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UPPER SWANSTON RANCH, INC. IRRIGATION AND FISH PASSAGE IMPROVEMENT PROJECT INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION

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Contents

Tables

Figures

Acronyms and Abbreviations

2012 Plan	DWR Climate Action Plan-Phase I: Greenhouse Gas Emissions Reduction Plan
2017 Ozone Plan	2017 Sacramento Regional 8-Hour Attainment and Reasonable Further Progress Plan
AB	Assembly Bill
AMM	Avoidance and Minimization Measure
A-N	Agricultural Intensive
ARC4	Agriculture Road Crossing 4 Fish Passage Project
BACT	best available control technologies
BMP	best management practice
C.F.R.	Code of Federal Regulations
CAA	Clean Air Act
CAAP	Climate Action and Adaptation Plan
CAAQS	California ambient air quality standards
CAL FIRE	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CAP	climate action plan
CARB	California Air Resources Board
CCA	Community Choice Aggregation
CDFW	California Department of Fish and Wildlife
CEQA Handbook	Handbook for Assessing and Mitigating Air Quality Impacts
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CH_4	methane
CHRIS	California Historic Resources Inventory System
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRHR	California Register of Historical Resources
CWA	Clean Water Act
cy	cubic yard
dB	decibel
dBA	A-weighted decibel
DDT	dichlorodiphenyltrichloroethane
Delta	Sacramento-San Joaquin River Delta
DPC	Delta Protection Commission
DPM	diesel particulate matter

DPS	distinct population segment
DWR	California Department of Water Resources
EIR	Environmental Impact Report
ESA	Endangered Species Act
Farmland	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zones
FPD	fire protection district
fps	feet per second
GHG	greenhouse gases
gpm	gallon per minute
HCP/NCCP	Habitat Conservation Plan/Natural Community Conservation Plan
HFC	hydrofluorocarbon
I-	Interstate
IS	Initial Study
ITA	Indian Trust Asset
L_{dn}	day-night average sound level
L_{eq}	equivalent continuous sound level
LOS	level of service
LRA	Local Responsibility Area
MBTA	Migratory Bird Treaty Act
MMRP	Mitigation Monitoring and Reporting Program
MND	Mitigated Negative Declaration
MRZ	Mineral Resources Zone
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NSR	New Source Review
NWIC	Northwest Information Center
Pb	lead
PCB	Polychlorinated biphenyl
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric Company
PM	particulate matter
PM2.5 Plan	PM2.5 Implementation/Maintenance Plan and Resignation Request for Sacramento PM2.5 Nonattainment Area
ppm	parts per million
PRC	Public Resources Code

project	Upper Swanston Ranch, Inc. Irrigation and Fish Passage Improvement Project
Projects	Central Valley Project and State Water Project
RD	reclamation district
ROG	reactive organic gases
RWQCB	Central Valley Regional Water Quality Control Board
SB	Senate Bill
SF_6	sulfur hexafluoride
SFNA	Sacramento Federal Nonattainment Area
SIP	State Implementation Plan
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_2	sulfur dioxide
SRA	shaded riverine aquatic
SRFCP	Sacramento River Flood Control Project
SVAB	Sacramento Valley Air Basin
Swanston	Upper Swanston Ranch, Inc.
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminants
TCR	tribal cultural resource
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
YSAQMD	Yolo-Solano Air Quality Management District

Chapter 1
Introduction

This Initial Study (IS) examines the potential direct, indirect, and cumulative impacts on the affected environment associated with the Upper Swanston Ranch, Inc. Irrigation and Fish Passage Improvement Project (project). The project consists of modifying an existing irrigation channel adjacent to Tule Canal to avoid fish entrainment, installing a new fish-friendly water intake structure within Tule Canal, and installing a new pump site west of Tule Canal that would pull water from the project's proposed water intake screens (i.e., fish screens) through buried irrigation pipes beneath a fallow rice field to an existing holding reservoir to the north. The water held in the reservoir would be available for diversion north from the reservoir to irrigated fields. The project is in the Yolo Basin in Yolo County, near West Sacramento, California (Figure 1-1). Figure 1-2 shows existing conditions at the project site.

The project is a discretionary action under the California Environmental Quality Act (CEQA); therefore, the project is subject to the requirements of CEQA. The California Department of Water Resources (DWR) is the CEQA lead agency for the preparation of the IS, and the United States Department of the Interior, Bureau of Reclamation (Reclamation) is the National Environmental Policy Act (NEPA) lead agency for the preparation of the project's connected Environmental Assessment and all federal permitting requirements. This IS has been prepared in accordance with CEQA requirements and guidance, and serves to publicly disclose the potential impacts of the project, as well as consideration for proposed mitigation measures.

Project Purpose

The purpose of the project is to modify an existing irrigation channel adjacent to Tule Canal to avoid fish entrainment, improve fish passage, and increase the viability of floodplain fisheries' rearing habitat in the Yolo Bypass and the lower Sacramento River basin.

Organization of this Report

This document was prepared to meet CEQA requirements for the analysis of the project. Chapter 1 provides an introduction, and describes the project purpose and the organization of the report. Chapter 2 describes the components of the proposed project. Chapter 3, *Evaluation of Environmental Impacts,* describes the environmental setting and the environmental impacts associated with project implementation. The following resource areas are included based on Appendix G (Environmental Checklist Form) of the State CEQA Guidelines:

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources

- Cultural Resources
- Energy
- Geology, Soils, and Paleontological Resources
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire
- Mandatory Findings of Significance

Chapters 4 and 5 provide references cited in this IS and the list of preparers, respectively.

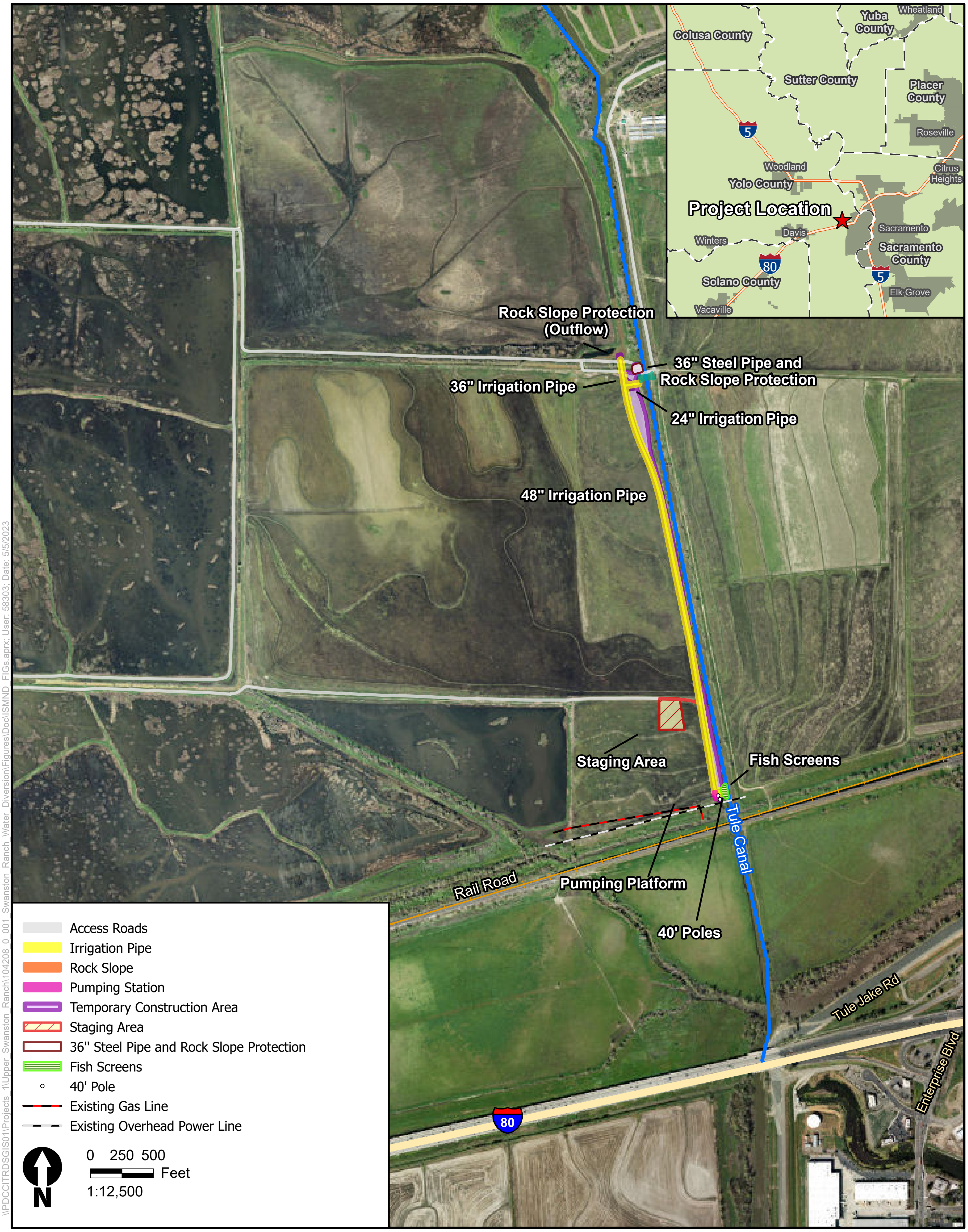
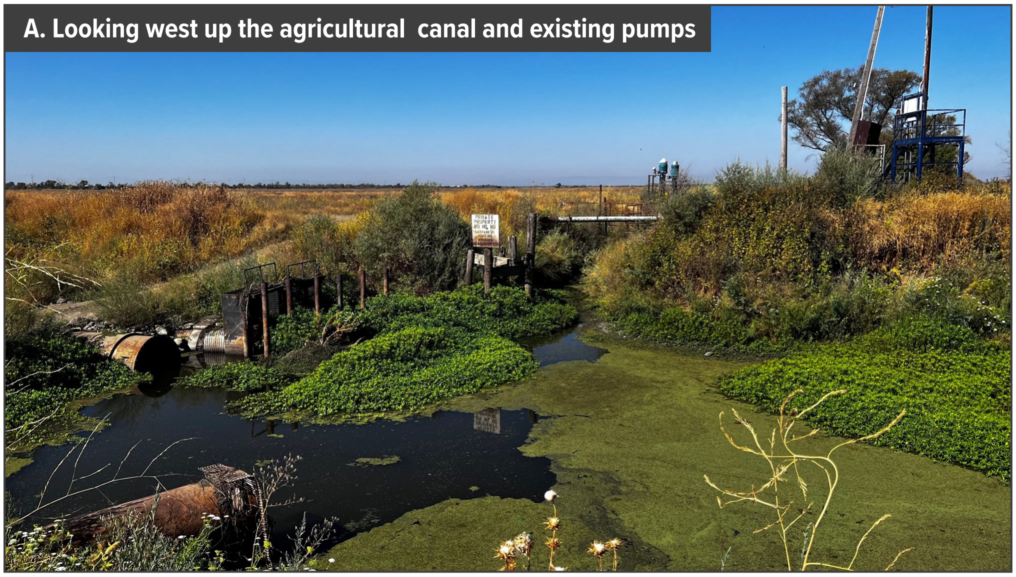


Figure 1-1
Project Location and Components

A. Looking west up the agricultural canal and existing pumps



B. Looking south of the existing crossing and culverts

C. Looking north of the existing crossing and culverts

Graphics ... CA DWR 104620_Swanston Ranch (2-1-2022) tag

Figure 1-2
Existing Conditions

Chapter 2
Proposed Project

Project Purpose

- Provide safe fish passage in the Tule Canal for federally listed and state-listed salmonids and green sturgeon that have entered the canal.
- Reduce fish stranding in adjacent irrigation drainage canals.
- Dedicate water for instream beneficial use and file a Petition for Instream Flow Dedication (California Water Code Section 1707) and make progress towards instream dedication.
- Improve diversion intake structures in the Tule Canal and associated agricultural water management facilities on Upper Swanston Ranch properties.

Project Location

The project is located west of the city of West Sacramento and north of Interstate (I-) 80 (Figure 1-1). This project and those in the vicinity are described in the *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Final Environmental Impact Statement/Environmental Impact Report* (Reclamation 2019). The Yolo Bypass Salmonid Habitat Restoration and Fish Passage project was developed to improve fish passage and increase floodplain fisheries' rearing habitat in the Yolo Bypass and the lower Sacramento River basin.

Project Description

The project consists of modifying structures within the Tule Canal to avoid fish entrainment by installing a new fish-friendly water intake structure within Tule Canal; installing a new pump station site west of Tule Canal that would pull water from the proposed water intake screens through two 36-inch pipes that extend back to the pump station before sending the water through one 48-inch buried irrigation pipe beneath a fallow rice field to an existing holding reservoir to the north; installing new power pole(s); and installing a new splash board riser, one fish-friendly flap culvert pipe, and backfill at the existing east–west diversion point, to create a barrier to fish entry from Tule Canal (Appendix A, C201). The water held in the holding reservoir would be available for diversion north from the reservoir for use in irrigated fields.

The proposed project is consistent with the Yolo Bypass fish passage improvements identified in the Fish Restoration Program Agreement between the California Department of Fish and Wildlife (CDFW) and DWR by providing improved fish passage and connectivity to the Sacramento River in Tule Canal, located north of the Yolo Bypass Wildlife Area. CDFW was instrumental in the design and location of the fish screens and the other project components discussed below. Several CDFW and DWR staff provided input throughout the design stage.

There is an existing water diversion structure located at the junction of Tule Canal and an interior drainage canal (latitude 38.588526, longitude -121.586173) (Appendix A, C204). The Tule Canal is the main drainage canal in the Yolo Bypass and is located near the eastern margin of the bypass. There is an existing seasonal agricultural crossing spanning west to east across the Tule Canal that is used during low-flow months for moving farming equipment east and west, and the existing water diversion pump moves water from the drainage canal to the water system in the north. The drainage canal, being open to the Tule Canal, is currently a fish entrainment risk ameliorated by this project. The existing earthen agricultural road crossing will be replaced by DWR as a separate project and will be subject to its own CEQA/NEPA analysis. The existing pump would remain in operation, although the potential for fish entrainment would be eliminated by this project. Impacts from cut and fill are described by project component below and detailed in Table 2-1. The operations of the proposed irrigation components according to the direction of water flow are detailed in Appendix A.

Upper Swanston Ranch, Inc. (Swanston) holds four appropriative water-right licenses, and a water-right permit, issued by the State Water Resources Control Board (SWRCB) for the diversion of surface water for irrigation. Due to the proposed change in the location of the new water intake and the change in use of the existing diversion facility, Swanston would update the allowed places of use consistent under all its rights. There would be no increase in water use under these minor changes.

Project Components

New Concrete Headwall Fish Barrier

Just west of the junction of Tule Canal, a new flashboard riser, one fish-friendly flap gate and 36-inch culvert pipe and backfill would be installed to create a barrier to fish entry from Tule Canal into an interior drainage canal (Appendix A, C204). The new backfill grade would consist of approximately 1,000 cubic yards (cy) of material and would be brought up to approximately 11 feet to match the existing height of the Tule Canal so that it would not be breeched during high flows. One new fish-friendly flap 36-inch culvert pipe set in a precast concrete box, approximately 8 feet tall and 5 feet wide, would be installed to allow water drainage from irrigation to return to Tule Canal. The anticipated flow rate would vary seasonally and according to agricultural, mosquito, and managed wetlands requirements. Typically, May 1–September 15 irrigation demands are utilized for rice cultivation and October 20–December 31 irrigation demands are utilized to promote managed wetlands and duck habitat. The maximum flow of the fish-friendly flap culvert pipe would be about 15 cubic feet per second (cfs). The culvert would be protected with rock slope protection to protect slopes and minimize maintenance. A turbidity curtain (installed only during construction) to support dewatering and deter fish from entering the irrigation canal would be installed prior to the start of construction at this location. Existing abandoned wood piers and structures would be removed as part of the project.

New Intake Screens

Approximately 3,200 feet downstream from the existing pump location, the contractor would install a new fish-friendly screened intake diversion structure in the Tule Canal to enable continued diversions for storage and irrigation (Appendix A, C201). The design of the new intake would be consistent with current National Marine Fisheries Service (NMFS) fish screening criteria and anadromous salmonid passage facility design criteria (NMFS 1997, 2022). The design consists of two 14-foot-diameter stainless steel mechanical brush-cleaned cone screens (model C168-48EA) on a concrete pad within a sheet pile alcove. The concrete pad would be approximately 52.5 feet wide at the channel, approximately 35 feet wide, and approximately 10 inches thick, set into the bank, and approximately 20 feet deep. The sheet pile alcove would be approximately 52 feet wide by 20 feet deep. The sheet piles (65 total), which are approximately 2 feet wide by 30 feet tall, would be installed with a vibratory pile hammer. The system includes a pipe manifold under the concrete pad with sediment clean-outs that would connect the two screens to the two 36-inch pipes that extend back to the pump station. The depth of the two pipes would be determined following geotechnical analysis but may be installed approximately 4 feet below ground level, in temporary trenches approximately 10 feet deep and 10 feet wide. A floating debris boom has been included as optional equipment should facility operators find they need to install such equipment for reducing debris accumulations inside the alcove. Two 6-inch riser rings would be added to the screens to allow for vertical adjustment of the screen elevation relative to water surface elevation unknowns now and into the future.

Two screens are included in the design due to limited water depth at low water, heavy duckweed (*Spirodela polyrhiza*) and water hyacinth (*Eichhornia crassipes*) loads, and limited sweeping flows. Screen elevation would be field-fit at the time of installation; however, the bottom of the screens would be at an approximate elevation of 2.0 feet. Excavation into the bank would be approximately 3 to 4 feet, totaling less than 300 yards cumulatively. Each cone screen would have a surface area of 181.3 square feet, for a total of 362.6 square feet for the two screens and would be constructed of 1.75-millimeter, slot-opening, wedge wire screen material with a 50 percent open area and submersible electric drive brush cleaning system (Figure 2-1 and Appendix A, C201). Submersible power and signal cables from the electric drives would connect to a junction box mounted on the bank above the 100-year floodplain elevation. Two 20 horsepower fish screen motors would support the electric drives. The screens would be capable of manual or programmed screen cleaning using a Siemens-based Programmable Logic Controller with Human Machine Interface screen touch panels housed in a National Electrical Manufacturer Association–rated outdoor enclosure.

Based on this design, the facility would be capable of withdrawing 55.7 cfs (i.e., able to operate two, 12,500 gallon per minute [gpm] pumps simultaneously) with as little as 19 inches of water depth, or 53 percent screen blinding[1] at full submergence, before exceeding NMFS' 0.33 foot per second (fps) approach velocity criterion for the protection of salmonids. Similarly, the new water intake facility would be capable of withdrawing 55.7 cfs with as little as 33 inches of water depth, or 23 percent screen blinding at full submergence, before exceeding an approach velocity of 0.2 fps recommended by the U.S. Fish and Wildlife Service (USFWS) for the protection of Delta smelt (*Hypomesus transpacificus*).[2] Full submergence of the fish screens is expected during the period when Delta smelt may be present at the new water intake facility (i.e., January to June); therefore, approach velocities would be expected to be below 0.2 fps when the facility is operating under these conditions. During the irrigation season, water withdrawal from Tule Canal by other diverters and other factors may cause water surface elevations to be lowered by as much as 1 foot below the top of the screens, resulting in 36 inches of screen submergence. However, as described above, adequate screen area would be available at this submergence depth to meet the 0.33 fps criterion for the protection of salmonids. Because Tule Canal in the project area is tidally influenced, water velocities rise and fall daily; consequently, CDFW and NMFS criteria for sweeping velocity would not always be

[1] A screen is said to be *blinded* when the mesh hole openings are clogged with material.

[2] USFWS does not have a specific criterion for fish screen approach velocities.

met when flows are low. Approximately 1,500 cy of excavation are anticipated for the intake structure (Table 2-1).

The manifold would be fabricated from immersion duty, epoxy coated carbon steel and placed under the concrete pad supporting the screens. A floating debris boom has been included as optional equipment should facility operators find they need to reduce debris accumulations inside the alcove. Screen elevation would be field-fit at the time of installation; however, the bottom of the fish screens would be at an approximate elevation of 2.0 feet. An existing water gauge is in Tule Canal at this location to measure water levels. To reduce sediment and turbidity downstream and keep fish out during construction, a silt curtain would be installed prior to installation of a coffer dam to support dewatering of the intake construction site.

Figure 2-1. Engineering Detail of the Two Brush-Cleaned Cone Screens

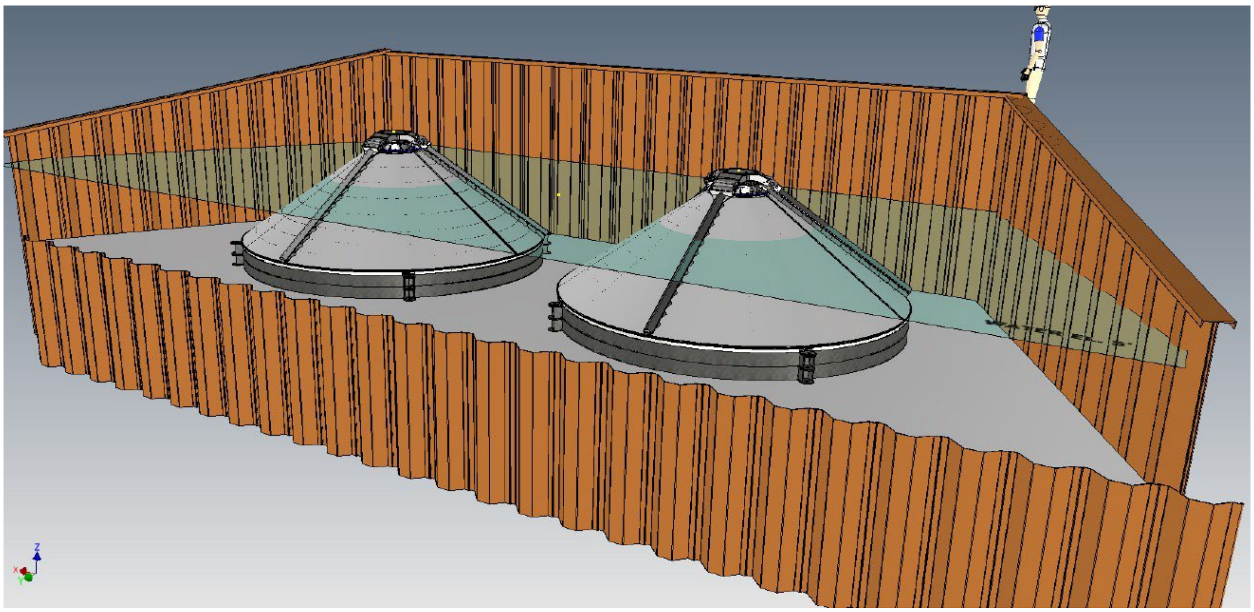


Table 2-1. Cut and Fill Estimates by Project Component

Project Component	Cut Estimates (cy)	Fill Estimates (cy)	Fill Material Type
New fish barrier at existing crossing with fish-flap drains to Tule Canal	--	1,000	Rock
New intake screens on concrete pad and pipe manifold	1,000	30	Concrete and Rock
New pumping pad, pumps, and concrete wet well	850	200	Concrete
One irrigation pipeline from fish screen north to existing Place of Use; one irrigation pipeline from primary north–south pipeline running east–west	2,100	5,000	Soil
Total	**3,950**	**6,230**	

New Pump Station

Geotechnical testing may occur at the proposed pump platform location. For the purposes of determining pump station stability, the project is proposing to explore the subsurface soil conditions at the new pump station location by boring into the ground and collecting soil samples. The site is accessible from existing paved roads or dirt paths (i.e., no overland travel is required). An area of up to 75 by 75 feet (0.13 acre) may be required to accommodate drill rig setup. To minimize surface disturbance, rubber mats or other appropriate BMPs would be used within the work area for vehicle/equipment staging. There would be one or two bores collected with a hollow-stem auger (<6-inch diameter) on a truck-mounted drill rig, inserted to the depth of at least 50 feet (displacing 9.8 cubic feet, or 0.36 cy, per bore). Samples would be collected from the borings using Standard Penetration Test, every 2.5 feet in the top 10 feet, then every 5 feet thereafter. The borings are expected to encounter groundwater and/or soft soils, where caving and squeezing of soils are expected to occur. All drilling fluid would utilize clean, potable water, and temporary steel casing may be used to advance the boring to the required depth or to stabilize the borehole. Boreholes would be backfilled after the sampling has been completed according to required specifications. Geotechnical investigations would require a crew of two to four personnel. It is anticipated that work would be completed within four working days.

The new pump station would be constructed adjacent and to the west of the proposed fish screens, which would draw water via two 36-inch irrigation pipelines (approximately 70 feet in length) connecting the new intake (Appendix A, C201) and the newly installed pump station. The pump station will be designed to draw water from the Tule Canal through the intake structure into the pump station and then push it north through an underground pipe, to the existing holding reservoir. Two 125-horsepower pumps would be installed at the pump station. The pumps' intake components would sit inside of a 14- by 16-foot concrete wet well installed approximately 16 feet below grade with a reveal of 2 feet above grade (710 cy of fill) (0.138 acre) (Table 2-1). The pumps are designed for 12,500 gpm for a total of 25,000 gpm at approximately 55 cfs. The pumps' motors would sit on top of a newly constructed 20- by 20-foot steel pump platform approximately 18 feet above the ground with the wet well located immediately below it. Guardrails approximately 42 inches tall would be installed on all four sides of the steel platform. Steel stairs would lead from the ground to the proposed pump steel platform (Appendix A, C201) where the electrical equipment and panel would also be housed. The steel platform would be supported by four approximately 14- by 14-inch and 100-foot-long steel H piling beams installed into the ground approximately 80 feet, to the point of resistance. The existing pumps located at the headwall installation site north of the new pump station would remain in place and only be used for back-up purposes. The new pump station area may be graded prior to installation depending on ground conditions at the time of construction.

The irrigation pipeline would consist of one new 48-inch pipe, approximately 3,300 feet long, that would run north–south between the proposed fish screens to the existing holding reservoir on Assessor's Parcel Number 042-270-015. The depth of the pipe would be determined following geotechnical analysis but may be installed approximately 4 feet below surface area, in temporary trenches approximately 10 feet deep and 10 feet wide (Appendix A, C201). To prevent scouring and erosion in the holding reservoir, California Department of Transportation (Caltrans) Class III rock slope protection (Caltrans 2016) would be placed on rock protection fabric leading to the holding reservoir. A new Pacific Gas and Electric Company (PG&E) connection, including installation of up to two approximately 60-foot-tall, 3-foot-diameter power poles buried up to 10 feet deep each, would be required to support the pumps (400 amp).

One 24-inch pipe with a butterfly valve for future pipe size reduction and pipeline crossing to the bridge proposed by DWR would be stubbed off to the east of the proposed 48-inch pipeline heading north to the holding reservoir (Appendix A, C203).

Construction Characteristics

Construction would occur in four phases in a single year with construction anticipated sometime between 2024 and 2026. Phase 1 would be vegetation trimming, mobilization and site preparation; Phase 2 would be grading; Phase 3 would be trenching, installation of the intake screens, headwall, pipe, and pump station; and Phase 4 would be backfill and cleanup. The project anticipated start date would be February 1, 2024, or as soon as possible, for purposes of vegetation trimming prior to nesting bird season, if access and permit conditions allow. Phase 1 and Phase 2 ground-disturbing activities would begin no sooner than May 1, 2024, and the end date for all Phase 1 and Phase 2 work would be approximately October 31, 2024, a period in line with the giant garter snake (*Thamnophis giga*s) active season work window. Phases 1 and 2 ground-disturbing activities would consist of out-of-water staging and construction.

Phase 3 would signal the beginning of all in-water work on June 1, 2024, a period in line with when few salmonids are present in Tule Canal (IEP 2022). Based on recent site conditions from work to the north on Tule Canal by DWR and ongoing efforts in the Yolo Bypass area, water conditions in June within the canal network consist of low outflow, high temperatures, and low dissolved oxygen. In-water work would continue through August 2024. Dewatering of Tule Canal along the west bank construction area is proposed during the installation of the new fish-friendly water intakes facility; a cofferdam and dewatering pumps would be used to dewater the construction area behind the cofferdam. Silt curtains and turbidity curtains would be used to contain turbid water and prevent or minimize its release to Tule Canal. Phase 4 would include backfill and cleanup.

Cofferdam installation at site of the new water intake facility would include driving sheet piles with a vibratory pile hammer, then dewatering the area, then excavating the area. A dewatering pump would be used to dewater the cofferdam. Installation of the sheet piles would take approximately 2 weeks; sheet pile alcove, pipe and concrete installation approximately 4 weeks; and screen conduit, wiring, and control panel installation approximately 1 week.

Silt curtain installation would include clearing the channel and levee of vegetation and debris; rolling out a 10- to 12-foot-tall silt curtain on shore with weighted chains along the bottom edge and floats along the top edge; dragging the silt curtain along the bottom of the channel from the starting point (intake site) toward the main water source to guide any fish out of the channel and into the main body of water; securing it in place to withstand in-channel currents; and leaving it in place until demobilization of the intake site.

Turbidity curtain installation at the headwall site would include installation of one 2-inch steel post on each bank (north and south) of the existing drainage ditch to support a cable to each side of the curtain. The top of the curtain is supported by buoys at the top and weighted by chains at the bottom to support dewatering during construction. The turbidity curtain would be left in place until demobilization of the headwall site.

Spoils from the entirety of the project would be stored on the access road immediately east of the proposed pipe installation area and west of the fish screens. No trees would be removed during construction. A water truck would be used for dust suppression and would remain on site throughout the construction period. Operations and maintenance activities would be the same as pre-project conditions.

Construction would typically occur during weekdays but could be up to 6 days per week with no construction on Sundays and holidays. Construction would occur during daylight hours.

Construction Equipment

All construction equipment would use best available control technology and implement dust control best management practices in accordance with current Sacramento Metropolitan Air Quality Management District guidance. Expected construction equipment and duration of use for each activity is presented in Table 2-2. A 12-foot aluminum boat (without motor) would also be used during construction.

Construction Personnel

Construction-related traffic would occur from daily commutes by construction workers and the delivery of equipment and materials. Up to 15 construction workers would be present at any given time.

Construction Haul Routes and Staging

Construction traffic (including truck traffic) accessing the project site would generally use I-80, exit 78 at E Chiles Road/Road 32A. From the offramp, construction traffic would turn right on Road 32A, then north on Road 105, then east on Road 30 to the project site and staging area. Existing improved and unimproved roads would be used by transport trucks to deliver materials.

Table 2-2. Construction Equipment

Phase	Equipment Type	Fuel Type	# of Equipment per Day	Operating Hours/ Equipment/Day
1 – Move in and Preparation	D8 Dozer	Diesel	1	10
	D6 Dozer	Diesel	1	10
	140 M Grader	Diesel	1	10
	615 Scrapers	Diesel	2	10
2 – Grading	140 M Grader	Diesel	1	10
	615 Scrapers	Diesel	2	10
3 – Trenching and Installation of Intake Screens, Headwall, Pipe and Pump	CAT 336 Excavator	Diesel	2	10
	CAT 966 Loader	Diesel	1	10
	308 Excavator	Diesel	1	10
	Gradeall Forklift	Diesel	2	10
	Fusion Machines	Diesel	2	10
4 – Backfill and Cleanup	D8 Dozer	Diesel	1	10
	D6 Dozer	Diesel	1	10
	140 M Grader	Diesel	1	10
	615 Scrapers	Diesel	2	10
	Compactors	Diesel	2	10

Staging would occur in the field just west of Tule Canal and the proposed pipelines as shown on Figure 1-1. The staging area would be approximately 1.1 acres in size.

Permits and Approvals

The proposed project may need permissions, permits, authorizations, and approvals from federal, state, regional, and local agencies (Table 2-3).

Table 2-3. Potential Actions, Permissions, Permits, Authorizations, and Approvals

Permit/Authorization/Permission	Agency
Clean Water Act (CWA) Section 404 permit	U.S. Army Corps of Engineers
Section 14 of the Rivers and Harbors Appropriation Act of 1899, as amended, and codified in 33 United States Code (USC) 408 (Section 408)	U.S. Army Corps of Engineers
CWA Section 401 Water Quality Certification/Waste Discharge Requirements	Central Valley Regional Water Quality Control Board
Endangered Species Act Section 7 compliance	National Marine Fisheries Service and U.S. Fish and Wildlife Service
National Historic Preservation Act Section 106 compliance	State Historic Preservation Office
Lake and Streambed Alteration Agreement	California Department of Fish and Wildlife
California Endangered Species Act consultation with CDFW regarding potential need for Section 2081(b) Consistency Determination (CD), and 2080.1 CD per CDFW's Cutting the Green Tape program	California Department of Fish and Wildlife
CWA Section 402 National Pollutant Discharge Elimination System/Stormwater Pollution Prevention Plan (NPDES/SWPPP)	Central Valley Regional Water Quality Control Board
Grading, Building, and Use Permits	Yolo County
Appropriative Water-Right Licenses and Permits	State Water Resources Control Board
Authority to Construct Permit	Sacramento Metropolitan Air Quality Management District
Encroachment Permit	Central Valley Flood Protection Board

Existing Appropriative Water Rights

Swanston holds four water-right licenses and a water-right permit issued by the SWRCB for the diversion of surface water for irrigation of Swanston Ranch located in the Yolo Bypass. Swanston is requesting that the SWRCB make certain minor changes to its licenses and permit to support the DWR's Division of Integrated Science and Engineering Riverine Habitat Restoration Section's effort to improve fish habitat and fish passage in the Yolo Bypass, consistent with the Yolo Bypass Drainage and Water Infrastructure Project.

Swanston is working with DWR in its implementation of that project by cooperating with DWR's relocation/replacement of Swanston's primary Tule Canal diversion structure under its existing water rights. A new diversion structure would be built downstream on Tule Canal at a point of diversion already named in three of Swanston's water rights. The new diversion structure would better facilitate upstream and downstream fish passage in the Tule Canal.

License 4505 (Application A009806) allows for diversions from the Tule Canal and unnamed drains from April 1 through October 1 each year for irrigation purposes. The lands where water can be used (Place of Use) are lands on the west side of Tule Canal, as shown on Figure 2-2. Licenses 9076 and 9078 (Applications A019086 and A020376) authorize diversion from the Tule Canal in the months of May, June, and September. Water under these three licenses can be used for irrigation of the majority of Swanston's lands located both east and west of Tule Canal, as shown on Figure 2-2. License 9077 (Application A019087) allows for diversion from the west, from the West Cut, in the months of May, June, and September, and for use on the lands south of the railroad tracks, as shown on Figure 2-2. Permit 20038 (Application A028453) authorizes diversions from the Tule Canal and unnamed drains from May 1 through October 1 for use on Swanston Ranch's lands within the Yolo Bypass.

The date by which full beneficial use of water was to be made under Permit 20038 was December 31, 1997. Swanston notified the SWRCB that it had made full beneficial use of water by that date and is awaiting inspection for licensing. Permit 20038 is subject to Term 91, which results in the right being curtailed any time that, in general, stored water is released from the Central Valley Project and State Water Project (Projects) to meet Sacramento–San Joaquin River Delta (Delta) water quality standards. Permit 20038 has been curtailed for at least one or more of the summer months for nearly every year since the SWRCB issued that permit in 1987.

Use under Licenses 4505, 9076, 9077, and 9078, and Permit 20038, has included irrigation of rice (last harvested by Swanston in 2018), tomatoes, corn, safflower, timothy grass, smartweed, and water grass. Swanston licenses and permit are summarized in Table 2-4.

Table 2-4. Summary of Existing Appropriative Water Rights

Description	License 4505 (A009806)	License 9076 (A019086)	License 9077 (A019087)	License 9078 (A020376)	Permit 20038 (A028453)
Priority	1-19-1940	11-19-1959	11-19-1959	8-31-1961	5-15-1985 [1]
Source	Tule Canal (RD 785 West Levee Borrow Pit) and Unnamed Drains	Tule Canal (RD 785 West Levee Borrow Pit) and Unnamed Drains	West Cut	Tule Canal (RD 785 West Levee Borrow Pit) and Unnamed Drains	Tule Canal (RD 785 West Levee Borrow Pit) and Unnamed Drains
Purpose of Use	Irrigation	Irrigation	Irrigation	Irrigation	Irrigation
Diversion Rate	25.4 cfs [3]	10 cfs [2,3]	0.92 cfs [3]	15.7 cfs [2, 3]	45 cfs [3]
Amount	9270.1 af	1805 af	166.1 af	2833.8 af	12,600 af

Description	License 4505 (A009806)	License 9076 (A019086)	License 9077 (A019087)	License 9078 (A020376)	Permit 20038 (A028453)
Season	4/1–10/1	5/1–6/30 and 9/1–9/30	5/1–6/30 and 9/1–9/30	5/1–6/30 and 9/1–9/30	5/1–10/1 Subject to Term 91
Place of Use	1,558.8 acres	2,750 acres net within a total of 3,014 acres	97 acres net within 107.1 acres	2,750 acres net within a total of 3,014 acres	2,616 acres net within a total of 3,257 acres

[1] Date by which full beneficial use of water to be made was December 31, 1997.

[2] Combined rate of diversion between Licenses 9076 and 9078 not to exceed 15.7 cfs.

[3] Maximum simultaneous rate of diversion among Licenses 4505, 9076, 9077, and 9078 and Permit 20038 not to exceed 52.02 cfs.

cfs = cubic feet per second; af = acre-feet RD=reclamation district

Proposed Petitions for Change in Water Rights

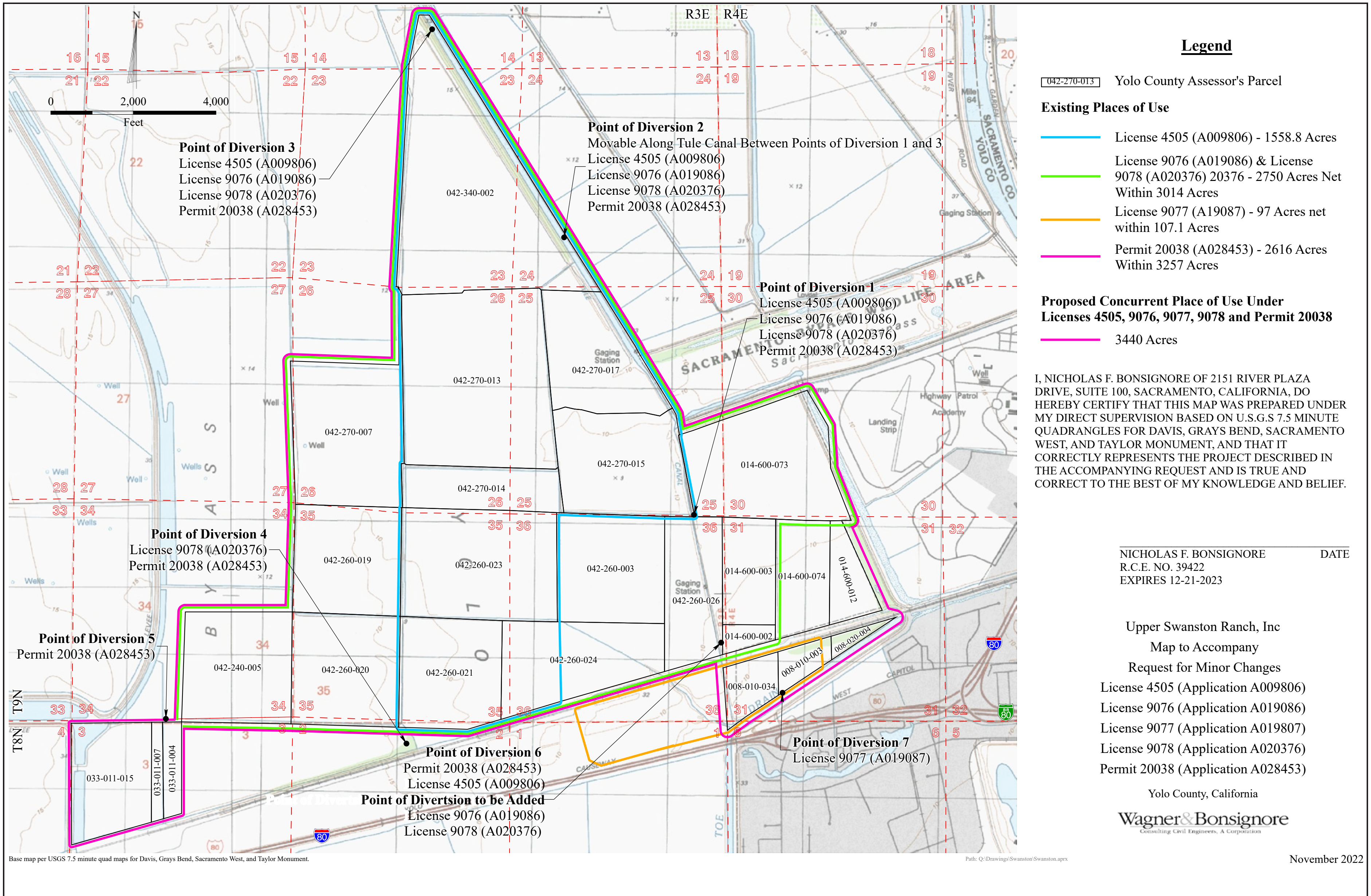
Swanston proposes that the SWRCB approve changes to Licenses 4505, 9076, and 9078, to add Point of Diversion #6 on Tule Canal (named in Permit 20038) to implement the project under the ISMND.

Swanston's petitions also seek the SWRCB's approval of the consolidation of the places of use stated in Licenses 4505, 9076, 9077, and 9078 and Permit 20038 to include all lands within Swanston Ranch. This change would allow flexibility for the movement of water via the existing common conveyance system on Swanston Ranch. There would be no increase in water use over existing conditions. All lands in the existing and proposed places of use have been agriculturally developed and irrigated for nearly 100 years.

Proposed changes to the Swanston water rights are summarized in Table 2-5. Points of Diversion and the existing and proposed Place of Use are shown on Figure 2-2.

Table 2-5. Proposed Water Rights Modifications

Component	Date Filed	Proposed Modification
1. Petition to Change License 4505 (A009806)	2022	Change Place of Use from 1,558.8 acres to 3,440 acres.
2. Petition to Change License 9076 (A019086)	2022	Add Point of Diversion #6 on Tule Canal. Change Place of Use from 2,750 acres to 3,440 acres.
3. Petition to Change License 9077 (A019087)	2022	Change Place of Use from 97 acres to 3,440 acres.
4. Petition to Change License 9078 (A020376)	2022	Add Point of Diversion #6 on Tule Canal. Change Place of Use from 2,750 acres to 3,440 acres.
5. Petition to Change Permit 20038 (A028453)	2022	Change Place of Use from 2,616 acres to 3,440 acres.



Source: Wagner & Bonsignore 2022

Graphics … CA DWR 104620_Swanston Ranch (12-6-2022) tag

Figure 2-2
Points of Diversion and Place of Use

Chapter 3
Evaluation of Environmental Impacts

Introduction

This section identifies the potential environmental impacts of the project using as a framework the CEQA Environmental Checklist Form as presented in Appendix G of the State CEQA Guidelines. Each environmental issue analyzed in this document provides brief background information and discussion of the environmental setting to help the reader understand the conditions present prior to the implementation of the project. The potential effects of the project are defined as changes to the environmental setting attributable to individual components or operations.

CEQA requires that a distinction be made between mitigation measures that are included in the project and other measures proposed by the lead, responsible, or trustee agencies, or by other persons that are not included, but that the lead agency determines could reasonably be expected to reduce adverse impacts if required as conditions of approval. The mitigation measures proposed by the lead agencies and presented in this IS would be implemented to reduce potential impacts to less-than-significant levels. Compliance would occur through implementation of a Mitigation Monitoring and Reporting Program.

1.	**Project Title:**	Upper Swanston Ranch, Inc. Irrigation and Fish Passage Improvement Project
2.	**Lead Agency Name:**	California Department of Water Resources
3.	**Contact Person and Phone Number:**	Josh Martinez California Department of Water Resources 3500 Industrial Boulevard, West Sacramento, CA 95691 916.835.8778
4.	**Project Location:**	The project is located west of Tule Jake Road and the Tule Canal, approximately 0.6 mile west of West Sacramento, in Yolo County, California.
5.	**Project Sponsor's Name and Address:**	California Department of Water Resources (above)
6.	**General Plan Designation:**	Agriculture (AG)
7.	**Zoning:**	Agricultural Intensive (A-N)

8. Description of Project:

The project consists of modifying an existing irrigation channel adjacent to Tule Canal to avoid fish entrainment, installing a new fish-friendly water intake structure within Tule Canal, and installing a new pump site west of Tule Canal that would pull water from the proposed water intake screens through buried irrigation pipes beneath an agricultural pasture to an improved holding reservoir to the west. The water held in the reservoir would be available for diversion north from the reservoir for use within irrigated fields.

9. **Surrounding Land Uses and Setting:**

   The project site is rural and unpopulated with agricultural lands to the north and west and developed areas of West Sacramento to the east and south. I-80 and railroad tracks are to the south and the Sacramento Bypass Wildlife Area is adjacent to the north.

10. **Other Public Agencies Whose Approval is Required:**

    See Table 2-3 in Chapter 2, above.

11. **Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code Section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?**

    Note: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (See Public Resources Code Section 21080.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per Public Resources Code Section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that Public Resources Code Section 21082.3(c) contains provisions specific to confidentiality.

    See Section XVIII. *Tribal Cultural Resources*, below.

Environmental Factors Potentially Affected

This IS has determined that in the absence of mitigation, the project could have the potential to result in significant impacts associated with the environmental factors checked below. However, mitigation measures are identified in this IS that would reduce all potentially significant impacts to a less-than-significant level.

	Aesthetics		Agricultural and Forestry Resources		Air Quality
X	Biological Resources	X	Cultural Resources		Energy
	Geology/Soils/ Paleontological Resources		Greenhouse Gas Emissions		Hazards and Hazardous Materials
	Hydrology/Water Quality		Land Use/Planning		Mineral Resources
	Noise		Population/Housing		Public Services
	Recreation		Transportation	X	Tribal Cultural Resources
	Utilities/Service Systems		Wildfire	X	Mandatory Findings of Significance

Determination

On the basis of this initial evaluation:

	I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
X	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions to the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
	I find that the proposed project MAY have an impact on the environment that is "potentially significant" or "potentially significant unless mitigated" but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards and (2) has been addressed by mitigation measures based on the earlier analysis, as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the project, nothing further is required.

Signature	Date
Printed Name	For

Evaluation of Environmental Impacts

1. A brief explanation is required for all answers except “No Impact” answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A “No Impact” answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A “No Impact” answer should be explained if it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
2. All answers must take account of the whole action involved, including offsite as well as onsite, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.
3. Once the lead agency has determined that a particular physical impact may occur, the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. “Potentially Significant Impact” is appropriate if there is substantial evidence that an effect may be significant. If there are one or more “Potentially Significant Impact” entries when the determination is made, an Environmental Impact Report (EIR) is required.
4. “Negative Declaration: Less than Significant with Mitigation Incorporated” applies when the incorporation of mitigation measures has reduced an effect from a “Potentially Significant Impact” to a “Less-than-Significant Impact.” The lead agency must describe the mitigation measures and briefly explain how they reduce the effect to a less-than-significant level. (Mitigation measures from *Earlier Analyses*, as described in #5 below, may be cross-referenced.)
5. Earlier analyses may be used if, pursuant to tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration (Section 15063(c)(3)(D)). In this case, a brief discussion should identify the following:
    a. Earlier Analysis Used. Identify and state where earlier analyses are available for review.
    b. Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards and state whether such effects were addressed by mitigation measures based on the earlier analysis.
    c. Mitigation Measures. For effects that are “Less than Significant with Mitigation Incorporated,” describe the mitigation measures that were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.
6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, when appropriate, include a reference to the page or pages where the statement is substantiated.
7. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
8. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project’s environmental effects in whatever format is selected.
9. The explanation of each issue should identify:
    a. the significance criteria or threshold, if any, used to evaluate each question; and
    b. the mitigation measure identified, if any, to reduce the impact to a less-than-significant level.

I. Aesthetics

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a. Have a substantial adverse effect on a scenic vista?				X
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings along a scenic highway?				X
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?				X
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?				X

Environmental Setting

Yolo County is predominantly rural, having an agricultural character throughout most of the eastern portion of the county. The project site and surrounding area includes lands that are almost entirely agricultural in land use and include vast stretches of alfalfa, rice, and tomato fields as well as other varieties of field crops. The landscape within this area is predominantly flat, with expansive views of cultivated fields uninterrupted by natural or constructed landforms or significant development. Adding to the visual character of this area are intermittent farm implement storage and agricultural industrial buildings, including barns, processing facilities, and storage areas. (Yolo County 2009)

Yolo County has no designated federal or state scenic highways. A portion of State Route 16 (from approximately the town of Capay at County Road 85, north to the county line) is identified by Caltrans as “eligible” for designation as a state scenic highway but is not officially designated. Yolo County has, however, designated the following as local scenic highways: State Route 16: Colusa County line to Capay; State Route 128: Winters to the Napa County line; County Roads 116 and 116B: Knights Landing to the eastern terminus of County Road 16; County Roads 16 and 117 and Old River Road: County Road 107 to West Sacramento; and South River Road: West Sacramento city limits to Sacramento County line. None of these roadways are in view of the project site. (Yolo County 2009)

Because of its rural character, night lighting and glare in the project area is limited to development in West Sacramento to the east and south. Existing sources of ambient nighttime lighting generally include neon and fluorescent signs in developed areas; exterior lighting along buildings for safety, architectural accent, or to illuminate nighttime operations; lights within buildings that illuminate the exteriors of buildings through windows; landscape and wayfinding signage lighting; street and parking lot lighting; and vehicle headlights. Glare is created by reflection of natural (i.e., sunlight) and artificial light off of existing windows and building surfaces. (Yolo County 2009)

Impacts

a. Have a substantial adverse effect on a scenic vista?

The project would be consistent with the scenic views of the surrounding agricultural landscape, which includes canals, ditches, and reservoirs and ancillary facilities, such as pump stations. The proposed pump for the irrigation pipelines would have a maximum elevation of 30 feet, which is approximately 20 feet above the existing ground. All other project components would be lower in elevation. Scenic views of the Sacramento River to the east would not be affected. No impact would occur.

b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings along a scenic highway?

There are no designated state scenic highways in the project area; therefore, no impact would occur.

c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

The project would be consistent with the existing visual resources in the project area, which primarily is characterized visually by substantial agricultural production, including canals and ditches and ancillary facilities, such as pumping stations. The project does not include any tall structures or incompatible uses. No impact would occur.

d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?

The project does not include the installation of any lighting or any structures that would produce substantial glare; therefore, no impacts related to increased light and glare would occur.

II. Agricultural and Forestry Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
In determining whether impacts on agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts on forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project, and forest carbon measurement methodology provided in the Forest Protocols adopted by the California Air Resources Board. Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b. Conflict with existing zoning for agricultural use or conflict with a Williamson Act contract?				X
c. Conflict with existing zoning for, or cause rezoning of forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?				X
d. Result in the loss of forest land or conversion of forest land to non-forest use?				X
e. Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?				X

Environmental Setting

Yolo County is an important agricultural region in California, and most of the land in the county is designated for agricultural use (Yolo County 2009b). Yolo County includes land that is classified as Prime Farmland, Farmland of Statewide Importance, and Unique Farmland by the California Department of Conservation (California Department of Conservation 2021). The project area is classified as Grazing Land and Unique Farmland (California Department of Conservation 2021). Project site parcels are not under Williamson Act contract (Yolo County 2009a). There is no forest land in the project area.

Impacts

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

Project site parcels are designated as Grazing Land and Unique Farmland (California Department of Conservation 2021). The project is consistent with and would support existing agricultural uses and would not result in the conversion of farmland. No impact would occur.

b. Conflict with existing zoning for agricultural use or conflict with a Williamson Act contract?

Project site parcels are not under Williamson Act contract, and the proposed uses would not conflict with existing zoning. No impact would occur.

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

No forest or timberland is present in the project area. No impact would occur.

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

No forest land is present in the project area. No impact would occur.

e. Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

No aspect of the project would result in the conversion of farmland to non-agricultural use, and there is no forest land in the project area. The existing reservoir and ditch are not on lands under agricultural use. The project is consistent with and would support existing agricultural uses, and it would not result in the conversion of farmland to non-agricultural use. No impact would occur.

III. Air Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?			X	
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard?			X	
c. Expose sensitive receptors to substantial pollutant concentrations?			X	
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?			X	

Environmental Setting

The project site is in Yolo County, which is within the Sacramento Valley Air Basin (SVAB). Concentrations of ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and particulate matter (PM10 and PM2.5) are commonly used as indicators of ambient air quality conditions. These pollutants are known as *criteria pollutants* and are regulated by the U.S. Environmental Protection Agency (USEPA) and California Air Resources Board (CARB) through national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS), respectively. The NAAQS and CAAQS are set with an adequate margin of safety for public health and the environment (Clean Air Act Section 109). Other pollutants of concern in the project area are nitrogen oxides (NO_X) and reactive organic gases (ROG), which are precursors to ozone, and toxic air contaminants (TAC), which can cause cancer and other human health effects.

Criteria pollutant concentrations in Yolo County and the SVAB are measured at several monitoring stations. The nearest station to the proposed project is the Woodland-Gibson Road station, which is approximately 7.5 miles north of the project site. Monitoring data show that the station experienced several violations of the ozone and particulate matter CAAQS and NAAQS during the 2019 and 2021 reporting period (CARB 2023). Data collected from monitoring stations throughout the region, including the Woodland-Gibson Road station, are used to designate Yolo County as nonattainment, maintenance, or attainment for the NAAQS and CAAQS. Based on the most recent local monitoring data, the SVAB portion of Yolo County is currently classified nonattainment for the federal ozone and PM2.5 standards, and state PM10 standard, and nonattainment-transitional for the state ozone standard (CARB 2022; USEPA 2022).

