Structure - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0694	0.5561	0.5035	1.6900e-003		0.0208	0.0208		0.0192	0.0192	0.0000	148.5223	148.5223	0.0480	0.0000	149.7232
Total	**0.0694**	**0.5561**	**0.5035**	**1.6900e-003**		**0.0208**	**0.0208**		**0.0192**	**0.0192**	**0.0000**	**148.5223**	**148.5223**	**0.0480**	**0.0000**	**149.7232**

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Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2300e-003	8.5000e-004	0.0106	3.0000e-005	4.0400e-003	2.0000e-005	4.0600e-003	1.0700e-003	2.0000e-005	1.0900e-003	0.0000	3.0957	3.0957	7.0000e-005	8.0000e-005	3.1207
Total	**1.2300e-003**	**8.5000e-004**	**0.0106**	**3.0000e-005**	**4.0400e-003**	**2.0000e-005**	**4.0600e-003**	**1.0700e-003**	**2.0000e-005**	**1.0900e-003**	**0.0000**	**3.0957**	**3.0957**	**7.0000e-005**	**8.0000e-005**	**3.1207**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0694	0.5561	0.5035	1.6900e-003		0.0208	0.0208		0.0192	0.0192	0.0000	148.5221	148.5221	0.0480	0.0000	149.7230
Total	**0.0694**	**0.5561**	**0.5035**	**1.6900e-003**		**0.0208**	**0.0208**		**0.0192**	**0.0192**	**0.0000**	**148.5221**	**148.5221**	**0.0480**	**0.0000**	**149.7230**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2300e-003	8.5000e-004	0.0106	3.0000e-005	4.0400e-003	2.0000e-005	4.0600e-003	1.0700e-003	2.0000e-005	1.0900e-003	0.0000	3.0957	3.0957	7.0000e-005	8.0000e-005	3.1207
Total	**1.2300e-003**	**8.5000e-004**	**0.0106**	**3.0000e-005**	**4.0400e-003**	**2.0000e-005**	**4.0600e-003**	**1.0700e-003**	**2.0000e-005**	**1.0900e-003**	**0.0000**	**3.0957**	**3.0957**	**7.0000e-005**	**8.0000e-005**	**3.1207**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.505022	0.051937	0.170337	0.165963	0.030143	0.007880	0.013096	0.025463	0.000664	0.000317	0.023954	0.001505	0.003719

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix E3
Project Photographs

Photo 1. Southwestern corner of Project footprint looking southeast along East Yosemite Avenue. Location of the proposed, spillways, and southern embankment.

Photo 2. Fairfield Canal at the western edge of the Project footprint, looking north. Location of the proposed western embankment.

Photo 3. Project footprint with view of the proposed north basin, looking north. Proposed location of the north basin and aquatic and riparian habitat enhancement.

Photo 4. Project footprint with view of the orchard within the proposed south basin, looking east.

Photo 5. Northern boundary of the Project footprint, looking east.

Appendix E4
Biological Assessment

Black Rascal Creek Flood Control Project, Merced County, California

Biological Assessment

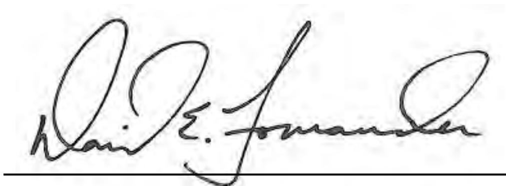
Final

September 2021

Natural Resources Conservation Service

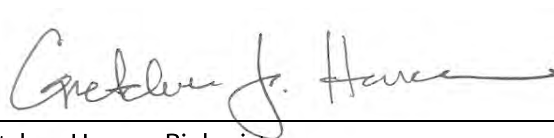
Technical Certification

Prepared by:



David E. Fornander, Biologist

March 2021
Date



Gretchen Herron, Biologist

March 2021
Date

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Acronyms and Abbreviations

2D	two-dimensional
BA	biological assessment
BMP	best management practice
CDFW	California Department of Fish and Wildlife
CFS	Conservancy fairy shrimp
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CTS	California tiger salamander
CV DPS	Central Valley Distinct Population Segment
DOSD	Division of Safety of Dams
EFH	Essential Fish Habitat
EFHA	Essential Fish Habitat Assessment
ESA	federal Endangered Species Act of 1973, as amended
FR	*Federal Register*
H:V	horizontal to vertical
MSA	Magnuson-Stevens Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resource Conservation Service
PMF	probable maximum flood
Project	Black Rascal Creek Flood Control Project
SJKF	San Joaquin kit fox
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
VPFS	vernal pool fairy shrimp
VPTS	vernal pool tadpole shrimp

1. Introduction

1.1 Background and Need

In accordance with Section 7(a)(2) of the federal Endangered Species Act of 1973, as amended (ESA), Jacobs has prepared this biological assessment (BA) for Merced County and the Natural Resource Conservation Service (NRCS) to evaluate the potential effects on threatened and endangered species, and their critical habitat, that may occur as a result of proposed construction activities for the Black Rascal Creek Flood Control Project (Project; Project area 296 acres) in Merced County, California (Appendix A, Figure 1).

The purpose of the Project is to provide flood attenuation and protection for up to a 200-year storm event within the Black Rascal Creek watershed (Appendix A, Figure 2). The Project is needed to reduce downstream peak flows entering Bear Creek, reducing the frequency, severity, and risk of flooding, property damage, and loss of life within the city of Merced and Merced County. Flooding in the region is typically caused by infrequent, severe winter storms in combination with snowmelt runoff from the Sierra Nevada foothills.

In the last century, the city of Merced has flooded in 1937, 1950, 1955, 1969, 1997, 1998, 2001, 2002, 2005, and 2006 (FEMA 2010, Patchett 2012). Many of these floods occurred during periods of El Niño, which often bring higher-than-average levels of precipitation to many parts of California, resulting in increased risk and severity of flood events (NOAA, 2014). The most damaging flood in Merced County in recent history occurred in 2006, when two levees on Black Rascal Creek failed near the confluence of Bear Creek and consequently flooded several housing developments and farmland. Earthen levees on both sides of Black Rascal Creek were weakened after 4 inches of rain in 24 hours; 200 people were evacuated from a flooded trailer park and 100 homes were evacuated, displacing approximately 600 people (DWR 2013). The damage cost residents, business owners, and government more than $12 million (MCAG n.d.).

The possibility of flooding during storm events and the likelihood of increased frequency and severity of El Niño events due to changing climatic conditions (Cai et al. 2014) require that more effective flood control measures be implemented throughout Merced County. The Project will construct and operate a detention basin within the Black Rascal Creek watershed to provide floodproofing and reduce floodwater and related damages to the city of Merced and surrounding areas.

The Project goals are as follows:

- Substantially reduce downstream flooding along Bear Creek and provide flood protection for public safety, particularly in disadvantaged communities (for example, Franklin and Beachwood)
- Minimize property damage caused by flooding on residential and prime agricultural lands
- Improve water quality by minimizing erosion and sedimentation
- Improve recharge of the groundwater basin within the Project area

The proposed action will require permitting by U.S. Army Corps of Engineers (USACE) under the Clean Water Act. A USACE Section 404 permit will be secured before initiating work with the potential to result in fill to jurisdictional wetlands or waters of the United States. Issuance of a USACE permit is a separate federal action not included within this BA. In accordance with the ESA, USACE must also consult with National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) to ensure that any action it initiates or permits is not likely to jeopardize the continued existence of a species or result in the destruction or adverse modification of habitat federally designated as critical. This BA is intended to fulfill consultation requirements for Merced County, NRCS, and USACE under the ESA.

Additionally, the Magnuson-Stevens Act (MSA) requires consultation for actions that may adversely affect Essential Fish Habitat (EFH), including actions outside EFH, such as upstream/upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of location.

A separate, "no-effect" determination was made for all listed species and critical habitat that are under the jurisdiction of NMFS and may potentially occur in the general vicinity (such as, California Central Valley steelhead [*Oncorhynchus mykiss*]*)*. A separate stand-alone EFH Assessment (EFHA) for Pacific Chinook salmon was also developed to address effects that may occur on EFH as a result of the proposed action and to meet requirements under the MSA. The EFHA determined the Project would result in no adverse effect on EFH. Neither the no-effect determination for species under NMFS jurisdiction nor the EFHA is discussed further in this BA.

USFWS-listed threatened and endangered species known to occur in the area, as well as their critical habitat, are evaluated and addressed in this BA. Specific effects on these resources that are anticipated to occur as a result of the proposed action and appropriate conservation measures are described in the following sections.

1.2 Federal Endangered Species Act Action Area

"Action area" refers to areas affected directly or indirectly by the federal action, and not merely the immediate area involved in the action (50 *Code of Federal Regulations* 402.02). This may include upland, riparian, and aquatic areas affected by site preparation, construction, and site restoration design criteria at each action site. The ESA action area, therefore, extends to where direct or secondary (indirect) impacts could occur from the proposed replacement project. The action area for the Project extends 500 feet from the Project area (including staging areas and access routes) and includes effects that may occur on habitat as a result of altered Project hydrology.

1.3 Species with Potential to Occur in the Action Area

Merced County is requesting consultation with USFWS regarding nine federally listed species in this BA (Table 1):

- San Joaquin kit fox (SJKF) (*Vulpes macrotis mutica*)
- California tiger salamander (CTS), Central Valley Distinct Population Segment (Central Valley Distinct Population Segment [CV DPS}) (*Ambystoma californiense*)
- conservancy fairy shrimp (CFS) (*Branchinecta conservatio*)
- vernal pool fairy shrimp (VPFS) (*Branchinecta lynchi*)
- vernal pool tadpole shrimp (VPTS) (*Lepidurus packardi*)
- Colusa grass (*Neostapfia colusana*)
- fleshy owl's-clover (*Castilleja campestris* ssp. *succulenta*)
- hairy Orcutt grass (*Orcuttia pilosa*)
- San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*)

These are the only species under the jurisdiction of USFWS determined to have the potential to occur within the action area. The following six species were determined to have no potential to occur onsite or within the action area:

- blunt-nosed leopard lizard (*Gambelia silus*) – endangered
- giant garter snake (*Thamnophis gigas*) – threatened
- California red-legged frog (*Rana aurora draytonii*) – threatened
- delta smelt (*Hypomesus transpacificus*) – threatened
- valley elderberry longhorn beetle (*Desmocerus californicus*) – threatened
- Keck's checkermallow (*Sidalcea keckii*) – endangered

No critical habitat for any USFWS species is designated within the Project action area (USFWS 2021). Justification for dismissal of other USFWS species and designated critical habitat identified on the Information for Planning and Consultation Resource List (USFWS 2021) is described in Section 4.

Table 1. Federally Listed Threatened, Endangered, or Candidate Species with Potential to Occur within the Action Area

Species (Distinct Population Segment)	Listing Status
San Joaquin kit fox (*Vulpes macrotis mutica*)	Endangered March 1967 (32 FR 4001)
California tiger salamander, CV DPS (*Ambystoma californiense*)	Threatened April 2004 (69 FR 47212)
Conservancy fairy shrimp (*Branchinecta conservatio*)	Endangered September 1994 (59 FR 48136)
vernal pool fairy shrimp (*Branchinecta lynchi*)	Threatened September 1994 (59 FR 48136)
vernal pool tadpole shrimp (*Lepidurus packardi*)	Endangered September 1994 (59 FR 48136)
Colusa grass (*Neostapfia colusana*)	Threatened March 1997 (63 FR 54975)
fleshy owl's-clover (*Castilleja campestris* ssp. *succulenta*)	Threatened March 1997 (62 FR 14338)
hairy Orcutt grass (*Orcuttia pilosa*)	Endangered March 1997 (62 FR 14338)
San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*)	Threatened March 1997 (58 FR 14338)

Note:
FR = *Federal Register*

2. Project Description

This section describes the Project, including best management practices (BMPs) and conservation measures that will be incorporated to minimize potential effects on ESA-listed species.

2.1 Project Location

The Black Rascal Creek Flood Control Project is located in Merced County within the Black Rascal Creek watershed, approximately 2 miles northeast of the city of Merced (Appendix A, Figure 1). The Project is on the Merced 7.5-minute U.S. Geological Survey quadrangle, in Township 7 South, Range 14 East, Section 12 (latitude 37°19′56.27″N and longitude 120°23′39.45″W). The Project includes a portion of Black Rascal Creek approximately 1.3 miles upstream of its confluence with Bear Creek. The anticipated beneficiaries from the Project include the communities of Merced County and city of Merced, which are currently affected by the overtopping of Black Rascal Creek during flood conditions.

2.2 Proposed Action

2.2.1 Project Features

The Project consists of a new embankment system to create a flood control detention basin that includes oak savannah, aquatic, and riparian enhancement (including secondary and tributary habitat channels) immediately upstream from the relocated diversion channel, which is a State Plan of Flood Control facility. The detention basin will temporarily detain a 200-year storm event and limit flow in the diversion channel to 3,000 cubic feet per second (cfs), thereby reducing peak flows in Bear Creek and the flooding along the old Black Rascal Creek channel that flows through the city of Merced. Design drawings for the proposed Project features are provided in Appendix B, Design Drawings. The Project consists of the following features as identified in Appendix A, Figure 3.

2.2.2 Detention Basin

An approximate 300-acre flood control detention basin created by an embankment aligned adjacent to the Merced Irrigation District Fairfield Canal and East Yosemite Avenue will be operated to accommodate a 200-year storm event and will limit flow in the diversion channel to 3,000 cfs. An almond *(Prunus dulcis* = *Prunus amygdalus*) orchard currently occupies approximately 230 acres of the proposed detention basin site.

The proposed detention basin will be created by constructing embankments on two sides of the Project inundation area, creating an L-shape with the upstream extent open to stormwater flows. The western side of the basin is bound by the Merced Irrigation District Fairfield Canal; the southern side of the basin is bound by East Yosemite Avenue; and the eastern side of the basin will remain in its current condition and is bordered by North Arboleda Drive. The western embankment extends to the north where it ties into existing grade. The southern embankment ends at a point where the embankment transitions into the existing grade near the intersection of East Yosemite Avenue and North Arboleda Drive.

The existing State Plan of Flood Control levee within the proposed detention basin would be modified to allow stormwater to occupy the south basin.

The embankments will be constructed as a homogeneous clay fill from onsite native materials (see Section 2.2.12 Use and Disposal of Excavated Materials). The seepage through the clay embankment will not develop a steady-state condition because of a short water retention period of only 1 to 2 days in the flood control basin. Only the interior surface of the embankment will become saturated to a limited depth during a storm event. Interior cores, drains, or seepage protection features are unnecessary because of the short retention period and because the native clay soil has a low hydraulic conductivity.

The upper native soil is likely to contain organics from cultivation activity, and at least 12 inches will be stripped from the area beneath the embankment prior to fill placement. The exposed soil will then be moisture conditioned and compacted to prepare for fill placement. A key trench will be excavated and backfilled with clay fill material beneath the center of the embankment. The key trench will limit underseepage by interrupting seepage paths beneath the embankment and allow observation of anomalies in the foundation conditions. The key trench will be 12 feet wide and 6 feet deep with maximum excavation slopes of 1H:1V (horizontal to vertical [H:V]).

Embankments will have a 12-foot-wide, gravel-surfaced top width with side slopes set at 3H:1V. The height of the embankment ranges from zero where it ties into existing ground at the northwestern corner to a maximum of approximately 21 feet near the proposed outlet structure; the majority of embankments are approximately 14 feet high.

2.2.3 Spillway

A 350-foot-long spillway crest sized for the probable maximum flood (PMF) will be constructed and is located adjacent to the proposed outlet structure.

The proposed spillway was designed to meet design requirements specified by California Department of Water Resources Division of Safety of Dams (DSOD) for jurisdictional dams. According to DSOD, the spillway must be sized to pass the PMF while providing at least 1.5 feet of residual freeboard below the embankment crest. The embankment height was determined based on the following minimum freeboard requirement during the PMF:

- 4 feet normal freeboard from the spillway crest to the embankment crest; or
- 1.5 feet freeboard above the maximum PMF water surface to the embankment crest

The spillway crest height was set 0.1 foot above the 200-year storm design water surface elevation. The spillway length was determined by analyzing different spillway lengths and the associated costs for construction of the spillway and their corresponding embankments. Using this relationship, an optimized spillway length of 350 feet was selected. The spillway is in line with the embankment at the southwestern corner of the detention basin, near the outlet structure.

The 350-foot-long spillway structure replaces a portion of the embankment with a cast-in-place reinforced concrete slab supporting a reinforced concrete ogee crest, chute blocks, and a dentated endsill. Cutoff walls will be placed at the upstream and downstream concrete extents of the spillway to protect against local scour and channel degradation. Riprap will also be placed at the downstream end of the spillway to prevent scour and reduce the water velocity. At each end of the spillway, a cast-in-place reinforced concrete cantilever retaining wall will retain the embankment fill and live load surcharge.

Stability of the spillway in sliding, overturning, and seepage was evaluated in accordance with methodology in USACE guidance document EM 1110-2-2100. The spillway was found to be stable for static and seismic loading. The largest differential water load on the structure occurs at the 200-year design storm event with water retained to the top of the spillway crest. The differential water level across the spillway becomes less with increased water height due to the tailwater level rising more than the subsequent increases in retained water level.

The seismic loads are assumed to occur while there is no water retained by the embankment. According to EM 1110-2-2100, seismic loads should be combined with coincident pool, which is defined as the elevation that the water is expected to be at or below for half of the time during each year. Earthquake loading was therefore applied to the spillway structure in a dry condition with no floodwater retained.

2.2.4 Outlet Structure

An at-grade, ungated, 20-foot-wide open outlet channel constriction (outlet structure) sized to limit flows in the Black Rascal Creek diversion channel to 3,000 cfs at the peak of a 200-year storm event will be constructed adjacent to the main spillway.

The structure will consist of a continuous cast-in-place reinforced concrete slab/footing with two cast-in-place reinforced concrete cantilever retaining walls spaced 20 feet apart. Each of the retaining walls has two 33-foot-long wing walls that gradually flare outward for a more efficient flow section on the northern side of the constriction. The retaining walls will retain the full height of soil embankments along with a live load surcharge. Between the two walls will be a cast-in-place concrete slab matching the existing downstream flowline of the diversion channel along with cutoff walls at each end to protect against local scour and channel degradation.

The back side of the retaining walls will be designed with cutoffs to create a tortuous seepage path behind the wall and limit erosion from seepage through the drain rock behind the walls during high flows. Weep holes will be placed in the concrete walls 3 inches above the invert of the concrete slab to prevent hydrostatic buildup behind the walls. The walls will be checked for sliding, overturning, and bearing-capacity failures in accordance with the USACE design manual for retaining structures (USACE 2005).

2.2.5 Aquatic and Riparian Habitat Enhancement

Aquatic and riparian habitat enhancement in the north basin will reconnect the Black Rascal Creek tributary habitat channel and establish a secondary habitat channel to reconnect floodplains associated with Black Rascal Creek (Appendix A, Figure 3).

The tributary habitat channel will be graded to reactivate an abandoned tributary of Black Rascal Creek north of the basin. The channel will convey flow through the basin and intersect Black Rascal Creek near the downstream end of the Project. The tributary habitat channel will be approximately 2,430 feet long and range from 100 to 290 feet wide at the top of bank. It is anticipated that approximately 8.1 acres of intermittent stream channel and associated riparian habitat will be restored/established. It is anticipated that the margins of the channel will support emergent wetland vegetation such as cattail (*Typha* sp.) and bulrush (*Schoenoplectus* spp.). Riparian trees such as willow (*Salix* spp.) and cottonwood (*Populus fremontii*) will be planted along the tributary channel banks.

A secondary habitat channel will be graded to convey stormflows from the main Black Rascal Creek channel through the north basin. The secondary habitat channel will be activated at approximately a 2-year storm event. The secondary habitat channel will be approximately 2,230 feet long and range from 60 to 275 feet wide at the top of bank. It is anticipated that approximately 9.7 acres of floodplain habitat will be restored/enhanced and that the secondary channel will support riparian vegetation such as willow shrubs and mulefat (*Baccharis salicifolia*). Riparian trees such as willow, cottonwood, and valley oak (*Quercus lobata*) will be planted along the secondary channel banks.

2.2.6 Drainage Facilities

Drainage facilities (that is, culverts, headwalls, and end treatments) will be included at three locations: the northwestern corner of the Project, the western bank of Black Rascal Creek south of the outlet structure, and the eastern bank of Black Rascal Creek south of the outlet structure. California Department of Transportation requires a minimum pipe diameter of 12 inches for pipes that do not cross under a roadway in accordance with their Highway Design Manual. Merced County Improvement Standards require storm drainage system pipes to be a minimum of 15 inches. The minimum drainage pipe diameter for the Project was set to 24 inches to minimize blockage potential and decrease culvert headwater, which reduces the risk of failure on embankments the culverts pass through. The size and quantity of culvert pipes located in the northwestern corner of the Project were determined using the HEC-HMS hydrologic model, and the pipe material was selected based on best practices. The size of the culvert pipes located on the eastern and western banks of Black Rascal Creek south of the outlet structure was determined by calculating their respective peak discharge using the Rational Method in the Highway Design Manual while considering the set minimum drainage diameter for the Project. The material for the culvert pipes located on the eastern and western banks of Black Rascal Creek south of the outlet structure was selected in accordance with Merced County Improvement Standards.

Culverts with flap gates included in the Project are as follows:

- Three 36-inch cement mortar-lined and -coated steel pipe culverts with flap gates will be included at the northwestern corner of the Project to alleviate ponding on the northwestern side of the Project beyond the embankment. The invert elevations of the culverts will be at grade to allow flow into the basin by gravity once the basin water level attenuates.
- One 24-inch reinforced concrete pipe culvert with flap gate will be included on the western bank of Black Rascal Creek south of the outlet structure to allow for drainage from a swale located between the western embankment and the Fairfield Canal to Black Rascal Creek.
- One 24-inch reinforced concrete pipe culvert with flap gate will be included on the eastern bank of Black Rascal Creek south of the outlet structure to allow for drainage from the area located between East Yosemite Avenue and the spillway to Black Rascal Creek.

2.2.7 Inundation Durations

Based on two-dimensional (2D) hydrologic models, under Project conditions, it is expected that during the rainy season, some portion of the north basin will impound water during a 2-year storm event, with inundation of the south basin expanding as flood return events increase. Appendix A, Figure 2 shows the expected inundation areas for the 200-year storm event under the Project. Existing conditions and proposed conditions for the 10-, 50-, 100-, and 200-year events are discussed in Section 3.2. Table 2 lists the approximate duration that flows will be detained and released from the detention basin(s) once filled, for different magnitude storm events.

Table 2. Anticipated Duration of Flood Retention by Storm Events

Storm Event	North Basin	South Basin	Area North of Basin
2-year	40 hours	No inundation	3 to 40 hours
5-year	42 hours	2 to 10 hours	8 to 41 hours
10-year	44 hours	3 to 14 hours	8 to 41 hours
25-year	48 hours	3 to 30 hours	16 to 41 hours
50-year	48 hours	4 to 31 hours	18 to 41 hours
100-year	48 hours	4 to 32 hours	20 to 41 hours
200-year	48 hours	6 to 33 hours	20 to 41 hours

2.2.8 Maintenance Activity

Maintenance activities will include vegetation management, embankment and structure maintenance and inspection activities, and management of sediment and debris deposited in the basin, as needed. Sediment will be removed during dry periods when rubber or tracked earthmoving equipment can access the detention basin. Most sediment originating upstream is projected to flow through the Project area because flows of less than 3,000 cfs are not detained. Sediment will be disposed of in an approved location within the Project limits.

2.2.9 Project Construction

Construction of the detention basin will include the following four primary activities and facilities:

- General – Mobilization, clearing and grubbing, topsoil stripping, and excavation of embankment borrow material
- Embankment – Construction of the embankment including foundation preparation, embankment construction, and slope protection
- Spillway– Construction of the spillway including concrete work
- Outlet works – Installation of outlet structure including concrete work

The total estimated duration for Project construction is 18 months, assuming consecutive construction of the four activities and facilities. The total area of disturbance is anticipated to approximately 300 acres.

2.2.10 Work Areas

Work areas during construction will be limited to the Project site. Construction equipment will remain onsite during construction, and equipment staging will occur within the Project site. Access to the Project site will be from East Yosemite Avenue.

2.2.11 Use and Disposal of Excavated Material

The north basin will be excavated for habitat channels and the relocation of Black Rascal Creek, and the area south of the relocated creek will be regraded, including grading of the existing levee, which will provide borrow material for the embankment construction. A 6-acre borrow area between the habitat channels has been optimized to provide earthwork balance. Stripped topsoil will be stockpiled and then replaced on embankment slopes and graded areas outside of drainage channels. Table 3 shows the approximate earthwork quantities.

Table 3. Approximate Earthwork Quantities

Description	Quantity (cubic yards)
Stripping	79,300
Borrow Area (6 acres) Cut	25,600
Habitat Channel Excavation	103,800
Relocated Black Rascal Creek Excavation	38,500
Total Embankment Required	174,000
Gravel Surfacing	1,700

Material generated from the Project that is not suitable for embankment construction (strippings/organics) will be disposed of on the completed engineered embankment slopes. Offsite disposal will not be required.

2.2.12 Construction Personnel and Construction Equipment

A maximum of 30 workers will be onsite during Project construction, with the majority of workers anticipated to be local residents. The construction activities, personnel, and equipment required for the Project are listed in Table 4.

Table 4. Construction Duration, Workforce, and Equipment

Activity	Duration	Personnel Required	Equipment Required
Site Clearing	3 months	8 to 10	1 loader
			2 dozers
			1 excavator
			4 dump trucks
Earthwork	12 months	20 to 30	4 scrapers
			4 bulldozers
			2 excavators
			2 graders
			4 compactors
			4 dump trucks
Structures	3 months	8 to 10	1 grader
			1 roller
			1 backhoe
			1 dump truck
Dust Control	18 months	2	2 water trucks

2.2.13 Construction Schedule

Construction of the detention basin will take approximately 18 months to complete and will occur over a 2-year period during the dry season (April through October). It is assumed that all work will be conducted during the day within a normal 8-hour shift between 7:00 a.m. and 6:00 p.m. Construction is anticipated to commence in April 2022 and be completed by September 2023.

2.3 Conservation Measures and Best Management Practices

To minimize and avoid the effects of the Project on federally listed species and their habitats, conservation measures, BMPs, and avoidance measures will be implemented. These measures are intended to reduce or avoid adverse effects on federally listed species as a result of Project construction and operation (including maintenance activities). Compliance with applicable environmental regulations will further mitigate potential impacts on biological resources.

Compensatory mitigation will be provided where effects on protected species and habitats cannot be avoided. General avoidance, minimization, and compensatory mitigation measures for potential adverse effects on federally listed species are listed below. Species-specific conservation measures are described in more detail in Section 2.3.3.

2.3.1 General Conservation Measures

Merced County will install or perform the following protective measures during construction and site restoration activities, as necessary:

- A worker environmental awareness training program for construction personnel, including contractors, will be conducted before construction begins to inform them of their responsibilities for BMPs and permit conditions for waters of the United States, special-status species, and other sensitive resources.
- All vehicle traffic will occur on established roads or designated temporary construction roadways.
- Construction and stormwater BMPs will be installed in staging areas as needed. Erosion control measures will include the use of hay bales, fiber rolls, silt fences, or other accepted practices to prevent downgradient impacts on Black Rascal Creek and wetland resources.
- During construction, trash and construction debris will be removed from the work areas daily. All food-related trash items, such as wrappers, cans, bottles, and food scraps, will be disposed of in closed containers and removed at the end of each workday from the Project site.
- All fueling and maintenance of vehicles and other equipment will occur at least 66 feet from constructed or natural watercourse and any associated riparian or wetland habitat.
- A spill prevention and countermeasure plan will be developed before Project construction that includes onsite handling rules for avoiding impacts on drainages and waterways. All spills will be cleaned immediately according to the spill prevention and countermeasure plan, and appropriate agencies identified in the plan will be notified of any spills and cleanup activities.
- Existing riparian vegetation that does not present a safety concern will be carefully trimmed to ground level by hand to allow willows and small cottonwoods to re-establish.
- Exclusion fencing will be placed around sensitive habitat resources (such as sensitive habitats that may support federally listed species) and labeled with clearly marked signs and exclusion requirements (Section 2.3.3).
- Excavation and grading operations will be conducted during the drier months of the year, April 15 through October 15. Dates are based on an average year and may need to be adjusted depending on

weather in a given year. Work within the drainages will be restricted to dry periods and when no rain is predicted and no surface runoff is anticipated.

- Any required dewatering activities will be conducted according to the requirements of the Central Valley Regional Water Quality Control Board using appropriate BMPs to protect water quality.
- BMPs will be removed once the area is re-established and no potential for sediment transport exists.
- ESA exclusion fencing will be removed at Project completion.
- All areas of temporary disturbance will be returned to preconstruction conditions upon Project completion.
- All construction debris and replaced construction soil will be hauled offsite to a permitted landfill facility.

2.3.2 Avoidance Minimization Measures

This section describes the following avoidance and minimization measures to minimize and avoid Project effects on federally listed species:

2.3.2.1 Construction Work Window Restrictions

Due to the number of federally listed species potentially affected by the Project and the conflicting potential construction work windows for each species or their habitat, construction work window restrictions will be determined with input from USFWS (Table 5). Since construction work window restrictions may not reduce effects on all federally listed wildlife species, additional measures may be required, as determined by the regulatory agencies. These measures may include provision of non-disturbance zones, additional site- or species-specific biological monitoring, or approved passive or active species relocation.

Table 5. Construction Restrictions and Work Windows

Resource	Construction Restrictions and Work Windows
San Joaquin kit fox	All work will be conducted during the dry season. No construction work windows are provided for SJKF.
California tiger salamander	All work will be conducted during the dry season. Construction activities within 250 feet of potential CTS breeding habitat will be restricted during the wet season (October 15 through April 15 for an average year; may need to be increased or decreased depending on weather in any given year).
Vernal pool-associated species (branchiopods and plants)	All work will be conducted during the dry season. Construction activities within 250 feet of potential vernal pool branchiopods breeding habitat and vernal pool-associated plant species will be restricted during the wet season (October 15 through April 15 for an average year; may need to be increased or decreased depending on weather in any given year).

Construction work window restrictions for special aquatic resources will be implemented to reduce potential direct and indirect effects of construction activities on federally listed species within those habitats. Construction activities in special aquatic resources (such as, vernal pools, seasonal wetlands) will be restricted during the rainy season (October 15 to April 15) or will be conducted when the resource is dry (that is, lacks flowing or standing water). In the event that construction work window restrictions cannot be met, the use of dewatering, water diversions, or additional BMPs will be employed as determined through consultation with USACE, USFWS, California Department of Fish and Wildlife (CDFW), and the Central Valley Regional Water Quality Control Board to enable the subject activity. Additional mitigation measures may be necessary to reduce or lessen the nature and magnitude of significant adverse effects when construction work window restrictions are not feasible (for example, nesting bird surveys, non-disturbance exclusion zones, resource and species monitoring).

2.3.2.2 Pre-construction Surveys

Prior to the start of construction, a qualified biologist(s) will conduct preconstruction survey(s) for federally listed ESA species (wildlife and plants). Preconstruction surveys will be conducted: (1) in general accordance with the appropriate technical guidance documents approved by USACE, USFWS, CDFW, and the California Native Plant Society; and (2) in accordance with standard professional practice. Based on the results of the preconstruction surveys, additional mitigation measures may be implemented, including those discussed below.

2.3.2.3 Worker Environmental Awareness Training

Personnel who work onsite will attend a worker environmental awareness training. The environmental training will cover general and specific biological and legal information on federally listed species and their habitats. The training sessions will be given by the site biological monitor before the initiation of construction activities and repeated, as needed. Daily updates and synopsis of the training will be performed during the daily safety ("tailgate") meeting.

2.3.2.4 Biological Monitoring during Construction Activities

A qualified USFWS-approved biological monitor will be present onsite during key construction activities, including during ground-disturbance activities and for all construction activities conducted within or adjacent to identified Environmentally Sensitive Areas or non-disturbance zones to oversee permit compliance and monitoring efforts. The onsite biologists will advise the contractor on methods that may minimize or avoid impacts on federally listed species.

2.3.2.5 Environmentally Sensitive Areas, Wildlife Exclusion Fencing, and Non-disturbance Zones

Fencing will be used to establish non-disturbance exclusion zones to restrict construction equipment and personnel from entering Environmentally Sensitive Areas or restrict wildlife species from entering the construction areas. Environmentally Sensitive Areas and Environmentally Restricted Areas will include sensitive habitats that may support federally listed species and areas within limits of indirect effect for federally listed species, as identified by the regulatory agencies in their permit documents. The non-disturbance zones will be determined through consultation and permitting with the various natural resources' regulatory agencies. No direct impacts on vernal pool features will result from the proposed Project.

2.3.2.6 Restoration of Temporarily Disturbed Areas

Temporarily disturbed biological communities or habitats that could support federally listed species and special aquatic resources will be restored to pre-Project conditions. Restoration activities will include, but not be limited to, the following: grading landform contours to approximate pre-disturbance conditions, removing invasive plant species and revegetating temporarily disturbed areas using native plant species to the extent possible, and using certified weed-free straw and mulch. A site restoration plan will be prepared to identify appropriate restoration activities, establish a monitoring schedule, describe the materials that should be used, identify timing of the work, identify monitoring requirements and success criteria, and recommend contingency measures.

2.3.2.7 Cleaning of Construction Equipment

During construction, equipment will be washed before entering the work area. Mud and foreign plant materials will be removed from construction equipment when working in native plant communities, near sensitive biological communities, or in areas where special-status plant species have been identified.

2.3.2.8 Dewatering and Water Diversion

If construction occurs where open or flowing water is present, a strategy approved by the resource agencies (for example, USACE, Regional Water Quality Control Board, USFWS) will be used to dewater or divert water from the immediate work area. To avoid and/or minimize potential effects that could result from these activities, the following measures will be implemented:

- Develop and implement a Stormwater Pollution Prevention Plan.
- Temporary construction BMPs will be implemented in accordance with the Project plans and specifications as well as the approved Stormwater Pollution Prevention Plan.
- BMPs may include, but will not be limited to, silt fences, fiber rolls, straw bales, sandbag barriers, check dams, and sediment basins.

2.3.2.9 Avoidance of Federally Listed Species Entrapment

At the end of each work day, all excavated, steep-walled holes or trenches that are more than 2 feet deep will be covered using plywood or similar materials or provided with escape ramps constructed of earthen fill or wooden planks. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. Culverts or similar enclosed structures with a diameter of 4 inches or greater that are stored at a construction site will be inspected for common and special-status wildlife species before the pipe is subsequently used or moved.

2.3.3 Species-specific Conservation Measures

The general conservation measures and avoidance minimization measures discussed in Sections 2.3.1 and 2.3.2 will be implemented to minimize and avoid effects of the Project on federally listed species with potential to occur in the Project area. In addition, the species-specific conservation measures listed below will be implemented to further avoid and minimize potential adverse effect on the identified mammal, amphibian, crustacean (vernal pool branchiopods), and vernal pool-associated plant species.

2.3.3.1 San Joaquin Kit Fox

To minimize and mitigate for potential impacts on SJKF, the measures outlined in the USFWS *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior To or During Ground Disturbance* (USFWS 1999) will be implemented. Adverse effects on SJKF will be mitigated as follows:

- At a minimum, the applicant will conduct preconstruction surveys for dens, burrows, or other subterranean structures (such as, potential dens) that could be occupied by the taxon. The preconstruction surveys will be conducted within no less than 14 days and no more than 30 days prior to the beginning of ground disturbance and/or construction activities. Appropriate exclusion zones around potentially occupied subterranean habitat will then be established where feasible as follows:
  - Potential den – 50 feet
  - Atypical den – 50 feet
  - Known den – 100 feet
  - Natal/Pupping den – CDFW and USFWS must be contacted

- Where infeasible to establish an exclusion zone, activities to limit the destruction of potential dens will occur. This will be accomplished by careful excavation of any potential dens until it is certain that no SJKF are inside. The potential dens will be fully excavated, filled with dirt, and compacted to ensure that individuals cannot re-enter or use the den during the construction period. If at any point during excavation, an individual is discovered inside the den, the excavation activities will cease immediately, and monitoring of the den will be conducted. Destruction of the den will be completed when, in the judgment of the biologist, the individual has escaped, without further disturbance, from the partially destroyed den. Destruction of any known or natal/pupping den requires take authorization from the CDFW and USFWS.

Other applicable mitigation measures that address potential adverse effects on SJKF include the following:

a) Project-related vehicles will observe a daytime speed limit of 20 miles per hour throughout the site in all Project areas, except on Merced County roads and state and federal highways. Night-time construction will be minimized to the extent possible. However, if night-time construction does occur, the speed limit will be reduced to 10 miles per hour. Off-road traffic outside of designated Project areas will be prohibited.

b) All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored at a construction site for one or more overnight periods will be thoroughly inspected for SJKF before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If necessary, and under the direct supervision of a qualified biologist, the pipe may be moved only once to remove it from the path of construction activity, until the individual has escaped.

c) All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in securely closed containers and removed daily from the Project site.

d) No firearms will be allowed on the Project site.

e) No pets, such as dogs or cats, will be permitted on the Project site to prevent the harassment or mortality of SJKF, or destruction of the taxon's dens.

f) Use of rodenticides and herbicides in Project areas will be restricted. This is necessary to prevent primary or secondary poisoning of individuals and the depletion of prey populations on which they depend. All uses of such compounds will observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other state and federal legislation, as well as additional Project-related restrictions deemed necessary by CDFW and USFWS. If rodent control must be conducted, zinc phosphide will be used because of its proven lower risk to SJKF.

g) A representative will be appointed by the applicant (Merced County in coordination with NRCS) who will be the contact source for any employee or contractor who might inadvertently kill or injure an SJKF or who finds a dead, injured, or entrapped individual. The representative will be identified during the employee education program, and their name and telephone number will be provided to CDFW and USFWS.

h) An employee education program will be prepared and delivered to all contractors, their employees, applicant personnel, and/or agency personnel involved in the Project. The program will consist of a brief presentation by persons knowledgeable in SJKF biology and legislative protection to explain endangered species concerns. The program, at a minimum, will include the following:

   i) Description of the SJKF and its habitat needs

   ii) Description of known occurrences of SJKF in the Project area

iii) Explanation of the status of the taxon and its protection under the State Endangered Species Act and ESA

iv) List of measures being taken to reduce adverse effects on the taxon during Project construction and implementation

A fact sheet conveying the above information will be prepared for distribution to the previously referenced people and anyone else who may enter the Project site.

i) Upon completion of the Project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, and pipeline corridors, will be re-contoured if necessary and revegetated to promote restoration of the area to pre-Project conditions. An area subject to “temporary” disturbance means any area that is disturbed during the Project, but after Project completion will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas will be determined on a site-specific basis in consultation with CDFW and USFWS.

j) In the case of trapped animals, escape ramps or structures will be installed immediately to allow the animal(s) to escape, and CDFW and USFWS will be contacted.

k) Any contractor, employee, or applicant or agency personnel who is responsible for inadvertently killing or injuring an SJKF must immediately report the incident to their representative. The representative will contact USFWS and CDFW immediately in the case of a dead, injured, or entrapped SJKF. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045.

l) The Sacramento Fish and Wildlife Office and CDFW will be notified in writing within 3 working days of the accidental death or injury to an SJKF during Project-related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured individual, and any other pertinent information. The USFWS contact is the Chief of the Division of Endangered Species.

m) New sightings of SJKF will be reported to the California Natural Diversity Database (CNDDB). A copy of the reporting form and a topographic map clearly marked with the location where the SJKF was observed will also be provided to USFWS at the following address: Endangered Species Division, 2800 Cottage Way, Suite W2605, Sacramento, California 95825-1846.

2.3.3.2 California Tiger Salamander

In addition to measures outlined above, the following species-specific conservation measures will be implemented to further avoid and minimize adverse effects on CTS and their habitat that may occur as a result of the proposed action:

a) Preconstruction surveys will be conducted prior to any construction activity.

b) An Incidental Take Permit will be obtained, in accordance with Section 2081(b) of the California Fish and Game Code, if necessary, or with USFWS, in accordance with Section 7 of the ESA.

c) Compensatory habitat mitigation from an approved conservation bank or other restoration/enhancement measures will be implemented as determined necessary with USACE, USFWS, and CDFW.

d) Construction activities within 250 feet of potential CTS breeding habitat will be restricted during the wet season (October 15 through April 15).

e) Establishment of a 250-foot non-disturbance exclusion zone around potential CTS breeding habitat during the wet season will occur; fencing will comprise a combination of both (i) Environmentally Sensitive Area high-visibility construction fencing, and (ii) wildlife exclusion fencing.

f) Non-disturbance exclusion zones will be maintained and monitored by a qualified biologist(s) to ensure that no take of CTS or destruction of suitable habitat occurs outside of the limit identified through consultation with USFWS.

g) If required, mitigation credits for temporary impact to CTS upland dispersal habitat (non-native grassland 1.60 acres) and permanent impact to potential CTS breeding habitat (0.198 acre) will be purchased from an approved CTS mitigation bank.

h) If construction activities within 250 feet of potential CTS breeding habitat cannot be avoided during the wet season, the following steps will be taken:

   - Preconstruction wet-season surveys of potential breeding habitat will be conducted within the limit of direct effect.
   - If CTS are found onsite, adults/juveniles/egg masses will be relocated from affected areas to USFWS-approved locations.

2.3.3.3 Vernal Pool Branchiopods

In addition to measures outlined above, the following species-specific conservation measures will be implemented to further avoid and minimize adverse effects on vernal pool branchiopods (including VPTS, VPFS, and CFS) and their habitat that may occur as a result of the proposed action:

a) Submit BRC aquatic resources delineation results to USACE for verification and jurisdiction; obtain a permit for fill under Section 404 of the Clean Water Act.

n) Avoid and minimize impacts on vernal pools.

o) Reduce indirect wetland impacts by installing fencing along perimeter of wetlands adjacent to Project area.

p) Evaluate and implement embankment configuration/footprint to minimize impacts on vernal pools and special-status branchiopods and amphibians.

q) Implement compensatory mitigation from an approved conservation bank or other restoration/enhancement measures as determined necessary with USACE, USFWS, and CDFW.

r) Maintain and monitor exclusion zones (Environmental Sensitive Areas and Environmentally Restricted Areas) (performed by a USFWS-approved biological monitor) to ensure that no take of vernal pool branchiopods or their habitat occurs aside from those approved for removal within the limit of direct effect.

s) If construction activities must occur during the October 15 through April 15 period, schedule initial ground-disturbance activities to begin during the dry season, April 16 through October 14, to minimize the effects on vernal pool branchiopod habitat.

2.3.3.4 Vernal Pool Associate Plants

In addition to measures outlined above, the following species-specific conservation measures will be implemented to further avoid and minimize adverse effects on vernal pool-associated plants (including San Joaquin Orcutt grass, hairy Orcutt grass, fleshy owl's-clover, and Colusa grass) that may occur as a result of the proposed action:

a) Botanical surveys for federally listed plant species will be conducted prior to any ground-disturbing activities. Surveys will be conducted in areas of suitable habitat and areas identified as "natural lands."

b) If populations of identified special-status plants are identified, then the additional measures will be applied for these species to avoid and minimize effects on these species:

- If special-status plant species are identified in the Project area through botanical preconstruction surveys, USFWS will be notified, and Merced County will work with USFWS to avoid, minimize, and potentially compensate for potential direct and indirect effects on the species.
- Prior to disturbance, preconstruction conditions will be documented detailing species composition, species richness, and percent cover of key species; and photo points will be established.
- All directly affected populations of federally listed plant species will be documented. Documentation will include the density and percent cover of the species and key habitat characteristics including soil type, associated species, hydrology, topography, and photo documentation of preconstruction conditions.
- Areas that support federally listed plant species that will be temporarily disturbed will be restored onsite to preconstruction conditions in areas determined appropriate during final design.
- Success criteria of restored areas will be determined through consultation with USFWS.

To the extent feasible, construction activities will avoid impacts on federally listed plants and their potential habitats. All populations of these species identified during the preconstruction survey not directly affected by the Project will be avoided. Federally listed plant populations must be protected by a buffer zone established prior to construction. A qualified botanist will determine whether a buffer adequate to avoid impacts on the plant is feasible to implement. If a buffer cannot be established, the occurrence will be considered affected, and compensatory mitigation will be implemented. If soils supporting federally listed plants are to be affected, seeds and topsoil will be salvaged to the extent feasible for use in offsite mitigation areas.

3. General Environmental Baseline Conditions

The Project area consists primarily of farmland, with some non-native grassland and a vernal pool complex north of the proposed detention basin (Appendix A, Figures 4 and 5). Figure 4 shows the location of all vegetation types. Figure 5 shows detailed distributions of aquatic resources in each section of the action area. Photographs of existing habitat conditions may be found in Appendix C, Photographs and Appendix D, Black Rascal Creek Aquatic Resource Delineation Report. Black Rascal Creek flows diagonally through the center of the Project area, flowing northeast to southwest. Agricultural land uses within the proposed detention basin consist primarily of an almond orchard but also include a hay field on the western side of the Project area adjacent to the Fairfield Canal. The majority of wetland habitats are located north of the proposed detention basin and construction footprint, and include emergent, vernal pools/swales, and riverine (Black Rascal Creek) features. Within the proposed detention basin footprint, aquatic resources are characterized as riverine (Black Rascal Creek) and irrigation ditches.

The area north of the basin footprint supports non-native annual grasses (such as, annual bromes [*Bromus* spp.], barleys [*Hordeum* spp.], and fescues [*Festuca* spp.]) various annual herbs, and a vernal pool complex including pools, swales, and playa pool habitats.

Further north of the proposed project area is the East Merced Vernal Pool Grassland Preserve, Expansion 6. The conservation easement is held by the California Rangeland Trust located in Merced County. The easement is 3,207 acres and includes the land directly north of the proposed detention basin (National Conservation Easement Database 2018). The conservation easement was established to conserve rolling grasslands with a high density of vernal pools and associated rare and endangered species. The conservation easement was established to ensure the existing habitat will continue to be managed in a manner that promotes endangered species, conserving significant natural landscapes and habitat areas.

The action area supports natural and human-modified vegetation communities. The human-modified vegetation communities consist mostly of an almond orchard, but also include field crops such as cotton (*Gossypium* sp.) and alfalfa (*Medicago sativa*). The human-modified vegetation communities are characterized as monocultures with the exception of the field containing alfalfa. This latter field contains a mix of alfalfa, other hay crop species, and ruderal (weedy) species.

The natural vegetation communities that occur in the action area include non-native annual grassland, vernal pools and swales, playa pool, cattail/tule marsh, and cottonwood/willow riparian woodland. The majority of the natural vegetation communities that occur within the action area comprise non-native annual grassland. This community is dominated by non-native annual grasses (such as annual bromes, annual barleys, wild oats [*Avena* spp.], and annual fescues), but also contains various annual herbs including Fitch's spikeweed (*Hemizonia fitchii*).

Vernal vegetation communities (that is, vernal pools and swales) occur embedded in the non-native annual grassland north of the proposed basins (Appendix A, Figure 5). Most, if not all, of these features are characterized as northern hardpan vernal pool (Holland 1986). This type of vernal vegetation community typically occurs on old to moderately old, acidic terrace soils and has an underlying iron-silica cemented hardpan in the subsoil that acts as a water-restricting layer. Vernal pools and swales are continuously or intermittently inundated through the winter months and gradually dry out during the spring through evaporation and plant transpiration. Larger vernal pools may remain inundated into the summer depending on seasonal rainfall. Coyote thistle (*Eryngium castrense*), a species that is endemic to vernal pools of the Central Valley, were found in most of the features considered to be vernal. Other dominant species that have been found in nearby, offsite vernal pools include Fremont's goldfields (*Lasthenia* *fremontii*), doublehorn calicoflower (*Downingia bicornuta*), adobe popcornflower (*Plagiobothrys acanthocarpus*), stalked popcornflower (*P. stipitatus*), woolly marbles (*Psilocarphus brevissimus* var. *brevissimus*), white meadowfoam (*Limnanthes alba*), annual hairgrass (*Deschampsia danthonioides*), and foxtail grass (*Alopecurus saccatus*) (http://vernalpools.ucmerced.edu/ecosystem). See Appendix D for a detailed description of aquatic resource conditions.

A larger vernal feature that occurs within the action area is located immediately northeast of the 90-degree bend in the Fairfield Canal. The feature is clearly vernal but exceeds 400 feet in diameter. Playa pools are very large vernal pools that differ in several important respects. By definition, they are much larger than typical vernal pools, generally more than 200 feet in diameter. Due to their large size, they typically remain inundated much longer than other vernal pools, often well into the summer, even though they have maximum depths comparable to other vernal pools. As such, they support an assemblage of plant species that typically do not occur in other vernal features. Playa pools also tend to be clay-bottomed. By definition, this larger vernal pool could be characterized as a playa pool, which in turn will be representative of a vegetation community that is considered extremely limited in its distribution throughout the state. See Appendix D for a detailed description of aquatic resource conditions.

Cattail/tule marsh occurs in scattered stands within the downstream portions of Black Rascal Creek and within a drainage ditch that parallels the northern boundary of the almond orchards. This community is dominated by broadleaf cattail (*Typha latifolia*) and common tule (*Schoenoplectus acutus* = *Scirpus acutus*). Cattail/tule marsh tends to develop in the low flow portions of the drainages where scouring does not occur or is minimal. See Appendix D for a detailed description of aquatic resource conditions.

Cottonwood/willow riparian woodland occurs along the western levee of the Fairfield Canal where the vegetation community consists of a one-tree-wide linear stand of mature trees. The dominant trees in the vegetation community are Fremont's cottonwoods (*Populus fremontii*), but a substantial number of willows (*Salix* spp.) also contribute to the canopy in this stand.

3.1 Surface Water Black Rascal Creek

Black Rascal Creek is a highly managed, intermittent stream system that flows primarily in response to high precipitation events. It has seasonal hydrologic connection to Bear Creek at two locations downstream. The first connection to Bear Creek is the reach of Black Rascal Creek upstream of East Yosemite Avenue, where it is diverted directly into Bear Creek through the diversion channel that runs parallel to the Fairfield Canal from East Yosemite Avenue to the confluence of Bear Creek. The second connection is described as the reach downstream of the diversion channel (described above) and flows through the city of Merced and joins Bear Creek south of Highway 99.

Significant fish passage barriers preclude fish from accessing Black Rascal Creek, including a concrete structure approximately 1.6 miles south of the Project location (near the confluence of Bear Creek and the "first connection" described in the above paragraph). An additional barrier to passage occurs just downstream of the confluence with Bear Creek south of Highway 99 (also described above). Thus, the portion of the creek affected by the Project is not considered accessible by salmonids, nor due to its hydrology is it considered suitable habitat for salmonids or identified listed fish species; and no occurrence is expected or has been found as documented. Historically, salmon and steelhead may have used Bear Creek for rearing and/or spawning during wet years; however, extensive modifications to the watershed and water use and infrastructure likely resulted in extirpation of salmon and steelhead decades ago. It is unlikely salmon or steelhead ever used Black Rascal Creek, with the exception of possibly at the confluence with Bear Creek during significantly wet years. Approximately 6 sediment and 35 surface water quality samples have been collected from Black Rascal Creek between 2006 and 2014 by the State Water Resources Control Board (National Water Quality Monitoring Council 2017). Sediment data were analyzed for methods relating to toxicity with respect to freshwater invertebrates. Surface water samples were analyzed for a variety of pesticides/insecticides/herbicides, metals, and general chemistry (for example, dissolved oxygen, nitrate/nitrite/ammonia, electrical conductivity, pH, and turbidity). These data suggest that the water quality for Black Rascal Creek is generally good. Although the minimum assessment thresholds are exceeded for some parameters, maximum contaminant levels and agricultural water quality standards are not. Additionally, Black Rascal Creek is not currently listed as an impaired waterway by the State Water Resources Control Board.

3.2 Surface Water Inundation, Existing Conditions – Duration and Maximum Water Level Change

Based on 2D hydrologic models, flood return duration and maximum water level change (depth) are compared for existing and proposed conditions at four locations (Appendix A, Figure 6) in vernal pool areas north of the Project area. Table 6 identifies the flood duration and maximum water level change in feet for existing and proposed conditions for 200-, 100-, 50-, 25-, 10-, and 5-year floods. Figures 7a through 7d provide a comparison of inundation extent between existing condition and proposed conditions for the 10-, 50-, 100-, and 200-year events.

For all locations, inundation duration ranges from 14 to 37 hours under existing conditions and from 10 to 40 hours under proposed conditions. At individual point location, most inundation durations are similar, and maximum water depth is relatively consistent between existing and proposed conditions (Table 6). For all locations, inundation conditions range from 1.0 foot to 5.0 feet total depth (existing conditions) as compared to the proposed condition range of 0.7 foot to 6.5 feet total depth. The change in duration and depth are not expected to have a biologically significant effect on vernal pool-associated animals or plants.

Table 6. Flood Duration and Maximum Change in Water Level, Existing and Proposed Conditions

Point	200-year Flood Duration Hours (maximum water level change in feet*)	100-year Flood Duration Hours (maximum water level change in feet*)	50-year Flood Duration Hours (maximum water level change in feet*)	25-year Flood Duration Hours (maximum water level change in feet*)	10-year Flood Duration Hours (maximum water level change in feet*)	5-year Flood Duration Hours (maximum water level change in feet*)
Existing Conditions						
Point 1	30 hours (2.2 feet)	29 hours (2.0 feet)	29 hours (1.8 feet)	28 hours (1.6 feet)	27 hours (1.4 feet)	27 hours (1.4 feet)
Point 2	31 hours (2.1 feet)	30 hours (1.9 feet)	29 hours (1.8 feet)	28 hours (1.6 feet)	27 hours (1.4 feet)	27 hours (1.4 feet)
Point 3	18 hours (1.9 feet)	17 hours (1.6 feet)	16 hours (1.3 feet)	15 hours (1.2 feet)	14 hours (1.0 foot)	14 hours (1.0 foot)
Point 4	37 hours (5.0 feet)	36 hours (4.7 feet)	36 hours (4.4 feet)	35 hours (2.6 feet)	35 hours (2.6 feet)	35 hours (2.6 feet)
Proposed Conditions						
Point	**200-year**	**100-year**	**50-year**	**25-year**	**10-year**	**5-year**
Point 1	32 hours (2.2 feet)	32 hours (2.0 feet)	31 hours (1.8 feet)	30 hours (1.6 feet)	29 hours (1.4 feet)	27 hours (1.2 feet)
Point 2	40 hours (2.1 feet)	40 hours (1.9 feet)	39 hours (1.8 feet)	39 hours (1.6 feet)	37 hours (1.4 feet)	36 hours (1.2 feet)
Point 3	21 hours (3.3 feet)	19 hours (2.4 feet)	17 hours (1.6 feet)	15 hours (1.2 feet)	13 hours (0.9 foot)	10 hours (0.7 foot)
Point 4	35 hours (6.5 feet)	35 hours (5.7 feet)	35 hours (4.8 feet)	34 hours (3.9 feet)	34 hours (2.8 feet)	33 hours (1.7 feet)
Results						
Point 1 Summary: Inundation under proposed conditions may be extended up to 3 hours as compared to existing conditions; no change in depth under any flood return interval.						
Point 2 Summary: Inundation under proposed conditions may be extended up to 11 hours as compared to existing conditions; depth may be reduced 0.2 foot depending on flood return interval.						
Point 3 Summary: Inundation under proposed conditions may be reduced by 4 hours or extended up to 3 hours (inundation depth may be slightly reduced or increased up to 1.4 feet) depending on flood return interval.						
Point 4 Summary: Inundation duration would be reduced up to 2 hours; depth may be reduced by 0.9 foot or increased up to 1.5 feet depending on flood return interval.						

* Maximum change in water level (maximum water level minus initial water level). Points 1 and 2 start each run wet with depths of 0.6 and 1.8 feet. To calculate true maximum depths for points 1 and 2, add these initial depths (0.6 and 1.8 feet) to the maximum water changes shown in the table. Points 3 and 4 start dry.

4. Status of Species and Critical Habitat

4.1 Regulatory Status – Federal Endangered Species Act

In accordance with ESA Section 7(a)(2), USACE and NRCS are required to assure that its actions have considered impacts on species federally listed or proposed as threatened or endangered for federally funded, permitted, or licensed projects.

In addition to the USFWS species list (USFWS 2021), Jacobs conducted a desktop analysis of existing data and several field visits (2018 and 2019) focused on the construction area, including potential access routes and staging areas identified in the field, and adjacent areas within the action area. Table 7 includes federally listed species identified from both the USFWS species list (USFWS 2021) and CNDDB (CDFW 2021). Figures 8, 9, and 10 (Appendix A) identify ESA species occurrence data within a 3-mile radius of the Project area (CDFW 2021). A total of 14 federally listed species were identified by USFWS as potentially occurring in the Project area (Appendix E, Information for Planning and Consultation; USFWS 2021). The USFWS species list (USFWS 2021) indicates there are no critical habitats in the Project area (Appendix E). Additionally, CNDDB data (CDFW 2021) identified one federally listed species (Keck's checkermallow) occurring within 3 miles of the Project area that was not recorded on the USFWS species list (USFWS 2021), totaling 15 federally protected species reviewed in this document. No federally listed species were observed during several onsite field evaluations. CNDDB occurrence data within 3 miles of the Project area are provided in Appendix A, Figures 8, 9, and 10.

Table 7 describes species status, habitat requirements, and the potential for species to occur within the proposed action area. Of the 15 species under the jurisdiction of USFWS described in Table 7, six species were determined to have no potential for occurring in the action area due to lack of suitable habitat. In turn, these species will not be affected by the Project.

The following six species, for reasons outlined in Table 7 or above, will not be discussed further in this BA:

- blunt-nosed leopard lizard (*Gambelia silus*) – endangered
- giant garter snake (*Thamnophis gigas*) – threatened
- California red-legged frog (*Rana aurora draytonii*) – threatened
- delta smelt (*Hypomesus transpacificus*) – threatened
- valley elderberry longhorn beetle (*Desmocerus californicus*) – threatened
- Keck's checkermallow (*Sidalcea keckii*) – endangered

Table 7. Federally Listed Species with Potential to Occur in the Proposed Black Rascal Creek Flood Control Project Action Area

Scientific Name	Common Name	Federal Status	Habitat Requirements	Potential for Species within Proposed Action Area
Mammals (1)				
Vulpes macrotis mutica	San Joaquin kit fox	FE	The species is found in the San Joaquin Valley from Contra Costa County south to Kern County. It is also found in the dry interior valleys of the Coast Ranges (such as, Salinas and Santa Clara Valleys). It occurs in open, sparsely vegetated areas of low relief (typically in native or non-native grassland or alkali sink scrub).	**Low Potential.** There is suitable habitat for the subspecies within the action area (that is, annual grassland). However, the subspecies is known only as an occasional vagrant to the northeastern San Joaquin Valley. Therefore, the subspecies is considered to have some potential, albeit low, to occur within the action area during construction activities.
Reptiles (2)				
Thamnophis gigas	giant garter snake	FT	This species is found in freshwater marshes and low-gradient streams. It prefers habitat with dense emergent vegetation, deep and shallow pools of water (which persist throughout the seasonal cycle of activity), open areas along water margins, and upland habitat with access to structures suitable for hibernation and escape from flooding. It has adapted to drainage canals, irrigation ditches, and adjacent rice lands supported by perennial fresh water on the floor of the Central Valley.	**No Potential.** The lower onsite reaches of Black Rascal Creek provide suitable habitat for this species (cattail marsh and perennial water). However, with the exception of a single historical occurrence within the city of Merced, the next nearest known occurrences of this species are found lower in elevation on the valley floor more than 18 miles from the Project site. Therefore, the species is considered to have no potential to occur within the action area.
Gambelia silus	blunt-nosed leopard lizard	FE	This species is found in the San Joaquin Valley from Merced County south to Ventura County. The species also occurs in the dry interior valleys adjacent to the southern San Joaquin Valley (such as, Carrizo Plain and Cuyama Valley). It occurs in open, sparsely vegetated areas of low relief (typically in native or non-native grassland or alkali sink scrub).	**No Potential.** The action area does not provide suitable habitat for this species given that most of the site supports either active agriculture or vernal pool grassland. In addition, all nearby occurrences of this species are found lower in elevation, closer to the valley floor. Therefore, it is considered to have no potential to occur within the action area.
Amphibians (2)				
Rana aurora draytonii	California red-legged frog	FT	The species prefers dense, shrubby riparian vegetation associated with deep (0.7 meter), still, or slow-moving water. The shrubby riparian vegetation that structurally seems to be most suitable for California red-legged frogs is that provided by arroyo willow (*Salix lasiolepis*), cattails (*Typha* sp.), and bulrushes (*Scirpus* sp.).	**No Potential.** No suitable habitat is within the survey area. Species is not known to occur within 3 miles of the survey area (CDFW, 2021).