The Yolo-Solano Air Quality Management District (YSAQMD) is responsible for ensuring that the NAAQS and CAAQS are met within Yolo County and eastern Solano County. YSAQMD manages air quality through a comprehensive program that includes long-term planning, regulations, incentives for technical innovation, education, and community outreach. For example, YSAQMD supported development of the *2017 Sacramento Regional 8-Hour Attainment and Reasonable Further Progress Plan* (2017 Ozone Plan), which outlines strategies to achieve the federal ozone standard throughout the entire Sacramento Valley region, inclusive of the project area. YSAQMD, alongside other air districts in the Sacramento Valley region, have also prepared the *PM2.5 Implementation /Maintenance Plan and Resignation Request for Sacramento PM2.5 Nonattainment Area* (PM2.5 Plan). YSAQMD adopts rules and regulations applicable to individual projects and emissions generating sources within its jurisdiction. Specific rules applicable to the project may include, but are not limited to, Regulation II, Rule 2.5 (Nuisance), Regulation II, Rule 2.8 (Particulate Matter Concentration), Regulation II, Rule 2.28 (Cutback and Emulsified Asphalts), and Rule Regulation II, Rule 2.32 (Stationary Internal Combustion Engines).

YSAQMD's (2007) *Handbook for Assessing and Mitigating Air Quality Impacts* (CEQA Handbook) provides guidance for evaluating project-level air quality impacts, including thresholds to assist lead agencies in evaluating the significance of project-generated criteria pollutant and precursor emissions. YSAQMD's ozone precursor thresholds are based on the emissions levels identified under Rule 3.20—Ozone Transport Mitigation, which implements the California Ozone Transport Mitigation Regulation codified under California Code of Regulations, Title 17, Division 3, Chapter 1, Subchapter 1.5, Article 6, section 70600(b)(1)(C). The Transport Mitigation Regulation was adopted to ensure that air quality is not significantly degraded by new sources of emissions, inclusive of pollutant transport to downwind air districts. Based on the ozone attainment status of YSAQMD and its location within the broader Sacramento area, Rule 3.20 requires a 10 tons per year "no net increase" program for NO_X and ROG generated by stationary sources. YSAQMD has concluded that the stationary source restriction established by Rule 3.20 is equally applicable to land use projects. YSAQMD's regional ozone thresholds for attaining the CAAQS and NAAQS were therefore set as the total emissions thresholds associated with Rule 3.20 and the California Ozone Transport Mitigation Regulation (YSAQMD 2007:B-1).

YSAQMD's PM10 threshold is based on the emissions levels identified under the New Source Review (NSR) program, which is a permitting program established by Congress as part of the Clean Air Act Amendments of 1990 to ensure that air quality is not significantly degraded by new sources of emissions. YSAQMD's NSR program requires best available control technologies (BACT) to be applied where new or modified PM10 emissions exceed 80 pounds per day. Therefore, a project's PM10 emissions that trigger the YSAQMD's BACT threshold for PM10 would result in substantial air emissions and have a potentially significant impact on air quality (YSAQMD 2007:B-1)

Table 3-1 summarizes YSAQMD's recommended mass emission thresholds. The thresholds consider whether a project's emissions would result in a cumulatively considerable adverse contribution to existing air quality conditions. If a project's emissions would be less than these levels, the project would not be expected to result in a cumulatively considerable contribution to the significant project-level and cumulative impact.

Table 3-1. Yolo-Solano Air Quality Management District's Criteria Pollutant and Precursor Thresholds

Source	Ozone Precursor Emissions		PM10
	ROG	NO_X	
Construction (short-term)	10 tons per year	10 tons per year	80 pounds per day
Operational (long-term)	Same as construction	Same as construction	Same as construction

Source: YSAQMD2007:6
NO_X = nitrogen oxides
PM10 = particulate matter 10 microns or less in diameter
ROG = reactive organic gases

YSAQMD's (2017:B-2) CEQA Handbook also states that "localized high levels of CO, or CO hotspots, is the District's concern," and that "hotspots are usually associated with roadways that are congested and have heavy traffic volume." YSAQMD considers a project to result in a significant CO impact if it would create a CO hotspot that would violate the CAAQS of 9 parts per million (ppm) (8-hour average) or 20 ppm (1-hour average) (YSAQMD 2007:B-2). YSAQMD has adopted the following screening criteria to determine whether a project could cause a CO hotspot.

- Peak-hour level of service (LOS) on one or more streets or at one or more intersections in the project vicinity will be reduced to an unacceptable LOS (typically LOS E or F), or
- Project will substantially worsen an already existing peak-hour LOS F on one or more streets or at one or more intersections in the project vicinity. "Substantially worsen" includes situations where delay would increase by 10 seconds or more when project-generated traffic is included.

YSAQMD (2007:7) has also adopted a threshold to evaluate receptor exposure to TAC. The "substantial" TAC threshold defined by the YSAQMD is the probability of contracting cancer for the maximum exposed individual exceeding 10 in a million. This risk threshold is used by YSAQMD to evaluate potential risks for both existing and new sources.

Impacts

As described in Chapter 2, operations and maintenance activities would be the same as pre-project conditions. Accordingly, there would be no change in operational emissions relative to existing conditions. This analysis therefore focuses exclusively on construction generated emissions as there would be no long-term operational air quality impact.

a. Conflict with or obstruct implementation of the applicable air quality plan?

YSAQMD is required, pursuant to the NAAQS and CAAQS, to reduce emissions of criteria pollutants for which the district is in nonattainment. The most recent YSAQMD air quality attainment plans applicable to the project area are the 2017 Ozone Plan and PM2.5 Plan. The simplest test to assess project consistency is to determine if the project proposes development that is consistent with the growth anticipated by the relevant land use plans that were used in the formulation of the air quality attainment plans; if so, then the project would be consistent with the attainment plans.

The purpose of the proposed project is to improve fish passage and agricultural water management facilities. The project, therefore, would not directly induce growth in the county or result in long-term development that would conflict with the county's General Plan growth forecast. Accordingly, the proposed project would not conflict with or obstruct the implementation of YSAQMD's air quality attainment plans. This impact would be less than significant. No mitigation is required.

b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard?

The predominant pollutants associated with construction of the proposed project are fugitive dust (PM10) from earth-moving activities and combustion pollutants, particularly ROG and NO_X, from heavy equipment and trucks.

Construction of the project would be short term, occurring between 2024 and 2026. Criteria pollutants and precursors generated by construction were quantified using CalEEMod and construction activity data provided by the project engineers (Quam pers. comm. 2023). Table 3-2 summarizes the results of the emissions modeling and compares emissions to the YSAQMD's thresholds. Refer to Appendix B for model outputs.

Table 3-2. Estimated Maximum Daily Criteria Pollutant Emissions from Project Construction

Year	Ozone Precursor (tons per year)		PM10 (pounds per day) [1]
	ROG	NO_X	
2024	0.10	0.95	46.7
YSAQMD threshold [2]	*10*	*10*	*80*
Exceed threshold?	*No*	*No*	*No*

[1] Represents the highest emissions during concurrent construction activity.

[2] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

NO_X = nitrogen oxides; PM10 = particulate matter 10 microns or less in diameter; ROG = reactive organic gases; YSAQMD = Yolo-Solano Air Quality Management District.

As shown in Table 3-2, construction of the proposed project would not generate ROG, NO_X, or PM10 emissions above YSAQMD's thresholds. Therefore, construction of the project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is designated as nonattainment under an applicable federal or state ambient air quality standard. This impact would be less than significant. No mitigation is required.

c. Expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors are facilities that house or attract children, the elderly, and people with illnesses, or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, convalescent facilities, and residential areas are examples of sensitive receptors. The project is surrounded by undeveloped land. There are no sensitive receptors within 1,000 feet of the project area.

The primary pollutants of concern with respect to health risks to sensitive receptors are criteria pollutants (regional and local) and TAC. Ozone precursors (ROG and NO_X) and particulate matter are considered regional pollutants because they affect air quality on a regional scale. Localized pollutants are deposited and potentially affect populations near the emissions source. Because these pollutants dissipate with distance, emissions from individual projects can result in direct and material health impacts on adjacent sensitive receptors. The localized criteria pollutants of concern that would be generated by the project are particulate matter (fugitive dust) and CO. The TAC of concern is diesel particulate matter (DPM).

Regional Criteria Pollutants

YSAQMD develops region-specific CEQA thresholds of significance in consideration of existing air quality concentrations and attainment or nonattainment designations under the NAAQS and CAAQS. Recognizing that air quality is a cumulative problem, YSAQMD typically considers projects that generate criteria pollutants and ozone precursor emissions that are below the thresholds to be minor in nature. Such projects would not adversely affect air quality or exceed the NAAQS or CAAQS. As described under response (b) above, construction of the project would not generate ROG, NO_X, or PM10 emissions above YSAQMD's thresholds. As such, the project would not be expected to contribute a significant level of air pollution that would degrade regional air quality within the SVAB. No mitigation is required.

While regional criteria pollutant emissions generated by implementation of the project would not result in a significant impact, consistent with *Sierra Club v. County of Fresno* (6 Cal. 5th 502), Table 3-3 provides a conservative estimate of potential health effects associated with these emissions. The estimates were developed using the Sacramento Metropolitan Air Quality Management District's (SMAQMD) Minor Project Health Screening Tool (version 2). The Minor Project Health Screening Tool was developed by SMAQMD, in partnership with other regional air districts in the Sacramento Federal Nonattainment Area (SFNA), including YSAQMD (Ramboll 2020). SMAQMD conducted photochemical and health effects modeling of hypothetical projects throughout the five-air-district SFNA region with NO_X, ROG, and PM2.5 emissions at 82 pounds per day, which corresponds to the highest daily emissions threshold of all SFNA air districts. The tool outputs the estimated health effects at the 82-pound-per-day emissions rate by spatial interpolating the health effects from the hypothetical projects based on user inputs for the latitude and longitude coordinates of a project.

The results presented in Table 3-3 are conservative for two reasons. First, they are based on a source generating 82 pounds per day of ROG, NO_X, and PM2.5. Daily emissions generated by construction of the project are well below 82 pounds (see Appendix B). Second, the results assume the source would generate emissions 365 days per year. Construction of the project would occur for less than 4 months. For these reasons, any increase in regional health risks associated with project-generated emissions would be less than those presented in Table 3-3, which are already very small increases over the background incident health effect.

Table 3-3. Conservative Estimate of Increased Regional Health Effect Incidence Resulting from Implementation of the Project (cases per year)

Health Endpoint[1]	Age Range[2]	Annual Mean Incidences (Model Domain and 5-District Region)[3]	% of Background Incidence (and 5-District Region)[4]	Total # of Health Incidence (and 5-District Region)[5]
PM2.5 Emissions – Respiratory				
Emergency Room Visits, Asthma	0–99	1	<1%	18,419
Hospital Admissions, Asthma	0–64	<1	<1%	1,846
Hospital Admissions, All Respiratory	65–99	<1	<1%	19,644
PM2.5 Emissions – Cardiovascular				
Hospital Admissions, All Cardiovascular[6]	65–99	<1	<1%	24,037
Acute Myocardial Infarction, Nonfatal	18–24	<1	<1%	4
Acute Myocardial Infarction, Nonfatal	25–44	<1	<1%	308
Acute Myocardial Infarction, Nonfatal	45–54	<1	<1%	741
Acute Myocardial Infarction, Nonfatal	55–64	<1	<1%	1,239
Acute Myocardial Infarction, Nonfatal	65–99	<1	<1%	5,052
PM2.5 Emissions – Mortality				
Mortality, All Cause	30–99	1	<1%	44,766
ROG and NO_X Emissions – Respiratory				
Hospital Admissions, All Respiratory	65–99	<1	<1%	19,644
Emergency Room Visits, Asthma	0–17	<1	<1%	5,859
Emergency Room Visits, Asthma	18–99	1	<1%	12,560
ROG and NO_X Emissions – Mortality				
Mortality, Non-Accidental	0–99	<1	<1%	30,386

Source: SMAQMD 2020.
Note: The analysis point is in the center of the project area at 38.574990, -121.645577.
[1] Importantly, outputs from SMAQMD's tools only include health effects of NO_X, ROG, and PM2.5 that have been researched sufficiently to be quantifiable. As noted in SMAQMD's guidance, research has identified other health effects for both PM2.5 and ozone precursors (ROG and NO_X) (Ramboll 2020). For example, exposure to PM2.5 at certain concentrations can alter metabolism, leading to weight gain and diabetes; cause cognitive decline, brain inflammation, or reduced brain volume; and affect gestation, resulting in low birthweight or preterm birth (Ramboll 2020). Likewise, at high enough doses, exposure to ozone can increase lung permeability, increasing susceptibility to toxins and microorganisms (Ramboll 2020). These and other effects have been documented, but a quantitative correlation to project-generated emissions cannot be accurately established based on published studies (Ramboll 2020).
[2] Affected age ranges are shown. Other age ranges are available, but the endpoints and age ranges shown here are the ones used by the USEPA in their health assessments. The age ranges are consistent with the epidemiological study that is the basis of the health function.
[3] Health effects are shown in terms of incidences of each health endpoint and how it compares to the base (2035 base year health effect incidences, or "background health incidence") values. Health effects are across the Northern California model domain and 5-air-district region (rounded values are equivalent).
[4] The percent of background health incidence uses the mean incidence. The background health incidence is an estimate of the average number of people who are affected by the health endpoint in a given population over a given period of time. In this case, these background incidence rates cover the 5-air-district region (estimated 2035 population of 3,271,451 persons). Health incidence rates and other health data are typically collected by the government as well as the World Health Organization. The background incidence rates used here are obtained from BenMAP, as reported in SMAQMD's Minor Project Health Screening Tool, version 2.
[5] The total number of health incidences across the 5-air-district region is calculated based on modeling data, as reported in SMAQMD's Minor Project Health Screening Tool, version 2. The information is presented to assist in providing overall health context.
[6] Less Myocardial Infarctions.
ROG = reactive organic gases; NO_X = nitrogen oxides; PM2.5 = particulate matter less than 2.5 microns in diameter; SMAQMD = Sacramento Metropolitan Air Quality Management District.

Localized Fugitive Dust

Exposure to fugitive dust at certain concentrations can irritate the respiratory system, especially for people who are naturally sensitive or susceptible to breathing problems. The primary source of localized fugitive dust under the proposed project is vehicle travel over unpaved surfaces and earth moving during construction. These emissions would be controlled through twice daily watering of construction access roads and adherence to YSAQMD's Regulation II, Rule 2.8 (Particulate Matter Concentration). As shown in Table 3-2, construction would not generate PM10 (which includes fugitive dust) emissions above the analysis threshold. Moreover, as noted above, there are no sensitive receptors within 1,000 feet of the project area. Because pollutant concentrations decline as a function of distance from the emission source, dust emissions generated by the proposed project would be substantially reduced at the nearest receptor location. Accordingly, the proposed project would not expose sensitive receptors to substantial fugitive dust concentrations. This impact would be less than significant, and no mitigation is required.

Localized Carbon Monoxide

Continuous engine exhaust may elevate localized CO concentrations, resulting in hot spots. Receptors exposed to these CO hot spots may have a greater likelihood of developing adverse health effects, such as fatigue, headaches, confusion, dizziness, and chest pain. CO hot spots are typically observed at heavily congested intersections where a substantial number of gasoline-powered vehicles idle for prolonged durations throughout the day. YSAQMD has developed screening criteria to assist lead agencies in evaluating potential impacts from localized CO. The few vehicle trips that would occur on local roads during construction would neither degrade peak-hour LOS to an unacceptable level nor substantially worsen delay at affected intersections. Accordingly, the project meets YSAQMD's CO screening criteria and therefore would not expose sensitive receptors to substantial CO concentrations. This impact would be less than significant, and no mitigation is required.

Diesel Particulate Matter

DPM is a TAC generated by diesel-fueled equipment and vehicles. Exposure to DPM can increase the risk of developing some cancers. Diesel combustion during construction would be limited to equipment and vehicle use over the less-than 4-month construction duration. Receptor exposure to construction and maintenance DPM would therefore be well below the 30-year exposure period typically associated with chronic cancer health risks, and substantially reduced at the nearest receptor location, which is more than 1,000 feet from the project site. Accordingly, the proposed project would not expose sensitive receptors to substantial DPM concentrations. This impact would be less than significant, and no mitigation is required.

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

Although offensive odors rarely cause any physical harm, they can be unpleasant, leading to citizen complaints to local governments and air districts. Diesel-powered equipment operating during construction may generate odors that are evident in the immediately surrounding area. These activities would be intermittent and temporary in duration and, therefore, would not result in nuisance odors. The project does not meet any of the facility types identified by YSAQMD (2017:14) as odor-generating; thus, the project would not generate substantial operational odors. Accordingly, the proposed project would not create objectionable odors affecting a substantial number of people. This impact would be less than significant, and no mitigation is required.

IV. Biological Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?		X		
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?		X		
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marshes, vernal pools, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X	
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X	
f. Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan?			X	

Environmental Setting

Methodology

ICF biologists reviewed existing information and conducted field surveys to identify biological resources issues in the project area (Figure 3-1). The following information was reviewed to support this biological resource analysis.

- Online soil maps from the National Resources Conservation Service (NRCS 2023a, 2023b);
- The CDFW California Natural Diversity Database (CNDDB) list of plant and wildlife species documented on the Sacramento West and eight surrounding quadrangles (CDFW 2023);
- The California Native Plant Society (CNPS) online database of plant species documented on the Sacramento West and eight surrounding quadrangles (CNPS 2023);
- A USFWS list of threatened or endangered species that may occur in the project location or be affected by the project (USFWS 2023);
- A NMFS list of species that may occur in the vicinity of the project (NMFS 2016) (Sacramento West and Davis quadrangles); and
- CDFW's Fish Species of Special Concern in California (Moyle et al. 2015).

This information was used to develop lists of special-status species and other sensitive biological resources that could be present or are known to occur in the region. Species were included in these lists if they were known to occur in the project region and if their habitats occur in the project vicinity.

Botanical surveys and aquatic resources delineations were conducted on June 16, 2022, August 5, 2022, and November 14, 2022. Botanical surveys were floristic in nature and were conducted to coincide with the identifiable periods of potentially occurring special-status plant species. A general biological survey was conducted on November 14, 2022. The survey included an inventory of all wildlife species observed within the project area. The presence and suitability of habitat for special-status species that could occur was documented.

The methods and results of the field investigations are detailed in the Biological Resources Technical Report prepared for the proposed project (included as Appendix C). The subsequent analyses of special-status plants, animals, natural communities, and potentially jurisdictional aquatic features are included in the report.

Locations of special-status-plant and wildlife species documented in the CNDDB are shown in Figures 3-3, 3-4, and 3-5. Figure 3-3 depicts only giant garter snake locations within a 5-mile radius of the project area; Figure 3-4 shows all special-status plant and wildlife locations within a 5-mile radius of the project area, and Figure 3-5 shows only Swainson's hawk (*Buteo swainsoni*) locations within a 10-mile radius of the project area.

Land Cover

The project area includes terrestrial and aquatic land cover types (Figure 3-2). Terrestrial land cover types consist of fallow rice, ruderal grassland, valley foothill riparian, and barren areas. The aquatic land cover types include freshwater emergent wetlands and open water features (i.e., agricultural canals and ditches). Terrestrial and aquatic land cover types are described in detail below.

Terrestrial Land Cover Types

Fallow Rice

Fallow rice fields occupy most of the project area, though no rice production has occurred for over 5 years. Unlike surrounding fields that are managed for waterfowl, the fallow rice fields in the project area have not been flooded since August 2018 (Google Earth aerial imagery 2018–2022). Any flooding of the fallow rice fields in the project area is temporary and is a result of overtopping of the Fremont Weir. The fallow rice fields have ruderal vegetation similar to the surrounding ruderal areas; however, the vegetation is stunted and has been mowed. Dominant species include Canadian horseweed (*Erigeron canadensis*) (FACU), bristly ox-tongue (*Helminthotheca echioides*) (FAC), prostrate knotweed (*Polygonum aviculare*) (FAC), annual beard grass (*Polypogon monspeliensis*) (FACW), cocklebur (*Xanthium strumarium*) (FAC), and toothpick weed (*Ammi visnaga*) (FAC).

Ruderal Grassland

Ruderal grassland occurs in the project area along roadsides and rice field edges. This community is dominated by nonnative grasses and broadleaf herbaceous plants (forbs). Dominant vegetation includes wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), rye grass (*Festuca perennis*), soft chess (*Bromus hordeaceus*), Bermuda grass (*Cynodon dactylon*), mustard (*Hirschfeldia incana*), willow lettuce (*Latuca saligna*), alkali mallow (*Malvella leprosa*), and toothpick weed.

Valley Foothill Riparian

Valley foothill riparian vegetation occurs intermittently along the banks of the canals in the project area where the bank slope is terraced. Dominant tree species include arroyo willow (*Salix lasiolepis*) and sandbar willow (*Salix exigua* var*. hindsiana*). Understory vegetation includes sandbar willow saplings, willowherb (*Epilobium brachycarpum*), and California rose (*Rosa californica*).

Barren

The barren land cover type consists of dirt roads periodically spread with gravel. They are characterized by compacted soil, regular maintenance activities, and little to no vegetation. The roads line Tule Canal and both sides of the northern canal.

Aquatic Land Cover Types

Freshwater Emergent Wetland

The banks of the canals within the project area support freshwater tidal wetland vegetation that grows below the high tide line of the canals. This vegetation consists of two species: six petal water primrose (*Ludwigia hexapetala*), an invasive species, and mosquito fern (*Azolla filiculoides*), a native aquatic fern. Vegetation cover is 70 percent, with water primrose growing closest to the bank and the mosquito fern floating at the margins and into the center of the canal.

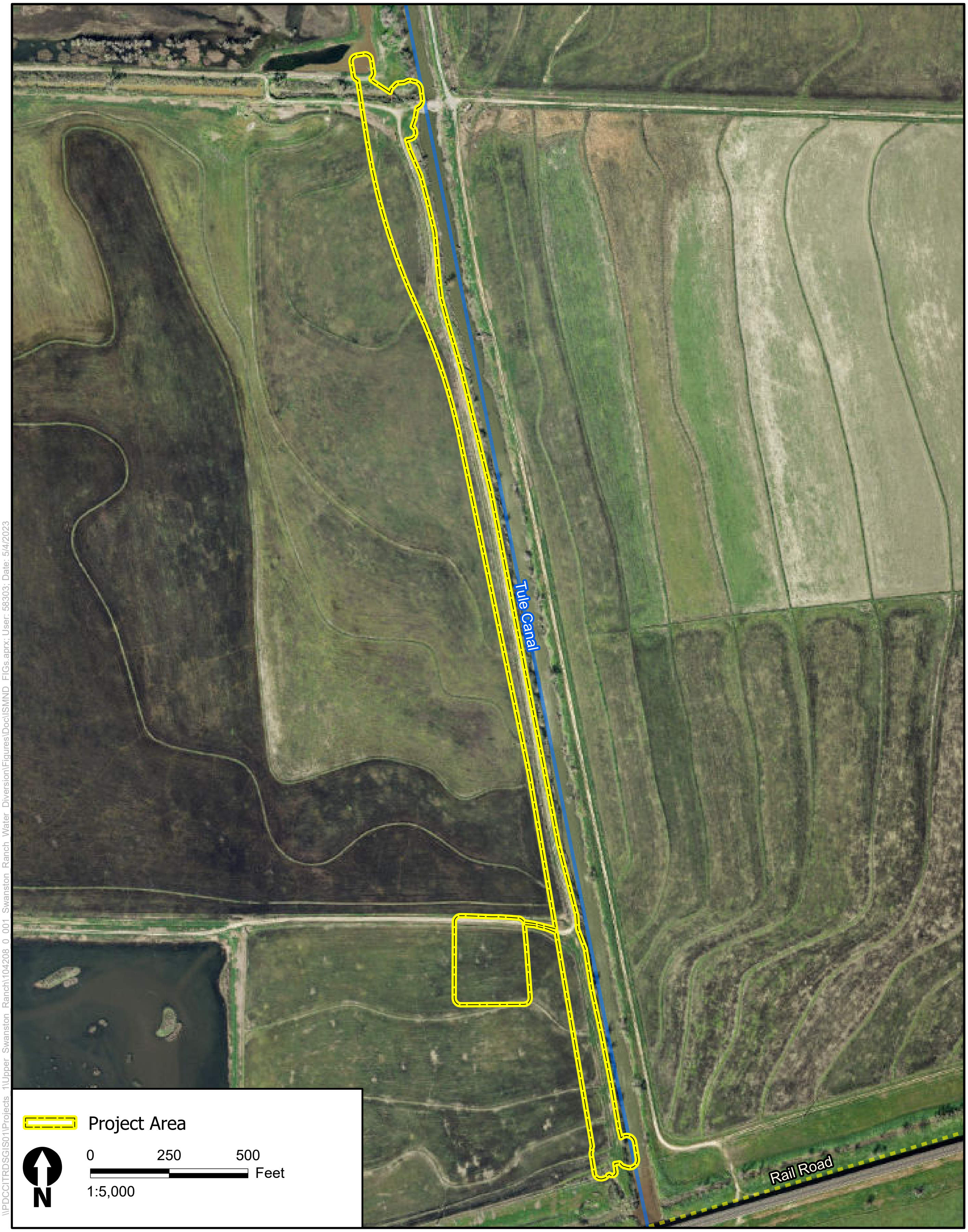


Figure 3-1
Project Area

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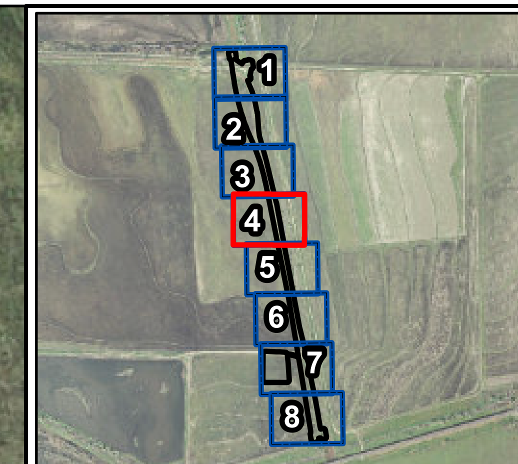
ICF

Figure 3-2
Land Cover
1 of 8

ICF

Figure 3-2
Land Cover
2 of 8

Figure 3-2
Land Cover
3 of 8



Project Area (8.282 acres)

Permanent Footprint (0.133 acre)

Temporary Footprint (5.568 acres)

MHW (Mean High Water)

HTL (High Tide Line)

Land Cover

Upland

Barren (1.203 acres)

Fallow Rice (5.432 acres)

Ruderal (1.108 acres)

Valley Foothill Riparian (0.076 acre)

Aquatic

Canal (0.350 acre)

Freshwater Emergent Wetland (0.060 acre)

Other

Agricultural Ditch (0.053 acre)

N

0 25 50 Feet

1:600

ICF

Figure 3-2
Land Cover
4 of 8

Figure 3-2
Land Cover
5 of 8

ICF

Figure 3-2
Land Cover
6 of 8

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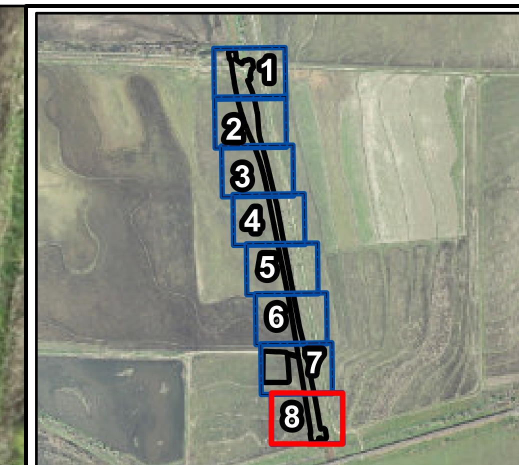
ICF

Figure 3-2
Land Cover
7 of 8



Project Area (8.282 acres)

Permanent Footprint (0.133 acre)

Temporary Footprint (5.568 acres)

MHW (Mean High Water)

HTL (High Tide Line)

Land Cover

Upland

Barren (1.203 acres)

Fallow Rice (5.432 acres)

Ruderal (1.108 acres)

Valley Foothill Riparian (0.076 acre)

Aquatic

Canal (0.350 acre)

Freshwater Emergent Wetland (0.060 acre)

Other

Agricultural Ditch (0.053 acre)

N

0 25 50 Feet

1:600

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ICF

Figure 3-2
Land Cover
8 of 8

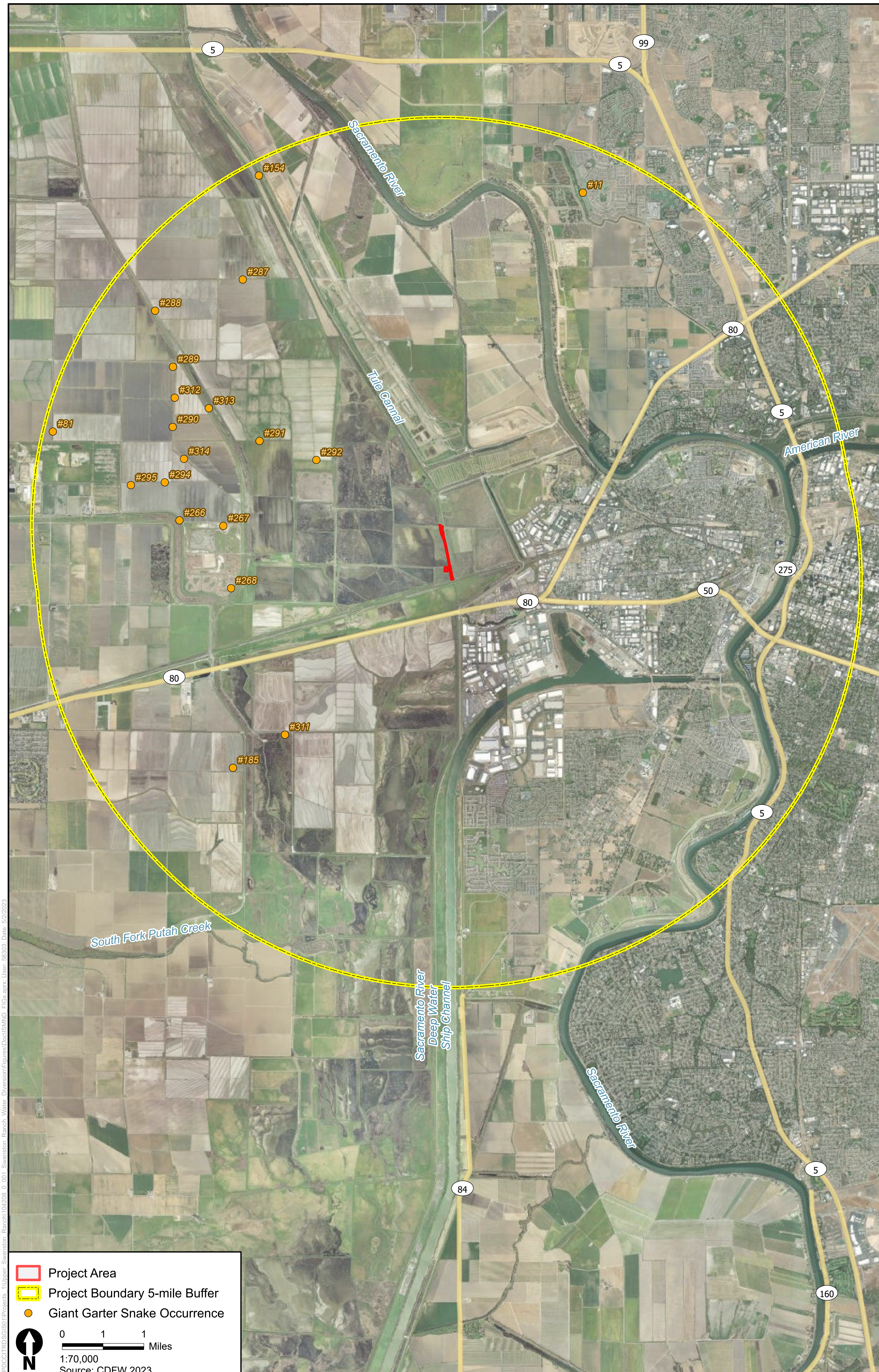

Figure 3-3
CNDDB Occurrences of Giant Garter Snake in 5 Miles of the Project Area

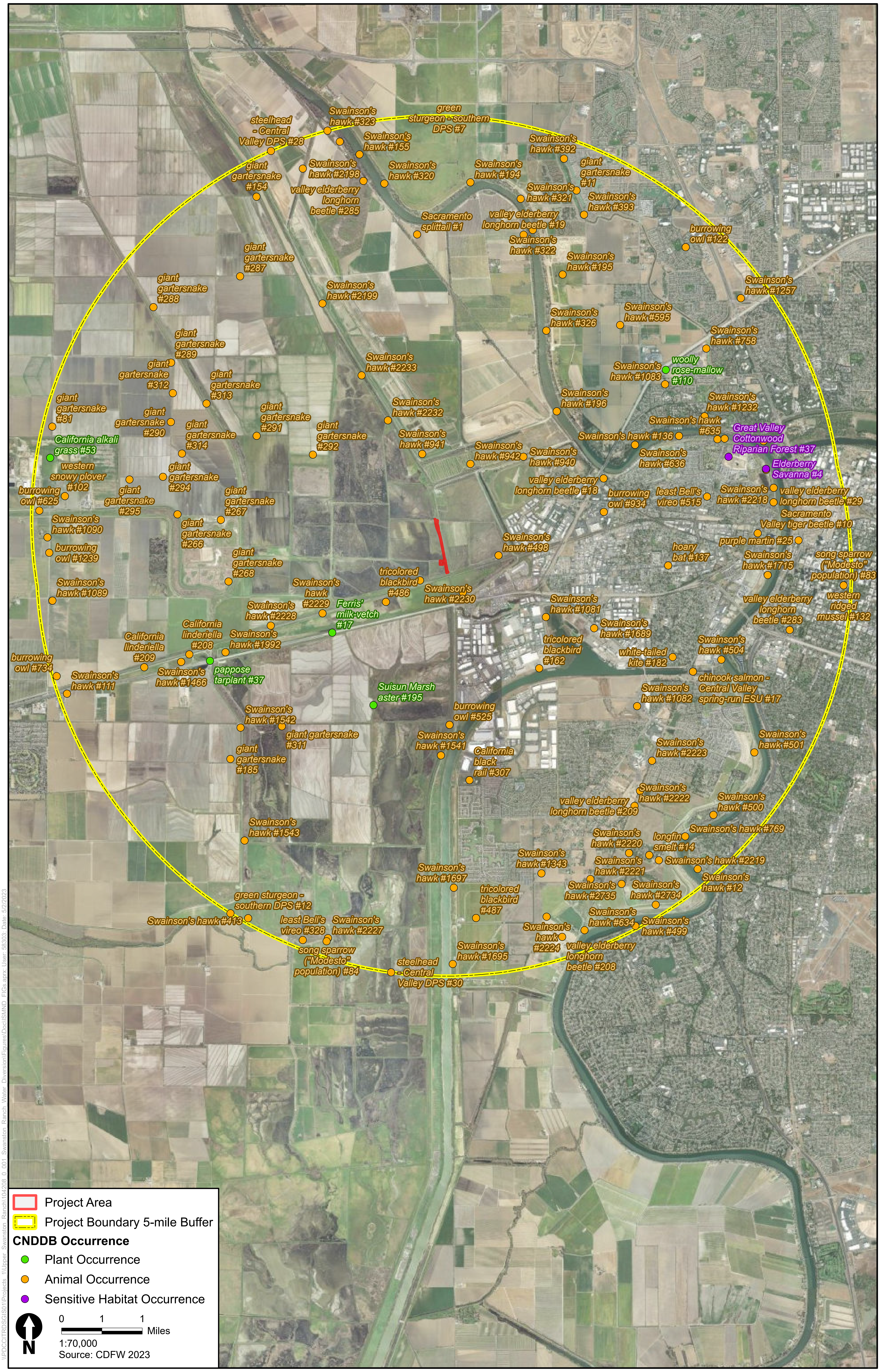

Figure 3-4
CNDDB Occurrences within 5 Miles of the Project Area

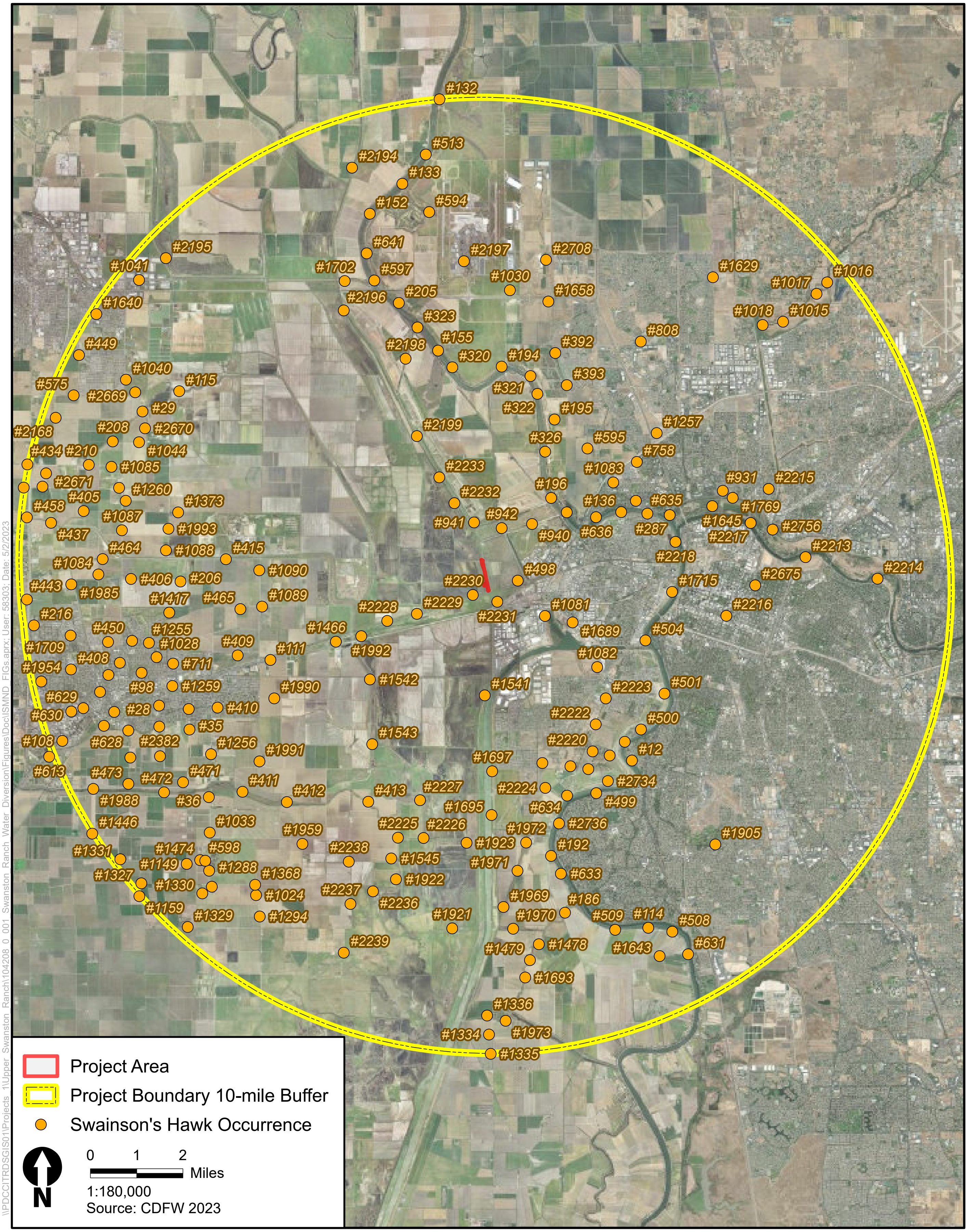

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Figure 3-5
Swainson's Hawk Occurrences within 10 Miles of the Project Area

Agricultural Ditch

Agricultural ditches within the project area are excavated channelized features that are less than 10 feet wide. The ditches receive water via gates from the canals to the north and release water to flood the downslope rice fields during flood months. At other times of the year the ditches are dry. The agricultural ditches terminate within the fields where water flow continues through excavated contours to flood irrigate large fields. These features receive water from an irrigation system and release water within the same system. The agricultural ditches are regularly maintained and do not have a regular water regime. For these reasons, agricultural ditches do not provide habitat for special-status plants or wildlife.

Canal

Canals within the project area are excavated channelized features that are greater than 10 feet wide. The canals include portions of Tule Canal and two unnamed agricultural canals. The canal banks have steep to gentle slopes and support freshwater marsh vegetation, and valley foothill riparian vegetation where the slopes are less steep. Tule Canal is considered a tidal perennial stream and has a rise of approximately 2 feet in elevation. The two agricultural canals are perennial but are not tidally influenced.

Wildlife Corridors

Movements of wildlife generally fall into three basic categories: (a) movements along corridors or habitat linkages associated with home range activities such as foraging, territory defense, and breeding; (b) dispersal movements—typically one-way movements (e.g., juvenile animals leaving areas where they were born and raised or individuals colonizing new areas); and (c) temporal migration movements—these movements are essentially dispersal actions that involve a return to the place of origin (e.g., deer moving from winter grounds to summer ranges and fawning areas). The project area provides a wildlife corridor for species within the Tule Canal and in the vicinity of the Yolo Bypass.

Wildlife Observed

Species observed in the project area include black-tailed jackrabbit (*Lepus californicus*), river otter *(Lontra canadensis*), California ground squirrel (*Spermophilus beecheyi*), Audubon's cottontail (*Sylvilagus audubonii*), red-winged blackbird (*Agelaius phoeniceus*), red-tailed hawk (*Buteo jamaicensis*), Brewer's blackbird (*Euphagus cyanocephalus*), and white-crowned sparrow (*Zonotrichia leucophrys*). Other common mammal species that may occur include Virginia opossum (*Didelphis virginiana*), coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), and house mouse (*Mus musculus*).

Fish and Aquatic Species Habitat

The project area includes Tule Canal and surrounding areas such as the Yolo Bypass and the Toe Drain. Aquatic habitats in the Yolo Bypass include stream and slough channels for fish migration and when flooded, seasonal spawning habitat and productive rearing habitat (Sommer et al. 2001a; CALFED Bay-Delta Program 2000a, 2000b). During years when the Yolo Bypass is flooded, it serves as an important migratory route for juvenile Chinook salmon (*Oncorhynchus tshawytscha*) and other native migratory and anadromous fishes moving downstream. During these times, it provides juvenile anadromous salmonids an alternative migration corridor to the lower Sacramento River

(Sommer et al. 2003) and, sometimes, better rearing conditions than the adjacent Sacramento River channel (Sommer et al. 2001a, 2005). When the floodplain is activated, juvenile salmon can rear for weeks to months in the Yolo Bypass floodplain before migrating to the estuary (Sommer et al. 2001b). Research on the Yolo Bypass has found that juvenile salmon grow substantially faster in the Yolo Bypass floodplain than in the adjacent Sacramento River, primarily because of the greater availability of invertebrate prey in the floodplain (Sommer et al. 2001b, 2005). Increased frequency and duration of connectivity between the Sacramento River and the Yolo Bypass may increase off-channel rearing opportunities that expand the life history diversity portfolio for Central Valley Chinook salmon (Takata et al. 2017). When not flooded, the lower Yolo Bypass provides tidal habitat for young fish that enter from the lower Sacramento River via Cache Slough Complex—a network of tidal channels and flooded islands that includes Cache Slough, Lindsey Slough, Liberty Island, the Sacramento Deepwater Ship Channel, and the Yolo Bypass (Mahardja et al. 2019). Tule Canal, including the portion in the project area, is designated as critical habitat for spring-run Chinook salmon, California Central Valley steelhead (*Oncorhynchus mykiss irideus*), and southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*) (70 *Federal Register* 52488, September 2, 2005; 74 *Federal Register* 52300, October 9, 2009).

Sommer et al. (1997) demonstrated that the Yolo Bypass is one of the single most important habitats for Sacramento splittail (*Pogonichthys macrolepidotus*). Because the Yolo Bypass is dry during summer and fall, nonnative species (e.g., predatory fishes) generally are not present year-round except in perennial water sources (Sommer et al. 2003). In addition to providing important fish habitat, winter and spring inundation of the Yolo Bypass supplies phytoplankton and detritus that may benefit aquatic organisms downstream in the brackish portion of the San Francisco Estuary (Sommer et al. 2004; Lehman et al. 2008).

The benefit of seasonal inundation of the Yolo Bypass has been studied by DWR as part of the Delta Smelt Resiliency Strategy, which was developed by DWR and other state and federal resource agencies to boost both immediate and near-term reproduction, growth rates, and survival of Delta smelt (California Natural Resources Agency 2016; Mahardja et al. 2019). The Yolo Bypass has been identified as a significant source of phytoplankton and zooplankton biomass to the Delta in the winter and spring during floodplain inundation. However, little has been known about its contribution to the food web during the drier summer and fall months.

Adult winter-run, spring-run, and fall-run Chinook salmon and white sturgeon (*Acipenser transmontanus*) have been documented to migrate into the Yolo Bypass via the Toe Drain and Tule Canal when there is no flow into the floodplain over the Fremont Weir (NMFS 2009). Fyke trap monitoring by DWR has shown that adult salmon and steelhead migrate up the Toe Drain in autumn and winter regardless of whether the Fremont Weir spills (Harrell and Sommer 2003; Sommer et al. 2014). The Toe Drain does not extend to the Fremont Weir because the channel is fully or partially blocked by roads or other higher ground at several locations, and fish are often unable to reach upstream spawning habitat in the Sacramento River and its tributaries (Harrell and Sommer 2003; Sommer et al. 2014). Other structures in the Yolo Bypass, such as the Lisbon Weir located on the Toe Drain downstream of the project area, and irrigation dams in the northern end of the Tule Canal may also impede upstream passage of adult anadromous fish (NMFS 2009). Currently, the Lisbon Weir is only passable during high flow or high tide events. The Fremont Weir Adult Fish Passage Modification Project modified Fremont Weir by expanding the existing fish ladder and removed or replaced road crossings with an open channel design to improve fish passage (California Eco Restore 2018).

Modifications to Fremont Weir have made it easier for Chinook salmon, steelhead, sturgeon, and other fish species to get through the Fremont Weir and back into the Sacramento River at the north end of Tule Canal (U.S. Bureau of Reclamation 2021). Tule Canal in the project area is a low velocity waterway surrounded by agricultural fields with associated drainage ditches from Tule Canal to the agricultural fields. Vegetation along the canal is ruderal grasslands with some riparian vegetation consisting of willow species (Figure 3-2). Six petal water primrose, an invasive species, and mosquito fern, a native aquatic fern, was present in the canal during surveys in November.

Waters of the United States

The project area contains 0.428 acre of potentially jurisdictional aquatic resources (ICF 2023) (Table 3-4). A description of these water features is provided in the *Preliminary Delineation of Wetlands and Other Water Bodies for the Swanston Ranch Fish Passage and Irrigation Improvement Project* (ICF 2023) and shown on Figure 3-2. The delineation is considered preliminary until the U.S. Army Corps of Engineers (USACE) verifies the findings.

Table 3-4. Summary of Potential USACE and RWQCB Jurisdictional Aquatic Resources Identified in the Delineation Survey Area

Aquatic Resources	Area (acres)
Wetlands	
Freshwater Emergent Wetland	0.071
Non-Wetland Waters	
Canal	0.357
Total	**0.428**

RWQCB = Regional Water Quality Control Board; USACE = U.S. Army Corps of Engineers

Special-Status Species

Tables 3-5 and 3-6 provide lists of special-status species, their general habitat requirements, and an assessment of their potential to occur within the project area based on the CDFW, CNPS, USFWS, and NMFS lists. Several regionally occurring special-status species were ruled out for further consideration for the following reasons: the project area does not contain suitable habitat for the species, the project area is outside of the known extant elevation range for the species, the species is not known to occur in the geographic region, and/or potentially occurring special-status plants were not observed within the project area during their evident and identifiable period. Special-status species without the potential to occur within the project area are not discussed further. Special-status species with the potential to occur within the project area are discussed below.

In addition, the analysis below includes consideration of nesting birds regulated by the federal Migratory Bird Treaty Act (MBTA) or the California Fish and Game Code (CFGC).

Table 3-5. Regionally Occurring Special-Status Plant Species in the Vicinity of Tule Canal, Upper Swanston Ranch, Yolo County, California

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Depauperate milk-vetch *Astragalus pauperculus*	–/–/4.3	Butte, Shasta, and Tehama Counties.	Chaparral, cismontane woodland, valley and foothill grasslands; 195–3,985 feet.	Mar–Jun	**None.** No potential habitat present; species not observed during surveys.
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	–/–/1B.1	Historical range included the Central Valley from Butte to Alameda County but currently only occurs in Butte, Glenn, Colusa, and Yolo Counties.	Meadows and seeps (vernally mesic), valley and foothill grassland, which is occasionally subalkaline flats; 5–245 feet.	Apr–May	**None.** No potential habitat present; species not observed during surveys.
Alkali milk-vetch *Astragalus tener* var. *tener*	–/–/1B.2	Southern Sacramento Valley, northern San Joaquin Valley, eastern San Francisco Bay Area.	Playas and vernal pools in valley and foothill grassland, alkali flats and flooded lands; 5–195 feet.	Mar–Jun	**None.** No potential habitat present; species not observed during surveys.
Heartscale *Atriplex cordulata* var. *cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills.	Alkaline flats and scalds, sandy soils in Chenopod scrub, valley and foothill grassland, meadows and seeps; below 1,835 feet.	Apr–Oct	**None.** No potential habitat present; species not observed during surveys.
Brittlescale *Atriplex depressa*	–/–/1B.2	Western and eastern Central Valley and adjacent foothills on west side of Central Valley.	Alkali grassland, alkali meadow, and alkali scrub; 5–1,050 feet.	Apr–Oct	**None.** No potential habitat present; species not observed during surveys.
Valley Brodiaea *Brodiaea rosea* ssp. *vallicola*	–/–/4.2	Butte, Calaveras, Nevada, Placer, Sacramento, San Joaquin, Sutter, and Yuba Counties.	Valley and foothill grasslands, vernal pools; 35–1,100 feet.	Apr–May	**None.** No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Bristly sedge *Carex comosa*	–/–/2B.1	Scattered occurrences throughout California; Oregon, Washington, and elsewhere.	Coastal prairie, marshes and swamps at lake margins, valley and foothill grassland; below 2,050 feet.	May–Sep	**None.** No potential habitat present; species not observed during surveys.
Pappose tarplant *Centromadia parryi* ssp. *parryi*	–/–/1B.2	North and Central Coast Ranges, the southern Sacramento Valley; occurrences in Butte, Colusa, Glenn, Lake, Napa, San Mateo, and Solano Counties.	Chaparral, coastal prairie, coastal salt marshes and swamps, meadows and seeps, alkaline soils in vernally mesic valley and foothill grassland; below 1,380 feet.	May–Nov	**None.** No potential habitat present; species not observed during surveys.
Pappose tarweed *Centromadia parryi* ssp. *rudis*	–/–/4.2	Inner North Coast Ranges, Sacramento Valley, northern San Joaquin Valley.	Valley and foothill grassland, vernal pools, often in clay or alkaline soils; below 330 feet.	May–Oct	**None.** Species was found during June 2022 surveys ¼ mile from study area. Species was not found within study area.
Palmate-bracted bird's-beak *Chloropyron palmatum*	FE/SE/1B.1	Livermore Valley and scattered locations in the Central Valley from Colusa County to Fresno County.	Alkaline sites in valley and foothill grassland and chenopod scrub; 15–510 feet.	May–Oct	**None.** No potential habitat present; species not observed during surveys.
Peruvian dodder *Cuscuta obtusiflora* var. *glandulosa*	–/–/2B.2	Not seen since 1948; occurrences in Butte, Los Angeles, Merced, Sacramento, San Bernardino,* and Sonoma Counties; Baja California and elsewhere.	Freshwater marshes and swamps; 50–920 feet.	Jul–Oct	**None.** No potential habitat present; species not observed during surveys.
Dwarf downingia *Downingia pusilla*	–/–/2B.2	Inner North Coast Ranges, southern Sacramento Valley, northern and central San Joaquin Valley.	Wet areas in valley and foothill grassland, vernal pools; 5–1,460 feet.	Mar–May	**None.** No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Jepson's coyote-thistle *Eryngium jepsonii*	–/–/1B.2	Southern Interior North Coast Ranges, deltaic Great Valley, San Francisco Bay Area.	Valley and foothill grassland, vernal pools; 10–985 feet.	Apr–Aug	**None.** No potential habitat present; species not observed during surveys.
San Joaquin spearscale *Extriplex joaquinana*	–/–/1B.2	Eastern San Francisco Bay Area, west edge of Central Valley from Glenn County to Fresno County.	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland; 5–2,740 feet.	Apr–Oct	**None.** No potential habitat present; species not observed during surveys.
Stinkbells *Fritillaria agrestis*	–/–/4.2	Alameda, Contra Costa, Fresno, Kern, Mendocino, Monterey, Merced, Monterey, Mariposa, Placer, Sacramento, Santa Barbara, San Benito, San Luis Obispo, San Mateo, Stanislaus, and Tuolumne Counties.	Chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland, on clay or serpentinite substrate; 35–5,100 feet.	Mar–Jun	**None.** No potential habitat present; species not observed during surveys.
Boggs Lake hedge-hyssop *Gratiola heterosepala*	–/SE/1B.2	Inner North Coast Ranges, Central Sierra Nevada foothills, Sacramento Valley and Modoc Plateau in Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, and Tehama Counties; and Oregon.	Clay soils in areas of shallow water, lake margins of swamps and marshes, vernal pool margins; 35–7,790 feet.	Apr–Aug	**None.** No potential habitat present; species not observed during surveys.
Hogwallow starfish *Hesperevax caulescens*	–/–/4.2	Broadly ranging in California, primarily in Great Valley and adjacent foothills, also in South Coast Ranges, Peninsular Ranges.	Mesic clay soils in valley and foothill grassland, shallow vernal pools; below 1,655 feet.	Mar–Jun	**None.** No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Woolly rose-mallow *Hibiscus lasiocarpos* var. *occidentalis*	–/–/1B.2	Scattered locations in the Central Valley, including the Delta, from Butte County to San Joaquin County.	Freshwater marshes and swamps; below 395 feet.	Jun–Sep	**None**. Species has a moderate potential to occur within the study area; however, it was not found during botanical surveys conducted during blooming period.
Alkali-sink goldfields *Lasthenia chrysantha*	–/–/1B.1	Fresno, Kern, Kings, Madera, Merced, Sacramento, Solano, Stanislaus, Tulare Counties.	Vernal pools, below 655 feet.	Feb–Apr	**None**. No potential habitat present; species not observed during surveys.
Legenere *Legenere limosa*	–/–/1B.1	Primarily in the lower Sacramento Valley, also from North Coast Ranges, northern San Joaquin Valley, and the Santa Cruz mountains.	Vernal pools; 5–2,885 feet.	Apr–Jun	**None**. No potential habitat present; species not observed during surveys.
Heckard's pepper-grass *Lepidium latipes* var. *heckardii*	–/–/1B.2	Southern Sacramento Valley in Glenn, Merced, Sacramento, Solano, and Yolo Counties.	Alkaline flats in valley and foothill grassland; 5–655 feet.	Mar–May	**None**. No potential habitat present; species not observed during surveys.
Mason's lilaeopsis *Lilaeopsis masonii*	–/CR/1B.1	Southern Sacramento Valley, Sacramento–San Joaquin River Delta, northeast San Francisco Bay Area in Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, Solano, and Yolo Counties.	Freshwater or brackish marsh, riparian scrub, in tidal zone; below 35 feet.	Apr–Nov	**None**. Species has a moderate potential to occur within the study area; however, it was not found during botanical surveys conducted during blooming period.
Little mousetail *Myosurus minimus* ssp. *Apus*	–/–/3.1	Central Valley and South Coast from Butte County south to San Diego County; Baja California; Oregon.	Valley and foothill grassland, alkaline vernal pools; 65–2,100 feet.	Mar–Jun	**None**. No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Cotula navarretia *Navarretia cotulifolia*	–/–/4.2	Inner North Coast Ranges, western Sacramento Valley, San Francisco Bay Area, Inner South Coast Ranges.	Chaparral, cismontane woodland, valley and foothill grassland, on adobe soils; 15–6,005 feet.	May–Jun	**None**. No potential habitat present; species not observed during surveys.
Baker's navarretia *Navarretia leucocephala* ssp. *bakeri*	–/–/1B.1	Inner North Coast Range, western Sacramento Valley: Colusa, Glenn, Lake, Mendocino, Marin, Napa, Solano, Sonoma, Tehama, and Yolo Counties.	In mesic areas in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and vernal pools; 15–5,710 feet.	Apr–Jun	**None**. No potential habitat present; species not observed during surveys.
Colusa grass *Neostapfia colusana*	FT/SE/1B.1	Central Valley with scattered occurrences from Colusa to Merced Counties.	Vernal pools, in adobe clay soils; 15–655 feet.	May–Aug	**None**. No potential habitat present; species not observed during surveys.
Bearded popcornflower *Plagiobothrys hystriculus*	–/–/1B.1	Montezuma Hills in Napa, Solano, and Yolo Counties.	Mesic valley and foothill grassland, vernal pool margins; below 900 feet.	Apr–May	**None**. No potential habitat present; species not observed during surveys.
California alkali grass *Puccinellia simplex*	–/–/1B.2	Scattered locations in the San Francisco Bay Area, Great Valley, Tehachapi Mountains, western Mojave Desert.	Chenopod scrub, meadows and seeps, valley and foothill grassland, vernal pools; 5–3,050 feet.	Mar–May	**None**. No potential habitat present; species not observed during surveys.
Sanford's arrowhead *Sagittaria sanfordii*	–/–/1B.2	Scattered locations in Central Valley and Coast Ranges.	Shallow freshwater swamps and marshes; sloughs, canals, and other slow-moving shallow-water habitats; below 2,135 feet.	May–Oct	**None**. No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Keck's checkerbloom *Sidalcea keckii*	FE/–/1B.1	Known historically from only three occurrences in Fresno, Merced, and Tulare Counties; similar plants from Inner North Coast Ranges in Colusa, Napa, Solano, and Yolo Counties treated as this species until further studies completed.	Cismontane woodland, valley and foothill grassland, in clay and serpentinine substrates; 245–2,135 feet.	Apr–May	**None.** No potential habitat present; species not observed during surveys.
Suisun Marsh aster *Symphyotrichum lentum*	–/–/1B.2	Sacramento–San Joaquin Delta, Suisun Marsh, Suisun Bay: Contra Costa, Napa, Sacramento, San Joaquin, and Solano Counties.	Brackish and freshwater marshes and swamps; below 10 feet.	May–Nov	**None.** No potential habitat present; species not observed during surveys.
Saline clover *Trifolium hydrophilum*	–/–/1B.2	Sacramento Valley, central western California.	Marshes and swamps, mesic alkaline areas in valley and foothill grasslands, vernal pools; below 985 feet.	Apr–Jun	**None.** No potential habitat present; species not observed during surveys.
Crampton's tuctoria *Tuctoria mucronata*	FE/SE/1B.1	Southwestern Sacramento Valley in Solano and Yolo Counties.	Mesic valley and foothill grassland, vernal pools; 15–35 feet.	Apr–Aug	**None.** No potential habitat present; species not observed during surveys.

[1] Status codes:

Federal

FE = Federally listed as Endangered under federal Endangered Species Act (ESA)
FT = Federally listed as Threatened under ESA
FC = Federal candidate for listing under ESA
SC = Federally listed as a Species of Concern

State

SE = State listed as Endangered under California Endangered Species Act (CESA)
ST = State listed as Threatened under CESA
SCE = State candidate for listing as Endangered under CESA

Other

SSC = California Species of Special Concern
CFP = California Fully Protected Species

California Rare Plant Rank[3]

1A = presumed extinct
1B = rare, threatened, or endangered in California and elsewhere
2B = rare, threatened, or endangered in California only
3 = plants about which more information is needed to determine their status
4 = plants of limited distribution
.1 = seriously endangered in California
.2 = fairly endangered in California
.3 = not very endangered in California

Distribution in California

* = known populations believed extirpated from that county.

[3] In March 2010, CDFW changed the name of "CNPS List" or "CNPS Ranks" to "California Rare Plant Rank" (or CRPR). This was done to reduce confusion over the fact that CNPS and CDFW jointly manage the Rare Plant Status Review groups (300+ botanical experts from government, academia, non-governmental organizations, and the private sector) and that the rank assignments are the product of a collaborative effort and not solely a CNPS assignment.

Table 3-6. Special-Status Animal Species Potentially Occurring in the Vicinity of Tule Canal, Upper Swanston Ranch, Yolo County, California

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Amphibians				
California tiger salamander *Ambystoma californiense*	FT/ST/SSC	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to northeastern San Luis Obispo County.	Grassland and oak woodland with seasonal ponds and/or pools for breeding; small mammal burrows in vicinity of breeding sites for underground retreats during the dry season.	**None**. Breeding habitat not present; no occurrences within 5 miles.
Reptiles				
Western pond turtle *Actinemys (Emys) marmorata*	–/–/SSC	California range includes Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada.	Ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and aquatic vegetation in woodland, grassland, and open forest.	**Moderate.** Potential aquatic habitat in Tule Canal. No known occurrences within 5 miles of site.
Giant garter snake *Thamnophis gigas*	FT/ST/–	Endemic to wetlands in the Sacramento and San Joaquin Valleys from Chico, south to the Mendota Wildlife Area in Fresno County.	Found in agricultural wetlands and other wetlands such as irrigation and drainage canals, low gradient streams, marshes, ponds, sloughs, small lakes, and their associated uplands. Upland habitat should have burrows or other soil crevices suitable for snakes to reside during their dormancy period (November–mid-March).	**High.** Tule Canal provides habitat and is connected to other, similar waterways. There are multiple CNDDB occurrences in the area.
Invertebrates				

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Crotch bumble bee *Bombus crotchii*	–/SCE/–	Occurs throughout the Pacific Coast, Western Desert, and adjacent foothills throughout most of the state's southwestern region.	Found in open grassland and scrub. Nests underground in abandoned rodent burrows. Colonies are annual and only the newly mated queens overwinter. The queens emerge from hibernation in early spring to search for nest sites. Host plant food includes milkweed (*Asclepias* sp.), pincushion (*Chaenactis* sp.), lupine (*Lupinus* sp.), bur clover (*Medicago* sp.), phacelia (*Phacelia* sp.), and sage (*Salvia* sp.).	**Low**. Although potential food plant *Medicago* was observed within the study area, it was not present in large concentrations, and the majority of the study area is agricultural. No CNDDB occurrences within 5 miles.
Western bumble bee *Bombus occidentalis*	–/SCE/–	Historic range extends throughout California, although current populations are primarily found in high elevation sites in the Sierra Nevada.	Found in open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows. Nests underground in abandoned rodent burrows or other cavities but may also nest above ground in structures including logs and railroad ties. Host plant food includes ceanothus (*Ceanothus* sp.), thistle (*Centaurea* sp.), rabbitbrush (*Chrysothamnus* sp.), geranium (*Geranium* sp.), gumplant (*Grindelia* sp.), lupine (*Lupinus* sp.), sweetclover (*Melilotus* sp.), monardella (*Monardella* sp.), blackberry (*Rubus* sp.), goldenrod (*Solidago* sp.), and clover (*Trifolium* sp.).	**Low**. Although potential food plants Centaurea, Cirsium, Melilotus, Rubus, and Trifolium were observed in the study area, there are no recent occurrences of this species within the region.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Conservancy fairy shrimp *Branchinecta conservatio*	FE/–/–	Northern two-thirds of the Central Valley. It ranges from Vina Plains of Tehama County; Sacramento National Wildlife Reserve in Glenn County; Jepson Prairie Preserve and surrounding area east of Travis Air Force Base, Solano County; Mapes Ranch west of Modesto, Stanislaus County.	Large vernal pools and seasonal wetlands, ~1 acre in size.	**None.** Habitat not present; no CNDDB occurrences within 5 miles of site.
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/–/–	Endemic to the Central Valley, Central Coast Mountains, and South Coast Mountains of California. It ranges from the Vina Plains in Tehama County, through the Central Valley, and south along the Central Coast to northern Santa Barbara County.	Endemic to the grasslands of the Central Valley, central coast mountains, and south coast mountains. Inhabits the ephemeral water of swales and vernal pools. It is most commonly found in grassed or mud bottomed swales, earth sump, or basalt flow depression pools in unplowed grasslands.	**None.** Habitat not present; no CNDDB occurrences within 5 miles of site.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT/–/–	Occurs only in the Central Valley and surrounding foothills below 3,000 feet elevation (USFWS 1999).	Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus nigra* ssp. *caerulea*). Prefers to lay eggs in elderberries 2–8 inches in diameter; some preference shown for "stressed" elderberries.	**None.** Elderberry shrubs not present in the study area.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE/–/–	Endemic to the northern portion of the Central Valley of California. This species occurs from the Millville Plains and Stillwater Plains in Shasta County south throughout the Central Valley to Merced County.	Found in a variety of natural and artificial seasonally ponded Sacramento Valley habitat types including vernal pools, swales, ephemeral drainages, stock ponds, reservoirs, ditches, backhoe pits, and ruts caused by vehicular activities.	**None.** Habitat not present; no CNDDB occurrences within 5 miles of site.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Monarch butterfly *Danaus plexippus*	FC/–/–	Adults breed and migrate throughout California and overwinter along the California coast and in central Mexico.	Open habitats including fields, meadows, weedy areas, marshes, and roadsides. Monarch butterflies roost in wind-protected tree groves (such as eucalyptus) with nectar and water sources nearby. Caterpillar host plants are native milkweeds.	**Low**. Adults may forage and migrate through the site, but no host milkweed plants were found in the study area during surveys and there are no CNDDB occurrences within 5 miles.
Birds				
White-tailed kite *Elanus leucurus*	–/–/CFP	Lowland areas west of Sierra Nevada from the upper Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border.	Open grasslands, meadows, or marshes; require dense-topped trees or shrubs for nesting and perching.	**High**. Potential nesting and foraging habitat is present within 0.5 mile of site. One CNDDB occurrence within 5 miles of the study area.
Tricolored blackbird *Agelaius tricolor*	–/ST/SSC	A resident in California found throughout the Central Valley and in coastal districts from Sonoma County south. Found locally in northeastern California. In winter, more widespread along central coast, and San Francisco Bay area.	Nests in dense blackberry, cattail, tules, bulrushes, sedges, willow, or wild rose within freshwater marshes. Nests in large colonies of at least 50 pairs (up to thousands of individuals).	**Moderate**. Vegetation along canal is too sparse to support nesting but there is suitable foraging habitat in and adjacent to the study area. Historic CNDDB occurrence notes that the colony has been extirpated.
Grasshopper sparrow *Ammodramus savannarum*	–/–/SSC	Uncommon and local, summer resident and breeder in foothills and lowlands west of Cascade-Sierra Nevada crest from Mendocino and Trinity Counties south to San Diego County. Also found in Shasta Valley, Siskiyou County, coastal Southern California.	Found in dense grasslands on rolling hills, lowland plains, in valleys and on hillsides on lower mountain slopes. Favors native grasslands with a mix of grasses, forbs, and scattered shrubs.	**None**. Habitat not suitable. Vegetation is managed and adequate cover is not present.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Burrowing owl *Athene cunicularia*	–/–/SSC	Central and southern coastal habitats, Central Valley, Great Basin, and deserts. Formerly common in appropriate habitat throughout the state, excluding humid northwest coastal forests and high mountains. Present on larger offshore islands.	Open annual grasslands or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Dependent upon burrowing mammals (especially California ground squirrel) for burrows.	**Moderate**. Fallow rice fields and ruderal areas may provide suitable habitat for burrows. Three recent CNDDB occurrences are noted within 5 miles of site. Additional records exist in the area but note that colonies are either extirpated or possibly extirpated.
Swainson's hawk *Buteo swainsoni*	–/ST/–	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, Northeastern plateau, Lassen County, and Mojave Desert.	Nests peripherally to valley riparian systems in lone trees or groves of trees in agricultural fields. Valley oak, Fremont cottonwood, walnut, and large willow trees, ranging in height from 41 to 82 feet, are the most commonly used nest trees in the Central Valley.	**High**. Well-documented presence with numerous occurrences in area. Potential nesting habitat is present within 0.5 mile of site.
Western snowy plover *Charadrius nivosus nivosus*	FT/–/SSC	Along the west coast states, with inland nesting taking place at the Salton Sea, Mono Lake, and at isolated sites on the shores of alkali lakes in northeastern California, in the Central Valley, and southeastern deserts.	Nests, feeds, and takes cover on sandy or gravelly beaches along the coast, on estuarine salt ponds, alkali lakes, and at the Salton Sea.	**None**. Suitable habitat is not present in the vicinity of the study area.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	FT/SE/–	Uncommon to rare summer resident in scattered locations throughout California. Breeding population along Colorado River, Sacramento and Owen Valley, along South Fork of Kern River, Santa Ana River, and Amargosa River. May be present along San Luis Rey River.	Deciduous riparian thickets or forests with dense, low-level or understory foliage, and which abut on slow-moving watercourses, backwaters, or seeps. Willow almost always a dominant component of the vegetation. In Sacramento Valley, also utilizes adjacent orchards, especially of walnut. Nests in sites with some willows, dense low-level or understory foliage, high humidity, and wooded foraging spaces.	**Low**. Nesting habitat not present at site. Individuals may use riparian habitat northwest of the study area during migration. One CNDDB occurrence within 5 miles from 1877.
California black rail *Laterallus jamaicensis coturniculus*	–/ST/CFP	Approximately 90% are found in the tidal salt marshes of the northern San Francisco Bay region, primarily in San Pablo and Suisun Bays. Smaller populations occur in San Francisco Bay, the outer coast of Marin County, freshwater marshes in the foothills of the Sierra Nevada, and in the Colorado River Area.	Nests and forages in saline, freshwater, or brackish emergent marshes with gently grading slopes and upland refugia with vegetative cover beyond the high-water line.	**Low**. Tule canal lacks suitable vegetation for nesting.
Song sparrow "Modesto" population *Melospiza melodia* pop. 1	–/–/SSC	Endemic to California, resides only in the north-central portion of the Central Valley.	Nests and forages primarily in emergent marsh, riparian scrub, and early successional riparian forest habitats, and infrequently in mature riparian forest and sparsely vegetated ditches and levees.	**Moderate.** Suitable nesting and foraging habitat in and adjacent to the study area. One recent CNDDB breeding occurrence from 2011; previous nest occurrence from 1900 notes that suitable habitat in the area was lost to development.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Purple martin *Prognis subis*	–/–/SSC	In the south, found on the coast and interior mountain ranges. Absent from higher desert regions. In the north, found on coast and inland to Modoc and Lassen Counties. Absent from higher slopes of Sierra Nevada. Current breeding populations are known from western Santa Clara and Alameda Counties, and western Placer County.	Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine, and Monterey pine. Uses open habitats during migration, including grassland, wet meadows, and fresh emergent wetlands. Nests in cavities: woodpecker holes, snags, buildings, cliffs.	**Low**. May forage aerially over site but nesting habitat is absent.
Bank swallow *Riparia riparia*	–/ST/–	A neotropical migrant found primarily in riparian and other lowland habitats in California west of the deserts during the spring-fall period. Main breeding population in California occurs along banks of the Sacramento and Feather Rivers in the northern Central Valley. Casual in Southern California in winter. Other colonies along the northern coast from Humboldt to Del Norte Counties, and along the central coast from Monterey to San Francisco Counties.	Requires vertical or nearly vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, lakes, and the ocean for nesting. Can also utilize banks found in upland habitats, including those in artificial sand or gravel pits. Feeds primarily over grassland, shrub land, savannah, and open riparian areas during breeding season and over grassland, brushland, wetlands, and cropland during migration.	**Low**. May forage aerially over site but nesting habitat is absent.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Least Bell's vireo *Vireo bellii pusillus*	FE/SE/–	California to northern Baja. Rare, local, summer resident below about 600 meters (2,000 feet), mostly in San Benito and Monterey Counties. Present in coastal Southern California from Santa Barbara County south. Formerly a common and widespread summer resident throughout Sacramento and San Joaquin valleys and in the coastal valleys and foothills but the species has been extirpated from much of its California range.	Inhabits low, dense riparian growth along water or along dry parts of intermittent streams. Typically associated with willow, cottonwood, Baccharis, wild blackberry, or mesquite in desert localities.	**Low**. The species has been documented in the Yolo Bypass Wildlife Area; however, the most recent CNDDB occurrence notes that breeding attempts were likely unsuccessful. Suitable riparian habitat is present northwest of the project footprint.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	–/–/SSC	Breeds east of Cascade range and Sierra Nevada, Imperial and Colorado River valley, in Central Valley and select locations in coast range west of Central Valley. Common in winter in Imperial Valley. Found as high as 2,000 meters (6,600 feet) in San Bernardino Mountains.	Associated with freshwater emergent wetlands along lakes and ponds. Nesting timed with maximum emergence of aquatic insects. Feeds on cultivated grains, in emergent vegetation, and in nearby grasslands and croplands. Nests in large wetlands, but also in mountain meadows and along the edges of ponds and rivers.	**High.** Suitable foraging habitat in and adjacent to the study area, but nesting habitat is absent. No recently active colony occurrences within 5 miles.
Mammals				
Pallid bat *Antrozous pallidus*	–/–/SSC, WBWG: High priority	Occurs throughout California, except the high Sierra, from Shasta to Kern County and the northwest coast, primarily at lower and middle elevations,	Occurs in a variety of habitats but most common in dry, rocky areas; day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, tree hollows, and various human structures (e.g., bridges, barns, porches)	**Low**. May forage over site but roosting habitat is absent.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
American badger *Taxidea taxus*	–/–/SSC	Throughout most of California except northern North Coast area.	Shrub, forest, and herbaceous cover types with friable soils for digging burrows.	**None**. Habitat not present.
Fish				
Delta smelt *Hypomesus transpacificus*	T/E/–	Found primarily in the Sacramento–San Joaquin Estuary near sea level but has been found as far upstream as Knights Landing (Vincik and Julienne 2012) on the Sacramento River and Mossdale on the San Joaquin River; range extends downstream to San Pablo Bay.	Occurs in estuary habitat in the Delta where freshwater and brackish water mix in the salinity range of 2 to 7 parts per 1,000 (Moyle 2002).	**Low**. Have been detected in the Toe Drain at beach seine sampling sites located 2.5 to 5.7 miles downstream of the project area in May and July (IEP 2022). Primary period of potential occurrence is from January to June.
Longfin smelt *Spirinchus thaleichthys*	–/T/–	Within California, mostly in the Sacramento River–San Joaquin River Delta, but also in Humboldt Bay, Eel River estuary, and Klamath River estuary. Also found in South San Francisco Bay and sloughs in Coyote Creek, Alviso Slough, and nearby salt ponds (Rosenfield and Baxter 2007).	Salt or brackish estuary waters with freshwater inputs for spawning.	**Low**. Detected in rotary screw trap in the Toe Drain downstream of Lisbon Weir in January and April – June (IEP 2022).
Green sturgeon – Southern DPS *Acipenser medirostris*	T/SSC/–	Occurs in Sacramento, San Joaquin, Stanislaus, Klamath, and Trinity Rivers (Moyle 2002; Jackson and Van Eenennaam 2013).	The species spawns in large river systems with well-oxygenated water, with temperatures from 8.0 to 14°C (Moyle 2002).	**High**. Present in the Yolo Bypass when flows are high in the spring and winter during flooding events (U.S. Bureau of Reclamation 2018). Yolo Bypass and Tule Canal are designated as critical habitat.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Steelhead – California Central Valley DPS *Oncorhynchus mykiss irideus*	T/–/–	Sacramento and San Joaquin rivers and their tributaries.	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 7.8 to 18°C (Moyle 2002). Habitat types are riffles, runs, and pools.	**High.** Present in the Toe Drain and Tule Canal from October through June (IEP 2022) when flows are high in the spring and winter during flooding events and also when the Yolo Bypass is not inundated (Harrell and Sommer 2003; Sommer et al. 2014). Tule Canal is designated as critical habitat.
Central Valley Spring-run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	T/T/–	Upper Sacramento River, Feather River, and Yuba River, and several perennial tributaries of the Sacramento River (Battle, Butte, Clear, Deer, and Mill Creeks).	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C; habitat types are riffles, runs, and pools (Moyle 2002).	**High.** Juveniles may occur in Yolo Bypass and Tule Canal when flows are high in the winter and spring through May during flooding events. Adults may stray into the Toe Drain and Tule Canal from March to early October to migrate upstream when the Yolo Bypass is not inundated (NMFS 2009, 2019:83). Tule Canal is designated as critical habitat.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Sacramento Winter-run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	E/E/–	Mainstem Sacramento River below Keswick Dam (Moyle 2002).	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°; habitat types are riffles, runs, and pools (Moyle 2002).	**High.** Juveniles may occur in Yolo Bypass and Tule Canal when flows are high in the winter and spring through March during flooding events. Adults may stray into the Toe Drain and Tule Canal from November through July to migrate upstream when the Yolo Bypass is not inundated (NMFS 2009, 2019:67, 2021).
Central Valley Fall- and Late Fall–run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	SC/SSC/–	Sacramento and San Joaquin Rivers and tributary Central Valley streams and rivers below impassable barriers.	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C; habitat types are riffles, runs, and pools (Moyle 2002).	**High.** Present in the Toe Drain and Tule Canal from September to June (IEP 2022) when flows are high in the spring and winter during flooding events. Use Tule Canal to migrate upstream when the Yolo Bypass is not inundated (NMFS 2009).
White sturgeon *Acipenser transmontanus*	–/SSC/–	Occurs in larger rivers in the Sacramento–San Joaquin River; spawns in upper Sacramento River, San Joaquin River, and possibly Feather River.	Spawns from late February to early June at temperatures from 8.0 to 19.0°C (Moyle et al. 2015; Jackson et al. 2016).	**High.** Present in the Yolo Bypass and Tule Canal from December to May (IEP 2022) when flows are high in the spring and winter during flooding events. Use Tule Canal to migrate upstream when the Yolo Bypass is not inundated (NMFS 2009).

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Pacific lamprey *Entosphenus tridentatus*	SC/SSC/–	Sacramento and San Joaquin Rivers and their tributaries below impassable barriers; tributaries of the San Francisco Estuary; and coastal streams throughout California.	Lamprey occur in clear, cold, water with clean gravel for spawning. Presence of cover such as boulders, riparian vegetation, and logs is also important for spawning. Additional habitat requirements include areas with low velocities and fine sediments for rearing that are not excessively scoured under high flows (Moyle et al. 2015).	**High.** Present in the Toe Drain and Tule Canal December through March (IEP 2022).
River lamprey *Lampetra ayresi*	–/SSC/–	Occurs in lower Sacramento and lower San Joaquin Rivers, and tributaries to lower Russian River and Eel River (Moyle et al. 2015).	Lamprey occur in clear, cold, water with clean gravel for spawning. Also need sandy to silty backwaters for ammocoetes to rear (Moyle et al. 2015).	**High.** Present in the Toe Drain and Tule Canal December through March (IEP 2022).
Sacramento hitch *Lavinia exilicauda exilicauda*	–/SSC/–	Scattered populations are found in the Sacramento River drainage, the San Joaquin River drainage downstream of the Merced River, a few larger tributaries to the San Francisco Estuary, and the Delta (Moyle et al. 2015).	Occurs in warm, low elevation waters including clear streams, turbid sloughs, lakes, and reservoirs; found in pools or runs among aquatic vegetation; may occur in riffles; can survive temperatures as high as 38°C and salinities up to 9 parts per thousand (Moyle 2002).	**High.** Present in the Toe Drain and Tule Canal year-round (IEP 2022).
Sacramento splittail *Pogonichthys macrolepidotus*	–/SSC/–	Occur in the Sacramento River, Suisun Bay, Suisun Marsh, Napa River, Petaluma River, and the Delta (Moyle et al. 2015).	Estuarine species with a large range of salinity and temperature tolerances, preferring shallow water (<4 meters deep) and low water velocities. Need flooded vegetation for spawning and rearing (Moyle et al. 2015).	**High.** Present in the Toe Drain and Tule Canal year-round (IEP 2022).

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Hardhead *Mylopharodon conocephalus*	–/SSC/–	Occurs in tributary streams in the San Joaquin River drainage; large tributary streams in the Sacramento River and the mainstem; and in low to mid-elevation streams of the Central Valley (Moyle 2002).	Prefers clear, deep pools and runs with slow velocities.	**High.** Low numbers present in the Toe Drain and Tule Canal all months except March, July, and August (IEP 2022).

[1] Status codes:

Federal

FE = Federally listed as Endangered under federal Endangered Species Act (ESA)
FT = Federally listed as Threatened under ESA
FC = Federal candidate for listing under ESA
SC = Federally listed as a Species of Concern

State

SE = State listed as Endangered under California Endangered Species Act (CESA)
ST = State listed as Threatened under CESA
SCE = State candidate for listing as Endangered under CESA

Other

SSC = California Species of Special Concern
CFP = California Fully Protected Species
WBWG = Western Bat Working Group (WBWG) priority species (http://wbwg.org/matrices/species-matrix/):
High = species imperiled or at high risk of imperilment
Medium = more research and closer attention needed to adequately assess species' status and needed conservation actions
Low = most of existing data support stable population of species; potential for major changes in status in near future unlikely
DPS = distinct population segment
ESU = evolutionary significant unit

Impacts

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Construction activities would occur in or near areas of suitable habitat and could directly or indirectly (through habitat modification) affect wildlife and fish species identified as candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW, NMFS, or USFWS. No special-status plants were located during the field surveys. See Figure 3-4 for the locations of all special-status plant and wildlife species in the vicinity. The following species could be affected.

The Yolo Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP) provides Endangered Species Act (ESA) permits and associated mitigation for planned covered activities including infrastructure (e.g., roads and bridges) and development (e.g., agricultural processing facilities, housing, and commercial buildings) identified for construction over the next 50 years in Yolo County. The Yolo HCP/NCCP was completed by the Yolo Habitat Conservancy in 2018, and implementation began in 2019. The Yolo HCP/NCCP coordinates mitigation to maximize benefits to species, as well as conserve habitat above and beyond required mitigation for the covered species. While the proposed project is not a covered activity and is not participating in the Yolo HCP/NCCP, the proposed mitigation measures given below are consistent with the HCP/NCCP.

Wildlife

Construction Effects

Giant garter snake. Suitable aquatic and upland habitat is present in the canals, fresh emergent wetland, valley foothill riparian areas, ruderal grassland, and fallow rice fields. Placement of the fish screens in the canal, and the clearing, grubbing, excavation, and trenching in or near the canals and fresh emergent wetland could injure or destroy giant garter snake. The rice fields adjacent to Tule Canal may be used for summer shelter when fallow; trenching and staging in these areas could injure or destroyl giant garter snake. The road may be used by giant garter snake for basking, and they may travel across the road to reach the rice fields. Vehicles and equipment driving along the roads could injure or kill giant garter snake. Aquatic habitat could become contaminated with oil, fuel, or uncured concrete and could injure giant garter snake and reduce habitat quality, which could lead to other impacts. Because giant garter snake is federally and state-listed as threatened, this would be a potentially significant impact. The project proponent will implement Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, and BIO-8 to avoid and minimize impacts on this species and bring this impact to a less-than-significant level with mitigation incorporated.

Mitigation Measure BIO-1. Conduct Preconstruction Surveys for Giant Garter Snake. The project proponent will retain a qualified biologist to conduct preconstruction clearance surveys using USFWS-approved methods. Surveys will occur within 24 hours prior to construction activities. Surveys will be conducted along the banks of the canals and within fresh emergent wetland, valley foothill riparian, ruderal grassland, and fallow rice fields. If construction activities stop for a period of 2 weeks or more, another preconstruction clearance survey will be conducted within 24 hours prior to resuming construction activity.

Mitigation Measure BIO-2. Provide Environmental Awareness Training. All construction personnel will participate in a worker environmental training program given by a qualified biologist. The training will provide education regarding sensitive natural communities and covered species and their habitats, the need to avoid adverse effects, state and federal protection, and the legal implications of violating the ESA.

Mitigation Measure BIO-3. Identify Work Area Boundaries. The project proponent will clearly identify the boundary of work areas and orange construction fencing. All personnel and equipment will be restricted to those areas. Movement of heavy equipment will be restricted to established roadways and designated staging areas to minimize habitat disturbance and potential for injury or mortality of special-status species.

Mitigation Measure BIO-4. Install Wildlife Exclusion Fencing. Prior to the start of construction, exclusion fencing will be installed along the edge of the construction and staging footprint to preclude wildlife from entering the work area, where feasible. Exclusion fencing includes silt fencing buried 3 inches into the ground. The exclusion fencing may abut or be installed along the inside of the orange construction fencing, where feasible. A biological monitor will be present during the installation of the fencing.

Mitigation Measure BIO-5. Install Temporary Fencing Around Environmentally Sensitive Areas. Temporary exclusion fencing will be installed to identify and protect wetland, riparian, and aquatic habitats adjacent to work areas. Construction equipment and personnel will not encroach on these fenced areas.

Mitigation Measure BIO-6. Stop Construction and Notify Monitor if a Giant Garter Snake Is Observed. If a live giant garter snake is encountered during construction activities, the biological monitor will stop construction in the vicinity of the snake, monitor the snake, and allow the snake to leave on its own. The monitor will remain in the area for the remainder of the workday to ensure the snake is not harmed, or, if it leaves the site, does not return. No work will recommence until the giant garter snake has left on its own volition or until authorized by the USFWS and CDFW.

Mitigation Measure BIO-7. Acquire a National Pollutant Discharge Elimination System (NPDES) General Construction Activity Stormwater Permit; Prepare and Implement a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will be prepared by the construction contractor prior to initiating construction activities. The SWPPP will describe the best management practices (BMPs) that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. Specific BMPs that will be incorporated into the SWPPP will be site-specific and will be prepared in accordance with the Regional Water Quality Control Board (RWQCB) field manual. Measures will specifically exclude tightly woven cloth or monofilament meshes, because wildlife can become trapped or entangled in the material. Coconut coir matting is an acceptable erosion-control material. Where feasible and or appropriate, the edge of the material would be buried in the ground to prevent wildlife from crawling underneath the material.

Mitigation Measure BIO-8. Maintain Water Quality and Limit Construction Runoff. The contractor will maintain baseline level or acceptable water quality measurements and limit construction runoff into wetland areas through the use of hay bales, filter fences, vegetative buffer strips, or other accepted practices. No plastic, monofilament, jute, or similar erosion-control matting that could entangle snakes or other wildlife will be permitted.

Western Pond Turtle. Potentially suitable aquatic and upland habitat is present in the canals and fallow rice fields in the project area. Clearing and grubbing, trenching, and other construction activities could result in the destruction of nests or mortality of turtles from being crushed or buried by equipment during construction or staging. Western pond turtles also could be struck by vehicles and equipment traveling along the roads during construction. Aquatic habitat could become contaminated with oil, fuel, or other contaminants and could injure adult turtles and hatchlings. Because western pond turtle is designated as a State Species of Special Concern, injury or mortality would be a potentially significant impact. The project proponent will implement Mitigation Measures BIO-2, BIO-3, BIO-4, BIO-5, BIO-7, BIO-8, and BIO-9 to reduce these impacts to a less-than-significant level. This impact would be less than significant with mitigation incorporated.

Mitigation Measure BIO-9. Avoid and Minimize Adverse Effects on Western Pond Turtle and its Habitat. The project proponent will retain a qualified biologist to conduct a preconstruction survey for western pond turtles. Surveys will occur immediately prior to construction activities (including vegetation removal) and will be conducted along the banks of the canals and in upland areas. The biologist will assess the likelihood of western pond turtle nests occurring in the disturbance area (based on sun exposure, soil conditions, and other species habitat requirements). If the biologist determines that there is a moderate to high likelihood of western pond turtle nests within the disturbance area, the biologist will monitor all initial ground-disturbing activity for nests that may be unearthed during the disturbance. If a western pond turtle nest is discovered during the preconstruction survey or during project construction, the project proponent will coordinate with CDFW to determine whether additional avoidance measures (e.g., no-disturbance buffer or monitoring) are prudent. If a western pond turtle is found within the immediate work area during the preconstruction survey or during project activities, work will cease in the area until the turtle is able to move out of the work area on its own. If western pond turtle does not leave the project area on its own accord, the biologist will relocate the individual to similar habitat outside of the construction area.

Foraging Habitat for Crotch Bumble Bee, Western Bumble Bee, Monarch Butterfly, and Birds, Including Tricolored Blackbird, Yellow-Headed Blackbird, and Swainson's Hawk. Potential foraging habitat is present in the ruderal vegetation in the project area. Clearing and grubbing, trenching, and other construction activities would cause a small (0.037-acre) permanent loss of foraging habitat associated with ruderal vegetation. Although clearing and grubbing, trenching, and other construction activities would temporarily reduce foraging habitat associated with the ruderal vegetation within the project area, the ruderal vegetation surrounding the project area on all sides provides abundant foraging habitat. Therefore, the potential impact on foraging habitat is considered less than significant, and no mitigation would be required.

Nesting Habitat for Swainson's Hawk and White-Tailed Kite. The trees within the riparian habitat in the vicinity of the project area provide nesting habitat for these species, and there are extensive records of Swainson's hawk breeding in the vicinity (Figure 3-5). The noise, activity, and general disturbance of construction activities during the nesting season could result in disturbance of nesting Swainson's hawk or white-tailed kite, if present. These disturbances could cause nest abandonment and death of young or loss of reproductive potential at active nests in or near the project area. Such disturbance would violate CFGC Sections 3503 (active bird nests), 3503.5 (active raptor nests), and 3511 (fully protected species) and the MBTA (50 Code of Federal Regulations [CFR], parts 10 and 21) and would be a potentially significant impact. The project proponent will implement Mitigation Measures BIO-2, BIO-3, BIO-4, BIO-5, BIO-7, BIO-8, and BIO-10 to avoid and minimize impacts on these species. These impacts would be less than significant with mitigation incorporated.

Mitigation Measure BIO-10. Conduct Preconstruction Surveys for Swainson's Hawk and White-Tailed Kite; Avoid and Minimize Adverse Effects on Swainson's Hawk and White-Tailed Kite. Prior to the start of construction, a qualified biologist with demonstrated nest-searching experience will conduct preconstruction surveys for Swainson's hawk and white-tailed kite. The surveys will occur no more than 7 days prior to the initiation of ground-disturbing activities (including clearing, grubbing, and staging). The biologist will conduct surveys within 0.25 mile (1,320 feet) of the project area, to the best of their abilities considering the private lands in the vicinity. Surveys will be consistent with guidelines provided by the Swainson's Hawk Technical Advisory Committee (2000).

If active nests are found during the survey, a 250-foot nest disturbance buffer will be established. No work will occur within the buffer until the biologist determines that the young have fledged and the nest is no longer active. The biologist will be on site daily while activities are taking place to monitor the nest and will have the authority to stop work if raptors are exhibiting agitated behavior. The biologist and the project proponent will consult with CDFW to determine the best course of action necessary to avoid nest abandonment or take of individuals. Work may be allowed to proceed only if Swainson's hawk or white-tailed kite are not exhibiting agitated behavior, such as defensive flights at intruders, getting up from a brooding position, or flying off the nest, and only with the agreement of CDFW and USFWS.

Nesting Habitat for Western Burrowing Owl. Potentially suitable nesting habitat is available on the edges of the ruderal grassland and the fallow rice fields. The noise, activity, and general disturbance of construction activities during nesting season could result in disturbance of nesting burrowing owls that may be present in or adjacent to the project area. These disturbances could cause nest abandonment and loss of young at active nests. If burrowing owls are nesting in the rice fields or ruderal grassland, nests could be destroyed by grading, clearing, trenching, or staging in or near the project area. Western burrowing owl is a California Species of Special Concern, and such disturbance would violate CFGC Sections 3503 (active bird nests) and 3503.5 (active raptor nests). This would be a potentially significant impact. The project proponent will implement Mitigation Measures BIO-2, BIO-3, BIO-4, BIO-5, BIO-7, BIO-8, and BIO-11 to avoid and minimize impacts on this species. These impacts would be less than significant with mitigation incorporated.

Mitigation Measure BIO-11. Conduct Preconstruction Surveys for Western Burrowing Owl; Avoid and Minimize Adverse Effects on Western Burrowing Owl. No more than 7 days prior to ground-disturbing activities, a qualified biologist will conduct preconstruction surveys for western burrowing owl in any potential habitat in the project area. Surveys will be consistent with CDFW guidelines. If occupied nest burrows are discovered, a no-disturbance buffer will be established around the nest burrows. The size of the buffer will depend on the time of year and level of disturbance, based on CDFW guidelines (California Department of Fish and Game 2012). The Yolo HCP/NCCP generally defines low, medium, and high levels of disturbances of burrowing owls as follows.

- Low: Typically 71–80 decibels (dB), generally characterized by the presence of passenger vehicles, small gas-powered engines (e.g., lawn mowers, small chain saws, portable generators), and high-tension power lines. Includes electric hand tools (except circular saws, impact wrenches and similar). Management and enhancement activities would typically fall under this category. Human activity in the immediate vicinity of burrowing owls would also constitute a low level of disturbance, regardless of the noise levels.

- Moderate: Typically 81–90 dB, and would include medium- and large-sized construction equipment, such as backhoes, front end loaders, large pumps and generators, road graders, dozers, dump trucks, drill rigs, and other moderate to large diesel engines. Also includes power saws, large chainsaws, pneumatic drills and impact wrenches, and large gasoline-powered tools. Construction activities would normally fall under this category.
- High: Typically 91–100 dB, and is generally characterized by impacting devices, jackhammers, compression ("jake") brakes on large trucks, and trains. This category includes both vibratory and impact pile drivers (smaller steel or wood piles) such as used to install piles and guard rails, and large pneumatic tools such as chipping machines. It may also include large diesel and gasoline engines, especially if in concert with other impacting devices.
- If the biologist finds the site to be occupied by western burrowing owls during the breeding season (February 1 to August 31), the project proponent will avoid all nest sites, based on the buffer distances described above, during the remainder of the breeding season or while the nest is occupied by adults or young (occupation includes individuals or family groups that forage on or near the site following fledging). Occupancy of burrowing owl habitat during preconstruction surveys is confirmed at a site when at least one burrowing owl or sign (fresh whitewash, fresh pellets, feathers, or nest ornamentation) is observed at or near a burrow entrance. Construction may occur inside of the disturbance buffer during the breeding season if the nest is not disturbed and the project proponent develops an Avoidance and Minimization Measure (AMM) plan that is approved by CDFW prior to project construction, based on the following criteria:
- The CDFW approves the AMM plan provided by the project proponent.
- A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline nesting and foraging behavior (i.e., behavior without construction).
- The same qualified biologist monitors the owls during construction and finds no change in owl nesting and foraging behavior in response to construction activities.
- If the qualified biologist identifies a change in owl nesting and foraging behavior as a result of construction activities, the qualified biologist will have the authority to stop all construction-related activities within the non-disturbance buffers described above. The qualified biologist will report this information to CDFW within 24 hours, and activities will immediately cease within the non-disturbance buffer. Construction cannot resume within the buffer until the adults and juveniles from the occupied burrows have moved out of the project site, as confirmed by the biologist.
- If monitoring indicates that the nest is abandoned prior to the end of nesting season and the burrow is no longer in use by owls, the project proponent may remove the non-disturbance buffer. If the burrow cannot be avoided by construction activity, the biologist will excavate and collapse the burrow in accordance with CDFW's 2012 guidelines to prevent reoccupation after receiving approval from the wildlife agencies.

A qualified biologist will monitor the site, consistent with the requirements described above, to ensure that buffers are enforced and owls are not disturbed.

Although there is a passive relocation component of this measure in the HCP/NCCP, it is not included here. This is because passive relocation is only allowed during nonbreeding season, and all project work will be conducted during breeding season.

Modesto Song Sparrow and Other Nesting Birds. Potential nesting habitat is present for Modesto song sparrow, kildeer, and multiple non–special-status migratory birds. No trees will be removed, trimmed, or pruned, but Modesto song sparrow (California Species of Special Concern) and migratory birds could nest in trees near project activities during the nesting season (February 1 to August 31). Multiple non–special-status migratory birds could nest on the ground or in shrubs or trees in and adjacent to the project area. Project activities could result in the disturbance or loss of bird nests, if present in or near the work area. This would violate CFGC Section 3503 (nesting birds) and the MBTA, and therefore would be a significant impact. The project proponent will implement Mitigation Measures BIO-2, BIO-3, BIO-4, BIO-5, BIO-7, BIO-8, and BIO-12 to reduce these impacts to a less-than-significant level.

Mitigation Measure BIO-12. Prior to the start of construction, a qualified biologist with demonstrated nest-searching experience will conduct preconstruction surveys for nesting birds, including Modesto song sparrow. The survey will occur no more than 7 days prior to the initiation of ground-disturbing activities (including clearing, grubbing, and staging).

- If active nests are found during the survey, the biologist will establish exclusion zones around each nest in which no work will be allowed until he/she has determined that the young have fledged or the nest is no longer active. The size of the exclusion zone(s) will be a minimum of 50 feet; this may be modified based on the species' sensitivity to disturbance and planned work activities in the vicinity, at the recommendation of the biologist.
- If a lapse in project-related activities of 15 days or longer occurs, another preconstruction survey will be conducted.
- After all nest surveys and monitoring are completed, the biologist will prepare a memorandum summarizing the survey effort and results, which they will submit to the lead agency and CDFW within 7 days of survey completion.

Operations Effects

Operation of the proposed project would not substantially affect any special-status wildlife species. The flap culvert, new fish screens, and new water intake structure would be underwater and would not affect terrestrial wildlife at all. The flap culvert may prevent giant garter snakes and western pond turtles from traveling between Tule Canal and the agricultural ditch; however, the agricultural ditch is maintained to be free of vegetation, has varying amounts of water, and does not provide habitat for either species.

There is an intake structure and a pump already in operation in Tule Canal, so their replacement would not be a change for either species. The existing pump and intake structure requires periodic maintenance, and the frequency of traffic along the levee and farm roads after project implementation would not noticeably change from that of existing conditions.

Fisheries

Construction Effects

Direct Effects

Direct Physical Injury and Disturbance

In-water work related to construction of the new backfill grade, installation of the new flap culvert pipe, and placement of rock slope protection for construction of the new concrete headwall fish barrier would not result in the injury, mortality, or disturbance of special-status fish species because the project would implement measures to avoid and minimize effects on fish, including restricting in-water construction activities to June 1 through August 31 when special-status fish species are least likely to be present in the project area. For the new intake screens, vibratory driving will be used to install the sheet piles surrounding the new screen. Vibratory pile driving is an alternative to impact driving that minimizes single-strike peak sound pressure and reduces adverse effects on fish (Caltrans 2020). Furthermore, the method proposed for installing the turbidity curtain prior to cofferdam installation would result in fish being guided out of the area where the cofferdam would be installed. Implementation of Mitigation Measures BIO-13 and BIO-14 would further protect special-status fish species from direct physical injury or mortality from construction activities by implementing cofferdam restrictions in Tule Canal at the new intake site and performing a fish rescue and relocation. These impacts would be less than significant with the proposed construction techniques and with mitigation incorporated.

Mitigation Measure BIO-13. Avoid and Minimize Adverse Effects on Special-Status Fish Species from Cofferdams. The following restrictions will be implemented during installation of the cofferdams and cofferdam dewatering.

- The extent of cofferdam footprints will be limited to the minimum necessary to support construction activities.
- Sheet piles used for cofferdams will be installed and removed using a vibratory pile driver.
- Cofferdams will be installed and removed only during the proposed in-water work window (between June 1 and August 31).
- All pumps used during dewatering of cofferdams will be screened according to CDFW and NMFS guidelines for pumps (CDFG 2010; NMFS 1997).

Mitigation Measure BIO-14. Avoid and Minimize Adverse Effects on Special-Status Fish Species by Implementing Fish Rescue and Relocation. The project proponent or their contractor will develop and implement a fish rescue and relocation plan to recover any fish trapped in cofferdams. The fish rescue and relocation plan will be submitted to the resource agencies (CDFW, NMFS, and USFWS) for approval at least 60 days before initiating activities to install cofferdams. At a minimum, the plan will include the following.

- Fish rescue and relocation activities will commence immediately after cofferdam closure and dewatering has sufficiently lowered water levels inside cofferdams to make it feasible to rescue fish.
- All gear and tools (e.g., waders, boots, nets, buckets) will be decontaminated to minimize and avoid spreading aquatic invasive species and diseases (e.g., chytrid fungus), as briefly summarized below.

  - Soak equipment and gear for 10 minutes in a 7 percent bleach solution: 9 liquid ounces of bleach per gallon of water; or
  - Soak equipment and gear for 30 seconds in 0.015 percent Quat 128: 1/8 teaspoon per gallon of water.

- The methods and equipment proposed to collect, transfer, and release all fish found trapped within cofferdams will be described. Capture methods may include seining, dip netting, and electrofishing, as approved by CDFW, NMFS, and USFWS. The precise methods and equipment to be used will be developed cooperatively by CDFW, NMFS, USFWS, and the project proponent or their contractor.
- Only CDFW-, NMFS-, and USFWS-approved fish biologists will conduct the fish rescue and relocation.
- Fish biologists will contact CDFW, NMFS, and USFWS immediately if any listed species are found dead or injured.
- A fish rescue and relocation report will be prepared and submitted to CDFW, NMFS, and USFWS within 5 business days following completion of the fish relocation. Data will be provided in tabular form and at a minimum will include the species and number rescued and relocated, approximate size of each fish (or alternatively, approximate size range if a large number of individuals are encountered), date and time of their capture, and general condition of all live fish (e.g., good—active with no injuries; fair—reduced activity with some superficial injuries; poor—difficulty swimming/orienting with major injuries). For dead fish, additional data will include fork length and description of injuries and/or possible cause of mortality if it can be determined.

Sediment Disturbance

Construction would involve activities that would potentially cause erosion and disturbance of sediment and soil, subsequently resulting in sediment transport and delivery to Tule Canal. Sediment input to Tule Canal could temporarily increase water column turbidity and sedimentation rates above ambient levels and potentially alter fish physiology, behavior, and habitat conditions in aquatic habitats. Construction activities that have the potential to result in erosion and sediment transport and delivery to streams include: (1) site clearing and vegetation removal at the new concrete headwall fish barrier and intake screen sites, (2) installing and extracting sheet piles for the cofferdam and installing sheet piles at the intake structure site on Tule Canal, and (3) placing RSP on the bed and bank at the headwall fish barrier site.

Direct effects on special-status fish species from elevated levels of suspended sediments would be avoided because in-water construction activities are restricted to June 1 through August 31 when most special-status fish species would not be present in the project area. However, elevated levels of suspended sediments, if they were to occur, have the potential to result in habitat effects on special-status fish species. The severity of these effects depends on the sediment concentration, proximity of the sediment-producing action to the waterbody and important habitat elements, and the duration of and spatial extent to which suspended sediments are elevated. Deposition of excessive fine sediment on the stream bottom could eliminate habitat for aquatic insects and reduce density, biomass, number, and diversity of aquatic insects and vegetation.

Based on general observations of similar in-water construction activities, increases in turbidity and suspended sediment generated during construction would be temporary and localized, and unlikely to reach levels that substantially alter or eliminate habitat for special-status fish species. In addition to implementation of Mitigation Measures BIO-7 and BIO-8, a silt curtain would be deployed prior to initiating activities to construct the concrete headwall fish barrier, and work to construct the new water intake would be conducted in the dry behind the cofferdam. These construction methods would further limit the potential for construction-related turbidity and sedimentation of aquatic habitats in Tule Canal.

Historically and currently, much of the project area is used for agriculture; therefore, soils could be contaminated with pesticides, herbicides, and other chemicals used in agriculture, as well as other contaminants. Eroded soils have been known to transport pollutants such as nutrients; metals; oils, fuels, and grease; and pesticides, herbicides, and other agricultural chemicals. Eroded soils could result in the potential release and dispersal of these contaminants if contaminated sediments are disturbed during construction and transported and delivered to aquatic habitats. The potential exposure of special-status fish species to contaminated sediments would be avoided because in-water construction activities are restricted to June 1 through August 31 when special-status fish species would not be present in the project area. However, disturbance of contaminated sediments could result in indirect effects on fish; these are described below.

The proposed project would be subject to a construction-related stormwater permit and dewatering requirements of the federal CWA and NPDES program. The project proponent would obtain required permits through the Central Valley RWQCB before any ground-disturbing construction activity occurs. As required in Mitigation Measure BIO-7, the project proponent will develop and implement a SWPPP before and throughout the construction period to protect fish and aquatic habitat from exposure to elevated levels of contaminants and sediment by preventing water runoff, spills, and sediment from entering waterways in immediate proximity to construction activities by using physical barriers (e.g., silt curtains and cofferdam) or by locating construction and staging activities not in proximity of waterways to the extent practicable. If sediment enters the waterway, surface water sampling will be implemented according to permit conditions. The monitoring will follow all technical certification conditions listed in the CWA Section 401 water quality certification for the project. The Spill Prevention Control and Countermeasures and response measures described in the SWPPP would prevent and minimize the introduction of oil during construction activities into surface waters through specific equipment, workforce, procedural, and training requirements for the prevention of, preparedness for, and response to, oil discharges (USEPA 2010). Mitigation Measure BIO-8 will be implemented to maintain water quality and limit construction runoff into wetland areas through the use of hay bales, filter fences, vegetative buffer strips, or other accepted practices. These measures would ensure that stormwater runoff would be controlled with physical and procedural means to reduce or avoid degradation of water quality in watercourses downstream of the construction sites that could have both short- and long-term effects on fish populations and aquatic habitat. Implementation of these mitigation measures would ensure that in-water and ground-disturbance construction activities do not violate water quality standards or waste discharge requirements or otherwise substantially degrade water quality that would adversely affect fish populations and habitat, including special-status fish species and their habitat. This impact would be less than significant with mitigation incorporated.

Water Quality Effects

Construction could result in accidental spills of contaminants, including cement, oil, fuel, hydraulic fluids, paint, and other construction-related materials, resulting in localized water quality degradation. This could in turn result in adverse effects on fish through direct injury and mortality (e.g., damage to gill tissue that causes asphyxiation) or delayed effects on growth and survival (e.g., increased stress or reduced feeding), depending on the nature and extent of the spill and the contaminants involved.

The greatest potential for an adverse water quality impact is associated with an accidental spill from construction activities occurring in or near surface waters. Installation of the cofferdam and construction of the new concrete headwall fish barrier involve extensive in-water work. Other construction elements that occur in upland areas or are isolated from fish-bearing waters have little potential for accidental spills that could affect fish because of the distance separating construction activities from receiving waters. Discharge of water from construction sites could also affect water quality for fish.

Implementation of Mitigation Measure BIO-15 would prevent and minimize the introduction of oil during construction activities into surface waters through specific equipment, workforce, procedural, and training requirements for the prevention of, preparedness for, and response to oil discharges (U.S. Environmental Protection Agency 2010). Mitigation Measures BIO-7 and BIO-8, described above for sediment disturbance, would also reduce and minimize effects associated with water quality and potential effects on state- and federally listed fish and other special-status fish species because they would prevent water runoff, spills, and sediment from entering waterways in immediate proximity to construction activities by using physical barriers and sediment basins or by locating construction and staging activities not in proximity of waterways to the extent practicable. This impact would be less than significant with mitigation incorporated.