Table 7. Federally Listed Species with Potential to Occur in the Proposed Black Rascal Creek Flood Control Project Action Area

Scientific Name	Common Name	Federal Status	Habitat Requirements	Potential for Species within Proposed Action Area
Ambystoma californiense	California tiger salamander	FT	This species is found in annual grassland, oak savannah, and coastal sage scrub adjacent to vernal pools, stock ponds, and ponded reaches of ephemeral streams (aquatic breeding sites). The species is distributed in the Central Valley from Glenn County to Kings County, but also occurs in Sonoma County and Alameda and Contra Costa Counties south through the interior valleys of the Coast Ranges.	**Moderate Potential.** Multiple occurrences of the species have been recorded within 3 miles of the Project boundaries (CDFW 2021). In addition, suitable habitat (such as, vernal pools and ponded reaches of ephemeral streams) occurs within the action area. Therefore, the species is considered to have a moderate potential to occur within the action area.
Fish (1)				
Hypomesus transpacificus	delta smelt	FT	This species is endemic to the upper Sacramento-San Joaquin Estuary of California and mainly inhabits the freshwater-saltwater mixing zone of the estuary except during its spawning season, when it migrates upstream to shallow fresh or slightly brackish water following winter “first flush” flow events.	**No Potential.** The Project area supports an intermittent system with solely fresh water flows in association with precipitation events. The action area does not provide suitable connectivity for delta smelt as a result of the flow regime and hydrology of the system, as well as passage barriers in place downstream of the action area.
Insect (1)				
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	FT	This species’ host plant is blue elderberry (*Sambucus nigra*). It occurs only in the Central Valley of California, generally found in riparian stands of clustered host plant.	**No Potential.** No suitable habitat is present within the action area, and no occurrences of the host plant or the species are recorded within the action area (Bumgardner Biological Consulting 2018).
Crustaceans (3)				
Branchinecta lynchi	vernal pool fairy shrimp	FT	This species occurs primarily in vernal pools (sandstone depression, grass swale, earth slump, or basalt-flow depression pools) in grassland and oak savannah of the Central Valley. However, the species also occurs at a few locations in the central Coast Ranges from Monterey County south to Santa Barbara County and in the South Coast Mountains in Riverside County.	**Known to Occur.** Previous surveys within the Project area (including the action area and Project site boundaries) have found several occurrences of the species in vernal pools. Therefore, it is known to occur in the action area.

Table 7. Federally Listed Species with Potential to Occur in the Proposed Black Rascal Creek Flood Control Project Action Area

Scientific Name	Common Name	Federal Status	Habitat Requirements	Potential for Species within Proposed Action Area
Lepidurus packardi	vernal pool tadpole shrimp	FE	This species inhabits clear to turbid vernal pools and swales, stock ponds, and other seasonal wetlands in the Sacramento Valley and northern San Joaquin Valley (from Shasta County south to Merced and Tulare Counties). It has also been recorded in three pools at the San Francisco Bay National Wildlife Refuge in Alameda County.	**Known to Occur.** Previous surveys within the Project area (including the action area) have found several occurrences of the species in vernal pools. Therefore, it is known to occur in the action area and within Project site boundaries.
Branchinecta conservatio	Conservancy fairy shrimp	FE	This species occurs in very large turbid vernal pools and playa pools underlain by clay substrates such as the Mehrten Formation. There are relatively few occurrences of this species, but it is known from Tehama, Glenn, Solano, Stanislaus, and Merced Counties.	**Low Potential.** No individuals of this species have been recorded within the Project site boundaries. However, the species is known from eight occurrences within 3 miles of the Project footprint. Furthermore, there is a large playa-type pool within the action area and within Project site boundaries that may provide suitable habitat for the species. Therefore, it has some potential, albeit low, to occur within the action area.
Plants (5)				
Neostapfia colusana	Colusa grass	FT	This grass occurs in vernal pools (typically larger or more persistent pools) and some human-made wetlands (such as, stock ponds) within valley and foothill grassland. It is distributed primarily along the eastern margin of the San Joaquin Valley in Stanislaus and Merced Counties, but also occurs in Solano and Yolo Counties. It flowers from May to July.	**Low Potential.** Multiple occurrences of the species have been recorded within the Project area (that is, within 3 miles of the Project boundaries). However, there is only one large, playa-type pool within the action area and within Project site boundaries that may provide suitable habitat for the species. Therefore, the species is considered to have some potential, albeit low, to occur within the Project site.
Castilleja campestris ssp. *succulenta*	fleshy owl's-clover	FT	This subspecies is currently known from sites in eastern Merced, southeastern Stanislaus, Madera, San Joaquin and northern Fresno Counties where it occurs on the margins of vernal pools, swales, and some seasonal wetlands (often on acidic soils). It blooms in May.	**Known to Occur.** Previous surveys within the Project area (including the action area and within Project site boundaries) have found several occurrences of the subspecies in vernal wetlands. Therefore, it is known to occur in the action area.

Table 7. Federally Listed Species with Potential to Occur in the Proposed Black Rascal Creek Flood Control Project Action Area

Scientific Name	Common Name	Federal Status	Habitat Requirements	Potential for Species within Proposed Action Area
Orcuttia pilosa	hairy Orcutt grass	FE	This grass occurs in vernal pools (typically larger or more persistent pools) within valley and foothill grassland. It is distributed along the eastern margin of the Sacramento and San Joaquin Valleys from Tehama County south to Stanislaus, Merced, and Madera Counties. It flowers from May to September.	**Low Potential.** No occurrences of the species have been recorded within 3 miles of the Project boundaries. There is a large, playa-type pool within the action area that may provide suitable habitat for the species. Therefore, the species is considered to have some potential, albeit low, to occur within the action area.
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	FT	This grass occurs in vernal pools (typically larger or more persistent pools) within valley and foothill grassland. The remaining populations of this species occur mostly in the southeastern San Joaquin Valley (Fresno, Merced, and Madera Counties). Historically, the species also occurred in Stanislaus County. It flowers from April to September.	**Known to Occur.** Previous surveys within the Project action area (within 500 feet of the Project footprint) have found several occurrences of the species in vernal wetlands. Therefore, it is known to occur within the action area.
Sidalcea keckii	Keck's checkermallow	FE	The species grows in relatively open areas on grassy slopes of the Sierra foothills in Fresno and Tulare Counties. The plant is endemic to California, where it is known from the Inner Northern California Coast Ranges and Southern Sierra Nevada foothills. Three recent occurrences in the southern Sierra, all of which may have been extirpated by now. It is associated with gabbro soils. These soils are unusually low in nutrients and high in heavy metals. These soil properties tend to restrict the growth of many competing plants. Because gabbro soils are fairly rare, this limits the range of Keck's checkermallow, which is adapted to grow on them.	**No Potential.** No known populations or suitable habitat in the action area. One CNDDB occurrence has been identified 3 miles northwest of the Project area. The species is associated with gabbro soils (derived from serpentine soils). Gabbro soils are not present within the Project area or action area. The species is considered to have no potential to occur within the action area.

Notes:

FE = listed as endangered under the ESA

FT = listed as threatened under the ESA

The status and habitat of ESA-listed species identified by USFWS (2021), or under the jurisdiction of USFWS, as having potential to occur were researched to determine if they are likely to occur or have suitable habitat within the action area. As noted in Table 7, habitat in the action area is suitable for nine species under the jurisdiction of USFWS having threatened or endangered federal status. The following threatened-status species have the potential to occur in the general vicinity of the action area:

- San Joaquin kit fox
- California tiger salamander, CV DPS
- Conservancy fairy shrimp
- vernal pool fairy shrimp
- vernal pool tadpole shrimp
- Colusa grass
- fleshy owl's-clover
- hairy Orcutt grass
- San Joaquin Valley Orcutt grass

This BA evaluates the effects of the proposed action on these nine species and their associated habitat. Occurrence data for federally protected species within 3 miles of the Project area are provided in Appendix A, Figures 8, 9, and 10 (CDFW 2021).

4.2 Listed Species

4.2.1 San Joaquin Kit Fox

SJKF was listed as a federally endangered species on March 11, 1967 (32 FR 4001). This mammal is fully protected under the ESA (16 [U.S.C.] 1531 et seq.). In February 2010, a 5-year review of the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) was conducted to review the status of the species. The review did not suggest any changes to the listing (USFWS 2010). No critical habitat has been designated for this species; however, designated landscape linkages for the species are present in the Central Valley (USFWS 2021).

4.2.1.1 Biological Requirements and Life History

SJKF is a subspecies of kit fox that has a broad distribution in the San Joaquin Valley. The historical range of SJKF included the San Joaquin Valley, from southern Kern County north to Tracy in San Joaquin County, and portions of the Inner Coast Range, such as the Carrizo Plain, Salinas Valley, Temblor Range, Cholame Hills, and Elkhorn Plain (USFWS 1998). The present-day distribution comprises fragmented populations that use remaining natural lands, mostly from Merced County southward to southern Kern County.

The SJKF has a small, slim body with an average weight of 5 pounds and stands about 12 inches tall. It has long legs, large ears, and a long bushy tail that tapers at the prominent black tip (USFWS 2010). The ears are conspicuously large and densely covered on the inside with stiff, white hairs. The summer coat is light buff to buff-gray on the back and white on the belly; its winter coat is grizzled gray on the back, rust to buff on the sides, and white beneath.

SJKF use complex dens for shelter, protection, and rearing of young (USFWS 1998). Dens may be used year-round. Most dens are located in flat terrain or the lower slopes of hills, and are commonly found in washes, drainages, and roadside berms. SJKF are reputed to be poor diggers and are usually found in areas with loose-textured, friable soils (USFWS 1998).

The SJKF is primarily nocturnal. Adult foxes are usually solitary during the late summer and fall. By September and October, adult females (that is, vixens) begin to excavate, clean, and enlarge their pupping dens. Adult males join the vixens in October or November (Morrell 1972), and mating occurs between December and March (USFWS 1998). Pups are typically born in late February or early March (Egoscue 1962, Morrell 1972), emerge from dens in March and April, and begin foraging for themselves between June and August, dispersing shortly thereafter in August or September (Morrell 1972, USFWS 2010).

The SJKF inhabits arid valley and foothill grasslands, sparsely vegetated scrub/shrub habitats (O'Farrell 1983, USFWS 1998), and some agricultural and urban areas (Jensen 1972, Morrell 1972, USFWS 2010). In Merced County, the species most frequently uses grassland in proximity to natural or constructed watercourses (Orloff et al. 1986). The SJKF is quite tolerant of human disturbances and will, to a minimal extent, use developed and agricultural lands, particularly for foraging and movement or migration. However, the use of agricultural lands by SJKF is dependent on prey availability (hunting mainly rodents, ground-nesting birds, and insects) (USFWS 2010) and refugia opportunities. Lands producing row crops are inundated weekly during irrigation, which impedes foraging and precludes the establishment, maintenance, and use of earthen dens (Warrick et al. 2007). On the other hand, orchards and vineyards that are located within 1 mile of natural lands have been reported to potentially provide adequate habitat for nighttime foraging by the species (Warrick et al. 2007).

Numerous threats to this species have been identified. In addition to habitat loss and fragmentation due to agricultural and urban development, predation, starvation, flooding, disease, drought, shooting, trapping, poisoning, and road kills are implicated in the decline of the species. The SJKF has declined throughout its range as a result of habitat loss, predator and pest control programs, and inter-specific competition with coyotes (Cypher et al. 2000).

4.2.1.2 Occurrence in the Project Vicinity

Suitable foraging and breeding habitat for the SJKF may be found in natural lands such as annual grassland, barren, and pasture. Although the species may be found in natural areas throughout the San Joaquin Valley, SJKF has a greater potential to den and breed in natural areas within or adjacent to mitigation banks. The species is also expected to have a greater potential to occur within identified linkage areas and satellite recovery areas described in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and 5-Year Review Summary (USFWS 2010). California Connectivity Project linkages (Spencer et al. 2010), where large blocks of natural areas and less habitat fragmentation occur, are also considered to have high potential for SJKF to den and breed. SJKF may be found in riparian corridors and habitat linkages, which provide dispersal opportunities and may provide foraging or breeding habitat.

Although agricultural lands are suboptimal for SJKF breeding, the species may use agricultural lands for foraging and dispersal. Grain crops and alfalfa, in particular, may host appropriate SJKF prey species. Agricultural areas within 1 mile of natural habitat blocks may be used more frequently for foraging and dispersal than agricultural lands isolated from movement corridors and natural lands.

A wide-ranging species, SJKF has been reported in Merced, Madera, and Fresno Counties. The *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) describes current populations throughout the San Joaquin Valley floor and surrounding foothills to the east and west. A review of the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the San Joaquin Kit Fox 5-Year Review (USFWS 2010) indicates that the Project area occurs within the known geographic range of the SJKF. Two documented occurrences of SJKF through CNDDB have been recorded within 3 miles of the Project site (CDFW 2021). See Appendix A, Figure 8.

Based on known distribution of the species, the presence of suitable habitats within 3 miles of the Project footprint, and documented occurrences of the species, it is reasonable to presume that SJKF have the potential to occur in areas of suitable habitat throughout the action area.

4.2.2 California Tiger Salamander, Central Valley Distinct Population Segment

The CTS was listed as a federally threatened species in April 2004 (69 FR 47212). This amphibian is fully protected under the ESA (16 U.S.C. 1531 et seq.). The CV DPS continues to be listed as threatened, while Sonoma and Santa Barbara populations are listed as endangered. A 5-year review was completed in October 2014; no change in status was recommended (USFWS 2014). Designated critical habitat for this species does not occur in the Project or action area (USFWS 2021).

4.2.2.1 Biological Requirements and Life History

The CTS is a large, stocky terrestrial salamander. They are black, with several white or pale-yellow spots or bars. Adult males are about 8 inches long, and females are a little less than 7 inches long. Adults are thought to forage on a variety of invertebrates. Hatchlings begin feeding on zooplankton, transitioning to tadpoles and aquatic invertebrates as they age (CaliforniaHerps.com, 2020).

During summer months, CTS use subterranean refuge sites, usually small mammal burrows, but also crevices in the soil, typically referred to as "aestivation" sites. Aestivation habitat is generally constructed by mammals that live underground such as California ground squirrels (*Otospermophilus beecheyi*) and Botta's pocket gophers (*Thomomys bottae*) (Goals Project 2000). The adults begin emerging from within their aestivation burrows during rainy nights in early winter (October to November) to migrate to freshly inundated breeding pools (CaliforniaHerps.com 2020). The peak breeding period typically occurs between December and March (USFWS 2014), and adults may migrate long distances (up to 1.3 miles) to reach breeding pools.

Breeding can occur explosively all at once, or it can continue for several months as dictated by precipitation events (CaliforniaHerps.com 2020). Adult females lay eggs that hatch in approximately 10 to 14 days. Larvae develop in the pools for several months until they metamorphose, with the larval stage usually lasting 3 to 6 months (USFWS 2014). Following metamorphosis, juveniles migrate from breeding ponds to suitable upland habitat. Successful long-term recruitment of CTS populations requires ephemeral ponds that are inundated an average of 4 to 5 months of the year (CaliforniaHerps.com 2020). Certain CTS populations may breed in slow streams and other semi-permanent waters such as cattle ponds that do not contain fish (CaliforniaHerps.com 2020)

CTS is distributed throughout portions of the Central Valley and Central Coast Ranges from Colusa County south to San Luis Obispo and Kern Counties, from sea level to 3,460 feet. This species requires suitable upland terrestrial habitat within range of seasonal breeding ponds to survive. Suitable upland habitat for CTS consists of annual grasslands, oak savannah, and pastures that support fossorial mammals that create appropriately sized burrow refugia. Seasonal ponds or semi-permanent calm waters that hold water for a minimum of 3 to 4 months in duration for breeding and larval maturation are required within access of upland habitats for long-term population survival. Annual grassland scattered with seasonally inundated features such as vernal pools and stock ponds contains the highest density of breeding populations of CTS (AmphibiaWeb 2020).

Threats to species survival include road construction and associated traffic, agricultural land conversion, urban development, non-native predators (largemouth bass, bullfrogs, and mosquito fish), and hybridization with the introduced barred salamander (*Ambystoma mavortium*) (CaliforniaHerps.com 2020).

4.2.2.2 Occurrence in the Project Vicinity

CTS are known to occur regionally. There are numerous occurrence records for the species associated with grazed grassland and vernal pool habitats, and stock ponds to the northwest, north, and northeast of the Project area. The nearest occurrence is 2.6 miles to the northwest and is associated with habitats comprising grazed grassland, vernal pools, and California ground squirrel burrows (Appendix A, Figure 9). There are several other similar records within approximately 3.5 miles of the site, with some breeding sites associated with stock ponds rather than vernal pools. All the known occurrences are from areas beyond the expected maximum dispersal distance for the species (approximately 1 mile), and CTS from known breeding sites are unlikely to occur on the Project site.

However, ostensibly suitable breeding habitat may be present in the action area, north of the Project area; if present, individuals may disperse into adjacent upland areas and take refuge in burrows or other forms of refugia. Based on reconnaissance site visits (2018 and 2019), there is a complex of vernal pools in the action area adjacent to the northwestern embankment extent (Appendix A, Figures 4 and 5-1 through 5-7). California ground squirrel burrows were also observed in this area; thus, this area appears suitable for breeding, dispersal, and as refugia. Other wetlands in the area, including seasonal or perennial wetlands, may also be used by breeding individuals. In the absence of focused surveys for the species, they are assumed to be present in the Project area and surrounding areas. Because the species may occur in both aquatic and upland areas in the Project area, individuals may disperse across and take refuge in upland areas that have burrows or other refugia. No CTS larvae were observed onsite in 2019 delineation activities. Onsite habitat includes suboptimal conditions with rock armoring in some pooled areas.

Based on known distribution of the species, the presence of suitable habitats within the Project area, and documented occurrences of the species 2.6 miles from the Project site, it is reasonable to presume that CTS have the potential to occur in areas of suitable habitat (non-native annual grassland, emergent marsh, riverine, and vernal wetlands) throughout the action area.

4.2.3 Conservancy Fairy Shrimp

The CFS was listed as federally endangered on September 19, 1994 (59 FR 48136). This small crustacean is fully protected under the ESA (16 U.S.C. 1531 et seq.).

Critical habitat was first designated for the federally endangered CFS in 2003 (68 FR 46684), with the final designation established in 2006 (71 FR 7118). The designation includes a total of 161,786 acres in California and Oregon. California holds six units of critical habitat located in Butte, Colusa, Mariposa, Merced, Solano, Stanislaus, Tehama, and Ventura Counties. Designated critical habitat for this species, however, does not occur in the Project or action area (USFWS 2021).

4.2.3.1 Biological Requirements and Life History

CFS have delicate elongated bodies, large stalked compound eyes, no carapaces, and 11 pairs of swimming legs. Males range from 0.6 to 1.1 inches long, with females measuring slightly smaller, between 0.6 and 0.9 inch (USFWS 2005). They glide gracefully upside down, swimming by beating their legs in a complex, wavelike movement that passes from front to back. CFS feed on algae, bacteria, protozoa, rotifers, and bits of detritus.

CFS occur in vernal pools found on several different landforms, geologic formations, and soil types. They have been observed in vernal pools ranging in size from 323 to 3,834,675 square feet, with a mean size of 299,936 square feet (USFWS 2005). Populations of CFS within the Central Valley have been located in northern hardpan pools within swales of old braided alluvium (Eriksen and Belk 1999). Large pools with a mean size of 6.89 acres and a moderately turbid water column are the typical habitat parameters for this species (Eriksen and Belk 1999). CFS have been found at elevations ranging from 16 to 5,577 feet, and at water temperatures as high as 73 degrees Fahrenheit (USFWS 2005).

The historical distribution of CFS is not known. However, the distribution of vernal pool habitats in the areas where CFS is now known to occur were once more continuous and larger in area than they are today (Holland 2009). It is likely CFS once occupied suitable vernal pool habitats throughout a large portion of the Central Valley and southern coastal regions of California (USFWS 2005).

Currently, CFS are known to be located in a few isolated populations distributed over a large portion of California's Central Valley and in southern California. In the San Joaquin Valley vernal pool region, CFS are found in the Grasslands Ecological Area in Merced County, and at a single location in Stanislaus County (USFWS 2005). Threats to this species are primarily from habitat loss and fragmentation caused by urban development and agricultural conversion.

4.2.3.2 Occurrence in the Project Vicinity

No individuals of this species have been recorded within the action area. However, the species is known from eight occurrences within 3 miles of the Project area (Appendix A, Figure 9). CFS tend to occur only in very large vernal and playa pools. No protocol-level habitat assessment or focused presence/absence surveys for CFS were conducted; however, the wetland delineation surveys identified seasonal wetlands and vernal pools that could provide habitat for this species. Given occurrences within 3 miles of the Project area and the presence of a large playa-type pool immediately north of the Fairfield Canal, the species is believed to have at least a low potential to occur within the action area.

4.2.4 Vernal Pool Fairy Shrimp

The VPFS was listed as a threatened species in September 1994 (59 FR 48136). This crustacean is fully protected under the ESA (16 U.S.C. 1531 et seq.).

Critical habitat was first designated for the federally threatened VPFS in 2003 (68 FR 46684), with the final designation established in 2006 (71 FR 7118). The designation includes a total of 597,821 acres in California and Oregon. California holds 29 units of critical habitat located in the Sacramento Valley, San Joaquin Valley, and Central California coastal counties. Designated critical habitat for this species, however, does not occur in the Project or action area (USFWS 2021).

4.2.4.1 Biological Requirements and Life History

VPFS is 1 to 1.5 inches long, translucent in appearance, and found in California's vernal pools. Due to the ephemeral nature of their habitat, fairy shrimp have short life spans, typically from December to early May. Shrimp eggs are laid by the adults each winter season. However, eggs may lie dormant (as cysts) in the soil for many years before hatching. VPFS are filter and suspension feeders. Their diet mainly consists of unicellular algae, bacteria, and ciliates. They may also scrape algae, diatoms, and protists from the surface of rocks, sticks, and plant stems.

VPFS have a high potential to occur within a spectrum of vernal pools and inundated non-wetlands. VPFS occupy a variety of different vernal pool habitats: from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools. Populations of VPFS within the Central Valley are located in small swales, earthen pools, and basalt flow depressions that are typically smaller in scale than other branchiopod habitat (Eriksen and Belk 1999). Pools vary dramatically in size from 10 hectares to 0.56 square meter (Eriksen and Belk 1999). Although the species has been collected from large vernal pools, including one that exceeds 25 acres, it tends to occur in small vernal pools or seasonal wetlands in unplowed grasslands (Eriksen and Belk 1999). It is most frequently found in seasonally aquatic pools measuring less than 0.05 acre. The species also has the ability to inhabit disturbed/constructed sites that are avoided by more habitat-specific species (Eriksen and Belk 1999).

Threats to this species are primarily from habitat conversion caused by urban and agricultural development.

4.2.4.2 Occurrence in the Project Vicinity

VPFS are vernal pool obligates that occur widely in eastern Merced County and have 14 recorded occurrences in the action area and within 3 miles of the Project site (Appendix A, Figure 9). No protocol-level habitat assessment or focused presence/absence surveys for VPFS were conducted; however, the wetland delineation surveys identified seasonal wetlands and vernal pools that are known to provide suitable habitat for this species (Appendix A, Figure 5). Therefore, this species is known to occur in the action area.

4.2.5 Vernal Pool Tadpole Shrimp

The VPTS was listed as an endangered in September 1994 (59 FR 48136). This crustacean is fully protected under the ESA (16 U.S.C. 1531 et seq.).

Critical habitat was first designated for the federally threatened VPTS in 2003 (68 FR 46684), with the final designation established in 2006 (71 FR 7118). The designation includes a total of 597,821 acres in California and Oregon. California holds 29 units of critical habitat located in the Sacramento Valley, San Joaquin Valley, and Central California coastal counties. Designated critical habitat for this species, however, does not occur in the Project or action area (USFWS 2021).

4.2.5.1 Biological Requirements and Life History

VPTS is a small crustacean, 1 to 1.5 inches long and brown in color, found in California's vernal pools. As dictated by this ephemeral habitat, VPTS have short life spans that last from December until the pools dry up in late spring or summer. Individuals can reach sexual maturity in 18 days and complete their life span in 9 weeks. VPTS reach maturity on average at 25 days, with first reproduction occurring at 54 days or a minimum carapace length of 0.393 inch (USFWS 2005). Eggs (as cysts) remain dormant in the soil during the dry season and may lie dormant in the soil for many years before hatching. VPTS feeds on small invertebrates, amphibian eggs, and some vegetation. Although it has not been documented, it is considered likely that VPTS prey on CFS when they co-occur (Eriksen and Belk 1999). VPTS is more temperature-tolerant than the VPFS.

Populations of VPTS within the Central Valley occur in a variety of ephemeral wetland habitats that are typically larger in scale to accommodate the longer life span of this species (USFWS 2005). However, pools where VPTS have been found vary dramatically in size from 2 to 88 acres (USFWS 2005). VPTS occupy a variety of different vernal pool habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools (Eng et al. 1990, Helm 1998). The species is adaptable to soil and water conditions, but over 50 percent of known occurrences have been associated with High Terrace landforms and Redding and Corning soils (USFWS 2005).

VPTS are endemic to California's Central Valley, from Shasta County to Merced County; the majority of the populations are distributed in the northern and eastern portions of the Central Valley. This species is found in vernal pools and seasonal wetlands containing highly turbid water, often in unplowed grasslands. These seasonal pools contain old alluvial soils underlain by hardpan or occur in sandstone depressions; water in the pools has very low alkalinity and conductivity.

This species is threatened by habitat loss, primarily from development, agriculture, and encroachment of non-native grasses.

4.2.5.2 Occurrence in the Project Vicinity

VPTS are vernal pool obligates that occur widely in eastern Merced County and have eight recorded occurrences within 3 miles of the Project area and some data located within the action area (Appendix A, Figure 9). No protocol-level habitat assessment or focused presence/absence surveys for VPFS were conducted; however, the wetland delineation surveys identified seasonal wetlands and vernal pools in the action area that are known to provide habitat for this species (Appendix A, Figure 5), and CNDDB occurrence data identify the species within the action area. Therefore, this species is known to occur in the action area.

4.2.6 Colusa Grass

Colusa grass was listed as a federally threatened species in March 1997 (62 FR 14338). This flowering plant is fully protected under the ESA (16 U.S.C. 1531 et seq.). A 5-year review completed in 2008 recommended that Colusa grass remain a federally listed threatened species (74 FR 12878). This species is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

Critical habitat for this species was designated in 2006 (71 FR 7118). Designated critical habitat for this species, however, does not occur in the Project or action area (USFWS 2021).

4.2.6.1 Biological Requirements and Life History

Colusa grass is a robust, tufted annual grass that grows to between 0.8 and 3.1 inches tall. Bloom period is between May and August. It is the only species in the genus *Neostapfia*, and its closest relatives are the Orcutt grasses.

Colusa grass has been found in Northern Claypan and Northern Hardpan vernal pool types (Sawyer et al. 1995) within rolling grasslands (USFWS 2005). It grows in pools ranging from 0.02 to 617.5 acres, with a median size of 0.5 acre, and also occurs in the beds of intermittent streams and in artificial ponds. This species typically grows in the deepest portion of the pool or stream bed but may also occur on the margins. It appears that deeper pools and stock ponds are most likely to provide the long inundation period required for germination. Colusa grass usually grows in single-species stands, rather than intermixed with other plants. Several soil series are represented throughout the range of Colusa grass. In the San Joaquin Valley Vernal Pool Region, soils are clay or silty clay loam in the Landlow and Lewis series (USFWS 2005).

The current distribution of this species, as published in the USFWS 2008 Five-Year Review (USFWS 2008), is 43 presumed extant occurrences in Yolo, Solano, Merced, and Stanislaus Counties.

Threats to Colusa grass populations include land conversion to agriculture, urbanization, and other forms of habitat loss and fragmentation. These threats continue to affect the species, as do dryland farming, flood control projects, and competition from invasive native and non-native plants (USFWS 2005). Colusa grass occurs on the rim of alkaline basins in the Sacramento and San Joaquin Valleys, as well as on acidic soils of alluvial fans and stream terraces along the eastern margin of the San Joaquin Valley and into the adjacent foothills; elevations range from 18 feet to about 350 feet at known sites (USFWS 2005).

4.2.6.2 Occurrence in the Project Vicinity

Multiple occurrences of the species have been recorded within 3 miles of the Project boundaries (Appendix A, Figure 10). These species have not been documented within the action area. A large, playa-type pool within the action area (northwest of the Project area) may provide suitable habitat for the species. Therefore, the species is considered to have some potential, albeit low, to occur within the action area.

4.2.7 Fleshy Owl's-Clover

Fleshy owl's-clover was listed as a federally threatened species in March 1997 (62 FR 14338). This flowering plant is fully protected under the ESA (16 U.S.C. 1531 et seq.). This species is addressed in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

Critical habitat for this species was first designated in 2003 (68 FR 46684), with a revised designation established in 2005 (70 FR 46923). Species by unit designations were published in 2006 (71 FR 7118). The designation includes a total of 175,873 acres in six units of critical habitat located in seven San Joaquin Valley counties. Designated critical habitat for this species, however, does not occur in the Project or action area (USFWS 2021).

4.2.7.1 Biological Requirements and Life History

Fleshy owl's-clover grows 4 to 12 inches tall and has spear-shaped leaves with smooth edges. Inflorescences are spike-like with green, spear-shaped bracts that are generally larger than the deep yellow to orange flowers. It blooms from April to May (Hickman 1993).

Fleshy owl's-clover is found on acidic soils in vernal pool grassland complexes at elevations between 160 and 2,400 feet. Fleshy owl's-clover is found in Fresno, Madera, Merced, Mariposa, San Joaquin, and Stanislaus Counties.

Habitat loss resulting from development, agriculture, overgrazing, and trampling poses the greatest threat to existing populations (CNPS 2011).

4.2.7.2 Occurrence in the Project Vicinity

Potentially suitable vernal pool habitat for fleshy owl's-clover has been identified in the action area (Appendix A, Figure 10; CDFW 2021). CNDDB occurrence data identify this species directly north of the Project area within the action area. In particular, fleshy owl's-clover is widely distributed in vernal pools on the Ichord Ranch. Fleshy owl's-clover is therefore known to occur in the action area.

4.2.8 Hairy Orcutt Grass

Hairy Orcutt grass was listed as a federally endangered species in March 1997 (62 FR 14338). This flowering plant is fully protected under the ESA (16 U.S.C. 1531 et seq.). This species is addressed in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

Critical habitat for this species was first designated in 2003 (68 FR 46684), with a revised designation established in 2005 (70 FR 46923). Species by unit designations were published in 2006 (71 FR 7118). Designated critical habitat for this species, however, does not occur in the Project or action area (USFWS 2021).

4.2.8.1 Biological Requirements and Life History

Hairy Orcutt grass has several stems that are 2 to 8 inches tall and that branch only from the lower nodes. Each stem ends in a long, spike-like inflorescence. Leaves are grayish, with soft, straight hairs. The upper spikelets are densely crowded and hairy. It blooms from May to September (Hickman 1993).

Hairy Orcutt grass is found on volcanic basalt or clay substrates in vernal pool grassland complexes at elevations between 150 and 650 feet. This species is found in Butte, Glenn, Madera, Merced, Stanislaus, and Tehama Counties.

Habitat loss resulting from development, agriculture, overgrazing, trampling, and displacement by non-native plants poses the greatest threat to existing populations (CNPS 2011).

4.2.8.2 Occurrence in the Project Vicinity

Two historical occurrences of the hairy Orcutt grass have been recorded outside of the analysis area and greater than 3 miles from the Project area. Hairy Orcutt grass has not been documented within 3 miles of the Project area (CDFW 2021) or within the action area (Appendix A, Figure 10; CDFW 2021). However, a large, playa-type pool within the action area may provide suitable habitat for the species. In turn, their presence cannot be discounted due to incomplete information on the taxon’s distribution or habitat requirements or the lack of focused surveys for the taxon within the Project area and action area. The species is considered to have some potential, albeit low, to occur within the Project site.

4.2.9 San Joaquin Valley Orcutt Grass

San Joaquin Valley Orcutt grass was listed as a federally threatened species in March 1997 (62 FR 14338). This flowering plant is fully protected under the ESA (16 U.S.C. 1531 et seq.). This species is addressed in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

Critical habitat for this species was first designated in 2003 (68 FR 46684), with a revised designation established in 2005 (70 FR 46923). Species by unit designations were published in 2006 (71 FR 7118). The designation includes a total of 136,312 acres in six units of critical habitat located in five San Joaquin Valley counties. Designated critical habitat for this species, however, does not occur in the Project or action area (USFWS 2021).

4.2.9.1 Biological Requirements and Life History

San Joaquin Valley Orcutt grass is a small, tufted annual in the grass family (Poaceae). Mature plants grow in tufts of several erect stems, each of which ranges from 2.0 to 11.8 inches long. The entire plant is grayish-green, due to long hairs on the stem and leaves. The oval lemmas are 0.16 to 0.20 inch long, and their tips are divided into five teeth approximately 0.08 inch long; the central tooth is longer than the others, hence the name inaequalis (“unequal”). At maturity, the spikelets of the plant are aggregated into a dense, hat-shaped cluster, which separates it from other members of the genus Orcuttia. The bloom period for this species is generally between April and September.

San Joaquin Valley Orcutt grass is typically found in Northern Claypan, Northern Hardpan, and Northern Basalt Flow vernal pools within rolling grassland on alluvial fans, high and low stream terraces, and tabletop lava flows (USFWS 2005). Occupied pools range in surface area from 0.05 to 12.1 acres, with a median area of 1.54 acres (USFWS 2005).

Historically, this species has been restricted to the Southern Sierra Foothills Vernal Pool Region; prior to 1990, 20 occurrences had been reported in Merced, Madera, and Fresno Counties. Since 1990, 18 additional occurrences have been found.

Threats to San Joaquin Valley Orcutt grass populations include habitat loss due to highway construction, residential development, and other forms of urbanization. Other threats include inappropriate grazing and foraging during grasshopper outbreaks (USFWS 2005).

4.2.9.2 Occurrence in the Project Vicinity

Potentially suitable vernal pool habitat for San Joaquin Valley Orcutt grass has been identified in the action area. Previous surveys within the action area have identified five occurrences of this species in vernal wetlands adjacent to the northern boundary of the Project area (Appendix A, Figure 10; CDFW 2021). In addition, San Joaquin Valley Orcutt grass is known from a small number of scattered occurrences on the Ichord Ranch farther north of the Project area. San Joaquin Valley Orcutt grass is known to occur in the action area.

5. Effects of the Proposed Action

This section describes potential and anticipated effects from the proposed action on USFWS-listed species with the potential to occur in the action area and their habitats.

Effects of the proposed action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action, and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (83 FR 35178).

Effects on federally listed species will be considered adverse if they result in any of the following:

- Direct mortality of a federally-listed species
- Loss of occupied habitat of a federally listed species
- Temporary impacts on habitats such that federally listed species suffer increased mortality or lowered reproductive success
- Permanent loss of habitat determined to be critical and/or essential to federally listed species
- Substantial reductions in the size of a population of federally listed species
- Substantial reduction in the quantity or value of habitats in which federally listed populations occur

Alleviation or lessening of impacts is predominantly achieved through the implementation of conservation measures identified in Sections 2.3.

5.1 San Joaquin Valley Kit Fox

The SJKF is a special-status fossorial (burrow-digging) mammal with potential to occur in the action area. The SJKF is a subspecies of the kit fox, the smallest canid species in North America. Habitat loss and fragmentation associated with urbanization and agricultural/industrial land uses are related to the decline of its population.

SJKF are unlikely to use the action area for denning and reproduction. Most of the Project area occurs in agricultural areas (Appendix A, Figure 4) that are largely unsuitable for denning because of incompatible land use practices and frequent human disturbances. However, all portions of the Project area may be used for foraging and as a movement corridor. Most of the proposed detention basin consists of almond orchard, which represents low-quality foraging habitat for SJKF, which prefer to hunt in open areas mainly for ground-dwelling rodents. Although they could use habitat in the almond orchard, other more suitable proximate habitat make regular use of the orchards unlikely. The hay crop fields represent more suitable foraging habitat for SJKF because those habitats are open and likely support forage species. In particular, California ground squirrel burrows are present in areas adjacent to the hay fields. The proximity of these agricultural areas to adjacent grasslands greatly increases the probability that SJKF could occur in the action area during the period of construction.

The undeveloped annual grasslands to the north represent higher-quality habitat for SJKF. Denning is unlikely to occur in the footprint of the embankment or near the creek in general because of regular flooding; SJKF have a greater potential to den in adjacent hilly areas. There are two occurrences of SJKF north of the Project area. One occurrence is approximately 0.5 mile northeast of the basin limit; a second record (foraging SJKF) occurs approximately 1 mile north of the basin limit. Other records in the general vicinity further suggest this species may use the action area for foraging or as a migratory corridor.

Although there is a low probability that SJKF will den within the action area, undeveloped grassland areas provide suitable habitat that will support foraging. Individuals may, therefore, regularly or periodically occur within the action area during the year.

Construction of the Project could result in the temporary displacement of SJKF that may occur in the area during the period of construction. Most likely however, any SJKF moving through the general vicinity will avoid the action area as a result of construction activity, noise, and other human disturbance. SJKF displaced during construction activities will incur temporary loss of foraging habitat until construction activities are completed. The only anticipated harm, harassment, or potential direct mortality of SJKF that could occur as a result of construction activity would be if dens in the Project area are destroyed by grading or other construction activities. The implementation of conservation measures (Section 3.3) is anticipated to limit the potential for this to occur to the extent that it is considered discountable.

Over the long-term, operation and maintenance activities could periodically displace SJKF in the area as a result of noise and other human activities. Additionally, the Project will result in the permanent loss or degradation of SJKF foraging habitat through the development of the north detention basin, including the construction of embankments. However, the quality and extent of habitat that will be modified is not considered critical to the species and will not likely affect reproductive success of individuals. Construction will result in the loss of agriculture/pasture habitat associated with construction of embankments, basin excavation, and tributary and riparian enhancement activity. Following excavation and tributary establishment, native riparian and oak woodland communities will be established (Appendix A, Figure 4), improving the available foraging habitat and cover for SJKF. Loss of agriculture/pasture community will result in temporary loss of foraging habitat during construction and periods when the north basin area is inundated.

Overall, the potential for adverse effects on SJKF over both the short term and long term as a result of the proposed action is considered discountable, and any direct or indirect effects that occur will likely be minimal.

5.2 California Tiger Salamander

Adult CTS inhabit rodent burrows or other natural crevices found in grassland, coastal sage scrub, or deciduous oak woodland communities. To support spawning and larvae survival, these communities must have seasonal or fishless natural ponds, vernal pools, intermittent streams, or stock ponds. Although this species is typically considered a vernal pool species, it also extensively uses stock ponds for breeding and, in many areas, may rely on these artificial habitats as their primary breeding/larval habitat. Tiger salamanders disperse onto upland habitats and use small mammal burrows (such as California ground squirrel burrows) for refugia. Suitable habitat for the CTS, therefore, usually extends well beyond the wetland areas. Dispersal distances by CTS are estimated to be at least 1 mile (Austin and Shaffer 1992).

It is unknown whether CTS use the vernal pools, other wetland habitats, or upland dispersal habitats in the Project area and/or in the action area. Most of the Project area represents low-quality habitat for amphibians because of the agricultural land use practices covering most of Project footprint. However, vernal pools and other wetlands in the action area represent potentially suitable breeding habitat and upland dispersal habitat. Based on habitat suitability and known occurrences within 3 miles of the Project, CTS are considered to have potential to occur in the action area; and without conducting focused surveys, their presence cannot be discounted.

During construction, CTS in the action area will be adversely temporarily affected by construction activities, including earthwork for construction of Project elements, vehicle traffic, noise, vibration, and other activity. Ground-breaking activity could result in mortality to CTS that are occupying burrows that may be destroyed or are moving through the area during active construction in non-native grassland habitat types (Appendix A, Figure 4). Added activity in the action area during construction may temporarily restrict dispersal, temporarily displace CTS, and temporarily restrict access to suitable habitat until construction activities have been completed. Water quality of vernal pools and other wetlands adjacent to construction may also be temporarily affected because of the fugitive dust and through the generation of runoff, temporarily reducing habitat quality for CTS until disturbed lands and restoration elements have stabilized/matured. Indirect effects to adjacent aquatic resources are expected to be minimal because BMPs (e.g., dust suppression) and a BRC air quality plan that addresses fugitive dust as a permit requirement will be in place to minimize dust and effects on water quality.

Potential upland/dispersal habitat will be temporarily affected in areas of northwest embankment construction in non-native annual grassland (approximately 1.60 acres). CTS upland dispersal and refugia suitable habitat is expected to be re-established on embankment substrates following construction, and impacts are considered temporary. A small amount of direct impact (approximately 0.198 acre of permanent impact) on CTS potential breeding habitat will occur in a riverine aquatic resource mapped adjacent to the proposed northwest embankment feature. Construction of the embankment will result in fill to potential CTS breeding habitat located in the northwest project extent. No direct impacts to vernal pool features will result from the proposed Project.

Over the long term, the Project is not expected to result in additional permanent loss of vernal pools, seasonal wetlands, or other wetland habitats. Embankment construction is not expected to be a barrier to long-term CTS dispersal. If CTS are present, upland refuge and dispersal opportunity are expected to be re-occupied on the constructed embankment and within the proposed restored habitat features (constructed habitat tributaries and riparian and oak woodland habitat installation; Appendix A, Figure 3).

In the action area, modeled hydrology is not significantly different from existing conditions pertaining to inundation extent and duration or maximum water change. Proposed hydrologic conditions (inundation duration, extent, or maximum water level change) are not anticipated to have long-term direct or indirect effect on CTS breeding, dispersal, or refugia. Surface water flow across the site and suitable habitats will not be impeded in a significant way nor will vernal pool or aquatic resource hydrology be significantly affected. Larger flood events will be retained onsite for no longer than 48 hours in the action area.

5.3 Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, and Vernal Pool Tadpole Shrimp

A complex of vernal pools (characterized as swales, pools, and playas) occurs in the non-native grasslands north of the proposed detention basin and adjacent to the footprint of the proposed northwestern embankment. Vernal pools form in Mediterranean climates where shallow depressions fill with rainwater during the rainy season and dry in the spring through evaporation. The pools form in areas where percolation is prevented by hard substrate, such as clay pan, hard pan, or volcanic material. Vernal pools typically occur as complexes of pools, sometimes with many small pools or fewer larger pools. CFS, VPFS, and VPTS occupy similar habitats and have been found or have potential to be found in the vernal pool habitats in the action area.

The CFS is considered to have low potential to occur in the action area, and VPFS and VPTS are known to occur in the action area. VPFS and VPTS have been documented in the vernal pool complex north of the proposed detention basin, and their records for occurrence originate from the area adjacent to the proposed western embankment (CDFW 2021).

Several vernal pools were delineated adjacent to the proposed northern embankment (Appendix A, Figures 4 and 5). Although direct impact on vernal pools will not occur, indirect effect on the features are expected. Indirect effects may include fugitive dust or temporary degradation of surface water quality during construction. These indirect effects are expected to be minimal as BMPs (e.g., dust suppression) and a BRC air quality plan that addresses fugitive dust as a permit requirement will be in place to minimize dust and effects on water quality. In this area, some non-vernal pool aquatic resources (Feature Riverine-01; Appendix A, Figure 5) will be fragmented by embankment construction, reducing area and habitat quality. Riverine features are not expected to provide habitat for VPTS, CFS, or VPFS. Only non-vernal, riverine features are expected to be directly affected by Project design features. Temporary construction access beyond the Project footprint will be limited to protect vernal pool features including exclusion fencing.

No direct impacts on vernal pool features will result from the proposed Project. The direct loss of vernal pools will be avoided; degradation of adjacent habitats will occur due to fragmentation of connecting features and impacts on soils in adjacent areas due to potential equipment access. Because of the regional rarity of vernal pool complexes and special-status branchiopods associated with vernal pools, potential impacts are limited to temporary impacts anticipated to occur over the short term during construction as a result of earthwork and other activities. If CFS, VPFS, and/or VPTS do occupy vernal pools that are temporarily modified or affected during construction, mortality to these species is not expected to occur.

Once construction is completed, any temporary impact on non-vernal pool wetlands and adjacent uplands will be restored to the extent feasible. Over the long term, direct mortality to ESA-listed branchiopods is not anticipated, as no active construction activities will continue. Temporary indirect impacts on vernal pools and available habitat will persist to some extent until construction ends and rehabilitated areas become established.

Based on 2D hydrologic modeling of existing and proposed flood return events, seasonal and episodic events will continue to provide hydrologic support to the vernal features with inundation duration and extent not expected to be significantly different. Under the proposed hydrologic conditions (inundation duration, extent, or maximum water level change), flood events are not anticipated to have long-term direct or indirect effects on vernal pool obligate species. Surface water flows across the site and suitable habitats will not be impeded in a significant way, nor will vernal pool or aquatic resource hydrology be significantly affected. Larger flood events will be retained onsite for no longer than 48 hours in the action area. Therefore, under proposed conditions, there will be no functional loss of the feature or displacement of vernal pool obligate species as compared to existing conditions. See Table 6 and Figures 7a through 7d, which show existing inundation extent and proposed inundation extent for selected flood returns.

Indirect temporary impacts and degradation of vernal pools will be minimized to the extent feasible, water quality measures will be implemented to protect adjacent wetlands (Section 401 permit requirements), and compensatory mitigation for aquatic resource impacts will be implemented. The amount and location of compensatory mitigation will be determined through agency coordination during the permitting processes but will likely occur through the purchase of credits from an approved offsite mitigation bank. Regardless, the destruction and/or modification of existing vernal pools during construction is not anticipated, and adverse impacts to CFS, VPFS, and VPTS are not expected to occur.

5.4 Colusa Grass, Fleshy Owl's-Clover, Hairy Orcutt Grass, and San Joaquin Valley Orcutt Grass

San Joaquin Valley Orcutt grass and fleshy owl's-clover have been documented in the Project action area directly adjacent to the Project area boundary. Colusa grass has been identified within 3 miles of the Project area, and hairy Orcutt grass has no occurrences within 3 miles of the Project area (CDFW 2021).

San Joaquin Valley Orcutt grass and fleshy owl's-clover are documented directly adjacent to the Project construction area in delineated wetland features west and north of the Project boundaries (CDFW 2021). San Joaquin Valley Orcutt grass grows in shallow playas and large or deep vernal pools. It grows on acidic soils that vary in texture from clay to sandy loam. Fleshy owl's-clover grows in small and large vernal pools, including shallower swales. Many of the known occurrences of this species are in eastern Merced County.

Colusa grass has not been documented within the action area (CDFW 2021) but has been recorded as occurring within 3 miles of the Project boundaries. Hairy Orcutt grass has not been identified within 3 miles of the Project area. Colusa grass and hairy Orcutt grass occur in vernal pools within valley and foothill grassland and are known to occur in Merced County.

No vernal habitats are proposed for impact under the Project. All direct impacts are associated with riverine features including a segment of Black Rascal Creek. No vernal resources have been delineated within the Project area, and emergent wetland features within the Project area are limited to segments of Black Rascal Creek and are not proposed for direct impacts (Appendix A, Figure 5). Habitats within the Project area are dominated by agriculture (agriculture/pasture or agriculture/orchard) with small areas of non-native grassland and disturbed lands (Appendix A, Figure 4).

Identified ESA-listed plants have no potential for occurring within the Project footprint and will not be directly affected by the Project. Construction activities could result in the temporary degradation of occupied or potentially suitable habitat in adjacent areas (for example, as a result of fugitive dust), thus reducing habitat quality in the areas subject to disturbance.

To avoid any potential impact or disturbance to ESA-listed plant populations, focused botanical surveys will be conducted during the appropriate season for identification, which for most plants is in spring or early summer. Surveys will be conducted prior to any ground-breaking activity and during the blooming period in accordance with the CDFW special-status plant survey protocol (CDFG 2009). If ESA-listed plant species are identified within the Project boundaries, USFWS will be notified, and Merced County will work with USFWS to avoid, minimize, and potentially compensate for potential direct and indirect effects on the species. Any habitats that have potential to support federally listed plant species and will be temporarily disturbed will be restored onsite to preconstruction conditions in areas determined appropriate during final design. Implementation of conservation measures are anticipated to minimize the potential temporary and indirect effects on ESA-listed plant species.

Short-term effects on ESA-listed plants to the extent that they will result in mortality are not anticipated. Preconstruction plant surveys will relocate any ESA-listed plant species of concern that may be affected as a result of groundbreaking activities. If adverse effects on ESA-listed plants in the area occur as a result of construction activities, it will likely be related to the suspension of fugitive dust. Any short-term adverse effects as a result of construction activity are considered discountable; and if they occur, they will likely be minimal.

Based on 2D hydrologic modeling of existing and proposed flood return events, seasonal and episodic events will continue to provide hydrologic support to the vernal features with inundation duration and extent not expected to be significantly different. Therefore, there will be no functional loss of the feature or displacement of vernal pool obligate species as compared to existing conditions. See Table 6 and Figures 7a through 7d, which show existing inundation extent and proposed inundation extent for selected flood returns.

No adverse effects on ESA-listed plant species over the long term as a result of future operation and maintenance is anticipated. Inundation extent and duration in the action area will not occur to the extent, frequency, and duration that they are anticipated to adversely affect ESA-listed plant species (Appendix A, Figures 7a through 7d). Any long-term adverse effects as a result of construction activity are considered discountable; and if they occur, they will likely be minimal.

5.5 Cumulative Effects

Cumulative effects are defined in 50 *Code of Federal Regulations* 402.02 as "those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation." No known non-federal projects are planned in the action area in the future; therefore, cumulative effects are not anticipated to occur as a result of the proposed flood control Project.

6. Determination of Effects

6.1 San Joaquin Valley Kit Fox

Merced County has determined that the proposed action **may affect but is Not Likely to Adversely Affect**, SJKF over the short term as a result of construction activity.

Merced County has also determined that the proposed action **may affect but is Not Likely to Adversely Affect**, SJKF over the long term as a result of future operation and maintenance activities.

6.2 California Tiger Salamander

The proposed action will directly and permanently affect non-native grassland habitat type (suitable CTS upland dispersal habitat) in the area of embankment. Upland dispersal habitat is expected to be replaced over time as CTS re-establish burrows in the embankment substrates. Embankment construction activity in areas of non-native annual grassland have the potential to bury or excavate CTS burrows and CTS if present. Direct effect to potentially suitable CTS breeding habitat is anticipated in one location (riverine). No direct effect to vernal features will occur. The proposed action has the potential to result in indirect effects on vernal pools resources adjacent to the Project area, as a result of embankment construction and basin construction. Merced County has determined that as a mobile vernal pool-associated species that uses suitable upland habitats and specific vernal or emergent habitats in the action area, the proposed action **may affect and is Likely to Adversely Affect** CTS over the short term as a result of construction activity and fill.

If CTS do occur in the action area, the proposed action will temporarily restrict dispersal capabilities of individuals due to the embankment placement adjacent and construction of the north basin within the agricultural pasture habitat type. Although CTS in the area will have access to other available habitat in the vicinity, habitat will be limited until temporary effects from construction cease and potentially degraded areas are rehabilitated. However, this would not be anticipated to result in mortality to the species or adversely affect CTS at the population level. Due to the described Project direct and indirect effect on CTS upland dispersal and potential breeding habitat, Merced County has determined that the proposed action **may affect and is Likely to Adversely Affect** CTS over the long term as a result of fragmentation and degraded habitat.

6.3 Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, and Vernal Pool Tadpole Shrimp

The proposed action will not result in permanent direct loss of vernal pools and associated habitats within the Project boundaries as a result of embankment construction. Merced County has therefore determined that as vernal pool-associated species, the proposed action **may affect and is Not Likely to Adversely Affect** CFS, VPFS, and VPTS over the short term as a result of construction activity.

If ESA-listed branchiopods do occur in the action area, the proposed action will fragment habitat and reduce quality of available habitat due to the construction and placement of embankments around the detention basin, particularly in the vernal pool complex to the north. Habitat quality is not expected to be influenced by altered hydrologic regime over the long term. Although CFS, VPFS, and VPTS in the area may be able to colonize other available habitat in the vicinity, habitat will be limited (or degraded) until construction ceases and potentially degraded areas are rehabilitated. Therefore, Merced County has determined that the proposed action **may affect and is Not Likely to Adversely Affect** CFS, VPFS, and VPTS over the long term as a result of fragmentation and degraded habitat, as well as altered hydrology.

6.4 Colusa Grass, Fleshy Owl's-Clover, Hairy Orcutt Grass, and San Joaquin Valley Orcutt Grass

The proposed action has the potential to result in temporary indirect effects on vernal pools and associated habitats within the action area resulting from adjacent embankment construction and other Project construction activities. However, preconstruction botanical surveys will be conducted, and any ESA-listed plant species found in areas that require earthwork will be relocated (earthwork is limited to riverine features). No mortality for ESA-listed plants is anticipated, and any indirect effects that were to occur as a result of construction will likely be minimal (as a result of fugitive dust/water quality). Merced County has therefore determined that the proposed action **may affect but is Not Likely to Adversely Affect** Colusa grass, fleshy owl's-clover, hairy Orcutt grass, and San Joaquin Valley Orcutt grass over the short term as a result of construction activity.

Merced County has also determined that the proposed action **may affect but is Not Likely to Adversely Affect** Colusa grass, fleshy-owl's clover, hairy Orcutt grass, and San Joaquin Valley Orcutt grass over the long term as a result of future operation and maintenance activities.

7. References

AmphibiaWeb.org. 2020. California Tiger Salamander – *Ambystoma californiense.* Accessed August 28, 2020. https://amphibiaweb.org/cgi/amphib_query?where-genus=Ambystoma&where-species=californiense&account=amphibiaweb.

Austin, C.C., and H.B. Shaffer. 1992. "Short-, Medium, and Long-term Repeatability of Locmotro Performance in the Tiger Salamander *(Ambystoma californiense)*." *Functional Ecology.* 6:145-153.

Bumgardner Biological Consulting. 2018. *Black Rascal Creek Flood Protection Project, Biological Evaluation, Merced County, California*. October.

Cai, Wenju, Simon Borlace, Matthieu Lengaige, Peter van Rensh, Mat Collins, Gabriel Vecchi, Axel Timmerman, Agus Santoso, Michael J. McPhaden, Lixin Wu, Matthew H. England, Guojian Wang, Eric Guilyardi, and Fei-Fei Jin. 2014. "Increasing Frequency of Extreme El Niño Events Due to Greenhouse Warming." *Nature Climate Change.* (4), pp. 111–116. January 19.

CaliforniaHerps.com. 2020. California Tiger Salamander - *Ambystoma californiense*. Accessed August 25, 2020. http://www.californiaherps.com/salamanders/pages/a.californiense.html.

California Department of Fish and Wildlife (CDFW). 2021. California Natural Diversity Database (CNDDB). Accessed August 2020. https://www.wildlife.ca.gov/data/cnddb/maps-and-data.

California Department of Fish and Game (CDFG). 2009. *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities*. California Natural Resources Agency. Sacramento, California. November 24.

California Department of Water Resources (DWR). 2013. *California's Flood Future*. Attachment C: History of California Flooding. Public review draft. April.

California Native Plant Society (CNPS). 2011. Inventory of Rare and Endangered Plants of California. Online edition, v7-06c. California Native Plant Society. Sacramento, California. Accessed March 15, 2011. http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi.

Cypher, Brian L., Gregory D. Warrick, Mark R.M. Otten, Thomas P. O'Farrell, William H. Berry, Charles E. Harris, Thomas T. Kato, Patrick M. McCue, Jerry H. Scrivner, and Bruce W. Zoellick. 2000. "Population Dynamics of San Joaquin Kit Foxes at the Naval Petroleum Reserves in California." *Wildlife Monographs*. No. 145, 43 pp.

Egoscue, Harold J. 1962. "Ecology and Life History of the Kit Fox in Tooele County, Utah." *Ecology*. 43:481-497.

Eng, L., D. Belk, and C. H. Eriksen. 1990. "Californian Anostraca: Distribution, Habitat, and Status." *Journal of Crustacean Biology*. 10:247-277.

Eriksen, C.H., and D. Belk. 1999. *Fairy Shrimps of California's Puddles, Pools, and Playas*. Eureka, CA: Mad River Press.

Federal Emergency Management Agency (FEMA). 2010. *Flood Insurance Study: Merced County, California and Incorporated Areas*. September 15.

Goals Project. 2000. *Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements of Key Plants, Fish and Wildlife*. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. P.R. Olofson, editor. San Francisco Bay Regional Water Quality Control Board, Oakland, California.

Helm, B.P. 1998. "Biogeography of Eight Large Branchiopods Endemic to California." Pages 124-139 in: C.W. Witham, E.T. Bauder, D. Belk, W.R. Ferren, Jr., and R. Ornduff, editors. *Ecology, Conservation, and Management of Vernal Pool Ecosystems.* Proceedings from a 1996 Conference. California Native Plant Society, Sacramento, California.

Hickman, J.C. (editor). 1993. *The Jepson Manual, Higher Plants of California*. University of California Press.

Holland, R.F. 1986. *Preliminary Descriptions of Terrestrial Natural Communities of California*. California Department of Fish and Game, Sacramento, California. Unpublished.

Holland, Robert F. 2009. *Central Valley Vernal Pool Complexes*. California Department of Fish and Game, Sacramento, California (data).

Jensen, C.C. 1972. *San Joaquin Kit fox Distribution*. U.S. Fish and Wildlife Service, Sacramento, California, 18 pp.

Merced County Association of Government (MCAG). n.d. Merced County, CA: Streams Project, Funding Request.

Morrell, S.H. 1972. "Life History of the San Joaquin Kit Fox." *California Fish and Game Journal*. 58(3): 162-174.

National Conservation Easement Database (NCED). 2018. East Merced Vernal Pool Grassland Preserve, Expansion 6. Accessed December 2018. https://www.conservationeasement.us/adv-search/query/id/975017.

National Oceanic and Atmospheric Administration (NOAA). 2014. *Fun with Statistics: El Niño and California Rainfall*. Accessed January 21, 2016. https://www.climate.gov/news-features/blogs/enso/fun-statistics-el-ni%C3%B1o-and-california-rainfall.

National Water Quality Monitoring Council. 2017. *Black Rascal Creek @ Yosemite Rd (CEDEN-535BRCAYR) Site Data in the Water Quality Portal*. Accessed March. https://www.waterqualitydata.us/portal/.