Mitigation Measure BIO-15. Develop and Implement a Spill Prevention, Containment, and Countermeasure Plan (SPCCP). The SPCCP will describe the measures to minimize effects from spills of hazardous or petroleum substances during construction and operation/maintenance by implementing measures such as physically-distancing equipment from waterways, maintaining spill prevention kits at facilities where hazardous materials may be used, providing the equipment and materials necessary for cleanup of accidental onsite spills, and storing hazardous materials in double containment to avoid and reduce localized water quality degradation and prevent direct injury or mortality to fish and their prey, and degradation of their habitat. The SPCCP will also describe pertinent emergency notification requirements, such as those outlined by the Governor's Office of Emergency Services (Cal OES 2014), in the event that a hazardous materials spill/release were to occur.

Loss of Riparian Vegetation (Including Shaded Riverine Aquatic Cover) and Increased Water Temperature

As described in response (b), below, a small amount (0.005 acre) of riparian habitat would be permanently impacted. Of this 0.005 acre of permanently affected riparian habitat, approximately 0.002 acre supports shaded riverine aquatic (SRA) cover. In addition, approximately 0.003 acre of riparian habitat, some of which supports SRA cover, would temporarily be affected by project construction.

SRA cover is a component of riparian vegetation, and is defined as the unique, nearshore aquatic area occurring at the interface between a river (or stream) and adjacent woody riparian habitat (Fris and DeHaven 1993). Riparian vegetation, including vegetation supporting SRA cover, occurs in valley foothill riparian areas and is present in the project area (Figure 3-2). The removal of trees in this land cover type where necessary at construction sites (e.g., during clearing and grubbing) would temporarily and permanently reduce the extent of riparian vegetation, including vegetation supporting SRA cover habitat.

Riparian vegetation is important in controlling stream bank erosion, contributing to instream structural diversity, and maintaining undercut banks in the absence of rock revetment. In addition, canopy cover (overhanging vegetation [a form of SRA cover]) maintains shade that is necessary to reduce thermal input and provides an energy input to the aquatic habitats in the form of fallen leaves and insects (a food source for fish). SRA cover also provides fish with protection from predators in the form of undercut banks and instream woody material such as submerged branches, roots, and logs, and provides habitat for several native, regionally important fish and wildlife species.

The amount of existing riparian and SRA cover habitat in the project area and in the region is of variable quality because of past and ongoing impacts, including levee construction and bank protection activities (i.e., placement of rock revetment), irrigation facilities, livestock grazing, and clearing for agricultural use.

The removal of SRA cover habitat that contributes to stream shading could potentially increase water temperature and have adverse effects on fish, depending on species-specific temperature preferences. However, such increases would be extremely localized as the linear extent of SRA cover habitat that would be removed at individual construction sites would be relatively small and primarily limited to late spring through early fall when stream shading has a much larger influence on water temperature. Because any water temperature increases as a result of decreased riparian vegetation from project construction are anticipated to be small, localized, and primarily limited to the warmer months when special-status fish species are less abundant in the project area, the effects on fish from changes in water temperature would be expected to be minimal.

Implementation of Mitigation Measure BIO-5 would minimize or avoid impacts on riparian vegetation and SRA cover habitat because temporary fencing will be installed to identify and protect wetland, riparian, and aquatic habitats adjacent to work areas and prevent construction equipment and personnel from encroaching on these habitats. Furthermore, any impacts on special-status fish species from this small amount of habitat loss associated with the construction of the new concrete headwall fish barrier being requested by CDFW would be offset by the project's long-term benefits that would result from eliminating fish entrainment into the existing interior canal. Therefore, this impact would be less than significant with mitigation incorporated.

Indirect Effects

Toxins in river channel sediments and subsequently disturbed during construction can enter the foodweb through uptake by benthic organisms. If contaminated sediments are disturbed and become suspended in the water column, they also become available directly to pelagic organisms, including fish species and planktonic food sources of fish species. Thus, construction-related disturbance of contaminated bottom sediments creates another potential pathway to the food chain, and the potential accumulation of these toxins in the tissue (i.e., bioaccumulation) of various fish species. The bioaccumulation of toxins can lead to lethal effects, as well as sublethal effects (e.g., effects on behavior, digestion, and immune system response) (Connon et al. 2011:290). Because toxins in contaminated sediments are adhered to the sediment, increases in suspended sediment generated during construction could also release these contaminants to the water column and substrate. However, as described above for sediment disturbance, the potential for transporting sediments to aquatic habitats would be minimized and avoided through a combination of construction methods (e.g., use of a silt curtain and cofferdam during construction) and implementation of Mitigation Measures BIO-7 and BIO-8. Furthermore, any increases in suspended sediment and associated contaminants in aquatic habitats would be spatially limited to a portion of channel width and not extend far downstream, dissipating within hours of construction activities ceasing.

The project is not expected to have any other indirect construction effects on special-status fish species because of the discrete and temporary nature of project activities, which would result in no substantial change in the environment once complete. This impact would be less than significant with mitigation incorporated.

Operations Effects

Operation of the proposed project would not result in effects on special-status fish species because the project would prevent special-status fish species from becoming entrained with water pumped from Tule Canal as under existing conditions. In addition, the design of the new fish screen would be consistent with current NMFS, USFWS, and CDFW fish screening guidelines, thereby minimizing or avoiding the potential for fish to be impinged on the face of the fish screens.

Installation of the flap culvert at the northern end of the project would prevent fish from entering the irrigation ditch at the north end of the project. Backfill at the culverts, consisting of approximately 1,000 cy of material, would bring up the elevation of the berm to approximately 11 feet to match the existing height of the Tule Canal so that it would not be breeched during high flows. The fish-friendly flap culvert would prevent fish in Tule Canal from straying into the existing east–west diversion point canal while water drainage from irrigation flows to Tule Canal.

The frequency and rate of operations-related diversions would remain the same as current operations; therefore, there would be no flow-related effects from the project. Overall, operational effects with the project are presumed to be beneficial for special-status fish species, as entrainment into the irrigation ditches (i.e., via pumping or volitional movement) that occurs under existing conditions would not occur under the project due to the new fish barrier, flap gate culvert, and fish screen.

Tule Canal provides migratory and rearing habitat, and in some instances spawning habitat, for the special-status fish species discussed above. Construction of the project would result in temporary and permanent removal of riparian vegetation (0.005 acre) and disturbance of bank habitat; otherwise, the canal would be minimally affected by construction or operation activities. Therefore, there would be no substantial adverse effect on special-status fish species through habitat modification.

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

A small amount (0.002 acre) of riparian habitat would be permanently impacted. However, this impact would not result in a substantial adverse effect on existing riparian habitat in the project area because of the relatively low quality of this habitat and limited quantity that would be permanently affected. Other sensitive natural communities identified in local or regional plans, policies, regulations, or by CDFW and USFWS are not present in the immediate area and would not be impacted. Implementation of Mitigation Measure BIO-5 would minimize or avoid impacts on riparian vegetation and SRA cover habitat because temporary fencing will be installed to identify and protect wetland, riparian, and aquatic habitats adjacent to work areas and prevent construction equipment and personnel from encroaching on these habitats. Furthermore, any impacts on special-status fish species from this small amount of habitat loss associated with the construction of the new concrete headwall fish barrier being requested by CDFW would be offset by the project's long-term benefits that would result from eliminating fish entrainment into the existing interior canal. Therefore, this impact would be less than significant with mitigation incorporated.

c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marshes, vernal pools, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means?

CWA Section 404 requires that a permit be obtained from USACE before the discharge of dredged or fill materials into any "waters of the United States," which include wetlands. Section 404 permits generally require mitigation to offset losses of these habitat types, in accordance with Executive Order 11990, which is intended to result in no net loss of wetland values or acres. Waters of the state are defined as any surface or subsurface water and are protected by the Porter-Cologne Water Quality Control Act.

The proposed project would result in permanent impacts on 0.009 acre of freshwater emergent wetland and 0.075 acre of canal. The proposed project would also result in temporary impacts on 0.024 acre of canal, 0.002 acre of freshwater emergent wetland, and 0.037 acre of agricultural ditch. The project proponent will acquire all applicable permits, including a CWA Section 404 permit from USACE, a CWA Section 401 water quality certification from the Central Valley RWQCB, and/or a Section 1600 lake and streambed alteration agreement from CDFW. Due to the nature and ecological benefit of the project (i.e., fish passage improvement) and the minimal amount of impacts on aquatic features, no compensatory mitigation is proposed.

d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The project would replace existing open culverts that direct water into agricultural ditches for watering agricultural land. One 36-inch culvert with a fish-friendly flap gate would be installed at the northern end of the project, and a fish screen would be placed at the southern end of the project (Figure 1-1). Both of these project components would keep special-status fish species from entering agricultural ditches and would have a beneficial effect on fish migrating through Tule Canal. During construction, a cofferdam would be placed at the fish screen site for dewatering. Fish would be able to access the channel during construction. At the culvert flap gate site, a silt curtain would be placed near the construction area and would exclude fish from the construction area and retain sediment that may be disturbed by construction activities. Impacts would be less than significant.

e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The vision of Yolo County is to remain an area of active and productive farmland and open space. The Yolo County 2030 General Plan includes a Conservation and Open Space element, which focuses on balanced management of the county's multiple natural resources. This element addresses open space for preservation of natural resources and for the managed production of resources including agricultural lands. The county has policies to protect, restore, and enhance habitat for sensitive fish species; to coordinate with other regional efforts such as the Yolo County HCP/NCCP to sustain or recover special-status species population; and to emphasize and encourage the use of wildlife-friendly farming practices within the agricultural districts, including managing and maintaining irrigation and drainage canals to provide habitat, support native species, and serve as wildlife movement corridors (Yolo County 2009).

The project would be consistent with the General Plan principles and objectives as well as the Yolo HCP/NCCP. It is intended to have a positive impact on habitat for sensitive fish species, and to improve structures and management facilities for agricultural water use. Impacts on existing natural resources would be minimal, and therefore less than significant.

f. Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan?

The project would not conflict with any adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan. The project area is within the 2018 Yolo HCP/NCCP planning area. The Yolo HCP/NCCP provides ESA permits and associated mitigation for planned covered activities including infrastructure (e.g., roads and bridges), development (e.g., agricultural processing facilities, housing, and commercial buildings), and operation and maintenance activities, and implementation of the Yolo HCP/NCCP. The plan covers several natural communities and species, including riparian communities, western pond turtle, giant garter snake, Swainson's hawk, white-tailed kite, burrowing owl, and tricolored blackbird.

The proposed project would be consistent with the Yolo HCP/NCCP. The project would provide safe fish passage in Tule Canal by improving diversion intake structures and dedicating water for instream beneficial use. The project would have minimal impacts on existing natural resources, vegetation, and wildlife. The avoidance and minimization measures identified above as mitigation for specific project impacts are consistent with the measures in the plan to reduce impacts on special-status species. The project would not interfere with the Yolo HCP/NCCP; therefore, there would be a less-than-significant impact.

V. Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?				X
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?		X		
c. Disturb any human remains, including those interred outside of dedicated cemeteries?		X		

Environmental Setting

This section presents information about what is known about cultural resources in the project area. This section includes summary archaeological, ethnographic, and historic-era contexts for the project area and summarizes cultural resources identification efforts and known cultural resources in the project area.

Archaeological Context

Although humans may have inhabited the Sacramento Valley as early as 10,000 years ago, the evidence for early human use likely is buried by deep alluvial sediments that accumulated rapidly during the late Holocene epoch. Archaeological remains of this early period have been identified in and around the Central Valley, including the Sierra foothills (Johnson 1967; Treganza and Heizer 1953).

The taxonomic framework of Central California, including the Sierra foothills, is described in terms of archaeological patterns (Moratto 1984). A pattern is characterized archaeologically by technology, particular artifacts, economic systems, trade, burial practices, and other aspects of culture. Fredrickson (1973) identified three broad patterns of resource use for the period between 4500 and 3500 before present B.P.: the Windmiller, Berkeley, and Augustine Patterns.

The Windmiller Pattern (4500–3000 B.P.) shows evidence of a mixed economy of game procurement with use of wild plant foods and materials. The archaeological record contains numerous projectile points associated with a wide range of faunal remains. Hunting was not limited to terrestrial animals, as is evidenced by fishing hooks and spears that have been found in association with the remains of sturgeon, salmon, and other fish (Moratto 1984). Plants were also used, as indicated by ground stone artifacts and clay balls or stones that were used for boiling acorn mush. Settlement strategies during the Windmiller period reflect seasonal adaptations; habitation sites in the valley were occupied during the winter months, but populations moved into the foothills during the summer (Moratto 1984).

The Windmiller Pattern transitioned to a more specialized adaptation labeled the Berkeley Pattern (3500–2500 B.P.). A reduction in the number of manos and metates and an increase in mortars and pestles indicate a greater dependence on acorns and seeds. Although seasonally harvested plant resources gained importance during this period, the continued presence of projectile points and atlatls (spear-throwers) in the archaeological record indicates that hunting was still an important activity (Fredrickson 1973).

The Berkeley Pattern was superseded by the Augustine Pattern around A.D. 500. The Augustine Pattern reflects a change in subsistence and land use patterns to those of the ethnographically known people (Nisenan) of the historic era. This pattern exhibits an elaboration of ceremonial and social organization, including the development of social stratification. Exchange became well developed, and an even more intensive emphasis was placed on the use of the acorn, as evidenced by the presence in the archaeological record of shaped mortars and pestles and numerous hopper mortars. Other notable elements of the artifact assemblage associated with the Augustine Pattern include flanged tubular smoking pipes, harpoons, clamshell disc beads, and an especially elaborate baked clay industry, which included figurines and pottery vessels (Cosumnes Brownware). The presence of small projectile point types, referred to as the Gunther Barbed series, suggests the use of the bow and arrow. Other traits associated with the Augustine Pattern include the introduction of preinterment burning of offerings in a grave pit during mortuary ritual, increased village sedentism, population growth, and an incipient monetary economy in which beads were used as a standard of exchange (Moratto 1984).

Ethnographic Context

The project is located at the interface of three Native American tribes: the Patwin (or Wintun), the Nisenan, and the Plains Miwok. The banks of the Sacramento River and associated riparian and tule marshland habitats were inhabited by the River or Valley Patwin. The Plains Miwok and Nisenan (also called Southern Maidu), while primarily occupying territories east of the Sacramento River, used land west of the river as well (Johnson 1978:350, Figure 1; Levy 1978:Figure 1; Wilson and Towne 1978:Figure 1).

The material culture and settlement-subsistence behavior of these tribes exhibit similarities, likely because of historical relationships and a shared natural environment. Historic maps and accounts of early travelers to the Sacramento Valley testify that tule marshes, open grasslands, and occasional oak groves (Jackson 1851; Ord 1843; Wyld 1849) characterized the project vicinity. The area was generally wet in the winter and often subject to flooding; the weather was exceedingly dry in summer. Much of the floodplain presumably was sparsely inhabited, and Native Americans typically situated their larger, permanent settlements on high ground along the Sacramento and American Rivers (Bennyhoff 1977; Kroeber 1925:351, 1932; Levy 1978; Wilson and Towne 1978:388).

The Native American economy in the project vicinity was based principally on the use of natural resources from the riparian corridors, wetlands, and grasslands adjacent to the Sacramento River. Fish, shellfish, and waterfowl were important sources of protein in the diet of these tribes (Johnson 1978:355; Kroeber 1932). Salmon, sturgeon, perch, chub, sucker, pike, trout, and steelhead were caught with nets, weirs, lines and fishhooks, and harpoons. Mussels were harvested from the gravels along the Sacramento River channel. Geese, ducks, and mud hens (*Fulica americana*) were hunted using decoys and various types of nets. The majority of important plant resources in the Patwin diet came from the grasslands of the Sacramento River floodplain (Stevens 2004a: Table 1). Plants important to California Indians also were obtained from and managed in valley wetlands (Stevens

2004b:7). In addition to the staple acorn, numerous plants were important secondary food sources, including sunflower, wild oat (*Avena fatua*), alfalfa (*Medicago sativa*), clover, and bunchgrass (Johnson 1978:355).

Historic Context

Early Exploration, Settlement, and Twentieth-Century Development

Spanish explorers visited the region as early as the 1700s in their search for suitable inland mission sites. In 1772, Pedro Fages passed through San Francisco Bay and the Delta and reached the San Joaquin and Sacramento Rivers. The Sacramento River was a convenient landmark for the early explorations and facilitated reconnaissance of the Sacramento Valley (Hoover et al. 2002:566–567). River traffic through the study area became more frequent between 1839 and 1848 with the establishment of John Sutter's fort at his New Helvetia Rancho, as well as other settlements upriver. The 1848 gold discovery at Coloma, however, was responsible for the vast increase in Sacramento River traffic in the study area through the 1850s (Goldfried 1988:9, 11.)

The decline of the California gold rush resulted in disenchanted miners who found it more profitable to engage in farming and ranching, thus transforming Yolo County into a booming agricultural region. From the mid-nineteenth through the mid-twentieth centuries, the main crops grown in Yolo County were grains such as wheat and barley. Commercial enterprises related to agriculture and livestock also sprang up during this period, furthering the development and growth of the region (Larkey and Walters 1987:25–45).

Yolo County's first town was Fremont, founded in 1849 near the confluence of the Sacramento and Feather Rivers (south of present-day Knights Landing). It became the first county seat in 1850. After the damaging flood of 1851, the county seat was moved to the town of Washington—founded in 1850 and now part of present-day West Sacramento. Between 1857 and 1861, the county seat moved from Washington to Cacheville (present-day Yolo) and back to Washington. However, in 1862, more flooding episodes motivated the community voters to select the centrally located town of Woodland as the permanent county seat (Hoover et al 2002:566, 568–569).

By the early decades of the twentieth century, a number of railroads provided service to the various communities that make up present-day West Sacramento, including the Sacramento Northern, Sacramento-Woodland, California Pacific, Northern Electric (Johnson 1978:350, Figure 1; Levy 1978:Figure 1; Wilson and Towne 1978:Figure 1), Western Pacific, Sacramento Short Line, and Southern Pacific (West Sacramento Historical Society 2004:25). The Sacramento and Woodland Railroad built a line in 1911 that traversed the project's area of potential effects in a roughly northeast–southwest direction. The line was later purchased by the Northern Electric Railroad before the Sacramento Northern Railway assumed ownership of it in 1918. Over time, portions of the rail alignment, including the segment in the project area, were abandoned. The segment was eventually removed and replaced with a public bike/running trail known as the Clarksburg Branch Line Trail.

Early Reclamation/Water Management in California

Historically, much of the Sacramento Valley was marsh and swampland, with seasonal flooding and periodic inundation of normally dry areas. Beginning in the nineteenth century, flood management and land reclamation projects were undertaken to make the area habitable for larger populations, expand agriculture, improve navigable waters, and offer flood projection. California's vast system of levees, canals, and drainages that provide flood protection and irrigate agricultural lands first originated in the mid- to late 1800s. Much like the evolution of state roadways and the national highway system, construction efforts to manage water through reclaiming land and building levees was first undertaken in bits and pieces by individual property owners and organizations, and then ultimately upgraded and connected with the aid of the state and federal governments (O'Neill 2006:Preface).

The earliest reclamation legislative act was passed by the U.S. Congress in 1850. Called the Arkansas Act, this legislation was enacted with the intent to grant swamp and overflow land to states under the prerequisite that the land could be "reclaimed" and used for agricultural purposes (Hundley 2001:80). This act assisted in funding the initial construction of levees and drainage in California by individual property owners along the Sacramento, American, and Feather Rivers. Five years later, the State of California began encouraging the purchase of swamp and overflowed lands at $1 per acre. Initially purchasers were limited to 320 acres of land; however, over the next several years legislative amendments increased the limit to 640 acres (Bonte 1930:109).

By 1861, the State legislature had enacted the Swamp and Overflowed Land Act, authorized the Swamp Land Commissioners, and initiated the formation of reclamation districts (RDs). The Swamp and Overflowed Land Act appropriated $200,000 from the previously established Swamp Land Fund for use at the discretion of the Commission and called for the taxation of land to fund reclamation projects (Bonte 1930:109). The years from 1861 to 1866 mark the first period of formal organization of reclamation in California (Bonte 1930:115). By 1866, 54 reclamation districts had petitioned for establishment. Of these, only 45 were formally organized and active in building levees and drainage structures. These initial reclamation districts were limited to 11 of California's 58 counties: Marin, Napa, Sacramento, San Joaquin, San Mateo, Solano, Sonoma, Sutter, Tulare, Placer, and Yolo. The first reclamation district in California, No. 1, encompassed the American Basin, extending from the American River north to the Bear River (Bonte 1930:116). Improvements of lands to protect from flooding and to allow reclamation of agricultural lands formally began in 1863. By 1865, 26 miles of levees and 20 miles of drainage canals had been constructed in RD No. 1 (consolidated later into portions of RD 1000 and RD 1001).

Between the 1860s and early 1900s, efforts were made to standardize the reclamation districts as regulating bodies. Efforts were also made to standardize construction methods for flood control structures. In 1866, the Swamp and Overflowed Land Act was amended yet again, abolishing the Swamp Land Commissioners, discharging their engineers, and transferring the funds allocated through this legislation to the various counties to construct levees and drainage. The county surveyors were then designated as the engineers for reclamation districts in their respective counties. This solidified the formation of reclamation districts by establishing county boards of supervisors for the districts (Bonte 1930:110–111).

In 1868 the California state legislature passed the Green Act, which would guide the state flood control policy into to the early 1900s. The Act enabled purchasers of swamp or overflow land to create a district and construct any type of levee or drainage system on their land. The act also removed restrictions on the amount of acreage individuals or groups could purchase, which led to land monopolies instead of promoting small irrigated farms.

By the early part of the twentieth century, over 700 reclamation districts had been organized, often with overlapping boundaries. Many of these districts lacked clear polices and feasible projects (Kelley 1989:112, 119). In 1911, the United States Corps of Engineers' California Debris Commission presented a plan to Congress to unify Northern California's levees and drainages. The plan, which came to be known as the Sacramento Flood Control Project and is commonly referred to as "the Jackson Report,"—named for the main author—involved creating a second river channel that the Sacramento River could overflow into. With enhancing navigation opportunities at the forefront of the report, the plan also included upgrading existing levees along the Sacramento and Feather Rivers (Kelley 1989:275, 282).

By 1911, "391 miles of such structures were already in existence, but only 74 miles of them were high enough and strong enough to be considered up to necessary standards and grade" (Kelley 1989:283). In essence, the 74 miles of existing levees that met construction standards as stated in the Jackson Report in 1911 became the benchmark for future levee upgrades and construction implemented through the Sacramento Flood Control Project. The Jackson Report projected that the levee upgrades and additional work on the system proposed in the report would be funded by the state or local landowners. That same year, Governor Hiram Johnson called a special session of the state legislature to pass the California State Flood Control Act, approving the Sacramento Flood Control Project. As part of this legislation, "the State Reclamation Board was established to coordinate reclamation, flood control, and navigation projects with the federal government" (O'Neill 2006:115). Accordingly, to a large degree, the passage of the California State Flood Control Act in 1911 marks the origin of a consolidated statewide water management plan, and standardized methods of reclamation construction in the state. (Bonte 1930:115).

The federal government had been historically reluctant to provide states aid for flood control. Six years after the Jackson Report was presented to Congress, and the State of California had begun implementation of the Sacramento Flood Control Project, the 1917 Flood Control Act was enacted. The federal legislation provided some funding for Sacramento Flood Control Project task; however, they were largely for navigation related undertakings. This federal legislation also helped fund levee improvements along the Mississippi River (O'Neill 2006:125). The 1917 Flood Control Act established the "federal government responsibility to protect lands adjacent to navigable rivers, and it further institutionalized relations between the federal government, contractors, and state and local governments," setting forth a new era of water management (O'Neill 2006:126).

California's earliest reclamation efforts were established between 1850 (Arkansas Act enacted) and 1911 (State Flood Control Act enacted). A few of these early levees, canals, and drainages were completed during this span of time, a period when California standardized reclamation efforts. Several of these early flood control structures still maintain their original alignment, continue to function as mechanisms of flood control, and serve as part of the existing statewide water management system. These structures best represent the evolution of statewide water management in California, establishing a model for all reclamation activities that followed throughout the state after 1911.

Reclamation District 900 and the Sacramento River South Levee

The Sacramento River South Levee is located within the jurisdiction of RD 900, which was consolidated in 1911 from portions of RD 539 (established in 1891) and RD 742 (established in 1903) (Bonte 1930:126, 129, 180-181). As early as 1892, Yolo County farmers came together to construct levees along the Sacramento River from the town of Washington to roughly 9 miles downstream. These levees, however, were not constructed to withstand powerful floods, such as the one that breached the levee near present-day 15th Street and the Jefferson Highway in West Sacramento in 1907 (Walters 1987:21).

The 1907 flood was a major setback for reclamation and development of land in eastern Yolo County. Earlier that year, the West Sacramento Land Company had been organized to establish a terminal for the Northern Electric Railroad across the river from downtown Sacramento and to build residential subdivisions along the new railroad corridor (Walters 1987:21). The damage from the flood and the high cost of draining the swamps, combined with another devastating flood in 1909, however, delayed the completion of the project and forced the company to reorganize in 1910 as the West Sacramento Company. Reclamation efforts began again in 1911. The project ultimately took the company 6 years to complete (Larkey and Walters 1987:64).

The Sacramento Land Company recognized that the sale of reclaimed land for farms, residential subdivisions, businesses, and industrial plants would be difficult without adequate levees to protect the area from flooding. Consequently, the company petitioned the state legislature for permission to organize a new reclamation district. The petition was approved and a new reclamation district, RD 900, was established in March of 1911, despite the opposition of smaller landowners in the West Sacramento area (Walters 1987:22).

That same year, a State Reclamation Board was established with jurisdiction over reclamation districts and levee plans, and the state legislature finally approved a flood control plan for the Sacramento River. Implementation of the Sacramento Flood Control Project resulted in new reclamation districts that constructed hundreds of miles of levees along the Sacramento River using large clam shell dredges. The plan called for a partnership between federal, state, and local agencies, as well as private companies, to build high levees and a series of weirs along the Sacramento River to lessen the potential for flooding (Larkey and Walters 1987:62; Walters 1987:22).

The reclamation districts that were created as a result of the 1911 legislation differed from their predecessors in that they were controlled by modern corporations with the resources to complete large, land-moving projects. The early reclamation districts were typically controlled by local landowners, who lacked the funds needed to complete reclamation plans. New districts such as RD 900, RD 1000, and RD 1500 also had a cadre of skilled professionals who could implement and manage plans for large-scale development projects. It was not uncommon for the officers and directors of these new reclamation districts to sit on the boards of other corporations. The director of the West Sacramento Company, Louis Sloss, for example, was not only involved in the development of RD 900, he was also a director of the Natomas Company (developer of RDs 1000 and 1001), the Northern Electric Railroad, Pacific Gas & Electric Company, and Alaska Packers Association. With the interests that these companies represented, corporate leaders such as Sloss were in a position "to see the relationships between the development and marketing of hydroelectric power, the reclamation and sale of land for agriculture, and the development of rail and water transportation which carried agricultural products to market." In this regard, "Sloss was typical of the leaders of these companies and his diverse involvements illustrate the way in which flood control and reclamation were taken over in the 1910s by a new type of enterprise" (quoted in Dames and Moore 1996:9).

Levee construction for RD 900 began in 1912 under the direction of the San Francisco engineering firm of Hauiland, Dozier & Tibbetts. The new reclamation district encompassed 11,500 acres, extending from the east–west line of the Southern Pacific Railroad tracks, south to the vicinity of Riverview, and north beyond the Barge Canal. Completed by 1915, the levee was constructed to a height of 24 feet, with a top width of 80 feet (Hauiland, Dozier & Tibbetts 1913:25–26). Construction also involved the installation of drainage canals and pump houses. The canals carried drainage to the pump houses, which moved the water over the levees and into the Yolo Bypass. As the land was drained of water, the fields of tules were removed, establishing acres of agricultural land.

Twentieth-Century Residential and Agricultural Development

The completion of the RD 900 levee spurred the development of communities and agriculture in the West Sacramento area. By the end of the second decade of the twentieth century, three distinct communities had been established within RD 900: Broderick (Washington), Bryte (Riverbank), and West Sacramento. Their combined population in 1920 was 2,638, nearly double the 1900 population of the area of 1,398 residents (Walters 1987:24).

The oldest of the three communities was Broderick, which was founded in 1850 and originally known as Washington. The name was changed in 1914 to Broderick. By 1915, there were 1,000 people living in the town, including Anglo-American families from the eastern United States, Chinese laborers, and Italian business owners (Walters 1987:24–26). The town featured a community hall, post office, grammar school, a business district, and tree-lined streets with attractive two-story residences. Architecturally, the pre-RD 900 era homes in the town were vernacular examples of the Italianate, Queen-Anne, and Neoclassical style and featured wood-frame structural systems, high foundations, horizontal wood siding, and porches or second-story verandas. These older residences were generally two stories in height, with the living quarters placed on the upper floor to accommodate for the periodic flooding that occurred in the area (West Sacramento Historical Society 2004:39).

One of the new subdivisions associated with the development of RD 900 was Riverbank, later known as Bryte. The West Sacramento Company laid out this new subdivision in 1911–1912 on 133 acres that it owned east of the present-day I-80 crossing of the Sacramento River. The culturally diverse community was home to Portuguese farmers and fishermen, Russian families, Japanese farmers, and Southern Pacific Railroad workers. With the establishment of a post office in 1915, the subdivision changed its name from Riverbank to Bryte in honor of George Bryte Sr., son of a local pioneer dairyman (Walters 1987:26). In contrast to the two-story homes built prior to the construction of RD 900 levees, the residences in Bryte were largely one-story, wood-frame buildings (West Sacramento Historical Society 2004:39). Bryte's domestic architecture reflects the influence of levee construction in the area and the subsequent reduced potential for flooding from the Sacramento River.

Shortly after the establishment of Bryte, the West Sacramento Company began work on another subdivision, West Sacramento. The company filed a map for the subdivision on December 1, 1913. The original plans for the city were designed by Charles H. Cheney and architect Lewis Hobart, who were both students of the esteemed Ecole des Beaux Arts in Paris. West Sacramento was designed as a model city with a modern water and sewer system, radial boulevards, and traffic arteries leading to a central plaza. The subdivision originally included 1,665 town lots, with a downtown area centered around the intersection of 15th Street and present-day Jefferson Boulevard (Walters 1987:28).

The grand development plans for West Sacramento, however, ended because of the onset of World War I in 1914, flood damage to the levees, the bankruptcy of the Northern Electric Railroad (a primary owner of the West Sacramento Company), and the increasing debt of the West Sacramento Company. Over the next few years, elements of the plan served as a framework for growth, supported in part by prominent landowner J. H. Glide. Development overall remained slow, with only 200 homes sold by 1920 (Larkey and Walters 1987:82). Homes built prior to World War II tended to have modest façades, often exhibiting Craftsman or Tudor Revival-style architectural elements.

Prior to 1920, the West Sacramento Company was more successful at selling farm parcels than building towns. Just south of the new community of West Sacramento was the farming district of RD 900 (Larkey and Walters 1987:82). The West Sacramento Company sold or leased thousands of acres of this newly reclaimed land in the years before 1920. Farmers were numerous within the RD 900 area. They organized a Farm Bureau in 1917 and held meetings at the West Sacramento Company's headquarters at the corner of 15th Street and Jefferson Boulevard. Farmers grew rice, sugar beets, tomatoes, onions, carrots, and other vegetables (Walters 1987:29; West Sacramento Historical Society 2004:62–63).

Farms in the area typically contained a complex of buildings, including a single-family dwelling and various ancillary agricultural buildings such as barns, storage sheds, and pump houses. Farm houses built prior to World War II were generally vernacular in style and built with a wood-frame structural system and wood board siding. Barns and other ancillary buildings were utilitarian in style and featured frame construction and wood board exterior siding, and corrugated metal roofs.

With the onset of World War II, factories and other industries began to prosper along the west bank of the Sacramento River. Major employers in the West Sacramento area included the State Box Company, Rice Growers Association, and Leinberger's Slaughterhouse. Despite an improved economy, few new buildings were constructed during the war due to the shortage of building materials (Walters 1987:34).

The end of the war spurred further growth in the area. In 1945, the Sacramento district office of USACE recommended the construction of a deep-water ship channel to connect Sacramento to the San Francisco Bay Area. After Congress approved the project, construction on the Barge Canal in eastern Yolo County began in 1949. Although construction temporarily halted during the Korean Conflict, the deep-water channel was completed in 1962. The channel terminated at a deep-water harbor at West Sacramento, where port facilities were established to transfer cargo from the ships. Additionally, a turning basin for the ships was created at Lake Washington (Walters 1987:35).

The Barge Canal divided RD 900 into two parts and rerouted Highway 84 to its present alignment along Jefferson Boulevard. The canal and the newly established Sacramento-Yolo Port brought hundreds of new workers into the area and contributed to a postwar housing boom. Early postwar residential architecture reflected the influence of the Minimal Traditional style, followed increasingly by the Ranch style during the 1950s. Among the new postwar subdivisions were Arlington Oaks, Westmore Oaks, and Linden Acres, which were constructed south of the Barge Canal in the Southport area during the 1950s. Additional subdivisions emerged in the communities north of the Barge Canal, including Westfield Village and Elkhorn Village. The postwar housing boom was reflected in the population of East Yolo County, which rose from 5,385 in 1940 to 25,032 in 1960 (Walters 1987:35).

In 1987, after numerous attempts, the city of West Sacramento was officially incorporated. The new city included the former communities of Broderick, Bryte, and surrounding urban and rural areas on the west side of the Sacramento River into Southport (Walters 1987:46; West Sacramento Historical Society 2004:97). As of the 2010 U.S. Census, the population of the city reached 48,744 (U.S. Census Bureau 2010).

Buried Sites Context

Research was conducted to address the archaeological sensitivity of the project area and the potential for buried archaeological sites. Identified landforms that predate earliest human occupation of the region are considered to have very low potential for buried archaeological sites. Conversely, identified landforms that postdate human occupation are considered to have a higher potential for buried archaeological sites.

The degree of potential for buried sites is directly correlated with the estimated date range of the formation of the landform. The more recent the landform, the more potential for buried sites. The archaeological record indicates that the earliest evidence for human occupation of California dates to the Late Pleistocene, which ended approximately 11,500 years before present. Because of this, it is easy to argue that there is a very low potential for buried sites in landforms dating from the Late Pleistocene and earlier because these contexts are too old to harbor subsurface archaeological deposits. However, if a landform dates to the Middle Holocene or later, there is high potential for subsurface archaeological deposits. Early Holocene landforms generally have a low to moderate sensitivity due to low population levels and an overall dearth of Early Holocene sites in the Central Valley.

According to geologic maps of the Sacramento quadrangle, California (Wagner et al. 1981), the majority of the project contains Basin deposits (Alluvium) dating to the Quaternary period. These soils consist primarily of silt loams (Vc, Valdez complex, flooded) with silty clay loams (Sg, Sacramento Soils, flooded) at the north end of the project area. According to soil maps, the silt loam soils are located in alluvial fans with silt loam down to 21 inches and then a layer of stratified sandy loam to silt clay loam down to 60 inches. These soils have a very high sensitivity for buried archaeological sensitivity (U.S. Department of Agriculture 2023; Meyer and Rosenthal 2008). As a result of the analysis, the project area has a very high sensitivity for buried archaeological sites due to age of landforms and the alluvial soils, which tend to bury previous archaeological remains.

Cultural Resources in the Project Area

A California Historic Resources Inventory System (CHRIS) records search of the project area was conducted on December 15, 2022, at the Northwest Information Center (NWIC). The CHRIS records search covered the project area and an additional 0.5-mile study radius. The record search indicated that eight studies were conducted within the record search radius with two encompassing portions of, or adjacent to, the project area. Additionally, one recent study not yet on file at the NWIC was conducted adjacent to the north end of the project area. The CHRIS results found two previously recorded resources adjacent to the project area, with a total of six previously recorded resources in the 0.5-mile study radius. Four of the five resources in the record search radius are built environment resources associated with canal systems, railroads, levees, and bypasses, with one resource identified as the documented location of a previous townsite.

Additional research was conducted using Government Land Office plats, U.S. Geological Survey quadrangle maps, aerial images, and standard historical references such as county histories, ethnographic reports, and both California Office of Historic Preservation and National Parks Service National Register information.

A request was submitted to Native American Heritage Commission (NAHC) for a Sacred Lands File search. A letter was received December 20, 2022, from NAHC, confirming that the Sacred Lands File search did not identify any Sacred Lands within the project area. The NAHC also provided a list of nine Native American contacts that may provide information on Native American cultural resources in the area. AB 52 Tribal consultation efforts have been carried out between the Lead Agency (Department of Water Resources) and the Yocha Dehe Wintun Nation (Tribe). Consultation has identified the project as culturally sensitive, and the Tribe as recommended Tribal monitoring during ground disturbing activities.

A cultural resources survey was conducted on February 16, 2023. As a result of the survey, one previously recorded cultural resource, the Tule Canal (P-57-000414), was identified within the project area. The Tule Canal is an earthen water conveyance structure oriented along a north–south axis with a varying width of 40–65 feet. Its banks are lined with varying degrees of vegetation and dirt roads run along both banks of the canal. In 2018, the Bureau of Reclamation identified the Tule Canal as a contributing feature to a proposed Sacramento River Flood Control Project (SRFCP) historic district. The Tule Canal's status as a contributing feature to the proposed historic district received State Historic Preservation Officer concurrence in 2019; therefore, it is considered a historical resource under CEQA. No archaeological resources were identified within the surveyed portions of the project, and most of the project area appeared to be fallow grasslands that had been cultivated for agricultural use in previous years. Through these methods and results, this study found that one CEQA historical resource (the Tule Canal, as a contributor to the SRFCP historic district) is in the project area. No unique archaeological resources are known to be located in the project area.

Impacts

a. Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?

The cultural resources investigation identified the Tule Canal, a contributing feature of the proposed SRFCP historic district, in the project area. The proposed project would not cause a substantial adverse change to the proposed SRFCP historic district because none of the proposed character-defining features of the Tule Canal, including the canal's alignment, location, function as a water conveyance structure, and setting that would contribute to the significance of the proposed SRFCP historic district would be changed. The Tule Canal would maintain its historic location, alignment, and function as an earthen water conveyance structure set within an agricultural setting. Thus, the proposed project would result in no impact on historical resources.

b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

The proposed project would not cause a substantial adverse change in the significance of a unique archaeological resource as defined in Section 15064.5 because no archaeological resources were identified in the project area. However, if previously unknown archaeological resources are encountered during construction of the proposed Project, they could be adversely affected. Implementing Mitigation Measures CUL-1/TCR-1, CUL-2/TCR-2, CUL-3/TCR-3, and CUL-4/TCR-4 would reduce potential impacts on previously unknown archaeological resources to a less-than-significant level. These mitigation measures apply to both cultural resources and tribal cultural resources.

Mitigation Measure CUL-1/TCR-1. Discovery of Previously Unknown Cultural or Tribal Cultural Resources. In the event that potential cultural or tribal cultural resources are discovered during project implementation, all earth-disturbing work within 100 feet of the find will be temporarily suspended or redirected until a qualified archaeologist can adequately assess the find and determine whether the resource requires further study. If the cultural or tribal cultural resource discovery is potentially significant, DWR and any local, state, or federal agency with approval or permitting authority over the project that has requested/required notification will be notified within 48 hours.

For all discoveries known or likely to be associated with Native American heritage (precontact sites and select post-contact historic-period sites), a Tribal Representative from a California Native American tribe that is traditionally and culturally affiliated with a geographic area will be immediately notified and will determine if the find is a tribal cultural resource (TCR) (Public Resources Code [PRC] Section 21074). If the find is identified as a TCR, the Tribal Representative, in consultation with DWR and a qualified archaeologist, will develop a treatment plan in any instance where significant impacts cannot be avoided. The treatment plan will be prepared in collaboration with consulting tribes and be submitted to the DWR and any participating tribe for review and approval prior to its implementation, and additional work in the vicinity of the discovery will not proceed until the plan is in place.

The location of any such finds must be kept confidential, and measures will be taken to secure the area from site disturbance and potential vandalism. Impacts on previously unknown significant cultural or tribal cultural resources will be avoided through preservation in place, if feasible. Damaging effects on TCRs will be avoided or minimized following the measures identified in PRC Section 21084.3, subdivision (b), if feasible, unless other measures are mutually agreed to by the lead archaeologist and culturally affiliated tribes that would be as or more effective.

Mitigation Measure CUL-2/TCR-2. Unanticipated Discovery of Human Remains. If human remains, including Native American remains or burials, are encountered, all provisions provided in California Health and Safety Code Section 7050.5 and PRC Section 5097.98 will be followed. Work will stop within 100 feet of the discovery and the County Coroner will be immediately contacted. If human remains are of Native American origin, the County Coroner will notify the Native American Heritage Commission (see at http://www.nahc.ca.gov/profguide.html) within 24 hours of this determination, and a Most Likely Descendent will be identified. No work is to proceed in the discovery area until consultation is complete and procedures to avoid or recover the remains have been implemented.

Mitigation Measure CUL-3/TCR-3. Cultural Resources Sensitivity Training. The Lead Agencies shall provide preconstruction training for all construction personnel engaged in construction that have the potential to affect archaeological resources. This training will provide instruction on how to identify resources in the field and appropriate measures to be taken if a discovery or potential discovery occurs. The Lead Agencies will include a list of cultural resources staff that can respond to cultural resource discoveries, provide management direction following discoveries in the construction training materials, and provide this list and these discovery requirements to the supervisory field staff for the construction workers. Construction worker trainings in the form of tailgate meetings would be implemented to familiarize workers with common types of artifacts (stone flakes, charmstones, and historic debris-like bottles) and the procedures to follow in the event of a buried discovery.

Mitigation Measure CUL-4/TCR-4. Treatment Protocol for Handling Human Remains and Cultural Items Affiliated with the Yocha Dehe Wintun Nation If human remains or cultural items found to be affiliated with the Yocha Dehe Wintun Nation are discovered during ground disturbing activities, the procedures set forth in the *Treatment Protocol for Handling Human Remains and Cultural Items Affiliated with the Yocha Dehe Wintun Nation* provided in Appendix E of this document shall be followed. The treatment protocol document outlines the Tribe's procedures for inadvertent discovery of Native American human remains, treatment of Native American remains, non-disclosure of location of reburials, treatment of cultural resources, inadvertent discoveries, and a work statement for Tribal monitors. The protocol document also provides a description of work and treatment protocol regarding the preferred treatment upon discovery, comportment when working around discoveries, and recommendation for excavation methods.

c. Disturb any human remains, including those interred outside of dedicated cemeteries?

No human remains are known to be in or near the project area. However, the possibility always exists that unmarked burials may be unearthed during subsurface construction activities. Consequently, there is the potential for the project to disturb human remains during construction, including those outside of formal cemeteries. This impact is considered potentially significant but would be reduced to a less-than-significant level by implementing Mitigation Measures CUL-2/TCR-2 and CUL-4/TCR-4.

VI. Energy

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?				X
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?				X

Environmental Setting

The Energy Conservation section of the Conservation and Open Space Element of the County of Yolo 2030 General Plan includes goals, policies and actions relating to energy production, usage, and conservation within Yolo County. Title 24, Part 6 of the California Code of Regulations sets forth the state energy efficiency standards for residential and non-residential buildings. In Yolo County, energy conservation can be achieved via a reduction in electricity usage and private automobile use, encouraging efficient siting and exposure for buildings, and implementing land use and transportation policies that encourage fewer and shorter vehicle trips. (Yolo County 2009)

The project would consume energy during construction in the form of gasoline and diesel used to operate equipment, generators, tractor trailers, tractors with auger, haul trucks, and construction personnel vehicles (passenger trucks and cars). The project would efficiently use energy during construction, which conforms with the Yolo County 2030 General Plan's conservation goals.

The consumption of energy associated with operating the intake screens would include electricity from PG&E, the lines of which would need to be installed.

Impacts

a, b. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation or conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

The construction and operation of the project would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Construction activities would result in short-term energy consumption from the use of petroleum fuels by off-road construction equipment, and from on-road vehicles used by construction workers to travel to and from the site during construction and to deliver construction materials. The project is not a capacity-increasing project and would not increase use of energy resources. The project would not conflict with state and local plans for renewable energy and energy efficiency. No impact would occur.

VII. Geology, Soils, and Paleontological Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
2. Strong seismic ground shaking?				X
3. Seismic-related ground failure, including liquefaction?				X
4. Landslides?				X
b. Result in substantial soil erosion or the loss of topsoil?			X	
c. Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?				X
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?				X
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater?				X
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X

Environmental Setting

The project area lies within the Sacramento Valley, which is part of the Great Valley Geomorphic Province. In the project area, Holocene (i.e., 11,700 years B.P.) and Pleistocene (1.8 million–11,700 years B.P.) alluvial deposits lie atop the thick sequence of sedimentary rock units that form the deeply buried bedrock units in the mid-basin areas of the valley. The youngest geomorphic features in the project area are low floodplains, which are found primarily along the Sacramento and American Rivers. These major drainage ways were originally confined within broad natural levees sloping away from the rivers or streams. The natural levees formed through the deposition of coarser materials that settled out of suspension nearest the rivers and streams, forming the natural levees and sand bars in the vicinity of the river channel. The finer material was carried in suspension farther from the rivers or streams and settled out in quiet water areas such as swales, abandoned meander channels, and lakes. However, because the streams have meandered and reworked the previously deposited sediments, extreme variations in material types may be found over a limited distance or depth. (U.S. Department of the Interior Bureau of Reclamation/City of Sacramento 2019)

Surface rupture occurs when the ground surface is broken due to fault movement during an earthquake. The only fault in the county that has been identified by the California Geological Survey (CGS) to be active, or potentially active, and subject to surface rupture (i.e., is delineated as an Alquist-Priolo Earthquake Fault Zone) is the Hunting Creek Fault. This fault is not near the project area, rather it is in the northwest corner of the county. The only other active or potentially active fault in the county is the Dunnigan Hills Fault, which extends west of I-5 between the town of Dunnigan and northwest of the town of Yolo. (Yolo County 2009)

Seismic shaking (or ground shaking) is a general term referring to all aspects of motion of the Earth's surface resulting from an earthquake and is normally the major cause of damage in seismic events. The extent of ground shaking is controlled by the magnitude and intensity of the earthquake, distance from the epicenter, and local geologic conditions. In addition to the Hunting Creek and Dunnigan Hills Faults discussed above, major regional faults outside the county but in the Coast Ranges and in the Sierra Nevada foothills are capable of producing ground shaking in the county. (Yolo County 2009)

Liquefaction is the temporary transformation of loose, saturated granular sediments from a solid state to a liquefied state as a result of seismic ground shaking. In the process, the soil undergoes transient loss of strength, which commonly causes ground displacement or ground failure to occur. Because saturated soils are a necessary condition for liquefaction, soil layers in areas where the groundwater table is near the surface have higher liquefaction potential than those in which the water table is located at greater depths. No map of liquefaction hazard has been prepared on a countywide basis. (Yolo County 2009)

Yolo County contains important soil resources. Twelve soil associations have been identified in Yolo County. According to the Yolo County 2030 General Plan EIR, project area soils are primarily Capay-Sacramento association soils, which are moderately well drained to poorly drained, nearly level silty clay looms to clays in basins. (Yolo County 2009)

Expansion and contraction of volume can occur when expansive soils undergo alternating cycles of wetting (swelling) and drying (shrinking). During these cycles, the volume of the soil changes markedly. As a consequence of such volume changes, structural damage to buildings and infrastructure may occur if the potentially expansive soils were not considered in building design and during construction. According to the Yolo County 2030 General Plan EIR, project area soils have a high to very high shrink-swell potential. (Yolo County 2009)

The Sacramento Valley is a northwest–southeast trending structural trough that contains a thick sequence of sediments, ranging in age from the Jurassic to recent Pleistocene and Holocene alluvium. The eastern boundary of the county is the Sacramento River. Prior to modern flood control measures, the river would heavily flood in the winter and deposit sediments on its floodplain. Late Holocene alluvial deposits overlie older Pleistocene alluvium and/or the upper Tertiary bedrock formations in the southern and eastern portions of Yolo County. This alluvium consists of sand, silt, and gravel deposited in fan, valley fill, terrace, or basin environments. This unit is typically in smooth, flat valley bottoms, in medium-sized drainages, and in other areas where the terrain allows a thin veneer of this alluvium to deposit. These alluvial deposits contain vertebrate and invertebrate fossils of extant, modern taxa, which are generally not considered paleontologically significant. (Yolo County 2009)

Impacts

a.1. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

The project area is not in an area designated as an Alquist-Priolo Earthquake Fault Zone (California Department of Conservation 2022). No impact would occur.

a.2. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: Strong seismic ground shaking?

The project would not consist of any activities or facilities that would directly or indirectly cause strong seismic shaking because the project is located over 12 miles from the nearest active fault, the Dunnigan Hills Fault. Also, the installation and operation of the facilities would not have any effect on the fault resulting in strong seismic shaking. No impact would occur.

a.3. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: Seismic-related ground failure, including liquefaction?

The project would not consist of any activities or facilities that would directly or indirectly cause seismic-related ground failure such as liquefaction as the installation and operations of the facilities would not have any effect on the nearest fault. The project area is in an unevaluated liquefaction zone (California Department of Conservation 2021). No impact would occur.

a.4. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: Landslides?

The project area is not located within an earthquake-induced landslide zone. Additionally, most of the project area is within flat land, and no rainfall-induced landslides or existing landslides are mapped (California Department of Conservation 2021). No impact would occur.

b. Result in substantial soil erosion or the loss of topsoil?

Construction activities associated with the project would result in approximately 1.0 acre of ground disturbance. Earth-moving activities such as excavation, temporary stockpiling, and grading could result in increased erosion and sedimentation to surface waters. However, substantial erosion is not expected because of the relatively small scale and short duration of earth-moving activities. In addition, the flat topography in the project area would minimize the potential for runoff movement and associated erosion. Wind during construction could result in minor soil losses. The impact would be less than significant.

c. Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?

Implementation of the project would not result in the creation of new structures that would be located on an unstable geologic unit or soils, nor would it cause a geologic unit or soils to become unstable resulting in landslide, lateral spreading, liquefaction, or collapse. No impact would occur.

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

According to the Yolo County 2030 General Plan EIR, project area soils have a high to very high shrink-swell potential (Yolo County 2009); however, construction activities would not result in the creation of structures with substantial risks to life or property as a result of the potential presence of expansive soils. No impact would occur.

e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater?

No aspect of the project would use septic tanks or alternative wastewater disposal systems; therefore, no impact would occur.

f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Sediments adjacent to the Sacramento and American Rivers are composed of recent (Holocene) alluvial floodplain deposits (Yolo County 2009). Construction activities that would occur within alluvial floodplain or basin deposits would be located within Holocene-age alluvium, which are generally considered too young to contain paleontologically sensitive resources. No impact would occur.

VIII. Greenhouse Gas Emissions

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:					
a.	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b.	Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	

Environmental Setting

The process known as the *greenhouse effect* keeps the atmosphere near Earth's surface warm enough for the successful habitation of humans and other life forms. The greenhouse effect is created by sunlight that passes through the atmosphere. Some of the sunlight striking Earth is absorbed and converted to heat, which warms the surface. The surface emits a portion of this heat as infrared radiation, some of which is re-emitted toward the surface by greenhouse gases (GHG). Human activities that generate GHGs increase the amount of infrared radiation absorbed by the atmosphere, thus enhancing the greenhouse effect, and amplifying the warming of Earth.

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution (Intergovernmental Panel on Climate Change 2018). Rising atmospheric concentrations of GHGs at more than natural levels result in increasing global surface temperatures—a process commonly referred to as *global warming*. Higher global surface temperatures, in turn, result in changes to Earth's climate system, including increased ocean temperature and acidity, reduced sea ice, variable precipitation, and increased frequency and intensity of extreme weather events (Intergovernmental Panel on Climate Change 2018). Large-scale changes to Earth's system are collectively referred to as *climate change*.

The principle anthropogenic (human-made) GHGs contributing to global warming are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated compounds, including sulfur hexafluoride (SF_6), hydrofluorocarbons (HFC), and perfluorocarbons (PFC). Unlike criteria air pollutants, which occur locally or regionally, the long atmospheric lifetimes of these GHGs allow them to be well mixed in the atmosphere and transported over distances. Within California, transportation is the largest source of GHG emissions (41 percent of emissions in 2019), followed by industrial sources (24 percent) (CARB 2022).

There is currently no federal law specifically related to climate change or the reduction of GHGs. California has adopted statewide legislation addressing various aspects of climate change and GHG emissions mitigation. Much of this establishes a broad framework for the state's long-term GHG reduction and climate change adaptation program. Of particular importance are Senate Bill (SB) 32 and Assembly Bill (AB) 1279, which outline the state's GHG reduction goals of achieving a 40 percent reduction below 1990 emissions levels by 2030 and net zero GHG emissions (i.e., reach a balance between the GHGs emitted and removed from the atmosphere) no later than 2045. AB 1279 also mandates an 85 percent reduction in statewide GHG emissions (from 1990 levels) by 2045.

As discussed in Section III, *Air Quality*, the YSAQMD has the primary responsibility for air quality management in Yolo County and eastern Solano County, although the air district has not yet adopted specific thresholds for the analysis of GHG emissions in CEQA documents. In May 2012, DWR adopted the *California Department of Water Resources Climate Action Plan Phase I: Greenhouse Gas Emissions Reduction Plan* (2012 Plan), which detailed DWR's efforts to reduce GHG emissions consistent with state goals. In July 2020, DWR developed the *California Department of Water Resources Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan Update 2020* (Update 2020), which specifies aggressive 2030 and 2045 emissions reduction goals. Update 2020 includes construction thresholds to define major actions from an emissions perspective. These thresholds are 25,000 metric tons of carbon dioxide equivalent (CO_2e) for the entirety of, or 12,500 metric tons CO_2e in any single year of, construction. Update 2020 was prepared consistent with State CEQA Guidelines Section 15183.5(b)(1) and is considered a qualified plan for the reduction of GHG emissions.

Yolo County adopted a climate action plan (CAP) in March 2011 to reduce community GHG emissions. The CAP contains 15 primary measures that will help the community achieve GHG reductions and successfully adapt to climate change. The combined implementation of these strategies, alongside local reductions resulting from state programs, achieve the county's 2020 and 2030 reduction targets (Yolo County 2011). The 2030 target is consistent with SB 32. The CAP was prepared consistent with State CEQA Guidelines Section 15183.5(b)(1) and can be used for CEQA review of subsequent plans and projects that are consistent with the GHG reduction strategies and targets in the CAP. In October 2020, Yolo County adopted resolution 20-114 declaring a climate crisis and authorizing preparation of a Climate Action and Adaptation Plan (CAAP). The CAAP is still in development.

Impacts

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction of the proposed project would generate emissions of CO_2, CH_4, N_2O, and HFCs from mobile and stationary construction equipment exhaust and employee and haul truck vehicle exhaust. Construction emissions were estimated using the methods described in Section III, *Air Quality*; the results are summarized in Table 3-7. Refer to Appendix B for model outputs.

Table 3-7. Estimated Greenhouse Gas Emissions from Project Implementation (metric tons)

Source	CO_2	CH_4	N_2O	HFC	CO_2e[1]
Construction (2024)	190	0.01	0.01	0.05	192

[1] Refers to carbon dioxide equivalent, which includes the relative warming capacity (i.e., global warming potential) of each GHG.

CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide; HFC = hydrofluorocarbons.

As discussed above under *Environmental Setting*, DWR has adopted a CAP. While Update 2020 outlines construction thresholds and is a qualified GHG reduction plan, it cannot be used by the proposed project for the purposes of tiering project-level GHG emissions because the project will be constructed and operated by private contractors, not DWR.

Yolo County's CAP is a qualified GHG reduction strategy per the State CEQA Guidelines and can be used to streamline GHG analyses for projects implemented in Yolo County prior to the CAP horizon year (2030). The CAP evaluates GHG emissions from construction activities in its community inventory, forecasts, and reduction target assessments (Yolo County 2011). Accordingly, the county's community CAP fully covers emission sources associated with construction of the proposed project. Construction GHG emissions generated in Yolo County are therefore evaluated based on compliance with the county's community CAP.

Table 3-7 indicates that construction of the project would result in an estimated total of 192 metric tons CO_2e. For reference, these emissions are considerably less than DWR's construction screening thresholds (12,500 metric tons CO_2e/year and 25,000 metric tons CO_2e total). Table 3-8 evaluates the proposed project's consistency with the county's CAP. As shown in the table, construction activities are consistent with all applicable community strategies with implementation. Accordingly, the proposed project would not conflict with the county's ability to achieve the GHG emissions reductions outlined in their CAP. This impact would be less than significant.

Table 3-8. Proposed Project Construction Consistency with Yolo County's Community Climate Action Plan

No.	CAP Measure	Applicable?	Project Implementation	Consistent?
Agriculture				
A-1	Reduce nitrogen fertilizer application rates	No	Applies to agricultural activities and is not applicable to construction of the proposed project because the proposed project does not include agricultural activities.	NA
A-2	Reduce fossil fuel consumption in field equipment	No	Applies to agricultural activities; see A-1.	NA
A-3	Reduce energy use in agricultural irrigation pumping	No	Applies to agricultural activities; see A-1.	NA
A-4	Reduce confined livestock manure methane emissions	No	Applies to agricultural activities; see A-1.	NA
A-5	Reduce methyl bromide application	No	Applies to agricultural activities; see A-1.	NA
A-6	Sequester carbon in agricultural landscapes	No	Applies to agricultural activities; see A-1.	NA
–	Supporting Measures for Agriculture	No	Applies to agricultural activities; see A-1.	NA
Transportation and Land Use				
T-1	Reduce Vehicle Miles Traveled in New Development	No	Establishes Vehicle Miles Traveled reduction standards for future development projects and is not applicable to construction of the project because the proposed project does not include development.	NA

No.	CAP Measure	Applicable?	Project Implementation	Consistent?
Energy				
E-1	Pursue a Community Choice Aggregation (CCA) Program	No	County initiative to evaluate and develop a CCA implementation plan and is not applicable to construction of the project because the proposed project does not include development or increased long-term electricity consumption.	NA
E-2	Reduce Energy Consumption in Existing Residential and Non-Residential Units	No	Applies to existing building efficiency and is not applicable to construction of the project because the proposed project is an irrigation and fish passage project and does not include buildings.	NA
E-3	Reduce Energy Consumption in New Residential and Non-Residential Units	No	Applies to building efficiency; see E-2.	NA
E-4	Increase On-Site Renewable Energy Generation to Reduce Demand for Grid Energy	No	Applies to residential and commercial renewable energy generation and is not applicable to construction of the proposed project.	NA
E-5	Promote On-Farm Renewable Energy Facilities	No	Applies to on-farm renewable energy generation and is not applicable to construction of the project because the proposed project does not include agricultural activities.	NA
E-6	Reduce Water Consumption in Existing Buildings Through Increased Plumbing Fixture Efficiency	No	Applies to existing building indoor water efficiency and is not applicable to construction of the project because the proposed project is an irrigation and fish passage project and does not include buildings.	NA
E-7	Promote Weather-Based Irrigation Systems and Water Efficient Turf Management	No	Applies to building outdoor water efficiency; see E-6.	NA
–	Supporting Measures for Energy	Yes	The CAP identifies a supporting measure to reduce the embodied energy content of construction materials by encouraging recycling of building materials, reusing salvaged products after demolition, and using locally available and durable materials. Construction activities would generate construction waste and will comply with mandatory CalGreen requirements for construction waste.	Yes
Solid Waste and Wastewater				
WR-1	Expand Landfill Methane Capture Systems	No	Applies to landfill gas collection systems and is not applicable to construction of the project because the proposed project is an irrigation and fish passage project and does not affect landfill operations.	NA

No.	CAP Measure	Applicable?	Project Implementation	Consistent?
–	Supporting Measures for Waste and Wastewater	Yes	The CAP identifies a supporting measure to expand the county's existing minimum diversion rate from 50 to 65 percent for construction and demolition waste. As noted above, the project will comply with mandatory CalGreen requirements for construction waste. For example, non-residential projects must recycle and/or salvage for reuse a minimum of 65 percent of nonhazardous construction and demolition debris or meet local construction and demolition waste management ordinance requirements, whichever is more stringent (Sections 4.4081.1 and 5.408.1).	Yes
Adaptation				
AD-1	Prepare for the Effects of Climate Change on Agriculture	No	County initiative to increase community resilience in agriculture and is not applicable to construction of the proposed project because the proposed project is an irrigation and fish passage project and does not include agricultural activities.	NA
AD-2	Prepare for the Effects of Climate Change on Water Resources	No	County initiative to increase community resilience on water resources and is not applicable to construction of the proposed project.	NA
AD-3	Respond to the Potential Threat of Sea Level Rise	No	County initiative to increase community resilience and is not applicable to the proposed project.	NA
AD-4	Protect the Public from Increased Health Risk	No	County initiative to update and revise emergency preparedness plans and is not applicable to the proposed project.	NA
AD-5	Develop Governance Strategies to Ensure that Yolo County Remains Resilient to Climate Change	No	County initiative to increase community resilience and is not applicable to construction of the proposed project.	NA

CalGreen = California Green Building Standards Code; NA = not applicable.

b. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The proposed project would not conflict with an applicable plan, policy or regulation regarding GHG emission. The project has been evaluated for GHG emissions and is determined to be consistent with Yolo County's CAP (refer to response "a"), which identifies a 2030 emissions reduction goal that is consistent with the statewide target adopted under SB 32. Because the project is consistent with Yolo County's CAP, it would not conflict with state or local plans adopted for the purpose of reducing GHG emissions within the temporal scope of the project.[4] As such, related impacts are considered less than significant, and no mitigation is required.

[4] Consistency with AB 1279 and the *2022 Scoping Plan Update* is not specifically reviewed because all emissions generated by construction of the project are expected to occur in 2024, which is well before the AB 1279 target year (2045).

IX. Hazards and Hazardous Materials

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			X	
c. Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d. Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e. Be located within an airport land use plan area or, where such a plan has not been adopted, be within two miles of a public airport or public use airport, and result in a safety hazard or excessive noise for people residing or working in the project area?				X
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?				X

Environmental Setting

Hazardous materials include chemicals and other substances defined as hazardous by federal, state, and local laws and regulations. Hazardous materials that may be associated with construction sites include fuels, motor oil, grease, various lubricants, solvents, soldering equipment, and glues. The California Department of Toxic Substances Control maintains a database containing information on properties in California where hazardous substances have been released, or where the potential for a release exists. This database is commonly known as EnviroStor and is one of a number of lists that make up the "Cortese List" (i.e., a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5). There are no active sites included on the list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 in the vicinity of the project area (California Environmental Protection Agency 2022).

The primary public-use airport near the project area is the Sacramento International Airport (approximately 7.5 miles north of the project area), which is an international general aviation airport. Because Sacramento International Airport serves the travel demands of the greater Sacramento region, many commercial flights arrive and depart from the airport frequently.

According to the California Department of Forestry and Fire Protection (CAL FIRE), the project area is in a Local Responsibility Area (LRA) and the county as a whole has no Very High Fire Hazard Severity Zones in the LRA (CAL FIRE 2007). LRAs are incorporated cities, urban regions, agriculture lands, and portions of the desert where the local government is responsible for wildfire protection.

Impacts

a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Construction associated with the project would require the use of heavy equipment and vehicles. Most of this equipment requires petroleum products such as fuel, hydraulic fluids, and lubricants for effective operation. There is a risk of small fuel or oil spills as a result of fuel replenishment and other lubricant and hydraulic fluid changes and replenishments that may be required during equipment use; however, this would have a negligible impact on public health because all hazardous materials would be stored, handled, and disposed of according to manufacturers' recommendations, and any spills would be cleaned up in accordance with existing regulations. Therefore, potential impacts would be less than significant.

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

The project would include the use of petroleum products such as fuel, hydraulic fluids, and lubricants during construction. Spills or an accidental upset (such as through operator error) could result in a release of these materials into the environment. However, construction activities would occur in sparsely populated areas dominated by existing agricultural use, and potential risks to the public and environment would be less than significant.

c. Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

The project would not emit hazardous emissions, nor would hazardous or acutely hazardous materials, substances, or waste be located within 0.25 mile of a school because there are no schools within 0.25 mile of the project area. The closest school is Sacramento Valley Charter School, approximately 1.5 miles to the east, at 2399 Sellers Way in West Sacramento. No impact would occur.

d. Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

The project area is not located on a site included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. No impact would occur.

e. Be located within an airport land use plan area or, where such a plan has not been adopted, be within two miles of a public airport or public use airport, and result in a safety hazard or excessive noise for people residing or working in the project area?

No public use airports are located within 2 miles of the project site. However, the project area is located within Referral Area 2, which includes locations where airspace protection (other than wildlife hazards) and/or overflight, but not noise or safety, are compatibility concerns of the Sacramento International Airport Land Use Compatibility Plan (Sacramento Area Council of Governments 2013:2-8). Implementation of the project would not expose people residing or working in the project area to an increased safety hazard above that which already exists. No impact would occur.

f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Implementation of the project is consistent with ongoing agricultural activities and existing uses in the project area, and would not impair implementation of or physically interfere with an adopted emergency response plan. No impact would occur.

g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

There are few residences near the project area, and the components included in the project are consistent with existing agricultural operations in the area. The project does not include any housing or other structures for human occupation. Therefore, the project would not expose people or structures to increased risk from wildland fires. No impact would occur.

X. Hydrology and Water Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?			X	
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?				X
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would:				
1. Result in substantial erosion or siltation on or off site;				X
2. Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site;				X
3. Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or				X
4. Impede or redirect flood flows?			X	
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?				X
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?				X

Environmental Setting

Yolo County lies within the Sacramento River watershed. The Sacramento River provides a significant source of fresh water to the California Bay-Delta. The Sacramento River (Knights Landing to the Delta) is listed in the SWRCB’s Total Maximum Daily Load program for a number of pollutants, chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, mercury, Polychlorinated biphenyls (PCBs), temperature, water, and toxicity (SWRCB 2022). The Sacramento River is approximately 2 miles east of the project site.

Tule Canal is listed in the SWRCB's Total Maximum Daily Load program for chlorpyrifos, DDT, diazinon, electrical conductivity, group a pesticides, invasive species, mercury, and toxicity (SWRCB 2022). Many of the other waterways and drainages in the Delta waterways are also on the 303(d) list for various pollutants.

Yolo County is located within the greater Sacramento Valley Groundwater Basin, specifically the Yolo Subbasin (DWR 2004). The Sacramento River and associated tributaries are the major sources of groundwater recharge to the groundwater Yolo Subbasin. Other sources of groundwater recharge in the county are from deep percolation of rainfall, agricultural irrigation, and subsurface inflow from adjacent groundwater basins (DWR 2004).

The Yolo Bypass is a 59,000-acre leveed floodplain constructed during 1917–1924 as part of the Sacramento River Flood Control Project. The Yolo Bypass can convey a maximum of 377,000 cfs at the Fremont Weir and 490,000 cfs south of Putah Creek. The Yolo Bypass carries flood flows generated by runoff from the entire Sacramento River watershed, including the Sacramento, Feather, and American Rivers and their associated tributary watersheds. The Yolo Bypass consists of farmed land and lands dedicated to publicly and privately managed wetlands. (Yolo County 2009)

A related project affecting the project area—the Big Notch Project, which is a 30,000-acre floodplain habitat restoration and fish passage project in the Yolo Bypass in Yolo County—will expand floodplain rearing habitat for juvenile salmon and improve access through the bypass for salmon and sturgeon, which is pivotal to the recovery of these threatened and endangered fish species. The Big Notch Project is located in the Fremont Weir State Wildlife Area in Yolo County. Part of the project includes the removal of a section of the Fremont Weir, the installation of three gates, the excavation of 180,000 cubic yards to carve a new path for salmon, and construction of a control building and pedestrian bridge. When the project is finished in late 2023, the gated passage, or notch, will be opened when the Sacramento River is high enough to flow into the Yolo Bypass floodplain. The water will enter the bypass through the notch at Fremont Weir and create shallow-water habitat for fish to easily migrate through the area. Juvenile salmon will be able to feed in a food-rich area for a longer time, allowing them to grow more rapidly in size, and improving their chances of survival as they travel to the Pacific Ocean. Adult salmon and sturgeon will benefit from improvements that will reduce stranding and migratory delays due to passage barriers. (DWR 2022)

Another project affecting the region, the Lower Elkhorn Basin Levee Setback Project, began construction in 2020. This project will reduce river levels (stages) in the Sacramento River and increase the capacity of the Yolo and Sacramento Bypasses near the urban communities of Sacramento and West Sacramento, as well as rural communities, Woodland, and Clarksburg. The improvements will also provide system resiliency, with opportunities to improve ecosystem functions, such as increasing inundated floodplain habitat for fish rearing and improving the connection to the Sacramento Bypass Wildlife Area. (DWR 2023)

Much of Yolo County is a natural floodplain. The Federal Emergency Management Agency (FEMA) produces and continuously updates flood hazard data in support of the National Flood Insurance Program (NFIP). Areas with a 1 percent probability of annual flooding are considered to be in a Special Flood Hazard Area, otherwise known as a 100-year floodplain. According to the FEMA NFIP Flood Rate Insurance Map for unincorporated Yolo County, the project area is in a 100-year flood zone, specifically Zone AE (FEMA 2010).

Impacts

a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

The project consists of modifying an existing irrigation channel adjacent to Tule Canal to avoid fish entrainment, installing a new fish-friendly water intake structure within Tule Canal, and installing a new pump site west of Tule Canal that would pull water from the proposed water intake screens through buried irrigation pipes beneath an agricultural pasture to an improved holding reservoir to the northwest. The water held in the reservoir would be available for diversion north from the reservoir for use in irrigated fields. The project would not have any waste discharge associated with it and would not contribute any substance that would adversely impact water quality. All the in-water project components are designed for use in natural aquatic systems during operations, and do not contain any substances that would violate water quality standards or discharge requirements or degrade surface- or groundwater quality.

Project construction would occur during the summer months when water levels are at their lowest and significant rain events are unlikely. Phases 1 and 2 would consist of out-of-water staging, vegetation removal after February 1, and construction to begin on May 1, 2024, a period in line with the giant garter snake work window. Phase 3 would signal the beginning of all in-water work on June 1, 2024, a period in line with when no salmonids have recently been found within fish passage weirs on Tule Canal. Therefore, excess sediment runoff and other potential sources of water quality degradation that could result from high flows are not expected.

Dewatering of Tule Canal is proposed during the installation of the new fish-friendly water intakes facility; a cofferdam and dewatering pumps would be used to dewater the construction area behind the cofferdam. Silt curtains and turbidity curtains would be used to contain turbid water and prevent or minimize its release to Tule Canal. Impacts on water quality should be insignificant as the affected area is small, and work would be short term and temporary. Construction would utilize fuel and gas that could impact surface and groundwater quality; however, the monitoring requirements, sampling frequency, and reporting will follow all technical certification conditions listed in the Clean Water Act Section 401 water quality certification for the project. The impact would be less than significant.

b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Implementation of the project would not substantially deplete groundwater supplies because no groundwater would be used, and no groundwater wells would be affected. The project site is located within the Sacramento River watershed and would not utilize or impact any groundwater supplies during construction or operation. The project would not have any components that would interfere with groundwater recharge and would not impede sustainable groundwater management of the basin. No impact would occur.

c.1. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: Result in substantial erosion or siltation on or off site?

Construction activities associated with the project would occur in areas that have been previously disturbed by construction of the existing canals, canal access roads, reservoirs, and drainage canals in the project area and vicinity. Operation of the project would allow more efficient use of diversion water north from the reservoir for use in irrigated fields; however, this would not alter the overall drainage pattern of the area or alter the course of a stream or river in a manner that would result in substantial erosion or siltation. No impact would occur.

c.2. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site?

Construction activities associated with the project would occur in areas that have been previously disturbed by construction of the existing canals, canal access roads, and drainage canals in the project area and vicinity. After construction is complete, temporary disturbance areas would be returned to their original condition. The project would not consist of any components that would increase non-permeable surfaces or lead to additional runoff that would result in flooding, on or off site. No impact would occur.

c.3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Implementation of the project would not result in an increase in impermeable surfaces that would create or contribute runoff that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. No impact would occur.

c.4. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: Impede or redirect flood flows?

The project consists of modifying an existing irrigation channel adjacent to Tule Canal to avoid fish entrainment, installing a new fish-friendly water intake structure within Tule Canal, and installing a new pump site west of Tule Canal that would pull water from the proposed water intake screens through buried irrigation pipes beneath an agricultural pasture to an improved holding reservoir to the west. The water held in the reservoir would be available for diversion north from the reservoir to the irrigated fields. The project area is within a 100-year flood hazard area. However, these new structures would be consistent with existing irrigation facilities in the project area, and a floodplain permit would be obtained from Yolo County, if required. Therefore, implementation of the project would not impede or redirect flood flows, and impacts would be less than significant.

d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

The project is not located in a tsunami zone and is not next to a large body of water capable of producing a seiche. The nearest identified earthquake fault is the Dunnigan Hills Fault approximately 12 miles away. The project area is in an unevaluated liquefaction zone (California Department of Conservation 2021). The project area is flat and is not located within an earthquake-induced landslide zone. Project components could potentially be inundated by a severe flood; however, those components are made up of sealed batteries and electronics and would not release pollutants as a result of flooding inundation. No impact would occur.

e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The project would not adversely affect groundwater or water quality and makes no use of groundwater in its construction or operation. Therefore, the project would not impact the implementation of a water quality control plan or sustainable groundwater management plan. No impact would occur.

XI. Land Use and Planning

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Physically divide an established community?				X
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?				X

Environmental Setting

The project is located west of Tule Jake Road and the Tule Canal, approximately 0.6 mile west of West Sacramento, in Yolo County, California (Figure 1-1). Yolo County is predominately rural with a landscape dominated by extensive agricultural areas, significant natural and recreational resources, and relatively low population density. Davis, West Sacramento, Winters, and Woodland are the four incorporated cities in the county. The unincorporated county contains several communities, including Capay, Clarksburg, Dunnigan, Esparto, Guinda, Knights Landing, Madison, Monument Hills, Rumsey, Yolo, and Zamora (Yolo County 2009). Agriculture, residential, and open space uses are the predominant land uses within the county (Yolo County 2009). The project area has a General Plan Land Use designation of Agriculture and is zoned Agricultural Intensive (A-N) (Yolo County 2009). The A-N Zone is applied to preserve lands best suited for intensive agricultural uses typically dependent on higher quality soils, water availability, and relatively flat topography. The purpose of the zone is to promote those uses, while preventing the encroachment of non-agricultural uses (Yolo County 2021:1).

Impacts

a. Physically divide an established community?

The project is in an agricultural area and would not result in the construction of any features that would physically divide an established community. No impact would occur.

b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The project site is within the Yolo Bypass area which is part of the Sacramento River Flood Control Project. The Delta Protection Commission (DPC) was created by the state legislature in 1992 with the goal of developing regional policies for the Delta to protect and enhance the existing land uses (agriculture, wildlife habitat, and recreation) in the primary zone. The DPC adopted the *Land Use and Resource Management Plan for the Primary Zone of the Delta* initially in 1995 and amended it most recently in 2010. A large portion of the Yolo Bypass is within the Primary Zone of the Delta (Bureau of Reclamation 2019:11–15). Yolo County's *2030 Countywide General Plan Land Use and Community Character Element* describes the policies and standards for future land use and agricultural resource protection for rural and urban land use.

The improvements for fish passage and diversion resulting from the project would provide safe passage in the Tule Canal for federally and state-listed salmonids and green sturgeon, and improve diversion of surface water for storage and irrigation. Land use designations would not be changed, and the project would not conflict with relevant existing land use plans, policies, or regulations adopted to avoid or mitigate an environmental effect. No impact would occur.

XII. Mineral Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?				X

Environmental Setting

Yolo County has two primary mineral resources, mined aggregate and natural gas. These resources are located throughout the county. There are six aggregate mines and 25 natural gas fields currently in operation in Yolo County (Yolo County 2009). Mineral Resources Zones (MRZs) are used by the state to define areas containing valuable deposits. There are 1,458 acres of MRZ-1, 18,452 acres of MRZ-2, and 8,220 acres of MRZ-3 in Yolo County. The Cache Creek MRZ-2 area is a significant high-grade aggregate deposit known to contain over 900 million tons of sand and gravel. These MRZs are located west of Woodland (Yolo County 2009). No MRZs are located in the project vicinity.

Impacts

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

The project would not result in the loss of availability of any known mineral resource of value to the region or state because no such sites occur within the project area. No impact would occur.

b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

The project would not result in the loss of availability of a locally important mineral resource recovery site because no such sites occur within the project area. No impact would occur.

XIII. Noise

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?			X	
b. Generate excessive groundborne vibration or groundborne noise levels?			X	
c. Be located within the vicinity of a private airstrip or an airport land use plan, or, where such a plan has not been adopted, within two miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels?				X

Environmental Setting

Noise is generally defined as unwanted sound. The sound pressure level is the most common descriptor used to characterize the loudness (or amplitude) of an ambient sound, and the decibel (dB) scale is used to quantify sound intensity. Because the human ear does not perceive every sound frequency with equal loudness, sounds are often adjusted in a process called "A-weighting." The A-weighted decibel (dBA) refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy equivalent sound/noise descriptor is called equivalent noise level.

The 2009 Yolo County General Plan Noise Element includes guidelines and policies pertaining to noise in the county. In addition, General Plan Action HS-A61 states that the county will adopt a comprehensive noise ordinance that includes the following components:

- Standards for acceptable exterior and interior noise levels, their applicability, and any specific exceptions to those standards.
- Guidelines and technical requirements for noise measurements and acoustical studies to determine conformance with provisions of the ordinance.
- Standards for construction equipment and noise-emitting construction activities.
- Regulations for the noise generated by events, including truck loading and unloading, operation of construction equipment, and amplified music."

Note that, to date, a county noise ordinance addressing construction noise has not been adopted.

Primary sources of noise in Yolo County include vehicle traffic, airplane traffic, railroads, agricultural operations, mining, and other commercial/industrial facilities such as food processing, winery, and olive oil processing (Yolo County 2009:312–318). In the project area, the principal noise sources are vehicle traffic, railroads, and agricultural uses. The primary public use airport near the project area is the Sacramento International Airport (approximately 6 miles north of the project area), which is an international general aviation airport with many commercial flights arriving and departing from the airport. Vehicle traffic on I-80 and Business 80 contribute to noise levels in the project area and vicinity. There are also many local roads that experience high traffic volumes, including high truck-traffic volumes, which contribute to the noise environment in the county. Field machinery, especially diesel tractors and trucks, make up most of the noise inputs from agricultural use.

Sensitive noise receptors are defined as residential uses, hospitals and nursing/convalescent homes, hotels and lodging, and appropriate habitat areas (Yolo County 2009:323). There are few residences near the project area; however, there is one residence on Tule Jake Road, east of Tule Canal, approximately 1,800 feet north of the northernmost portion of the project site.

Impacts

a. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?

Construction

Noise sources associated with construction activities include vehicular traffic, machinery including diesel-engine-driven heavy trucks and diesel-powered construction equipment. Note that the project applicant has indicated that noise-producing construction activities would be limited to weekdays and daylight hours, when people are generally less sensitive to noise. In addition, construction would be relatively short term, taking place for 4 months or less in total. Further, note that the project site is not located near any noise-sensitive land uses. As described above, the nearest sensitive use is a residence located approximately 1,800 feet north of the project site.

To analyze a reasonable worst-case construction noise scenario, the loudest two pieces of equipment during a given construction phase are assumed to be operating simultaneously and relatively close to one another at the portion of the project site closest to nearby sensitive uses. Note that, although a vibratory pile driver would be used for some project construction, its use would be limited to approximately 6 total days. The construction work requiring the use of a vibratory pile driver would be the loudest component of construction for the project. However, because it would be relatively short term, the worst-case typical construction noise (from phases not requiring a vibratory pile driver) is also shown below. The Move In and Preparation, Pre-grading and Backfill and Cleanup construction phases all would require the use of a grader and a scraper. These would be the loudest phases of typical construction. Refer to Tables 3-9 and 3-10 for combined construction noise levels at various distances for the loudest overall phase of construction (involving sheet pile installation) and the loudest typical project construction work.

Table 3-9. Worst-Case Construction Noise at Various Distances – Sheet Pile Construction Work

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition(s): Sheet Pile Construction Work			
Source 1: Vibratory Pile Driver – Sound level (dBA) at 50 feet =	101	20%	94.0
Source 2: Excavator – Sound level (dBA) at 50 feet =	81	40%	77.0
Calculated Data:			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			101
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			94

Distance Between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
50	0	0.0	101	94
500	-20	0.0	81	74
1,000	-26	0.0	75	68
1,500	-30	0.0	72	65
1,800	**-31**	**0.0**	**70**	**63**

Geometric attenuation based on 6 dB per doubling of distance.

Note: This calculation does not include the effects, if any, of local shielding from walls, topography, or other barriers, which may reduce sound levels further.

dB = decibels; dBA = A-weighted decibels; L_{eq} = equivalent continuous sound level; L_{max} = maximum sound level.

Table 3-10. Combined Construction Noise at Various Distances – Move In and Preparation, Pre-grading, Backfill and Cleanup Construction

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition(s): Move In and Preparation, Pre-grading, Backfill and Cleanup Construction			
Source 1: Grader – Sound level (dBA) at 50 feet =	85	40%	81.0
Source 2: Scraper – Sound level (dBA) at 50 feet =	84	40%	80.0
Calculated Data:			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			88
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			84

Distance Between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
50	0	0.0	88	84
500	-20	0.0	68	64
1,000	-26	0.0	62	58
1,500	-30	0.0	58	54
1,800	**-31**	**0.0**	**56**	**52**

Geometric attenuation based on 6 dB per doubling of distance.

Note: This calculation does not include the effects, if any, of local shielding from walls, topography, or other barriers, which may reduce sound levels further.
dB = decibels; dBA = A-weighted decibels; L_{eq} = equivalent continuous sound level; L_{max} = maximum sound level.

At a distance of 1,800 feet, the distance to the nearest noise-sensitive land use, the combined daytime construction noise level from longer-term/typical project construction work would be an estimated 52 dBA equivalent continuous sound level (L_{eq}). During the 6 days when a vibratory pile driver would be used, combined construction noise may be up to 63 dBA L_{eq} at this distance. Note that no nighttime construction is proposed.

The Noise Compatibility Guidelines contained in the Yolo County 2030 General Plan, Figure HS-7, do not typically apply to construction noise. However, in the absence of a county noise ordinance, the noise limits presented herein can be used to help assess construction noise impacts. The noise limits in the table are in the form of a 24-hour average noise level, with a penalty added for noise generated during nighttime hours (for the day-night average sound level [L_{dn}] metric). The project site and surrounding areas have a General Plan Land Use designation of Agriculture and are zoned Agricultural Intensive (A-N). The maximum normally acceptable noise level for agricultural land uses, including the parcel where the nearest residential structure is located, is 75 dBA L_{dn}.

Construction noise for the project would take place only during daytime hours. To result in a 24-hour average L_{dn} noise level of 75 dBA or less, daytime noise levels for each daytime hour should be 75 dBA or less, and nighttime (10:00 p.m. to 7:00 a.m.) noise levels should be 65 dBA or less, due to the 10-dB penalty for noise generated during the nighttime period. Therefore, and because no nighttime construction is proposed, it can be extrapolated that daytime noise should not exceed 75 dBA L_{eq} at the nearest sensitive use in order to ensure compliance with the Noise Compatibility Guidelines in the General Plan. Using noise land use compatibility guidelines for a temporary noise source, such as construction, provides a conservative analysis because these guidelines are intended to apply to long-term or permanent noise sources.

Because estimated worst-case construction noise levels from temporary (4 months or less) project construction would be in the range of 52 dBA L_{eq} (typically) to 63 dBA L_{eq} (during the 6 days when a vibratory pile driver may be used), project construction would not result in noise levels in excess of the noise compatibility guidelines at nearby land uses. Construction noise impacts would be less than significant.

Operations and Maintenance

As described in Chapter 2, operations and maintenance activities would be the same as pre-project conditions. Although the project would involve the operation of electric motor-driven pumps, these would be replacing older, similar pumps that are already operating, and making noise, at the project site. Therefore, noise would not increase as compared to existing conditions. Because routine operations and maintenance would be the same as existing conditions, and because project pumps would be replacing existing operational pumps, noise impacts from project operations would be less than significant.

b. Generate excessive groundborne vibration or groundborne noise levels?

Construction of the proposed project, although short term (lasting no more than 4 months), would require equipment that could generate groundborne vibration. However, most of the proposed equipment types generate relatively low vibration levels. In addition, vibration attenuates rapidly with distance.

Groundborne vibration can result in structural damage if the vibration occurs at very close distances to buildings. This will not occur for the proposed project, with the nearest sensitive structure located over 1,800 feet from project construction areas. Vibration can also disturb people, who are generally more sensitive to vibration during nighttime hours when sleeping than during daytime waking hours. No construction would take place during nighttime hours for the proposed project.

The Caltrans vibration criteria for annoyance provides appropriate guidelines to use when analyzing vibration-related human annoyance. Table 3-11 includes the Caltrans guidelines for vibration-related annoyance.

Table 3-11. Caltrans Guidelines for Vibration Annoyance Potential

	Maximum PPV (in/sec)	
Human Response	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: Caltrans 2013.

Note: Transient sources create a single, isolated vibration event (e.g., blasting or drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV = peak particle velocity; in/sec = inches per second.

The most vibration-intensive equipment proposed for use is a vibratory pile driver. Typical vibration levels associated with heavy-duty construction equipment that may be used for the project at a reference distance of 50 feet are shown in Table 3-12.

Table 3-12. Vibration Levels for Construction Equipment at Various Distances

Equipment	PPV at 25 Feet	PPV at 100 Feet	PPV at 1,800 Feet
Vibratory pile driver	0.734	0.092	0.001
Large bulldozer[1]	0.089	0.011	0.000
Loaded trucks	0.076	0.010	0.000
Small bulldozer	0.003	0.000	0.000

Source: Federal Transit Administration 2018.

[1] Representative of large earth-moving equipment such as graders, scrapers, and excavators.

The project area is located in an agricultural area with few sensitive receptors. As described above, the nearest existing sensitive receptor is a residence located approximately 1,800 feet north of the northernmost construction areas for the project. At this distance, vibration from project construction equipment would not be perceptible, and would in fact be 10 times below the “barely perceptible” Caltrans vibration criterion shown in Table 3-11.

Because vibration would not be perceptible at the nearest occupied structure (and noting that substantially greater levels of vibration are required to result in structural damage than to result in human annoyance), vibration impacts related to both human annoyance and structural damage would be less than significant.

c. Be located within the vicinity of a private airstrip or an airport land use plan, or, where such a plan has not been adopted, within two miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels?

No public use airports or private airstrips are located within 2 miles of the project site. The nearest airports to the project site are the Sacramento International Airport (located approximately 6 miles north of the project site) and the Sacramento Executive Airport (located approximately 6 miles southeast of the project site). Because there are no airports within a 2-mile radius of the proposed project, the proposed project would not expose people working or residing in the project area to excessive noise levels from either a public or public use airport or private airstrip. There would be no impact related to excessive aircraft noise levels.

XIV. Population and Housing

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?				X
b. Displace a substantial number of existing people or housing, necessitating the construction of replacement housing elsewhere?				X

Environmental Setting

In 2021, Yolo County's estimated population was 216,916 and total housing units was 81,259 (United States Census Bureau 2021). The project site is rural and unpopulated with agricultural lands to the north and west and developed areas of West Sacramento to the east and south.

Impacts

a. Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?

The project does not include construction of any new housing, establish substantial new employment opportunities, or remove any obstacle to additional growth; therefore, it would not induce population growth in Yolo County either directly or indirectly. No impact would occur.

b. Displace a substantial number of existing people or housing, necessitating the construction of replacement housing elsewhere?

The project would not displace existing housing or any people or necessitate the construction of replacement housing elsewhere. No impact would occur.

XV. Public Services

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
Fire protection?				X
Police protection?				X
Schools?				X
Parks?				X
Other public facilities?				X

Environmental Setting

A large number of local fire protection districts (FPDs) provide fire protection, rescue, and emergency medical services within the unincorporated areas of Yolo County. There are 18 FPDs in Yolo County. The East Davis FPD and Elkhorn FPD provide fire protection services in the project area. The Yolo County Sheriff–Coroner Department (Sheriff's Department) provides law enforcement services to the unincorporated areas of Yolo County. (Yolo County 2009). There are no schools, parks, or other public facilities within 0.25 mile of the project site.

Impacts

a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any public services:

Increases in demand for public services generally result from population increases. Implementation of the project would not result in a population increase. No impact would occur.

XVI. Recreation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b. Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?				X

Environmental Setting

There are 17 parks in Yolo County, totaling approximately 1,976 acres. Existing and future parks in Yolo County are classified in the following general categories for management purposes: community parks and resource parks (Yolo County 2009). Park and recreation facilities in Yolo County include state wildlife areas for hunting, fishing, and hiking; river recreation areas for boating, picnicking, and fishing; parks for recreation and community events; and sports facilities for baseball, soccer, and golf (Yolo County 2009).

Impacts

a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

The project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. There are no recreational facilities on the project site. No impact would occur.

b. Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

The project would not require the construction or expansion of recreational facilities that could result in an adverse physical effect on the environment. No impact would occur.

XVII. Transportation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?				X
b. Conflict or be inconsistent with State CEQA Guidelines section 15064.3, subdivision (b)?				X
c. Substantially increase hazards because of a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
d. Result in inadequate emergency access?				X

Environmental Setting

The roadway network within the unincorporated parts of the county is a grid-based system of rural two-lane roads that connects individual communities and provides access to agricultural fields. Urban development is mainly concentrated in the eastern and southern portions of the county within the incorporated cities of Davis, West Sacramento, Winters, and Woodland. I-80, I-5, and I-505 are the primary transportation corridors extending through the county and serve all of the county's major population centers. Other state highways, county arterials, and a network of local public and private roads constitute the remainder of the roadway system. (Yolo County 2009)

I-80 and the railroad tracks are approximately 0.5 mile and 200 feet south, respectively, from the proposed fish screens. Tule Jake Road is the closest gravel roadway serving the project site, and it has a locked gate for access.

Impacts

a. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?

The project would result in a minor, short-term increase in construction traffic; however, this minor construction traffic increase would be consistent with existing agricultural activities in the project area, and would not conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system. Ongoing operation and maintenance activities associated with the new facilities would be consistent with existing operation and maintenance activities in the project area, and would not conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system. No impact would occur.

b. Conflict or be inconsistent with State CEQA Guidelines section 15064.3, subdivision (b)?

The project would not adversely impact any local or regional roads in the project vicinity. The equipment would be stored at the staging area on site west of Tule Canal and hauled in and out before and after the project components are completed. Traffic from the project is not expected to increase compared to existing conditions. Therefore, the project would not conflict with State CEQA Guidelines Section 15064.3, subdivision (b), and there would be no impact.

c. Substantially increase hazards because of a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The project site would be accessed from Tule Jake Road, which is a gravel roadway with gated access from Old River Road/North Harbor Boulevard. The project would not change the existing roadway infrastructure such that there would be an increase in hazards attributable to design features. No impact would occur.

d. Result in inadequate emergency access?

The project would not change the existing roadway infrastructure in a way that would result in inadequate emergency access. Construction equipment would not interfere with emergency access on Old River Road/North Harbor Boulevard, or any other local or regional roads within the vicinity of the project site. The project would not include any road or lane closures. No impact would occur.

XVIII. Tribal Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or		X		
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.		X		

Environmental Setting

Tribal cultural resources (TCRs) as defined by PRC Section 21074 (1) are sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either on or eligible for inclusion in the California Register of Historical Resources (CRHR) or a local historic register; or (2) are defined as such because the lead agency, at its discretion and supported by substantial evidence, chooses to treat the resource as a TCR. Additionally, a cultural landscape may also qualify as a TCR if it meets the criteria to be eligible for inclusion in the CRHR and is geographically defined in terms of the size and scope of the landscape. Other historical resources (as described in PRC Section 21084.1), a unique archaeological resource (as defined in PRC Section 21083.2(g)), or nonunique archaeological resources (as described in PRC Section 21083.2(h)) may also be TCRs if they conform to the criteria to be eligible for inclusion in the CRHR.

AB 52 requires the lead agency to begin consultation with any California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project if the tribe requests of the lead agency, in writing, to be informed by the lead agency through formal notification of proposed projects in that geographic area and the tribe subsequently requests consultation. PRC Section 21084.3 states that “public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.”

AB 52 consultation was initiated by the California Department of Water Resources on April 4, 2023, in which letters were sent via certified mail and email to the following tribes:

- Anthony Roberts, Chairperson – Yocha Dehe Wintun Nation (YDWN)
- Gene Whitehouse, Chairperson – United Auburn Indian Community of the Auburn Rancheria of California

As part of the outreach efforts, The YDWN requested further consultation under AB 52. On August 2, 2023, representatives from the YDWN, DWR, and ICF engaged in an informational AB 52 consultation meeting via Microsoft Teams. During the meeting, the background, purpose, and elements of the project were presented to the tribe as well as a discussion of the cultural studies to date. Although no TCRs were identified within the project area, representatives from the YDWN discussed the overall sensitivity of the project in relation to nearby villages, the landscape as a floodplain and fluctuation zone, and proximity to waterbodies. YDWN representatives recommended that Tribal Monitors be present during ground disturbance for the project.

Impacts

a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

The proposed project would not cause a substantial adverse change in the significance of a TCR as defined in Section 21074 because no TCRs were identified in the project area during AB 52 consultation efforts. However, if previously unknown TCRs are encountered during construction of the proposed project, they could be adversely affected. Implementing Mitigation Measures CUL-1/TCR-1, CUL-2/TCR-2, CUL-3/TCR-3, and CUL-4/TCR-4 would reduce potential impacts on previously unknown tribal cultural resources to a less-than-significant level. These mitigation measures apply to both cultural resources and TCRs.

Mitigation Measure CUL-1/TCR-1. Discovery of Previously Unknown Cultural or Tribal Cultural Resources. In the event that potential cultural or tribal cultural resources are discovered during project implementation, all earth-disturbing work within 100 feet of the find will be temporarily suspended or redirected until a qualified archaeologist can adequately assess the find and determine whether the resource requires further study. If the cultural or tribal cultural resource discovery is potentially significant, DWR and any local, state, or federal agency with approval or permitting authority over the project that has requested/required notification will be notified within 48 hours.

For all discoveries known or likely to be associated with Native American heritage (precontact sites and select post-contact historic-period sites), a Tribal Representative from a California Native American tribe that is traditionally and culturally affiliated with a geographic area will be immediately notified and will determine if the find is a tribal cultural resource (TCR) (Public Resources Code [PRC] Section 21074). If the find is identified as a TCR, the Tribal Representative, in consultation with DWR and a qualified archaeologist, will develop a treatment plan in any instance where significant impacts cannot be avoided. The treatment plan will be prepared in collaboration with consulting tribes and be submitted to the DWR and any participating tribe for review and approval prior to its implementation, and additional work in the vicinity of the discovery will not proceed until the plan is in place.

The location of any such finds must be kept confidential, and measures will be taken to secure the area from site disturbance and potential vandalism. Impacts on previously unknown significant cultural or tribal cultural resources will be avoided through preservation in place, if feasible. Damaging effects on TCRs will be avoided or minimized following the measures identified in PRC Section 21084.3, subdivision (b), if feasible, unless other measures are mutually agreed to by the lead archaeologist and culturally affiliated tribes that would be as or more effective.

Mitigation Measure CUL-2/TCR-2. Unanticipated Discovery of Human Remains. If human remains, including Native American remains or burials, are encountered, all provisions provided in California Health and Safety Code Section 7050.5 and PRC Section 5097.98 will be followed. Work will stop within 100 feet of the discovery and the County Coroner shall be immediately contacted. If human remains are of Native American origin, the County Coroner will notify the Native American Heritage Commission (see at http://www.nahc.ca.gov/profguide.html) within 24 hours of this determination, and a Most Likely Descendent will be identified. No work is to proceed in the discovery area until consultation is complete and procedures to avoid or recover the remains have been implemented.

Mitigation Measure CUL-3/TCR-3. Cultural Resources Sensitivity Training. The Lead Agencies shall provide preconstruction training for all construction personnel engaged in construction that have the potential to affect archaeological resources. This training will provide instruction on how to identify resources in the field and appropriate measures to be taken if a discovery or potential discovery occurs. The Lead Agencies will include a list of cultural resources staff that can respond to cultural resource discoveries, provide management direction following discoveries in the construction training materials, and provide this list and these discovery requirements to the supervisory field staff for the construction workers. Construction worker trainings in the form of tailgate meetings would be implemented to familiarize workers with common types of artifacts (stone flakes, charmstones, and historic debris-like bottles) and the procedures to follow in the event of a buried discovery.

Mitigation Measure CUL-4/TCR-4. Treatment Protocol for Handling Human Remains and Cultural Items Affiliated with the Yocha Dehe Wintun Nation If human remains or cultural items found to be affiliated with the Yocha Dehe Wintun Nation are discovered during ground disturbing activities, the procedures set forth in the *Treatment Protocol for Handling Human Remains and Cultural Items Affiliated with the Yocha Dehe Wintun Nation* provided in Appendix E of this document shall be followed. The treatment protocol document outlines the Tribe's procedures for inadvertent discovery of Native American human remains, treatment of Native American remains, non-disclosure of location of reburials, treatment of cultural resources, inadvertent discoveries, and a work statement for Tribal monitors. The protocol document also provides a description of work and treatment protocol regarding the preferred treatment upon discovery, comportment when working around discoveries, and recommendation for excavation methods.

b. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1?

The proposed project would not cause a substantial adverse change in the significance of a TCR as defined in Section 21074 because no TCRs were identified in the project area during AB 52 consultation efforts. However, if previously unknown TCRs are encountered during construction of the proposed project, they could be adversely affected. Implementing Mitigation Measures CUL-1/TCR-1, CUL-2/TCR-2, CUL-3/TCR-3 and CUL-4/TCR-4 would reduce potential impacts on previously unknown TCRs to a less-than-significant level.

XIX. Utilities and Service Systems

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?				X
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?				X
c. Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
d. Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?				X
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?				X

Environmental Setting

The project site is in a rural, agricultural area in Yolo County; however, West Sacramento is just to the east and south. Groundwater is pumped from privately owned wells. Wastewater is treated using individual septic systems, which is common for wastewater treatment in rural areas that lack a community- or city-owned treatment plant. The project area is located within the boundaries of the Central Valley RWQCB. PG&E provides electrical and natural gas service to customers within Yolo County.

Solid waste and recycling services are provided by the Yolo County Division of Integrated Waste Management (Yolo County 2009). Waste and recycling are taken to either the Yolo County Central Landfill, located 2 miles northeast of the City of Davis, or the Esparto Convenience Center. At the current waste disposal rate (also assuming a diversion rate of 70 percent, no large increase of waste from outside the county, and future waste cells operated as bioreactors described below) the Central Landfill's closure date is estimated to be January 1, 2081, an operational life of about 72 years (Yolo County 2009).

Impacts

a. Require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Implementation of the project would not require the construction of new water, wastewater, stormwater drainage, electric power, natural gas, or telecommunications facilities. The consumption of energy associated with operating the intake screens involves use of an onsite solar power system. A new PG&E connection would be installed near the pump station to support the pumps (400 amp) and fish screens. No impact would occur.

b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?

The project does not include any elements during installation or operation that would require external water supplies. No impact would occur.

c. Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

The project does not include any elements during installation or operation that would impact the service of wastewater treatment providers. Wastewater services for construction crews would be provided by temporary portable facilities, and the project would not require relocation or construction of new wastewater treatment facilities. No impact would occur.

d. Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

The project is small in scope and does not include any elements during installation or operation that would generate solid waste in excess of local landfill capacity or state or local standards. Therefore, the project would have no impact on local infrastructure capacity or solid waste reduction goals. No impact would occur.

e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Implementation of the project would comply with federal, state, and local statutes and regulations related to solid waste. No impact would occur.

XX. Wildfire

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?				X
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks of, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?				X
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts on the environment?				X
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?			X	

Environmental Setting

In California, wildfire protection jurisdictions are separated and overseen by three areas of government: local, state, and federal. Each of the three areas have determined Fire Hazard Severity Zones (FHSZ) within each county. The zone classification is based on a multitude of factors: fire behavior models using vegetation density, adjacent wildland areas, and distance to wildland areas, another factor being the probability of a fire threatening nearby structures.

According to CAL FIRE, the project area is in an LRA, and the county as a whole has no Very High FHSZs in the LRA (CAL FIRE 2007). LRAs are incorporated cities, urban regions, agriculture lands, and portions of the desert where the local government is responsible for wildfire protection.

There are 18 FPDs in Yolo County. The East Davis FPD and Elkhorn FPD provide fire protection services in the project area.

Impacts

a. Substantially impair an adopted emergency response plan or emergency evacuation plan?

The project is on privately owned land (Upper Swanston Ranch, Inc.) and would be accessed via existing paved roads or dirt paths (i.e., no overland travel is required). Construction traffic (including truck traffic) accessing the project site would generally access the site from Tule Jake Road from the north or south. The project would not impact public roads or highways and would not cause rerouting of traffic or road closures; also, construction activities would not result in emergency vehicles or law enforcement delays. Staging is planned to be within the project site and outside of public roads and highways. Therefore, the project would have no impact on local emergency response plans or emergency evacuation plans.

b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks of, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

The project is in the Yolo Basin in Yolo County, west of West Sacramento. The project area is in an LRA, and the county as a whole has no Very High FHSZs in an LRA. Vegetation primarily consisting of shrubs and low-lying grasses would need to be trimmed during construction; however, all vegetation removal would be completed with hand tools and would not exacerbate wildfire risk. During the operational period, electronic components would be housed in protective metal boxes and conduits to eliminate the risk of wildfire. Therefore, the project would not exacerbate wildfire risks and expose project occupants to pollution concentrations from a wildfire. No impact would occur.

c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts on the environment?

The project would not require the installation or maintenance of a new road, fuel break, water source, power line, or other utilities. The consumption of energy associated with operating the intake screens involves use of an onsite solar power system. All electrical wiring and hardware would be contained within conduits or utility boxes to ensure no loose wiring is exposed, and all vegetation would be trimmed to minimize the risk of fire hazards. No impact would occur.

d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The project is located within the Yolo Bypass floodplain and has been designed and would operate to withstand high and fluctuating flows. The design and operation of the project would not impact the functionality of the floodplain, and therefore the project would not expose people or structures to significant risks as a result of runoff or drainage changes. The project site is flat and the risk of fire and subsequent post-fire slope instability from the project is low as the project would take place within the floodplain and there are no slopes. The impact would be less than significant.

XXI. Mandatory Findings of Significance

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
a.	Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?		X		
b.	Does the project have impacts that are individually limited but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)		X		
c.	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?		X		

Impacts

a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

As indicated in Sections 3.IV and 3.V, impacts on biological and cultural resources were reduced to a less-than-significant level with incorporation of mitigation measures. As a result, implementation of the project with the proposed mitigation measures incorporated would not create environmental effects that would degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal community, or eliminate important examples of major periods of California history or prehistory.

b. Does the project have impacts that are individually limited but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

As indicated throughout this IS, impacts on all environmental resources were either less than significant or had no impact or were reduced to a less-than-significant level with incorporation of mitigation measures. Table 3-2 in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project EIS/EIR (U.S. Department of the Interior/California Department of Water Resources 2019) lists past, present, and future actions and projects considered in the cumulative analysis for that project. Effects of past, present, and reasonably foreseeable probable future actions were assessed qualitatively for all resource areas for that project. The project's contribution to cumulative impacts with these past, present, and reasonably foreseeable probable future actions/projects would not be considerable and would be comparable to existing adjacent activities.

The Agriculture Road Crossing 4 Fish Passage Project (ARC4) by DWR is anticipated to be completed after the proposed project. ARC4 currently poses as a barrier or a delay to fish migration depending on the flow conditions. Project implementation would remove migratory delays and loss of adult and juvenile salmonids and green sturgeon, all of which are state- or federally listed species. ARC4 is the earthen road crossing within the project site that spans the Tule Canal, the main drainage feature on the eastern margin of the bypass. The road crossing is approximately 80 feet long and is either seasonally degraded or washes out during flood flows. The road crossing provides the ability to seasonally impound water for agricultural and waterfowl purposes. Water control structures at the road crossing consist of one 72-inch-diameter culvert with a cable-operated slide gate, and two 48-inch-diameter culverts controlled by stoplogs. The road crossing provides vehicle and equipment access to and from agricultural fields on the east and west of Tule Canal.

The ARC4 project includes the construction of a new, two-span bridge crossing immediately downstream from the existing road embankment. The existing embankment and culverts would be removed at the end of the project. The proposed two-span pier and bent cap type bridge would provide vehicular access over Tule Canal. The bridge is planned to be approximately 80 feet long and 20 feet wide. The ARC4 project will be a beneficial impact in concert with the proposed project.

The proposed project would avoid fish entrainment, improve fish passage, and increase floodplain fisheries rearing habitat in the Yolo Bypass and the lower Sacramento River basin. As a result, implementation of the project with proposed mitigation measures would not create environmental effects that would have impacts that are individually limited, but cumulatively considerable. Therefore, impacts would be less than significant.

c. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

As indicated throughout this IS, potential impacts on resources are less than significant or were reduced to a less-than-significant level with incorporation of mitigation measures. As a result, implementation of the project with proposed mitigation measures incorporated would not create environmental effects that would cause substantial adverse effects on human beings either directly or indirectly.

Chapter 4
References Cited

Chapter 2, Proposed Project

Bureau of Reclamation (Reclamation). 2019. *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Final Environmental Impact Statement/Environmental Impact Report*. May. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=30484. Accessed: August 4, 2022.

California Department of Transportation. 2016. *Implementation of Rock Slope Protection (RSP) Design*. Available: https://dot.ca.gov/-/media/dot-media/programs/design/documents/f0002770-2016-07-15-implementation-of-rsp-design-a11y.pdf. Accessed: August 29, 2023.

National Marine Fisheries Service (NMFS). 1997. *Fish Screening Criteria for Anadromous Salmonids*. Available: https://media.fisheries.noaa.gov/dam-migration/southwest_region_1997_fish_screen_design_criteria.pdf. Accessed: March 15, 2023.

National Marine Fisheries Service (NMFS). 2022. *NOAA Fisheries West Coast Region Anadromous Salmonid Passage Design Manual,* with Addendum No. 1. Available: https://media.fisheries.noaa.gov/2023-02/anadromous-salmonid-passage-design.pdf. Accessed: March 15, 2023.

Chapter 3, Evaluation of Environmental Impacts

I. Aesthetics

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: July 21, 2022.

II. Agricultural and Forestry Resources

California Department of Conservation. 2021. *California Important Farmland Finder*. Available: https://maps.conservation.ca.gov/dlrp/ciff/app/. Accessed: July 21, 2022.

Yolo County. 2009a. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: July 21, 2022.