O'Farrell, T.P. 1983. *Recovery Plan, San Joaquin Kit Fox, Vulpes macrotis mutica*. U.S. Fish and Wildlife Service, Portland, Oregon. 84 pp.

Orloff, Susan, Frank Hall, Linda and Spiegel. 1986. "Distribution and Habitat Requirements of the San Joaquin Kit Fox in the Northern Extreme of Its Range." *Western Section Wildlife Society (CAL-NEV) Conference Transactions*. 22:60–70.

Patchett, Jesse. 2012. *Merced Integrated Regional Water Management Plan: Existing Regional Flood Management Summary*. Peterson Brustad, Inc. August 13.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. *A Manual of California Vegetation, 2nd Edition*. California Native Plant Society Press. Sacramento, California.

Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. *California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California*. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration. February 2010.

U.S. Army Corps of Engineers (USACE). 2005. Engineering and Design – EM 1110-2-2100 for Stability Analysis of Concrete Structures. December 1.

U.S. Fish and Wildlife Service (USFWS). 1998. *Recovery Plan for Upland Species of the San Joaquin Valley, California*. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service (USFWS). 1999. *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior To or During Ground Disturbance*. Prepared by the Sacramento Fish and Wildlife Office. June.

U.S. Fish and Wildlife Service (USFWS). 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*. U.S. Fish and Wildlife Service, Region 1, Portland, Oregon. December 15.

U.S. Fish and Wildlife Service (USFWS). 2008. *Atriplex coronata var. notatior (San Jacinto Valley crownscale) 5-Year Review: Summary and Evaluation.* March.

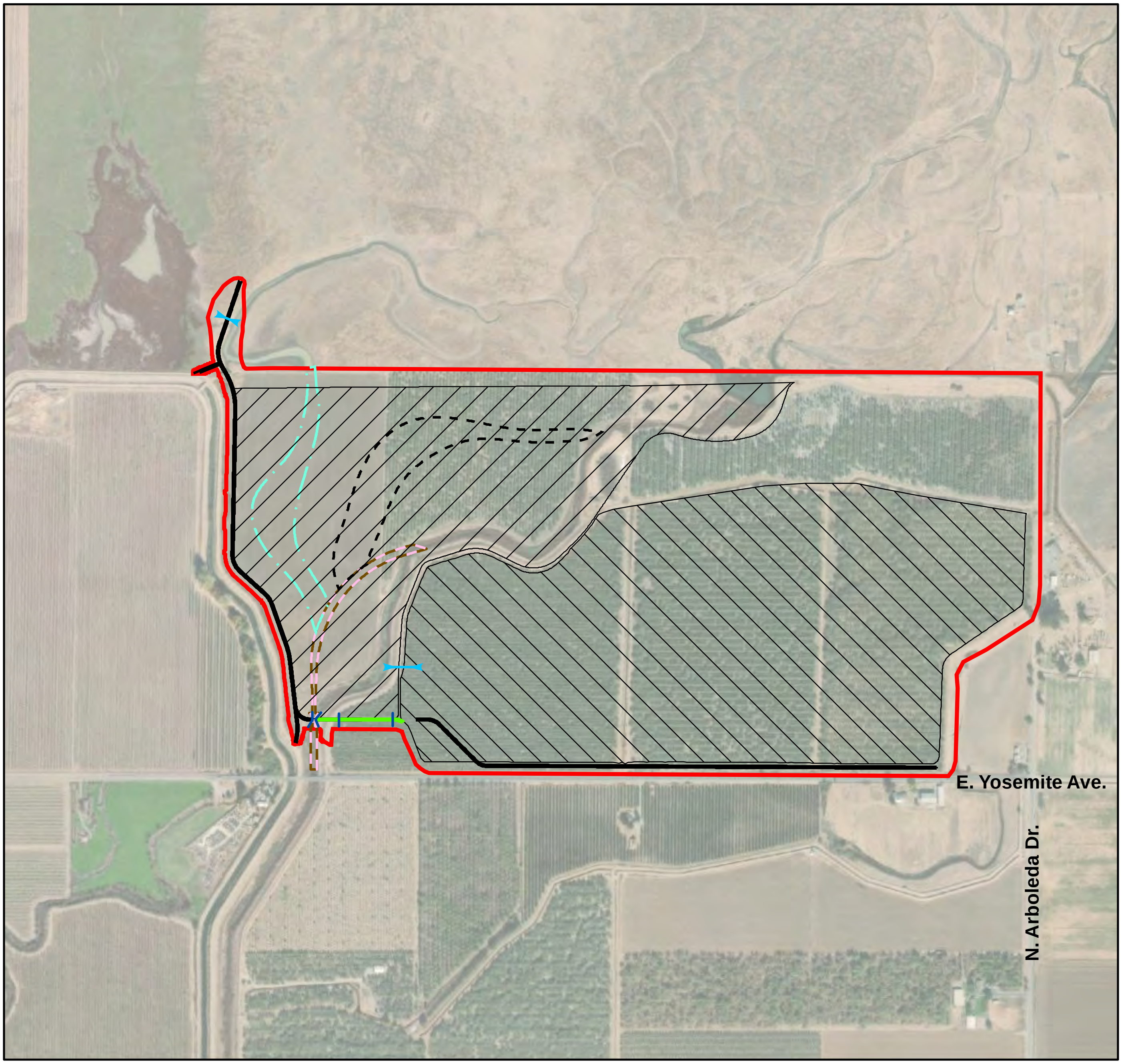
U.S. Fish and Wildlife Service (USFWS). 2010. *San Joaquin Kit Fox (Vulpes macrotis mutica) 5-Year Review: Summary and Evaluation*. Sacramento Fish and Wildlife Office. February.

U.S. Fish and Wildlife Service (USFWS). 2014. *California Tiger Salamander Central California Distinct Population Segment (Ambystoma californiense) 5-Year Review: Summary and Evaluation*. Sacramento Fish and Wildlife Office. October.

U.S. Fish and Wildlife Service (USFWS). 2021. Information for Planning and Consultation. Accessed August 2021. http://ecos.fws.gov/ipac/.

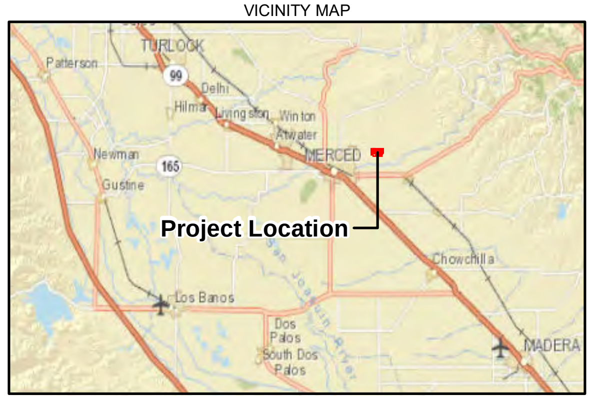
Warrick, Gregory D., Howard O. Clark, Patrick A. Kelly, Daniel F. Williams, and Brian L. Cypher. 2007. "Use of Agricultural Lands by San Joaquin Kit Foxes." *Western North American Naturalist*. 67(2), 270-277.

Appendix A
Figures



Project Area (296 acres)
North Basin
South Basin
Secondary Habitat Channel
Tributary Habitat Channel
Relocated Black Rascal Creek Diversion
External Embankment
Outlet Structure
Spillway
Culverts with Flap Gates

VICINITY MAP

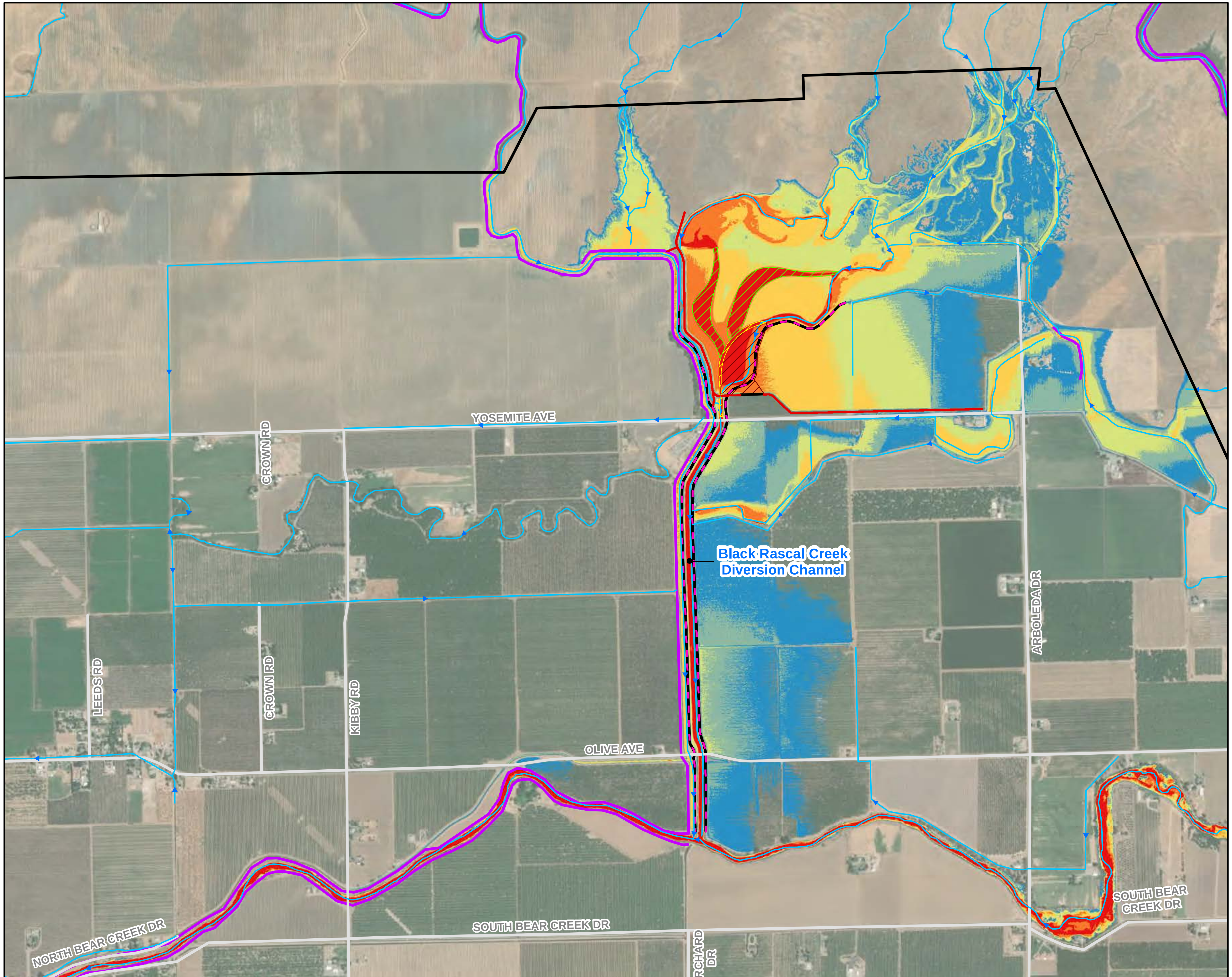


N

0 500 1,000
Feet

FIGURE 1
Project Area
Black Rascal Creek Flood Control Project

Jacobs



0 0.2 0.4 0.8
Miles

LEGEND

- National Hydrography Dataset Flowline
- Other Levee
- SPFC Levee
- HEC-RAS 2D Model Extent
- External Embankment
- Spillway
- Habitat Channel
- Realigned Channel
- Regraded Area

With Project 200-year

Maximum Flood Depth (ft)

- < 1
- 1 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- > 8

FIGURE 2
200-year Flood Extent
Black Rascal Creek Flood Control Project

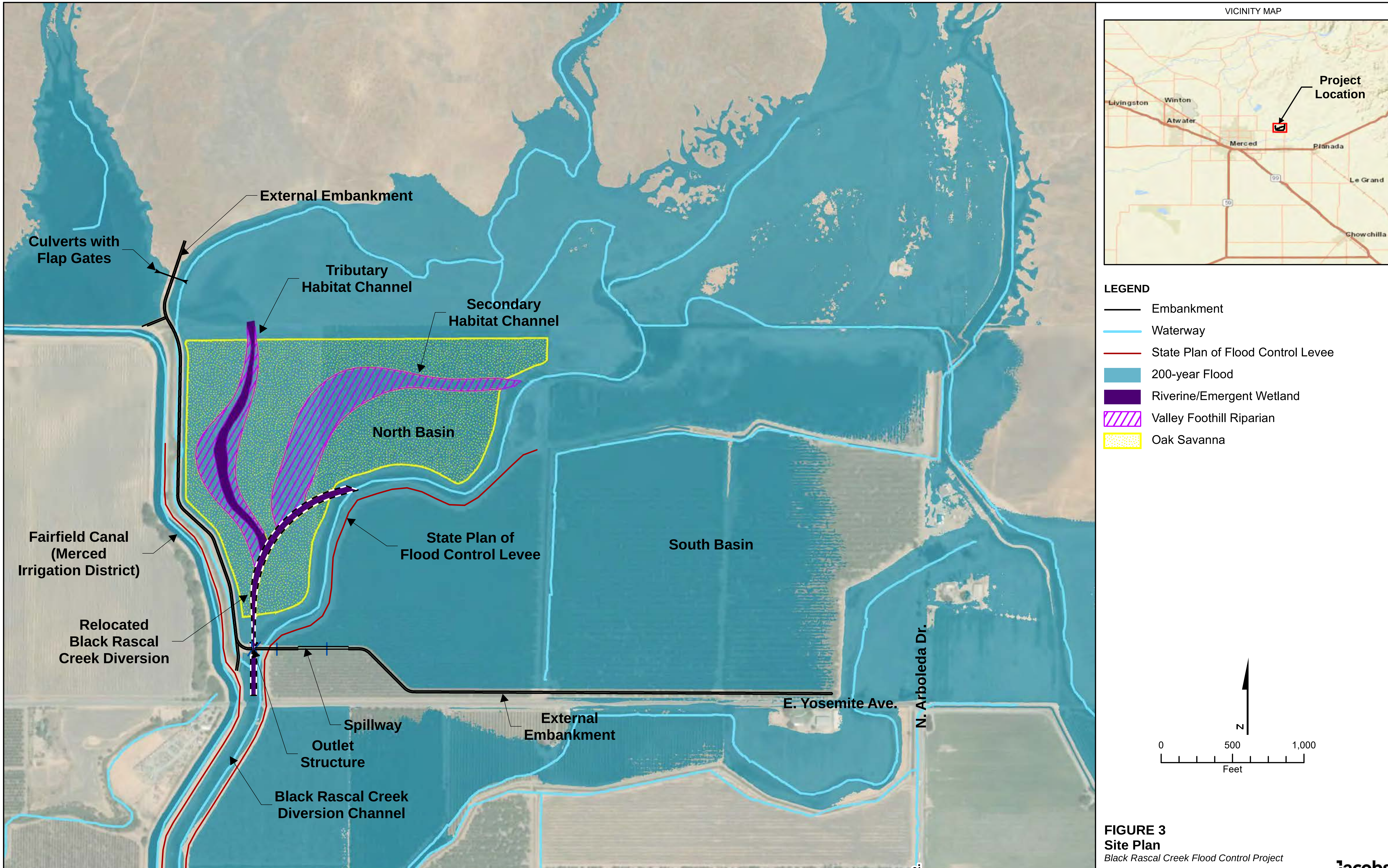


FIGURE 3
Site Plan
Black Rascal Creek Flood Control Project

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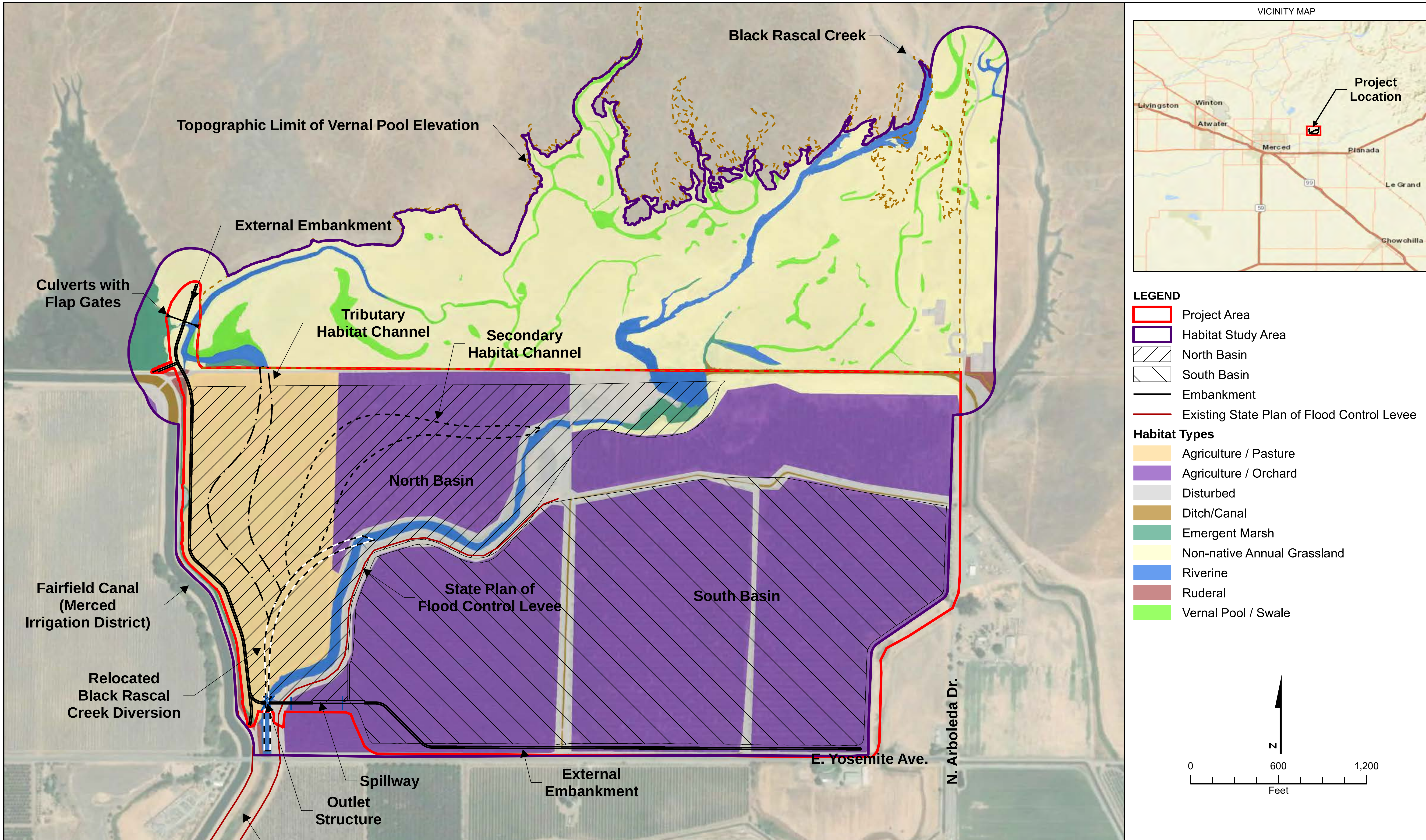


FIGURE 4
Habitat Types
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG4_HABITAT_MAP.MXD 3/25/2021 8:55:27 PM CARCHER

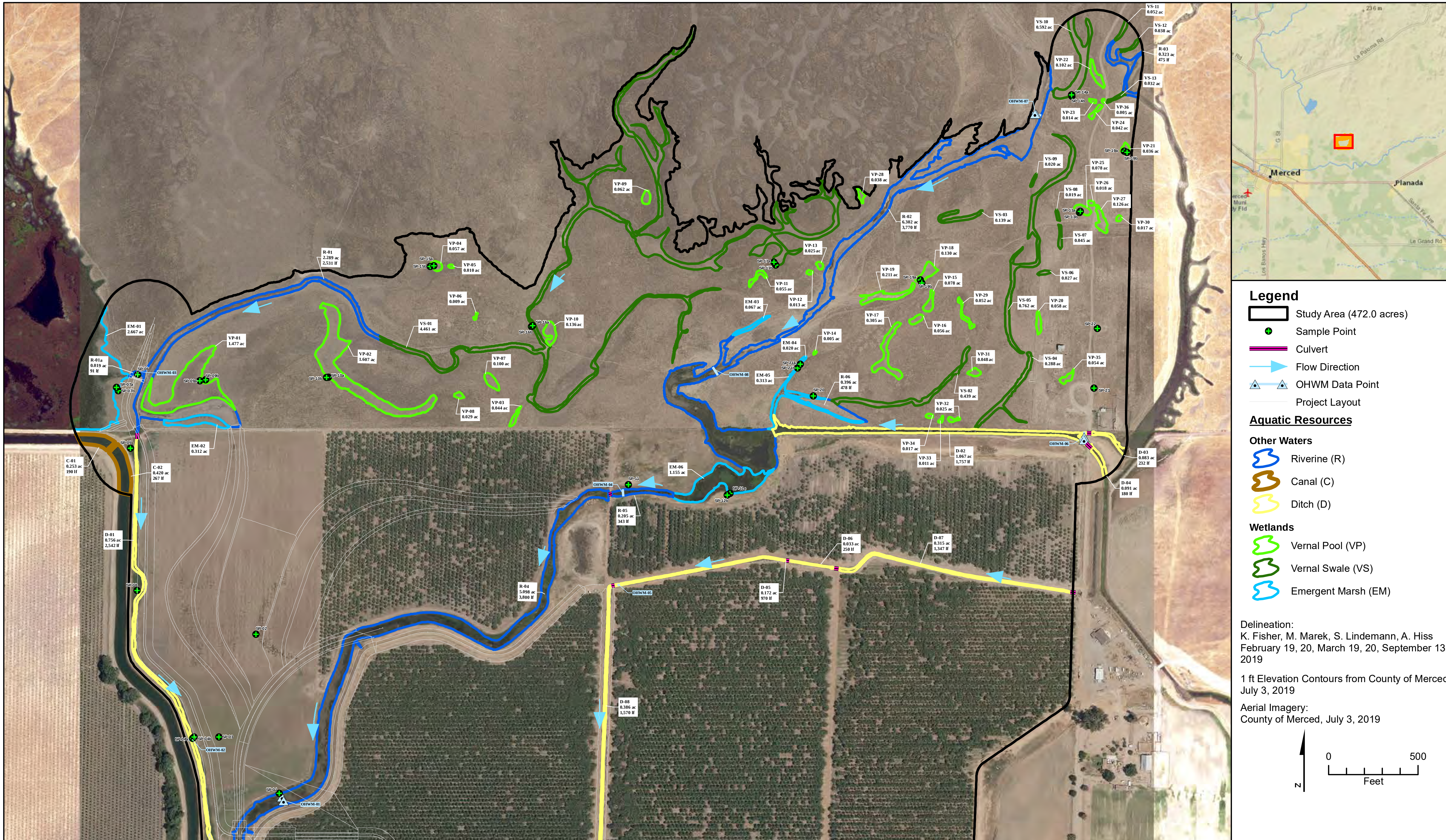
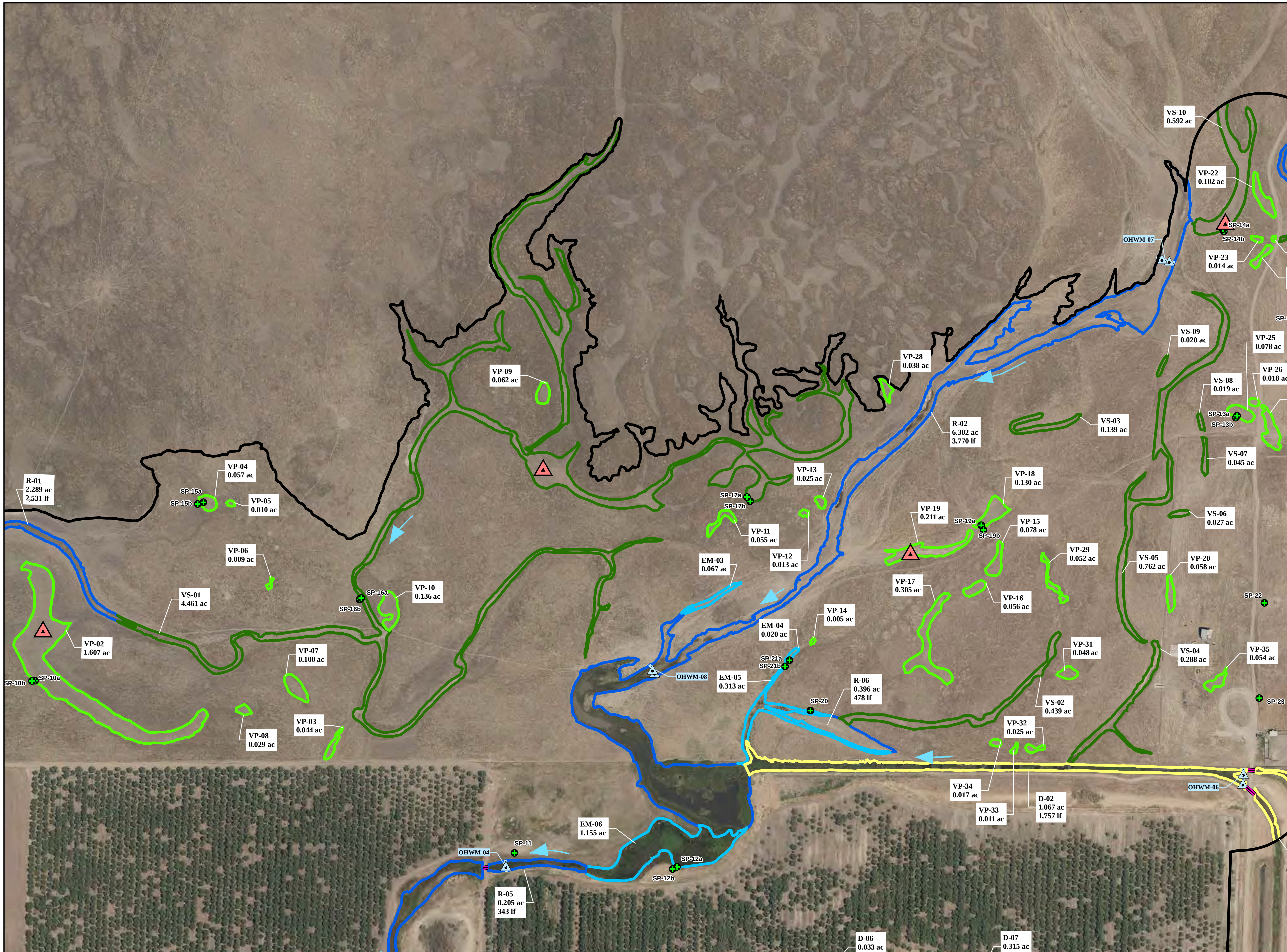


FIGURE 5
Black Rascal Creek Delineation and Project Layout
Black Rascal Creek Flood Control Project



Legend

- Study Area (470.2 acres)
- Water Level Comparison Location
- Sample Point
- Culvert
- Flow Direction
- OHWM Data Point

Aquatic Resources

Other Waters

- Riverine (R)
- Ditch (D)

Wetlands

- Vernal Pool (VP)
- Vernal Swale (VS)
- Emergent Marsh (EM)

Aerial Imagery:
County of Merced, July 3, 2019

N

0 335
Feet

FIGURE 6
Four Locations Used to Compare Existing and Proposed Flood Return Durations and Maximum Water Levels
Black Rascal Creek Flood Control Project

Jacobs

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG6_LOCATIONS_USED_TO_COMPARE_EXISTING_AND_PROPOSED_FLOOD_RETURN.MXD 3/26/2021 11:52:22 AM CARCHER

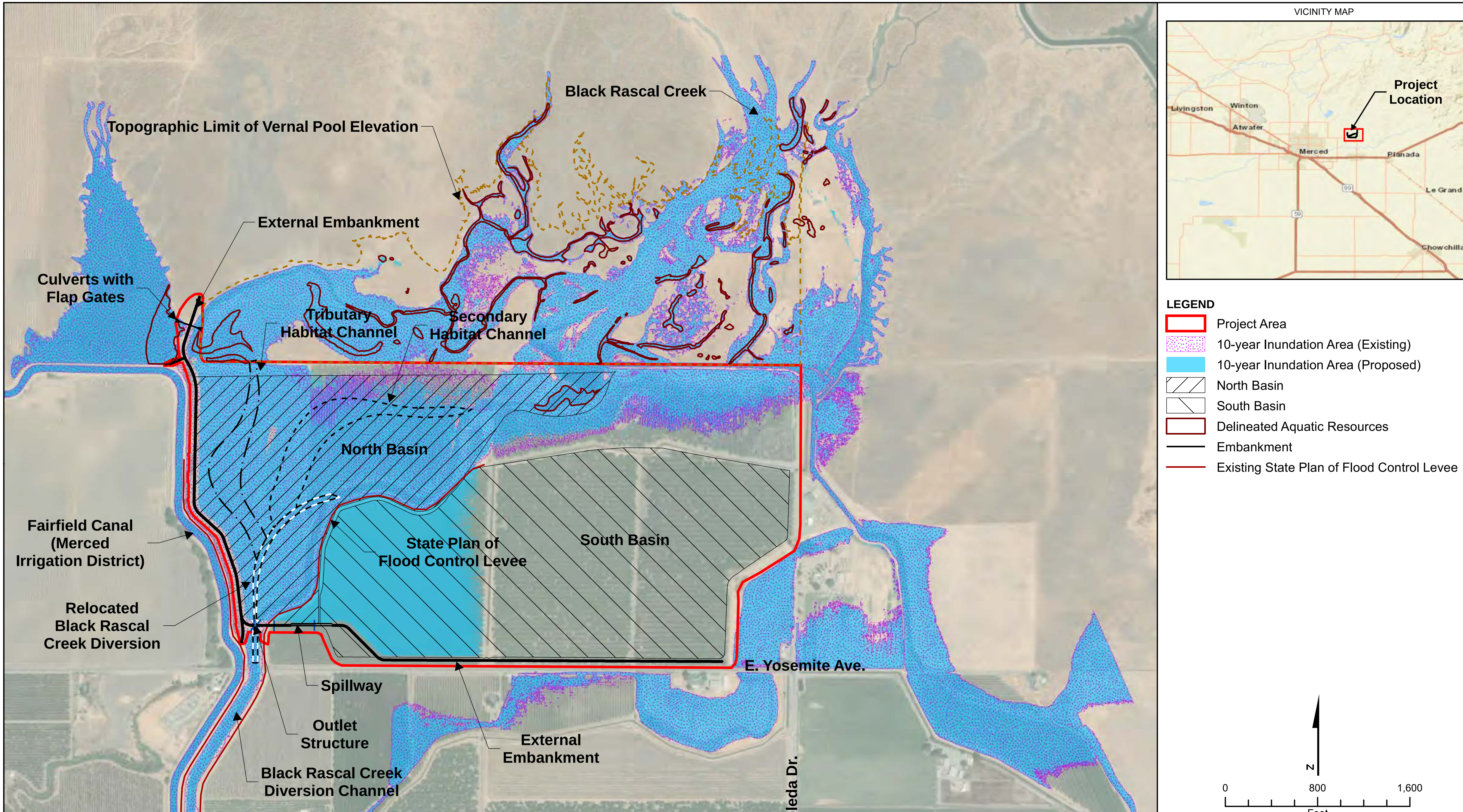


FIGURE 7a
10-year Inundation Area
Black Rascal Creek Flood Control Project

Jacobs

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG7A_INUNDATIONAREA_10YR_COMPARE.MXD 3/25/2021 9:20:27 PM CARCHER

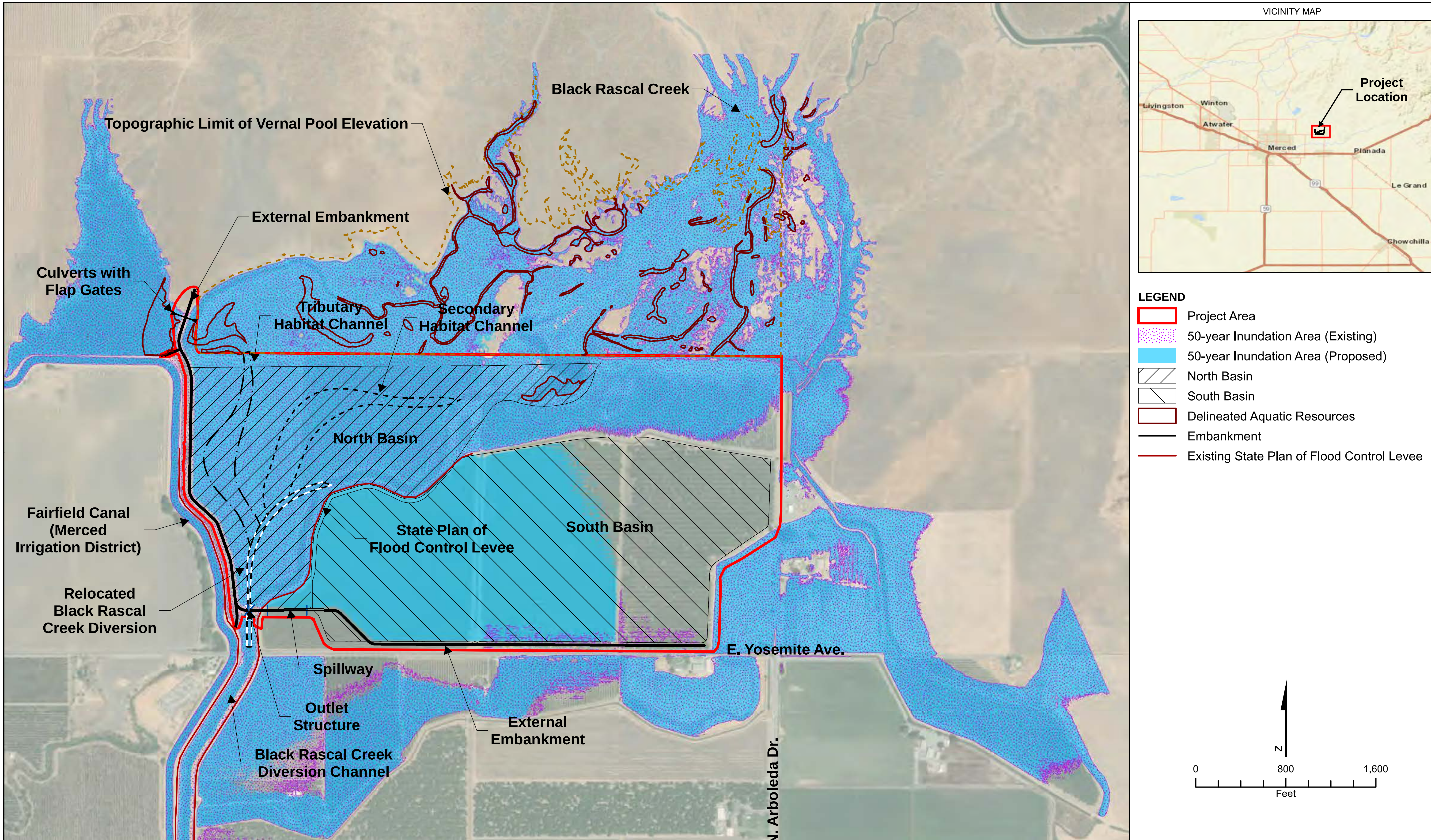
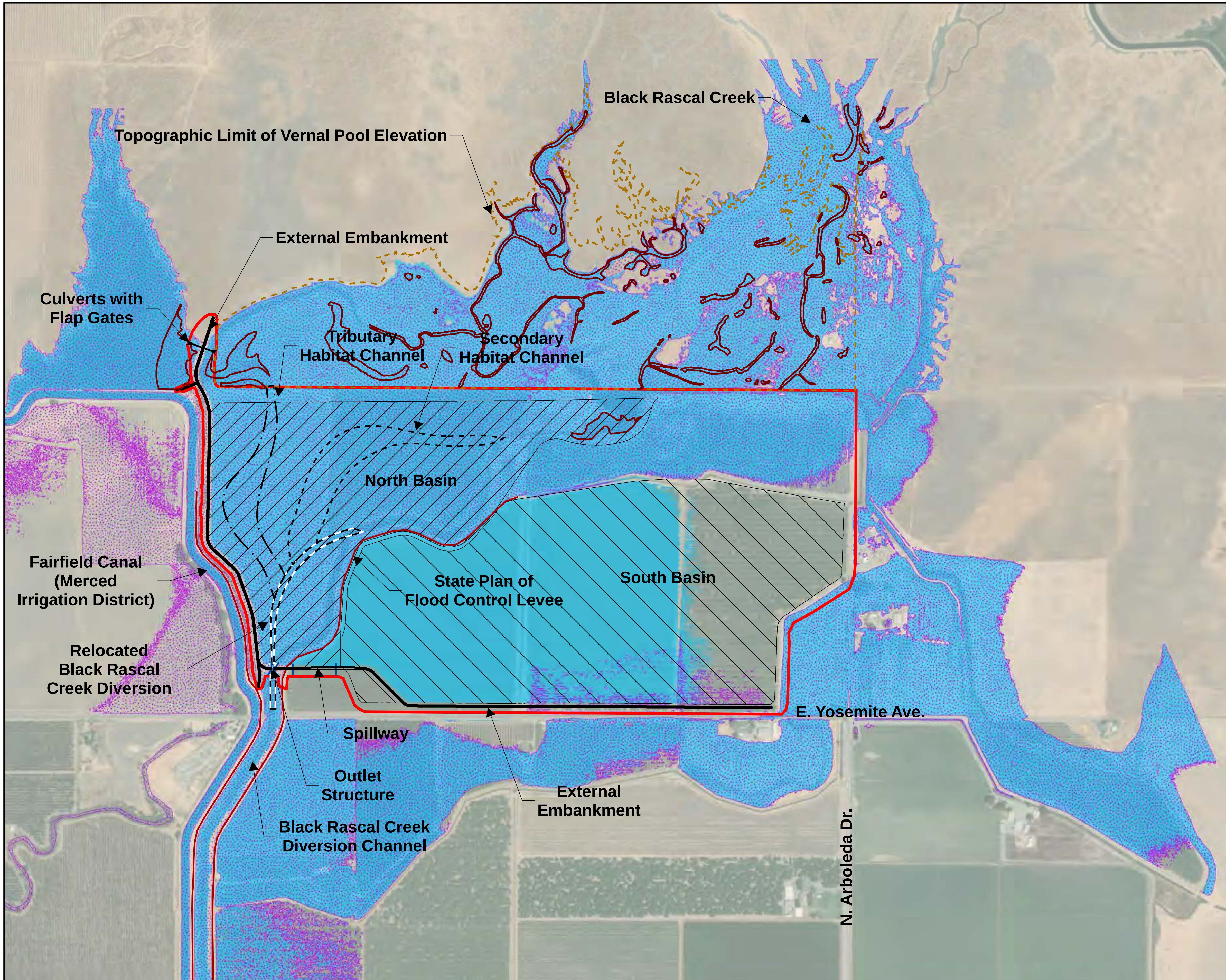


FIGURE 7b
50-year Inundation Area
Black Rascal Creek Flood Control Project

Jacobs

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG7B_INUNDATIONAREA_50YR_COMPARE.MXD 3/26/2021 10:28:48 AM CARCHER



VICINITY MAP

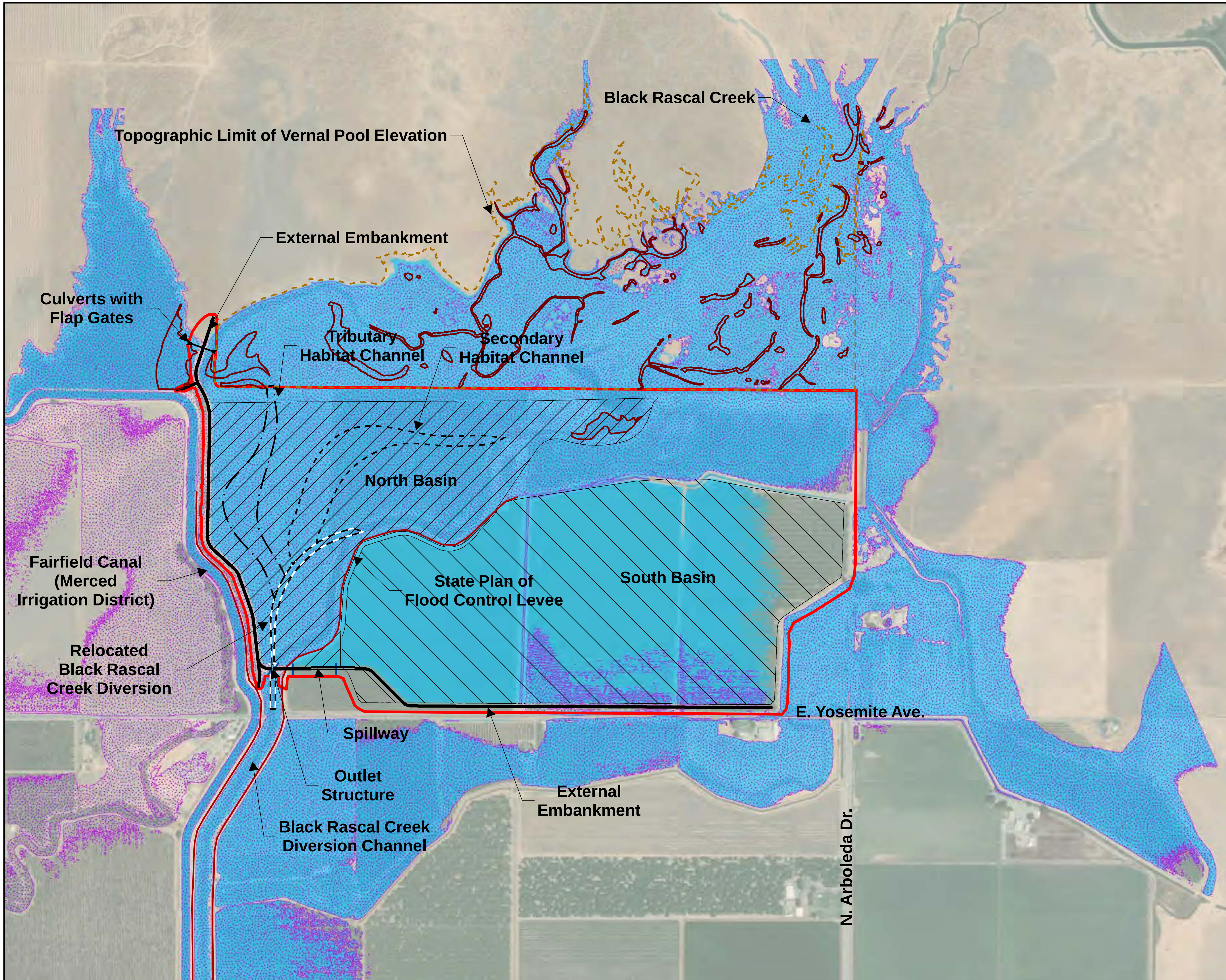
LEGEND

- Project Area
- 100-year Inundation Area (Existing)
- 100-year Inundation Area (Proposed)
- North Basin
- South Basin
- Delineated Aquatic Resources
- Embankment
- Existing State Plan of Flood Control Levee

FIGURE 7c
100-year Inundation Area
Black Rascal Creek Flood Control Project

Jacobs

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG7C_INUNDATIONAREA_100YR_COMPARE.MXD 3/25/2021 9:53:43 PM CARCHER



VICINITY MAP

LEGEND

- Project Area
- 200-year Inundation Area (Existing)
- 200-year Inundation Area (Proposed)
- North Basin
- South Basin
- Delineated Aquatic Resources
- Embankment
- Existing State Plan of Flood Control Levee

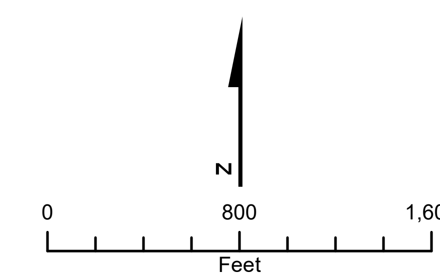
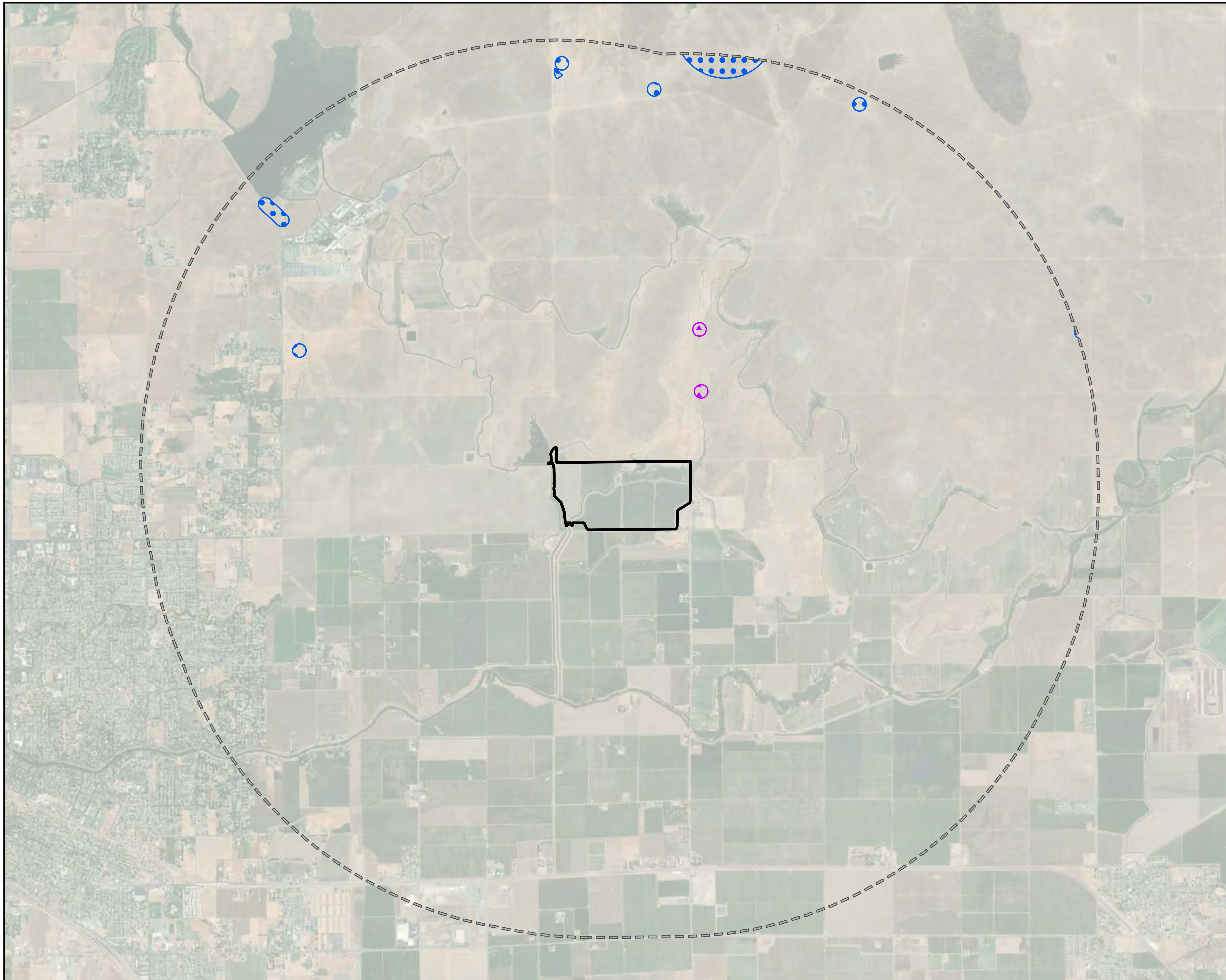


FIGURE 7d
200-year Inundation Area
Black Rascal Creek Flood Control Project

Jacobs

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG7D_INUNDATIONAREA_200YR_COMPARE.MXD 3/26/2021 11:35:26 AM CARCHER



LEGEND

Project Area

Project Area 3-mile Buffer

Animal Species Not Associated With Vernal Pools

California tiger salamander

San Joaquin kit fox

NOTES:

CALIFORNIA NATURAL DIVERSITY DATABASE (CNDDB). AVAILABLE AT HTTP://WWW.DFG.CA.GOV/BIOGEODATA/CNDDB/MAPSANDDATA.ASP. ACCESSED FEB 2021

BASEMAP SOURCE: ESRI

N

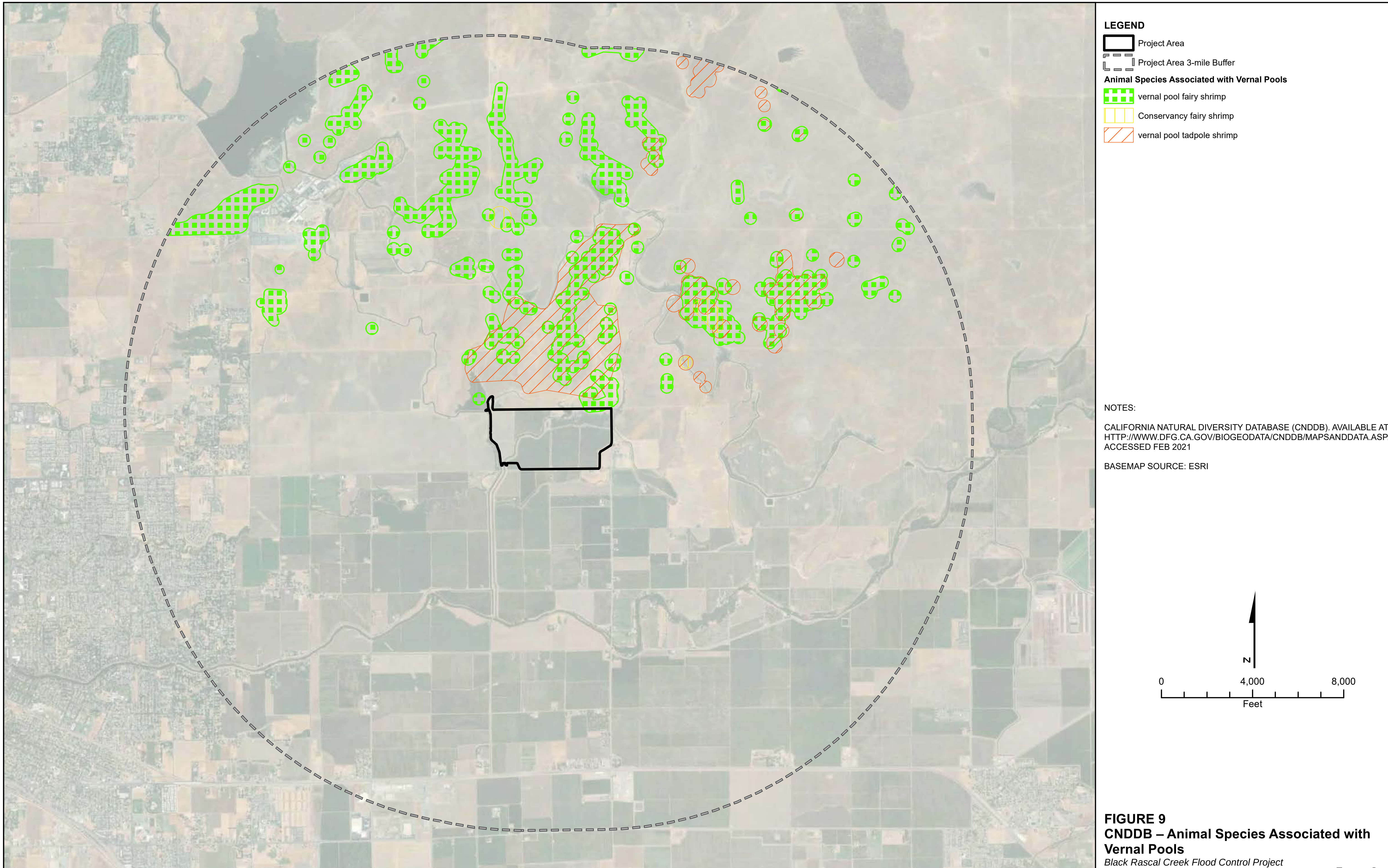
0 4,000 8,000

Feet

FIGURE 8
CNDDB – Animal Species Not Associated with Vernal Pools
Black Rascal Creek Flood Control Project

Jacobs

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG8_CNDDB_NON_VERNALPOOLANIMALS.MXD 3/26/2021 10:53:01 AM CARCHER



NOTES:

CALIFORNIA NATURAL DIVERSITY DATABASE (CNDDB). AVAILABLE AT HTTP://WWW.DFG.CA.GOV/BIOGEODATA/CNDDB/MAPSANDDATA.ASP. ACCESSED FEB 2021

BASEMAP SOURCE: ESRI

FIGURE 9
CNDDB – Animal Species Associated with Vernal Pools
Black Rascal Creek Flood Control Project

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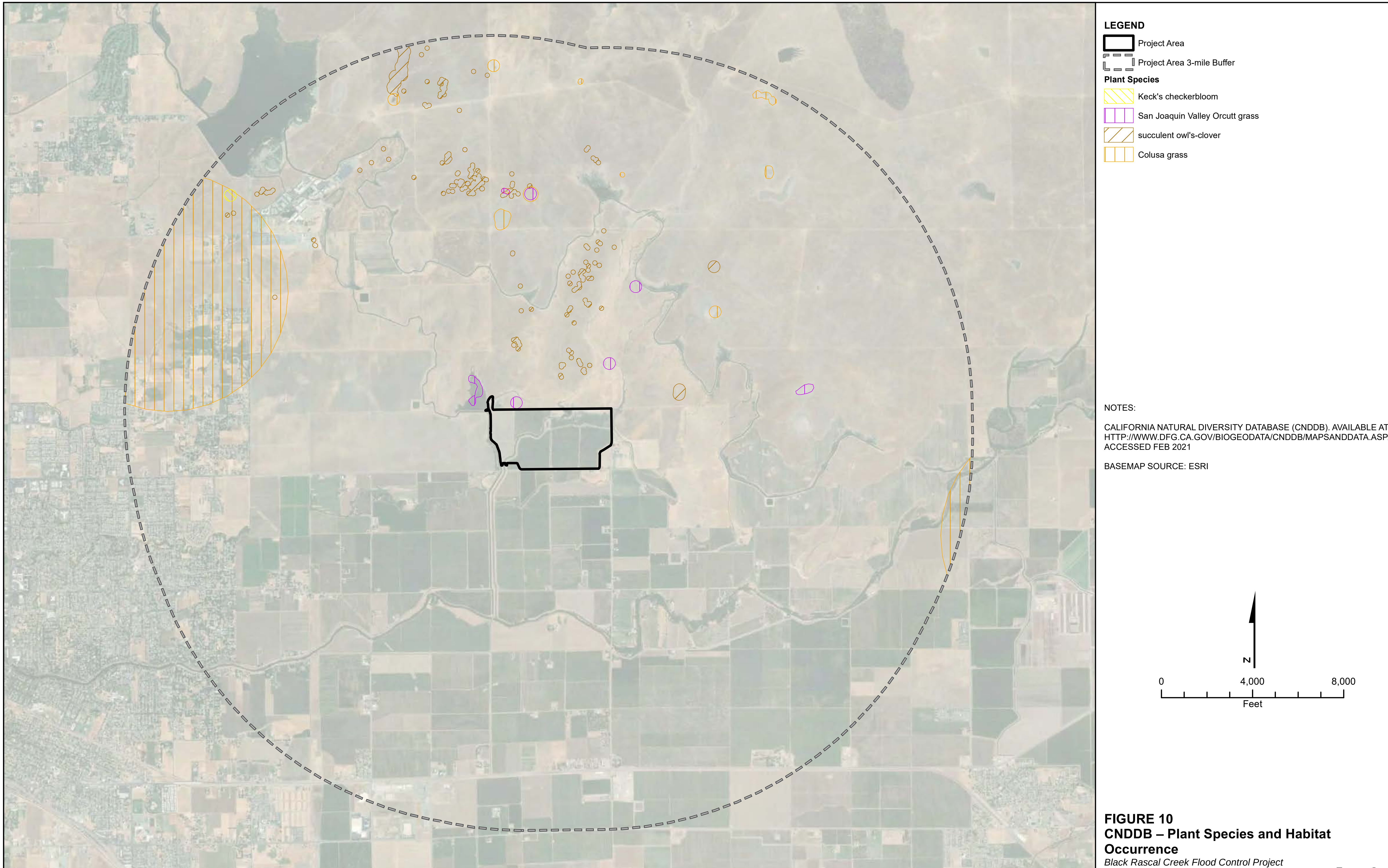
\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG9_CNDDB_VERNALPOOLANIMALS.MXD 3/25/2021 9:46:24 PM CARCHER



NOTES:

CALIFORNIA NATURAL DIVERSITY DATABASE (CNDDB). AVAILABLE AT HTTP://WWW.DFG.CA.GOV/BIOGEODATA/CNDDB/MAPSANDDATA.ASP. ACCESSED FEB 2021

BASEMAP SOURCE: ESRI

FIGURE 10
CNDDB – Plant Species and Habitat Occurrence
Black Rascal Creek Flood Control Project

Jacobs

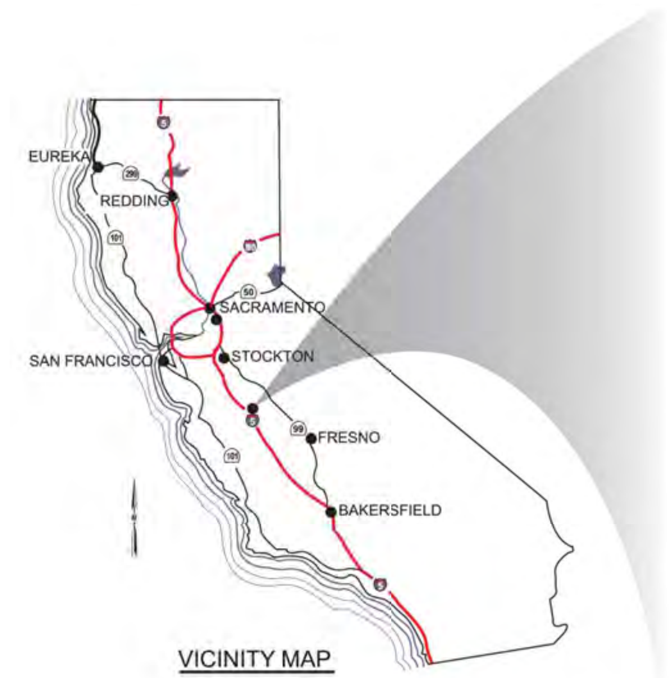
\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2021\BA\MARCH\FIG10_CNDDB_PLANTS_SPECIES.MXD 3/26/2021 11:04:52 AM CARCHER

Appendix B
Design Drawings

MERCED COUNTY
BLACK RASCAL CREEK FLOOD CONTROL PROJECT

MERCED COUNTY, CA

60 PERCENT DESIGN DRAWINGS
NOVEMBER 2020



N
VICINITY MAP
NTS

N
LOCATION MAP
NTS

BRAD L. MEMEO
CA C81778

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BLACK RASCAL CREEK
FLOOD CONTROL PROJECT
MERCED COUNTY
MERCED, CA

GENERAL
COVER SHEET, LOCATION MAP AND VICINTY MAP

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	01-G-0001
SHEET	1 of 58

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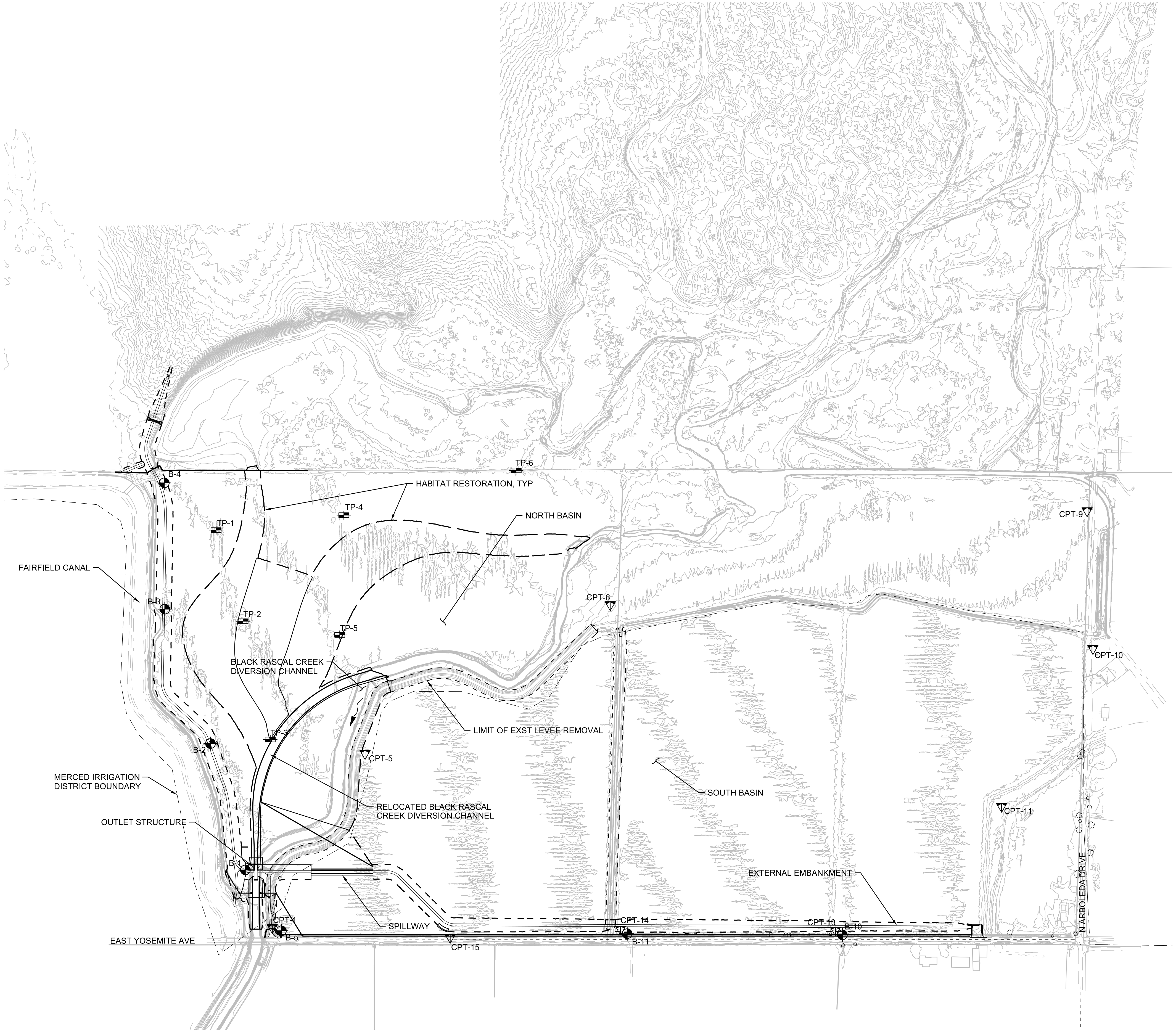

PLAN
1"=300'

N

0 300 600 900
Scale In Feet

LEGEND:

- CPT-X APPROXIMATE CONE PENETRATION TEST LOCATION.
- B-X APPROXIMATE BOREHOLE LOCATION.
- TP-X APPROXIMATE TEST PIT LOCATION.