Yolo County. 2009b. *Yolo County General Plan Land Use Designations: General Plan 2030*. Available: https://www.yolocounty.org/home/showdocument?id=10862. Accessed: July 21, 2022.

III. Air Quality

California Air Resources Board (CARB). 2022. Maps of State and Federal Area Designations. Available: http://www.arb.ca.gov/desig/adm/adm.htm. Accessed: July 2022.

California Air Resources Board (CARB). 2023. iADAM: Air Quality Data Statistics (Top 4 Summary). Available: https://www.arb.ca.gov/adam/topfour/topfour1.php. Accessed: January 2023.

Quam, Justin. Quam General Engineering, Inc. February 1, 2023—email message to ICF.

Ramboll. 2020. *Guidance to Address the Friant Ranch Ruling for CEQA Projects in the Sac Metro Air District Sacramento, California.* October.

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2020. Minor Project Health Screening Tool, version 2. Available: http://www.airquality.org/Residents/CEQA-Land-Use-Planning/CEQA-Guidance-Tools. Accessed: July 2022.

U.S. Environmental Protection Agency (USEPA). 2022. *Greenbook*. Last revised: June 30, 2022. Available: https://www.epa.gov/green-book. Accessed: July 2022.

Yolo-Solano Air Quality Management District (YSAQMD). 2007. *Handbook for Assessing and Mitigating Air Quality Impacts*. July.

IV. Biological Resources

CALFED Bay-Delta Program. 2000a. *Ecosystem Restoration Program Plan. Volume I: Ecological Attributes of the San Francisco Bay-Delta Watershed*.

CALFED Bay-Delta Program. 2000b. *Ecosystem Restoration Program Plan - Volume II: Ecological Management Zone Visions. Final Programmatic EIS/EIR Technical Appendix*. Sacramento, CA.

Calflora. 2023. The Calflora Database. Available: https://www.calflora.org/. Accessed: January 25, 2023.

California Department of Fish and Game (CDFG). 2010. California Salmonid Stream Habitat Restoration Manual, Appendix S, Fish Screen Criteria. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=22672.

California Department of Fish and Game. 2012. *Staff Report on Burrowing Owl Mitigation*. 34 pp.

California Department of Fish and Wildlife (CDFW). 2019. *Evaluation of the Petition from the Xerces Society, Defenders of Wildlife, and the Center for Food Safety to List Four Species of Bumble Bees and Endangered Under the California Endangered Species Act.* Report to the Fish and Game Commission. April 4, 2019

California Department of Fish and Wildlife (CDFW). 2022. *Pacific Lamprey*, Entosphenus tridentatus. Available: https://wildlife.ca.gov/Conservation/Fishes/Pacific-Lamprey. Accessed: March 16, 2022.

California Department of Fish and Wildlife (CDFW). 2023. California Natural Diversity Database (CNDDB). Commercial version updated January 3, 2023. Available: https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed: January 26, 2023.

California Department of Transportation (Caltrans). 2020. *Technical Guidance for the Assessment of Hydroacoustic Effects of Pile Driving on Fis*h. October. 2020 update. Available: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/hydroacoustic-manual-a11y.pdf. Accessed: February 8, 2023.

California Eco Restore. 2018. *Fremont Weir Adult Fish Passage Modification Project*. Available: https://resources.ca.gov/CNRALegacyFiles/ecorestore/wp-content/uploads/2018/06/FAQs_FremontWeir_Final.pdf. Accessed: January 30, 2023.

California Native Plant Society (CNPS). 2023. *CNPS Inventory of Rare Plants.* Available: https://www.cnps.org/rare-plants/cnps-inventory-of-rare-plants. Accessed: March 16, 2023.

California Natural Resources Agency. 2016. *Delta Smelt Resiliency Strategy*. July.

California Governor's Office of Emergency Services (Cal OES). 2014. California Hazardous Materials Spill / Release Notification Guidance. February. Available: https://www.caloes.ca.gov/wp-content/uploads/Fire-Rescue/Documents/CalOES-Spill_Booklet_Feb2014_FINAL_BW_Acc.pdf. Accessed: September 5, 2023.

Connon, R. E., L. A. Deanovic, E. B. Fritsch, L. S. D'Abronzo, and I. Werner. 2011. Sublethal Responses to Ammonia Exposure in the Endangered Delta Smelt; *Hypomesus transpacificus* (Fam. Osmeridae). *Aquatic Toxicology* 105 (2011):369–377.

Fris, M. B. and R. W. DeHaven. 1993. *A Community-Based Habitat Suitability Index Model for Shaded Riverine Aquatic Cover, Selected Reaches of the Sacramento River System*. February. U.S. Fish and Wildlife Service, Ecological Services. Sacramento Field Office. Sacramento, CA.

Google Earth. 2018–2022. Aerial imagery. Available: https://earth.google.com/web/.

Harrell, W. C., and T. R. Sommer. 2003. Patterns of Adult Fish Use on California's Yolo Bypass Floodplain. California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration. Pages 88–93 in P. M. Faber (ed.), *California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration.* 2001 Riparian Habitat and Floodplains Conference Proceedings. Riparian Habitat Joint Venture.

ICF. 2023. *Preliminary Delineation of Wetlands and Other Water Bodies for the Swanston Ranch Fish Passage and Irrigation Improvement Project.*

Interagency Ecological Program (IEP). 2022. Yolo Bypass Fish Monitoring Program. Available: https://iep.ca.gov/Science-Synthesis-Service/Monitoring-Programs/Yolo-Bypass. Accessed: January 30, 2023.

Jackson, Z. J., and J. P. Van Eenennaam. 2013. *2012 San Joaquin River Sturgeon Spawning Survey*. U.S. Fish and Wildlife Service, Anadromous Fish Restoration Program, Stockton Fish and Wildlife Office, Stockton, CA.

Jackson, Z. J., J. J. Gruber, and J. P. Van Eenennaam. 2016. White Sturgeon Spawning in the San Joaquin River, California, and Effects of Water Management. *Journal of Fish and Wildlife Management* 7(1):171–180; e1944-687X. doi: 10.3996/09215-JFWM-092. Available: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/docs/petitioners_exhibit/dwr/part2/DWR-1122%20Jackson_et_al_2016_white_sturgeon_spawning_SJR.pdf. Accessed: February 1, 2023.

Lehman, P. W., T. Sommer, and L. Rivard. 2008. The Influence of Floodplain Habitat on the Quantity of Riverine Phytoplankton Carbon Produced During the Flood Season in San Francisco Estuary. *Aquatic Ecology* 42:363–378.

Mahardja, B., J. A. Hobbs, N. Ikemiyagi, A. Benjamin, and A. J. Finger. 2019. Role of Freshwater Floodplain-Tidal Slough Complex in the Persistence of the Endangered Delta Smelt. *PLOS ONE* 14(1):e208084.

Moyle, P. B. 2002. *Inland Fishes of California*. Revised and expanded. Berkeley, CA: University of California Press.

Moyle, P. B., R. M. Quiñones, J. V. Katz, and J. Weaver. 2015. *Fish Species of Special Concern in California.* Sacramento: California Department of Fish and Wildlife. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=104282&inline. Accessed: June 12, 2020.

National Marine Fisheries Service (NMFS). 1997. Fish Screening Criteria for Anadromous Salmonids. January. Southwest Region. Available: https://media.fisheries.noaa.gov/dam-migration/southwest_region_1997_fish_screen_design_criteria.pdf.

National Marine Fisheries Service (NMFS). 2009. *Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project*. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Region, Long Beach, CA.

National Marine Fisheries Service (NMFS). 2014. *Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead*. California Central Valley Office, Sacramento, California. July.

National Marine Fisheries Service (NMFS). 2016. Online species list on Google Earth. Accessed: January 10, 2023.

National Marine Fisheries Service (NMFS). 2018. *Draft Recovery Plan for the Southern Distinct Population Segment of North American Green Sturgeon* (Acipenser medirostris). January. National Marine Fisheries Service, West Coast Region, Sacramento, CA.

National Marine Fisheries Service (NMFS). 2019. *Biological Opinion on Long-Term Operation of the Central Valley Project and the State Water Project*. WCRO-2016-00069. October. West Coast Region, Sacramento, CA.

National Marine Fisheries Service. 2021. *Species in the Spotlight, Priority Actions 2021–2025, Sacramento River Winter-Run Chinook Salmon (*Oncorhynchus tshawytscha*)*. April. Available: https://www.fisheries.noaa.gov/resource/document/species-spotlight-priority-actions-2021-2025-sacramento-river-winter-run-chinook. Accessed: July 30, 2023.

Natural Resources Conservation Service (NRCS). 2023a. Climate Data for Davis 2 WSW EXP FARM, California. Available: https://agacis.rcc-acis.org/?fips=06113. Accessed: January 2023.

Natural Resources Conservation Service (NRCS). 2023b. *Soil Survey Staff, United States Department of Agriculture. Web Soil Survey*. Available: http://websoilsurvey.sc.egov.usda.gov/. Accessed: January 2023.

Rosenfield, J. A., and R. D. Baxter. 2007. Population Dynamics and Distribution Patterns of Longfin Smelt in the San Francisco Estuary. *Transactions of the American Fisheries Society* 136(6):1577–1592.

Sommer, T. R., R. Baxter, and B. Herbold. 1997. Resilience of Splittail in the Sacramento–San Joaquin Estuary. *Transactions of the American Fisheries Society* 126(6):961–976.

Sommer, T., B. Harrell, M. Nobriga, R. Brown, P. Moyle, W. Kimmerer, and L. Schemel. 2001a. California's Yolo Bypass: Evidence that Flood Control Can Be Compatible with Fisheries, Wetlands, Wildlife, and Agriculture. *Fisheries* 26(8):6–16.

Sommer, T. R., M. L. Nobriga, W. C. Harrell, W. Batham, and W. J. Kimmerer. 2001b. Floodplain Rearing of Juvenile Chinook Salmon: Evidence of Enhanced Growth and Survival. *Canadian Journal of Fisheries and Aquatic Sciences* 58: 325–333.

Sommer, T. R., W. C. Harrell, M. L. Nobriga, and R. Kurth. 2003. Floodplain as Habitat for Native Fish: Lessons from California's Yolo Bypass. Pages 81–87 in P. M. Faber (ed.), *California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration*. 2001 Riparian Habitat and Floodplains Conference Proceedings. Riparian Habitat Joint Venture, Sacramento, CA.

Sommer, T. R. W. C. Harrell, A. M. Solger, B. Tom, and W. Kimmerer. 2004. Effects of Flow Variation on Channel and Floodplain Biota and Habitats of the Sacramento River, California, USA, Aquatic Conservation. *Marine and Freshwater Ecosystems*, 10.1002/aqc.620, 14, 3: 247-261.

Sommer, T. R., W. C. Harrell, and M. L. Nobriga. 2005. Habitat Use and Stranding Risk of Juvenile Chinook Salmon on a Seasonal Floodplain. *North American Journal of Fisheries Management* 25:1493–1504.

Sommer, T. R., W. C. Harrell, and F. Feyrer. 2014. Large-Bodied Fish Migration and Residency in a Flood Basin of the Sacramento River, California, USA. *Ecology of Freshwater Fish* 23(3):414–423.

Spautz, Hildie, Nadav Nur, and Diana Stralberg. 2005. California Black Rail (*Laterallus jamaicensis coturniculus*) Distribution and Abundance in Relation to Habitat and Landscape Features in the San Francisco Bay Estuary. Pages 465–468 in C. J. Ralph and T.D. Rich (eds.), *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference*. 2002 March 20-24; Asilomar, California, Volume 1 Gen. Tech. Rep. PSW-GTR-191. Albany, CA: U.S. Dept. of Agriculture, Forest Service, Pacific Southwest Research Station.

Takata, L., T. R. Sommer, J. L. Conrad, and B. M. Schreier. 2017. Rearing and Migration of Juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) in a Large River Floodplain. *Environmental Biology of Fishes* 100(9):1105–1120.

Thomson, R. C., A. N. Wright, and B. Shaffer. 2016. *California Amphibian and Reptile Species of Special Concern*. University of California Press. Oakland, CA.

U.S. Bureau of Reclamation. 2008. *Biological Assessment on the Continued Long-Term Operations of the Central Valley Project and the State Water Project. Sacramento, CA: Mid-Pacific Region*.

U.S. Bureau of Reclamation. 2018. *Yolo Bypass.* Available: https://www.usbr.gov/mp/mpr-news/docs/factsheets/yolo-bypass.pdf. Accessed: January 30, 2023.

U.S. Bureau of Reclamation. 2021. *Fremont Weir Adult Fish Passage Modification Project*. Bay-Delta office.

U.S. Environmental Protection Agency (USEPA). 2010. The SPCC Rule and Recent Amendments Presentation. November. Available: https://www.epa.gov/oil-spills-prevention-and-preparedness-regulations/spill-prevention-control-and-countermeasure-16. Accessed: June 29, 2021.

U.S. Fish and Wildlife Service (USFWS). 1993. *Mitigation Policy: 501 FW 2*. Series Interagencies Activities. February.

U.S. Fish and Wildlife Service (USFWS). 1999. *Conservation Guidelines for Valley Elderberry Longhorn Beetle*. July 9, 1999.

U.S. Fish and Wildlife Service (USFWS). 2023. *IPaC Trust Resource Report. List of Federal Endangered and Threatened Species That Occur in or May Be Affected by the Project*. Updated: January 5, 2023, Available: http://www.fws.gov/sacramento/es_species/Lists/es_species_lists.cfm.

Vincik, R. F. and J. M. Julienne. 2012. Occurrence of Delt Smelt (*Hypomesus transpacificus*) in the Lower Sacramento River near Knights Landing, California. *California Fish and Game* 98(3):171–174; 2012.

Yolo County. 2009. *2030 Countywide General Plan*. Woodland, CA.

Yolo Habitat Conservancy. 2018a. *Yolo Habitat Conservation Plan/Natural Community Conservation Plan*. Sacramento, CA.

Yolo Habitat Conservancy. 2018b. *Yolo Habitat Conservation Plan/Natural Community Conservation Plan Final Environmental Impact Statement/Environmental Impact Report*. Sacramento, CA.

V. Cultural Resources

Bennyhoff, J. A. 1977. *Linguistics in California Prehistory*. Lecture delivered in the Department of Anthropology, San Francisco State University.

Bonte, Harmon S. 1930. *Bulletin No. 37 Financial and General Data Pertaining to Irrigation, Reclamation, and Other Public Districts in California.* Sacramento, CA. California State Print Office.

Dames & Moore. 1996. *Historic Property Treatment Plan for Reclamation District 1000 Rural Historic Landscape District for the Cultural Resources Inventory and Evaluations for the American River Watershed Investigation, Sacramento and Sutter Counties, California*. Prepared by Dames & Moore, Inc., Chico, CA. Submitted to the U.S. Army Corps of Engineers, Sacramento District, Sacramento, CA. On file at the North Central Information Center, California Historical Resources Information System, Sacramento, CA.

Fredrickson, D. A. 1973. *Early Cultures of the North Coast Ranges, California.* Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Davis.

Goldfried, H. P. 1988. *A Map and Record Investigation of Historical Sites and Shipwrecks along the Sacramento River Between Sacramento City and Sherman Island*. California State Lands Commission, Sacramento, CA.

Hauiland, Dozier & Tibbetts. 1913. *Great American Levees: A Comparative Report on Flood Protection in the Mississippi and Sacramento Valleys Made for the West Sacramento Company*. San Francisco: Taylor, Nash & Taylor.

Hoover, M. B., H. E. Rensch, E. G. Rensch, and W. N. Abeloe. 2002. *Historic Spots in California*. 5th edition. Revised by Douglas E. Kyle. Palo Alto, CA: Stanford University Press.

Hundley, Norris. 2001. *The Great Thirst: Californians and Water, A History.* Berkeley and Los Angeles, CA. University of California Press. 80

Jackson, W. A. 1851. *Map of the Mining District of California*. Map on file at the Library of Congress, Washington D.C.

Johnson, J. J. 1967. *The Archaeology of the Camanche Reservoir Locality, California*. Paper 6. Sacramento Anthropological Society, Sacramento, California.

Johnson, P. J. 1978. Patwin. Pages 350–360 in R. F. Heizer (ed.), *California. Handbook of North American Indians*, Vol. 8, W. C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Kelley, Robert. 1989. *Battling the Inland Sea: Floods, Public Policy, and the Sacramento Valley.* Berkeley and Los Angeles, CA. University of California Press.

Kroeber, A. L. 1925 (1976). *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin 78, Smithsonian Institution. NY: Dover Publications, Inc.

Kroeber, A. L. 1932. The Patwin and their Neighbors. *University of California Publications in American Archaeology and Ethnography* 29(4):253–423.

Larkey, J. L., and S. Walters. 1987. *Yolo County: Land of Changing Patterns, An Illustrated History*. Northridge, CA: Windsor Publications.

Levy, R. 1978. Eastern Miwok. Pages 398–413 in R. F. Heizer (ed.), *California*. *Handbook of North American Indians,* Vol. 8, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Meyer, J., and J. S. Rosenthal. 2008. *A Geoarchaeological Overview and Assessment of Caltrans District 3: Cultural Resources Inventory of Caltrans District 3 Rural Conventional Highways.* April. Far Western Anthropological Research Group, Inc., Davis, California. Submitted to Office of Environmental Management, California Department of Transportation North Region, District 3, Marysville, California.

Moratto, M. J. 1984 (2004). *California Archaeology*. Coyote Press, Salinas, CA.

O'Neill, Karen M. 2006. *Rivers by Design: State Power and the Origins of U.S. Flood Control.* Durham, NC. Duke University Press.

Ord, E. O. C. 1843. *Topographical Sketch of the Gold and Quicksilver District of California*. Map on file at the Library of Congress, Washington, D.C.

Stevens, M. L. 2004a. White Root (*Carex barbarae*). *Fremontia* 32(4):3–6. Available: http://cnps.org/cnps/publications/fremontia/Fremontia_Vol32-No4.pdf. Accessed: November 11, 2009.

Stevens, M. L. 2004b. Ethnoecology of Selected California Wetland Plants. *Fremontia* 32(4):7–15. Available: http://cnps.org/cnps/publications/fremontia/Fremontia_Vol32-No4.pdf. Accessed: November 11, 2009.

Treganza, A. E., and R. F. Heizer. 1953. Additional Data on the Farmington Complex: A Stone Implement Assemblage of Probably Early Post-Glacial Date from Central California. *University of California Survey Reports* 22:28–38.

U.S. Census Bureau. 2010. *State & County Quick Facts for West Sacramento, CA*. Available: U.S. Census Bureau QuickFacts: Sacramento County, California. Accessed: March 29, 2023.

United States Department of Agriculture (USDA). 2023. *Natural Resources Conservation Service Web Soil Survey.* Available: http://websoilsurvey.sc.egov.usda.gov/app/WebSoilSurvey.aspx. Accessed: March 29, 2023.

Wagner, D. L., C. W. Jennings, T. L. Bedrossian, and E. J. Bortugno. 1981. Geologic Map of the Sacramento Quadrangle, California, 1:250,000. Available: NGMDB Product Description Page (usgs.gov). Accessed March 29, 2023.

Walters, S. 1987. *West Sacramento: The Roots of A New City*. Yolo County Historical Society, Woodland, CA.

West Sacramento Historical Society. 2004. *Images of America: West Sacramento*. San Francisco: Arcadia Publishing.

Wilson, N. L., and A. H. Towne. 1978. Nisenan. Pages 387–397 in R. F. Heizer (ed.), *California*. *Handbook of North American Indians*, Vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Wyld, J. 1849. *Map of the Gold Regions of California*. Map on file at the Library of Congress, Washington, D.C.

VI. Energy

County of Yolo. 2009. *2030 Countywide General Plan County of Yolo.* Public Review Draft. Available: https://www.yolocounty.org/home/showpublisheddocument/14457/636643925992000000. Accessed: July 21, 2022.

VII. Geology, Soils, and Paleontological Resources

California Department of Conservation. 2021. *Earthquake Zones of Required Investigation*. Last updated: September 23, 2021. Available: https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed: August 2, 2022.

California Department of Conservation 2022. *CGS Seismic Hazards Program: Alquist-Priolo Fault Hazard Zones.* Last updated: April 11, 2022. Available: https://gis.data.ca.gov/maps/ee92a5f9f4ee4ec5aa731d3245ed9f53/explore?location=38.533495%2C-121.237725%2C9.42. Accessed: August 2, 2022.

U.S. Department of the Interior Bureau of Reclamation/City of Sacramento. 2019. *Environmental Assessment/Initial Study and Proposed Mitigated Negative Declaration Lower American River Anadromous Fish Habitat Restoration Project*. Available: http://cvfpb.ca.gov/wp-content/uploads/2018/12/19445_CityofSacramento_ISMND_MND_MMRP_NOD.pdf. Accessed: August 1, 2022.

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: August 1, 2022.

VIII. Greenhouse Gas Emissions

California Air Resources Board (CARB). 2022. *Current California GHG Emission Inventory Data*. Available: https://ww2.arb.ca.gov/ghg-inventory-data. Accessed: July 2022.

California Department of Water Resources (DWR). 2020a. *California Department of Water Resources Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan, Update 2020.* July. Sacramento, CA.

California Department of Water Resources (DWR). 2020b. *Addendum to the Initial Study and Negative Declaration for DWR Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan, Update 2020.* SCH #2012032002. Sacramento, CA.

Intergovernmental Panel on Climate Change. 2018. *Global Warming of 1.5°C.* Chapter 1, Framing and Context. Summary for Policymakers. M.R. Allen, O.P. Dube, W. Solecki, F. Aragón-Durand, W. Cramer, S. Humphreys, M. Kainuma, J. Kala, N. Mahowald, Y. Mulugetta, R. Perez, M. Wairiu, and K. Zickfeld.

Yolo County. 2011. *Yolo County Climate Action Plan*. March.

IX. Hazards and Hazardous Materials

California Department of Forestry and Fire Protection (CAL FIRE). 2007. *FHSZ Viewer*. Available: https://egis.fire.ca.gov/FHSZ/. Accessed: August 3, 2022.

California Environmental Protection Agency. 2022. *Cortese List Data Resources*. Available: https://calepa.ca.gov/sitecleanup/corteselist/. Accessed: August 3, 2022.

Sacramento Area Council of Governments. 2013. *Sacramento International Airport Land Use Compatibility Plan*. Available: https://www.sacog.org/sites/main/files/file-attachments/smf-1-front_chapters_1-2-2013-12-12-complete.pdf. Accessed: August 3, 2022.

X. Hydrology and Water Quality

California Department of Conservation. 2021. *Earthquake Zones of Required Investigation*. Last updated: September 23, 2021. Available: https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed: August 2, 2022.

California Department of Water Resources (DWR). 2004. *Sacramento Valley Groundwater Basin Yolo Subbasin*. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_021_67_YoloSubbasin.pdf. Accessed: August 3, 2022.

California Department of Water Resources (DWR). 2022. *Groundbreaking Marks Largest Floodplain Salmon Rearing Habitat Project in California History*. Available: https://water.ca.gov/News/News-Releases/2022/June-22/Groundbreaking-Marks-Largest-Floodplain-Salmon-Rearing-Habitat-Project-in-California-History. Accessed: February 7, 2023.

California Department of Water Resources (DWR). 2023. *Lower Elkhorn Basin Levee Setback Project*. Available: https://water.ca.gov/Programs/Flood-Management/Flood-Projects/Lower-Elkhorn-Basin. Accessed: February 7, 2023.

Federal Emergency Management Agency (FEMA). 2010. National Flood Insurance Program Flood Insurance Rate Map, Yolo County, California and Unincorporated Areas, Panel 630 of 785. Available: https://msc.fema.gov/portal/search?AddressQuery=west%20sacramento%2C%20ca#searchresultsanchor. Accessed: August 3, 2022.

State Water Resources Control Board (SWRCB). 2022. *California 2020-2022 Integrated Report Integrated Report details & documentation*. Last updated July 25, 2022. Available: https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=6cca2a3a1815465599201266373cbb7b. Accessed: August 3, 2022.

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: August 3, 2022.

XI. Land Use and Planning

Bureau of Reclamation (Reclamation). 2019. *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Final Environmental Impact Statement/Environmental Impact Report*. May. Available: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=30484. Accessed: August 4, 2022.

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR. Public Review Draft*. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: August 4, 2022.

Yolo County. 2021. *Yolo County Zoning Code Title 8 Land Development, Chapter 2: Zoning Regulations, Article 3: Agricultural Zones*. Available: https://www.yolocounty.org/home/showpublisheddocument/72002/637753306774370000. Accessed: August 4, 2022.

XII. Mineral Resources

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: August 4, 2022.

XIII. Noise

Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: January 20, 2023.

Sacramento Area Council of Governments. 2013. *Sacramento International Airport Land Use Compatibility Plan*. Adopted December 12, 2013. Available: https://www.sacog.org/sites/main/files/file-attachments/smf-1-front_chapters_1-2-2013-12-12-complete.pdf. Accessed: October 17, 2022.

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR*. Prepared by LSA Associates, Inc. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: October 17, 2022.

XIV. Population and Housing

United States Census Bureau. 2021. *QuickFacts Yolo County, California*. Available: https://www.census.gov/quickfacts/yolocountycalifornia. Accessed: August 4, 2022.

XV. Public Services

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: August 4, 2022.

XVI. Recreation

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: August 4, 2022.

XVII. Transportation

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: August 4, 2022.

XVIII. Tribal Cultural Resources

N/A

XIX. Utilities and Service Systems

Yolo County. 2009. *Yolo County 2030 Countywide General Plan EIR.* Public Review Draft. Prepared for Yolo County. Prepared by LSA Associates. Available: https://www.yolocounty.org/government/general-government-departments/county-administrator/general-plan/final-environmental-impact-report-eir. Accessed: August 8, 2022.

XX. Wildfire

California Department of Forestry and Fire Protection (CAL FIRE). 2007. *FHSZ Viewer*. Available: https://egis.fire.ca.gov/FHSZ/. Accessed: August 3, 2022.

XXI. Mandatory Findings of Significance

U.S. Department of the Interior/California Department of Water Resources. 2019. *Yolo Bypass Salmonid Habitat Restoration and Fish Passage Final Environmental Impact Statement/Environmental Impact Report*. Available: https://www.usbr.gov/mp/bdo/yolo-bypass.html. Accessed: October 10, 2022.

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Appendix A

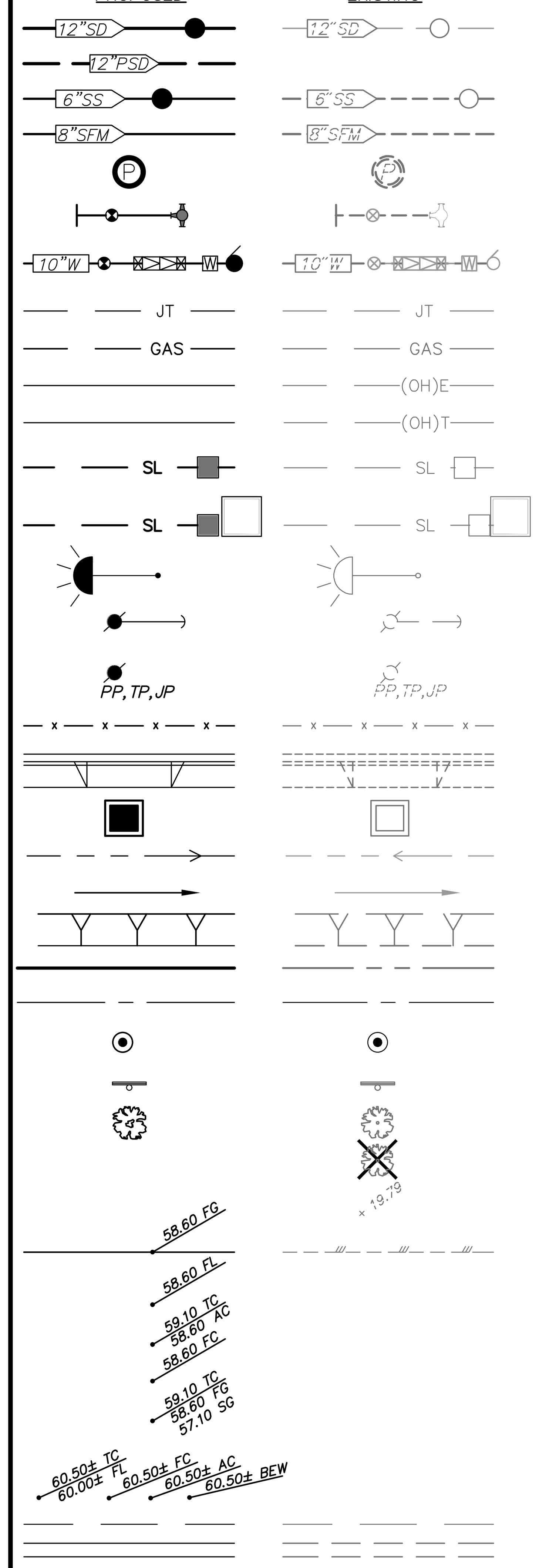
Upper Swanston Ranch, Inc. Plan Set

IRRIGATION IMPROVEMENTS
FOR
UPPER SWANSTON RANCH, INC.

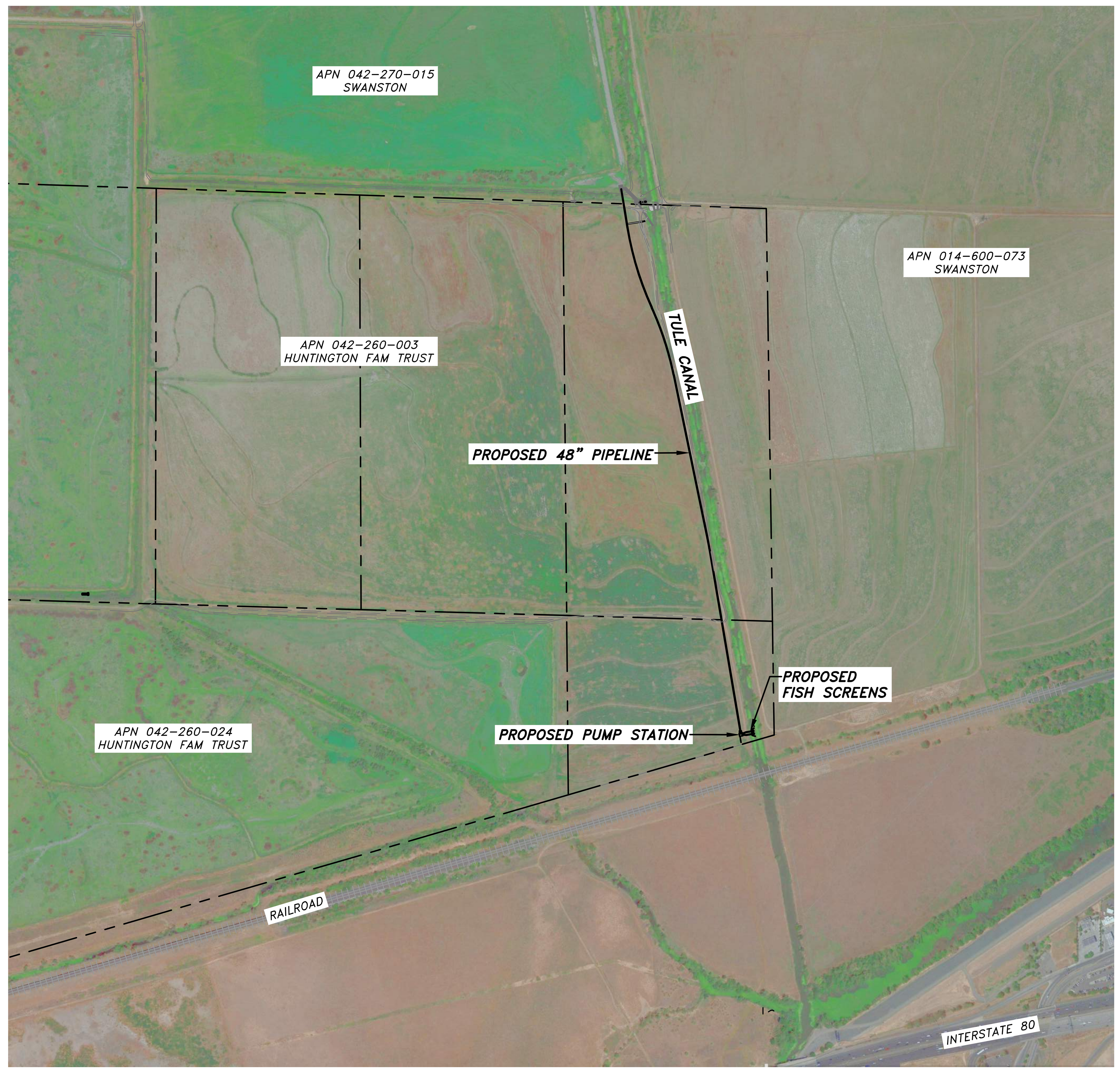
YOLO COUNTY, CA

LEGEND

PROPOSED | EXISTING



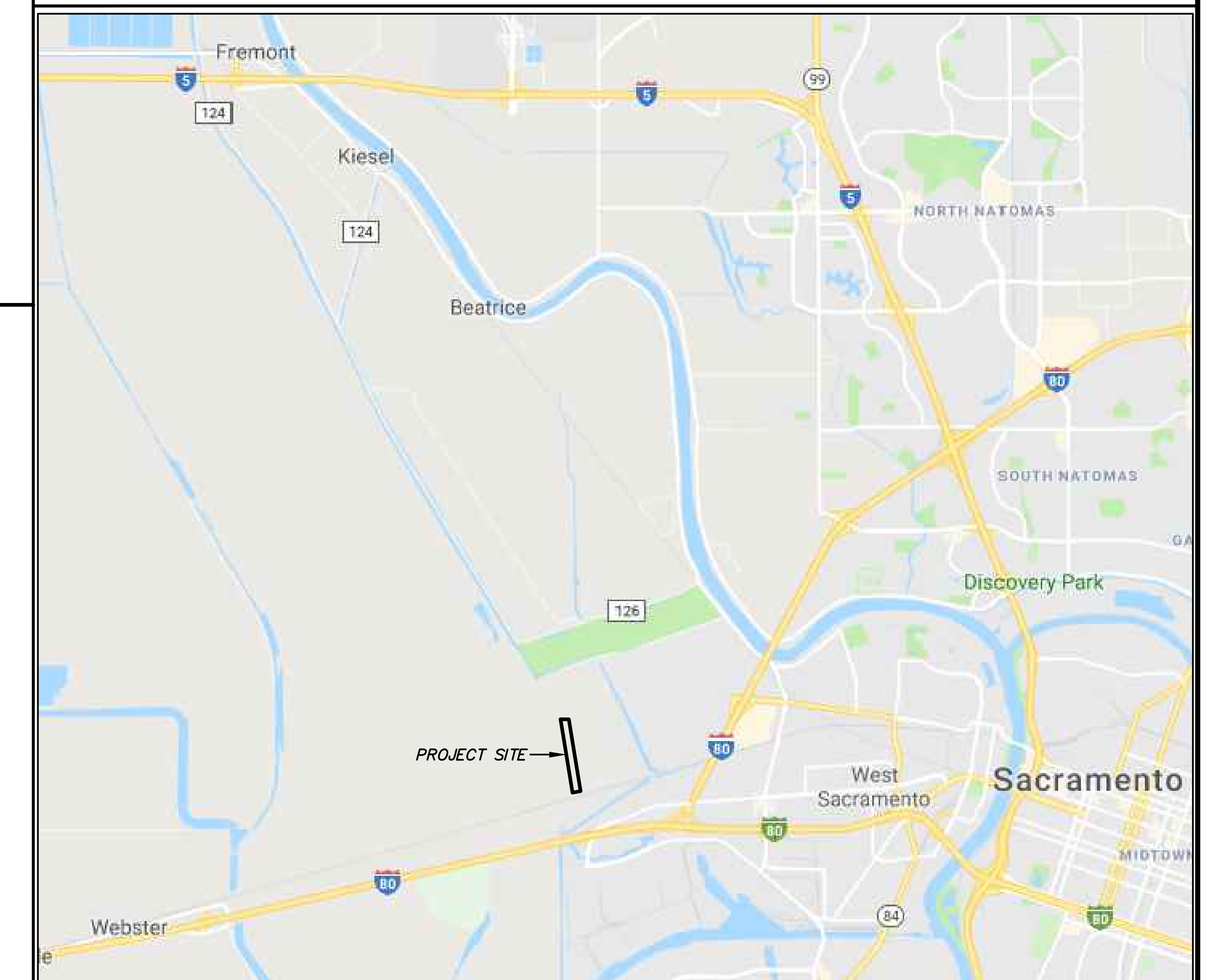
- STORM DRAIN AND MANHOLE
- PERFORATED STORM DRAIN
- SANITARY SEWER AND MANHOLE
- SANITARY SEWER FORCE MAIN
- SEWER PUMP STATION
- FIRE HYDRANT AND VALVE ASSEMBLY
- WATER MAIN, VALVE, DOUBLE DETECTOR CHECK VALVE, METER & BLOWOFF VALVE
- JOINT UTILITY TRENCH
- GAS MAIN
- ELECTRICAL LINE
- TELEPHONE LINE
  UG–UNDERGROUND
  OH–OVERHEAD
- STREET LIGHT CONDUIT, WIRING & PULL BOX
- STREET LIGHT SERVICE POINT AT UTILITY CO. BOX
- STREET LIGHT AND POLE
- UTILITY POLE WITH DOWN GUY & ANCHOR
- POWER POLE, TELEPHONE POLE, JOINT POLE
- FENCE
- VERTICAL CURB, GUTTER & SIDEWALK WITH DRIVEWAY
- CATCH BASIN OR DRAINAGE INLET
- FLOWLINE OF DITCH OR SWALE
- DIRECTION OF SURFACE DRAINAGE FLOW
- CUT OR FILL SLOPE
- RIGHT OF WAY OR PROPERTY LINE
- STREET CENTERLINE OR BASELINE
- SURVEY MONUMENT
- SIGN
- TREE
- TREE TO BE REMOVED
- EXISTING GROUND SURFACE ELEVATION
- EDGE OF PAVEMENT AND ELEVATION
- FLOW LINE GRADE
- TOP OF CURB GRADE/ASPHALT GRADE
- FINISHED CONCRETE GRADE
- TOP OF CURB/FINISHED GRADE/SUBGRADE ELEVATION
- MATCH EXISTING GRADE (FIELD VERIFY)
- PUBLIC UTILITY EASEMENT
- ROLL CURB, GUTTER, & SIDEWALK



OVERALL SITE PLAN

0 250 500 1000
SCALE: 1"=500'

VICINITY MAP



UTILITY REPRESENTATIVES

UTILITY	COMPANY	REPRESENTATIVE	PHONE NUMBER
GAS	P.G.& E.	SETH PEREZ	(530) 661–5668
ELECTRICITY	P.G.& E.	SETH PEREZ	(530) 661–5668
TELEPHONE	AT&T	LISA MARANO	(916) 484–2420
TELEPHONE	YOLO COUNTY TELECOMMUNICATIONS	TOM BATES	(530) 506–5012
CABLE TV	WAVE BROADBAND	FRANK BARGIEL	(916) 223–0123
USA			(916) 642–2444
DRAINAGE	YOLO COUNTY	NICHOLAS BURTON	(530) 666–8844
FIRE	ELKHORN FIRE PROTECTION DISTRICT	RICHARD YEUNG	(916) 425–1766

SHEET INDEX

DESIGNED BY TCT				
DRAWN BY MSW				
CHECKED BY TCT				
REV.	DATE	DESCRIPTION	BY	APP'D.

LM LAUGENOUR AND MEIKLE
CIVIL ENGINEERING · LAND SURVEYING · PLANNING
608 COURT STREET, WOODLAND, CALIFORNIA 95695 · PHONE: (530) 662–1755
P.O. BOX 828, WOODLAND, CALIFORNIA 95776 · FAX: (530) 662–4602
BY TODD C. TOMMERAASON
DATE 05/05/2023 P.E. 59277
REGISTERED PROFESSIONAL ENGINEER TODD C. TOMMERAASON No. 59277 CIVIL STATE OF CALIFORNIA

IRRIGATION IMPROVEMENTS
FOR
UPPER SWANSTON RANCH, INC.
YOLO COUNTY CALIFORNIA

TITLE SHEET

SCALE 1"=500'
DATE: 05/05/2023
JOB NO. 4471

C001

SHEET 1 OF 15

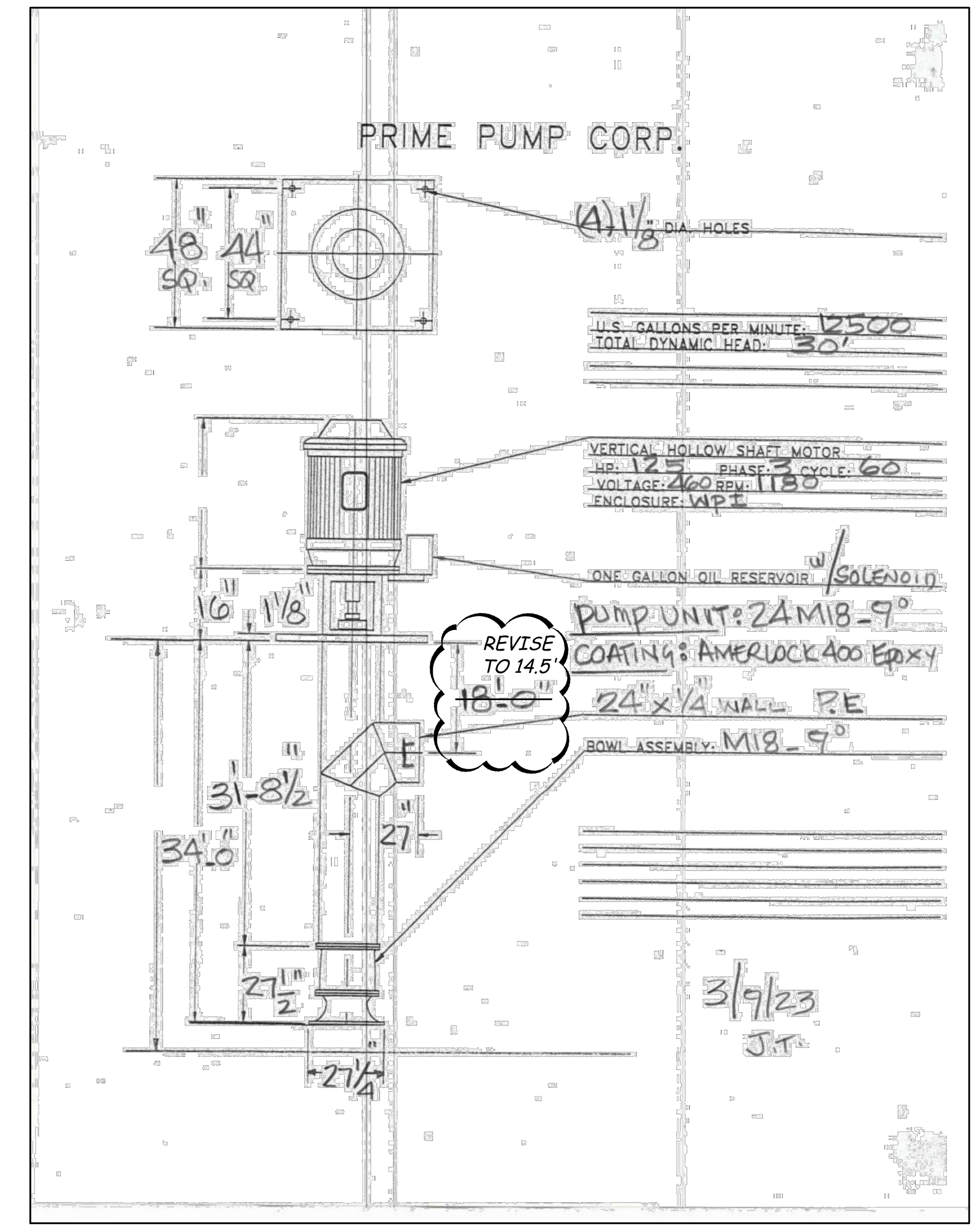
X:\Land Projects\4471\dwg\4471_C001.dwg

ABBREVIATIONS

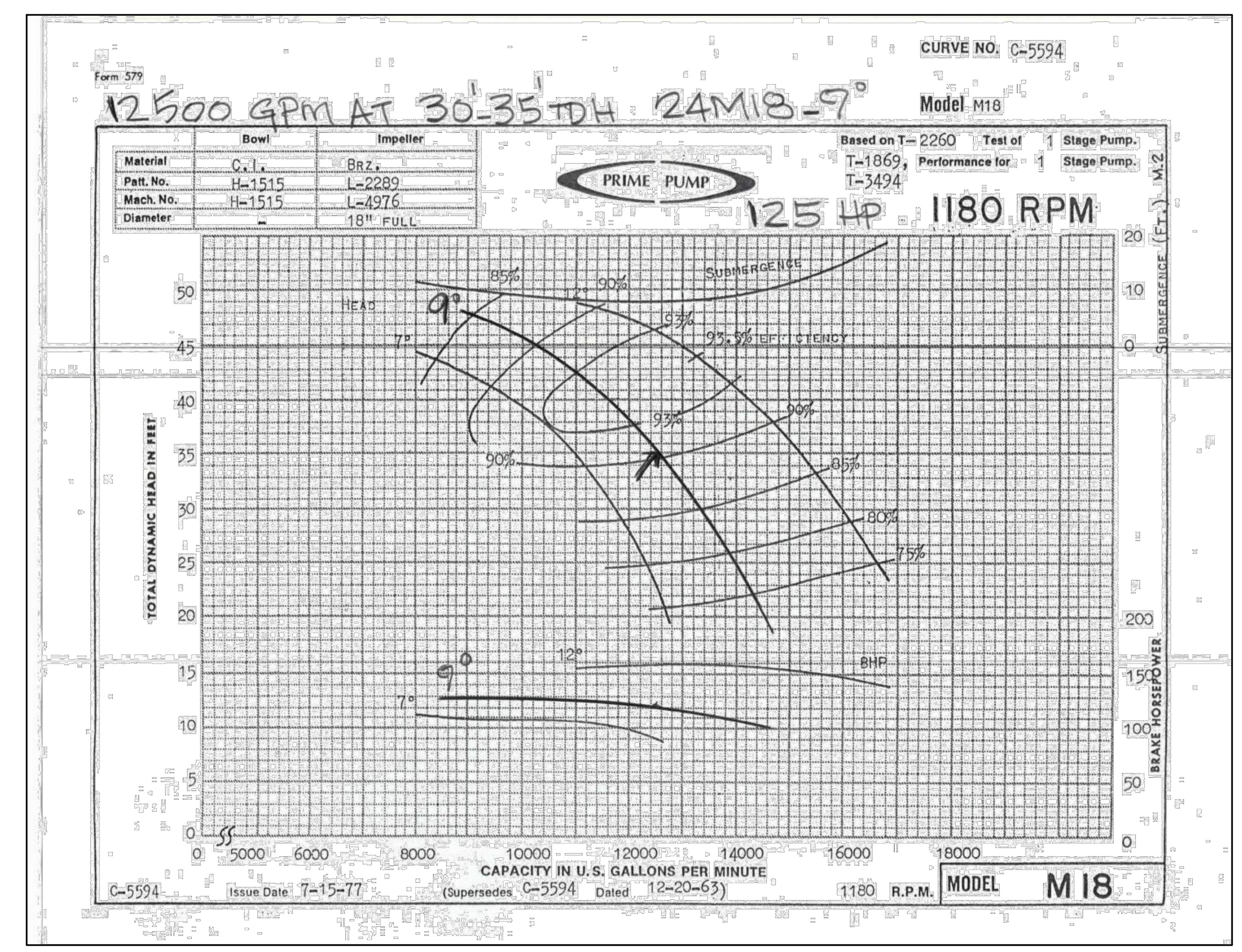
AB	AGGREGATE BASE
AC	ASPHALT CONCRETE
APPD.	APPROVED
APPROX.	APPROXIMATE(LY)
ARV	AIR RELEASE VALVE
ASB	AGGREGATE SUBBASE
ASS'Y.	ASSEMBLY
BC	BEGIN CURVE
BEW	BACK EDGE OF WALK
BLDG.	BUILDING
BF	BOTTOM OF FOOTING
BM	BENCH MARK
BOC	BACK OF CURB
BOV	BLOW-OFF VALVE
BP	BACKFLOW PREVENTER
BTM.	BOTTOM
BVC	BEGIN VERTICAL CURVE
BW	BOTTOM OF WALL
C	COMPACT CAR PARKING SPACE
CATV	CABLE TELEVISION
CAVV	COMBINATION AIR & VACUUM VALVE
C&G	CURB AND GUTTER
C,G & SW	CURB, GUTTER AND SIDEWALK
CB	CATCH BASIN
C	CENTER
CC	CENTER TO CENTER
CIP	CAST IRON PIPE
CIPCP	CAST IN PLACE CONCRETE PIPE
CJ	CONSTRUCTION JOINT
CL	CENTERLINE, CONTROL LINE, CHAIN LINK CLASS
CL.	CLEAR OR CLEARANCE
CLR.	CLEANOUT
CO	CLEANOUT TO GRADE
COTG	CONCRETE
CONC.	CONSTRUCT
CONST.	CONTROL OR CONTINUOUS
CONT.	COORDINATE
COORD.	CORNER
COR.	CONCRETE PIPE
CP	CORRUGATED POLYETHYLENE PIPE
CPEP	CURB RETURN
CR	CORRUGATED STEEL PIPE
CSP	CENTER
CTR.	CHECK VALVE
CV	CROSSWALK
CW	DOUBLE CHECK DETECTOR CHECK ASSEMBLY
DCDCA	DOUBLE CHECK VALVE
DCV	DRAINAGE INLET
DI	DUCTILE IRON PIPE
DIP	DOWNSPOUT
DS	DETAIL
DTL.	DRIVEWAY
DW	DRAWING
DWG.	EXISTING
(E)	EAST
E	EASEMENT
EAS'T.	END CURVE
EC	EXPANSION JOINT
EJ	ELECTRIC(AL)
ELEC.	ELEVATION
EL., ELEV.	EDGE OF PAVEMENT
EP	EQUIVALENT
EQUIV.	EXTRA STRENGTH VITRIFIED CLAY PIPE
ESVCP	END VERTICAL CURVE
EVC	EXISTING
EX., EXIST.	EXPANSION JOINT
EXP. JT.	EXTERIOR
EXT.	FURNISH AND INSTALL
F & I	CONCRETE COMPRESSIVE STRENGTH
f'c	

FCA	FLANGED COUPLING ADAPTER
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDN.	FOUNDATION
FEW	FRONT EDGE OF WALK
FF, FIN. FLR.	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FL	FLOWLINE
FM	FORCE MAIN
FO	FIBER OPTIC
FOC	FACE OF CURB OR CONCRETE
FP	FINISHED PAVING GRADE (AC OR PCC)
FSR	FIRE SPRINKLER RISER
FTA	FIBER TRANSMISSION A CABLE
FTB	FIBER TRANSMISSION B CABLE
FTG.	FOOTING
GA.	GAUGE
GALV.	GALVANIZED
GB	GRADE BREAK OR GRADE CHANGE
GM	GAS METER
GS	GAS SERVICE, GREASE SEWER
GSP	GALVANIZED STEEL PIPE
GTV	GATE VALVE
GV	GAS VALVE
H	HANDICAP PARKING SPACE
HB	HEADER BOARD OR HOSE BIBB
HDCP.	HANDICAPPED
HDPE	HIGH DENSITY POLYETHYLENE
HP	HIGH POINT
INTX.	INTERSECTION
INV.	INVERT
IRR.	IRRIGATION
IWV	IRRIGATION WATER VALVE
JP	JOINT-USE UTILITY POLE
JT	JOINT-USE TRENCH OR JOINT
L	LEFT
LF	LINEAL FEET
LOG	LIP OF GUTTER
LT	LEFT OR LIGHT
LTB	LIME TREATED BASE
MAX.	MAXIMUM
MFR.	MANUFACTURER
MH	MANHOLE
MIN.	MINIMUM
MJ	MECHANICAL JOINT
MOC	MIDDLE OF CURVE
MON.	MONUMENT
MRC	MINIMUM RELATIVE COMPACTION
MTD.	MOUNTED
N	NORTH
NTS	NOT TO SCALE
OA	OVERALL
OH	OVERHEAD
OD	OVERFLOW ROOF DRAIN
PB	PULL BOX
PCC	PORTLAND CEMENT CONCRETE OR
	POINT OF COMPOUND CURVATURE
PE	POLYETHYLENE OR PLAIN END
PED.	PEDESTRIAN
PERF.	PERFORATED
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
PL	PROPERTY LINE
POC	POINT OF CONNECTION, POINT ON CURVE
PP	POWER POLE
PRC	POINT OF REVERSE CURVATURE
PRF	PAVEMENT REINFORCING FABRIC
PRVC	POINT OF REVERSE VERTICAL CURVATURE

PROJ.	PROJECTED
PROP.	PROPERTY
PS	PUMP STATION
PT.	POINT
PUE	PUBLIC UTILITY EASEMENT
PVCP	POLYVINYL CHLORIDE PIPE
PVMT.	PAVEMENT
PWD	PUBLIC WORKS DEPARTMENT
R	RADIUS, RADIAL OR RIGHT
R&D	REMOVE AND DISPOSE OF
R&R	REMOVE AND RELOCATE
R&S	REMOVE AND SALVAGE
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN OR ROAD
REINF.	REINFORCED OR REINFORCING
REQ'TS.	REQUIREMENTS
RET.	RETAINING
RP	RADIUS POINT OR REFERENCE POINT
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RT	RIGHT
R/W	RIGHT-OF-WAY
RW	RECYCLED WATER
S	SOUTH OR SLOPE
SCH.	SCHEDULE
SCSCS	SACRAMENTO COUNTY STANDARD CONSTRUCTION SPECIFICATIONS
SD	STORM DRAIN
SEC.	SECTION
SEP.	SEPARATION
SIM.	SIMILAR
SL	STREET LIGHT
SNS	STREET NAME SIGN
SQ.	SQUARE
SS	SEWER SERVICE, SANITARY SEWER
STD.	STANDARD
SW	SIDEWALK OR SURFACE WATER
SYM.	SYMMETRICAL
TC	TOP OF CURB OR CONCRETE
TD	TRENCH DRAIN
TEL	TELEPHONE
TEMP.	TEMPORARY
TF	TOP OF FOOTING
TFOC	TOP FACE OF CURB
TM	TELEPHONE CABLE MARKER
TOP	TOP OF PAVING OR TOP OF PIPE
TOS	TOP OF SLAB
TP	TELEPHONE POLE
TR	TOP OF RAIL OR TELEPHONE RISER
TPME	TREE PLANTING AND MAINTENANCE EASEMENT
TRAF.	TRAFFIC
TRANS.	TRANSITION
TW	TOP OF WALL
TYP.	TYPICAL
UG	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
UP	UTILITY POLE
VAR.	VARIES OR VARIABLE
VCP	VITRIFIED CLAY PIPE
VERT.	VERTICAL
VG	VALLEY GUTTER
W	WEST
WM	WATER METER OR WATER MAIN
WP	WORKING PRESSURE
WS	WATER SERVICE
WSP	WELDED STEEL PIPE
WV	WATER VALVE
WWF	WELDED WIRE FABRIC
XFMR	TRANSFORMER
XING	CROSSING



1 FLOWMETER DETAIL
NTS



2 PUMP CURVE DETAIL
NTS

DESIGNED BY TCT
DRAWN BY MSW
CHECKED BY TCT

REV.	DATE	DESCRIPTION	BY	APP'D.