NUMBER	NORTHING	EASTING	DEPTH (FT)	COMPLETED
CPT-1	1943483	6592463	80	YES
CPT-5	1944470	6592987	40	YES
CPT-6	1945312	6594375	50	YES
CPT-9	1945844	6597074	12	YES
CPT-10	1945064	6597107	50	YES
CPT-11	1944170	6596590	60	YES
CPT-13	1943470	6595650	40	YES
CPT-14	1943476	6594433	60	YES
CPT-15	1943429	6593469	60	YES
B-1	1943819	6592310	77	YES
B-2	1944534	6592112	61	YES
B-3	1945295	6591854	52	YES
B-4	1946010	6591851	50	YES
B-5	1943474	6592514	57	YES
B-10	1943451	6595689	57	YES
B-11	1943458	6594471	56	YES
TP-1	1945742	6592144	8	YES
TP-2	1945226	6592296	9	YES
TP-3	1944557	6592450	9	YES
TP-4	1945827	6592867	8	YES
TP-5	1945149	6592844	8	YES
TP-6	1946081	6593842	8	YES

NOTE:

1. BORING LOCATIONS ARE APPROXIMATE, LOCATED USING HAND HELD GPS DEVICE WITH APPROXIMATE ACCURACY OF +/- 15 FEET, AND VISUAL SITING OF THE BORING LOCATIONS IN RELATION TO SURROUNDING FEATURES.

MARK R. TWEDE
CA GE2642

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MERCED COUNTY
MERCED, CA

GEOTECHNICAL

EXPLORATION PLAN

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1"=300'

VERIFY SCALE

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0 1"

DATE	NOVEMBER 2020
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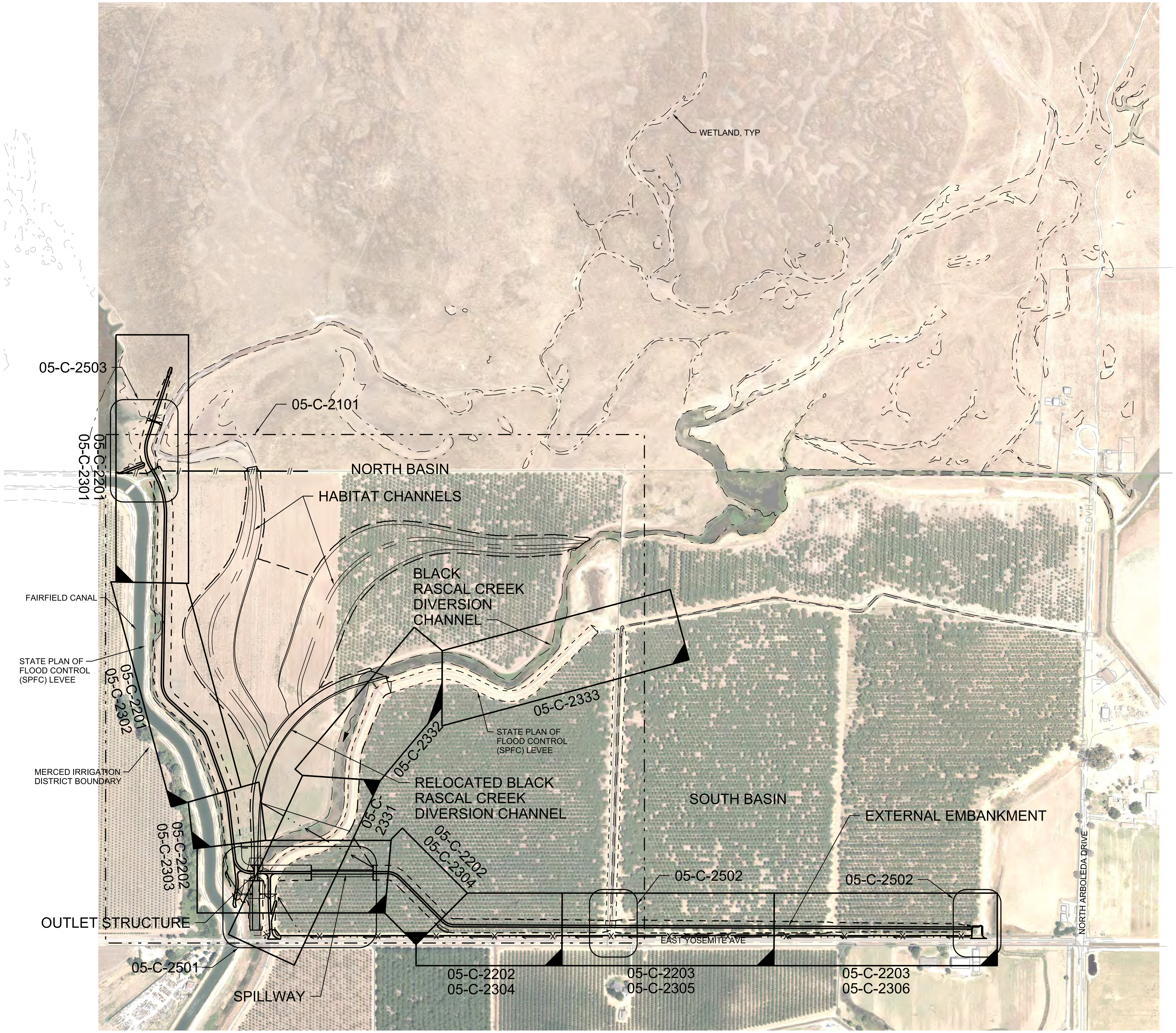
DWG	03-B-2001
SHEET	7 of 58



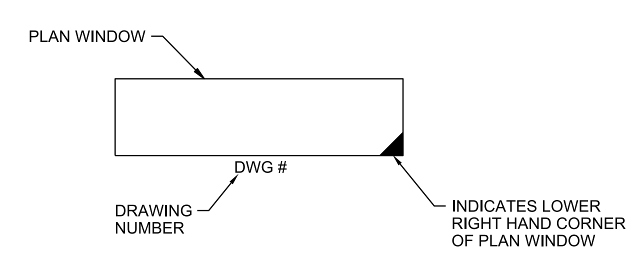
PLAN

1"=300'

0 300 600 900

Scale In Feet

LEGEND



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OVERALL SITE AND KEY PLAN

1"=300'

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

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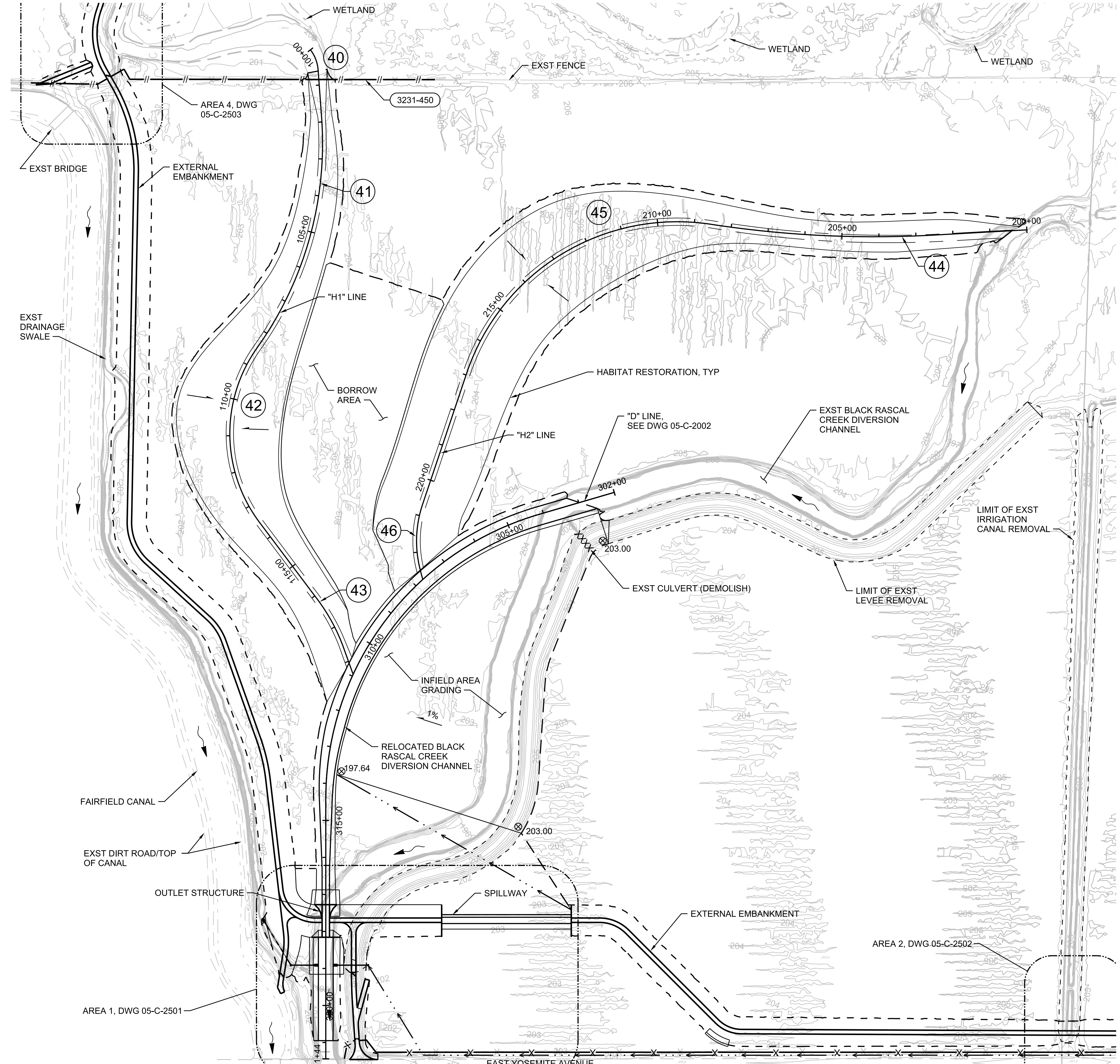

PLAN
1"=150'

N

0 150 300 450
Scale In Feet

CONTROL LINE DATA

ALIGNMENT	TYPE	STATION	NORTHING	EASTING	DELTA	RADIUS	LENGTH	TANGENT
"H1" LINE	POB/PC	100+00.00	1946160.00	6592328.09				
	(40)				33°31'22"	100'	58.51'	30.12'
	PT	100+58.51	1946106.15	6592348.75				
	PC	101+88.03	1945976.98	6592358.29				
	(41)				39°41'40"	950'	658.16'	342.90'
	PRC	108+46.18	1945355.74	6592184.56				
	(42)				72°25'14"	400'	505.59'	292.87'
	PT	113+51.78	1944883.18	6592190.67				
	PC	116+11.82	1944675.37	6592346.98				
	(43)				17°13'44"	500'	150.35'	75.75'
	PT	117+62.17	1944543.53	6592418.08				
	POE	118+37.29	1944472.82	6592443.43				
"H2" LINE	POB	200+00.00	1945673.68	6594263.04				
	PC	202+50.00	1945659.62	6594013.44				
	(44)				11°57'22"	2900'	605.16'	303.68'
	PRC	208+55.16	1945688.66	6593410.08				
	(45)				80°08'51"	600'	839.30'	504.78'
	PT	216+94.46	1945286.85	6592750.27				
	PC	220+69.06	1944931.79	6592630.87				
	(46)				33°11'05"	310'	179.55'	92.37'
	PT	222+48.61	1944754.84	6592624.72				
	POE	222+75.27	1944729.04	6592631.44				

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CA C59851

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FLOOD CONTROL PROJECT
MERCED COUNTY
MERCED, CA

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CIVIL
SITE GRADING PLAN

1"=300'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

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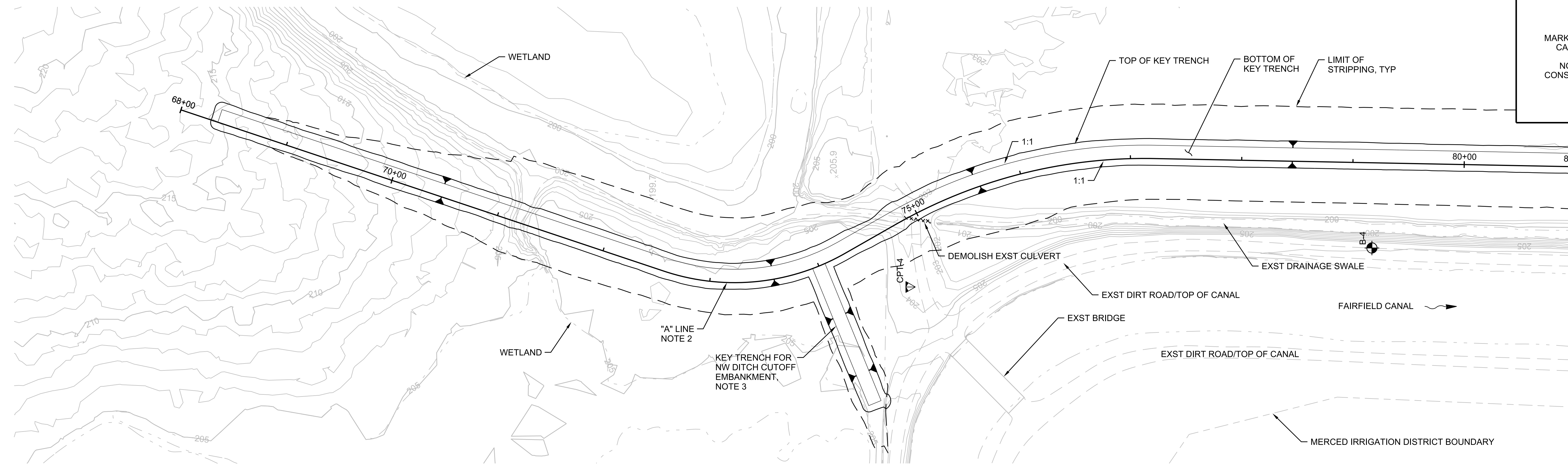

N

PLAN
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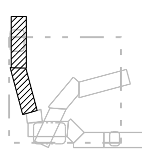
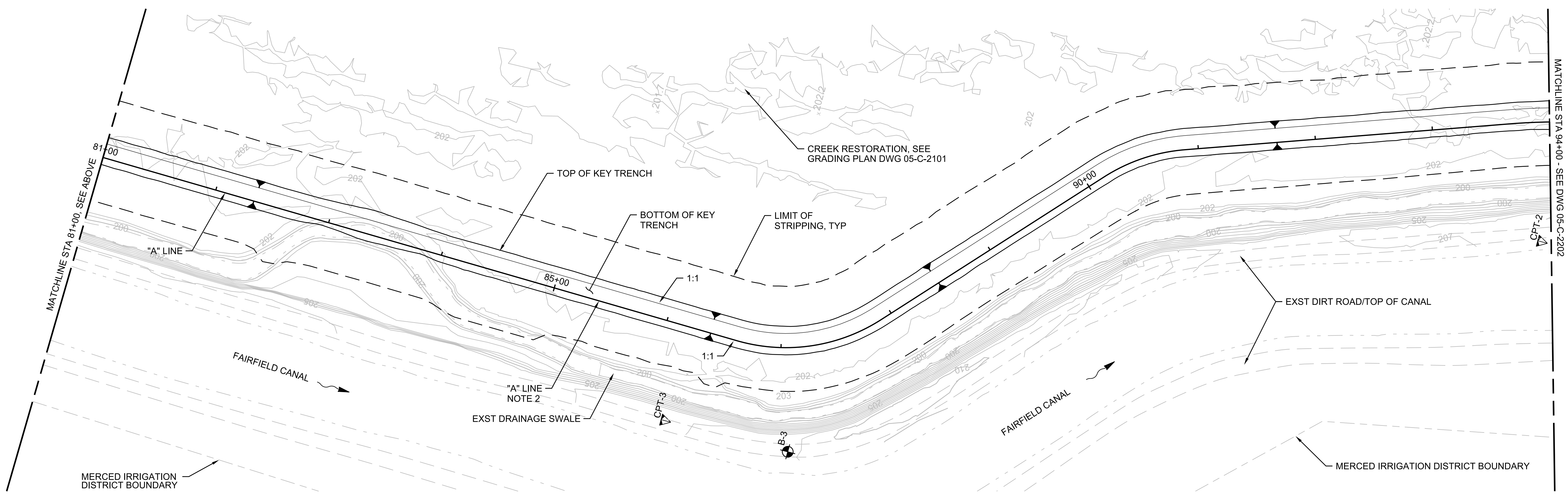


KEY PLAN



N

PLAN
1"=50'

EMBANKMENT SUBGRADE PLANS GENERAL NOTES:

1. FOR TYPICAL KEY TRENCH SECTION, SEE EMBANKMENT SECTIONS ON DRAWING 05-C-3201.
2. FOR "A" LINE CONTROL DATA, SEE DRAWINGS 05-C-2002 AND 05-C-2003.
3. SEE "A" LINE TYPICAL SECTION FOR KEY TRENCH REQUIREMENTS, SIMILAR. CENTER KEY TRENCH UNDER EMBANKMENT.
4. FOR BOTTOM OF KEY TRENCH ELEVATION, SEE EMBANKMENT PLAN AND PROFILE DRAWINGS.

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CA GE2642
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CA C59851
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MERCED COUNTY
MERCED, CA

CIVIL

EMBANKMENT SUBGRADE PLANS
"A" LINE STA 68+00 TO 94+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2201
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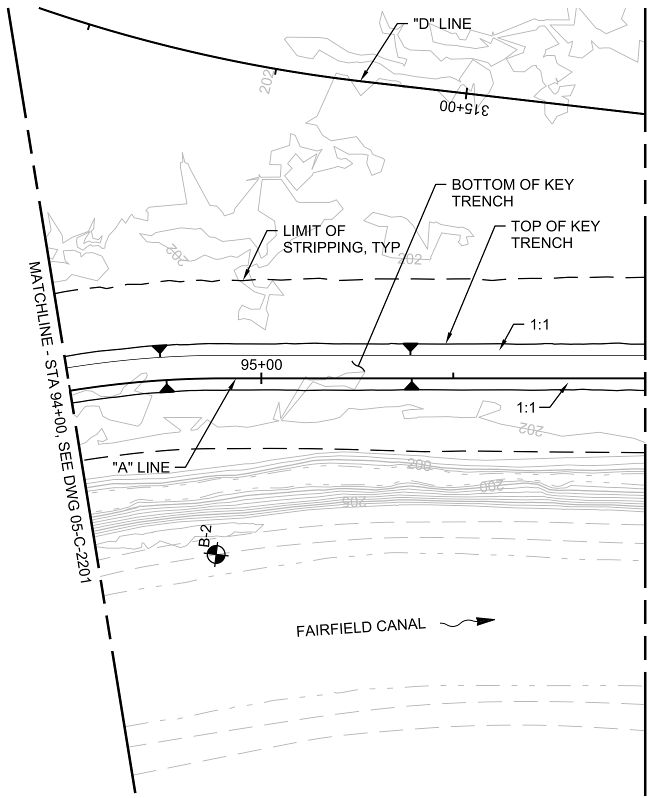

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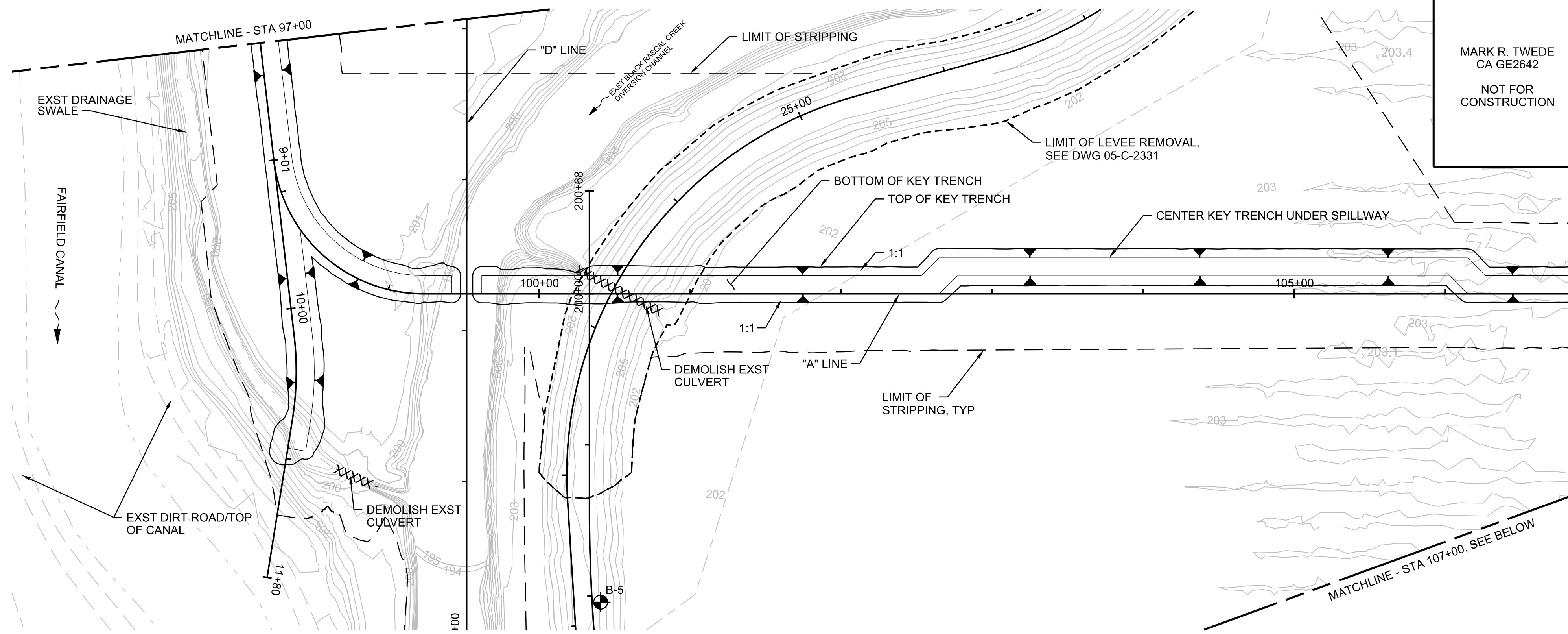

PLAN
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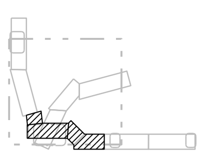

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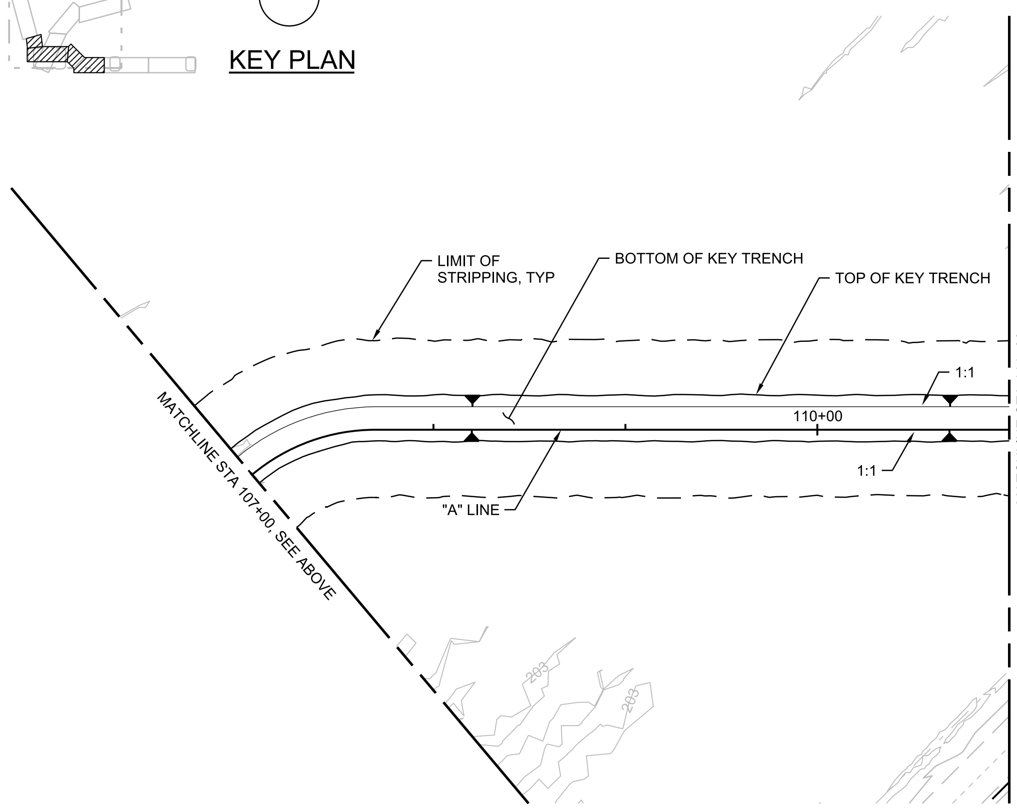

PLAN
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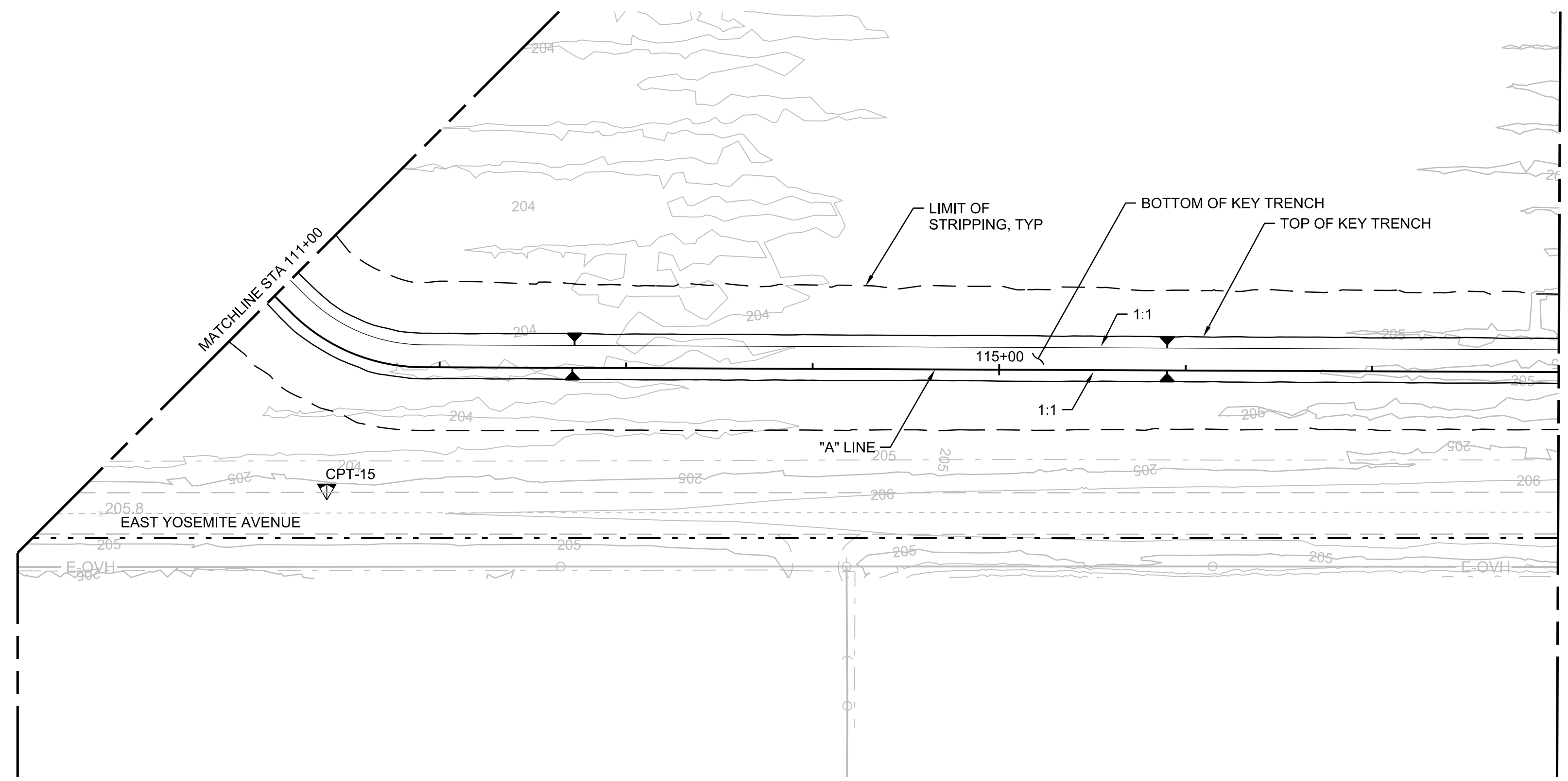

PLAN
1"=50'

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MERCED COUNTY
MERCED, CA

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EMBANKMENT SUBGRADE PLANS "A" LINE STA 94+00 TO 118+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

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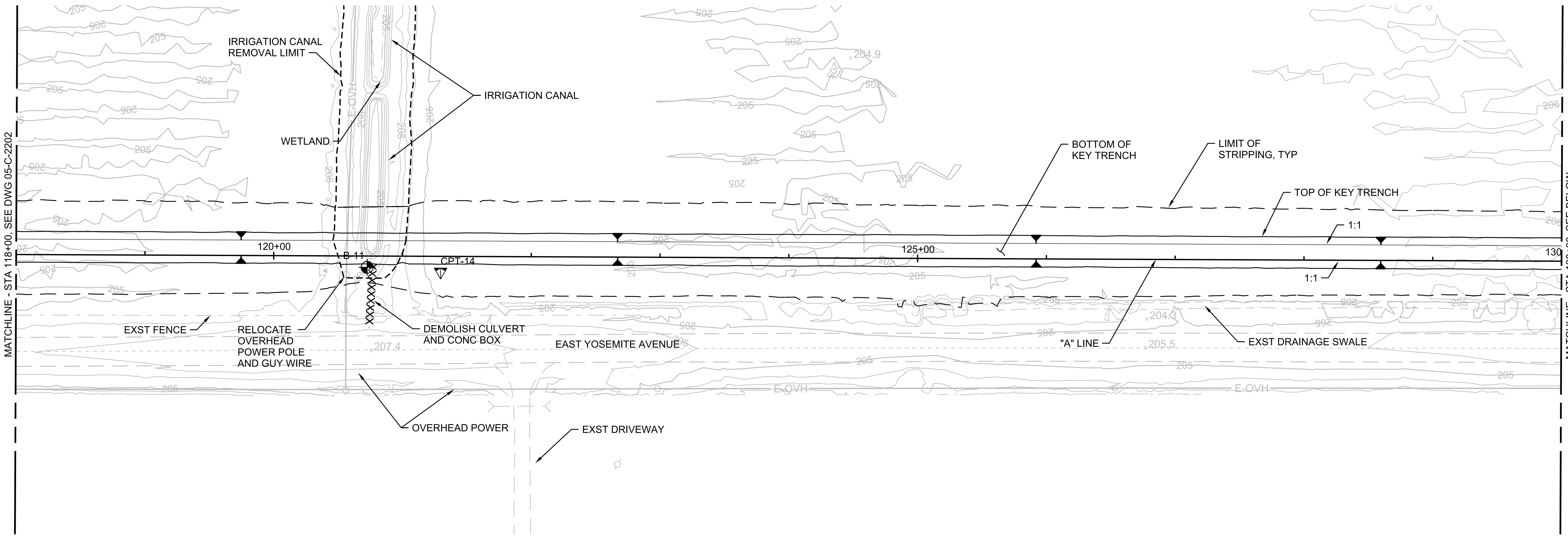
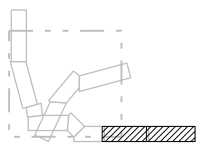
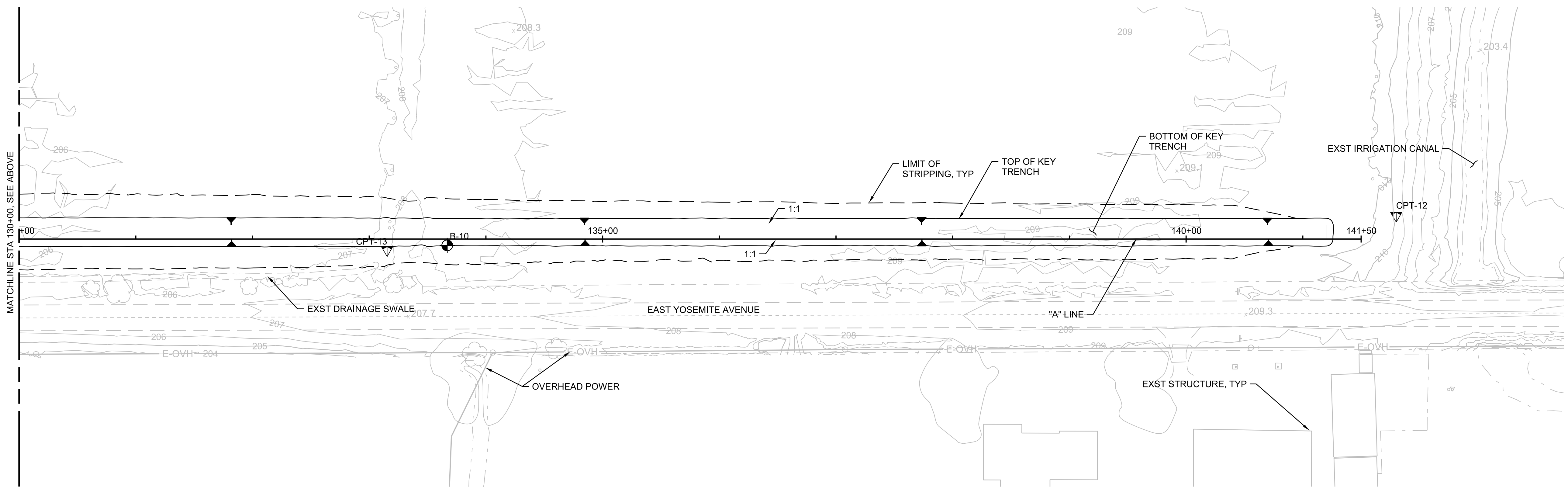


PLAN
1"=50'



KEY PLAN



PLAN
1"=50'

NO.	DATE	REVISION	BY	APVD

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MERCED COUNTY
MERCED, CA

CIVIL

EMBANKMENT SUBGRADE PLANS
"A" LINE STA 118+00 TO 143+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

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PROJ	W8Y00700
DWG	05-C-2203
SHEET	17 of 58

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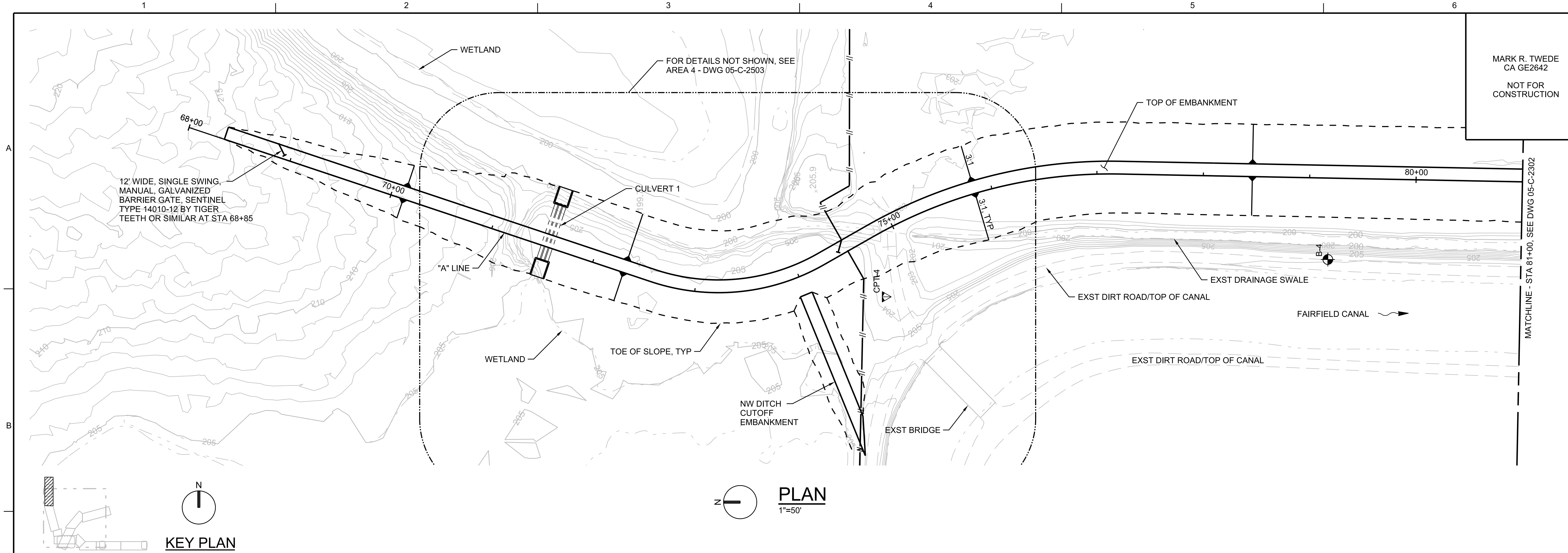

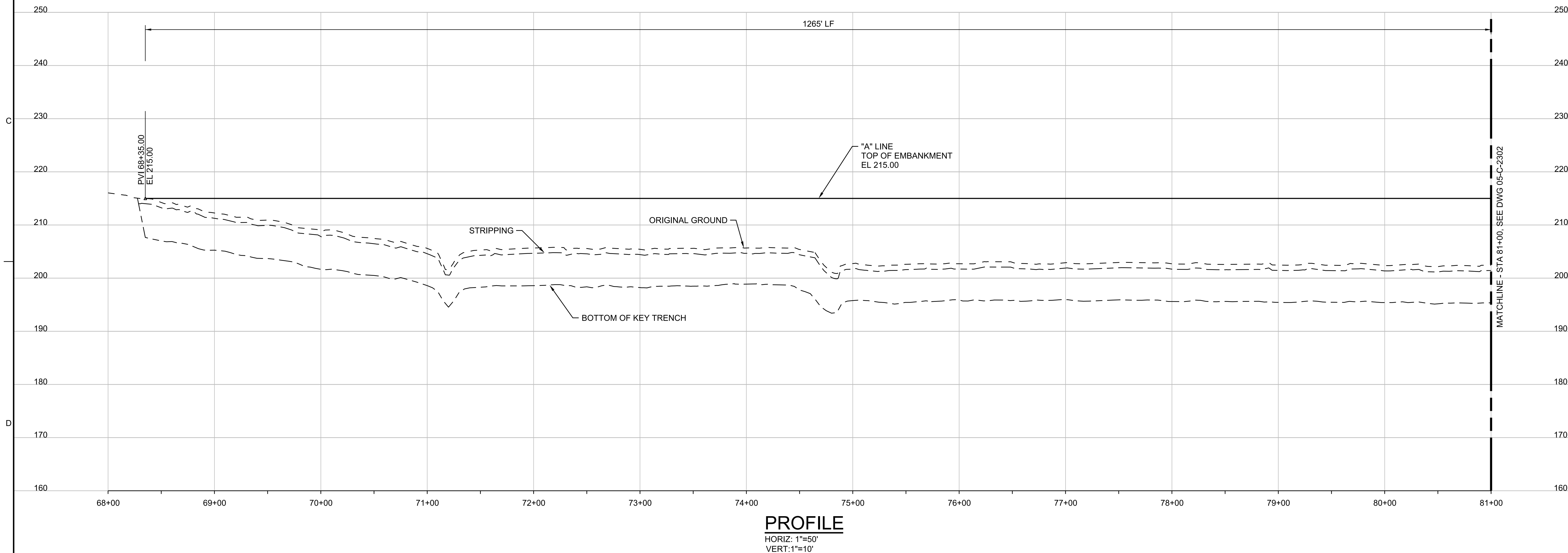

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CA GE2642
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CA C59851
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BLACK RASCAL CREEK
FLOOD CONTROL PROJECT
MERCED COUNTY
MERCED, CA

CIVIL

EMBANKMENT PLAN AND PROFILE "A" LINE STA 68+00 TO STA 81+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2301
SHEET	18 of 58

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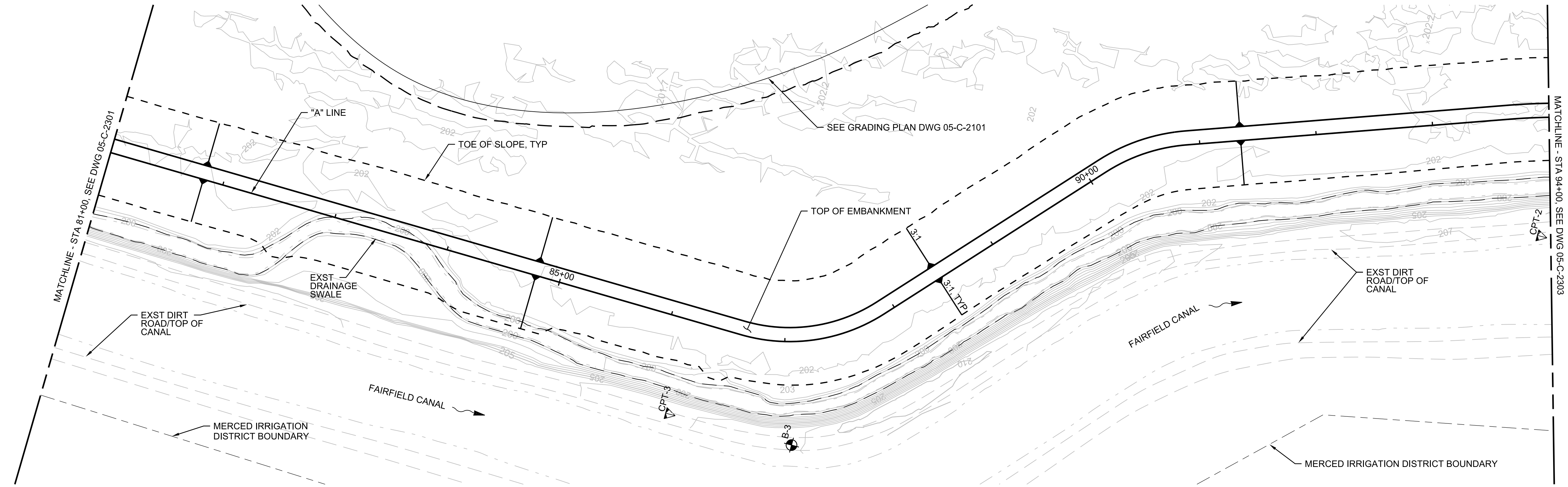
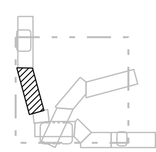
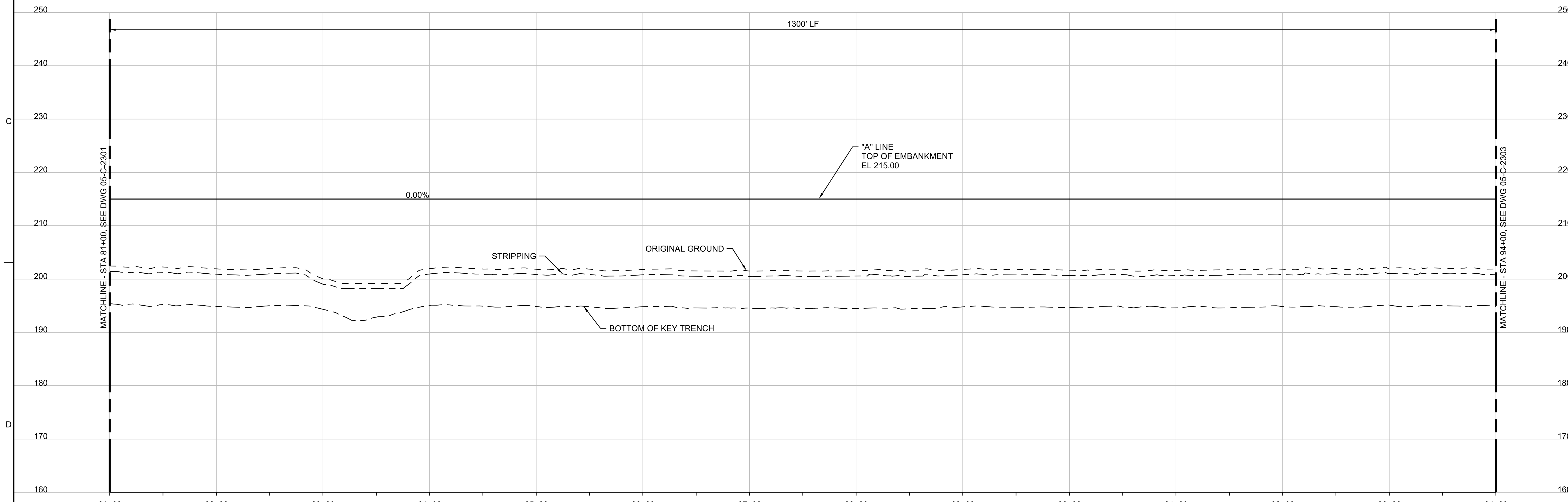




KEY PLAN

PLAN

1"=50'



PROFILE

HORIZ: 1"=50'
VERT:1"=10'

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EMBANKMENT PLAN AND PROFILE
"A" LINE STA 81+00 TO STA 94+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2302
SHEET	19 of 58

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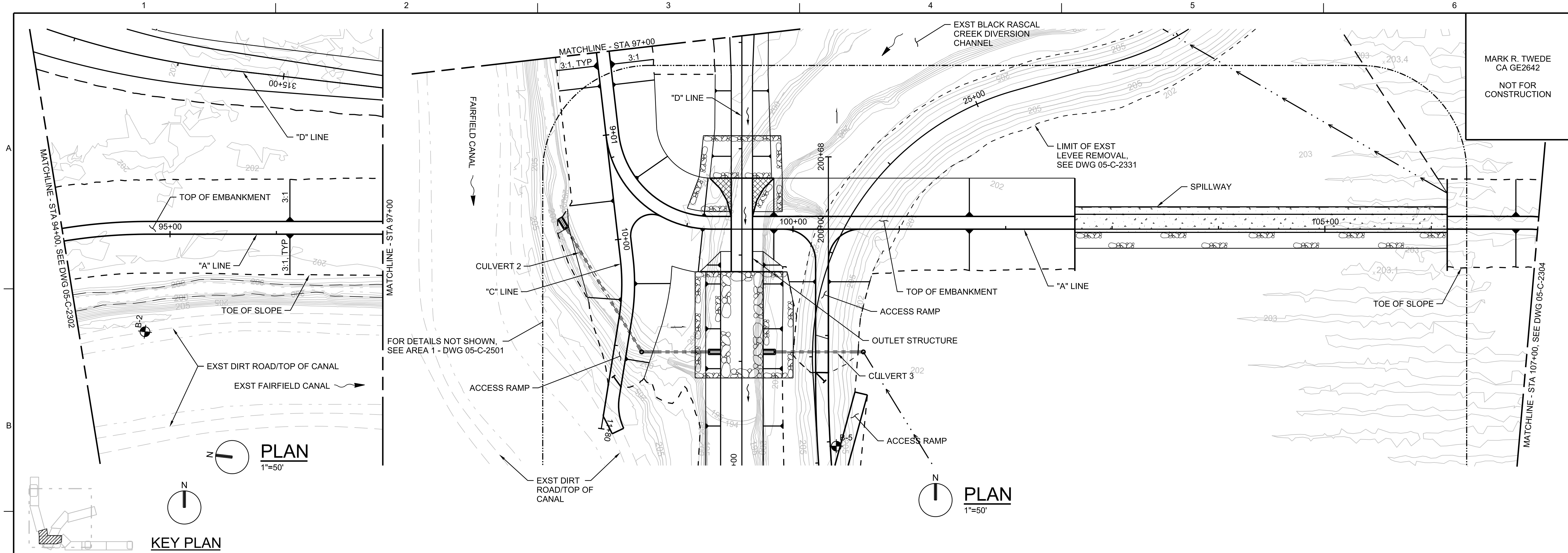

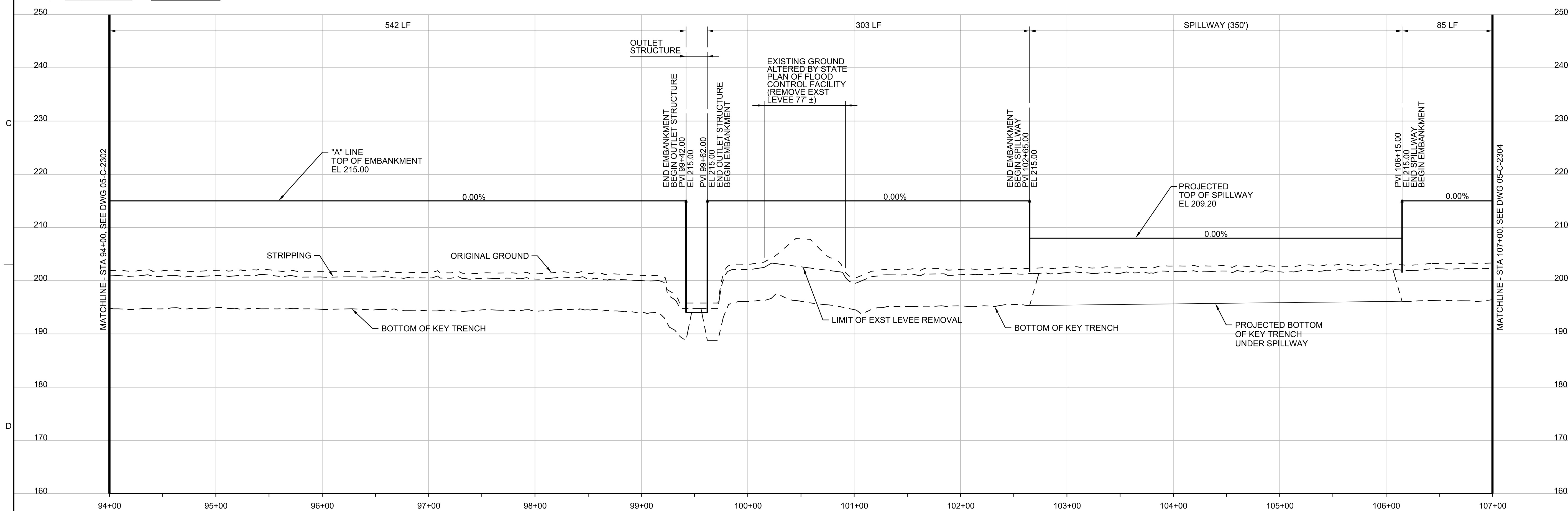

PROFILE

HORIZ: 1"=50'
VERT: 1"=10'

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CIVIL

EMBANKMENT PLAN AND PROFILE "A" LINE STA 94+00 TO STA 107+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2303
SHEET	20 of 58

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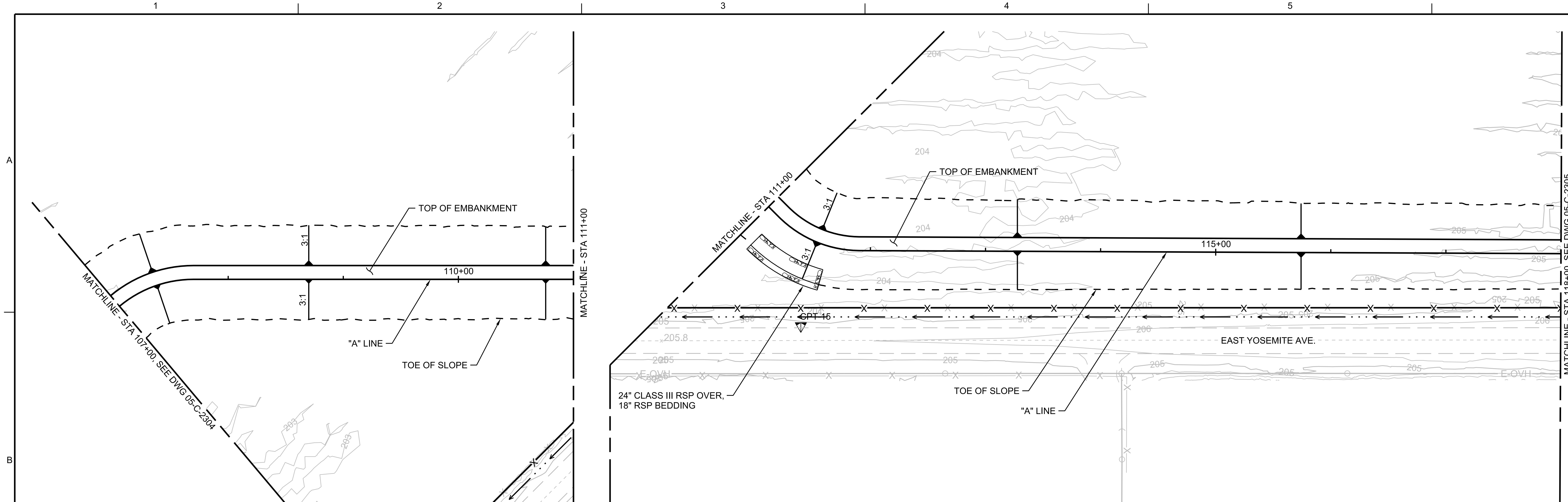
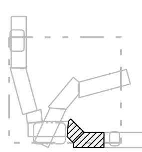
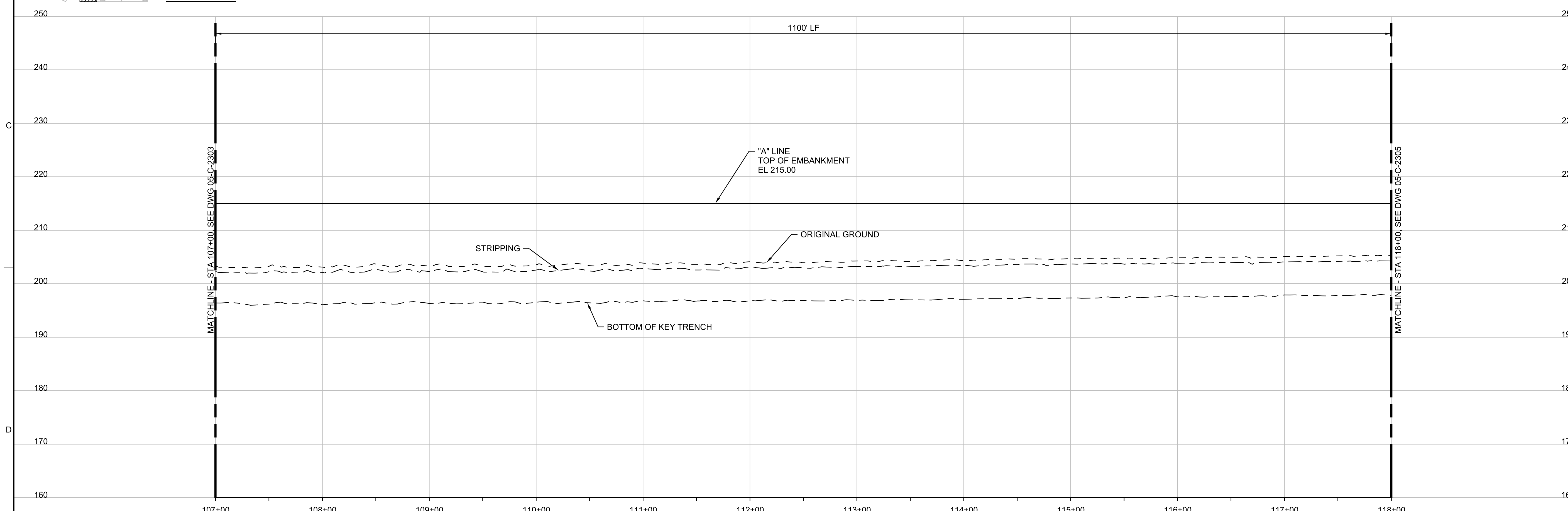


PLAN
1"=50'

PLAN
1"=50'



KEY PLAN



PROFILE
HORIZ: 1"=50'
VERT: 1"=10'

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CIVIL

EMBANKMENT PLAN AND PROFILE "A" LINE STA 107+00 TO STA 118+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2304
SHEET	21 of 58

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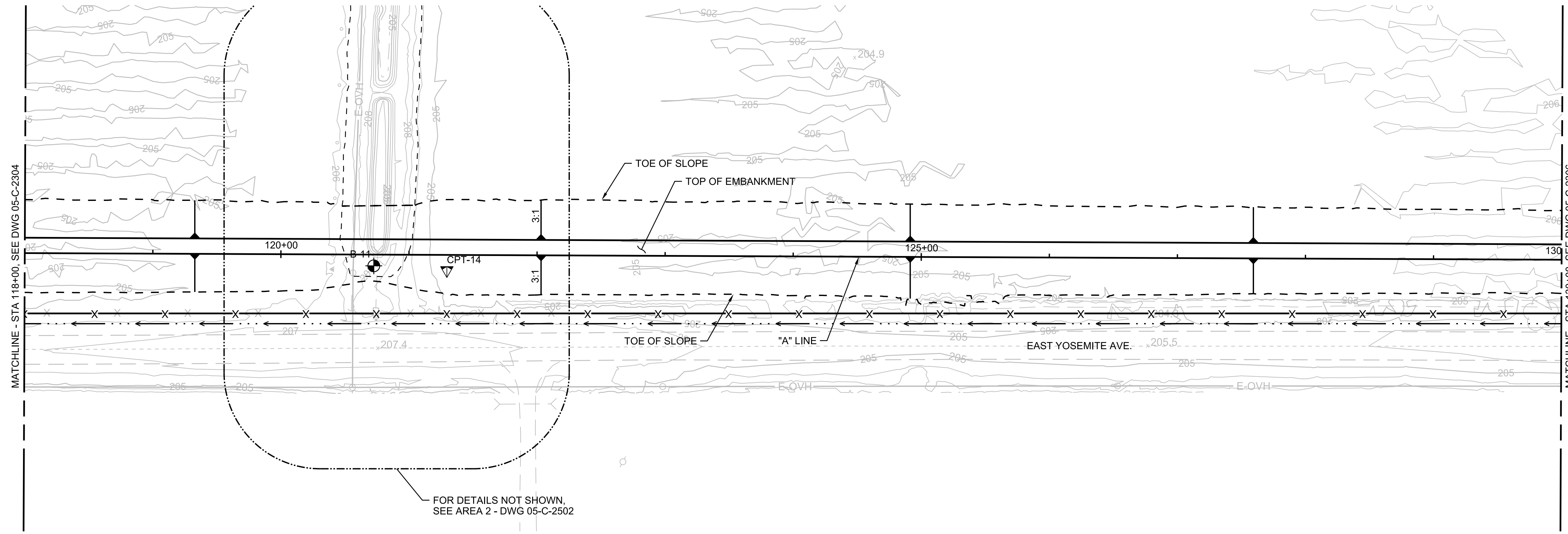

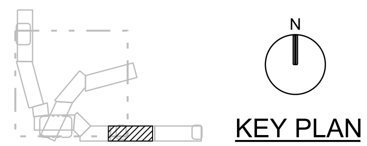

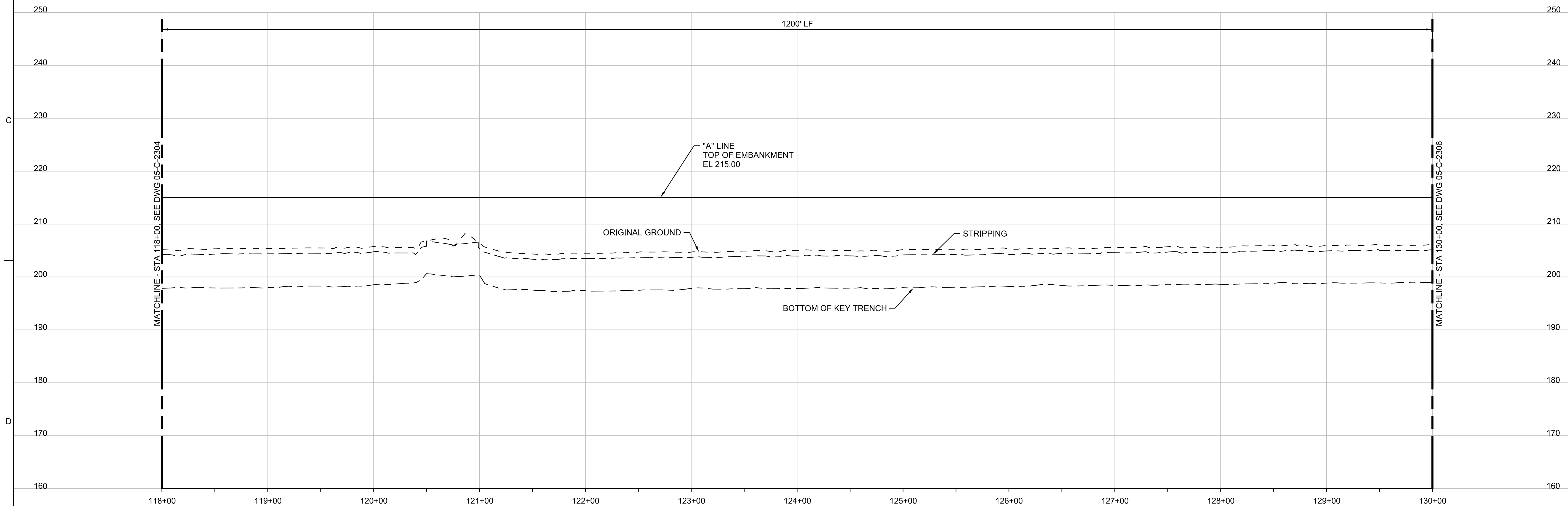

PROFILE
HORIZ: 1"=50'
VERT:1"=10'

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EMBANKMENT PLAN AND PROFILE "A" LINE STA 118+00 TO STA 130+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2305
SHEET	22 of 58

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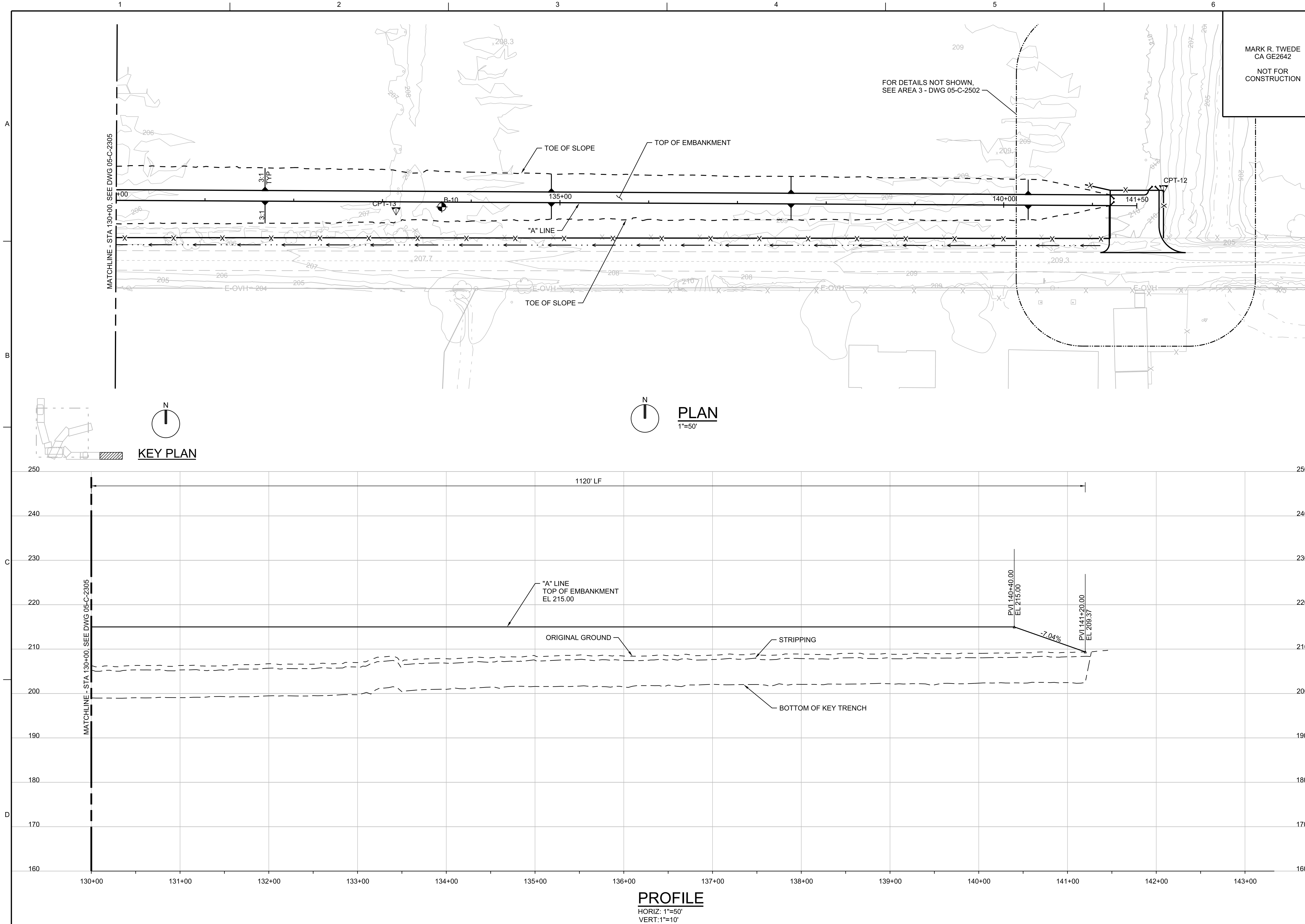

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EMBANKMENT PLAN AND PROFILE "A" LINE STA 130+00 TO STA 143+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2306
SHEET	23 of 58

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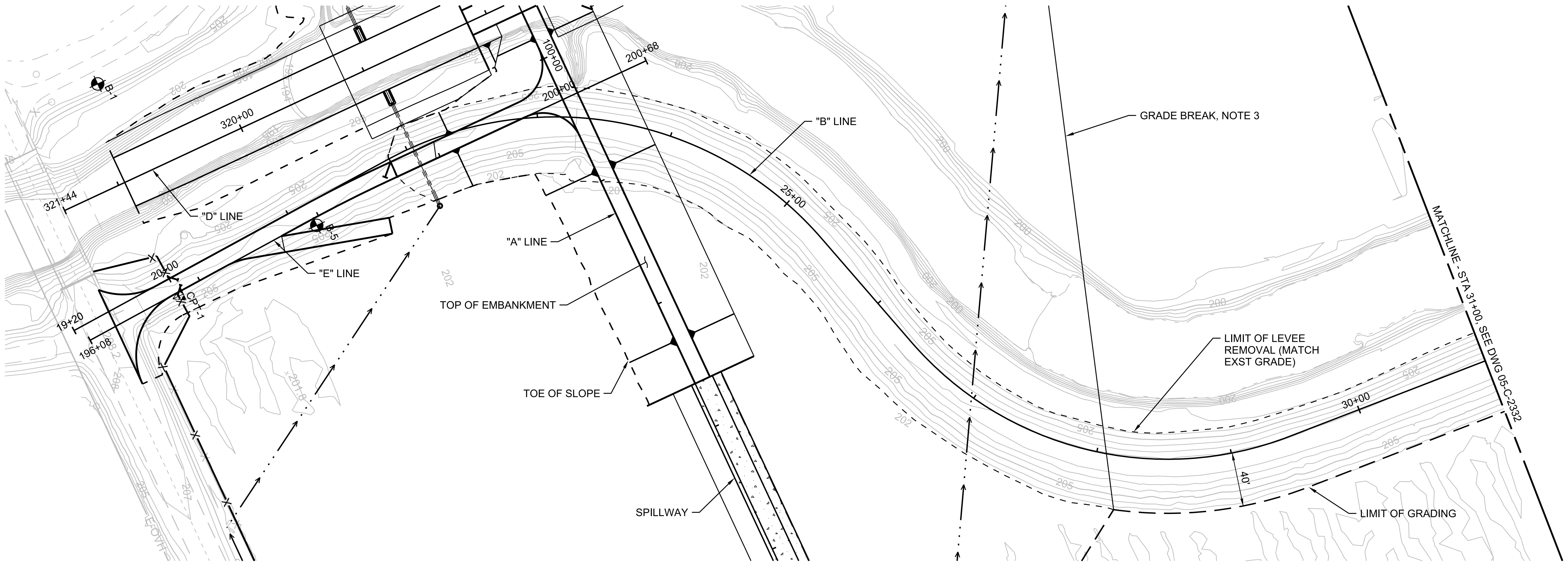
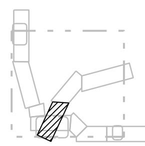




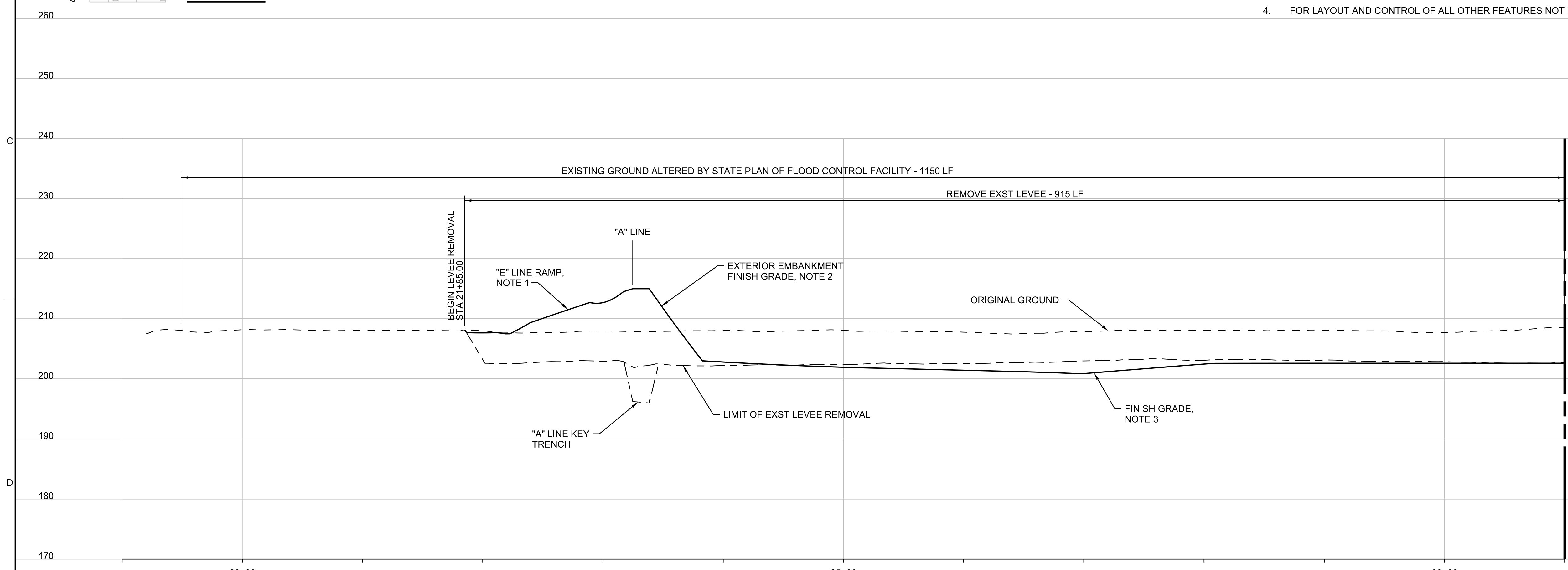
KEY PLAN

N

PLAN
1"=50'

NOTES:

1. "E" LINE RAMP FINISH GRADE PROFILE IS SHOWN ON DWG 05-C-3001.
2. "A" LINE EXTERIOR EMBANKMENT FINISH GRADE PROFILE IS SHOWN ON DWG 05-C-2303.
3. FOR FINISH GRADE CONTROL, SEE SITE GRADING PLAN, DWG 05-C-2101.
4. FOR LAYOUT AND CONTROL OF ALL OTHER FEATURES NOT LABELED, SEE DWG 05-C-2501.



PROFILE
HORIZ: 1"=50'
VERT: 1"=10'

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LEVEE REMOVAL PLAN AND PROFILE
"B" LINE STA 19+00 TO STA 31+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2331
SHEET	24 of 58

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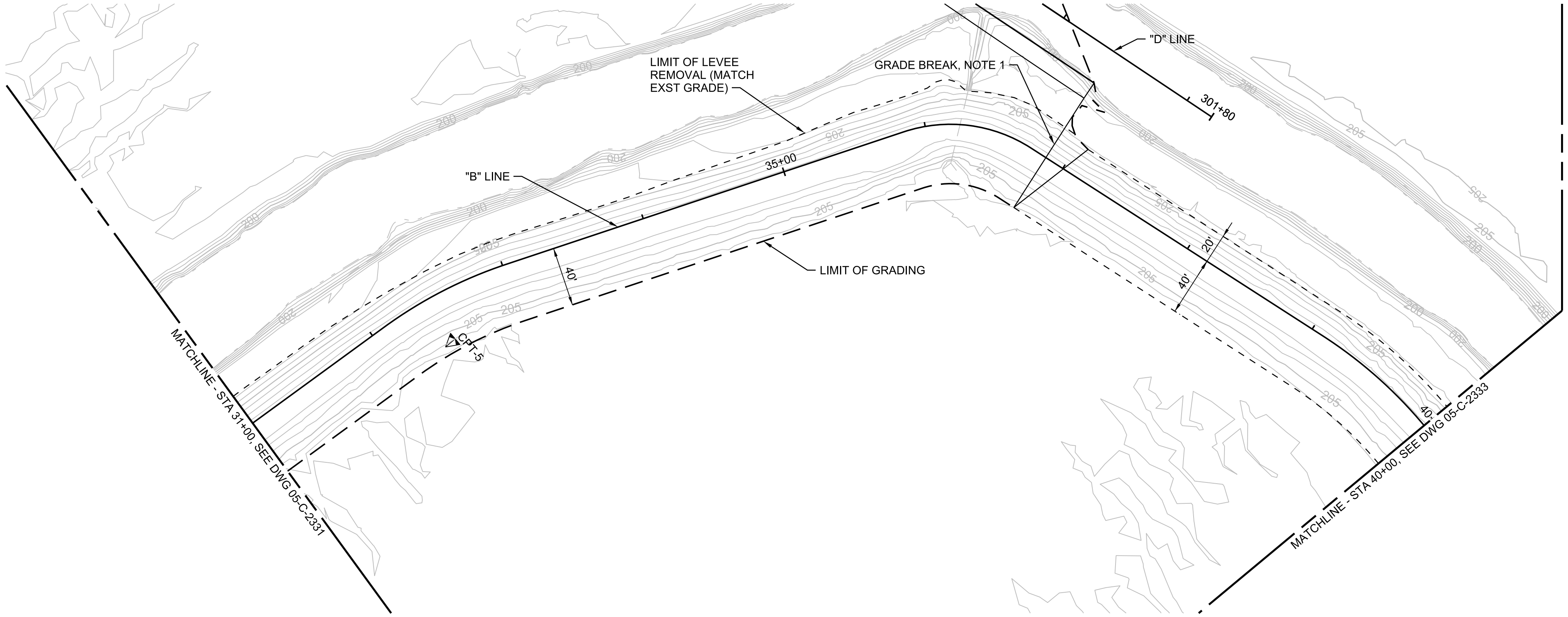
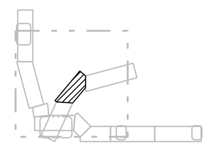
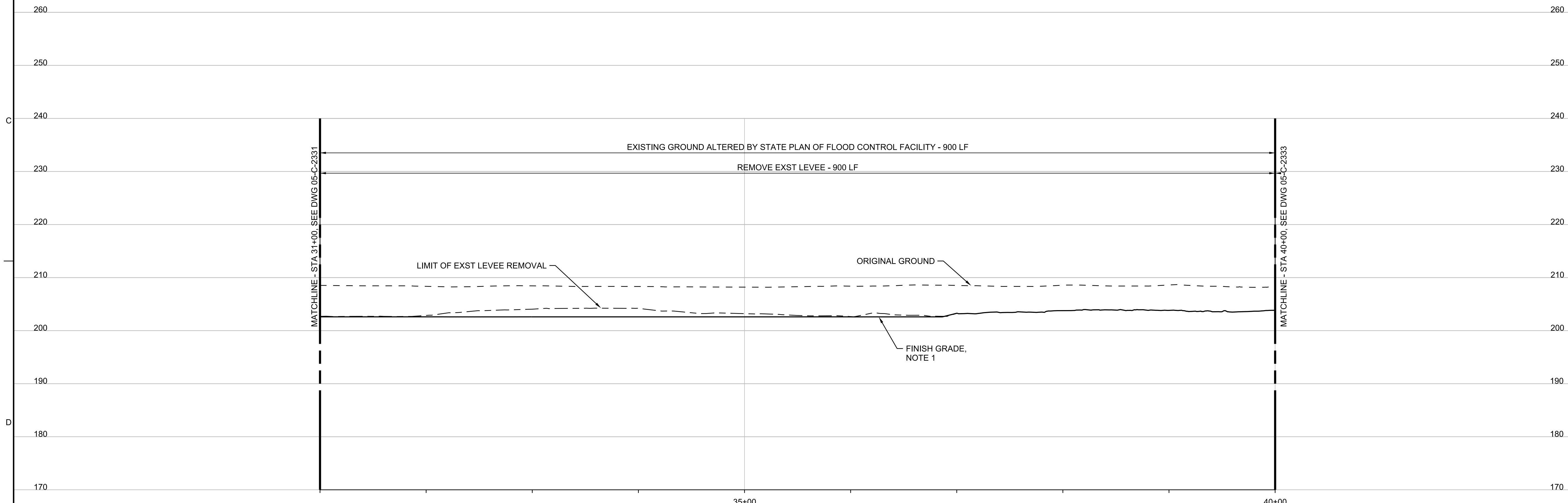


PLAN
1"=50'


KEY PLAN

NOTE:

1. FOR FINISH GRADE CONTROL, SEE SITE GRADING PLAN, DWG 05-C-2101



PROFILE
HORIZ: 1"=50'
VERT:1"=10'

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LEVEE REMOVAL PLAN AND PROFILE
"B" LINE STA 31+00 TO STA 40+00

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2332
SHEET	25 of 58

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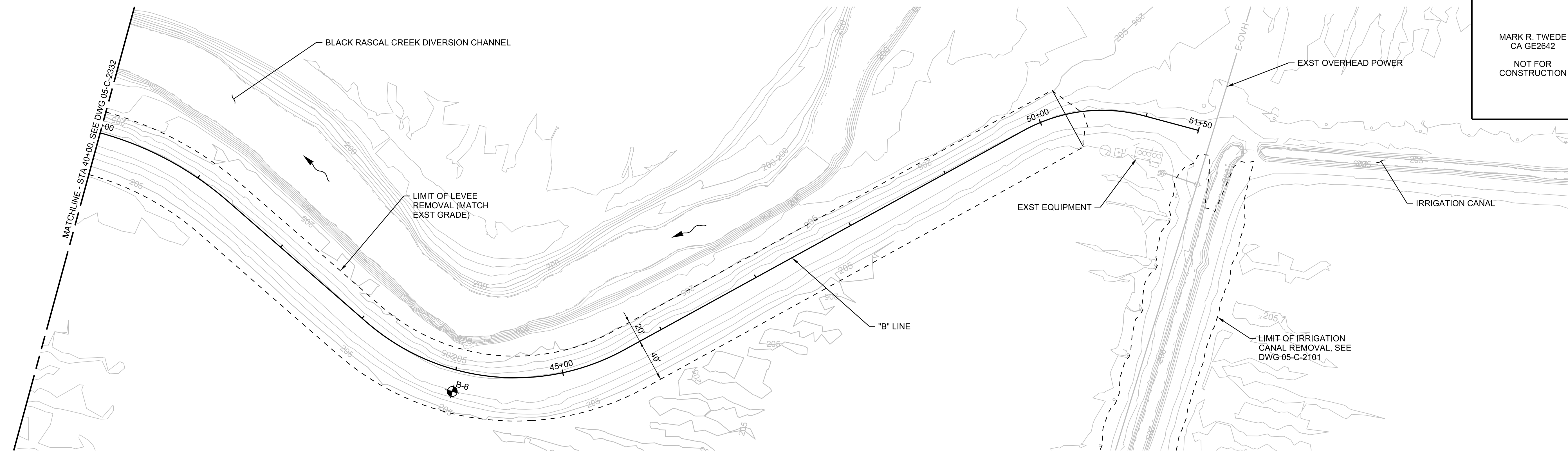
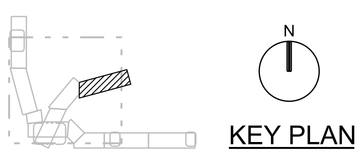
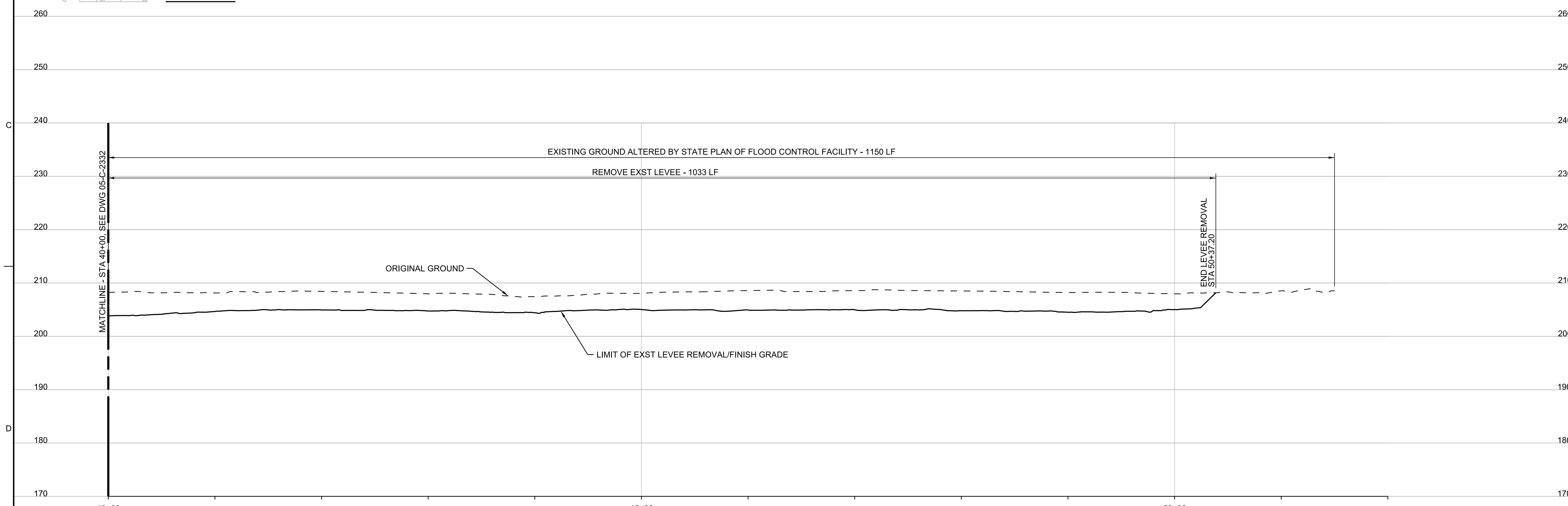




KEY PLAN

PLAN
1"=50'



PROFILE
HORIZ: 1"=50'
VERT: 1"=10'

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LEVEE REMOVAL PLAN AND PROFILE "B" LINE STA 40+00 TO STA 51+50

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2333
SHEET	26 of 58

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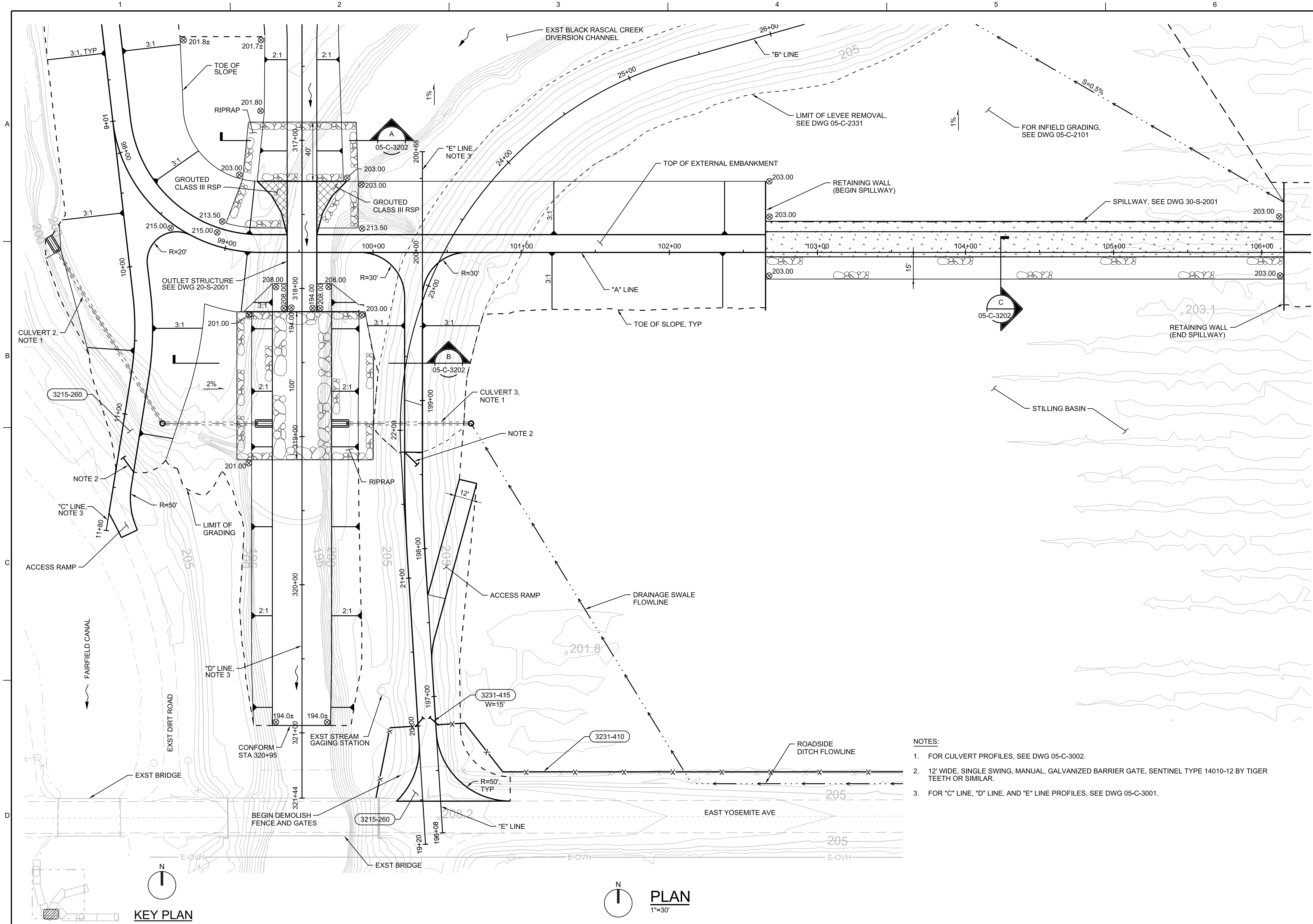

NOTES:

1. FOR CULVERT PROFILES, SEE DWG 05-C-3002.
2. 12' WIDE, SINGLE SWING, MANUAL, GALVANIZED BARRIER GATE, SENTINEL TYPE 14010-12 BY TIGER TEETH OR SIMILAR.
3. FOR "C" LINE, "D" LINE, AND "E" LINE PROFILES, SEE DWG 05-C-3001.

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MERCED COUNTY
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ENLARGED SITE PLAN
AREA 1

1"=30'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2501
SHEET	27 of 58

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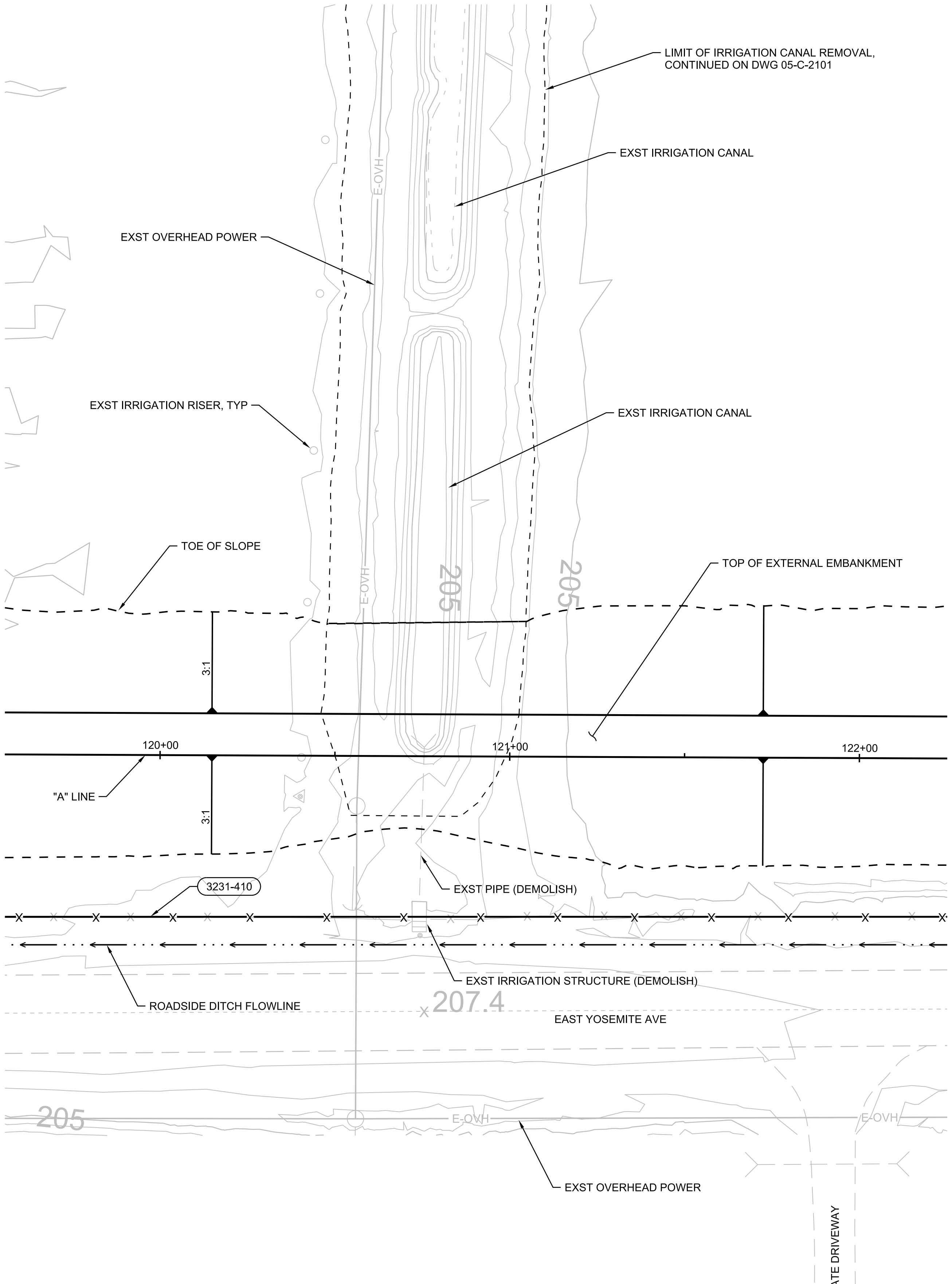
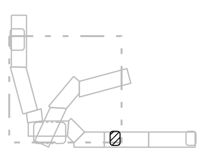
NOTE:

1. DEMOLISH EXISTING ROADSIDE FENCE AND GATES WHERE IT IS BEING REPLACED BY NEW FENCE AND GATES.





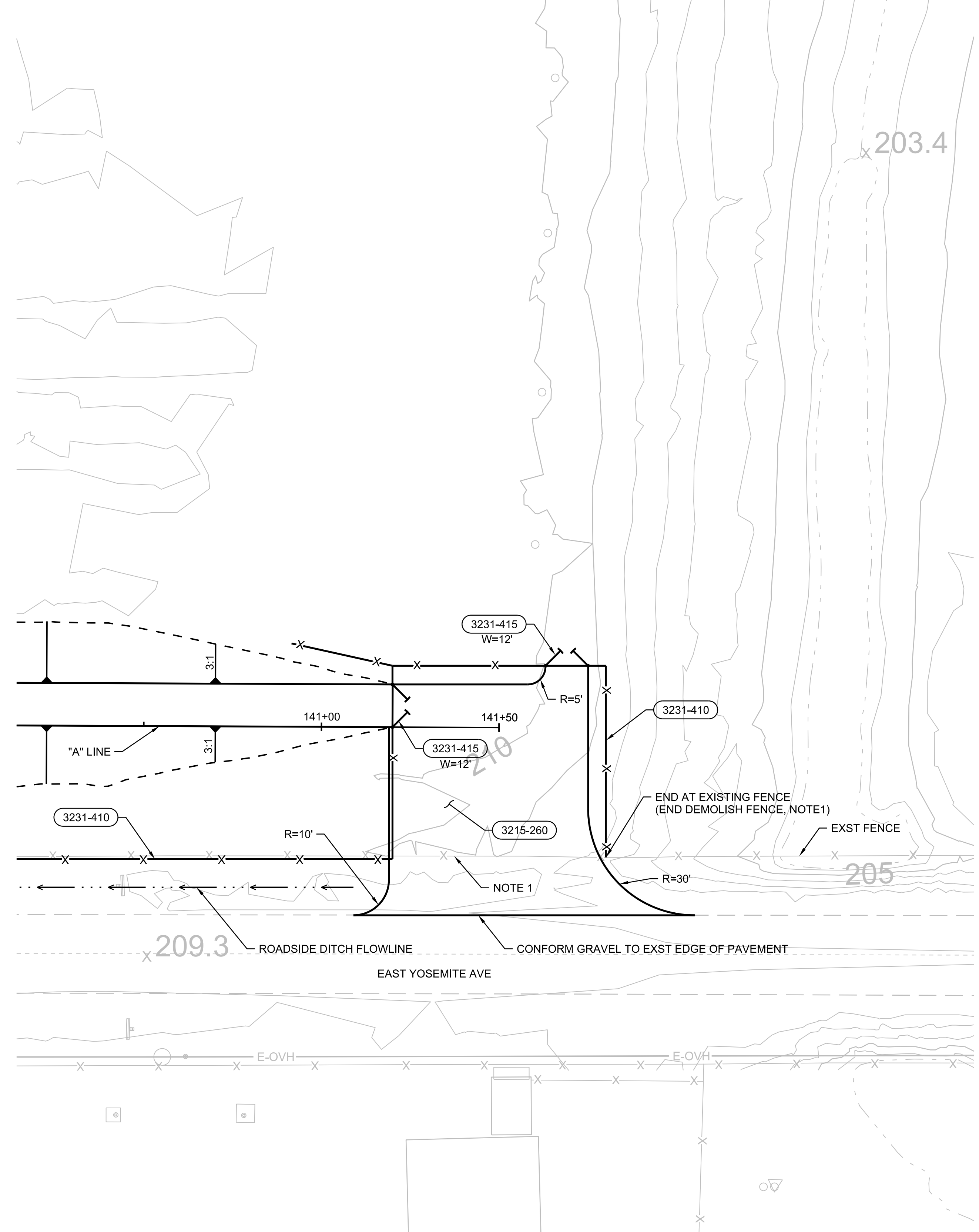
N

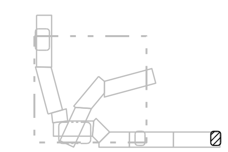
KEY PLAN

N

AREA 2 PLAN

1"=20'





N

KEY PLAN

N

AREA 3 PLAN

1"=20'

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MERCED, CA

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ENLARGED SITE PLANS AREAS 2 AND 3

1"=20'

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.

0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2502
SHEET	28 of 58

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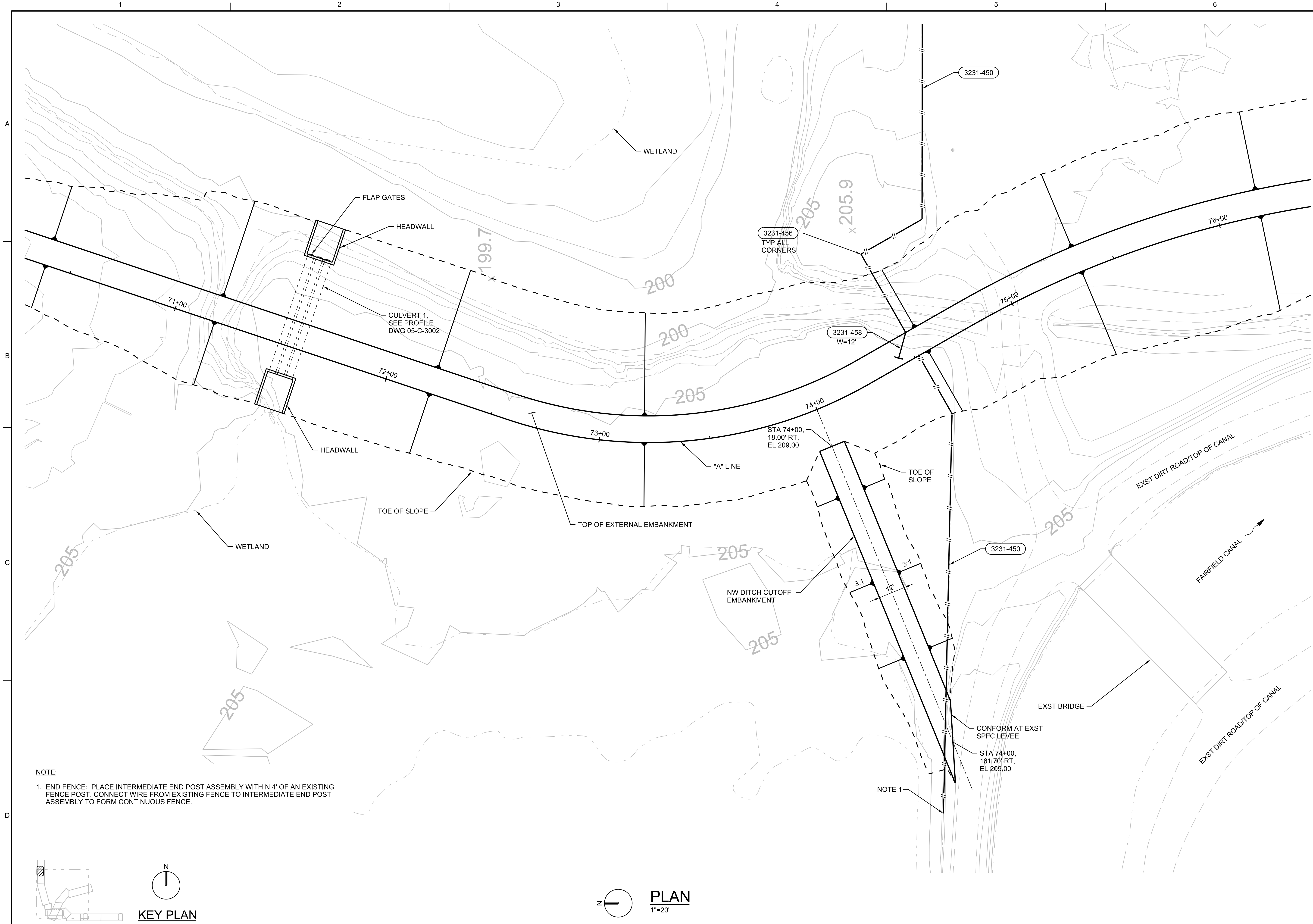

NOTE:

1. END FENCE: PLACE INTERMEDIATE END POST ASSEMBLY WITHIN 4' OF AN EXISTING FENCE POST. CONNECT WIRE FROM EXISTING FENCE TO INTERMEDIATE END POST ASSEMBLY TO FORM CONTINUOUS FENCE.

BECKY K. CHELONIS
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MERCED COUNTY
MERCED, CA

CIVIL

ENLARGED SITE PLAN AREA 4

1"=30'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-2503
SHEET	29 of 58

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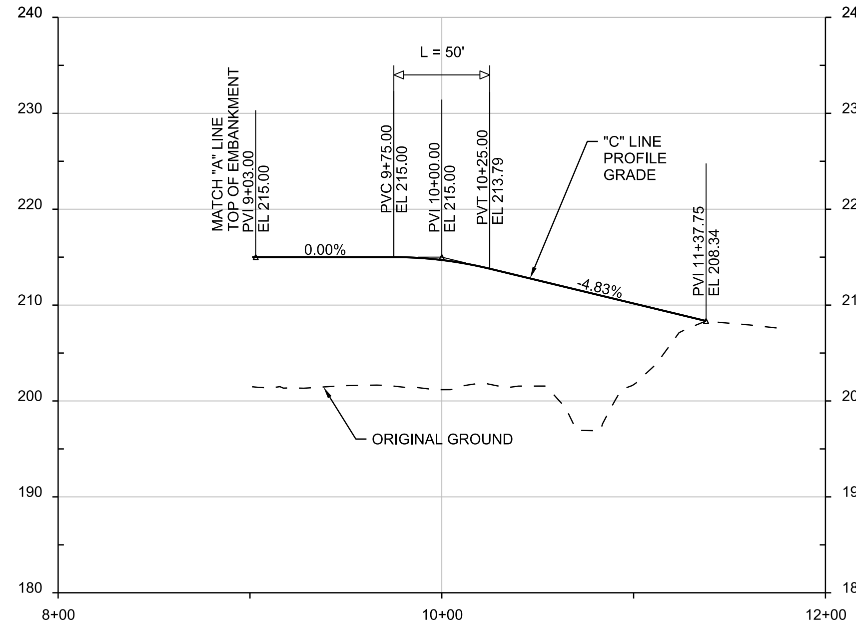
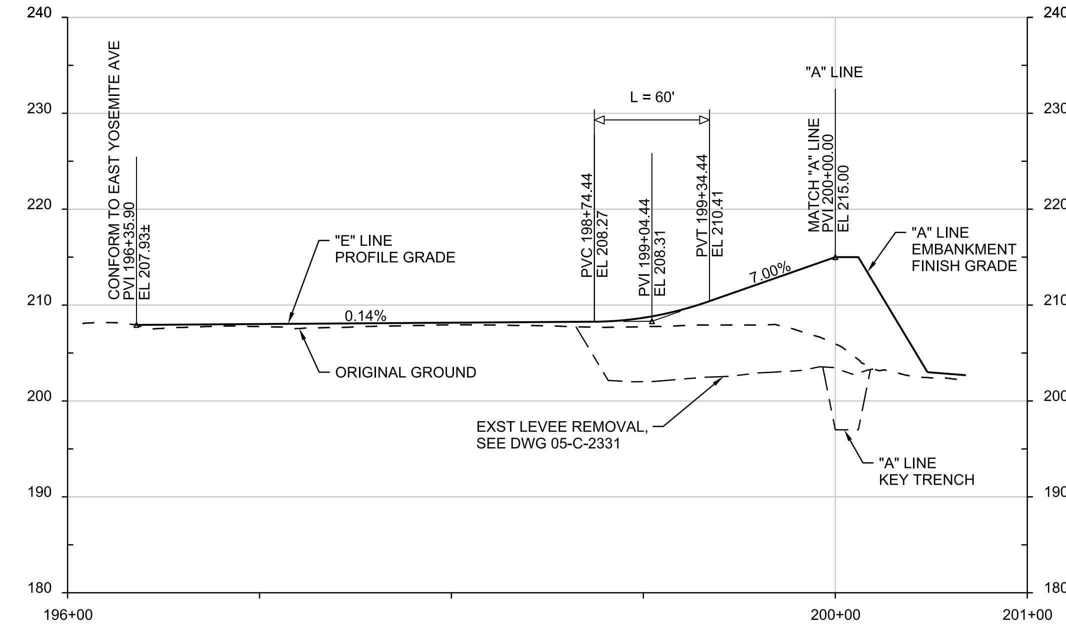


PROFILE "C" LINE

HORIZ: 1"=50'
VERT:1"=10'

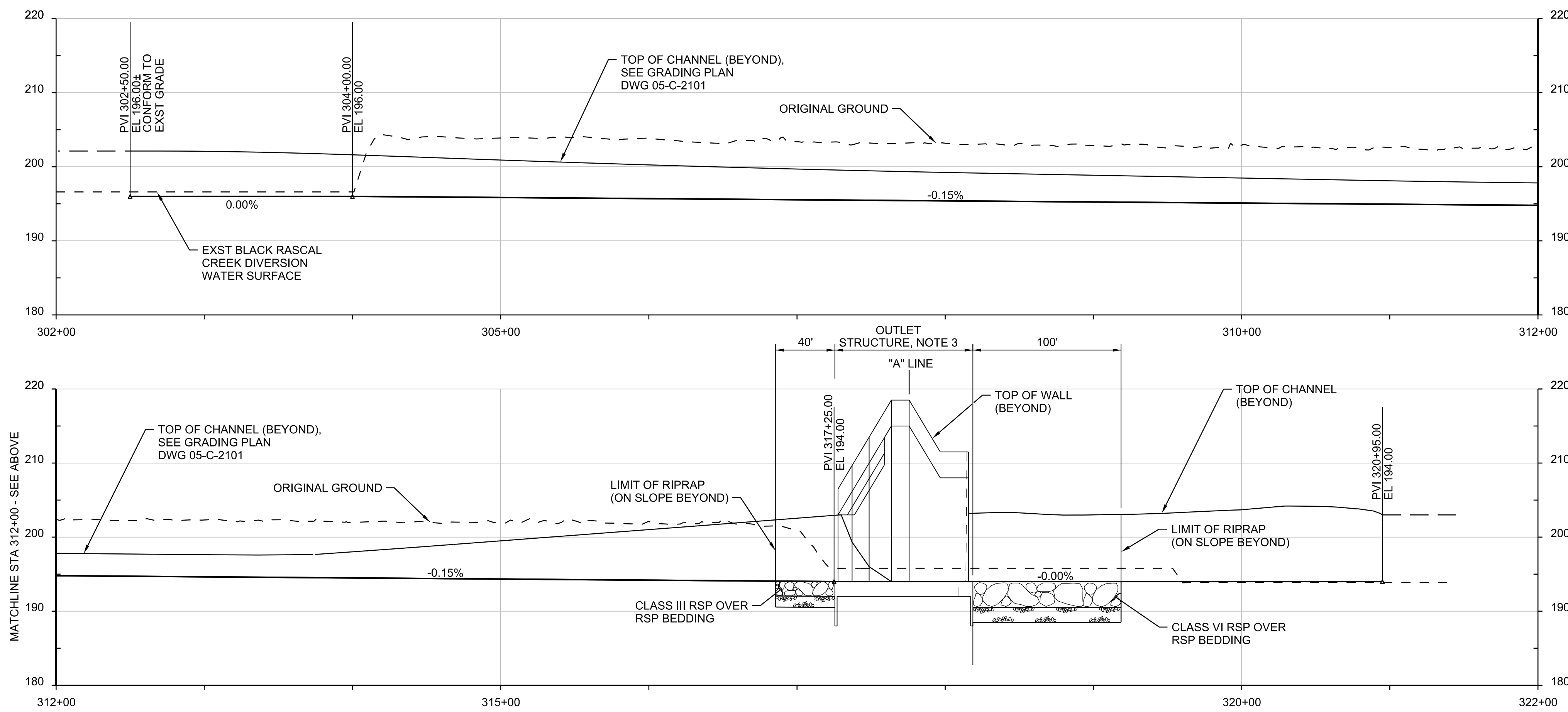


PROFILE "E" LINE

HORIZ: 1"=50'
VERT:1"=10'

NOTES:

1. FOR "C" LINE AND "E" LINE RAMP TYPICAL SECTIONS, SEE DWG 05-C-3201.
2. FOR "D" LINE TYPICAL CHANNEL SECTION, SEE DWG 05-C-3202.
3. FOR OUTLET STRUCTURE, SEE DWG 20-S-3001.



PROFILE "D" LINE

HORIZ: 1"=50'
VERT:1"=10'

BECKY K. CHELONIS
CA C59851

NOT FOR
CONSTRUCTION

NO.	DATE	REVISION	BY	APVD
DSGN	B CHELONIS	DR J MESTEMACHER	CHK L ALLIGER	APVD B CHELONIS/M TWEDE

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BLACK RASCAL CREEK
FLOOD CONTROL PROJECT
MERCED COUNTY
MERCED, CA

CIVIL

"C", "D" AND "E" LINE PROFILES

1"=50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2020
PROJ	W8Y00700
DWG	05-C-3001
SHEET	30 of 58

NOT FOR CONSTRUCTION

Appendix C
Photographs

Photograph 1: Photograph depicts a dry vernal pool on the Project site. Note that there is extensive cover of dried, senescent *Eryngium* sp. within the vernal pool. In addition, the vernal pool/annual grassland interface is well defined.

Photograph 2: Photograph shows a close-up view of the *Eryngium* sp. (a vernal pool obligate) that is prevalent in most of the vernal pools on the Project site.

Photograph 3: Photograph depicts another dry vernal pool on the Project site. The dried, senescent cover of *Eryngium* sp. within this vernal pool is not as extensive as that depicted in Photograph No. 1.

Photograph 4: Photograph shows the primary channel of Black Rascal Creek on the Project site. Although the channel is largely dry, there are occasional pools of standing water (even though it was late in the season).

Photograph 5: Photograph shows some of the freshwater marsh that is associated with the onsite downstream reaches of Black Rascal Creek. Other portions of the creek support freshwater marsh that is dominated by stands of cattail and tule. This particular stand of freshwater marsh supports broad-leaved arrowhead (*Sagittaria latifolia*).

Appendix D
Black Rascal Creek Aquatic Resource Delineation Report

Black Rascal Creek Flood Control Project, Merced County, California

Aquatic Resource Delineation Report

Draft

August 2020

Merced County Department of Public Works

Executive Summary

The Black Rascal Creek Flood Control Project (Project) includes the construction and operation of a detention basin within the Black Rascal Creek watershed to provide floodproofing and reduce floodwater and related damages to the city of Merced and surrounding areas. The Merced County Department of Public Works (County) is the Project proponent.

This report presents the methods and results of an aquatic resources delineation for a 470.2-acre study area that encompasses the Project site. This delineation was conducted in accordance with the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0* (USACE 2008), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008). The study area contained 16.60 acres of wetlands and 18.19 acres of non-wetland waters. The County is requesting verification of the delineation based on the information contained in this report.

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Acronyms and Abbreviations

County	Merced County Department of Public Works
Jacobs	Jacobs Engineering Group Inc.
OHWM	ordinary high water mark
Project	Black Rascal Creek Flood Control Project
SP	sample point

1. Introduction and Project Location

This report presents the methods and results of an aquatic resources delineation conducted for the Black Rascal Creek Flood Control Project (Project). The project aims to provide floodproofing and reduce floodwater and related damages to the city of Merced and surrounding areas.

Merced County Department of Public Works (County) is the applicant and can be contacted at:

Oscar Ortiz
Department of Public Works
345 W 7th Street, Merced, CA 95341
209.385.7602 x4678
Oscar.Ortiz@countyofmerced.com

Jacobs Engineering Group Inc. (Jacobs) is the agent and can be contacted at:

John Schoonover
Jacobs
2525 Airpark Drive, Redding, CA 96001
530.229.3305
John.Schoonover@jacobs.com

The project site is located in Merced County and is within the Merced U.S. Geological Survey 7.5-minute quadrangle (Figure 1-1; all figures located at the end of this report). The aquatic resources delineation was conducted for a 470.2-acre study area that encompasses the Project site (Figure 1-2). The study area is approximately 2 miles northeast of the city of Merced, immediately north and west of the intersection of East Yosemite Avenue and North Arboleda Drive. Table 1-1 provides location information and driving directions from the U.S. Army Corps of Engineers Sacramento District office.

Table 1-1. Location Information

Attribute	Project Information		
Main Waterbody	Black Rascal Creek		
Tributary To and Downstream Waterbody	Bear Creek, San Joaquin River, San Francisco Bay-Delta, Pacific Ocean		
Watershed Hydrologic Unit Code and Name	Lower Black Rascal Creek 180400011403		
Latitude and Longitude	38.336292°/-120.387363°		
Section, Township, Range	S11 T7S R14E, S12 T7S R14E, S7 T7S R15E		
U.S. Geological Survey Quadrangle	Merced		
County Assessor Parcel Numbers	060-006-002	060-006-006	060-006-007
Street Address	North Arboleda Drive and East Yosemite Avenue, California 95340		
Directions	From the U.S. Army Corps of Engineers Sacramento District office, take CA-99 southbound for approximately 113 miles to exit 186B for CA-140 E. Continue on CA-140 E for 7.4 miles to North Arboleda Drive. The site is on private property. Please contact the County before entering.		

2. Environmental Setting

2.1 Regional Setting

The study area lies within the Great Valley Ecological Section (Miles and Goudey 1998). Regionally, this section consists of floodplains and alluvial fans associated with streams draining the Sierra Nevada into the San Joaquin River. Two ecological subsections of the Great Valley Ecological Section occur within the study area: the Hardpan Terraces Subsection and the Manteca-Merced Alluvium Subsection (Miles and Goudey 1998). Low, rolling hills in the northern portion of the study area are typical of the Hardpan Terraces Subsection. The flat land that makes up the southern portion of the study area is typical of the Manteca-Merced Alluvium Subsection.

Regional land cover is primarily agricultural. The northern section of the study area, as well as the surrounding areas farther north, are primarily used as rangeland for cattle ranching. The southern portion, and areas farther south, are devoted to orchards, row crops, and pasture grasses. Scattered houses and farming infrastructure are also present in this area.

2.2 Local Setting

The following sections describe the topography, climate, hydrology, soils, and habitat types associated with the study area.

2.2.1 Topography

Elevations in the study area range from approximately 195 to 214 feet above mean sea level. The study area as a whole is gently sloped at approximately 0.2 percent toward the southwest. The natural gradient is approximately 0.1 percent toward the west in the areas south and west of the study area; the grade rises more steeply (2 to 5 percent) into the hills to the north and east.

2.2.2 Climate

The regional climate is semi-arid and typical of a Mediterranean-type climate, characterized by cool, wet winters and hot, dry summers (SCS 1962). Based on climate records from Merced Airport (weather station located approximately 7.3 miles southwest of the study area), average monthly temperatures range from a low of 36.6 degrees Fahrenheit in December to a high of 96.3 degrees Fahrenheit in July. Average annual precipitation is 10.9 inches, with most of the rainfall occurring from October to April, and minimal rainfall from May through September (NRCS 2019a). The growing season (50 percent chance of 28 degrees Fahrenheit or higher) is 321 days long, from January 23 to December 10.

2.2.3 Hydrology

The hydrology of aquatic resources in the study area is primarily influenced by streamflow within Black Rascal Creek, rainfall, and irrigation for agriculture.

Black Rascal Creek is the main drainage in the study area. The headwaters of Black Rascal Creek are in the Sierra Nevada foothills approximately 11 miles north-northeast of the study area. Streamflow within the study area is unregulated. The drainage area at the downstream end of the study area is 24.3 square miles. The peak 2-year flood discharge and 100-year flood discharge are 210 and 1,910 cubic feet per second, respectively (USGS 2019a).

Historically, Black Rascal Creek flowed from the headwaters to the west-southwest, through the city of Merced, discharging to Bear Creek approximately 7 miles west-southwest of the city. Currently, flow from Black Rascal Creek is diverted to Bear Creek at the diversion channel at East Yosemite Avenue, which is just downstream of the study area.