LM LAUGENOUR AND MEIKLE
CIVIL ENGINEERING · LAND SURVEYING · PLANNING
608 COURT STREET, WOODLAND, CALIFORNIA 95695 · PHONE: (530) 662-1755
P.O. BOX 828, WOODLAND, CALIFORNIA 95776 · FAX: (530) 662-4602
BY
TODD C. TOMMERAASON
DATE 05/05/2023 P.E. 59277

REGISTERED PROFESSIONAL ENGINEER TODD C. TOMMERAASON No. 59277 CIVIL STATE OF CALIFORNIA

IRRIGATION IMPROVEMENTS
FOR
UPPER SWANSTON RANCH, INC.
YOLO COUNTY CALIFORNIA
ABBREVIATIONS AND DETAILS

SCALE
NONE
DATE: 05/05/2023
JOB NO. 4471

C002
SHEET 2 OF 15

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GENERAL NOTES

1. STANDARDS AND PLANS

A. UNLESS SHOWN OR SPECIFIED OTHERWISE, ALL WORK SHALL BE IN ACCORDANCE WITH THESE PLANS, AND THE STRUCTURAL PLANS BY VE SOLUTIONS, INC. AND WITH THE LATEST EDITION OF THE COUNTY OF SACRAMENTO PUBLIC WORKS AGENCY STANDARD CONSTRUCTION SPECIFICATIONS (SCSCS).

B. IT IS INTENDED THAT THESE PLANS AND SPECIFICATIONS REQUIRE ALL LABOR AND MATERIALS NECESSARY AND PROPER FOR THE WORK CONTEMPLATED AND THAT THE WORK BE COMPLETED IN ACCORDANCE WITH THEIR TRUE INTENT AND PURPOSE. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY REGARDING ANY DISCREPANCIES OR AMBIGUITIES WHICH MAY EXIST IN THE PLANS OR SPECIFICATIONS. THE ENGINEER'S INTERPRETATION OR CORRECTION THEREOF SHALL BE CONCLUSIVE.

C. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE ALL NECESSARY SITE INSPECTIONS AND DETERMINE ALL ITEMS OF WORK NOT SPECIFICALLY SHOWN AS BID ITEMS, OR OTHERWISE INDICATED, PRIOR TO BIDDING. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL ITEMS OF WORK NECESSARY TO PERFORM A COMPLETE AND ACCEPTABLE JOB.

D. WHERE THE PLANS OR SPECIFICATIONS DESCRIBE PORTIONS OF THE WORK IN GENERAL TERMS BUT NOT IN COMPLETE DETAIL, IT IS UNDERSTOOD THAT ONLY THE BEST GENERAL PRACTICE IS TO PREVAIL AND THAT ONLY MATERIALS AND WORKMANSHIP OF FIRST QUALITY ARE TO BE USED.

E. THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS AND THE OWNER.

F. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES AND REGULATIONS BEARING ON THE CONDUCT OF THE WORK AS SHOWN ON THE PLANS AND DESCRIBED IN THE SPECIFICATIONS. HE SHALL PROMPTLY NOTIFY THE ENGINEER IN WRITING OF ANY SPECIFICATION AT VARIANCE THEREWITH AND ANY NECESSARY CHANGES SHALL BE ADJUSTED AS PROVIDED IN THE CONTRACT FOR CHANGES IN THE WORK. IF THE CONTRACTOR PERFORMS ANY WORK CONTRARY TO SUCH LAWS, ORDINANCES, RULES AND REGULATIONS, HE SHALL BEAR ALL COSTS ARISING THEREFROM.

G. CONSTRUCTION SHALL COMPLY WITH THE PROJECT GEOTECHNICAL ENGINEERING REPORT PREPARED BY WKA.

H. ALL WORK SHALL COMPLY WITH THE PROJECT SWPPP, INCLUDING THE EROSION AND SEDIMENTATION CONTROL PLAN.

2. EXISTING UTILITIES AND COORDINATION OF WORK

A. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE IMPROVEMENT PLANS WERE OBTAINED FROM SOURCES OF VARYING RELIABILITY. THE CONTRACTOR IS CAUTIONED THAT ONLY ACTUAL EXCAVATION WILL REVEAL THE TYPES, EXTENT, SIZES, LOCATIONS AND DEPTHS OF SUCH UNDERGROUND UTILITIES. LAUGENOUR AND MEIKLE ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF ITS DELINEATION OF SUCH UNDERGROUND UTILITIES, NOR FOR THE EXISTENCE OF OTHER BURIED OBJECTS OR UTILITIES WHICH MAY BE ENCOUNTERED BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.

B. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO ANY EXCAVATION. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE UTILITY COMPANIES INVOLVED AND REQUESTING A VISUAL VERIFICATION OF THE LOCATIONS OF THEIR UNDERGROUND FACILITIES. THE INSPECTOR AND THE ENGINEER SHALL BE NOTIFIED BY THE CONTRACTOR OF THE SCHEDULED TIME AND PLACE OF SUCH VISUAL VERIFICATION TO ENABLE THEM TO HAVE REPRESENTATIVES PRESENT. IF, IN THE OPINION OF THE INSPECTOR, A CONFLICT EXISTS, THEN THE ENGINEER SHALL: (1) MAKE ANY NEEDED GRADE AND/OR ALIGNMENT ADJUSTMENTS AND REVISE THE PLANS ACCORDINGLY; AND/OR (2) CONTACT THE UTILITY PARTY RESPONSIBLE FOR THE RELOCATION OF THE CONFLICTING FACILITY.

C. THE COUNTY IS A MEMBER OF THE UNDERGROUND SERVICE ALERT (U.S.A.) ONE–CALL PROGRAM. THE CONTRACTOR OR ANY SUBCONTRACTOR FOR THIS CONTRACT SHALL NOTIFY MEMBERS OF U.S.A. 48 HOURS IN ADVANCE OF PERFORMING EXCAVATION WORK BY CALLING THE TOLL–FREE NUMBER 800–227–2600. EXCAVATION IS DEFINED AS BEING MORE THAN 18 INCHES IN DEPTH BELOW THE EXISTING SURFACE.

D. ANY EXISTING UNDERGROUND UTILITY (INCLUDING PIPELINES) WHICH IS TO BE EXTENDED, WHICH IS THE CONNECTION POINT FOR NEW UNDERGROUND UTILITIES, OR WHICH NEW FACILITIES CROSS, SHALL BE EXPOSED BY THE CONTRACTOR PRIOR TO CONSTRUCTION STAKING FOR PLACEMENT OF THE NEW UTILITIES. COST OF SUCH EXCAVATION AND SUBSEQUENT BACKFILL SHALL BE INCLUDED IN THE PRICES PAID FOR THE VARIOUS ITEM OF WORK. THE ELEVATIONS AND LOCATIONS OF THE EXISTING UTILITIES WILL BE CHECKED FOR POSSIBLE CONFLICTS WITH PLANS BY THE INSPECTOR AND THE ENGINEER. IF, IN THE OPINION OF THE INSPECTOR, A CONFLICT EXISTS, THEN THE ENGINEER SHALL: (1) MAKE ANY NEEDED GRADE AND/OR ALIGNMENT ADJUSTMENTS AND REVISE THE PLANS ACCORDINGLY; AND/OR (2) CONTACT THE UTILITY PARTY RESPONSIBLE FOR THE RELOCATION OF THE CONFLICTING FACILITY.

E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURVEY MONUMENTS AND OTHER SURVEY MARKERS DURING CONSTRUCTION. ALL SUCH MONUMENTS OR MARKERS DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

3. EXAMINATIONS OF PLANS, SPECIFICATIONS AND SITE OF WORK

THE BIDDER SHALL EXAMINE CAREFULLY THE SITE OF THE PROPOSED WORK AND THE PLANS, SPECIFICATIONS AND BID DOCUMENTS, AND SHALL BE SATISFIED AS TO THE CHARACTER, QUALITY, AND QUANTITY OF SURFACE AND SUBSURFACE MATERIALS OR OBSTACLES TO BE ENCOUNTERED. THE SUBMISSION OF A BID SHALL BE CONCLUSIVE EVIDENCE THAT THE BIDDER IS SATISFIED THROUGH THE BIDDER'S OWN INVESTIGATION AS TO THE CONDITIONS TO BE ENCOUNTERED; THE CHARACTER, QUALITY, QUANTITY AND SCOPE OF WORK TO BE PERFORMED; AND THE MATERIALS AND EQUIPMENT TO BE FURNISHED.

IF MATERIAL DISCREPANCIES OR APPARENT MATERIAL ERRORS ARE FOUND IN THE PLANS AND SPECIFICATIONS PRIOR TO THE DATE OF BID OPENING, AN ADDENDUM MAY BE ISSUED.

4. CONSTRUCTION STAKING

A. BASIC CONSTRUCTION STAKING SHALL BE FURNISHED BY THE OWNER.

B. THE CONTRACTOR SHALL BE PROVIDED WITH ONE SET OF CONSTRUCTION STAKES FOR EACH PHASE OF THE WORK. THE CONTRACTOR SHALL COORDINATE THE SPACING AND OFFSETS OF STAKES WITH THE ENGINEER/SURVEYOR AT LEAST 5 WORKING DAYS PRIOR TO THE DATE OF STAKING, AND HE SHALL REQUEST CONSTRUCTION STAKES FOR ANY PARTICULAR PHASE OF WORK AT LEAST 48 HOURS PRIOR TO THE DATE OF THE PLANNED USE OF THE STAKES.

C. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE THE STAKES DURING THE CONSTRUCTION OF THE VARIOUS PHASES OF WORK. RESTAKING OR CHECKING OF ANY STAKES DISTURBED, DESTROYED OR REMOVED BY CONSTRUCTION, ACCIDENT, OR OTHERWISE, EVEN DURING NONWORKING OR INCLEMENT WEATHER PERIODS, THAT ARE NEEDED FOR CONSTRUCTION OR AS A REFERENCE FOR FURTHER STAKING, SHALL BE AT THE CONTRACTOR'S EXPENSE. NO REQUESTS FOR STAKES RECEIVED FROM A SUBCONTRACTOR WILL BE RECOGNIZED WITHOUT PRIOR AGREEMENT WITH THE GENERAL CONTRACTOR.

D. ALL CORRECTIVE ACTIONS PERFORMED BY THE CONTRACTOR, WHICH ARE NECESSARY DUE TO A STAKING ERROR, SHALL NOT BE PERFORMED UNTIL THE CONSULTING ENGINEER/SURVEYOR HAS BEEN NOTIFIED AND HAS HAD THE OPPORTUNITY TO VERIFY PREVIOUS STAKING AND/OR PROVIDE RESTAKING. ANY CORRECTIVE ACTION TAKEN BY THE CONTRACTOR, PRIOR TO, OR WITHOUT BENEFIT OF SUCH NOTICE, AND IF THE ORIGINAL STAKING IS PERFORMED BY OTHERS, SHALL RELIEVE THE CONSULTING ENGINEER/SURVEYOR OF ALL LIABILITY FOR THE COSTS OF SUCH CORRECTIVE ACTIONS.

E. THESE IMPROVEMENT PLANS HAVE BEEN PREPARED WITH THE INTENT THAT LAUGENOUR AND MEIKLE WILL BE HIRED TO PERFORM THE CONSTRUCTION STAKING FOR THE COMPLETE PROJECT. IF, HOWEVER, ANOTHER ENGINEER AND/OR SURVEY FIRM SHOULD BE EMPLOYED TO USE THESE PLANS FOR THE PURPOSE OF CONSTRUCTION STAKING, NOTICE IS HEREBY GIVEN THAT LAUGENOUR AND MEIKLE WILL NOT ASSUME ANY RESPONSIBILITY FOR ANY ERRORS OR OMISSIONS WHICH MIGHT OCCUR AND WHICH COULD HAVE BEEN AVOIDED, CORRECTED OR MITIGATED IF LAUGENOUR AND MEIKLE HAD PERFORMED THE STAKING WORK.

5. CONFLICTS

THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO PERFORMING ANY CORRECTIVE ACTION REQUIRED DUE TO UNFORESEEN CONFLICTS IN THE IMPROVEMENT PLANS OR DUE TO POSSIBLE STAKING ERRORS. THE ENGINEER ASSUMES NO LIABILITY FOR THE COST OR DESIGN OF ANY MODIFICATION PERFORMED WITHOUT SUCH NOTIFICATION, AND ALSO ASSUMES NO LIABILITY FOR STAKING PROVIDED BY OTHERS.

6. OBSTRUCTIONS

A. THE CONTRACTOR SHALL REMOVE ALL OBSTRUCTIONS, BOTH ABOVE GROUND AND UNDERGROUND, EXCEPT AS NOTED IN ITEM 2 ABOVE, AS NECESSARY FOR THE CONSTRUCTION OF THE PROPOSED IMPROVEMENTS. WHEN FEASIBLE, SUCH WORK SHALL BE COMPLETED PRIOR TO GRADING.

B. ALL UNSUITABLE AND SURPLUS MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE UNLESS SPECIFIED OTHERWISE.

C. ALL EXCAVATIONS RESULTING FROM REMOVAL ACTIVITIES SHALL BE CLEANED OF LOOSE OR DISTURBED MATERIAL (INCLUDING ALL PREVIOUSLY–PLACED BACKFILL) AND DISH–SHAPED (WITH SIDES SLOPED 3(H):1(V), OR FLATTER) TO PROVIDE ACCESS FOR COMPACTION EQUIPMENT.

7. PUBLIC SAFETY AND TRAFFIC CONTROL

A. CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL CURRENTLY APPLICABLE SAFETY LAWS OF ALL JURISDICTIONAL BODIES. THE CONTRACTOR IS DIRECTED TO CONTACT THE STATE INDUSTRIAL RELATIONS DEPARTMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL BARRICADES, SAFETY DEVICES, AND CONTROL OF TRAFFIC WITHIN AND AROUND THE CONSTRUCTION AREA.

B. CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.

C. ALL EXCAVATIONS MUST COMPLY WITH APPLICABLE LOCAL, STATE AND FEDERAL SAFETY REGULATIONS INCLUDING THE CURRENT OSHA EXCAVATION AND TRENCH SAFETY STANDARDS.

8. CONTROL POINTS AND SURVEY MONUMENTS

A. CERTAIN CONTROL POINTS WILL BE SET BY THE ENGINEER, OR ITS REPRESENTATIVE, WHICH ARE CRITICAL TO THE CONSTRUCTION STAKING OF THE PROJECT. THESE POINTS WILL BE DESIGNATED AT A PRE–CONSTRUCTION CONFERENCE BETWEEN REPRESENTATIVES OF THE ENGINEER AND THE CONTRACTOR. THE CONTROL POINTS WILL BE CLEARLY MARKED ON THE JOB SITE. THE CONSTRUCTION SHALL NOT DISTURB THE CONTROL POINTS IN ANY MANNER. IF IT BECOMES NECESSARY TO REMOVE SAID CONTROL POINTS DURING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER 48 HOURS IN ADVANCE OF SAID REMOVAL TO ALLOW FOR REFERENCING SAID CONTROL POINTS AND THEIR EVENTUAL REPLACEMENT. IF CONTROL POINTS ARE REMOVED OR DESTROYED WITHOUT SAID NOTIFICATION AND REFERENCING, THE COST OF REPLACEMENT SHALL BE DEDUCTED FROM THE CONTRACTOR'S PAYMENT, AND PAYMENT SHALL BE MADE BY OWNER TO THE ENGINEER.

B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURVEY MONUMENTS AND OTHER SURVEY MARKERS DURING CONSTRUCTION. ALL MONUMENTS OR MARKERS DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. WHEN THE LOCATION OF AN EXISTING SURVEY MONUMENT CONFLICTS WITH PROPOSED WORK, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE ENGINEER MAY REFERENCE THE MONUMENT. AFTER THE MONUMENT HAS BEEN REFERENCED THE CONTRACTOR SHALL REMOVE THE MONUMENT AND LATER REPLACE IT WITH THE COUNTY STANDARD MONUMENT. THE ENGINEER WILL THEN MARK THE SURVEY POINT ON THE MONUMENT.

9. EARTHWORK

A. ALL EARTHWORK ACTIVITIES, INCLUDING EXCAVATION, GRADING, SCARIFYING, MOISTURE CONDITIONING, FILL PLACEMENT, COMPACTION, ETC., SHALL BE PERFORMED IN ACCORDANCE WITH THESE PLANS, SUBJECT TO THE RECOMMENDATIONS OF THE WALLACE–KUHL & ASSOC. (WKA) PREPARED GEOTECHNICAL ENGINEERING REPORT NO. _______, DATED ________ (CONTACT: MIKE WATARI, PHONE 916–372–1434).

B. THE GEOTECHNICAL ENGINEER, WALLACE – KUHL & ASSOC., SHALL OBSERVE THE GRADING ACTIVITIES AND PERFORM COMPACTION TESTING FOR THIS PROJECT. THE CONTRACTOR SHALL PROVIDE AT LEAST 24 HOURS NOTICE TO THE GEOTECHNICAL ENGINEER OF THE NEED FOR OBSERVATION AND TESTING SERVICES. THE PROJECT OWNER WILL PAY FOR THE COST OF PROVIDING THESE SERVICES; HOWEVER, IF SAMPLES OF MATERIALS ARE SUBMITTED WHICH FAIL TO PASS THE SPECIFIED TESTS OR IF WORK IS PERFORMED WHICH FAILS TO MEET THESE SPECIFICATIONS, THE CONTRACTOR SHALL PAY FOR ALL SUBSEQUENT RE–TESTS AND REINSPECTIONS.

C. EARTHWORK SHALL INCLUDE ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO CONSTRUCT THE SITE TO THE GRADES SHOWN.

D. ALL CUT SLOPES SHALL BE ROUNDED AT THE "BREAK" SO THAT THEY BLEND WITH THE NATURAL GROUND CONTOUR. PERMANENT SLOPES SHALL NOT BE STEEPER THAN 2H:IV.

E. THE CONTRACTOR SHALL APPLY EITHER WATER OR DUST PALLIATIVE, OR BOTH, FOR THE ALLEVIATION OR PREVENTION OF DUST NUISANCE AS DIRECTED BY THE ENGINEER.

F. EXCAVATION AND EMBANKMENT SIDE SLOPES SHOWN ON THE PLANS AS A RATIO, E.G. 4:1, REFER TO THE RATIO OF HORIZONTAL TO VERTICAL DISTANCES. "MINIMUM" SLOPE MEANS "NOT FLATTER THAN", AND "MAXIMUM" SLOPE MEANS "NOT STEEPER THAN". ALL EMBANKMENT AND EXCAVATION SLOPES SHALL BE 3:1 UNLESS NOTED OTHERWISE.

G. UNLESS SPECIFIED OTHERWISE, EARTH FILL SHALL INCLUDE COMPACTION TO AT LEAST 90% OF THE ASTM D1557 MAXIMUM DRY DENSITY.

H. ALLOWABLE GRADING TOLERANCE IS PLUS OR MINUS 0.10 FOOT OF THE ELEVATIONS SHOW HEREON.

I. ONLY NATIVE SOILS (IN LIEU OF GRAVEL OR SAND BACKFILL) SHALL BE USED AS BACKFILL FOR UTILITY TRENCHES LOCATED WITHIN FIVE FEET BEYOND THE BUILDING PERIMETER FOUNDATION TO MINIMIZE WATER TRANSMISSION BENEATH THE BUILDING. BACKFILL FOR UTILITY TRENCHES LOCATED WITHIN THE FOOTPRINT OF THE BUILDING SHALL CONFORM WITH THE CURRENT CALIFORNIA PLUMBING CODE. UTILITY TRENCH BACKFILL SHALL BE THOROUGHLY MOISTURE CONDITIONED TO AT LEAST THE OPTIMUM MOISTURE CONTENT AND MECHANICALLY COMPACTED TO AT LEAST 90 PERCENT OF THE ASTM D1557 MAXIMUM DRY DENSITY.

J. A GEOTEXTILE FILTER FABRIC SHALL BE USED TO SEPARATE CLEAN, OPEN–GRADED COBBLES OR CRUSHED ROCK BEDDING AND BACKFILL MATERIALS FROM ADJACENT FINER–GRAINED NATIVE SOILS TO PREVENT PIPING AND RESULTING TRENCH SETTLEMENT. ADDITIONALLY, SANDS USED AS BEDDING AND BACKFILL MUST BE SIMILARLY SEPARATED FROM CLEAN, OPEN–GRADED COBBLE AND GRAVEL BACKFILL MATERIALS.

K. UNDERGROUND UTILITY TRENCHES THAT ARE ALIGNED NEAR FOUNDATIONS SHALL BE CONSTRUCTED TO PREVENT LOSS OF BOTH LATERAL AND VERTICAL SUPPORT OF FOUNDATIONS, RESULTING IN POSSIBLE SETTLEMENT OF THE FOUNDATIONS.

10. RECORD DRAWINGS

A. "RECORD DRAWINGS" IS DEFINED AS BEING THOSE DRAWINGS MAINTAINED BY THE CONTRACTOR TO SHOW THE CONSTRUCTION OF A PARTICULAR STRUCTURE OR WORK AS ACTUALLY COMPLETED UNDER THE CONTRACT. "RECORD DRAWINGS" SHALL BE SYNONYMOUS WITH "AS–BUILT DRAWINGS". AS REQUIRED BY THE ENGINEER, THE CONTRACTOR SHALL PROVIDE THE ENGINEER ACCURATE INFORMATION TO BE USED IN THE PREPARATION OF PERMANENT RECORD DRAWINGS. FOR THIS PURPOSE, THE CONTRACTOR SHALL RECORD ON ONE SET OF CONTRACT DRAWING PRINTS ALL CHANGES FROM INSTALLATIONS ORIGINALLY INDICATED, AND RECORD FINAL LOCATIONS OF UNDERGROUND LINES BY DEPTH FROM FINISH GRADE AND BY ACCURATE HORIZONTAL OFFSET DISTANCES TO PERMANENT SURFACE IMPROVEMENTS SUCH AS BUILDINGS, CURBS OR EDGES OF WALKS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL AS–BUILT INFORMATION PREPARED BY SUBCONTRACTORS IS INCLUDED IN HIS RECORD DRAWINGS.

THE CONTRACTOR SHALL MAINTAIN AT LEAST ONE COMPLETE SET OF UPDATED "RECORD DRAWING" IMPROVEMENT PLAN PRINTS. THESE PRINTS SHALL BE READILY AVAILABLE TO THE OWNER AND TO THE ENGINEER. UPON COMPLETION OF THE PROJECT, AND PRIOR TO FINAL PAYMENT, THESE RECORD DRAWING PRINTS SHALL BE SUBMITTED TO THE ENGINEER.

11. INSPECTIONS & FINAL ACCEPTANCE

A. INSPECTIONS & FINAL ACCEPTANCE OF THE WORK SHALL BE IN ACCORD WITH THE LATEST EDITION OF THE COUNTY OF SACRAMENTO PUBLIC WORKS AGENCY STANDARD CONSTRUCTION SPECIFICATIONS (SCSCS). AT LEAST 24–HOURS ADVANCE NOTICE SHALL BE GIVEN TO THE TRIBAL INSPECTOR BY THE CONTRACTOR WHEN REQUESTING FIELD INSPECTIONS OR TESTS. THE CONTRACTOR SHALL FURNISH ALL COMPACTION TEST REPORTS AND BACKFLOW PREVENTION DEVICE TEST REPORTS TO THE INSPECTOR PRIOR TO FINAL ACCEPTANCE OF THE WORK.

PIPING NOTES

A. SCOPE OF WORK:

THE WORK COVERED BY THIS SECTION CONSISTS OF FURNISHING ALL LABOR, MATERIALS, TOOLS AND EQUIPMENT REQUIRED TO PERFORM ALL OPERATIONS REQUIRED FOR FURNISHING AND INSTALLING PIPES, FITTINGS AND APPURTENANCES AS SPECIFIED HEREIN AND AS SHOWN ON THE PLANS.

B. FOR ALL PIPING AND APPURTENANCES THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS, ALIGNMENT/LAYOUT DRAWINGS AND MANUFACTURER'S PRODUCT DATA, INCLUDING SIZE, TYPE, WEIGHT, GASKET MATERIALS, MATERIALS STANDARDS AND INSTALLATION REQUIREMENTS.

C. WELDED STEEL PIPING:

1. PIPING SHALL COMPLY WITH ASTM A53, GRADE B. USE STANDARD WEIGHT CLASS PIPE UNLESS NOTED OTHERWISE. PIPE LARGER THAN 12" NOMINAL DIAMETER SHALL BE 0.375" MIN. WALL THICKNESS.
2. EXTERIOR COATING SHALL BE FUSION BONDED EPOXY PER AWWA C213.
3. BURIED STEEL PIPING SHALL BE FUSION BONDED EPOXY COATED AND SHALL ALSO BE WRAPPED WITH POLYKEN NO. 932–50 TAPE COATING SYSTEM, INCL. PRIMER, AS RECOMMENDED BY MFR.
4. ALL WORK SHALL COMPLY WITH AWWA STANDARDS, INCL. MANUAL M11.

D. DUCTILE IRON PIPING:

1. LINING OF PIPE AND FITTINGS SHALL BE CEMENT MORTAR LINING CONFORMING TO AWWA/ANSI C104/A21.4. MORTAR LINING SEAL SHALL BE ASPHALTIC COATING PER AWWA/ANSI C151/A21.51 FOR PIPE AND AWWA/ANSI C110/A21.10 FOR FITTINGS.
2. ASPHALTIC COATING PER AWWA/ANSI C151/A21.51 FOR PIPE AND AWWA/ANSI C110/A21.10 FOR FITTINGS.
3. POLYETHYLENE ENCASEMENT SHALL BE USED ON ALL DUCTILE IRON PIPE AND FITTINGS BURIED IN SOIL. INSTALLATION OF POLYETHYLENE SHALL BE AS SPECIFIED IN AWWA/ANSI C105/A21.5, SECTION 5–4.2.1, DIPRA'S "POLYETHYLENE ENCASEMENT" BROCHURE, AND THESE SPECIFICATIONS. PIPE, FITTINGS, VALVES AND COUPLINGS SHALL BE WRAPPED. FITTINGS THAT REQUIRE CONCRETE BACKING SHALL BE WRAPPED PRIOR TO PLACING THE CONCRETE.
4. THE POLYETHYLENE ENCASEMENT SEAMS AND OVERLAPS SHALL BE WRAPPED AND HELD IN PLACE BY MEANS OF A 2–INCH WIDE PLASTIC BACKED ADHESIVE TAPE. THE TAPE SHALL BE POLYKEN NO. 900 (POLYETHYLENE), SCOTCHWRAP NO. 50 (POLYVINYL), OR EQUAL. THE TAPE SHALL BE SUCH THAT THE ADHESIVE SHALL BOND SECURELY TO BOTH METAL SURFACES AND POLYETHYLENE FILM.
5. PIPE SHALL BE INSTALLED IN ACCORDANCE WITH AWWA C600. CUTS ON DIP PIPE SHALL BE COATED WITH AN ACCEPTABLE BITUMINOUS MATERIAL.
6. PIPE DESIGN, MATERIALS AND MANUFACTURE SHALL COMPLY WITH THE LATEST REVISION OF THE FOLLOWING STANDARDS: THICKNESS DESIGN AWWA/ANSI C150/A21.50; PRESSURE PIPE AWWA/ANSI C151/A21.51; THREADED FLANGES AWWA/ANSI C115/A21.15; FITTINGS AWWA/ANSI C110/A21.10 OR C153/A21.53; RUBBER GASKETS AWWA/ANSI C111/A21.11.
7. PIPE SHALL BE PRESSURE CLASS 350, UNLESS NOTED OTHERWISE ON THE PLANS.

E. SOLVENT–CEMENT WELDED PVC PIPING:

1. PIPING SHALL COMPLY WITH ASTM STANDARDS D1784, D1785, D2467, D2564 AND D2855 FOR SCH. 80 PVC PIPE AND FITTINGS.

F. HDPE PIPING:

1. HDPE PIPE DIMENSIONS AND MANUFACTURING REQUIREMENTS: PIPE SHALL HAVE A MANUFACTURING STANDARD OF ASTM F714 AND SHALL COMPLY WITH C906 (4" AND LARGER). PIPE O.D. SIZES SHALL BE IRON PIPE SIZES (IPS).
2. THE PRESSURE CLASS (PC) OR STANDARD DIMENSION RATION (SDR) OF HDPE PIPE SHALL BE AS SPECIFIED ON THE PLANS.
3. THE PIPE SHALL CONTAIN NO RECYCLED COMPOUNDS EXCEPT THAT GENERATED IN THE MANUFACTURER'S OWN PLANT FROM RESIN OF THE SAME SPECIFICATION FROM THE SAME RAW MATERIAL. ALL PIPES SHALL BE SUITABLE FOR USE AS PRESSURE CONDUITS, AND HAVE A NOMINAL BURST VALUE OF THREE AND ONE–HALF TIMES THE WORKING PRESSURE RATING (WPR) OF THE PIPE.
4. HDPE PIPE INSTALLATION SHALL COMPLY WITH PIPE MANUFACTURER'S RECOMMENDATIONS; AWWA C901/C906; ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS"; ASTM D2774, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PRESSURE PIPING"; AND ASTM F1962, "STANDARD GUIDE FOR USE OF MAXI–HORIZONTAL DIRECTIONAL DRILLING FOR PLACEMENT OF POLYETHYLENE PIPE OR CONDUIT UNDER OBSTACLES, INCLUDING RIVER CROSSINGS".
5. MINIMUM COLD–BENDING RADIUS FOR HDPE PIPE IS 100 TIMES THE OUTSIDE DIAMETER OR THE PIPE.
6. PIPE JOINING SHALL COMPLY WITH ASTM F2620, "STANDARD PRACTICE FOR HEAT FUSION OF POLYETHYLENE PIPE AND FITTINGS"; ASTM D2657, "STANDARD PRACTICE OF HEAT FUSION JOINING OF POLYOLEFIN PIPE AND FITTINGS"; AND ASTM F1290, "STANDARD PRACTICE FOR ELECTROFUSION JOINING POLYOLEFIN PIPE AND FITTINGS".
7. BUTT HEAT FUSION JOINING; THE ASSEMBLY OF ALL HDPE PIPE JOINTS, INCLUDING PIPE ENDS AND PIPE FITTINGS, SHALL BE BY CONVENTIONAL BUTT HEAT FUSION JOINING, EXCEPT WHERE JOINING BY OTHER MEANS IS REQUIRED TO CONNECT WITH OTHER PIPE, VALVE, OR EQUIPMENT MATERIALS.
8. THE CONTRACTOR SHALL ENSURE THAT PERSONS MAKING HEAT FUSION JOINTS HAVE RECEIVED TRAINING IN THE MANUFACTURER'S RECOMMENDED PROCEDURE. THE CONTRACTOR SHALL MAINTAIN RECORDS OF TRAINED PERSONNEL, AND SHALL CERTIFY THAT TRAINING WAS RECEIVED NOT MORE THAN 12 MONTHS BEFORE COMMENCING CONSTRUCTION. EXTERNAL AND INTERNAL BEADS SHALL NOT BE REMOVED.
9. BUTT FUSION FITTINGS SHALL BE PE4710 HDPE, COMPATIBLE FOR HEAT FUSION WITH THE PROJECT–SPECIFIED PIPE AND FITTINGS, AND APPROVED FOR AWWA USE. BUTT FUSION FITTINGS SHALL HAVE A MANUFACTURING STANDARD OF ASTM D3261. MOLDED & FABRICATED FITTINGS SHALL BE MADE BY HEAT FUSION JOINING SPECIALLY MACHINED SHAPES CUT FROM PIPE, POLYETHYLENE SHEET STOCK OR MOLDED FITTINGS. FABRICATED FITTINGS SHALL BE RATED FOR INTERNAL PRESSURE SERVICE AT LEAST EQUAL TO THE FULL SERVICE PRESSURE RATING OF THE MATING PIPE. FABRICATED FITTINGS SHALL BE TESTED IN ACCORDANCE WITH AWWA C906. FABRICATED FITTINGS ARE TO BE MANUFACTURED USING DATA LOGGERS. TEMPERATURE, FUSION PRESSURE AND A GRAPHIC REPRESENTATION OF THE FUSION CYCLE SHALL BE PART OF THE QUALITY CONTROL RECORDS.
10. JOINING BY OTHER MEANS: HDPE PIPE AND FITTINGS MAY BE JOINED TOGETHER OR TO OTHER MATERIALS BY MEANS OF (A) FLANGED CONNECTIONS (FLANGE ADAPTERS AND BACK–UP RINGS), (B) MECHANICAL COUPLINGS DESIGNED FOR JOINING POLYETHYLENE PIPE OR FOR JOINING POLYETHYLENE PIPE TO ANOTHER MATERIAL, (C) MJ ADAPTERS OR (D) ELECTROFUSION. WHEN JOINING BY OTHER MEANS, THE INSTALLATION INSTRUCTIONS OF THE JOINING DEVICE MANUFACTURER SHALL BE OBSERVED.
11. FLANGE ADAPTERS WITH DUCTILE IRON BACK–UP RINGS SHALL BE USED WHERE HDPE PIPE MATES TO DISSIMILAR MATERIALS, AND TO PUMPS, VALVES AND OTHER APPURTENANCES. FLANGED ADAPTERS SHALL BE PE4710 HDPE, COMPATIBLE FOR HEAT FUSION WITH THE PROJECT–SPECIFIED PIPE AND FITTINGS. FLANGED ADAPTERS SHALL HAVE A MANUFACTURING STANDARD OF ASTM D3261.

   POLYETHYLENE FLANGE ADAPTERS: FLANGE ADAPTERS SHALL BE MADE WITH SUFFICIENT THROUGH–BORE LENGTH TO BE CLAMPED IN A BUTT FUSION–JOINING MACHINE WITHOUT THE USE OF A STUB–END HOLDER. THE SEALING SURFACE OF THE FLANGE ADAPTER SHALL BE MACHINED WITH A SERIES OF SMALL V–SHAPED GROOVES (SERRATIONS).

   BACK–UP RINGS & FLANGE BOLTS: FLANGE ADAPTERS SHALL BE FITTED WITH BACK–UP RINGS THAT ARE PRESSURE RATED EQUAL TO OR GREATER THAN THE MATING PIPE. FLANGES SHALL CONFORM TO ANSI B16.1 DIMENSIONAL STANDARDS. THE BACK–UP RING BORE SHALL BE CHAMFERED OR RADIUSED TO PROVIDE CLEARANCE TO THE FLANGE ADAPTER RADIUS. FLANGE BOLTS AND NUTS SHALL BE TYPE 304SS WITH DIELECTRIC WASHERS AND CHLOROPRENE GASKETS.

   DUCTILE IRON BACK–UP RINGS, AND ALL METAL FITTINGS AND APPURTENANCES SHALL BE ENCASED IN 8–MIL PE PER AWWA C105. SECURELY TAPE THE EDGES OF THE ENCASEMENT WITH PVC TAPE.

MOTOR AND VFD NOTES

A. TWO IDENTICAL MOTORS.

B. VERTICAL SOLID SHAFT, WP–1 CONSTRUCTION.

C. 125 HP NAMEPLATE RATING.

D. 1180 RPM

E. 480 VAC

F. GREASE–LUBED BEARINGS, SUITABLE FOR VERTICAL OPERATING POSITION.

G. SUITABLE FOR FULL–TIME OPERATION IN THE HOT SUMMERS OF THE VALLEY.

H. MOTOR SPEED WILL BE VFD–REGULATED BY A YASKAWA IQPUMP CONTROLLER.

YASKAWA AUTHORIZED REP TO PROVIDE OWNER WITH WRITTEN VERIFICATION THAT EACH PUMP CONTROLLER INSTALLATION IS IN ACCORD WITH YASKAWA RECOMMENDATIONS, PROPERLY TESTED AND SET UP FOR FULL–TIME SERVICE.

I. MOTOR MFR'S AUTHORIZED REPRESENTATIVE TO PROVIDE WRITTEN VERIFICATION THAT EACH MOTOR INSTALLATION IS IN ACCORD WITH MOTOR MFR'S RECOMMENDATIONS, PROPERLY TESTED AND SET UP FOR FULL–TIME SERVICE.

STEEL STRUCTURE PROTECTION COATING NOTES

A. SURFACE PREPARATION:

1. SURFACE MUST BE CLEAN, DRY AND IN SOUND CONDITION. REMOVE ALL OIL, DUST, GREASE, DIRT, LOOSE RUST, AND OTHER FOREIGN MATERIAL TO ENSURE ADEQUATE ADHESION.
2. REFER TO COATING MFR'S PRODUCT APPLICATION GUIDELINES FOR DETAILED SURFACE PREPARATION INFO.

B. STRUCTURAL STEEL, EXCLUDING STEEL PILING:

1. MIN. SURFACE PREPARATION IS SSPC–SP6/NACE 3 COMMERCIAL BLAST CLEANING, WITH A MINIMUM ANGULAR ANCHOR PROFILE OF 1.5 MILS.
2. PRIME COAT: TNEMEC SERIES 94–H20 HYDRO–ZINC, ZINC–RICH URETHANE, OR APPROVED EQUIVALENT, AT 2.5 TO 3.5 MILS DFT.
3. FINISH COAT: TNEMEC ENDURA–SHIELD SERIES 1095 POLYURETHANE, OR APPROVED EQUIVALENT, AT 2.0 TO 3.0 MILS DFT.
4. REFER TO COATING MFR'S PRODUCT APPLICATION GUIDELINES FOR DETAILED APPLICATION INFO. MFR'S AUTHORIZED REP TO PROVIDE WRITTEN VERIFICATION THAT COATING APPLICATION, INCL. SURFACE PREPARATION, IS IN ACCORD WITH MFR'S RECOMMENDATIONS.

C. STEEL PILING:

1. MIN. SURFACE PREPARATION IS SSPC–SP10/NACE 2 NEAR–WHITE BLAST CLEANING, WITH A MINIMUM ANGULAR ANCHOR PROFILE OF 1.5 MILS.
2. PRIME COAT: TNEMEC SERIES 94–H20 HYDRO–ZINC, ZINC–RICH URETHANE, OR APPROVED EQUIVALENT, AT 2.5 TO 3.5 MILS DFT.
3. FINISH COAT: TNEMEC SERIES L69F HI–BUILD EPOXOLINE II, OR APPROVED EQUIVALENT, AT 4.0 TO 6.0 MILS DFT.
4. REFER TO COATING MFR'S PRODUCT APPLICATION GUIDELINES FOR DETAILED APPLICATION INFO. MFR'S AUTHORIZED REP TO PROVIDE WRITTEN VERIFICATION THAT COATING APPLICATION, INCL. SURFACE PREPARATION, IS IN ACCORD WITH MFR'S RECOMMENDATIONS.

DESIGNED BY TCT
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CHECKED BY TCT

REV.	DATE	DESCRIPTION	BY	APP'D.

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BY
TODD C. TOMMERAASON
DATE 05/05/2023 P.E. 59277

REGISTERED PROFESSIONAL ENGINEER TODD C. TOMMERAASON No. 59277 CIVIL STATE OF CALIFORNIA

IRRIGATION IMPROVEMENTS FOR
UPPER SWANSTON RANCH, INC.
YOLO COUNTY CALIFORNIA
GENERAL NOTES

SCALE NONE
DATE: 05/05/2023
JOB NO. 4471
C003
SHEET 3 OF 15

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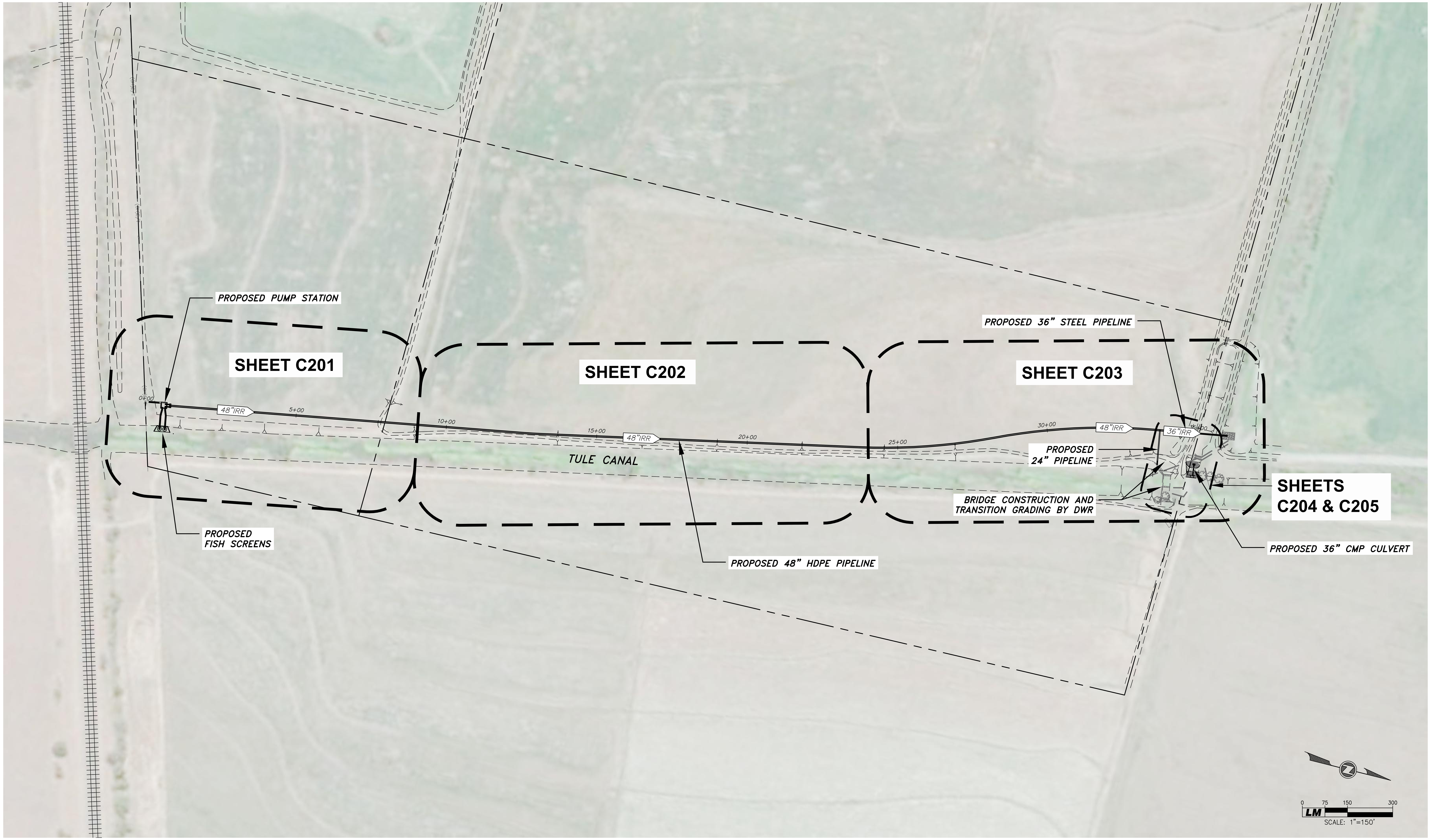

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BY
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DATE 05/05/2023 P.E. 59277

REGISTERED PROFESSIONAL ENGINEER
TODD C. TOMMERAASON
No. 59277
CIVIL
STATE OF CALIFORNIA

IRRIGATION IMPROVEMENTS
FOR
UPPER SWANSTON RANCH, INC.
YOLO COUNTY CALIFORNIA
SHEET INDEX

SCALE
1"=150'
DATE: 05/05/2023
JOB NO. 4471

C101
SHEET 4 OF 15

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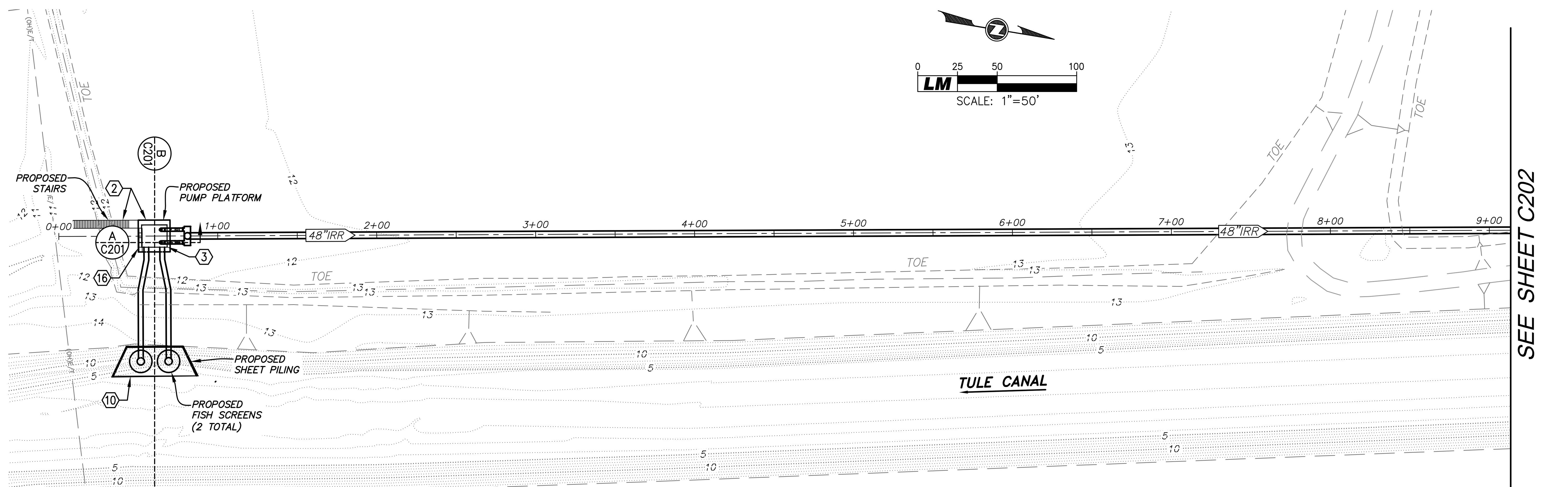
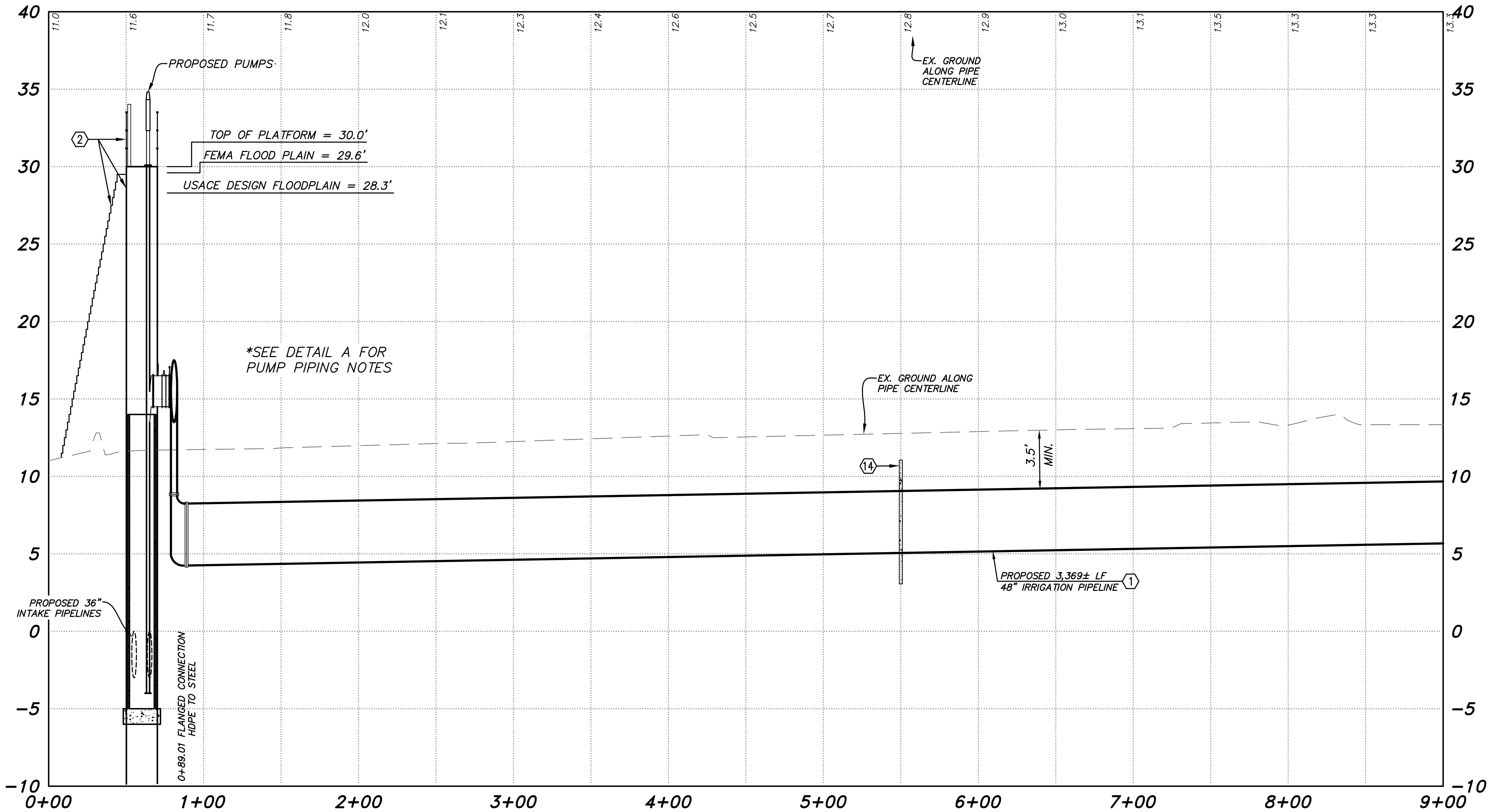


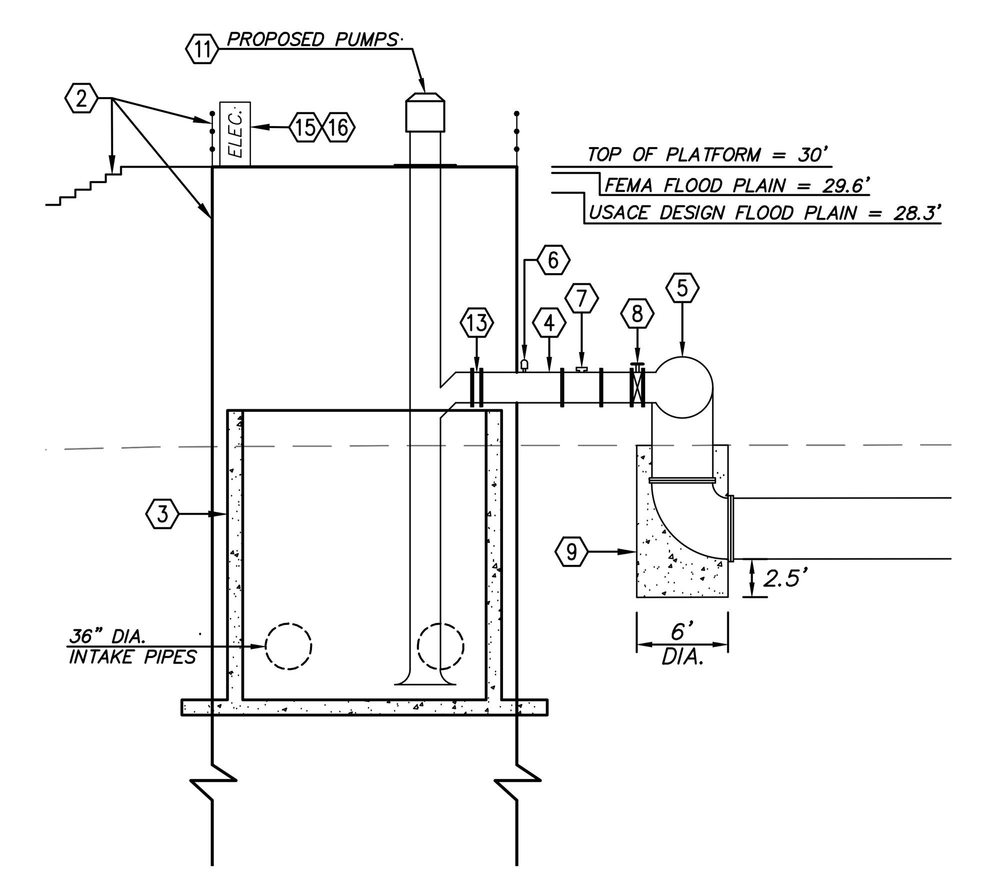
PLAN VIEW

H: 1"=50'