The hydrology of seasonal wetlands in the study area (predominately vernal pools and swales) is primarily influenced by rainfall. Field work for the delineation was conducted in February, March, and September 2019. Regional precipitation was wetter than normal for February and March field work, and about normal for September 2019 field work (NRCS 2019a, Table 2-1).

Irrigation water influences the hydrology of canals, ditches, and some emergent wetlands in the study area. Merced Irrigation District's Fairfield Canal conveys irrigation water along the western boundary of the study area. Several ditches in the interior portion of the study area provide irrigation water to orchards and pasture lands. Irrigation return flows influence the hydrology of some emergent wetlands within the study area (see further discussion in Chapter 4).

2.2.4 Geology and Soils

The predominant geologic formations in the study area consist of upper and lower Modesto Formation and Holocene alluvium. The Modesto Formation includes unconsolidated Pleistocene deposits of coarse alluvium in upper alluvial fans and terraces, stream channel deposits of the San Joaquin River, and inland basins. The Holocene alluvium includes alluvial sand, silt, and gravel associated with floodplains and low terraces. These formations consist of gravel, sand, silt, and clay derived from heterogeneous, metamorphic, sedimentary, and volcanic rocks (Marchand and Allwardt 1978). Soil formations in the study area include alluvial fans, fan remnants, floodplains, and terraces. The alluvial materials are derived from a mix of igneous, metamorphic, and sedimentary rocks from the Sierra Nevada.

Soils in the study area have been mapped by the Soil Conservation Service (now the Natural Resources Conservation Service) and are described in the soil survey of Merced Area (SCS 1962, NRCS 2019b). Soil series mapped within the study area are shown on Figure 2-1 and summarized in Table 2-2.

2.2.5 National Wetlands Inventory

Figure 2-2 provides a map showing aquatic resources in the study area identified by the National Wetlands Inventory (NWI) (USFWS 2019) and the National Hydrography Dataset (USGS 2019b). NWI identifies Black Rascal Creek channel as an intermittent riverine feature throughout most of the study area. Some small sections are mapped as freshwater pond (PUBFh) and freshwater emergent wetland (PEM1C, PEM1Kx) (Figure 2-2). Several other riverine, pond, and wetland features are mapped by NWI in the study area. Only a few of the vernal pools in the northern portion of the study area are included in the NWI mapping (Figure 2-2).

2.2.6 Habitat Types

2.2.6.1 Aquatic Habitats

Riverine

Riverine habitats in the study area include Black Rascal Creek, tributary channels, and agricultural canals and ditches. In the northern portion of the study area, Black Rascal Creek has a coarse, cobble-dominated streambed. In the southern portion, the streambed is composed of finer alluvium.

Table 2-1. WETS Table for Field Work in February, March, and September 2019

Month	Total (Observed)	Precipitation Average	30th Percentile	70th Percentile	Condition[a]	Condition Weight Factor[b]	Month Weight Factor	Product
February 2019								
Dec	1.51	1.8	0.7	2.18	Normal	2	1	2
Jan	2.34	2.04	0.89	2.49	Normal	2	2	4
Feb	3.33	1.96	1.11	2.39	Wet	3	3	9
Sum[c]								15
March 2019								
Jan	2.34	2.04	0.89	2.49	Normal	2	1	2
Feb	3.33	1.96	1.11	2.39	Wet	3	2	6
Mar	2.28	1.57	0.78	1.92	Wet	3	3	9
Sum[c]								17
September 2019								
Jul	0	0	0	0	Normal	2	1	2
Aug	0	0	0	0	Normal	2	2	4
Sep	0	0.05	0	0.06	Normal	2	3	6
Sum[c]								12

Source: NRCS 2019a

[a] If Total (Observed) is between 30th percentile and 70th percentile values, Condition = Normal; if Total (Observed) is less than 30th percentile; Condition = Dry; if Total (Observed) is more than 70th percentile, Condition = Wet.

[b] Dry = 1; Normal = 2; Wet = 3.

[c] A sum of 6 to 9 is drier than normal; 10 to 14 is normal; 15 to 18 is wetter than normal.

Note: Data are presented in inches.

Table 2-2. Soil Series Mapped Within or Adjacent to the Study Area

Type/ Series	Texture	Landscape Position and Parent Material	Drainage and Permeability
Bear Creek*	Loam, clay loam	Nearly level narrow alluvial fans and floodplains under annual grass-herb vegetation. Alluvium derived from igneous, metamorphic, and sedimentary rock.	Moderately well to somewhat poorly drained; low to very low runoff.
Corning*	Gravelly loam	Nearly level to gently rolling treads on high fan remnants with mound and swale microrelief and risers on fan remnants. Gravelly alluvium derived from igneous, metamorphic, and sedimentary rock.	Well drained on the mound and in areas that lack hummocky microrelief; moderately well drained in the swales; low to very high runoff on the mound, ponded to slow in the swales; very slow and slow permeability.
Honcut*	Silty clay loam	On floodplains and alluvial fans at elevations less than 2,000 feet. Alluvium derived from igneous and metamorphic rock.	Well drained; slow to medium runoff; moderately rapid permeability.
Landlow*	Clay	On nearly level basins of valley plains. Formed in moderately fine-textured alluvium.	Somewhat poorly drained; slow runoff; slow permeability.
Marguerite	Silty clay loam	Alluvium derived from metamorphic rock.	Well drained, medium runoff.
Ryer	Clay loam	On fairly old terraces and having slope gradients of 0 to 9 percent. Basic alluvium derived from igneous rock.	Well drained; slow to medium runoff; slow permeability.
Wyman	Loam, clay loam	Old stream terraces and old alluvial fans. Alluvium derived from volcanic rock.	Well drained; slow to medium runoff; moderately slow permeability.
Yokohl	Loam	Gently sloping old fans and terraces on alluvium from dominantly basic igneous rock.	Well drained. Runoff is very slow to rapid, and permeability is slow to very slow.

Source: NRCS 2019b

* Indicates a hydric soil within Merced County (NRCS 2019c).

A tributary to Black Rascal Creek flows east to west through the grassland/vernal pool complex in the northern portion of the study area. This feature originates as a vernal swale (wetlands), then transitions to a riverine feature. American bullfrogs (*Lithobates catesbeianus*) were observed in several locations along this channel.

Agricultural canals and ditches in the study area vary considerably in character. The Fairfield Canal is a large canal with steep, unvegetated embankments. Smaller drainage and irrigation ditches occur throughout the study area. The drainage features generally flow in the wet season, and the agricultural ditches are flooded during the irrigation season. Some of the larger drainage features support tall emergent vegetation; the smaller ditches are either bare ground or covered by weedy herbaceous species.

Vernal Pools and Swales

Vernal pools and swales occur embedded in the non-native annual grassland within the northern portion of the study area. Most, if not all, of these features are characterized as northern hardpan vernal pools (Holland 1986). Vernal pools and swales are continuously or intermittently inundated through the winter months and gradually dry out during the spring through evaporation and plant transpiration. Dominant plant species that have been found in vernal pools in the region include Fremont's goldfields (*Lasthenia fremontii*), doublehorn calicoflower (*Downingia bicornuta*), adobe popcornflower (*Plagiobothrys acanthocarpus*), stalked popcornflower (*P. stipitatus*), woolly marbles (*Psilocarphus brevissimus* var. *brevissimus*), white meadowfoam (*Limnanthes alba*), annual hairgrass (*Deschampsia danthonioides*), foxtail grass (*Alopecurus saccatus*), and coyote thistle (*Eryngium castrense*) (Merced County 2017, Merced Vernal Pools and Grassland Reserve 2019).

Emergent Wetlands

A large emergent wetland occurs on the western boundary of the study area just north of the Fairfield Canal. This wetland appears to be formed by the Fairfield Canal embankment impounding a natural drainage. The wetland receives natural drainage as well as drainage from irrigation runoff, as evidenced by substantial outflow observed in late summer 2019. This wetland is perennial flooded and dominated by common rush (*Juncus effusus*).

Another relatively large area of emergent wetland occurs within the Black Rascal Creek channel where it enters the southern portion of the study area. This section of the creek appears to be modified and potentially dredged in the past. A pond/basin supports dense growth of tall emergent vegetation including broadleaf cattail (*Typha latifolia*) and common tule (*Schoenoplectus acutus* = *Scirpus acutus*).

Smaller patches of emergent wetland occur in areas that are inundated for extended duration due to backwater conditions and/or supplemental water from irrigation return flow.

2.2.6.2 Terrestrial Habitats

Agricultural Lands

Agricultural land in the study areas consist mostly of almond tree (*Prunus dulcis*) orchards, with one large field cultivated with pasture grasses. At the time of the survey, the pasture field was dominated by johnsongrass (*Sorghum halepense)*.

Non-native Annual Grassland

This community is dominated by non-native annual grasses including soft brome (*Bromus hordeaceus*), foxtail barley (*Hordeum murinum)*, wild oats (*Avena* spp.), and annual fescues (*Festuca* spp.). Forbs common in this habitat include narrow tarplant (*Holocarpha virgata)*, vinegar weed (*Trichostema lanceolatum*), and doveweed (*Croton setigerus*). Grasslands in the study area are grazed by livestock.

3. Methods

A routine aquatic resources delineation was conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*, Version 2.0 (USACE 2008), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008).

3.1 Pre-field Investigation

Prior to the field survey, available and relevant information pertaining to site conditions, wetlands, and other water resources was reviewed. The following materials were included in this data review:

- Natural Resources Conservation Service soil maps and descriptions (SCS 1962, NRCS 2019b)
- National Hydrography Dataset Maps (USGS 2019b)
- U.S. Fish and Wildlife Service NWI maps (USFWS 2019)
- Google Earth imagery from multiple dates including March 31, 2015; October 11, 2016; May 2, 2017; and May 16, 2018 (Google Earth 2019)

3.2 Field Data Collection

The field data collection was conducted by Kevin Fisher, Mia Marek, Scott Lindemann, and Amy Hiss (Jacobs). Delineation data were collected February 19 and 20, March 19 and 20, and September 13, 2019 (Table 3-1).

Table 3-1. Delineators by Date

Date	Kevin Fisher	Mia Marek	Scott Lindemann	Amy Hiss
February 19, 2019	X	X		
February 20, 2019	X	X	X	
March 19, 2019	X	X	X	
March 20, 2019	X			
September 13, 2019	X			X

3.3 Field Methods

Riverine aquatic resources in the study area were delineated based on guidance from *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008) using the 2010 updated datasheets (Curtis and Lichvar 2010).

Wetland sample points were established in locations where hydrophytic vegetation was dominant; inundation or saturation were observed in the field or on aerial; or the landform indicated the potential for wetlands to occur (for example, active floodplains, closed depressions). At wetland sample points, vegetation species within a 1-meter radius of the sample point were identified by stratum. The wetland indicator status of plant species was determined using the 2016 National Wetland Plant List (Lichvar et al. 2016). The soil profile was examined to a depth of approximately 10 to 14 inches, unless otherwise noted.

Soils were characterized by evaluating texture and color within each distinct layer of the profile. Soil color was described using a Munsell Soil Color Chart (Munsell 2009). Redoximorphic features were noted and characterized where present. Each sampling location was examined for evidence of wetland hydrology.

The locations of sample points and representative boundaries of aquatic resources were mapped in the field with ArcGIS Collector using an Apple iPad paired with an external EOS Arrow 100 Global Positioning System receiver. The EOS Arrow 100 provides submeter accuracy.

3.4 Desktop Analysis

Global Positioning System data were imported into ESRI ArcGIS 10.5 software for developing aquatic resource maps. Georeferenced, high-resolution aerial photographs and topographic data were used in ArcGIS to refine the boundaries of aquatic resources in conjunction with the field-collected data. Imagery and topographic data included the following sources:

- Aerial topographic survey and high-resolution imagery collected for the Project area on July 3, 2019
- Google Earth imagery from multiple dates including March 31, 2015; October 11, 2016; May 2, 2017; and May 16, 2018 (Google Earth 2019)

4. Results

The results of the aquatic resource delineation are presented in this section. Figure 4-1, maps 1 through 6, show aquatic resources delineated in the study area, and Table 4-1 lists the aquatic resources. Delineation data forms are included in Appendix A. Representative photographs are included in Appendix B. A copy of the ORM Upload Sheet is provided in Appendix C.

Table 4-1. Potential Waters of the U.S. in the Study Area

Aquatic Resource ID	Cowardin Code	Latitude	Longitude	Area (Acres)	Length (Linear Feet)
Wetlands					
EM-01	PEM1K	37.3401034531	-120.3971455190	2.67	NA
EM-02	PEM1	37.3395468167	-120.3951809280	0.31	NA
EM-03	PEM1	37.3410023638	-120.3845355730	0.07	NA
EM-04	PEM1	37.3404630432	-120.3835742290	0.02	NA
EM-05	PEM1	37.3398361475	-120.3836798340	0.31	NA
EM-06	PEM1x	37.3385902747	-120.3850833900	1.16	NA
VP-01	PEM1C	37.3400697838	-120.3953586760	1.48	NA
VP-02	PEM1C	37.3403496489	-120.3921878740	1.61	NA
VP-03	PEM1C	37.3395942024	-120.3890971430	0.04	NA
VP-04	PEM1C	37.3419311684	-120.3905921280	0.06	NA
VP-05	PEM1C	37.3419247051	-120.3903156510	0.01	NA
VP-06	PEM1C	37.3411489334	-120.3898458380	0.01	NA
VP-07	PEM1C	37.3401555824	-120.3895380160	0.10	NA
VP-08	PEM1C	37.3399409988	-120.3901655560	0.03	NA
VP-09	PEM1C	37.3429751178	-120.3865589240	0.06	NA
VP-10	PEM1C	37.3409025691	-120.3884092300	0.14	NA
VP-11	PEM1C	37.3417515227	-120.3844273220	0.05	NA
VP-12	PEM1C	37.3418252764	-120.3834196050	0.01	NA
VP-13	PEM1C	37.3419315851	-120.3832220160	0.03	NA
VP-14	PEM1C	37.3405937421	-120.3833196970	0.01	NA
VP-15	PEM1C	37.3413466127	-120.3811176620	0.08	NA
VP-16	PEM1C	37.3410984572	-120.3813669010	0.06	NA
VP-17	PEM1C	37.3405445619	-120.3819207040	0.31	NA
VP-18	PEM1C	37.3418305503	-120.3811521400	0.13	NA
VP-19	PEM1C	37.3414625600	-120.3819602710	0.21	NA
VP-20	PEM1C	37.3410416123	-120.3790160320	0.06	NA
VP-21	PEM1C	37.3437290427	-120.3773467920	0.04	NA
VP-22	PEM1C	37.3448494681	-120.3778993000	0.10	NA
VP-23	PEM1C	37.3444519328	-120.3779696270	0.01	NA
VP-24	PEM1C	37.3442825123	-120.3779214930	0.04	NA

Table 4-1. Potential Waters of the U.S. in the Study Area

Aquatic Resource ID	Cowardin Code	Latitude	Longitude	Area (Acres)	Length (Linear Feet)
VP-25	PEM1C	37.3427811687	-120.3781639910	0.08	NA
VP-26	PEM1C	37.3428847155	-120.3780093690	0.02	NA
VP-27	PEM1C	37.3426103442	-120.3778072900	0.13	NA
VP-28	PEM1C	37.3430095182	-120.3824280900	0.04	NA
VP-29	PEM1C	37.3411588557	-120.3804258930	0.05	NA
VP-30	PEM1C	37.3426480772	-120.3774677290	0.02	NA
VP-31	PEM1C	37.3402847027	-120.3802484030	0.05	NA
VP-32	PEM1C	37.3395627607	-120.3806603490	0.02	NA
VP-33	PEM1C	37.3395563327	-120.3808937520	0.01	NA
VP-34	PEM1C	37.3396175981	-120.3811200030	0.02	NA
VP-35	PEM1C	37.3401965753	-120.3784728570	0.05	NA
VP-36	PEM1C	37.3444558342	-120.3777698990	0.00	NA
VS-01	PEM1C	37.3422659398	-120.3866264290	4.46	NA
VS-02	PEM1C	37.3399788709	-120.3815778410	0.44	NA
VS-03	PEM1C	37.3426735923	-120.3805754080	0.14	NA
VS-04	PEM1C	37.3399340757	-120.3796142290	0.29	NA
VS-05	PEM1C	37.3423386893	-120.3791133520	0.76	NA
VS-06	PEM1C	37.3418154159	-120.3789083810	0.03	NA
VS-07	PEM1C	37.3423539039	-120.3785996410	0.04	NA
VS-08	PEM1C	37.3426950582	-120.3786485830	0.02	NA
VS-09	PEM1C	37.3432322332	-120.3791133100	0.02	NA
VS-10	PEM1C	37.3450474323	-120.3782800420	0.59	NA
VS-11	PEM1C	37.3455379755	-120.3773957210	0.05	NA
VS-12	PEM1C	37.3452961139	-120.3772104950	0.04	NA
VS-13	PEM1C	37.3445036612	-120.3775201970	0.03	NA
			Total (wetlands)	**16.60**	**NA**
Other Waters					
C-01	R4x	37.3392541900	-120.3971475610	0.25	190
C-02	R4x	37.3388058562	-120.3966382240	0.42	267
D-01	R4x	37.3357592444	-120.3958147890	0.76	2,542
D-02	R4x	37.3393815962	-120.3814013420	1.07	1,757
D-03	R4x	37.3392221232	-120.3776062700	0.08	232
D-04	R4x	37.3389263165	-120.3778453410	0.09	180
D-05	R4x	37.3372626849	-120.3855183210	0.17	970
D-06	R4x	37.3373419175	-120.3833975660	0.03	250
D-07	R4x	37.3372252008	-120.3809009050	0.32	1,347
D-08	R4x	37.3348624194	-120.3873767790	0.39	1,570

Table 4-1. Potential Waters of the U.S. in the Study Area

Aquatic Resource ID	Cowardin Code	Latitude	Longitude	Area (Acres)	Length (Linear Feet)
D-09	R4x	37.3324968225	-120.3874856420	0.03	119
D-10	R4x	37.3322270998	-120.3846573450	0.09	814
R-01	R4SB	37.3404283240	-120.3948056970	2.29	2,531
R-01a	R4SB	37.3404295378	-120.394793083	0.02	91
R-02	R4SB	37.3413589996	-120.3830500170	6.30	3,770
R-03	R4SB	37.3449818530	-120.3773836700	0.28	475
R-04	R4SB	37.3354608049	-120.3915436720	4.99	3,735
R-05	R4SB	37.3384506966	-120.3866606060	0.20	343
R-06	R4SB	37.3397445286	-120.3830243550	0.40	478
			Total (other waters)	**18.19**	**21,570**

4.1 Aquatic Resources

4.1.1 Wetlands

4.1.1.1 Emergent Marsh (EM)

Emergent wetlands were delineated in perennially flooded areas and/or areas with an extended period of inundation or saturation. The hydrology of these wetlands is influenced by artificial water sources (such as, agricultural inputs) and/or past land use practices (for example, fill or excavation).

Feature EM-1 is a large marsh on the western margin of the study area (Figure 4-1, Map 1). Paired sample points (SP) were established along the wetland boundary (SP-07a and -07b). This feature receives natural drainage as well as drainage from irrigation runoff. In September 2019, water from EM-1 was draining to the east, causing extended inundation of R-01 and saturation of feature EM-02.

Features EM-03, EM-04, and EM-05 were delineated in backwater channels connected to Black Rascal Creek channel. These features have a longer hydroperiod than adjacent vernal pools and swales because they are subject to backwater flooding from Black Rascal Creek. A wetland sample point was established within EM-04 (SP-21a), which is representative of the emergent wetlands in this area. Vegetation was dominated by common spikerush (*Eleocharis macrostachya*). Hydric soil indicators included Depleted Matrix (F8). Surface water was present at the time of the survey. The paired upland sample point (SP-21b) had no wetland indicators present.

Feature EM-6 was delineated within a basin in the Black Rascal Creek channel. The shape and apparent depth of the basin suggests it was excavated at some time in the past. Tall emergent vegetation has colonized a portion of the basin. SP-12a and SP-12b were established within and adjacent to the wetland within the basin. The wetland sample point (SP-12a) was dominated by broadleaf cattail and curly dock (*Rumex crispus*). Soils met the indicator for Redox Dark Surface (F6), and saturation was observed at the time of sampling. The paired upland sample point (SP-12b) exhibited no wetland indicators.

A total of 4.53 acres of emergent wetlands were delineated within the study area. The Cowardin classification assigned to these wetlands is Palustrine, Emergent, Persistent (PEM1) and Palustrine, Emergent, Persistent, Artificially Flooded (PEM1K) (Cowardin et al. 1979).

4.1.1.2 Vernal Pools (VP) and Vernal Swales (VS)

Vernal pool and swale complexes were delineated in the alluvial terraces adjacent to Black Rascal Creek in the northern portion of the study area. Vernal pools and swales occur as tributaries to Black Rascal Creek, distributary channels, abandoned meander scars, and other erosional features/depressions in the landscape.

Sample points were established in representative vernal pool and swale complexes (Figure 4-1, SP-09a, -10a, -13a, -14a, -15a, -16a, -17a, -18a, and -19a). During the spring surveys, vegetation within vernal pool and swale sample points was dominated by hydrophytes such as white meadowfoam and seaside barley (*Hordeum marinum*). During late fall surveys, the pools and swales were dominated by species such as Great Valley button celery (*Eryngium castrense*), stalked popcornflower (*Plagiobothrys stipitatus),* and seaside barley. Redoximorphic features in soils were generally weakly expressed with a low abundance of redox concentrations occurring along pore linings primarily within the upper portion of the soil profile. While soils at sample points met typical hydric soil indicators found in western vernal pools (F3 and F8), the spatial distribution of redoximorphic features was highly variable within and among the wetlands. Primary indicators of wetland hydrology included surface water (A1), high water table (A2), and saturation (A3).

Upland sample points were established adjacent to vernal pools/swales based on micro-topographic gradients, observations of inundation/saturation, and changes in vegetation species composition (Figure 4-1, SP-09b, -10b, -13b, -14b, -15b, -16b, -17b, -18b, and -19b). Wetland boundaries were generally distinct and abrupt. Vegetation communities transitioned from vernal pool hydrophytes to upland grasses along narrow ecotones. No indicators of wetland hydrology or hydric soils were observed in upland sample points located near the wetland boundaries.

A total of 12.06 acres of vernal pool and swale wetlands were delineated within the study area. The Cowardin classification assigned to these wetlands is Palustrine, Emergent, Persistent, Seasonally Flooded (PEM1C) (Cowardin et al. 1979).

4.1.2 Other Waters

4.1.2.1 Riverine (R)

Riverine features mapped within the study area include Black Rascal Creek, a tributary channel, a canal, and ditches.

Black Rascal Creek is the largest riverine feature in the study area. Four ordinary high water mark (OHWM) cross-sections were established along the Black Rascal Creek channel (Figure 4-1, OHWM-01, -04, -07, and -08). Geomorphic indicators of OHWM along Black Rascal Creek included drift deposits and break in bank slope (Appendix A). Vegetation indicators included change in vegetation species cover and composition (Appendix A). The Cowardin classification assigned to Black Rascal Creek is Riverine, Intermittent, Streambed (R4SB) (Cowardin et al. 1979).

OHWM-03 was established adjacent to SP-06 in the small channel/erosional feature that connects EM-01 to R-01 (Figure 4-1, Map 1). Indicators of the OHWM included break in bank slope and change in vegetation species cover (Appendix A). The Cowardin classification assigned to this feature is Riverine, Intermittent, Streambed (R4SB) (Cowardin et al. 1979).

OHWM-02, -05, -06, and -09 were established in constructed drainages and ditches. Indicators of the OHWM included break in bank slope and change in vegetation species cover or composition (Appendix A). The Cowardin classification assigned to these features is Riverine, Intermittent, Streambed (R4SBx)

(Cowardin et al. 1979). The "x" in the Cowardin classification denotes excavated features (Cowardin et al. 1979).

A total of 21,570 linear feet intermittent riverine waters spanning 18.19 acres were delineated within the study area.

4.2 Other Areas Investigated

Other areas investigated that were determined not to be aquatic resources included the following:

- SP-1 was established on the bank of Black Rascal Creek, just upgradient of OHWM-1 (Figure 4-1, Map 4) (Appendix B, Photograph 1). Vegetation was composed of non-native annual grasses and weedy forbs. There was no evidence of wetland hydrology at this location, and soils did not meet hydric criteria; therefore, no aquatic resources were delineated in this location.
- SP-2 and SP-3 (Figure 4-1, Map 1) (Appendix B, Photograph 2). were established in the agricultural field located between Black Rascal Creek (to the southeast of the field) and the Fairfield Canal (to the west of the field). These sites were investigated because aerial imagery suggests these areas may be seasonally saturated. The herb stratum was dominated by johnsongrass. There was no evidence of wetland hydrology or hydric soils during the site visit, and no aquatic resources were delineated at these locations.
- SP-5 was established in a depression adjacent to an excavated drainage ditch (D-01), beside the Fairfield Canal levee road (Figure 4-1, Map 1) (Appendix B, Photograph 5). There was no evidence of wetland hydrology at this location, and soils did not meet hydric criteria; therefore, no aquatic resources were delineated in this location.
- SP-6 was established adjacent to the small channel (R-01a) that connects EM-01 to R-01. (Figure 4-1, Map 1) (Appendix B, Photograph 6). Vegetation was composed of non-native annual grasses and herbs. There was no evidence of wetland hydrology at this location, and soils did not meet hydric criteria; therefore, no aquatic resources were delineated in this location.
- SP-8 was established on a floodplain bench adjacent to an excavated drainage ditch (D-01) beside the Fairfield Canal levee road (Figure 4-1, Map 4) (Appendix B, Photograph 4).
- SP-11 was established in an area where shallow standing water was observed during the February 2019 site visit (Figure 4-1, Maps 3 and 6) (Appendix B, Photograph 11). The sample point had no indicators of hydric soils or hydrophytic vegetation. Soils in this area appeared compacted from farming activities. Because seasonal ponding in this area was due to disturbed conditions (poor infiltration caused by compaction) and there was no indication of OHWM, this area was considered to be a puddle and not delineated as an aquatic resource.
- SP-22 and SP-23 were established in areas where standing water was observed during the February and March 2019 site visits (Figure 4-1, Map 5) (Appendix B, Photographs 15 and 16). Soils in these areas appear compacted from cattle trampling. The sample points had hydrophytic vegetation, but hydric soils were not present. Because seasonal ponding in these areas was due to disturbed soil conditions (poor infiltration caused by compaction) and there was no indication of OHWMs, these areas were considered to be puddles and not delineated as aquatic resources.

5. References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service Report No. FWS/OBS/-79/31. Washington, D.C.

Curtis, Katherine E., and Robert W. Lichvar. 2010. *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. ERDC/CRREL TN-10-1. U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A176 912.

Google Earth. 2019. Version 7.32. http://www.google.com/earth/index.html.

Holland, R. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=75893&inline

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. "The National Wetland Plant List: 2016 Wetland Ratings." *Phytoneuron.* 2016-30: 1-17. Published April 28, 2016. ISSN 2153 733X.

Lichvar, R.W., and S.M. McColley. 2008. *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. ERDC/CRREL TR-08-12. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

Marchand, D.E. and Alan Allwardt. 1978. *Preliminary Geologic Map Showing Quaternary Deposits of the Northeastern San Joaquin Valley, California*. U.S. Geological Survey. Miscellaneous Field Studies Map MF-945.

Merced County. 2017. *Final Environmental Impact Report, Black Rascal Creek Flood Control Project*. December.

Merced Vernal Pools and Grassland Reserve. 2019. Ecosystem Web Page. University of California, Merced. Accessed October 14, 2019. http://vernalpools.ucmerced.edu/ecosystem.

Miles, Scott, and Charles Goudey, eds. 1998. *Ecological Subregions of California*. United States Department of Agriculture, Forest Service. Pacific Southwest Division. R5-EM-TP-005-Net. San Francisco.

Munsell Soil-Color Charts (Munsell). 2009. *Munsell Soil Color Charts*. Year 2009 Revised Edition. Grand Rapids, Michigan.

Natural Resources Conservation Service (NRCS). 2019a. Climate Analysis for Wetlands Tables (WETS Tables). Agricultural Applied Climate Information System. Accessed October 14, 2019. https://www.wcc.nrcs.usda.gov/climate/navigate_wets.html.

Natural Resources Conservation Service (NRCS). 2019b. Web Soil Survey 2.0 National Cooperative Soil Survey. Accessed October 14, 2019. http://websoilsurvey.nrcs.usda.gov/app/.

Natural Resources Conservation Service (NRCS). 2019c. List of Hydric Soils. Accessed October 14, 2019. https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/.

Soil Conservation Service (SCS). 1962. *Soil Survey, Merced Area California*.

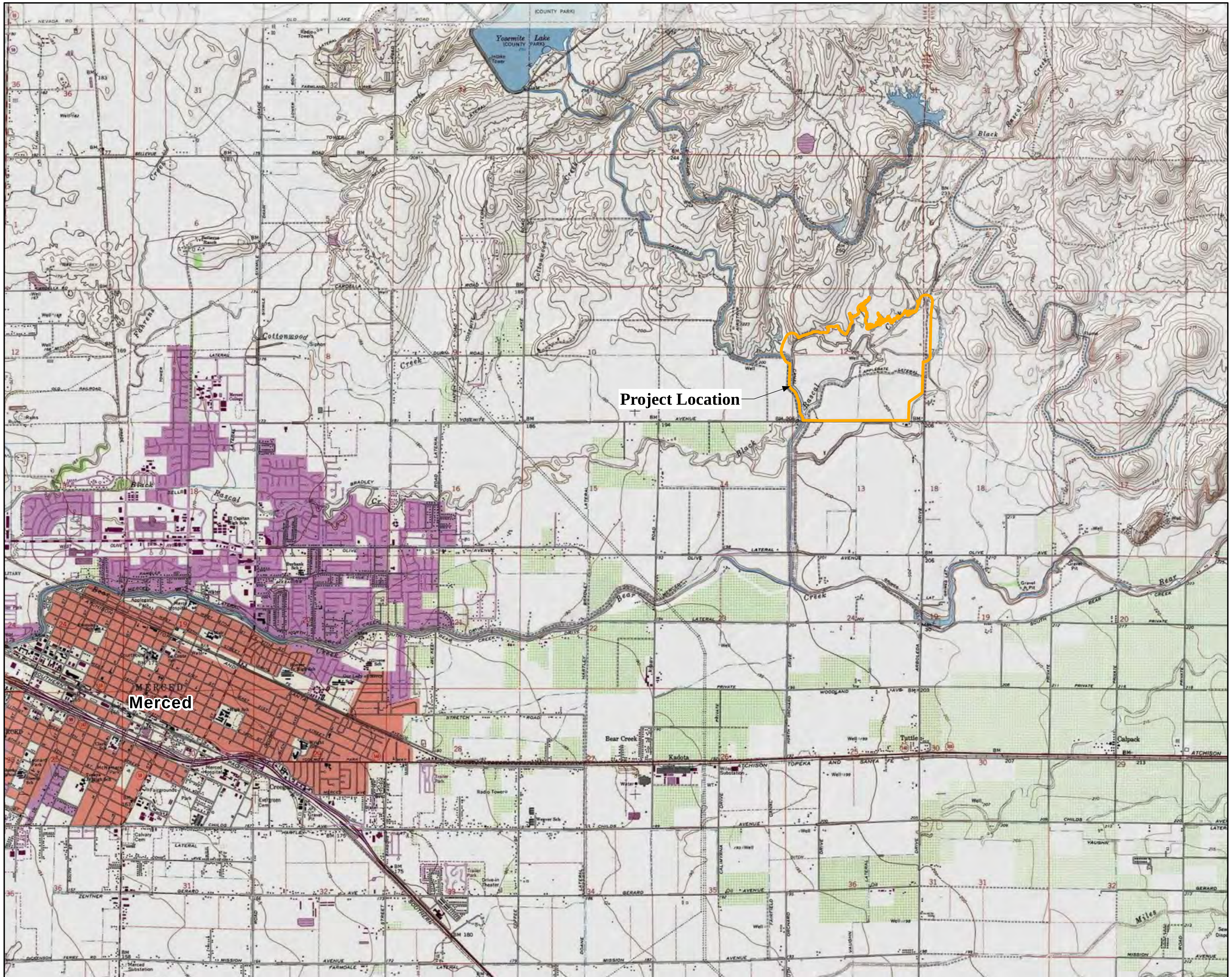
U.S. Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0.* September.

U.S. Fish and Wildlife Service (USFWS). 2019. National Wetlands Inventory Map. Accessed October 14, 2019. http://www.fws.gov/wetlands/Data/Mapper.html.

U.S. Geological Survey (USGS). 2019a. The StreamStats Program. Accessed October 14, 2019. http://streamstats.usgs.gov.

U.S. Geological Survey (USGS). 2019b. National Hydrography Dataset. Accessed October 14, 2019. https://www.usgs.gov/core-science-systems/ngp/national-hydrography.

Figures



VICINITY MAP

LEGEND

Study Area

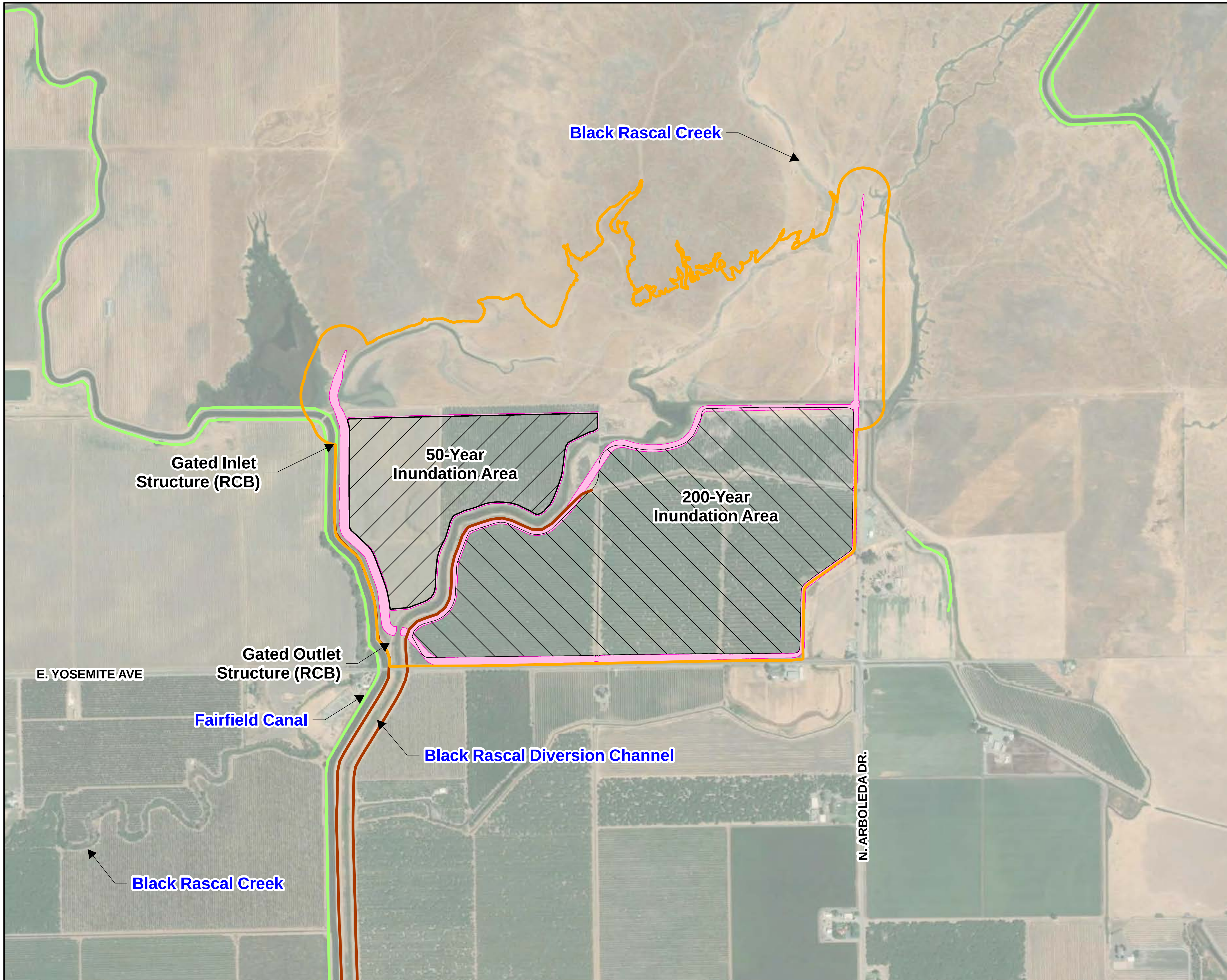
Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

N

0 2,000 4,000 8,000
Feet

FIGURE 1-1
Vicinity Map
Black Rascal Creek Flood Control Project

VICINITY MAP



LEGEND

- Study Area
- 200-Year Inundation Area
- 50-Year Inundation Area
- Embankment

DWR Levee Category

- State-Federal SPFC
- Other

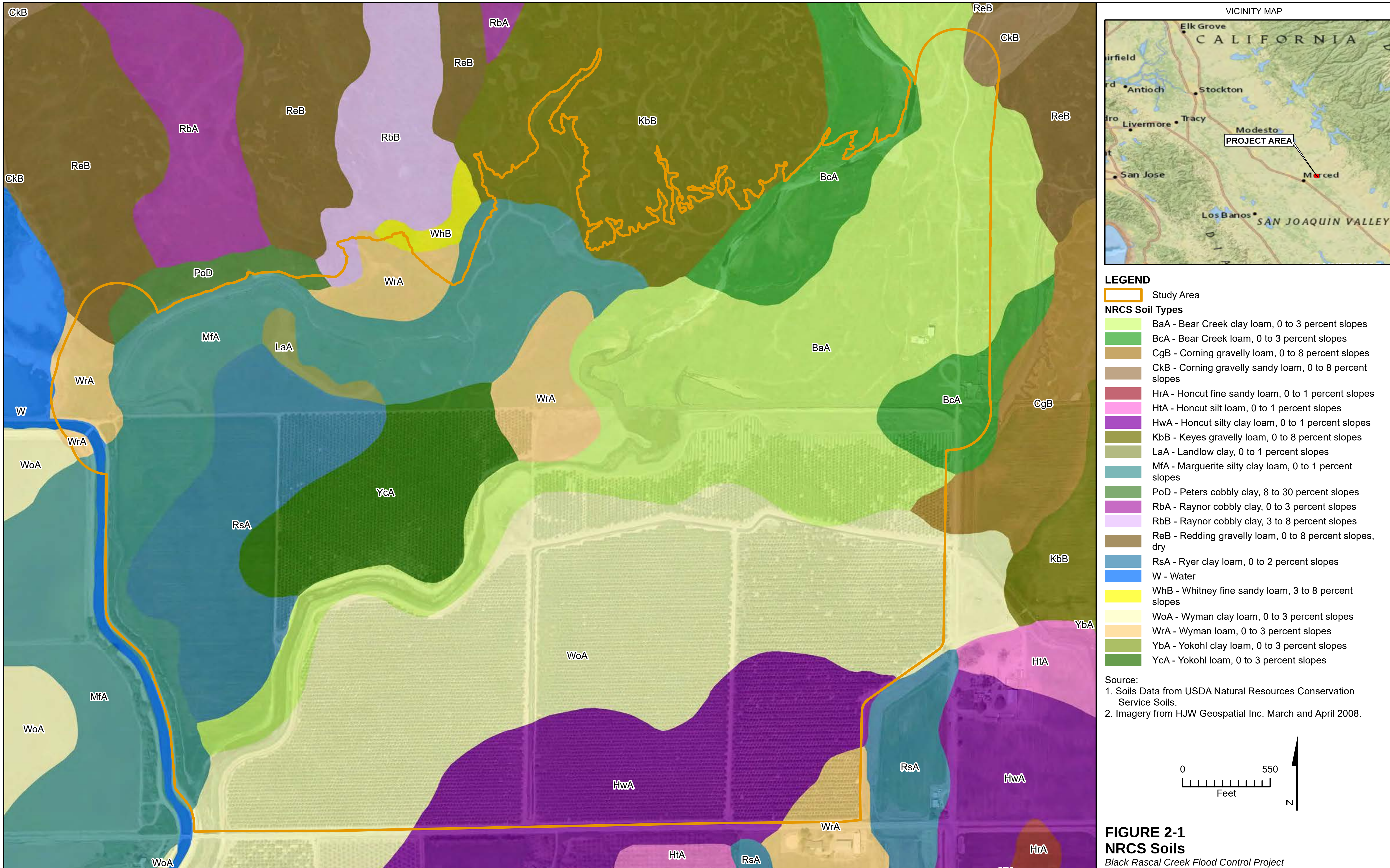
Notes:
DWR = California Department of Water Resources
SPFC = State Plan of Flood Control

N

0 1,000 2,000
Feet

FIGURE 1-2
Study Area
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2020\WDR\AUG\FIG1-2_STUDY_AREA.MXD 8/20/2020 9:54:37 AM CARCHER



Source:
1. Soils Data from USDA Natural Resources Conservation Service Soils.
2. Imagery from HJW Geospatial Inc. March and April 2008.

FIGURE 2-1
NRCS Soils
Black Rascal Creek Flood Control Project

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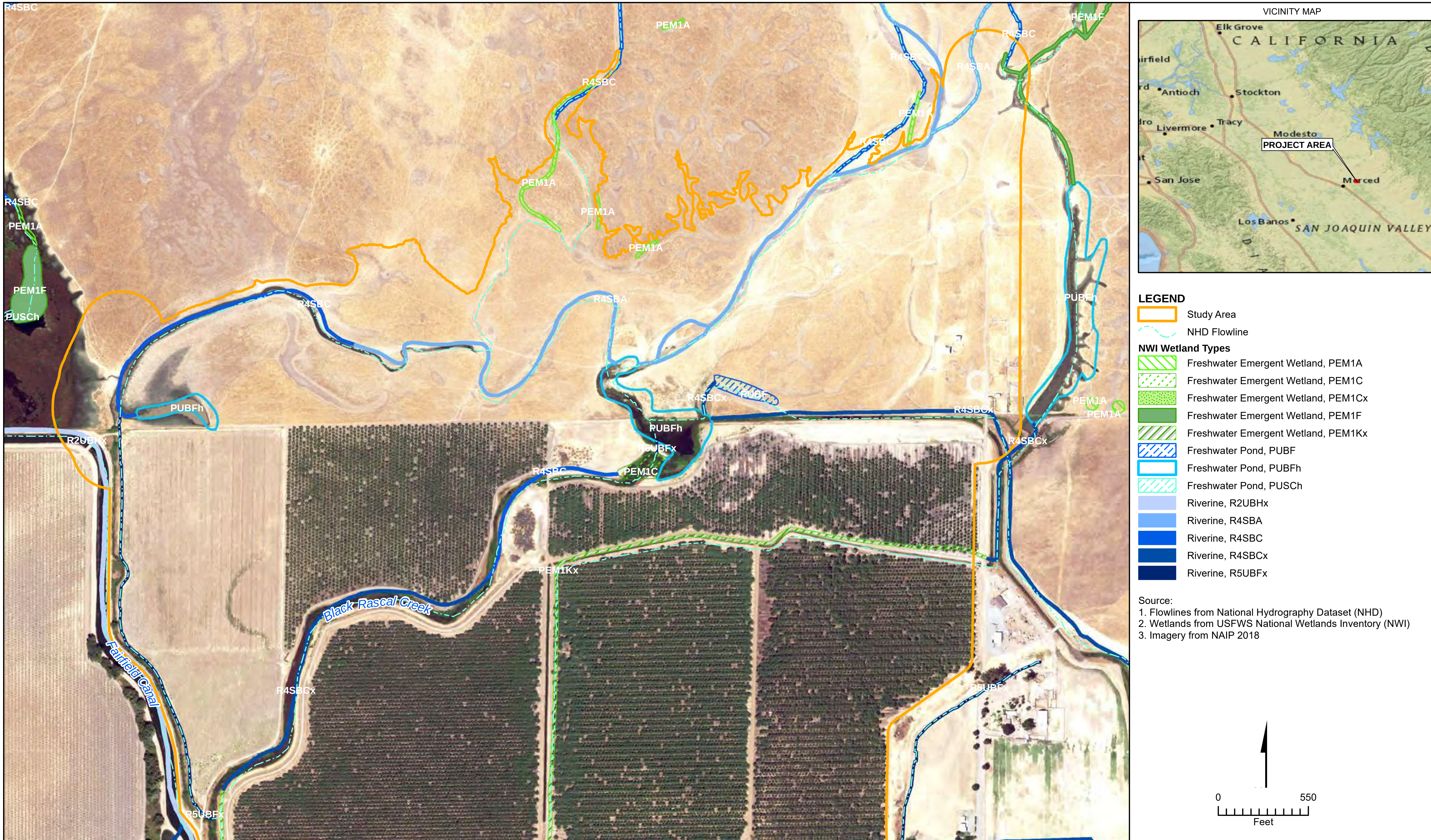

FIGURE 2-2
National Wetlands Inventory (NWI)
Black Rascal Creek Flood Control Project

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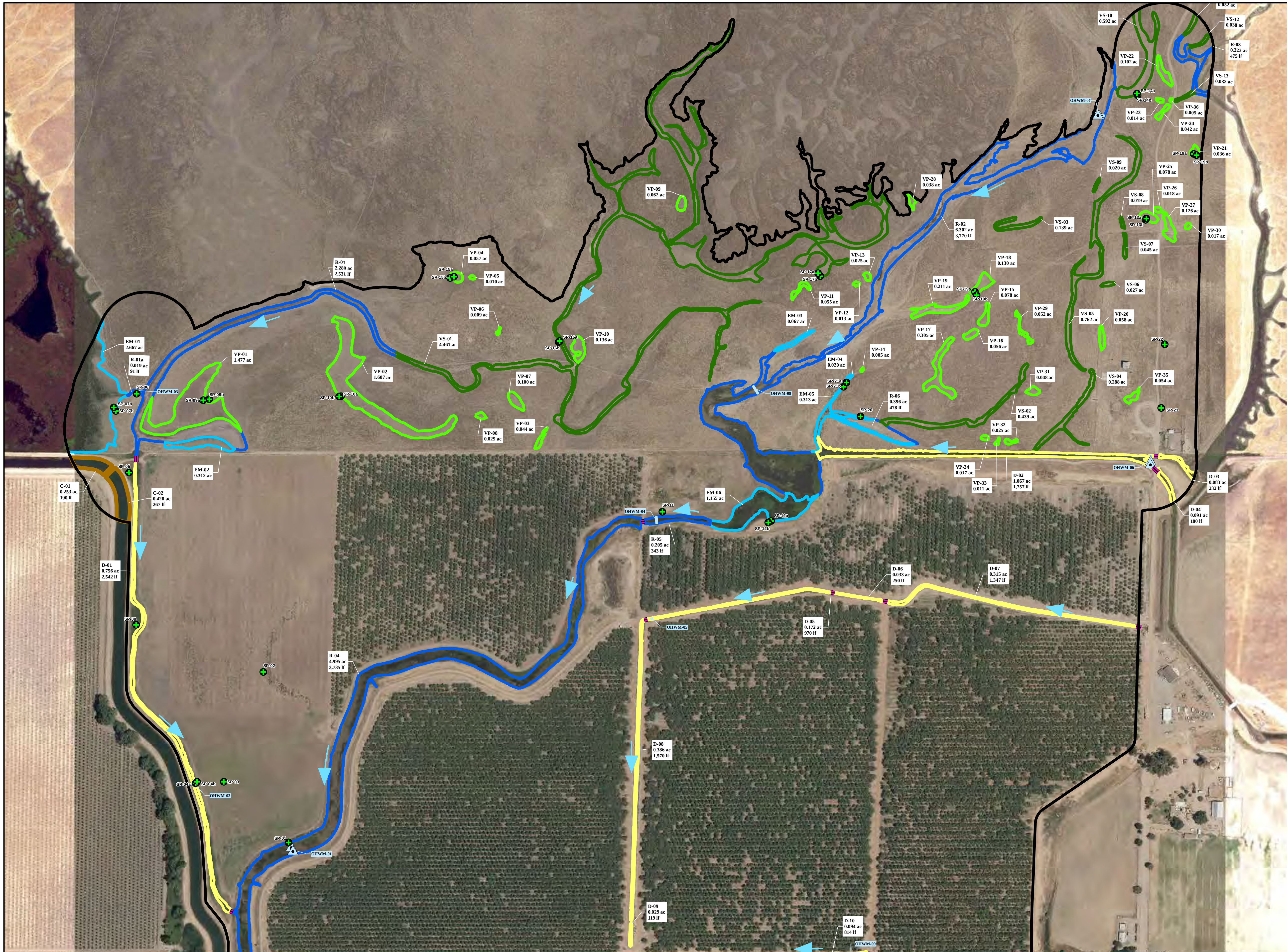
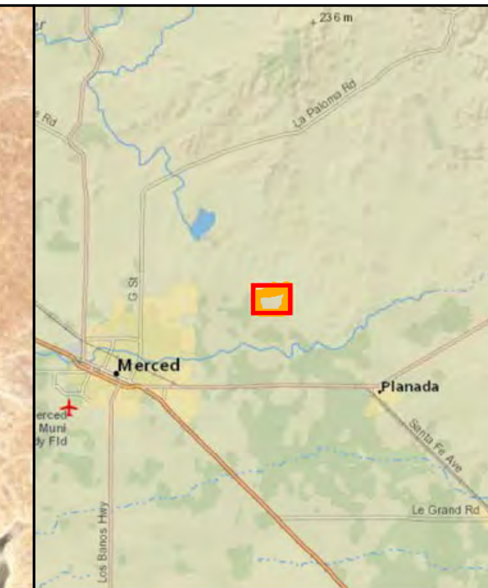




Legend

- Study Area (470.2 acres)
- Sample Point
- Culvert
- Flow Direction
- OHWM Data Point

Aquatic Resources

Other Waters

- Riverine (R)
- Canal (C)
- Ditch (D)

Wetlands

- Vernal Pool (VP)
- Vernal Swale (VS)
- Emergent Marsh (EM)

Delineation:
K. Fisher, M. Marek, S. Lindemann, A. Hiss
February 19, 20, March 19, 20, September 13, 2019

1 ft Elevation Contours from County of Merced
July 3, 2019

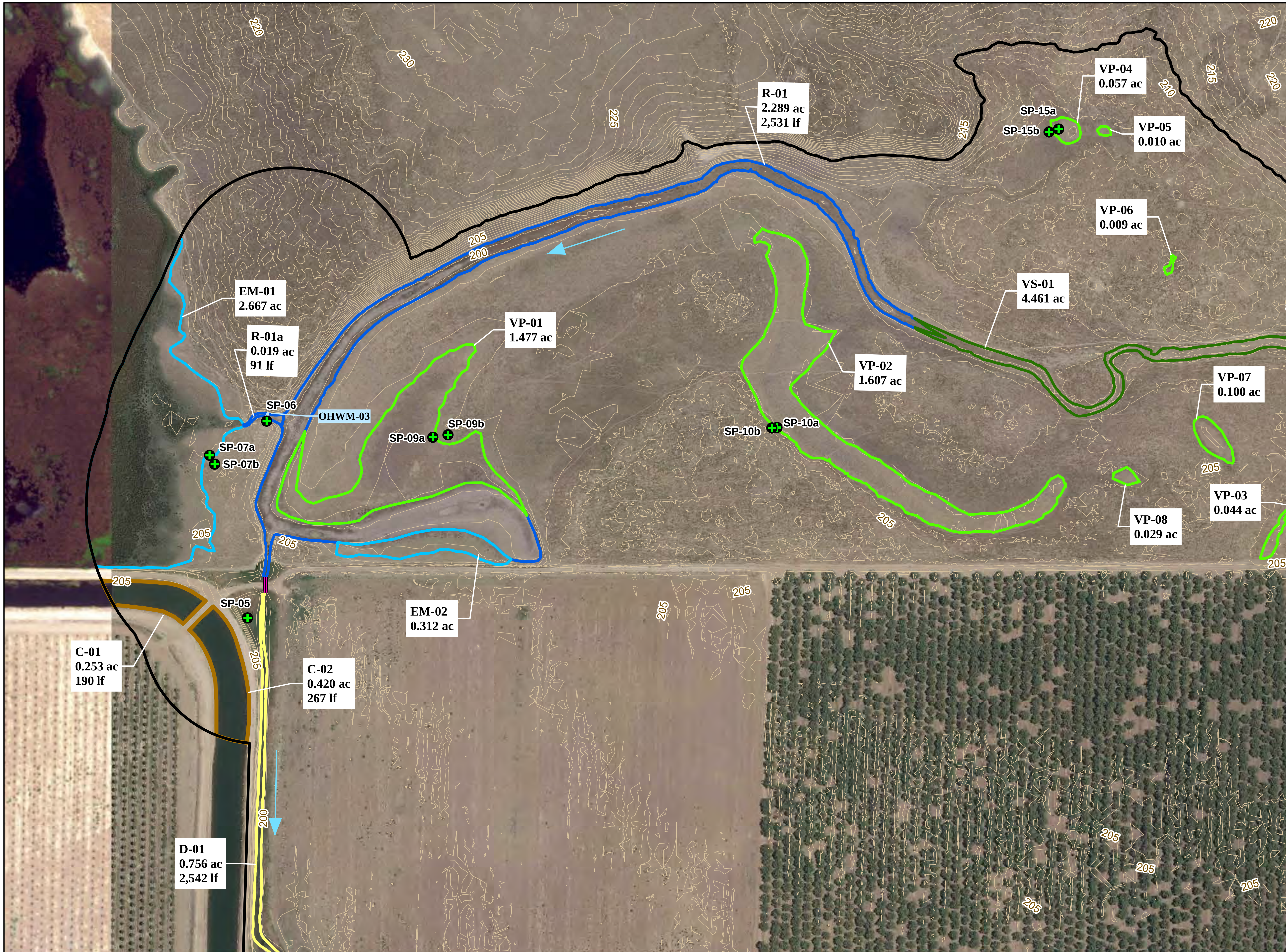
Aerial Imagery:
County of Merced, July 3, 2019

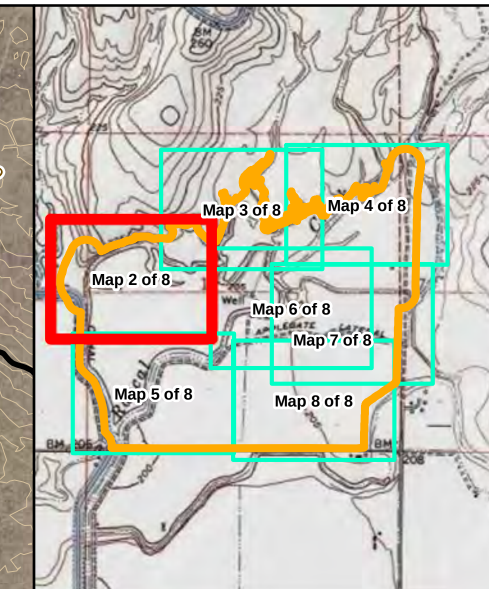
N

0 500
Feet

FIGURE 4-1
Map 1 of 8
Aquatic Resource Delineation Map
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2020\WDR\AUG\FIG4-1_AQUATIC_RESOURCES_DELINEATION_OVERVIEW.MXD 8/20/2020 10:21:44 AM CARCHER





Legend

- Study Area (470.2 acres)
- Sample Point
- Culvert
- Flow Direction
- OHWM Data Point
- 1-Foot Elevation Contours

Aquatic Resources

Other Waters

- Riverine (R)
- Canal (C)
- Ditch (D)

Wetlands

- Vernal Pool (VP)
- Vernal Swale (VS)
- Emergent Marsh (EM)

Delineation:
K. Fisher, M. Marek, S. Lindemann, A. Hiss
February 19, 20, March 19, 20, September 13, 2019

1-Foot Elevation Contours from County of Merced
July 3, 2019

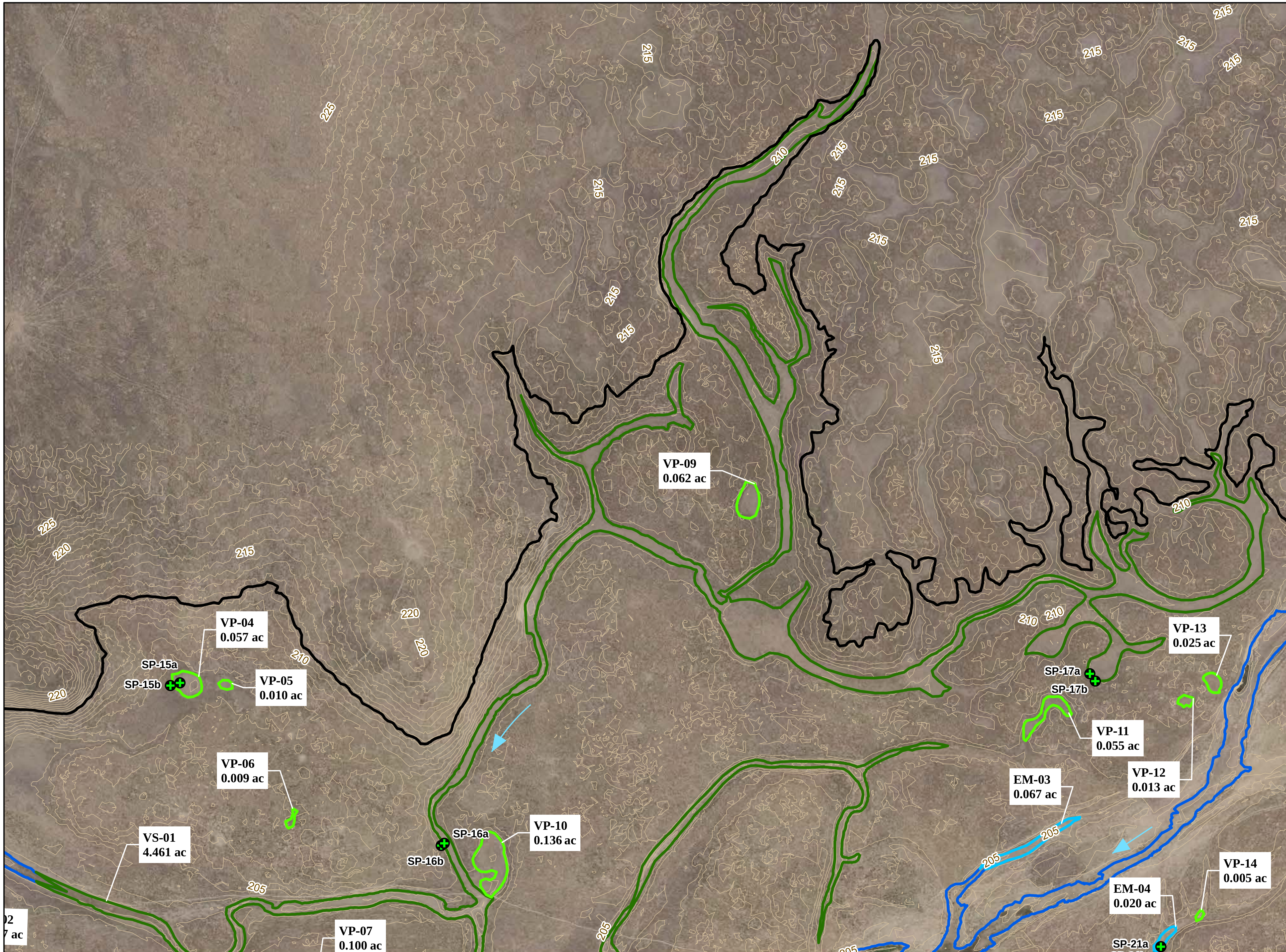
Aerial Imagery:
County of Merced, July 3, 2019

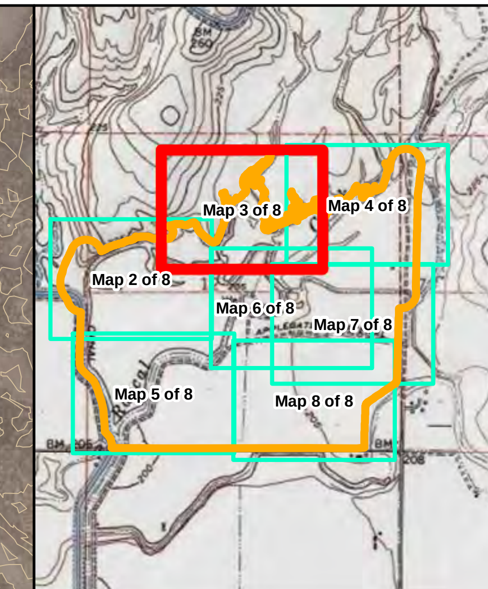
N

0 200
Feet

FIGURE 4-1
Map 2 of 8
Aquatic Resource Delineation Map
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2020\WDR\AUG\FIG4-1_AQUATIC_RESOURCES_DELINEATION.MXD 8/20/2020 10:35:13 AM CARCHER





Legend

- Study Area (470.2 acres)
- Sample Point
- Flow Direction
- OHWM Data Point
- 1-Foot Elevation Contours

Aquatic Resources

Other Waters

- Riverine (R)

Wetlands

- Vernal Pool (VP)
- Vernal Swale (VS)
- Emergent Marsh (EM)

Delineation:
K. Fisher, M. Marek, S. Lindemann, A. Hiss
February 19, 20, March 19, 20, September 13, 2019

1-Foot Elevation Contours from County of Merced
July 3, 2019

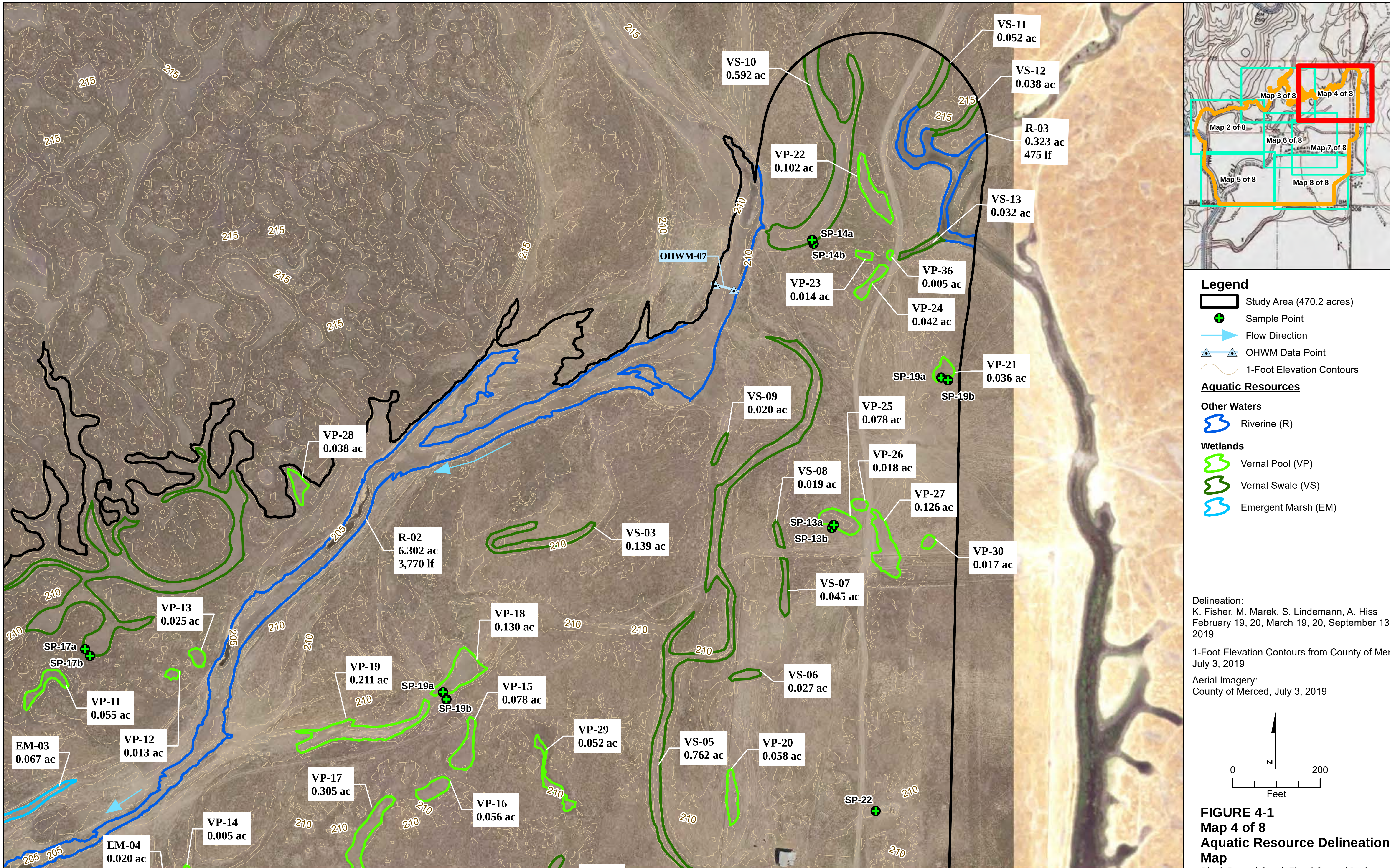
Aerial Imagery:
County of Merced, July 3, 2019

N

0 200
Feet

FIGURE 4-1
Map 3 of 8
Aquatic Resource Delineation Map
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2020\WDR\AUG\FIG4-1_AQUATIC_RESOURCES_DELINEATION.MXD 8/20/2020 10:35:32 AM CARCHER



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Legend

Study Area (470.2 acres)
Sample Point
Flow Direction
OHWM Data Point
1-Foot Elevation Contours

Aquatic Resources

Other Waters
Riverine (R)

Wetlands
Vernal Pool (VP)
Vernal Swale (VS)
Emergent Marsh (EM)

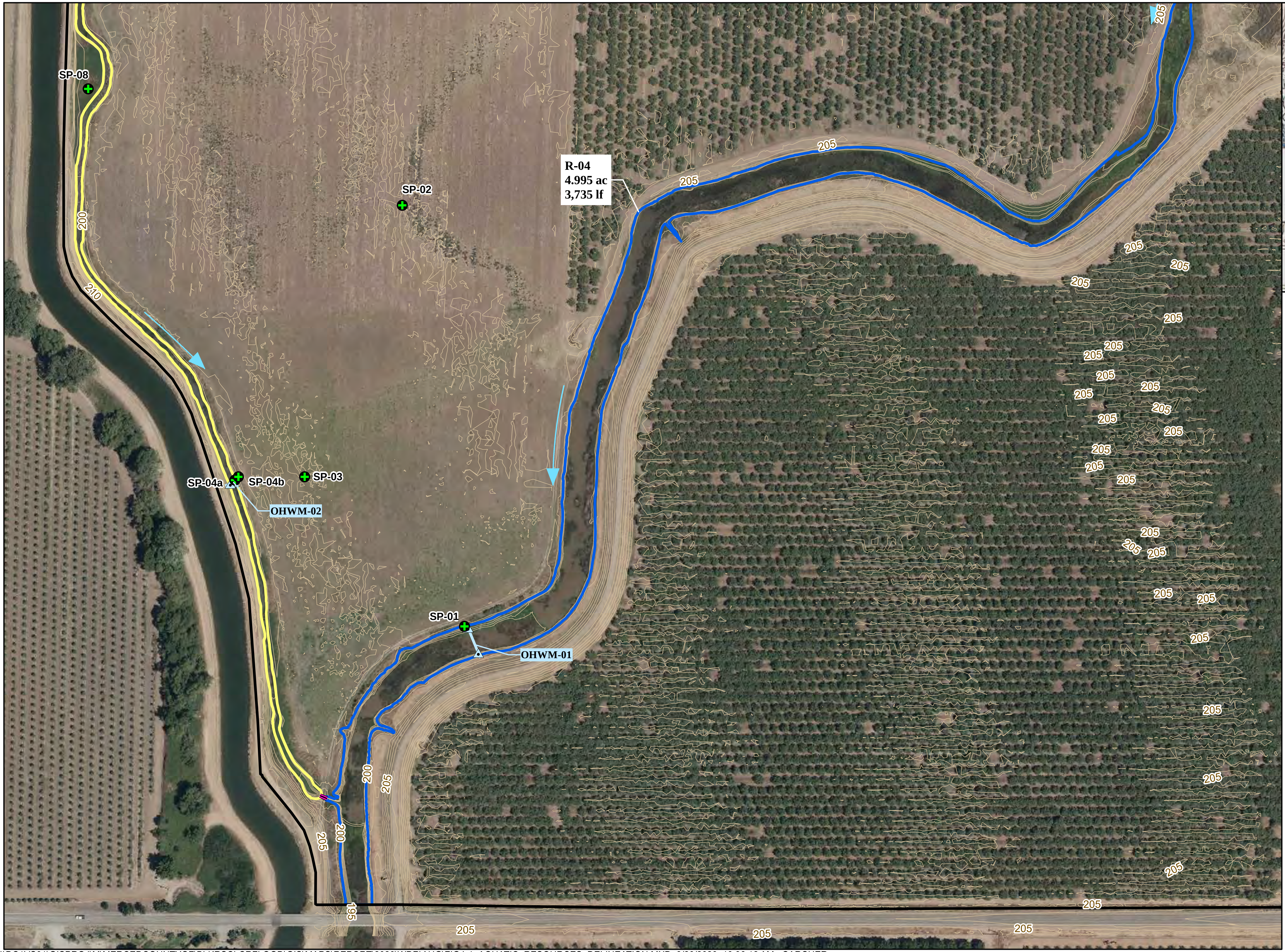
Delineation:
K. Fisher, M. Marek, S. Lindemann, A. Hiss
February 19, 20, March 19, 20, September 13, 2019

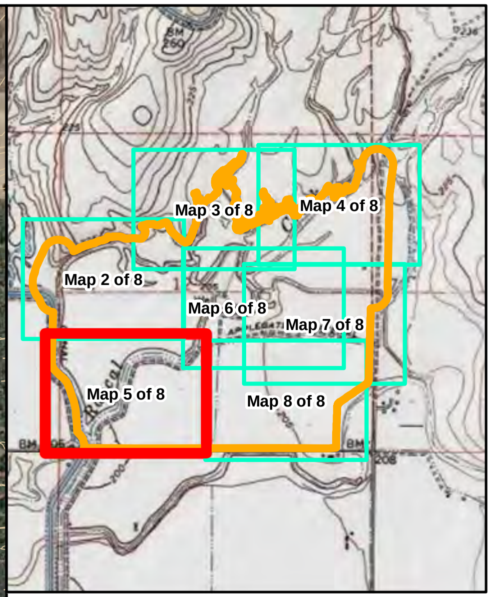
1-Foot Elevation Contours from County of Merced
July 3, 2019

Aerial Imagery:
County of Merced, July 3, 2019

0 200
Feet

FIGURE 4-1
Map 4 of 8
Aquatic Resource Delineation Map
Black Rascal Creek Flood Control Project





Legend

Study Area (470.2 acres)
Sample Point
Culvert
Flow Direction
OHWM Data Point
1-Foot Elevation Contours

Aquatic Resources

Other Waters

Riverine (R)
Ditch (D)

Delineation:
K. Fisher, M. Marek, S. Lindemann, A. Hiss
February 19, 20, March 19, 20, September 13, 2019

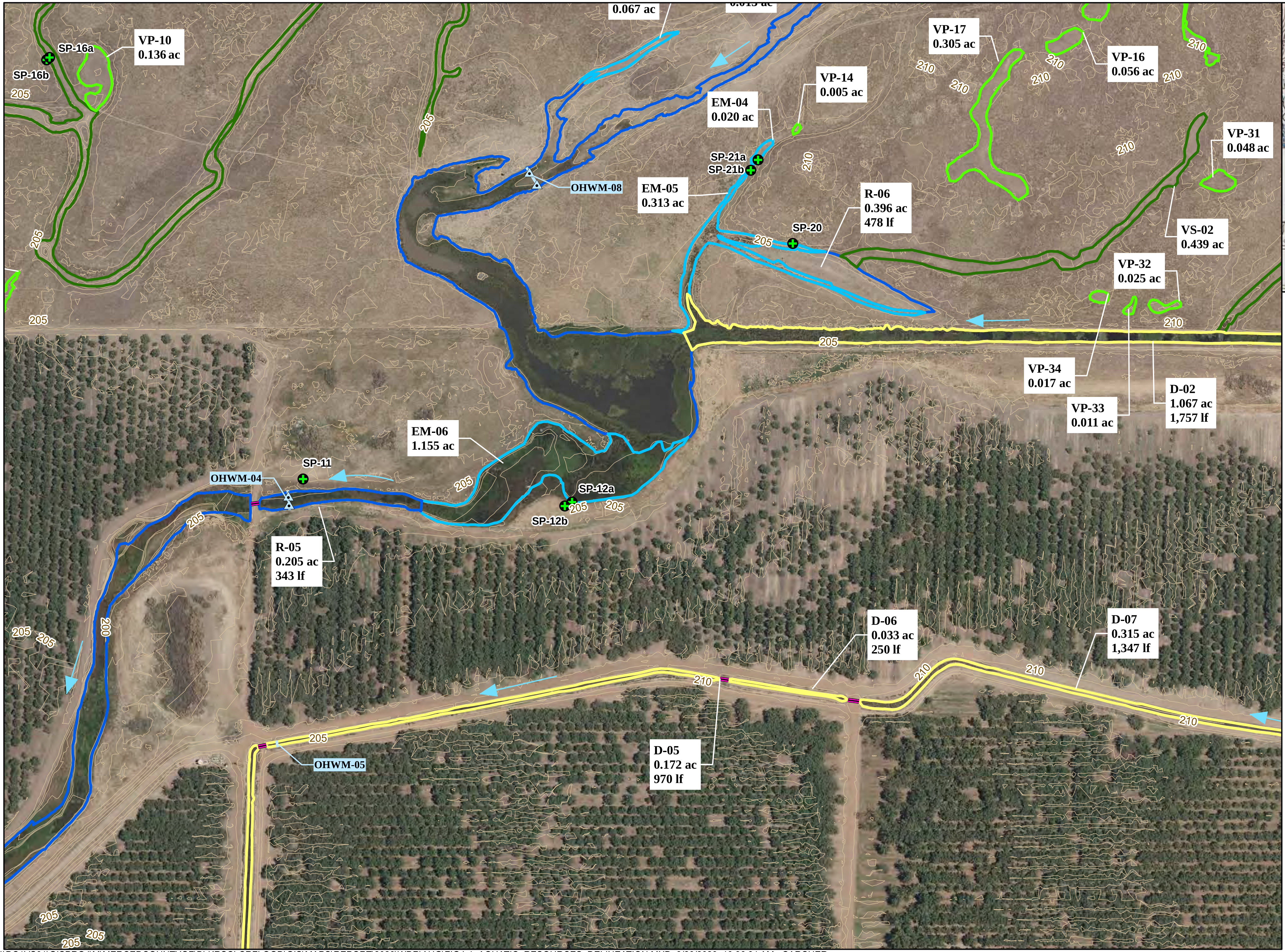
1-Foot Elevation Contours from County of Merced
July 3, 2019

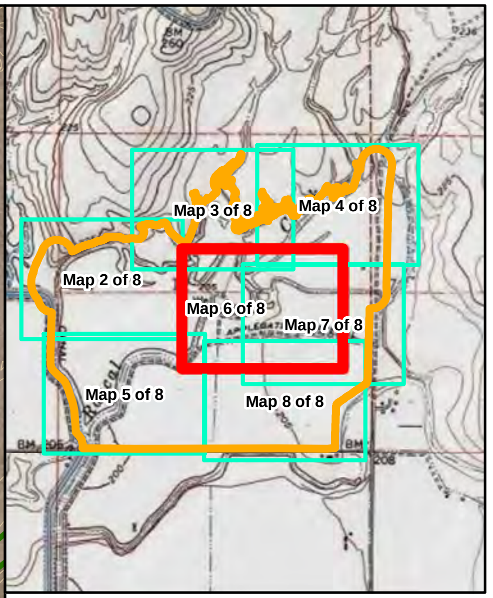
Aerial Imagery:
County of Merced, July 3, 2019

N
0 200
Feet

FIGURE 4-1
Map 5 of 8
Aquatic Resource Delineation Map
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2020\WDR\AUG\FIG4-1_AQUATIC_RESOURCES_DELINEATION.MXD 8/20/2020 10:36:12 AM CARCHER





Legend

- Study Area (470.2 acres)
- Sample Point
- Culvert
- Flow Direction
- OHWM Data Point
- 1-Foot Elevation Contours

Aquatic Resources

Other Waters

- Riverine (R)
- Ditch (D)

Wetlands

- Vernal Pool (VP)
- Vernal Swale (VS)
- Emergent Marsh (EM)

Delineation:
K. Fisher, M. Marek, S. Lindemann, A. Hiss
February 19, 20, March 19, 20, September 13, 2019

1-Foot Elevation Contours from County of Merced
July 3, 2019

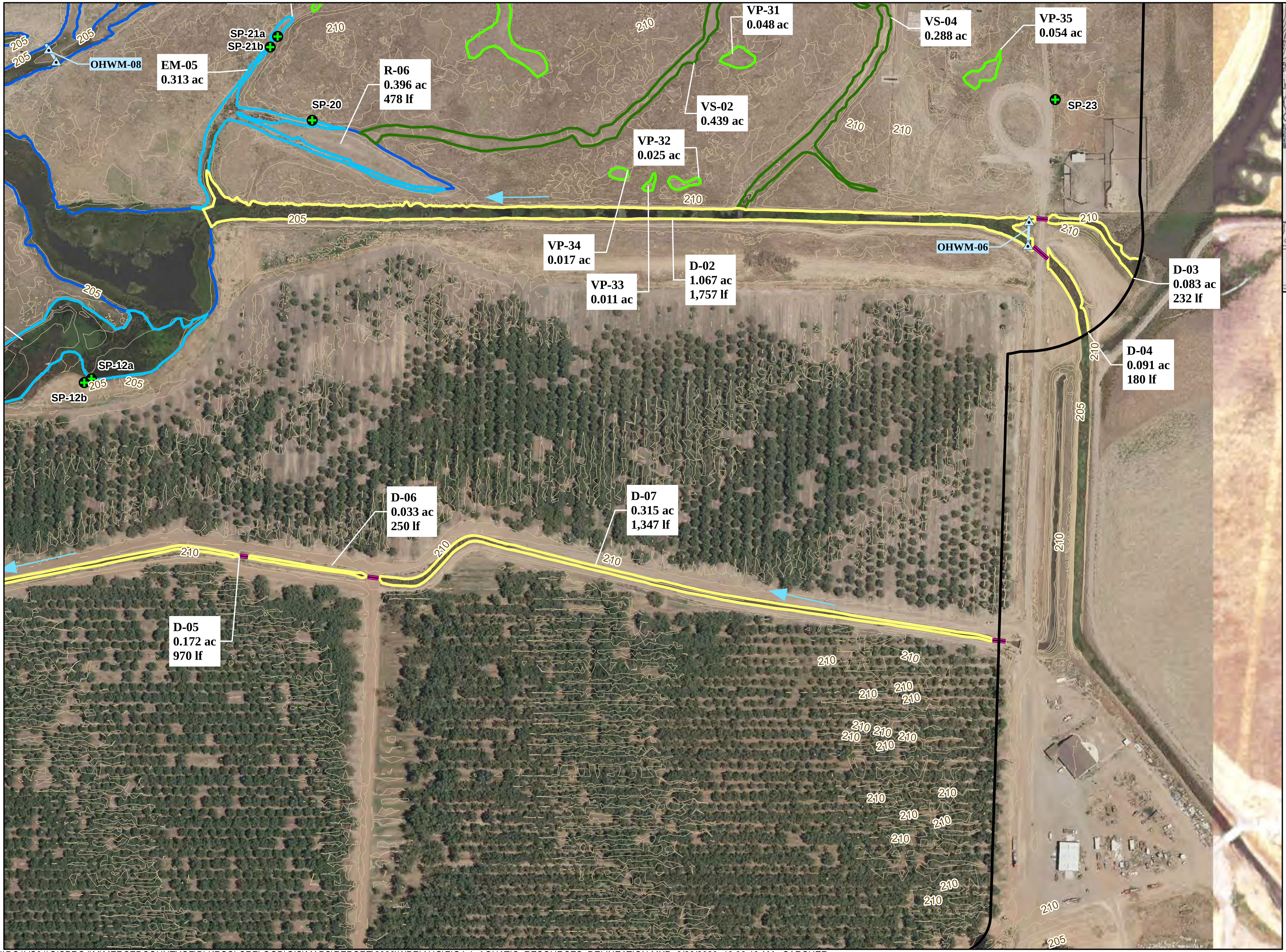
Aerial Imagery:
County of Merced, July 3, 2019

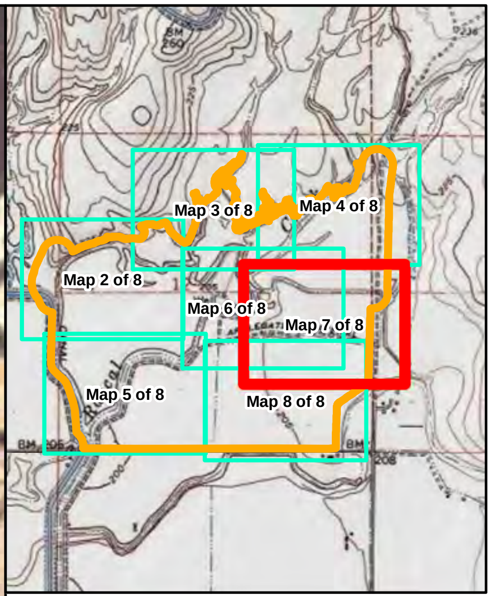
N

0 200
Feet

FIGURE 4-1
Map 6 of 8
Aquatic Resource Delineation Map

Black Rascal Creek Flood Control Project





Legend

- Study Area (470.2 acres)
- Sample Point
- Culvert
- Flow Direction
- OHWM Data Point
- 1-Foot Elevation Contours

Aquatic Resources

Other Waters

- Riverine (R)
- Ditch (D)

Wetlands

- Vernal Pool (VP)
- Vernal Swale (VS)
- Emergent Marsh (EM)

Delineation:
K. Fisher, M. Marek, S. Lindemann, A. Hiss
February 19, 20, March 19, 20, September 13, 2019

1-Foot Elevation Contours from County of Merced
July 3, 2019

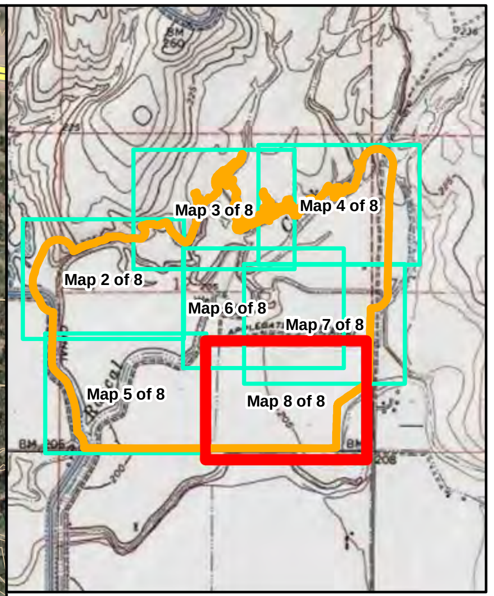
Aerial Imagery:
County of Merced, July 3, 2019

N

0 200
Feet

FIGURE 4-1
Map 7 of 8
Aquatic Resource Delineation Map
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2020\WDR\AUG\FIG4-1_AQUATIC_RESOURCES_DELINEATION.MXD 8/20/2020 10:36:49 AM CARCHER



Legend

- Study Area (470.2 acres)
- Culvert
- Flow Direction
- OHWM Data Point
- 1-Foot Elevation Contours

Aquatic Resources

Other Waters

- Ditch (D)

Delineation:
K. Fisher, M. Marek, S. Lindemann, A. Hiss
February 19, 20, March 19, 20, September 13, 2019

1-Foot Elevation Contours from County of Merced
July 3, 2019

Aerial Imagery:
County of Merced, July 3, 2019

N

0 200
Feet

FIGURE 4-1
Map 8 of 8
Aquatic Resource Delineation Map
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2020\WDR\AUG\FIG4-1_AQUATIC_RESOURCES_DELINEATION.MXD 8/20/2020 10:37:07 AM CARCHER

Appendix A
Aquatic Resource Determination Datasheets

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 2/19/2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-1

Investigator(s): K. Fisher, M. Marek | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): streambank | Local relief (concave, convex, none): none | Slope (%): 30

Subregion (LRR): C - Mediterranean California | Lat: 37.33383709 | Long: -120.39363964 | Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam | NWI classification: R4SBCx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	○	◉
Hydric Soil Present?	○	◉
Wetland Hydrology Present?	○	◉

Is the Sampled Area within a Wetland? **Yes** ○ **No** ◉

Remarks: 2-3 feet above OHWM of Black Rascal Creek

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Avena barbata*	30	Yes	Not Listed
2. *Festuca (Lolium) perenne*	20	Yes	FAC
3. *Raphanus sativus*	30	Yes	Not Listed
4. *Conium maculatum*	20	Yes	FACW
5. *Cirsium vulgare*	2	No	FACU
6.			
7.			
8.			
Total Cover:	102 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	20	x 2 =	40
FAC species	20	x 3 =	60
FACU species	2	x 4 =	8
UPL species	60	x 5 =	300
Column Totals:	102 (A)		408 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ○ **No** ◉

Remarks:

SOIL

Sampling Point: SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-14	10 YR 3/2	100					Clay Loam	Earthworms at 6 inches

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 2/19/2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-2

Investigator(s): K. Fisher, M. Marek | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): None | Slope (%): 0

Subregion (LRR): C - Mediterranean California | Lat: 37.33628034 | Long: -120.39408782 | Datum: WGS 84

Soil Map Unit Name: Ryer Clay Loam | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Sampling point taken in location where aerial imagery suggest saturation.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Sorghum halpense*	70	Yes	FACU
2. *Convolvulus arvensis*	3	No	Not Listed
3. *Avena barbata*	1	No	Not Listed
4. *Lactuca serriola*	1	No	FACU
5.			
6.			
7.			
8.			
Total Cover:	75 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 25 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	71	x 4 =	284
UPL species	4	x 5 =	20
Column Totals:	75	(A)	304 (B)

Prevalence Index = B/A = 4.05

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-14	10 YR 3/2	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 19 Feb 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-3

Investigator(s): K. Fisher, M. Marek Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): C - Mediterranean California Lat: 37.33470524 Long: -120.39479966 Datum: WGS 84

Soil Map Unit Name: Ryer Clay Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ( )	No (●)
Hydric Soil Present?	Yes ( )	No (●)
Wetland Hydrology Present?	Yes ( )	No (●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Sampling point taken in location where aerial imagery suggest saturation.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Sorghum halpense*	70	Yes	FACU
2. *Convolvulus arvensis*	2	No	Not Listed
3. *Avena barbata*	2	No	Not Listed
4. *Lactuca serriola*	1	No	FACU
5.			
6.			
7.			
8.			
Total Cover:	75 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 25 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	71	x 4 =	284
UPL species	4	x 5 =	20
Column Totals:	75 (A)		304 (B)

Prevalence Index = B/A = 4.05

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 3/2	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? **Yes** ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Not saturated

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control　City/County: Merced　Sampling Date: 2/19/2019

Applicant/Owner: Merced County　State: CA　Sampling Point: SP-4a

Investigator(s): K. Fisher, M. Marek　Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Ditch slope　Local relief (concave, convex, none): Concave　Slope (%): 30

Subregion (LRR): C - Mediterranean California　Lat: 37.33469427　Long: -120.39528924　Datum: WGS 84

Soil Map Unit Name: Marguerite Silty Clay Loam　NWI classification: R5UBFx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed?　Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic?　(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	●	
Hydric Soil Present?		●
Wetland Hydrology Present?	●	

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

Excavated drainage did not have evidence of hydric soils. Aquatic resource was delineated based on limits of OHWM.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Typha angustifolia*	50	Yes	OBL
2. *Geranium dissectum*	5	No	Not Listed
3. *Brassica nigra*	5	No	Not Listed
4. *Avena sp.*	5	No	Not Listed
5. *Silybum marianum*	2	No	Not Listed
6.			
7.			
8.			
Total Cover:	67 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 33 %　% Cover of Biotic Crust ___ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	17	x 5 =	85
Column Totals:	67 (A)		135 (B)

Prevalence Index = B/A = 2.01

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks:

SOIL

Sampling Point: SP-4a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 3/2	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ◉ No ○ Depth (inches): 4"

Saturation Present? (includes capillary fringe) Yes ◉ No ○ Depth (inches): 0"

Wetland Hydrology Present? Yes ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 19 Feb 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-4b

Investigator(s): K. Fisher, M. Marek | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Concave | Slope (%): 20

Subregion (LRR): C - Mediterranean California | Lat: 37.33470637 | Long: -120.39528110 | Datum: WGS 84

Soil Map Unit Name: Marguerite Silty Clay Loam | NWI classification: R5UBFx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	○	◉
Hydric Soil Present?	○	◉
Wetland Hydrology Present?	○	◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks: Sample point taken above OHWM

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Avena sp.*	40	Yes	Not Listed
2. *Geranium dissectum*	20	Yes	Not Listed
3. *Brassica nigra*	5	No	Not Listed
4. *Epilobium ciliatum*	3	No	FACW
5. *Raphanus sativus*	2	No	Not Listed
6.			
7.			
8.			
Total Cover:	70 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 30 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	3	x 2 =	6
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	67	x 5 =	335
Column Totals:	70 (A)		341 (B)

Prevalence Index = B/A = 4.87

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:

SOIL

Sampling Point: SP-4b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 4/2						Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 2/19/2019
Applicant/Owner: Merced County | State: CA | Sampling Point: SP-5
Investigator(s): K. Fisher, M. Marek | Section, Township, Range: S11 T7S R14E
Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): None | Slope (%): 0
Subregion (LRR): C - Mediterranean California | Lat: 37.33914156 | Long: -120.39649443 | Datum: WGS 84
Soil Map Unit Name: Wyman Loam | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) **No** (●)

Remarks: In depression adjacent to D-1 ditch (west side), next to levee road.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Sorghum halpense*	40	Yes	FACU
2. *Brassica nigra*	30	Yes	Not Listed
3. *Foeniculum vulgare*	15	No	Not Listed
4. *Conium maculatum*	5	No	FACW
5.			
6.			
7.			
8.			
Total Cover:	90 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 15 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	5	x 2 =	10
FAC species		x 3 =	0
FACU species	40	x 4 =	160
UPL species	45	x 5 =	225
Column Totals:	90 (A)		395 (B)

Prevalence Index = B/A = 4.39

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks:

SOIL

Sampling Point: SP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-8	10 YR 2/2	100					Clay Loam	
8-11	10 YR 2/2	99	7.5 YR 4/6	<1	RM	M	Clay Loam	
11-14	10YR 2/2	90	7.5 YR 4/6	10-15	RM	M	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 19 Feb 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-6

Investigator(s): K. Fisher, M. Marek Section, Township, Range: S11 T7S R14E

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 10

Subregion (LRR): C - Mediterranean California Lat: 37.34027072 Long: -120.39635495 Datum: WGS 84

Soil Map Unit Name: Wyman Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Adjacent to small channel connecting emergent marsh (west) to riverine feature (east).

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Hordeum murinum*	50	Yes	FACU
2. *Medicago polymorpha*	4	No	FACU
3. *Bromus hordeaceus*	30	Yes	FACU
4. *Festuca [Lolium] perenne*	10	No	FAC
5. *Cynodon dactylon*	3	No	FACU
6. *Xanthium strumarium*	P	No	FAC
7.			
8.			
Total Cover:	97 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 3 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	10	x 3 =	30
FACU species	87	x 4 =	348
UPL species		x 5 =	0
Column Totals:	97	(A)	378 (B)

Prevalence Index = B/A = 3.90

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Area is grazed

SOIL

Sampling Point: SP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture[3]	Remarks
0-14	10 YR 3/3	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 19 Feb 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-7a

Investigator(s): K. Fisher, M. Marek Section, Township, Range: S11 T7S R14E

Landform (hillslope, terrace, etc.): Terrace/Depression Local relief (concave, convex, none): Convex Slope (%): 1-5

Subregion (LRR): C - Mediterranean California Lat: 37.34006778 Long: -120.39676704 Datum: WGS 84

Soil Map Unit Name: Wyman Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Lythrum hyssopifolium*	15	Yes	OBL
2. *Paspalum distichum*	60	Yes	FACW
3. *Erodium botrys*	4	No	FACU
4. *Juncus effusus*	5	No	FACW
5. *Ludwigia peploides*	1	No	OBL
6.			
7.			
8.			
Total Cover:	85 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 15 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	16	x 1 =	16
FACW species	65	x 2 =	130
FAC species		x 3 =	0
FACU species	4	x 4 =	16
UPL species		x 5 =	0
Column Totals:	85 (A)		162 (B)

Prevalence Index = B/A = 1.91

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-7a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-2	7.5 YR 3/2	100					Clay Loam	
2-4	7.5 YR 3/2	95	5 YR 4/6		C	M	Clay Loam	
4-12	7.5 YR 3/2	75	5 YR 4/6		C	M	Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches): 0
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 19 Feb 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-7b

Investigator(s): K. Fisher, M. Marek | Section, Township, Range: S11 T7S R14E

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Concave | Slope (%): 1-2

Subregion (LRR): C - Mediterranean California | Lat: 37.34002362 | Long: -120.39672923 | Datum: WGS 84

Soil Map Unit Name: Wyman Loam | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Out point adjacent to emergent marsh/wetland

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Avena barbata*	50	Yes	Not Listed
2. *Bromus hordeaceus*	25	Yes	FACU
3. *Centaurea solstitialis*	15	No	Not Listed
4. *Erodium botrys*	1	No	FACU
5. *Cynodon dactylon*	5	No	FACU
6.			
7.			
8.			
Total Cover:	96 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ~5 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	31	x 4 =	124
UPL species	65	x 5 =	325
Column Totals:	96	(A)	449 (B)

Prevalence Index = B/A = 4.68

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-7b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-14	7.5 YR 3/3	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 2/19/2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-8

Investigator(s): K. Fisher, M. Marek | Section, Township, Range: S11 T7S R14E

Landform (hillslope, terrace, etc.): floodplain (excavated) | Local relief (concave, convex, none): none | Slope (%): 0

Subregion (LRR): C - Mediterranean California | Lat: 37.33695784 | Long: -120.39636999 | Datum: WGS 84

Soil Map Unit Name: Marguerite Silty Clay Loam | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ● No ○ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ● No ○

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	○	●
Hydric Soil Present?	○	●
Wetland Hydrology Present?	○	●

Is the Sampled Area within a Wetland? Yes ○ No ●

Remarks: Sample point taken on floodplain bench adjacent to ditch.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Brassica nigra*	45	Yes	Not Listed
2. *Conium maculatum*	40	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	85 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 15 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 = 0
FACW species	40	x 2 = 80
FAC species		x 3 = 0
FACU species		x 4 = 0
UPL species	45	x 5 = 225
Column Totals:	85 (A)	305 (B)

Prevalence Index = B/A = 3.59

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ○ No ●

Remarks:

SOIL

Sampling Point: SP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 4/3	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ●

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ● Depth (inches):

Water Table Present? Yes ○ No ● Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ● Depth (inches):

Wetland Hydrology Present? Yes ○ **No** ●

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control   City/County: Merced   Sampling Date: 19 March 2019

Applicant/Owner: Merced County   State: CA   Sampling Point: SP-9a

Investigator(s): K. Fisher, M. Marek, S. Lindemann, A. Hiss   Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace   Local relief (concave, convex, none): Concave   Slope (%): <1

Subregion (LRR): C - Mediterranean California   Lat: 37.340158   Long: -120.385143   Datum: WGS 84

Soil Map Unit Name: Marguerite Silty Clay Loam   NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☒ significantly disturbed?   Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic?   (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	●	
Hydric Soil Present?	●	
Wetland Hydrology Present?	●	

Is the Sampled Area within a Wetland? Yes (●) No ( )

Remarks: Wetland hydrology is modified due to agricultural runoff from the west which contributes to waters feature adjacent to wetland.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Festuca [Lolium] perenne*	35	Yes	FAC
2. *Polypogon monspeliensis*	15	Yes	FACW
3. *Plagiobothrys stipitatus*	10	No	FACW
4. *Medicago polymorpha*	3	No	FACU
5. *Bromus hordeaceus*	3	No	FAC
6. *Cynodon dactylon*	5	No	FACU
7. *Spergularia rubra*	4	No	FAC
8. *Phyla [Lippia] nodiflora*	5	No	FACW
Total Cover:	80 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 20 %   % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	30	x 2 =	60
FAC species	42	x 3 =	126
FACU species	8	x 4 =	32
UPL species		x 5 =	0
Column Totals:	80 (A)		218 (B)

Prevalence Index = B/A = 2.73

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☒ Prevalence Index is ≤3.0[1]
☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-9a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture[3]	Remarks
0-3	10 YR 3/2	90	5 YR 4/6	10	C	PL	Clay Loam	
3-5	10 YR 3/2	98	5 YR 4/6	2	C	PL	Clay Loam	
5-12	10 YR 3/2	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils:[4]

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☒ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches): 0
Water Table Present?	Yes ◉	No ○	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Saturation and surface water observed in Feb 2019 site visit

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 20 Feb 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-9b

Investigator(s): K. Fisher, M. Marek | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): None | Slope (%): <1

Subregion (LRR): C - Mediterranean California | Lat: 37.34019115 | Long: -120.39505095 | Datum: WGS 84

Soil Map Unit Name: Marguerite Silty Clay Loam | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (X) No ( ) (If no, explain in Remarks.)

Are Vegetation [ ] Soil [ ] or Hydrology [ ] significantly disturbed? Are "Normal Circumstances" present? Yes (X) No ( )

Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(X)	( )
Hydric Soil Present?	( )	(X)
Wetland Hydrology Present?	(X)	( )

Is the Sampled Area within a Wetland? Yes ( ) No (X)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Holocarpha virgata*	15	Yes	Not Listed
2. *Hordeum marinum*	15	Yes	FAC
3. *Festuca [Lolium] perenne*	15	Yes	FAC
4. *Phyla nodiflora*	10	Yes	FACW
5. *Lythrum hyssopifolium*	10	No	OBL
6. *Medicago polymorpha*	10	No	FACU
7. *Erodium botrys*	5	No	FACU
8. *Gastridium phleoides*	P	No	FACU
Total Cover:	80 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 20 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	75.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	10	x 2 =	20
FAC species	30	x 3 =	90
FACU species	15	x 4 =	60
UPL species	15	x 5 =	75
Column Totals:	80 (A)		255 (B)

Prevalence Index = B/A = 3.19

Hydrophytic Vegetation Indicators:

- [X] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (X) No ( )

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-9b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2	100					Clay Loam	Some gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches): 0
Water Table Present?	Yes ◉	No ○	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): Not recorded

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 20 Feb 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-10a

Investigator(s): K. Fisher, M. Marek Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%): 2

Subregion (LRR): C - Mediterranean California Lat: 37.34022482 Long: -120.39270060 Datum: WGS 84

Soil Map Unit Name: Ryer Clay Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(●)	( )
Hydric Soil Present?	(●)	( )
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks: At toe of shallow slope on margin of large vernal pool.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Eryngium castrense*	30	Yes	OBL
2. *Eleocharis macrostachya [syn. E. palustris]*	20	Yes	OBL
3. *Polypogon monspeliensis*	15	No	FACW
4. *Plagiobothrys stipitatus*	5	No	FACW
5. *Pogogyne douglasii*	5	No	OBL
6. *Psilocarphus brevissimus*	5	No	OBL
7. *Hordeum marinum*	5	No	FAC
8.			
Total Cover:	85 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 15 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	60	x 1 =	60
FACW species	20	x 2 =	40
FAC species	5	x 3 =	15
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	85 (A)		115 (B)

Prevalence Index = B/A = 1.35

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-10a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-2	10 YR 2/2	100					Silty Clay Loam	
2-8	10 YR 2/2	80	5 YR 3/4	20	C	PL		
8-12	10 YR 2/2	98	5 YR 3/4	2	C	PL		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [x] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** (●) **No** ( )

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [x] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Plowed Soils (C6)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [ ] Sediment Deposits (B2) (**Riverine**)
- [ ] Drift Deposits (B3) (**Riverine**)
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Thin Muck Surface (C7)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes (●)	No ( )	Depth (inches): 0
Water Table Present?	Yes (●)	No ( )	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes (●)	No ( )	Depth (inches): 0

Wetland Hydrology Present? **Yes** (●) **No** ( )

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 20 Feb 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-10b

Investigator(s): K. Fisher, M. Marek Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): C - Mediterranean California Lat: 37.34022807 Long: -120.39272167 Datum: WGS 84

Soil Map Unit Name: Ryer Clay Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: upland adjacent to vernal pool

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Avena barbata*	15	No	Not Listed
2. *Bromus hordeaceus*	20	Yes	FACU
3. *Erodium moschatum*	5	No	Not Listed
4. *Hordeum murinum*	5	No	FACU
5. *Holocarpha virgata*	25	Yes	Not Listed
6. *Croton setigerus*	10	No	Not Listed
7.			
8.			
Total Cover:	80 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 20 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	25	x 4 =	100
UPL species	55	x 5 =	275
Column Totals:	80 (A)		375 (B)

Prevalence Index = B/A = 4.69

Hydrophytic Vegetation Indicators:

- ( ) Dominance Test is >50%
- ( ) Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-10b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 3/3	100					Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? **Yes** ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control   City/County: Merced   Sampling Date: 20 Feb 2019

Applicant/Owner: Merced County   State: CA   Sampling Point: SP-11

Investigator(s): K. Fisher, M. Marek   Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Depression   Local relief (concave, convex, none): Concave   Slope (%): 1

Subregion (LRR): C - Mediterranean California   Lat: 37.33857184   Long: -120.38692308   Datum: WGS 84

Soil Map Unit Name: Wyman Loam   NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation [ ] Soil [X] or Hydrology [ ] significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Shallow ponded area on compacted soils.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *unknonwn grass (not flowering)*	60	Yes	FAC*
2. *Medicago polymorpha*	20	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	80 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 20 %   % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	60	x 3 =	180
FACU species	20	x 4 =	80
UPL species		x 5 =	0
Column Totals:	80 (A)		260 (B)

Prevalence Index = B/A = 3.25

Hydrophytic Vegetation Indicators:

- [ ] Dominance Test is >50%
- [ ] Prevalence Index is ≤3.0[1]
- [ ] Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Grasses not flowering at time of survey but vegetative parts were similar to other non-native annual grasses in upland areas.

SOIL

Sampling Point: SP-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2	100					Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches): 0
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Shallow, seasonally ponded depression in disturbed agricultural area. No saturation observed.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 20 Feb 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-12a

Investigator(s): K. Fisher, M. Marek | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Floodplain | Local relief (concave, convex, none): none | Slope (%): <1

Subregion (LRR): C - Mediterranean California | Lat: 37.33842920 | Long: -120.38497749 | Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam | NWI classification: PUBFh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(●)	( )
Hydric Soil Present?	(●)	( )
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Typha angustifolia*	50	Yes	OBL
2. *Rumex crispus*	20	Yes	FAC
3. *Cyprus eragrostis*	10	No	FACW
4.			
5.			
6.			
7.			
8.			
Total Cover:	80 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 20 % | % Cover of Biotic Crust ___ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	10	x 2 =	20
FAC species	20	x 3 =	60
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	80 (A)		130 (B)

Prevalence Index = B/A = 1.63

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: SP-12a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-3	7.5 YR 3/2	100					Silty Clay Loam	
3-9	7.5 YR 3/2	60	5 YR 3/4	40	C	M	Silty Clay Loam	
9-14	7.5 YR 3/2	80	5 YR 3/4	20	C	M	Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [x] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes (●) No ( )

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [ ] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Plowed Soils (C6)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [ ] Sediment Deposits (B2) (**Riverine**)
- [ ] Drift Deposits (B3) (**Riverine**)
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Thin Muck Surface (C7)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ( )	No (●)	Depth (inches):
Water Table Present?	Yes (●)	No ( )	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes (●)	No ( )	Depth (inches): 0

Wetland Hydrology Present? **Yes** (●) **No** ( )

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control — City/County: Merced — Sampling Date: 20 Feb 2019

Applicant/Owner: Merced County — State: CA — Sampling Point: SP-12b

Investigator(s): K. Fisher, M. Marek — Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Terrace — Local relief (concave, convex, none): None — Slope (%): 0

Subregion (LRR): C - Mediterranean California — Lat: 37.33841327 — Long: -120.38502052 — Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam — NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(●)	( )
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) **No** (●)

Remarks: Terrace adjacent (south) of wetland.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Hordeum sp*	60	Yes	FAC
2. *Bromus sp.*	40	Yes	FAC
3. *Rumex crispus*	2	No	FAC
4. *Geranium molle*	2	No	Not Listed
5.			
6.			
7.			
8.			
Total Cover:	104 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % — % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	102	x 3 =	306
FACU species		x 4 =	0
UPL species	2	x 5 =	10
Column Totals:	104 (A)		316 (B)

Prevalence Index = B/A = 3.04

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks: Grasses were not flowering at time of survey. Conservatively assumed to be FAC.

SOIL

Sampling Point: SP-12b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2	100					Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 20 Feb 2019
Applicant/Owner: Merced County State: CA Sampling Point: SP-13a
Investigator(s): K. Fisher, M. Marek, A. Hiss Section, Township, Range: S7 T7S R15E
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): C - Mediterranean California Lat: 37.34276270 Long: -120.37822598 Datum: WGS 84
Soil Map Unit Name: Bear Creek Clay Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Eryngium castrense*	25	Yes	OBL
2. *Polypogon monspeliensis*	25	Yes	FACW
3. *Hordeum marinum*	20	Yes	FAC
4. *Festuca [Lolium] perenne*	5	No	FAC
5. *Bromus hordeaceus*	2	No	FACU
6. *Phalaris lemmonii*	3	No	FACW
7. *Veronica peregrina ssp. xalapensis*	5	No	FAC
8.			
Total Cover:	85 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 15 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	28	x 2 =	56
FAC species	30	x 3 =	90
FACU species	2	x 4 =	8
UPL species		x 5 =	0
Column Totals:	85 (A)		179 (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-13a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-1	10 YR 3/2	100						Gravelly
1-8	10 YR 3/2	95	7.5 YR 4/3	5	C	RC	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☒ Vernal Pools (F9)

Indicators for Problematic Hydric Soils:[4]

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ◉ No ○

Remarks: Redox features area weakly expressed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☒ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches): 0
Water Table Present?	Yes ◉	No ○	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 20 Feb 2019
Applicant/Owner: Merced County | State: CA | Sampling Point: SP-13b
Investigator(s): K. Fisher, M. Marek, A. Hiss | Section, Township, Range: S7 T7S R15E
Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): Concave | Slope (%): 1
Subregion (LRR): C - Mediterranean California | Lat: 37.34274340 | Long: -120.37824085 | Datum: WGS 84
Soil Map Unit Name: Bear Creek Clay Loam | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? **Yes** ( ) **No** (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Bromus hordeaceus*	70	Yes	FACU
2. *Holocarpha virgata*	15	No	Not Listed
3. *Hordeum murinum*	5	No	FACU
4. *Croton setiger*	10	No	Not Listed
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum ____ % | % Cover of Biotic Crust ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	75	x 4 =	300
UPL species	25	x 5 =	125
Column Totals:	100	(A)	425 (B)

Prevalence Index = B/A = 4.25

Hydrophytic Vegetation Indicators:

- ( ) Dominance Test is >50%
- ( ) Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ( ) **No** (●)

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-13b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 3/2	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? **Yes** ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control   City/County: Merced   Sampling Date: 20 Feb 2019

Applicant/Owner: Merced County   State: CA   Sampling Point: SP-14a

Investigator(s): K. Fisher, M. Marek, A. Hiss   Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Depression   Local relief (concave, convex, none): Concave   Slope (%): 1

Subregion (LRR): C - Mediterranean California   Lat: 37.34455496   Long: -120.37839251   Datum:

Soil Map Unit Name: Bear Creek Clay Loam   NWI classification: R4SBA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed?   Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic?   (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Eryngium castrense*	25	Yes	OBL
2. *Plagiobothrys stipitatus*	15	Yes	FACW
3. *Hordeum marinum*	10	No	FAC
4. *Psilocarphus brevissimus*	10	No	OBL
5. *Crypsis schoenoides*	5	No	FACW
6. *Festuca [Lolium] perenne*	5	No	FAC
7. *Eleocharis [macrostachya] palustris*	5	No	OBL
8.			
Total Cover:	75 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 25 %   % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	20	x 2 =	40
FAC species	15	x 3 =	45
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	75 (A)		125 (B)

Prevalence Index = B/A = 1.67

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-14a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-1	10 YR 3/2	100					Clay loam	Gravelly
1-8	10 YR 3/2	95	7.5 YR 4/3	5	C	RC	Clay loam	Gravelly

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [x] Redox Depressions (F8)
- [x] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Unknown

Depth (inches): 8"

Hydric Soil Present? Yes (●) No ( )

Remarks: Redox features weakly expressed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [x] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Plowed Soils (C6)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [ ] Sediment Deposits (B2) (**Riverine**)
- [ ] Drift Deposits (B3) (**Riverine**)
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Thin Muck Surface (C7)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes (●)	No ( )	Depth (inches): 0
Water Table Present?	Yes (●)	No ( )	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes (●)	No ( )	Depth (inches): 0

Wetland Hydrology Present? **Yes** (●) **No** ( )

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 20 Feb 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-14b

Investigator(s): K. Fisher, M. Marek, A. Hiss | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): Concave | Slope (%): 1-3

Subregion (LRR): C - Mediterranean California | Lat: 37.34453033 | Long: -120.37838258 | Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam | NWI classification: R4SBA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Bromus hordeaceus*	50	Yes	FACU
2. *Hordeum murinum*	15	No	FACU
3. *Vulpia [Festuca] myuros*	10	No	FACU
4. *Festuca [Lolium] perenne*	5	No	FAC
5. *Holocarpha virgata*	5	No	Not Listed
6.			
7.			
8.			
Total Cover:	85 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 15 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	5	x 3 =	15
FACU species	75	x 4 =	300
UPL species	5	x 5 =	25
Column Totals:	85 (A)		340 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-14b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 3/2	100					Clay loam	Gravelly

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 19 March 2019
Applicant/Owner: Merced County | State: CA | Sampling Point: SP-15a
Investigator(s): K. Fisher, M. Marek, S. Lindemann | Section, Township, Range: S12 T7S R14E
Landform (hillslope, terrace, etc.): Terrace/Swale | Local relief (concave, convex, none): concave | Slope (%): 0
Subregion (LRR): C - Mediterranean California | Lat: 37.34194198 | Long: -120.39065814 | Datum: WGS 84
Soil Map Unit Name: Wyman Loam | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )	
Hydric Soil Present?	Yes (●)	No ( )	**Is the Sampled Area**
Wetland Hydrology Present?	Yes (●)	No ( )	**within a Wetland?** **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Limnauthes alba*	25	Yes	FACW
2. *Hordeum marinum*	40	Yes	FAC
3. *Plagiobothrys sp*	3	No	OBL
4. *Eryngium sp*	3	No	OBL
5.			
6.			
7.			
8.			
Total Cover:	71 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 30 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	6	x 1 =	6
FACW species	25	x 2 =	50
FAC species	40	x 3 =	120
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	71 (A)		176 (B)

Prevalence Index = B/A = 2.48

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: SP-15a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-8	10 YR 4/1	97	5 YR 4/6	3	C	PL	Clay	
8-12	10 YR 4/1	100					Clay	Very cobbley

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [x] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** (●) **No** ( )

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [x] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Plowed Soils (C6)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [ ] Sediment Deposits (B2) (**Riverine**)
- [ ] Drift Deposits (B3) (**Riverine**)
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Thin Muck Surface (C7)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes (●)	No ( )	Depth (inches): 0
Water Table Present?	Yes (●)	No ( )	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes (●)	No ( )	Depth (inches): 0

Wetland Hydrology Present? **Yes** (●) **No** ( )

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 19 March 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-15b

Investigator(s): K. Fisher, M. Marek, S. Lindemann | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrrace | Local relief (concave, convex, none): concave | Slope (%): <1

Subregion (LRR): C - Mediterranean California | Lat: 37.34192577 | Long: -120.39072705 | Datum: WGS84

Soil Map Unit Name: Wyman Loam | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	●	
Hydric Soil Present?		●
Wetland Hydrology Present?		●

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Trifolium variegatum*	25	Yes	FAC
2. *Hesperevax caulescens*	20	Yes	OBL
3. *Lepidium nitidum*	30	Yes	FAC
4. *Geranium sp*	5	No	FAC
5. *Erodium botrys*	7	No	FACU
6. *Plagiobothrys sp*	15	No	OBL
7.			
8.			
Total Cover:	102 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species		x 2 =	0
FAC species	60	x 3 =	180
FACU species	7	x 4 =	28
UPL species		x 5 =	0
Column Totals:	102 (A)		243 (B)

Prevalence Index = B/A = 2.38

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks: Grasses too early

SOIL

Sampling Point: SP-15b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-14	7.5 YR 4/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 19 March 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-16a

Investigator(s): K. Fisher, M. Marek, S. Lindemann | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Swale | Local relief (concave, convex, none): Concave | Slope (%): 3

Subregion (LRR): C - Mediterranean California | Lat: 37.34101613 | Long: -120.38876674 | Datum: WGS 84

Soil Map Unit Name: Marguerite silty clay loam | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Limnanthes alba*	60	Yes	FACW
2. *Hordeum marinum*	20	Yes	FAC
3. *Eleocharis macrostachya [=palustris]*	10	No	OBL
4.			
5.			
6.			
7.			
8.			
Total Cover:	90 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 10 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	60	x 2 =	120
FAC species	20	x 3 =	60
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	90 (A)		190 (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: SP-16a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-4	7.5 YR 3/2	90	5 YR 4/6	10	C	PL	Clay loam	
4-12	7.5 YR 3/2	100					Clay loam	Cobble

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches): 0
Water Table Present?	Yes ○	No ◉	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? Yes ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Surface water in bottom of swale adjacent to sample point.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 19 March 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-16b

Investigator(s): K. Fisher, M. Marek, S. Lindemann Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR): C - Mediterranean California Lat: 37.34100568 Long: -120.38878229 Datum: WGS 84

Soil Map Unit Name: Marguerite silty clay loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? **Yes** ( ) **No** (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Triteleia sp.*	5	No	FAC
2. *Hordeum murinum*	70	Yes	FACU
3. *Medicago polymorpha*	25	Yes	FACU
4. *Cerastium glomeratum*	3	No	UPL
5.			
6.			
7.			
8.			
Total Cover:	103 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	5	x 3 =	15
FACU species	95	x 4 =	380
UPL species	3	x 5 =	15
Column Totals:	103 (A)		410 (B)

Prevalence Index = B/A = 3.98

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ( ) **No** (●)

Remarks:

SOIL

Sampling Point: SP-16b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2	100					Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? **Yes** ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control — City/County: Merced — Sampling Date: 19 March 2019

Applicant/Owner: Merced County — State: CA — Sampling Point: SP-17a

Investigator(s): K. Fisher, M. Marek, S. Lindemann — Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace — Local relief (concave, convex, none): concave — Slope (%): 0

Subregion (LRR): C - Mediterranean California — Lat: 37.34198721 — Long: -120.38412028 — Datum: WGS 84

Soil Map Unit Name: Keyes Gravelly Loam — NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Limnanthes alba*	35	Yes	FACW
2. *Hordeum marinum*	40	Yes	FAC
3. *Trifolium variegata*	2	No	FAC
4. *Trifolium debiauperatum*	3	No	FAC
5. *Ranunculus bonariensis*	3	No	OBL
6. *Eleocharis sp*	15	No	OBL
7.			
8.			
Total Cover:	98 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 2 % — % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	18	x 1 =	18
FACW species	35	x 2 =	70
FAC species	45	x 3 =	135
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	98 (A)		223 (B)

Prevalence Index = B/A = 2.28

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: SP-17a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-3	10 YR 4/2	100					Silty clay loam	
3-9	10 YR 4/2	80	10 YR 3/4	20	C	M	Silty clay loam	M/PL

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☒ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? **Yes** ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches): 0
Water Table Present?	Yes ◉	No ○	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 19 March 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-17b

Investigator(s): K. Fisher, M. Marek, S. Lindemann Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): None Slope (%): 0

Subregion (LRR): C - Mediterranean California Lat: 37.34194532 Long: -120.38408168 Datum: WGS 84

Soil Map Unit Name: Keyes Gravelly Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	●	
Hydric Soil Present?		●
Wetland Hydrology Present?		●

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Hordeum sp*	50	Yes	FAC
2. *Bromus sp*	40	Yes	FAC
3. *Erodium botrys*	10	No	FACU
4. *Dichelostemeria capitatum*	3	No	FACU
5.			
6.			
7.			
8.			
Total Cover:	103 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	90	x 3 =	270
FACU species	13	x 4 =	52
UPL species		x 5 =	0
Column Totals:	103 (A)		322 (B)

Prevalence Index = B/A = 3.13

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks: Grasses not flowering at time of survey. Species likely upland but conservatively assumed FAC

SOIL

Sampling Point: SP-17b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-14	7.5 YR 3/2	100					Silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? **Yes** ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 20 March 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-18a

Investigator(s): K. Fisher, M. Marek, S. Lindemann, A. Hiss Section, Township, Range: S7 T7S R15E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR): C - Mediterranean California Lat: 37.34368743 Long: -120.37737800 Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ◉ No ○

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ◉	No ○
Wetland Hydrology Present?	Yes ◉	No ○

Is the Sampled Area within a Wetland? **Yes** ◉ **No** ○

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Hordeum marinum*	45	Yes	FAC
2. *Limnanthes alba*	30	Yes	FACW
3. *Eryngium castrense*	5	No	OBL
4. *Festuca [Lolium] perenne*	5	No	FAC
5.			
6.			
7.			
8.			
Total Cover:	85 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 15 % % Cover of Biotic Crust ___ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	30	x 2 =	60
FAC species	50	x 3 =	150
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	85 (A)		215 (B)

Prevalence Index = B/A = 2.53

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ◉ **No** ○

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-18a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-4	10 YR 4/2	90	7.5 YR 3/4	10	C	PL	Clay loam	
4-10	10 YR 4/2	100					Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☒ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ **No** ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches): 0
Water Table Present?	Yes ◉	No ○	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? Yes ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 20 March 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-18b

Investigator(s): K. Fisher, M. Marek, S. Lindemann, A. Hiss | Section, Township, Range: S7 T7S R15E

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Concave | Slope (%): 1

Subregion (LRR): C - Mediterranean California | Lat: 37.34367101 | Long: -120.37732612 | Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☒ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? **Yes** ( ) **No** (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Bromus hordeaceus*	40	Yes	FACU
2. *Hordeum murinum*	40	Yes	FACU
3. *Holocarpha virgata*	5	No	Not Listed
4. *Avena barbata*	10	No	Not Listed
5. *Medicago polymorpha*	5	No	FACU
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	85	x 4 =	340
UPL species	15	x 5 =	75
Column Totals:	100 (A)		415 (B)

Prevalence Index = B/A = 4.15

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ( ) **No** (●)

Remarks: Vegetation composition confirmed on 9/13/19

SOIL

Sampling Point: SP-18b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 4/2	100					Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 20 March 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-19a

Investigator(s): K. Fisher, M. Marek, S. Lindemann Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): C - Mediterranean California Lat: 37.34171392 Long: -120.38130373 Datum:

Soil Map Unit Name: Bear Creek Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes (●)	No ( )
Wetland Hydrology Present?	Yes (●)	No ( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Ranunculus sp.*	10	No	FACW
2. *Limnanthes alba*	10	No	FACW
3. *Horduem marinum*	30	Yes	FAC
4. *Cerastrum glomeratum*	2	No	UPL
5. *Eleocharis macrostachya [=palustris]*	10	No	OBL
6. *Festuca [=Lolium] perrene*	20	Yes	FAC
7.			
8.			
Total Cover:	82 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 20 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	20	x 2 =	40
FAC species	50	x 3 =	150
FACU species		x 4 =	0
UPL species	2	x 5 =	10
Column Totals:	82 (A)		210 (B)

Prevalence Index = B/A = 2.56

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: SP-19a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6	10 YR 4/1	95	5 YR 4/6	5	C	PL	Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks: Sample point taken in wet area. Not able to retrieve sample below 6".

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches): 0
Water Table Present?	Yes ◉	No ○	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 20 March 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-19b

Investigator(s): K. Fisher, M. Marek, S. Lindemann Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR): C - Mediterranean California Lat: 37.34166847 Long: -120.38127695 Datum: WGS 84

Soil Map Unit Name: Bear Creek Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(●)	( )
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Hordeum/Bromus sp.*	75	Yes	FAC
2. *Medicago polymorpha*	10	No	FAC*
3. *Plagiobothrys sp*	5	No	FACW
4. *Lepidium nitidum*	2	No	FAC
5.			
6.			
7.			
8.			
Total Cover:	92 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 5 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	5	x 2 =	10
FAC species	87	x 3 =	261
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	92 (A)		271 (B)

Prevalence Index = B/A = 2.95

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks: Grasses not flowering at time of survey. Likely upland but conservatively assumed FAC.

SOIL

Sampling Point: SP-19b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2	100					Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control | City/County: Merced | Sampling Date: 20 March 2019

Applicant/Owner: Merced County | State: CA | Sampling Point: SP-20

Investigator(s): K. Fisher, M. Marek, S. Lindemann | Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): none | Slope (%): 3

Subregion (LRR): C - Mediterranean California | Lat: 37.33993445 | Long: -120.38336213 | Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam | NWI classification: PUBF

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	( )	(●)

Is the Sampled Area within a Wetland? **Yes** ( ) **No** (●)

Remarks: Point taken in upland area adjacent to pond (Waters)

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Medicago polymorpha*	20	Yes	FACU
2. *Erodium sp.*	20	Yes	FACU
3. *Hordeum/Bromus sp*	60	Yes	FAC
4. *Lasthenia californica*	2	No	FACU
5.			
6.			
7.			
8.			
Total Cover:	102 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 0 % | % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	60	x 3 =	180
FACU species	42	x 4 =	168
UPL species		x 5 =	0
Column Totals:	102 (A)		348 (B)

Prevalence Index = B/A = 3.41

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ( ) **No** (●)

Remarks:

SOIL

Sampling Point: SP-20

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2	100					Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? **Yes** ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control — City/County: Merced — Sampling Date: 20 March 2019

Applicant/Owner: Merced County — State: CA — Sampling Point: SP-21a

Investigator(s): K. Fisher, M. Marek, S. Lindemann — Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): Depression — Local relief (concave, convex, none): Concave — Slope (%): 3

Subregion (LRR): C - Mediterranean California — Lat: 37.34042052 — Long: -120.38361280 — Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam — NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	(●)	( )
Hydric Soil Present?	(●)	( )
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? **Yes** (●) **No** ( )

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Eleocharis macrostachya [=palustris]*	30	Yes	OBL
2. *Rumex sp.*	10	Yes	FACW
3. *Ranunculus bonariensus*	15	Yes	FACW
4. *Hordeum /Bromus sp*	5	No	FAC
5.			
6.			
7.			
8.			
Total Cover:	60 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 40 % — % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	25	x 2 =	50
FAC species	5	x 3 =	15
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	60 (A)		95 (B)

Prevalence Index = B/A = 1.58

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** (●) **No** ( )

Remarks:

SOIL

Sampling Point: SP-21a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-5	10 YR 4/1	95	7.5 YR 3/4	5	C	PL		
5-10	10 YR 4/1	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches): 0
Water Table Present?	Yes ◉	No ○	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 20 March 2019

Applicant/Owner: Merced County State: CA Sampling Point: SP-21b

Investigator(s): K. Fisher, M. Marek, S. Lindemann Section, Township, Range: S12 T7S R14E

Landform (hillslope, terrace, etc.): terrace (possible fill) Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR): C - Mediterranean California Lat: 37.34035682 Long: -120.38363656 Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☒ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		●
Hydric Soil Present?		●
Wetland Hydrology Present?		●

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Appears to be a disturbed area that may have been filled to allow vehicle access to field. Now this features separates aquatic features that once may have been connected.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Lasthenia californica*	10	No	FACU
2. *Medicago polymorpha*	75	Yes	FACU
3. *Cerastium glotheratum*	5	No	UPL
4.			
5.			
6.			
7.			
8.			
Total Cover:	90 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 10 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species	85	x 4 =	340
UPL species	5	x 5 =	25
Column Totals:	90	(A)	365 (B)

Prevalence Index = B/A = 4.06

Hydrophytic Vegetation Indicators:

- Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks:

SOIL

Sampling Point: SP-21b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 3/2	100					Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ **No** ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control City/County: Merced Sampling Date: 13 Sept 2019
Applicant/Owner: Merced County State: CA Sampling Point: SP-22
Investigator(s): K. Fisher, M. Marek, S. Lindemann, A. Hiss Section, Township, Range: S7 T7S R15E
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): C - Mediterranean California Lat: 37.34367101 Long: -120.37732612 Datum: WGS 84
Soil Map Unit Name: Bear Creek Clay Loam NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)
Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )
Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	●	
Hydric Soil Present?		●
Wetland Hydrology Present?	●	
Is the Sampled Area within a Wetland?		●

Remarks: Point established in disturbed area subject to seasonal ponding.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Glyceria x occidentalis*	30	Yes	OBL
2. *Polypogon monspeliensis*	10	Yes	FACW
3. *Hordeum marinum*	10	Yes	FAC
4.			
5.			
6.			
7.			
8.			
Total Cover:	50 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 50 % % Cover of Biotic Crust %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	10	x 2 =	20
FAC species	10	x 3 =	30
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	50 (A)		80 (B)

Prevalence Index = B/A = 1.60

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks:

SOIL

Sampling Point: SP-22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-11	10 YR 4/2						Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: gravel

Depth (inches): 11

Hydric Soil Present? Yes ○ No ●

Remarks: gravel encountered at 11 inches

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☒ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ●	No ○	Depth (inches):
Water Table Present?	Yes ○	No ●	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ●	Depth (inches):

Wetland Hydrology Present? Yes ● No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Site was ponded during 2019 spring site visit (Feb-Mar)

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Black Rascal Creek Flood Control   City/County: Merced   Sampling Date: 13 Sept 2019

Applicant/Owner: Merced County   State: CA   Sampling Point: SP-23

Investigator(s): K. Fisher, M. Marek, S. Lindemann, A. Hiss   Section, Township, Range: S7 T7S R15E

Landform (hillslope, terrace, etc.): Depression   Local relief (concave, convex, none): Concave   Slope (%): 1

Subregion (LRR): C - Mediterranean California   Lat: 37.34367101   Long: -120.37732612   Datum: WGS 84

Soil Map Unit Name: Bear Creek Clay Loam   NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (•) No ( ) (If no, explain in Remarks.)

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed?   Are "Normal Circumstances" present? Yes (•) No ( )

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic?   (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (•)	No ( )
Hydric Soil Present?	Yes ( )	No (•)
Wetland Hydrology Present?	Yes (•)	No ( )

Is the Sampled Area within a Wetland? Yes ( ) No (•)

Remarks: Point established in a disturbed, closed depression subject to seasonal ponding.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Glyceria x occidentalis*	15	Yes	OBL
2. *Polypogon monspeliensis*	25	Yes	FACW
3. *Lythrum hyssopifolium*	5	No	OBL
4. *Rumex crispus*	2	No	FAC
5. *Epilobium [Boisduvalia] densiflorum*	2	No	FACW
6. *Malvella [Sida] leprosa*	P	No	FACU
7. *Plagiobothrys stipitatus*	1	No	FACW
8.			
Total Cover:	50 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 50 %   % Cover of Biotic Crust ___ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	28	x 2 =	56
FAC species	2	x 3 =	6
FACU species	0	x 4 =	0
UPL species		x 5 =	0
Column Totals:	50 (A)		82 (B)

Prevalence Index = B/A = 1.64

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☒ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (•) No ( )

Remarks:

SOIL

Sampling Point: SP-23

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	10 YR 3/2						Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[4]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[4]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☒ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ◉ No ○ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ◉ **No** ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Area was ponded during spring site visit in Feb-Mar 2019

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: BRCFC
Project Number:
Stream: Black Rascal Creek (OHWM-1)
Investigator(s): M Marck, K. Fisher

Date: 2/19/19 **Time:** 12PM
Town: Merced **State:** CA
Photo begin file#: **Photo end file#:**

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates:

Potential anthropogenic influences on the channel system:
Adjacent ag. usage & irrigation channel approx 200' west
Creek has been modified & reconstructed sinuous form but creek itself modified

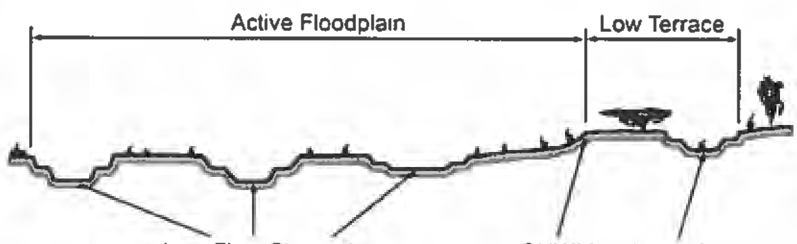
Brief site description:
west flowing BRC, cattails emergent w/in OHWM Banks steeply sloped modified channel, earthen

Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☑ Other studies inundation mapping

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

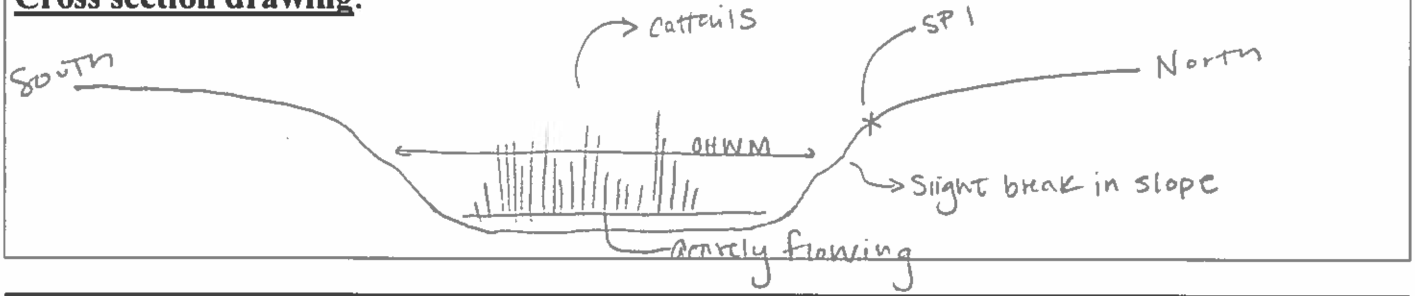


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☑ GPS
   - ☐ Other:

Project ID: BRCFC **Cross section ID:** OHWM - 1 **Date:** 2/19/19 **Time:** 12PM

Cross section drawing:



OHWM

GPS point: GPS OHWM line

Indicators:

- ☐ Change in average sediment texture
- ☑ Change in vegetation species
- ☑ Change in vegetation cover
- ☐ Break in bank slope
- ☑ Other: drift/debris deposits
- ☐ Other: ________

Comments:

OHWM based on veg debris line & boundary with this year's annual veg (mostly conium mac).

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ________

Characteristics of the floodplain unit:

Average sediment texture: ________

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ________
- ☐ Other: ________
- ☐ Other: ________

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: **Project Number:** **Stream:** Ditch/Wetland (OHWM-2) **Investigator(s):**	**Date:** 2/19/19 **Town:** **Photo begin file#:**	**Time:** 2PM **State:** **Photo end file#:**
Y ☑ / N ☐ Do normal circumstances exist on the site?	**Location Details:**	
Y ☐ / N ☑ Is the site significantly disturbed?	**Projection:** **Coordinates:**	**Datum:**

Potential anthropogenic influences on the channel system:
constructed ditch adjacent to ag-land

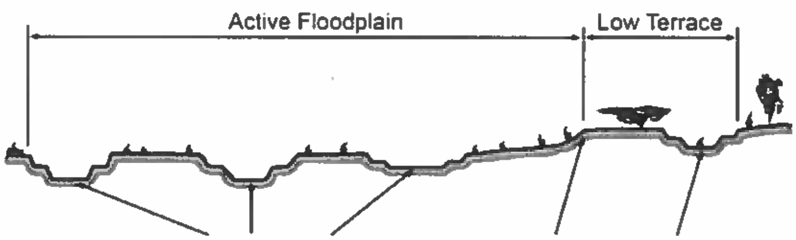
Brief site description:
ditch w/in steep slopes. OHWM very low in channel (at the toe)

Checklist of resources (if available):

- ☐ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☑ Global positioning system (GPS)
- ☑ Other studies inundation

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

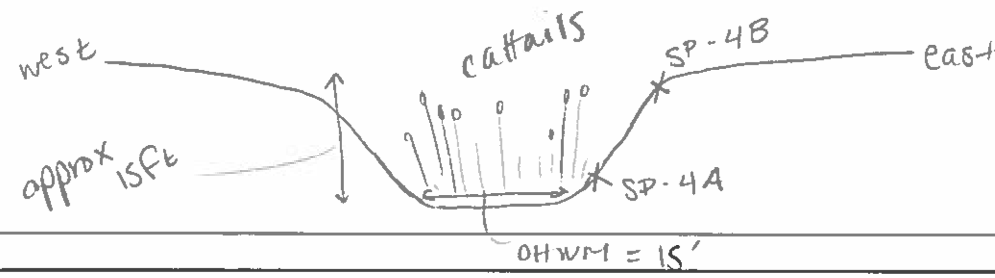


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☑ GPS
   - ☐ Other:

Project ID: **Cross section ID:** OHWM-2 **Date:** 2/19/19 **Time:**

Cross section drawing:



OHWM

GPS point: approximate from aerial (approx 15' wide)

Indicators:

- ☐ Change in average sediment texture
- ☑ Change in vegetation species
- ☑ Change in vegetation cover
- ☐ Break in bank slope
- ☐ Other: ______
- ☐ Other: ______

Comments:
Typha growing w/in OHWM, OHWM @ the veg shift from typha to annual forbs. water is flowing slighty

Floodplain unit:

☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ______

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ______
- ☐ Other: ______
- ☐ Other: ______

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: BRCFC
Date: 2/19/19
Time: 3:30PM
Project Number:
Town:
State:
Stream: Drainage - 2/channel
Photo begin file#:
Photo end file#:
Investigator(s): OHWM - 3

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details: upslope of SP-6
Projection:
Datum:
Coordinates:

Potential anthropogenic influences on the channel system:
Adjacent ag usage, grazing

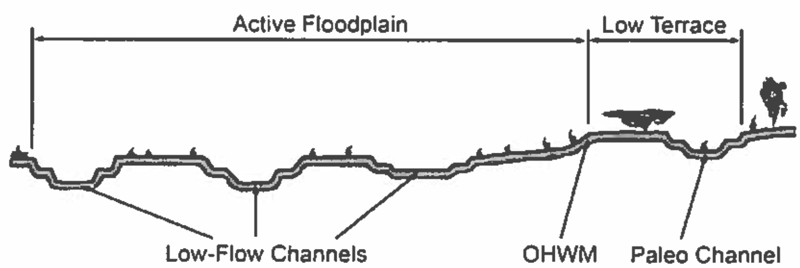
Brief site description:
Small drainage connecting marsh/wetland to the west to the pond/channel to the east

Checklist of resources (if available):

- ☐ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☑ Global positioning system (GPS)
- ☑ Other studies inundation

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

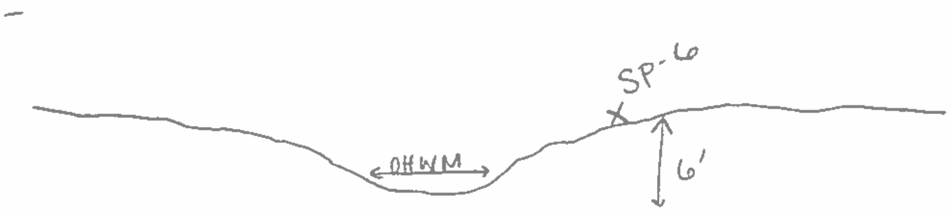


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☑ GPS
   - ☐ Digitized on computer
   - ☐ Other:

Project ID: upslope of SP-6 **Cross section ID:** OHWM-3 **Date:** 2/19/19 **Time:**

Cross section drawing:



OHWM

GPS point: GPS'd as OHWM ± 6' wide

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ____________
- [ ] Other: ____________

Comments:

at the boundary of vegetation growth

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ____________

Characteristics of the floodplain unit:

Average sediment texture: ____________

Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: ____________
- [ ] Other: ____________
- [ ] Other: ____________

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: BRCFC
Project Number:
Stream: OHWM 4 / BRC
Investigator(s):
Date: 2/20/19
Town:
Photo begin file#:
Time: 10 AM
State:
Photo end file#:

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details: near culverted portion of BRC
Projection:
Datum:
Coordinates:

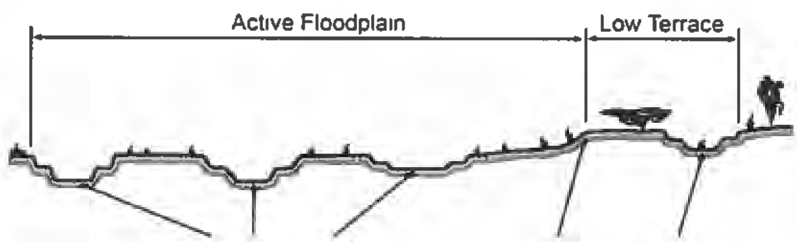
Potential anthropogenic influences on the channel system:
2-30" CMP culverts. Adjacent to ag (grazing & almond) channel has been modified

Brief site description:

Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☑ Global positioning system (GPS)
- ☑ Other studies inundation
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

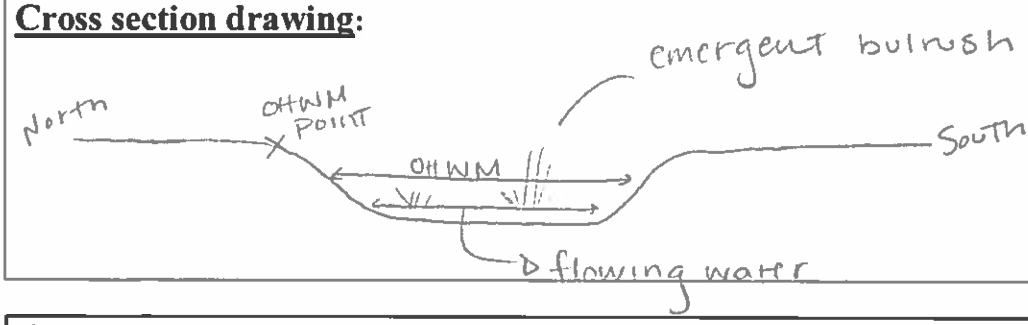


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☑ GPS
   - ☐ Digitized on computer
   - ☐ Other:

Project ID: **Cross section ID:** OHWM 4 **Date:** **Time:**

Cross section drawing:



OHWM

GPS point: OHWM4 = approx 37' wide

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ______
- [ ] Other: ______

Comments:

Channel vegetated w/ Bulrush (Typha); approx 20% veg cover. Juncus along channel margin.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ______

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: ______
- [ ] Other: ______
- [ ] Other: ______

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: BRCFC	**Date:** 2/20/19	**Time:** 10:15AM
Project Number:	**Town:**	**State:**
Stream: OHWM 5 / Constructed Ag. Ditch	**Photo begin file#:**	**Photo end file#:**
Investigator(s):		

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details:

Projection: **Datum:**

Coordinates:

Potential anthropogenic influences on the channel system:

Constructed Ag channel, within almond orchard

Brief site description:

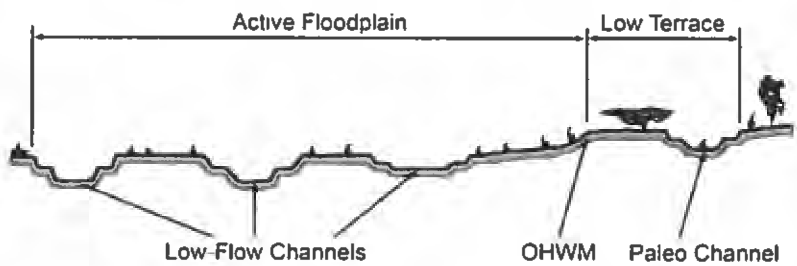
No water @ time of survey

Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☑ Global positioning system (GPS)
- ☑ Other studies inundation

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



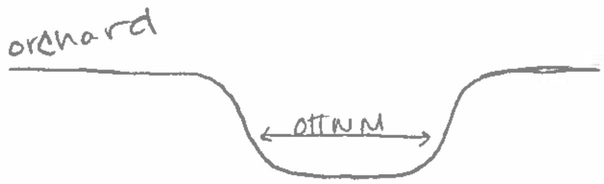
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

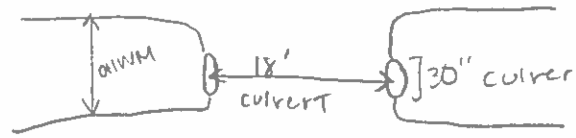
1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

☐ Mapping on aerial photograph ☑ GPS
☐ Digitized on computer ☐ Other:

Project ID: **Cross section ID:** OHWM5 **Date:** 2/20/19 **Time:** 10:15 AM

Cross section drawing:





OHWM

GPS point: OHWM 5 = 12' wide

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ______
- [ ] Other: ______

Comments:

At boundary of veg. No water.

Floodplain unit:

- [ ] Low-Flow Channel
- [ ] Active Floodplain
- [ ] Low Terrace

GPS point: ______

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: ______
- [ ] Other: ______
- [ ] Other: ______

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: BRCFL **Project Number:** **Stream:** OHWM 6 **Investigator(s):**	**Date:** 2/20/19 **Town:** **Photo begin file#:**	**Time:** 12PM **State:** **Photo end file#:**
Y ☑ / N ☐ Do normal circumstances exist on the site?	**Location Details:**	
Y ☐ / N ☑ Is the site significantly disturbed?	**Projection:** **Coordinates:**	**Datum:**

Potential anthropogenic influences on the channel system:

constructed ag channel w/ typha (40% cover within OHWM) Adjacent ag land (grazing & almond) culverted in places

Brief site description:

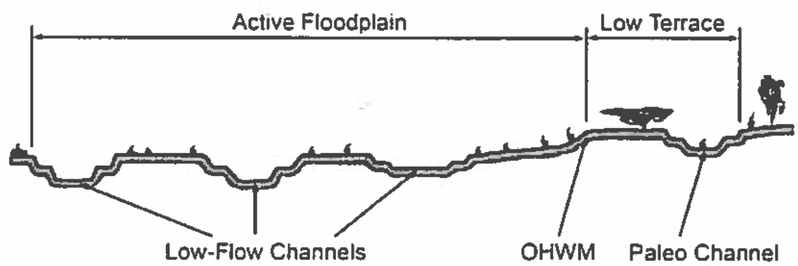
Steeply slope constructed ag channel very slow flow

Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☑ Global positioning system (GPS)
- ☑ Other studies inundation

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



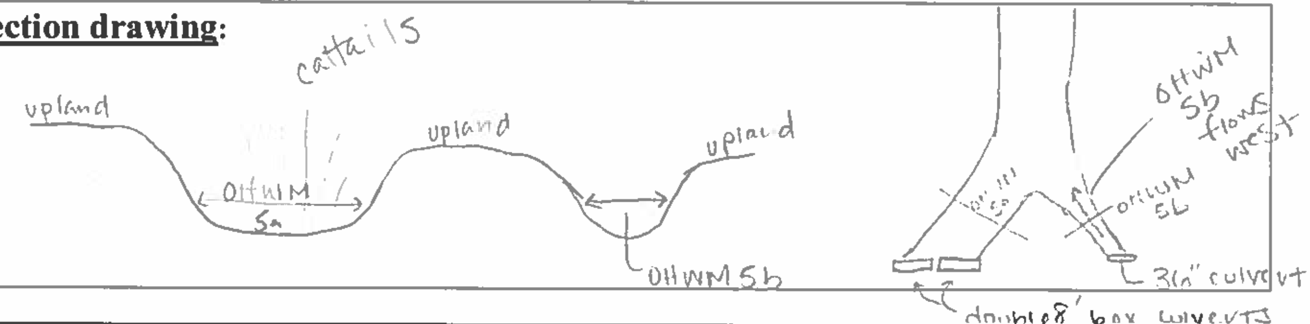
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

   ☐ Mapping on aerial photograph ☑ GPS
   ☐ Digitized on computer ☐ Other:

Project ID: **Cross section ID:** OHWM-6 **Date:** **Time:**

Cross section drawing:



OHWM

GPS point: OHWM 5 lines GPS'd

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ____________
- [ ] Other: ____________

Comments:

Juncus patens @ OHWM boundary
emergent cattails in OHWM 5a, but not 5b
└▷ approx 40% cover w/in OHWM

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ____________

Characteristics of the floodplain unit:

Average sediment texture: ____________

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: ____________
- [ ] Other: ____________
- [ ] Other: ____________

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: PRCFC **Project Number:** **Stream:** OHWM 7 = BRC **Investigator(s):**	**Date:** 2/20/19 **Town:** **Photo begin file#:**	**Time:** 1:30PM **State:** **Photo end file#:**
Y ☑ / N ☐ Do normal circumstances exist on the site? Y ☐ / N ☑ Is the site significantly disturbed?	**Location Details:** **Projection:** **Coordinates:**	**Datum:**

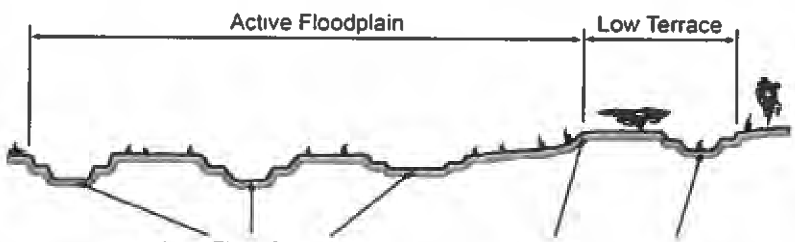
Potential anthropogenic influences on the channel system:
Grazed area BRC may have been prev. modified throughout but generally is sinuous Narrows in areas w/ riffle

Brief site description:
wide portion of BRC w/ incised slope 3' deep on the east, some flood plateau on the west

Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☑ Global positioning system (GPS)
- ☑ Other studies inundation
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

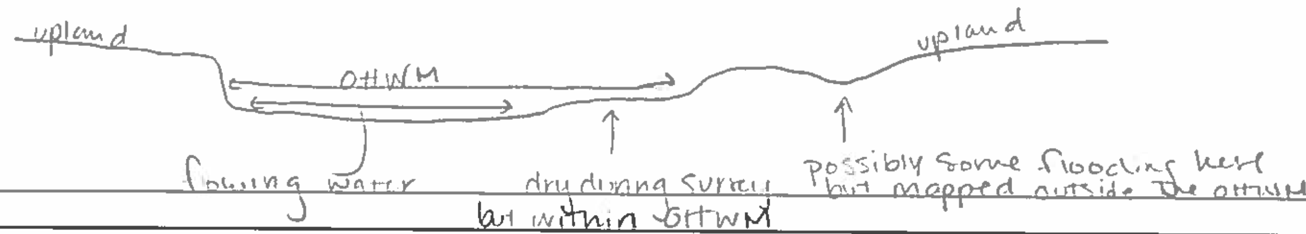


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☑ GPS
   - ☐ Other:

Project ID: **Cross section ID:** OHWM 7 **Date:** 2/20/19 **Time:**

Cross section drawing:



OHWM

GPS point: OHWM 7 67'

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ______
- [ ] Other: ______

Comments:

approx 3-6" deep

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ______

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: ______
- [ ] Other: ______
- [ ] Other: ______

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: BRCFC
Project Number: OHWM 8
Stream: BRC
Investigator(s):

Date: 3/20/19
Town:
Photo begin file#:

Time: 12PM
State:
Photo end file#:

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☑ / N ☐ Is the site significantly disturbed?

Location Details:
* Probably OHWM 8

Projection:
Datum:
Coordinates:

Potential anthropogenic influences on the channel system:
Ag/grazing, BRC

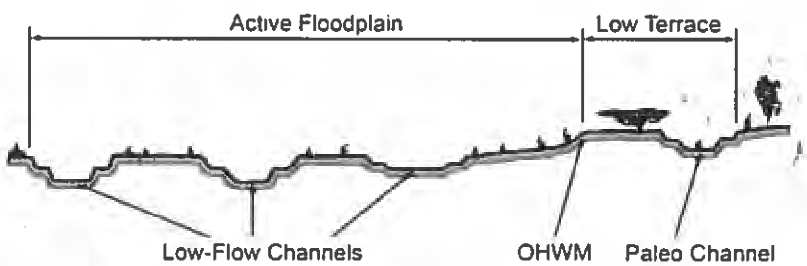
Brief site description:
BRC w/ off-channels that may be wetlands (vegetated but w/ cobble) some cobble bars within the OHWM

Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☑ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number.
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

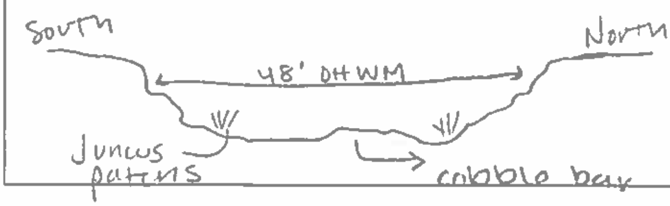


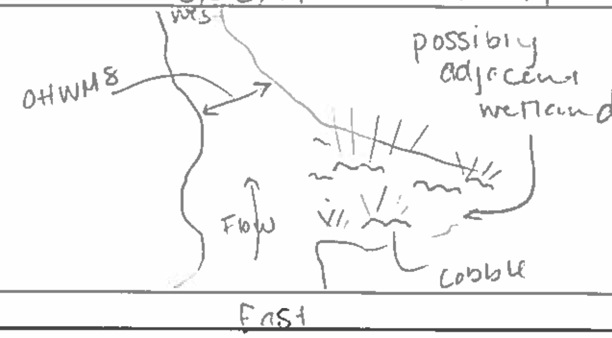
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☑ GPS
   - ☐ Digitized on computer
   - ☐ Other:

Project ID: BRCEC **Cross section ID:** OHWM 8 **Date:** 3/20/19 **Time:** 12 PM

Cross section drawing:





OHWM

GPS point: OHWM 8

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [x] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ____
- [ ] Other: ____

Comments:

cobble bar in the channel

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: ____

Characteristics of the floodplain unit:

Average sediment texture: ____

Total veg cover: ____ % Tree: ____ % Shrub: ____ % Herb: ____ %

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: ____
- [ ] Other: ____
- [ ] Other: ____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: BRCFL **Project Number:** OHWM 9 **Stream:** Drainage Ditch **Investigator(s):**	**Date:** 3/20/19 **Time:** 1:00PM **Town:** **State:** **Photo begin file#:** **Photo end file#:**
Y ☐ / N ☐ Do normal circumstances exist on the site? Y ☐ / N ☐ Is the site significantly disturbed?	**Location Details:** OHWM 9 **Projection:** **Datum:** **Coordinates:**

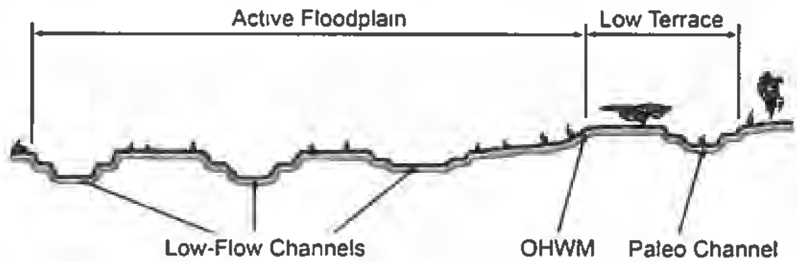
Potential anthropogenic influences on the channel system:
excavated, immediately adjacent to ~~[illegible]~~ almond orchard

Brief site description:
unvegetated channel

Checklist of resources (if available):

- ☑ Aerial photography
  Dates:
- ☑ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☑ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☑ Global positioning system (GPS)
- ☐ Other studies
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



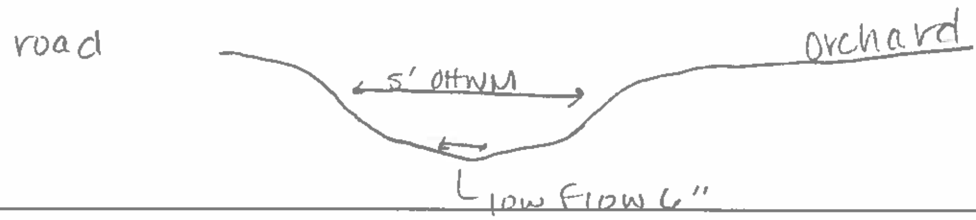
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

☐ Mapping on aerial photograph ☑ GPS
☐ Digitized on computer ☐ Other:

Project ID: BRCFC **Cross section ID:** OHWM 9 **Date:** 3/20/19 **Time:**

Cross section drawing:



OHWM

GPS point: OHWM 9

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☑ Break in bank slope
- ☐ Other: ____
- ☐ Other: ____

Comments:

excavated roadside drainage

Floodplain unit: ☑ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: within OHWM

Characteristics of the floodplain unit:

Average sediment texture: Silt loam

Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

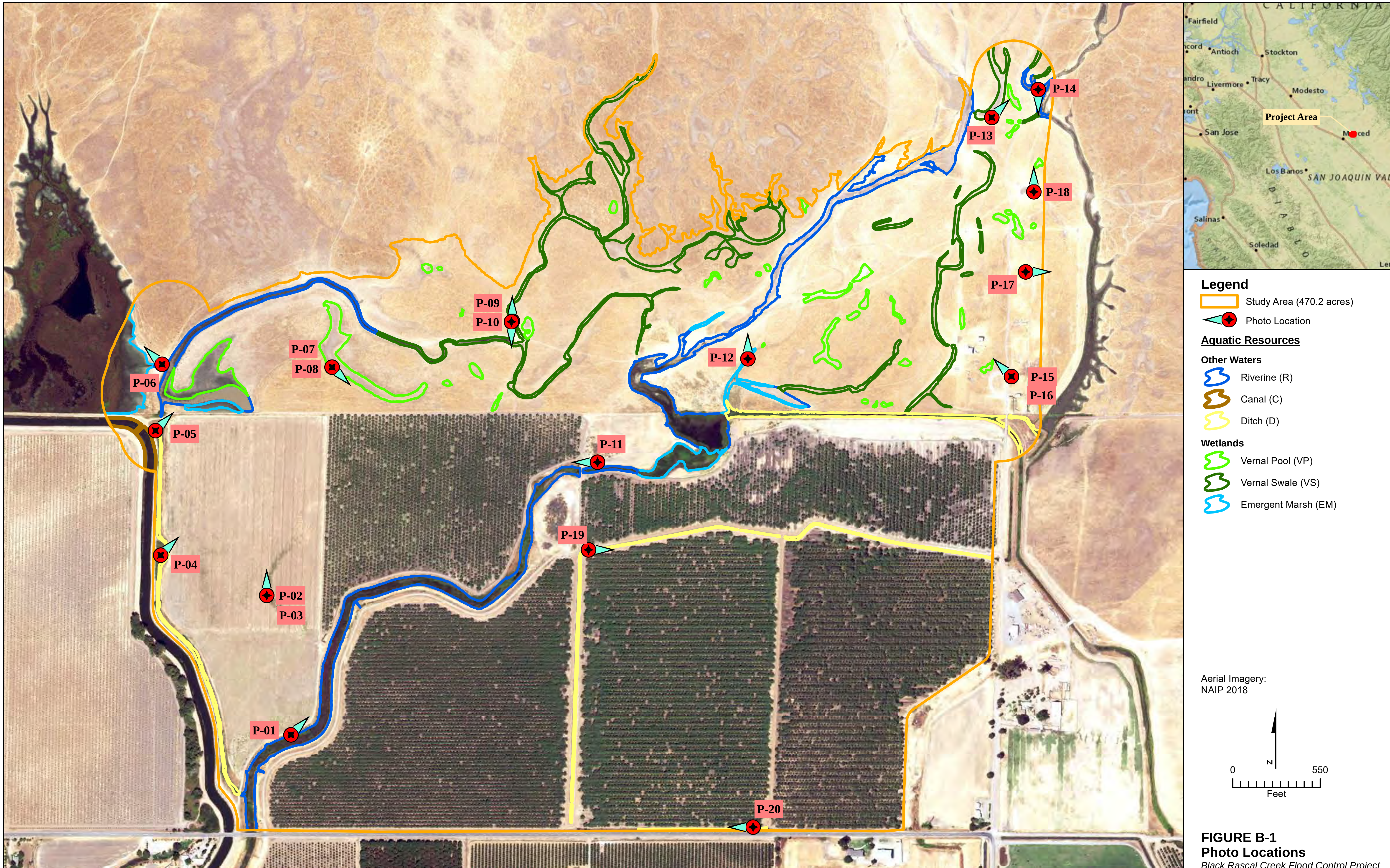
- ☐ NA
- ☑ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☑ Drift and/or debris
- ☑ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ____
- ☐ Other: ____
- ☐ Other: ____

Comments:

Appendix B
Representative Site Photographs



Legend

Study Area (470.2 acres)

Photo Location

Aquatic Resources

Other Waters

Riverine (R)

Canal (C)

Ditch (D)

Wetlands

Vernal Pool (VP)

Vernal Swale (VS)

Emergent Marsh (EM)

Aerial Imagery:
NAIP 2018

N

0 550

Feet

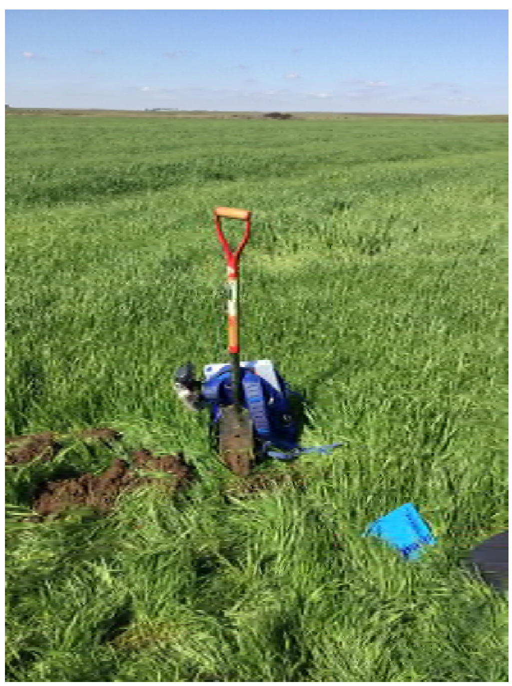
FIGURE B-1
Photo Locations
Black Rascal Creek Flood Control Project

\\DC1VS01\GISPROJ\M\MERCEDCOUNTYOF\BLKRSCLCRFLOOD\GIS\MAPS\REPORT\2020\WDR\AUG\FIGB-1_PHOTO_LOCATIONS.MXD 8/20/2020 11:33:40 AM CARCHER

Appendix B. Representative Site Photographs

Photograph 1: SP-1. Sample point was established on the bank of Black Rascal Creek, just above the ordinary high water mark (OHWM).

Date taken: *2/19/2019, facing northeast*



Photograph 2: SP-2. Sample point was established in an area where aerial imagery suggests there may be seasonal saturation. No evidence of wetland hydrology or hydric soils was observed.

Date taken: *2/19/2019, facing north*

Photograph 3: SP-2 soil profile. No hydric soil indicators present.

Date taken: *2/19/2019*

Photograph 4: SP-8.

Date taken: *2/19/2019, facing northeast*

Photograph 5: SP-5.

Date taken: *2/19/2019, facing northeast*

Photograph 6: SP-6. Feature R-01a is the small channel in the center of the photograph.

Date taken: *2/19/2019, facing northwest*

Photograph 7: SP-10a. Feature VP-02 is on the left side of the photograph.

Date taken: *2/19/2019, facing southeast*

Photograph 8: SP-10a soil profile. The soil surface is on the left side of photograph. Note redox features visible in the soil profile.

Date taken: *2/19/2019*

Photograph 9: SP-16a. Feature VS-01 is on the right side of the photograph.

Date taken: 2/19/2019, facing north

Photograph 10: SP-16b. Feature VS-01 is on the left side of the photograph.

Date taken: 2/19/2019, facing south

Photograph 11: SP-11. The puddle in the photograph was determined not to be an aquatic resource because there were no indicators of hydric soils or hydrophytic vegetation, and there was no indication of OHWM.

Date taken: *2/19/2019, facing west*

Photograph 12: SP-21b. Feature EM-04 is in the background of photograph.

Date taken: *3/20/2019, facing north*

Photograph 13: SP-14b. Feature VS-10 is on the left side of photograph.

Date taken: *2/20/2019, facing northeast*

Photograph 14: Feature VS-10 is on the right side of photograph.

Date taken: *9/13/2019, facing south*

Photograph 15: SP-23. This area was ponded in the wet season but was determined not to be an aquatic resource because the sample point had no indicators of hydric soils, and there was no indication of an OHWM.

Date taken: *9/13/2019, facing northwest*

Photograph 16: SP-23 soil profile. No redox features.

Date taken: *9/13/2019*

Photograph 17: Asphalt slab. The signature of this feature on aerial imagery is similar to aquatic resources.

Date taken: *3/20/2019, facing east*

Photograph 18: Area trampled by cattle that appears saturated on aerial imagery. No wetland indicators were observed.

Date taken: *3/20/2019, facing east*

Photograph 19: Feature D-05 at OHWM-05.

Date taken: *3/20/2019, facing east*

Photograph 20: Feature D-10 at OHWM-09.

Date taken: *3/21/2019, facing west*

Appendix C
ORM Upload Sheet

Waters_Name	State	Cowardin_Code	HGM_Code	Meas_Type	Amount	Units	Waters_Type	Latitude	Longitude
EM-01	CALIFORNIA	PUSCh		Area	2.667296316	ACRE	DELINPJD	37.34010345	-120.39714552
EM-02	CALIFORNIA	PUBFh		Area	0.311946621	ACRE	DELINPJD	37.33954682	-120.39518093
EM-03	CALIFORNIA	PUBF		Area	0.067306162	ACRE	DELINPJD	37.34100236	-120.38453557
EM-04	CALIFORNIA	PUBF		Area	0.020224602	ACRE	DELINPJD	37.34046304	-120.38357423
EM-05	CALIFORNIA	PUBF		Area	0.31256496	ACRE	DELINPJD	37.33983615	-120.38367983
EM-06	CALIFORNIA	PUBFh		Area	1.155376848	ACRE	DELINPJD	37.33859027	-120.38508339
VP-01	CALIFORNIA	PEM1A		Area	1.47714599	ACRE	DELINPJD	37.34006978	-120.39535868
VP-02	CALIFORNIA	PEM1A		Area	1.607250444	ACRE	DELINPJD	37.34034965	-120.39218787
VP-03	CALIFORNIA	PEM1A		Area	0.04379906	ACRE	DELINPJD	37.33959420	-120.38909714
VP-04	CALIFORNIA	PEM1A		Area	0.057401102	ACRE	DELINPJD	37.34193117	-120.39059213
VP-05	CALIFORNIA	PEM1A		Area	0.009790102	ACRE	DELINPJD	37.34192471	-120.39031565
VP-06	CALIFORNIA	PEM1A		Area	0.008914168	ACRE	DELINPJD	37.34114893	-120.38984584
VP-07	CALIFORNIA	PEM1A		Area	0.100109478	ACRE	DELINPJD	37.34015558	-120.38953802
VP-08	CALIFORNIA	PEM1A		Area	0.028602548	ACRE	DELINPJD	37.33994100	-120.39016556
VP-09	CALIFORNIA	PEM1A		Area	0.062081263	ACRE	DELINPJD	37.34297512	-120.38655892
VP-10	CALIFORNIA	PEM1A		Area	0.135695055	ACRE	DELINPJD	37.34090257	-120.38840923
VP-11	CALIFORNIA	PEM1A		Area	0.05487384	ACRE	DELINPJD	37.34175152	-120.38442732
VP-12	CALIFORNIA	PEM1A		Area	0.012765032	ACRE	DELINPJD	37.34182528	-120.38341961
VP-13	CALIFORNIA	PEM1A		Area	0.025160142	ACRE	DELINPJD	37.34193159	-120.38322202
VP-14	CALIFORNIA	PEM1A		Area	0.005232567	ACRE	DELINPJD	37.34059374	-120.38331970
VP-15	CALIFORNIA	PEM1A		Area	0.078145556	ACRE	DELINPJD	37.34134661	-120.38111766
VP-16	CALIFORNIA	PEM1A		Area	0.055796577	ACRE	DELINPJD	37.34109846	-120.38136690
VP-17	CALIFORNIA	PEM1A		Area	0.305096958	ACRE	DELINPJD	37.34054456	-120.38192070
VP-18	CALIFORNIA	PEM1A		Area	0.129671507	ACRE	DELINPJD	37.34183055	-120.38115214
VP-19	CALIFORNIA	PEM1A		Area	0.211145837	ACRE	DELINPJD	37.34146256	-120.38196027
VP-20	CALIFORNIA	PEM1A		Area	0.058092914	ACRE	DELINPJD	37.34104161	-120.37901603
VP-21	CALIFORNIA	PEM1A		Area	0.035559811	ACRE	DELINPJD	37.34372904	-120.37734679
VP-22	CALIFORNIA	PEM1A		Area	0.102010792	ACRE	DELINPJD	37.34484947	-120.37789930
VP-23	CALIFORNIA	PEM1A		Area	0.01376458	ACRE	DELINPJD	37.34445193	-120.37796963
VP-24	CALIFORNIA	PEM1A		Area	0.041914451	ACRE	DELINPJD	37.34428251	-120.37792149
VP-25	CALIFORNIA	PEM1A		Area	0.077642821	ACRE	DELINPJD	37.34278117	-120.37816399
VP-26	CALIFORNIA	PEM1A		Area	0.018136829	ACRE	DELINPJD	37.34288472	-120.37800937
VP-27	CALIFORNIA	PEM1A		Area	0.125810611	ACRE	DELINPJD	37.34261034	-120.37780729
VP-28	CALIFORNIA	PEM1A		Area	0.038386053	ACRE	DELINPJD	37.34300952	-120.38242809
VP-29	CALIFORNIA	PEM1A		Area	0.052494402	ACRE	DELINPJD	37.34115886	-120.38042589
VP-30	CALIFORNIA	PEM1A		Area	0.016940042	ACRE	DELINPJD	37.34264808	-120.37746773
VP-31	CALIFORNIA	PEM1A		Area	0.048330086	ACRE	DELINPJD	37.34028470	-120.38024840
VP-32	CALIFORNIA	PEM1A		Area	0.024725198	ACRE	DELINPJD	37.33956276	-120.38066035
VP-33	CALIFORNIA	PEM1A		Area	0.011311104	ACRE	DELINPJD	37.33955633	-120.38089375
VP-34	CALIFORNIA	PEM1A		Area	0.017489089	ACRE	DELINPJD	37.33961760	-120.38112000
VP-35	CALIFORNIA	PEM1A		Area	0.054015255	ACRE	DELINPJD	37.34019658	-120.37847286
VP-36	CALIFORNIA	PEM1A		Area	0.004596656	ACRE	DELINPJD	37.34445583	-120.37776990
VS-01	CALIFORNIA	PEM1A		Area	4.460717167	ACRE	DELINPJD	37.34226594	-120.38662643
VS-02	CALIFORNIA	PEM1A		Area	0.439445626	ACRE	DELINPJD	37.33997887	-120.38157784
VS-03	CALIFORNIA	PEM1A		Area	0.138954946	ACRE	DELINPJD	37.34267359	-120.38057541
VS-04	CALIFORNIA	PEM1A		Area	0.288051631	ACRE	DELINPJD	37.33993408	-120.37961423
VS-05	CALIFORNIA	PEM1A		Area	0.761820306	ACRE	DELINPJD	37.34233869	-120.37911335
VS-06	CALIFORNIA	PEM1A		Area	0.026598669	ACRE	DELINPJD	37.34181542	-120.37890838
VS-07	CALIFORNIA	PEM1A		Area	0.044500088	ACRE	DELINPJD	37.34235390	-120.37859964
VS-08	CALIFORNIA	PEM1A		Area	0.018704923	ACRE	DELINPJD	37.34269506	-120.37864858
VS-09	CALIFORNIA	PEM1A		Area	0.020055347	ACRE	DELINPJD	37.34323223	-120.37911331
VS-10	CALIFORNIA	PEM1A		Area	0.591726048	ACRE	DELINPJD	37.34504743	-120.37828004
VS-11	CALIFORNIA	PEM1A		Area	0.052331176	ACRE	DELINPJD	37.34553798	-120.37739572
VS-12	CALIFORNIA	PEM1A		Area	0.037626622	ACRE	DELINPJD	37.34529611	-120.37721050
VS-13	CALIFORNIA	PEM1A		Area	0.03198238	ACRE	DELINPJD	37.34450366	-120.37752020
C-01	CALIFORNIA	R2UBHx		Linear	190	FOOT	DELINPJD	37.33925419	-120.39714756
C-02	CALIFORNIA	R2UBHx		Linear	267	FOOT	DELINPJD	37.33880586	-120.39663822
D-01	CALIFORNIA	R5UBFx		Linear	2542	FOOT	DELINPJD	37.33575924	-120.39581479
D-02	CALIFORNIA	R4SBCx		Linear	1757	FOOT	DELINPJD	37.33938160	-120.38140134
D-03	CALIFORNIA	R4SBCx		Linear	232	FOOT	DELINPJD	37.33922212	-120.37760627

Waters_Name	State	Cowardin_Code	HGM_Code	Meas_Type	Amount	Units	Waters_Type	Latitude	Longitude
D-04	CALIFORNIA	R4SBCx		Linear	180	FOOT	DELINPJD	37.33892632	-120.37784534
D-05	CALIFORNIA	PEM1Kx		Linear	970	FOOT	DELINPJD	37.33726268	-120.38551832
D-06	CALIFORNIA	PEM1Kx		Linear	250	FOOT	DELINPJD	37.33734192	-120.38339757
D-07	CALIFORNIA	PEM1Kx		Linear	1347	FOOT	DELINPJD	37.33722520	-120.38090091
D-08	CALIFORNIA	PEM1Kx		Linear	1570	FOOT	DELINPJD	37.33486242	-120.38737678
D-09	CALIFORNIA	PEM1Kx		Linear	119	FOOT	DELINPJD	37.33249682	-120.38748564
D-10	CALIFORNIA	PEM1Kx		Linear	814	FOOT	DELINPJD	37.33222710	-120.38465735
R-01	CALIFORNIA	R4SBC		Linear	2531	FOOT	DELINPJD	37.34042832	-120.39480570
R-01a	CALIFORNIA	R4SB		Linear	91	FOOT	DELINPJD	37.34028199	-120.39479308
R-02	CALIFORNIA	R4SBA		Linear	3770	FOOT	DELINPJD	37.34135900	-120.38305002
R-03	CALIFORNIA	R4SBC		Linear	475	FOOT	DELINPJD	37.34498185	-120.37738367
R-04	CALIFORNIA	R4SBCx		Linear	3735	FOOT	DELINPJD	37.33546080	-120.39154367
R-05	CALIFORNIA	R4SBCx		Linear	343	FOOT	DELINPJD	37.33845070	-120.38666061
R-06	CALIFORNIA	R4SBCx		Linear	478	FOOT	DELINPJD	37.33974453	-120.38302436

Appendix E
USFWS Information for Planning and Consultation Results

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Merced County, California

Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

NOT FOR CONSULTATION

San Joaquin Kit Fox *Vulpes macrotis mutica* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2873	Endangered

Reptiles

NAME	STATUS
Blunt-nosed Leopard Lizard *Gambelia silus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/625	Endangered
Giant Garter Snake *Thamnophis gigas* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander *Ambystoma californiense* There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS

NOT FOR CONSULTATION

Valley Elderberry Longhorn Beetle Desmocerus californicus dimorphus Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Conservancy Fairy Shrimp Branchinecta conservatio Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp Branchinecta lynchi Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp Lepidurus packardi Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/2246	Endangered

NOT FOR CONSULTATION

Flowering Plants

NAME	STATUS
Colusa Grass Neostapfia colusana Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/5690	Threatened
Fleshy Owl's-clover Castilleja campestris ssp. succulenta Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/8095	Threatened

Hairy Orcutt Grass Orcuttia pilosa — Endangered

Wherever found

There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/2262

San Joaquin Orcutt Grass Orcuttia inaequalis — Threatened

Wherever found

There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/5506

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31
Clark's Grebe Aechmophorus clarkii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 31
Common Yellowthroat Geothlypis trichas sinuosa This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/2084	Breeds May 20 to Jul 31
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

NOT FOR CONSULTATION

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Yellow-billed Magpie Pica nuttalli — Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9726

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

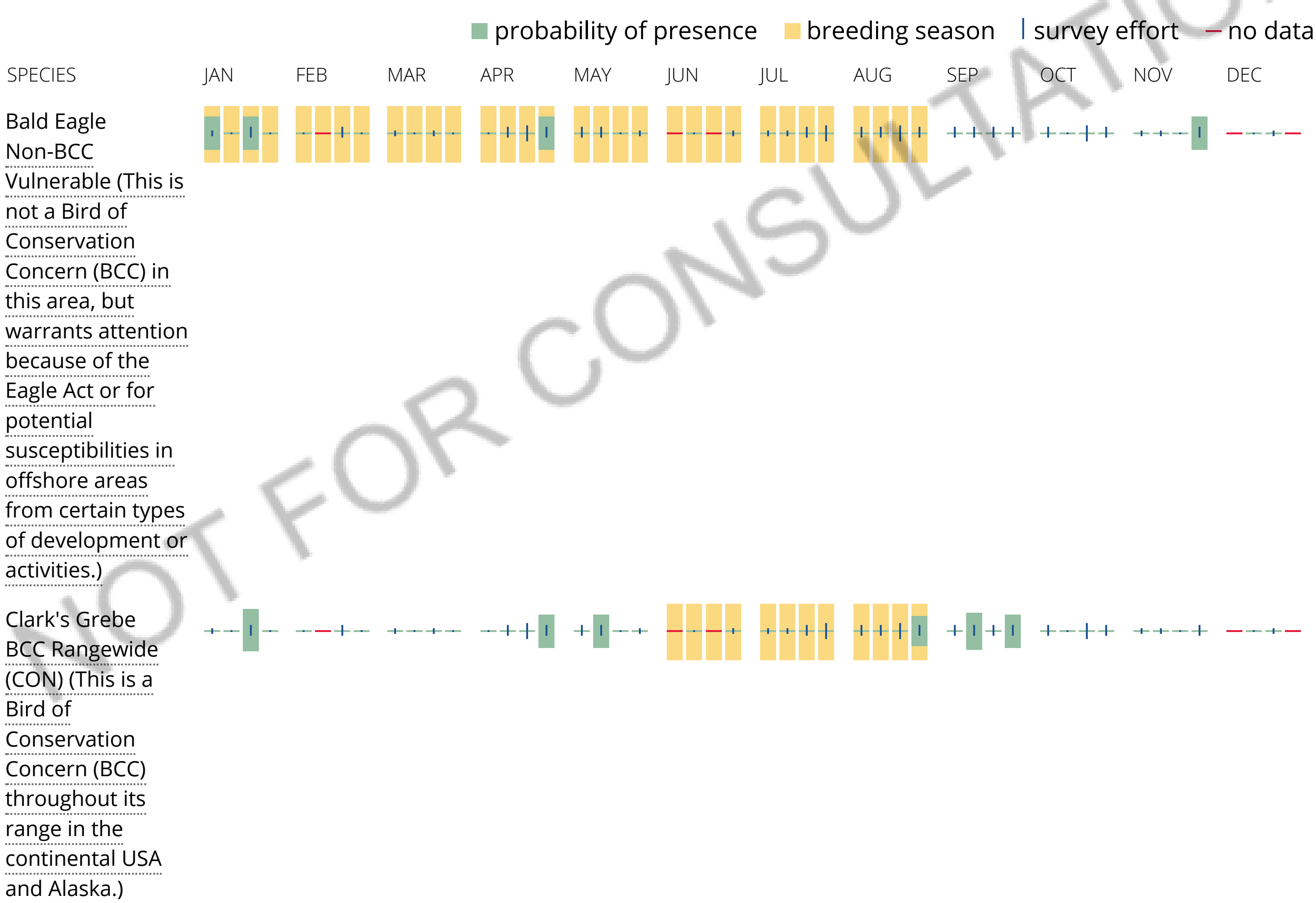
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

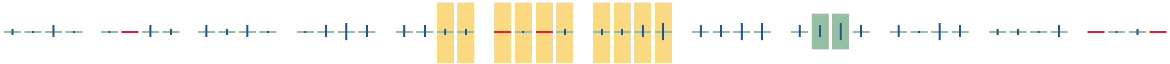
Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

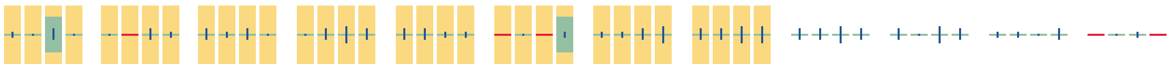


NOT FOR CONSULTATION

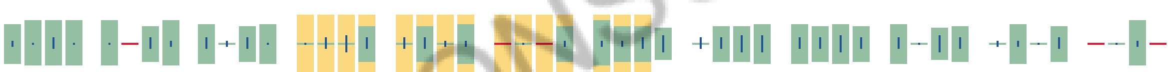
Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



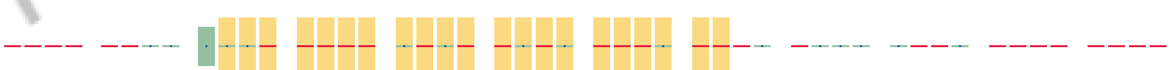
Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

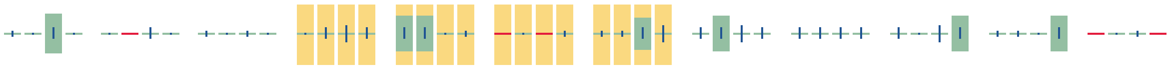


Tricolored Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



NOT FOR CONSULTATION

Yellow-billed Magpie
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

NOT FOR CONSULTATION

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1Kx
- PEM1Ah
- PEM1Cx
- PEM1C
- PEM1Ch

FRESHWATER FORESTED/SHRUB WETLAND

- PFOA

FRESHWATER POND

- PUBFh
- PUSCh
- PUBF

RIVERINE

NOT FOR CONSULTATION

R2UBHx
R4SBCx
R5UBFx
R4SBC
R4SBA
R5UBF

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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