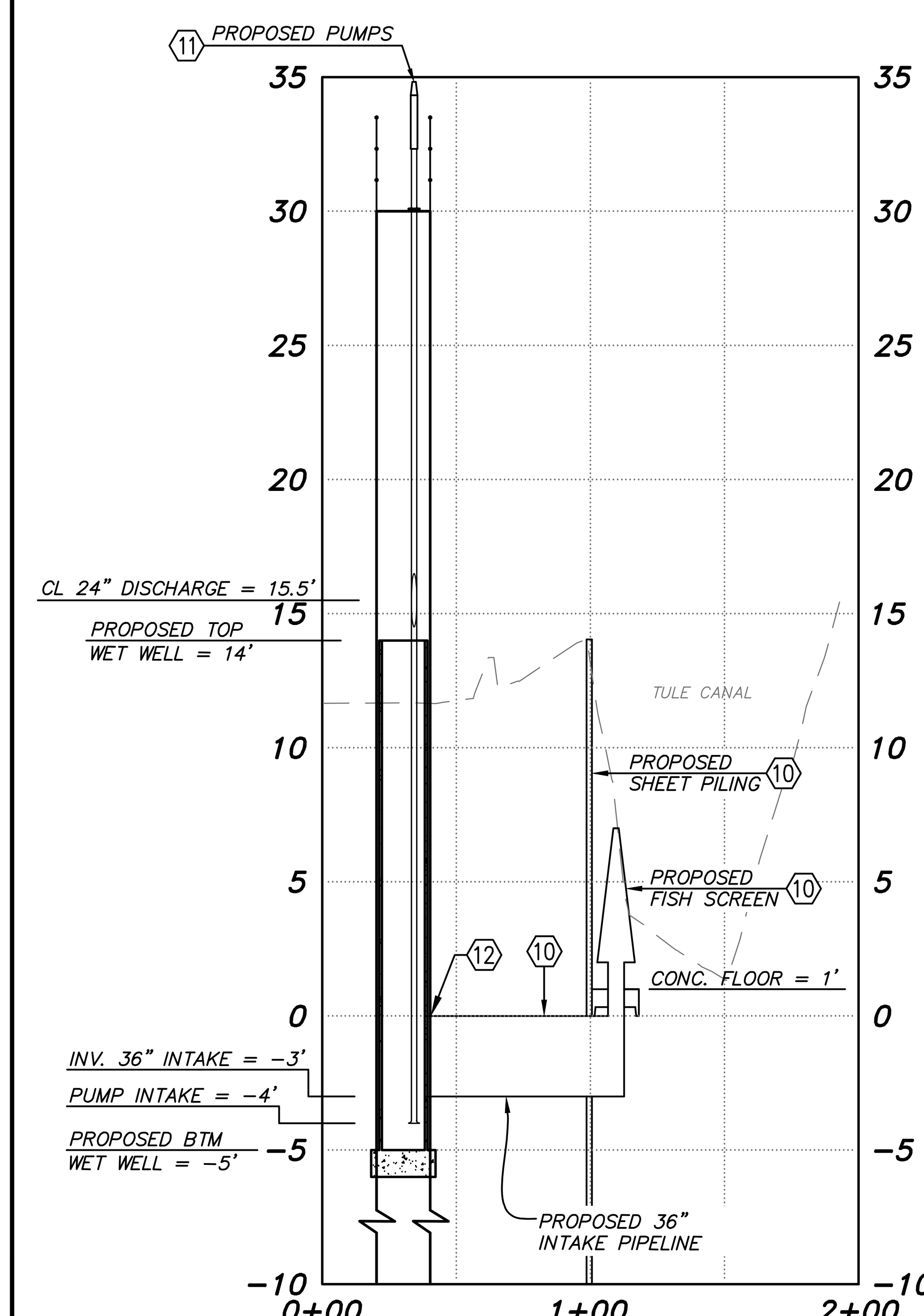
PROFILE VIEW

H: 1" = 50'
V: 1" = 5'



A CROSS SECTION THRU PUMP

1" = 10'



B CROSS SECTION THRU FISH SCREEN

H: 1"=50', V: 1"=5'

CONSTRUCTION NOTES ⬡:

1. INSTALL 48" DIA. IPS DR 21 HDPE PIPELINE PER MANUFACTURER'S RECOMMENDATIONS.
2. INSTALL STEEL PUMP PLATFORM PER THE STRUCTURAL PLANS.
3. INSTALL CONCRETE WET WELL (INTERNAL DIMENSIONS 14'x16') PER THE STRUCTURAL PLANS.
4. INSTALL 24" DIA. 3/8" WALL WELDED STEEL PIPE.
5. INSTALL 48" DIA. 3/8" WALL WELDED STEEL PIPE HEADER. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO FABRICATION AND COATING.
6. INSTALL 4" WATERMAN MODEL AV-150, OR EQUIVALENT, AIR VENT & VACUUM RELIEF VALVE PER MANUFACTURER'S RECOMMENDATIONS.
7. FURNISH AND INSTALL A FLANGED ULTRA MAG METER BY McCROMETER IN ACCORD WITH THE MANUFACTURER'S RECOMMENDATIONS. METER SHALL BE POWERED BY 24V WIRING THAT WILL BE ENCASED IN RIGID CONDUIT TO THE CONTROL PANEL ON THE PUMP PLATFORM. THERE MUST BE AT LEAST 2' OF STRAIGHT PIPING PRIOR TO THE METER. COORDINATE WITH OWNER.
8. FURNISH AND INSTALL 24" DIA. HENRY PRATT TRITON XR-70 BUTTERFLY VALVE WITH HANDWHEEL AND GEAR BOX, OR EQUIVALENT, PER MANUFACTURER'S RECOMMENDATIONS. HANDWHEEL SHALL COME OUT OF THE SIDE OF THE PIPING. COORDINATE WITH OWNER.
9. CONSTRUCT CONCRETE THRUST BLOCK AGAINST UNDISTURBED EARTH OR EARTH COMPACTED TO 90% MRC. USE SCSCS CLASS "A-2" 6 SACK CONCRETE MIX WITH 3/4" MAXIMUM COARSE AGGREGATE SIZE AND 3" MAXIMUM SLUMP. ALL EXPOSED EDGES TO HAVE 0.5" TOOLED RADIUS. REINFORCE WITH SEVEN (MIN.) #4 REBAR HOOPS TIED TO FOUR (MIN.) VERTICAL #4 BARS.
10. FISH SCREENS, SHEET PILING, CONCRETE AND INTAKE PIPING TO BE INSTALLED BY I.S.I., INTAKE SCREENS INCORPORATED. SEE DRAWINGS 10-15.
11. PUMPS SHALL BE CAPABLE OF PUMPING 12,500 GPM. SEE DETAIL 2/SHEET C002.
12. CONTRACTOR TO COORDINATE WITH I.S.I. ON WATERTIGHT CONNECTION OF INTAKE PIPING TO THE CONCRETE WET WELL.
13. INSTALL MEGALUG MEGAFLANGE SERIES 2100 FLANGE COUPLING ADAPTER, OR EQUIVALENT, PER MANUFACTURER'S RECOMMENDATIONS.
14. INSTALL CONCRETE CUTOFF WALL WITH 1' MINIMUM THICKNESS AND EXTENDING 2' BEYOND THE TOP, BOTTOM AND SIDES OF THE PIPE AT 500'± MIN. SPACING. THE PIPE SHALL BE WRAPPED TO PREVENT BONDING WITH THE CONCRETE AND ALLOW HORIZONTAL PIPE MOVEMENT. CONTRACTOR TO COORDINATE LOCATIONS WITH ENGINEER PRIOR TO INSTALLATION.
15. ELECTRICAL PANELS AND YASKAWA CONTROLLERS DESIGN PENDING ON PG&E SERVICE.
16. ELECTRICAL PANELS, YASKAWA CONTROLLERS AND FISH SCREEN CONTROL PANELS TO BE PLACED ON THE SOUTH SIDE OF THE PUMP PLATFORM AND MOUNTED PER MANUFACTURER'S RECOMMENDATIONS.

DESIGNED BY TCT
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CHECKED BY TCT

REV.	DATE	DESCRIPTION	BY	APP'D.

LAUGENOUR AND MEIKLE
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BY
TODD C. TOMMERAASON
DATE 05/05/2023 P.E. 59277

REGISTERED PROFESSIONAL ENGINEER TODD C. TOMMERAASON No. 59277 CIVIL STATE OF CALIFORNIA

IRRIGATION IMPROVEMENTS
FOR
UPPER SWANSTON RANCH, INC.

YOLO COUNTY CALIFORNIA

PIPELINE PLAN & PROFILE (STA. 0+00 - 9+00)

SCALE AS SHOWN

DATE: 05/05/2023
JOB NO. 4471

C201

SHEET 5 OF 15

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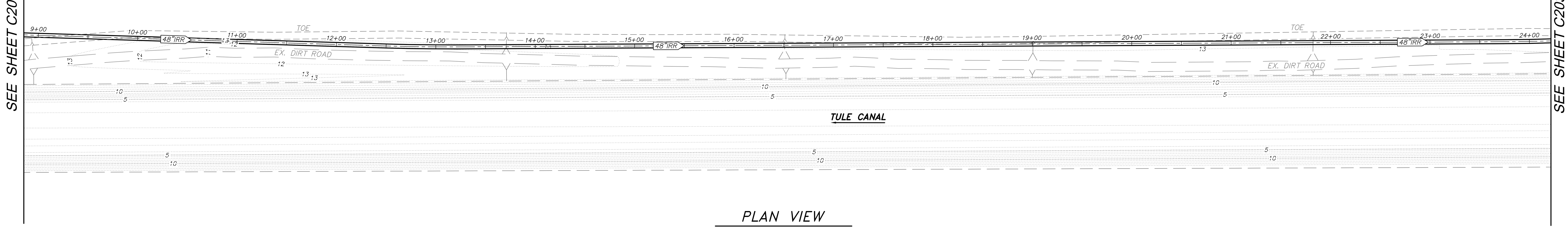
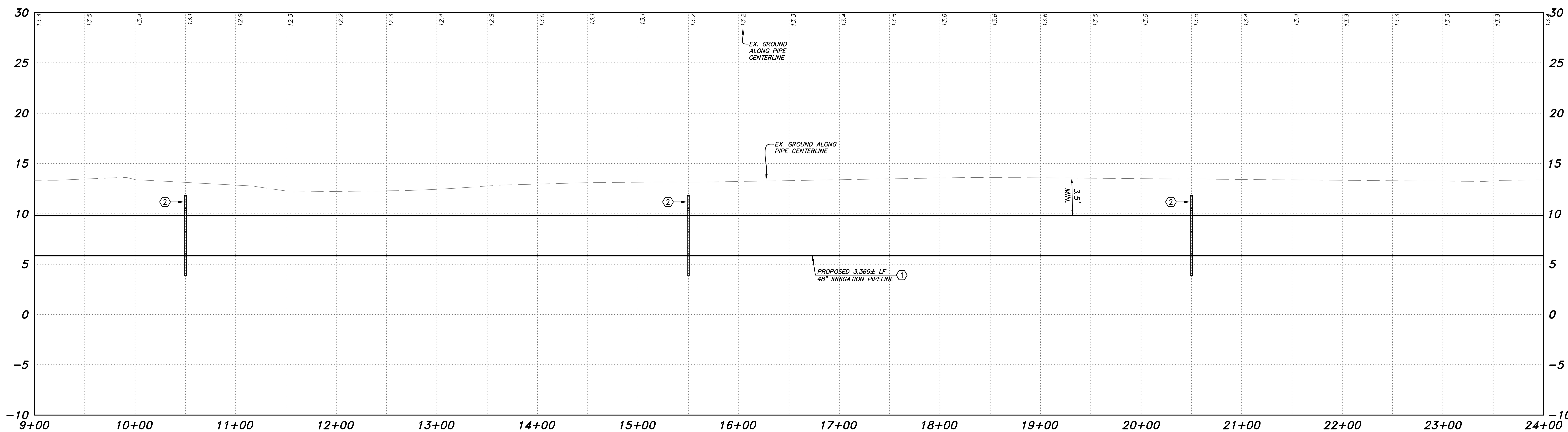
CONSTRUCTION NOTES ⬡:

1. INSTALL 48" DIA. IPS DR 21 HDPE PIPELINE PER MANUFACTURER'S RECOMMENDATIONS.
2. INSTALL CONCRETE CUTOFF WALL WITH 1' MINIMUM THICKNESS AND EXTENDING 2' BEYOND THE TOP, BOTTOM AND SIDES OF THE PIPE AT 500' MIN. SPACING. THE PIPE SHALL BE WRAPPED TO PREVENT BONDING WITH THE CONCRETE AND ALLOW HORIZONTAL PIPE MOVEMENT.

0 25 50 100
SCALE: 1"=50'



PLAN VIEW
H: 1"=50'



PROFILE VIEW
H: 1" = 50'
V: 1" = 5'

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BY
TODD C. TOMMERAASON
DATE 05/05/2023 P.E. 59277
REGISTERED PROFESSIONAL ENGINEER · TODD C. TOMMERAASON · No. 59277 · CIVIL · STATE OF CALIFORNIA

IRRIGATION IMPROVEMENTS
FOR
UPPER SWANSTON RANCH, INC.
YOLO COUNTY CALIFORNIA
PIPELINE PLAN & PROFILE (STA. 9+00 - 24+00)

SCALE
AS SHOWN
DATE: 05/05/2023
JOB NO. 4471

C202
SHEET 6 OF 15

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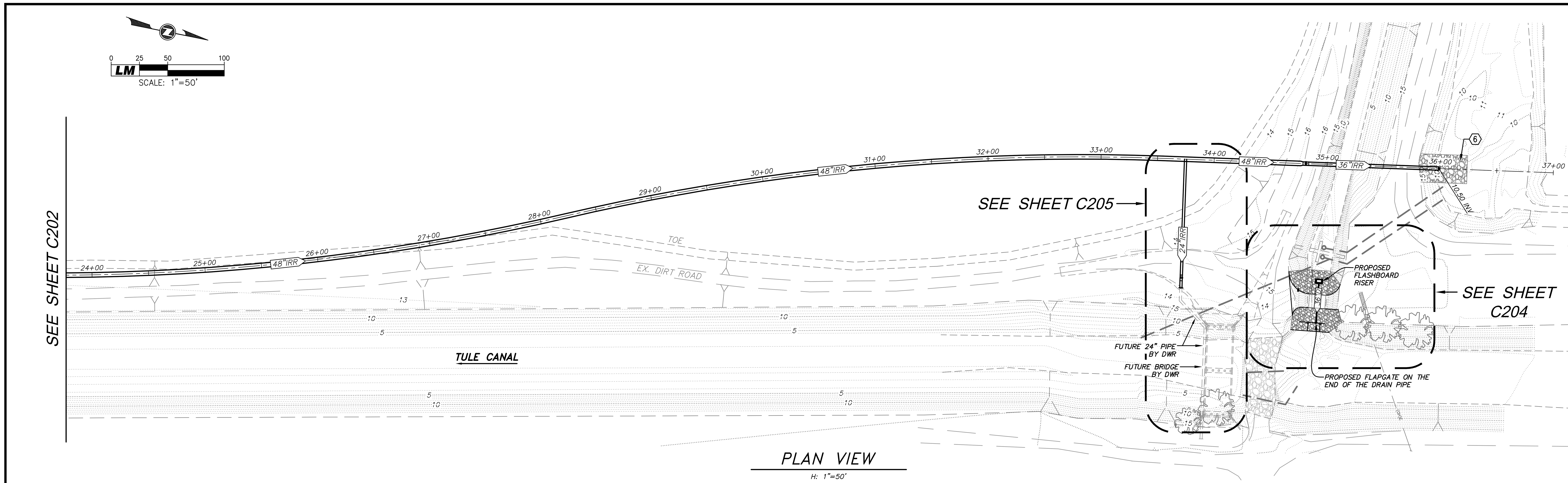
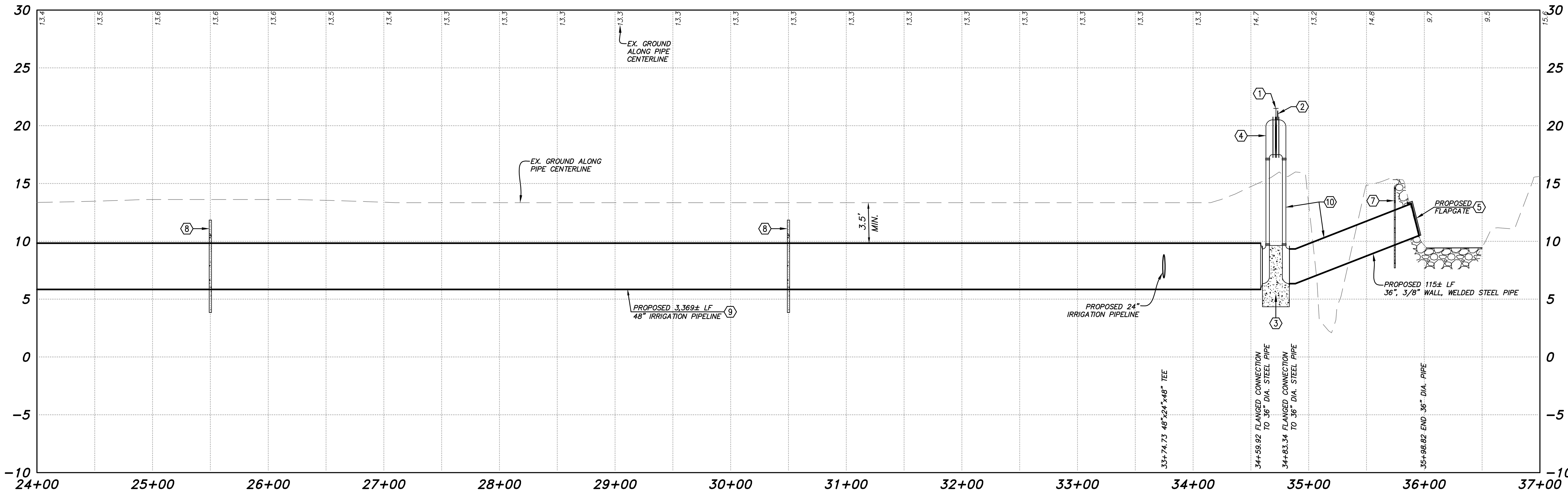


PLAN VIEW

H: 1"=50'

CONSTRUCTION NOTES ◯:

1. FURNISH AND INSTALL HENRY PRATT TRITON XR-70 BUTTERFLY VALVE WITH HANDWHEEL AND GEAR BOX, OR EQUIVALENT, PER MANUFACTURER'S RECOMMENDATIONS.
2. INSTALL 4" WATERMAN MODEL AV-150, OR APPROVED EQUIVALENT, AIR VENT & VACUUM RELIEF VALVE PER MANUFACTURER'S RECOMMENDATIONS.
3. INSTALL CONCRETE THRUST BLOCK BETWEEN 36" RISERS.
4. COORDINATE LOCATION OF RISER AND VALVE WITH OWNER PRIOR TO INSTALLATION.
5. INSTALL WATERMAN F-10 FLAPGATE, OR APPROVED EQUIVALENT, PER THE MANUFACTURER'S RECOMMENDATIONS.
6. HATCHING DENOTES CALTRANS CLASS III ROCK SLOPE PROTECTION PLACED ON CLASS 8 ROCK SLOPE PROTECTION FABRIC.
7. INSTALL CONCRETE CUTOFF WALL WITH 1' MINIMUM WIDTH THAT EXTENDS A MINIMUM OF 2' BEYOND THE TOP, BOTTOM AND SIDES OF THE PIPE. WELD (4) 1/2" DIA. x 2.5" LENGTH CONCRETE EMBEDMENT ANCHORS WELDED TO THE STEEL PIPE.
8. INSTALL CONCRETE CUTOFF WALL WITH 1' MINIMUM THICKNESS AND EXTENDING 2' BEYOND THE TOP, BOTTOM AND SIDES OF THE PIPE AT 500' MIN. SPACING. THE PIPE SHALL BE WRAPPED TO PREVENT BONDING WITH THE CONCRETE AND ALLOW HORIZONTAL PIPE MOVEMENT.
9. INSTALL 48" DIA. IPS DR 21 HDPE PIPELINE PER MANUFACTURER'S RECOMMENDATIONS.
10. INSTALL 36" DIA. WELDED STEEL PIPE WITH 3/8" WALL AND FLANGED STEEL FITTINGS. SEE GENERAL NOTES FOR COATING REQUIREMENTS.



PROFILE VIEW

H: 1" = 50'
V: 1" = 5'

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	REV.	DATE	DESCRIPTION	BY	APP'D.

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BY ______ TODD C. TOMMERAASON
DATE 05/05/2023 P.E. 59277

REGISTERED PROFESSIONAL ENGINEER · TODD C. TOMMERAASON · No. 59277 · CIVIL · STATE OF CALIFORNIA

IRRIGATION IMPROVEMENTS
FOR
UPPER SWANSTON RANCH, INC.

YOLO COUNTY CALIFORNIA

PIPELINE PLAN & PROFILE (STA. 24+00 - 36+00)

SCALE AS SHOWN

DATE: 05/05/2023
JOB NO. 4471

C203

SHEET 7 OF 15

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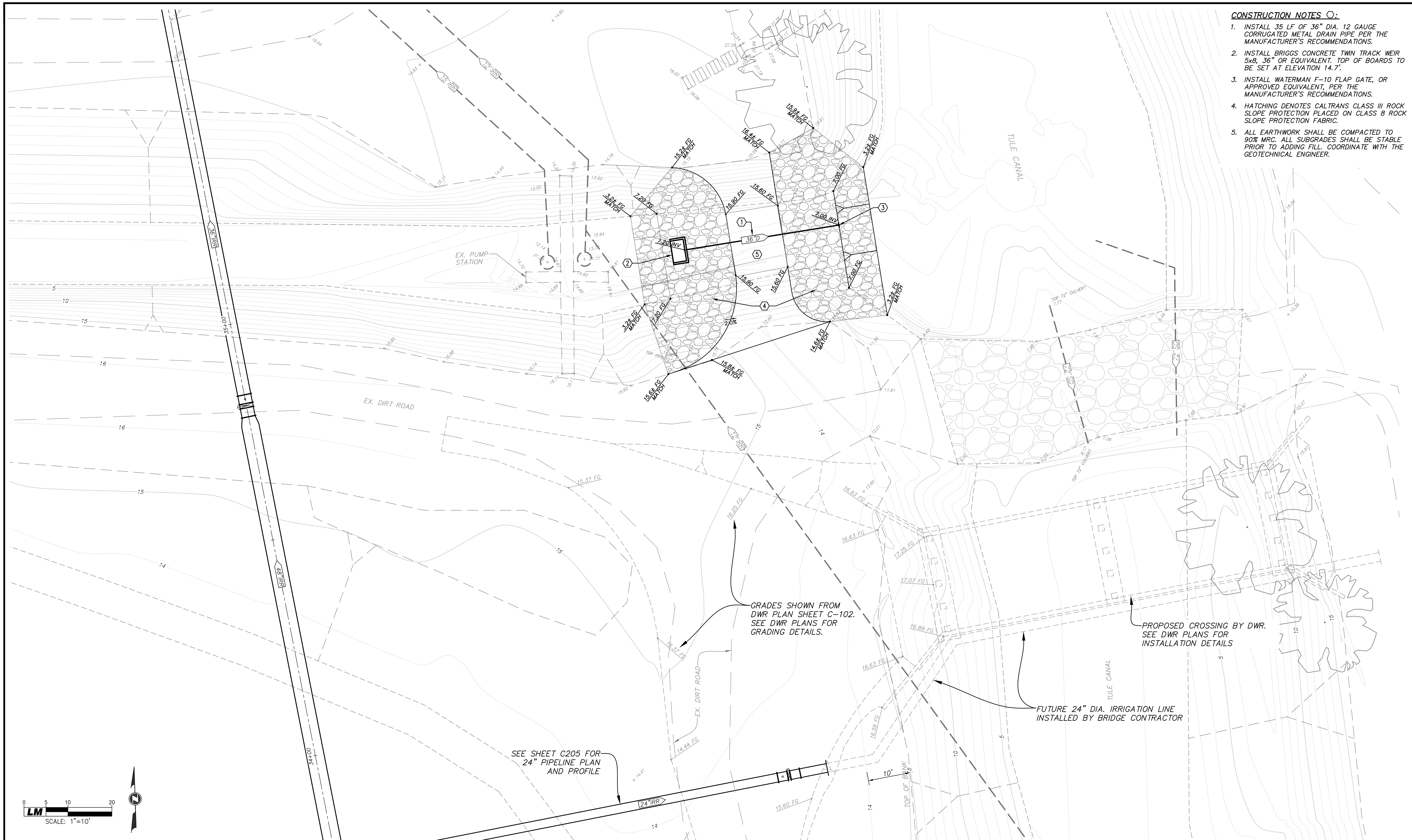

CONSTRUCTION NOTES ⬡:

1. INSTALL 35 LF OF 36" DIA. 12 GAUGE CORRUGATED METAL DRAIN PIPE PER THE MANUFACTURER'S RECOMMENDATIONS.
2. INSTALL BRIGGS CONCRETE TWIN TRACK WEIR 5x8, 36" OR EQUIVALENT. TOP OF BOARDS TO BE SET AT ELEVATION 14.7'.
3. INSTALL WATERMAN F-10 FLAP GATE, OR APPROVED EQUIVALENT, PER THE MANUFACTURER'S RECOMMENDATIONS.
4. HATCHING DENOTES CALTRANS CLASS III ROCK SLOPE PROTECTION PLACED ON CLASS 8 ROCK SLOPE PROTECTION FABRIC.
5. ALL EARTHWORK SHALL BE COMPACTED TO 90% MRC. ALL SUBGRADES SHALL BE STABLE PRIOR TO ADDING FILL. COORDINATE WITH THE GEOTECHNICAL ENGINEER.

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REV.	DATE	DESCRIPTION	BY	APP'D.

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DATE 05/05/2023 P.E. 59277
REGISTERED PROFESSIONAL ENGINEER · TODD C. TOMMERAASON · No. 59277 · CIVIL · STATE OF CALIFORNIA

IRRIGATION IMPROVEMENTS FOR
UPPER SWANSTON RANCH, INC.
YOLO COUNTY CALIFORNIA

36 INCH CULVERT

SCALE 1"=10'
DATE: 05/05/2023
JOB NO. 4471

C204

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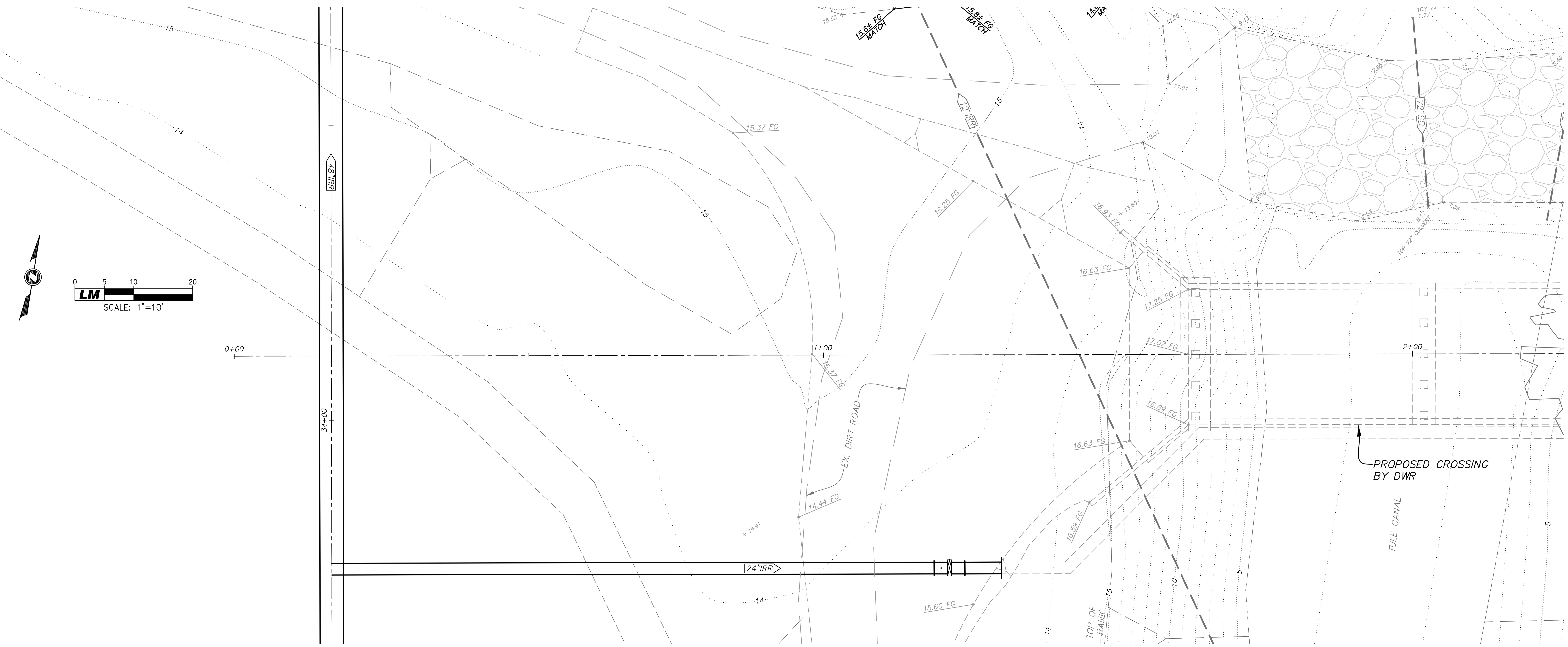

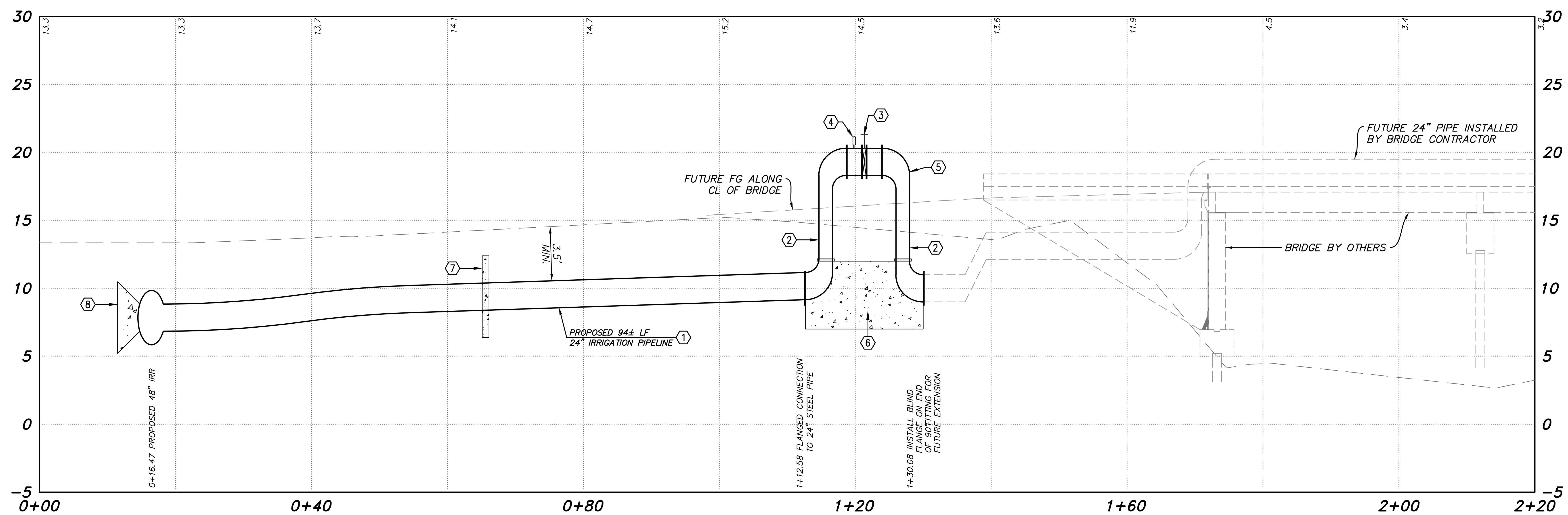

CONSTRUCTION NOTES ⬡:

1. INSTALL 24" DIA. IPS DR21 HDPE PIPELINE PER MANUFACTURER'S RECOMMENDATIONS.
2. INSTALL 24" DIA. WELDED STEEL PIPE WITH 3/8" WALL AND FLANGED STEEL FITTINGS. SEE GENERAL NOTES FOR COATING REQUIREMENTS.
3. FURNISH AND INSTALL HENRY PRATT TRITON XR–70 BUTTERFLY VALVE WITH HANDWHEEL AND GEAR BOX, OR EQUIVALENT, PER MANUFACTURER'S RECOMMENDATIONS.
4. INSTALL 4" WATERMAN MODEL AV–150, OR APPROVED EQUIVALENT, AIR VENT & VACUUM RELIEF VALVE PER MANUFACTURER'S RECOMMENDATIONS.
5. COORDINATE LOCATION OF RISER AND VALVE WITH OWNER PRIOR TO INSTALLATION.
6. INSTALL CONCRETE THRUST BLOCK BETWEEN 24" RISERS.
7. INSTALL CONCRETE CUTOFF WALL WITH 1' MINIMUM THICKNESS AND EXTENDING 2' BEYOND THE TOP, BOTTOM AND SIDES OF THE PIPE. THE PIPE SHALL BE WRAPPED TO PREVENT BONDING WITH THE CONCRETE AND ALLOW HORIZONTAL PIPE MOVEMENT.
8. INSTALL CONCRETE THRUST BLOCK. COORDINATE SIZING WITH ENGINEER ONCE THE SOILS REPORT IS COMPLETED AND PUMP PRESSURE IS FINALIZED.

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CHECKED BY TCT	REV.	DATE	DESCRIPTION	BY APP'D.

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TODD C. TOMMERAASON
DATE 05/05/2023 P.E. 59277

REGISTERED PROFESSIONAL ENGINEER · TODD C. TOMMERAASON · No. 59277 · CIVIL · STATE OF CALIFORNIA

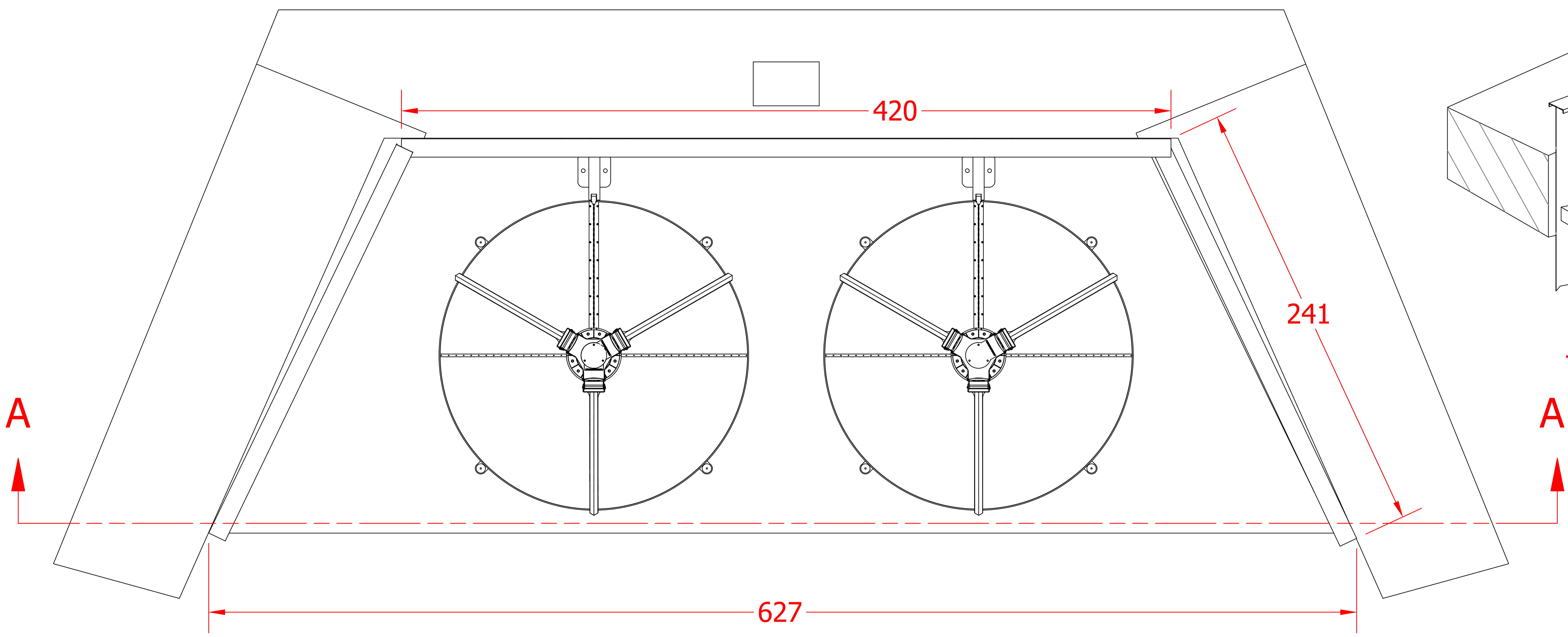
IRRIGATION IMPROVEMENTS
FOR
UPPER SWANSTON RANCH, INC.
YOLO COUNTY CALIFORNIA
24 INCH PIPELINE AT BRIDGE

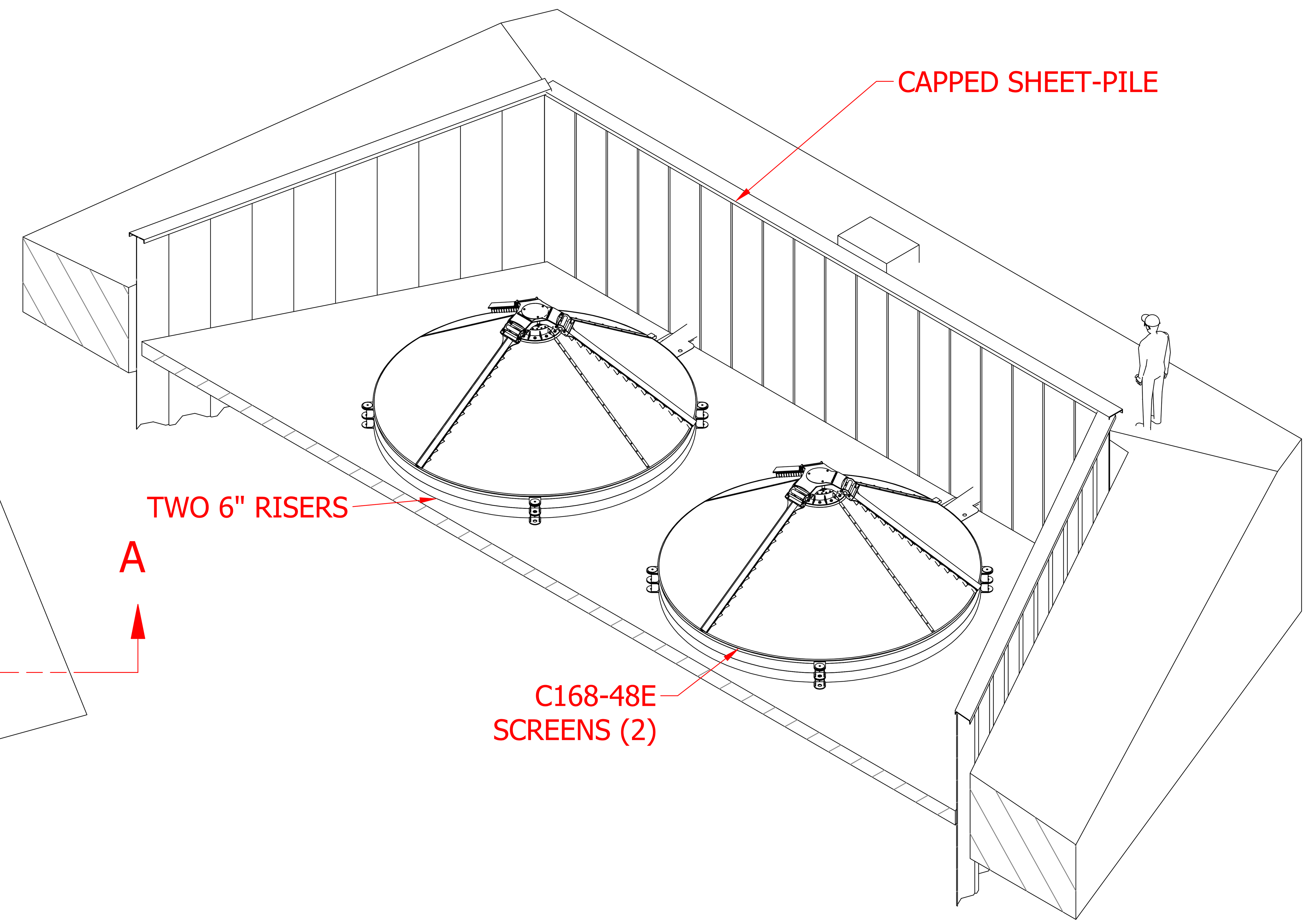
SCALE
H: 1"=10'
V: 1"=5'
DATE: 05/05/2023
JOB NO. 4471

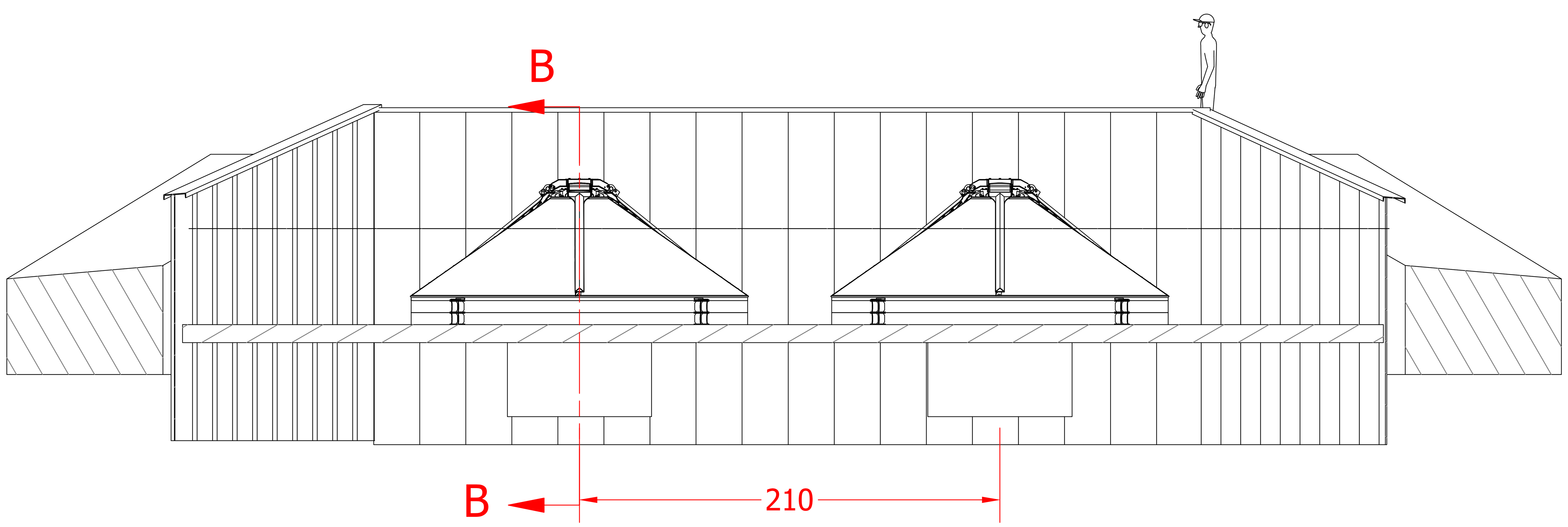
C205
SHEET 9 OF 15

X:\Land Projects\4471\dwg\4471_C205.dwg

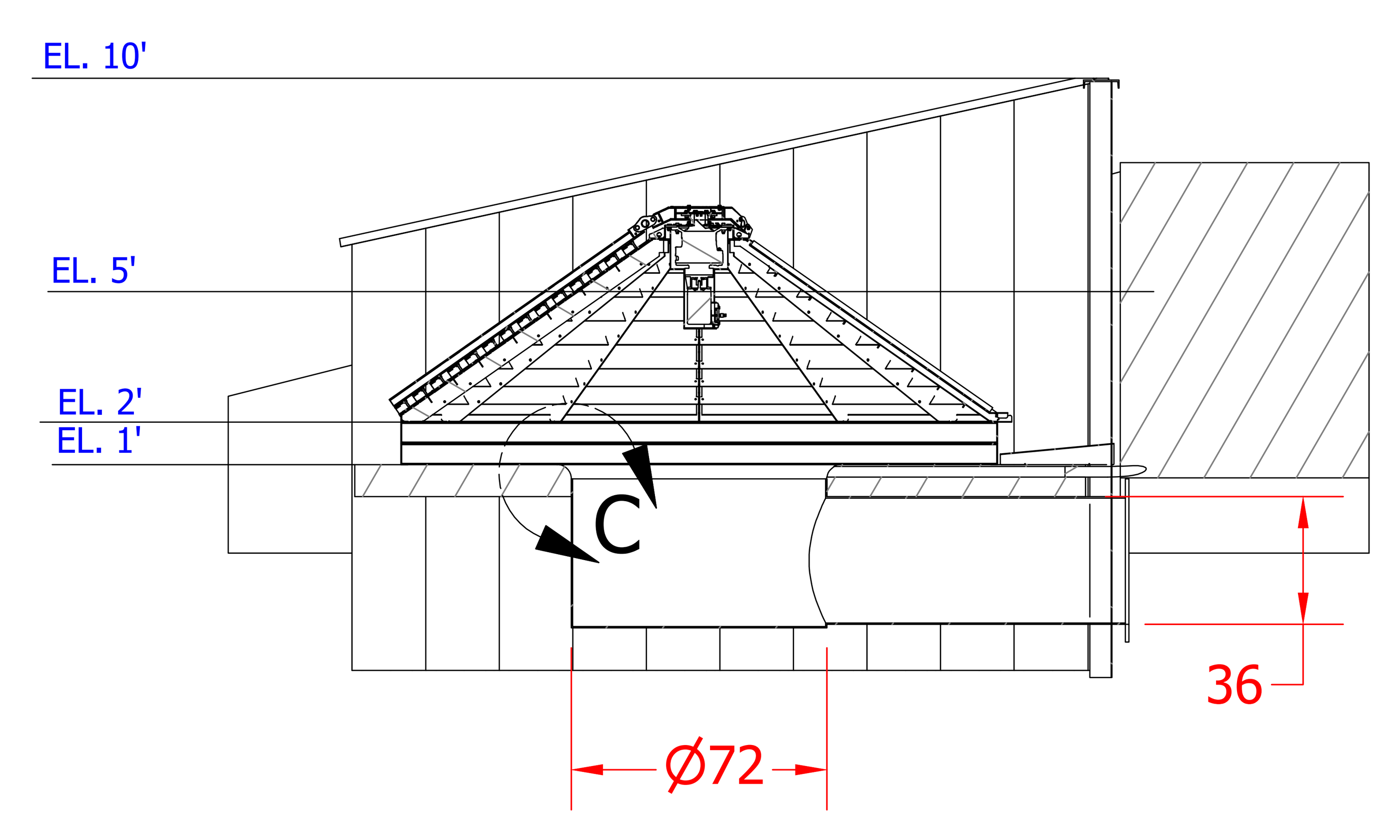
NOT FOR CONSTRUCTION



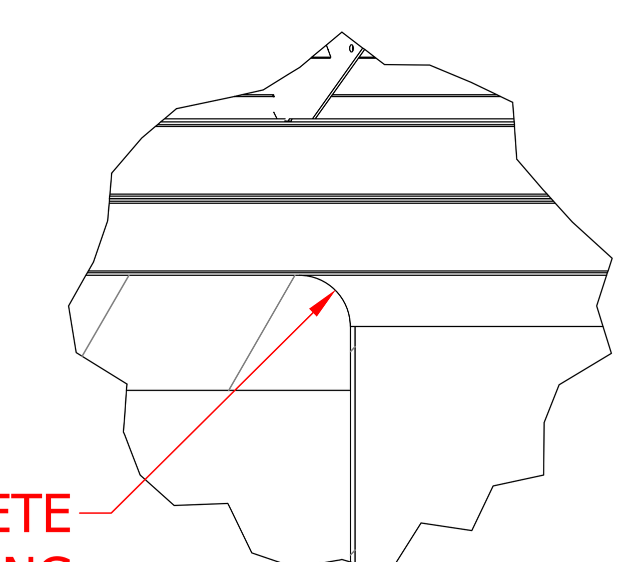




SECTION A-A



SECTION B-B



DETAIL C

REV	DESCRIPTION	DATE	APPROVED
ALL DIMENSIONS IN INCHES UNLESS NOTED			

Designs are property of INTAKE SCREENS INC; and are subject to change without notice.

STANDARD TOLERANCES
Fractional Dimensions ± 1/32
Decimal Dimensions ± 0.005

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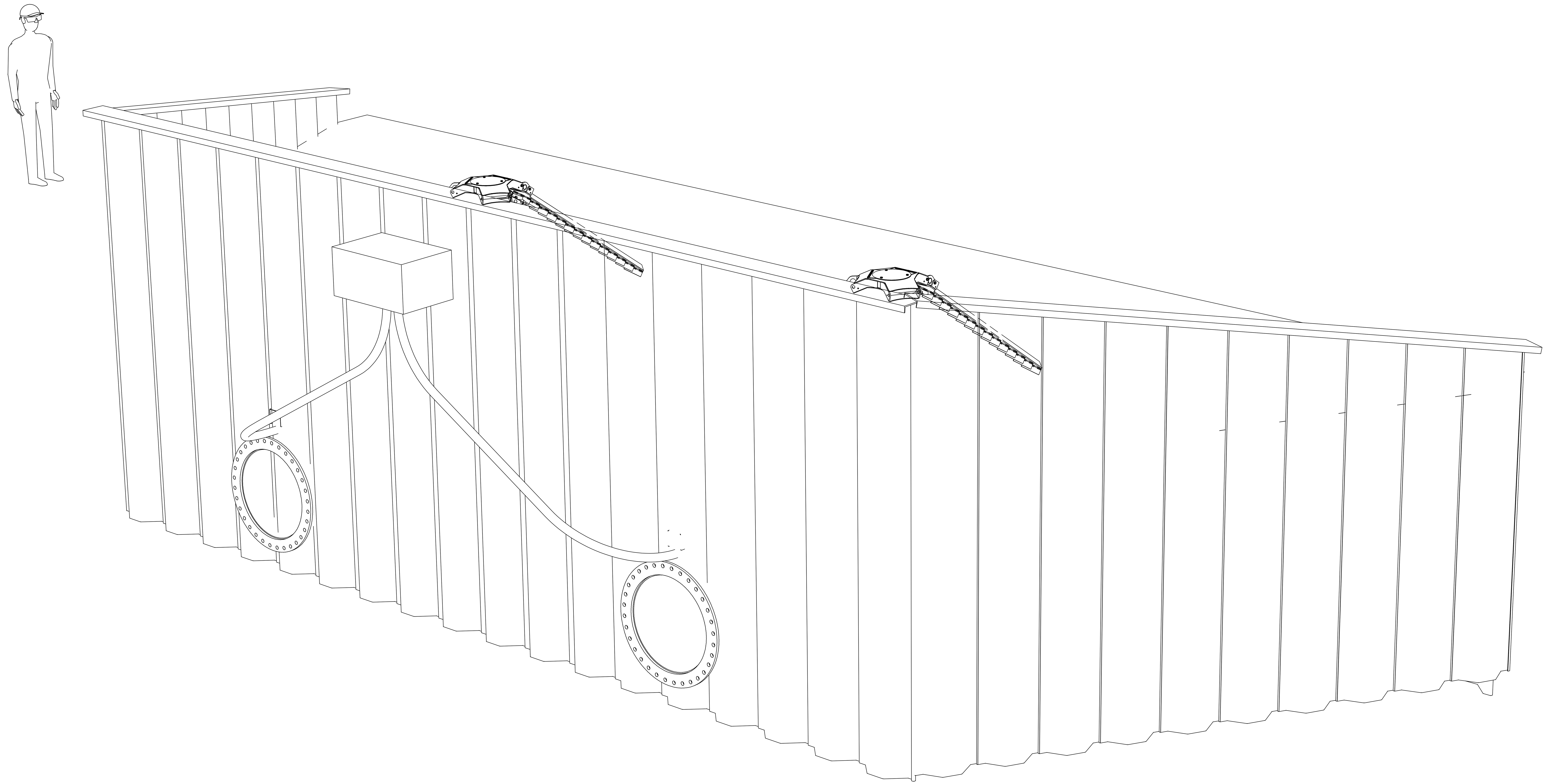
www.intakescreensinc.com
CA C.L. 796197
ISI Intake Screens, Inc.
8417 River Road - Sacramento, California 95832
(916) 665-2727 (916) 665-2729 FAX

DATE	3/23/23
APP'D BY	RUSSELL BERRY IV
DRAWN BY	JACOB CHAPIN
"B" SHEET SCALE	
PROJECT	SWANSTON
DESCRIPTION	Two C168-48EA
MATERIAL	LAYOUT
DRAWING NUMBER	SWANSTON-LAYOUT 3
MASS	
SHEET NUMBER	1 of 2



ALL DIMENSIONS IN INCHES UNLESS NOTED		
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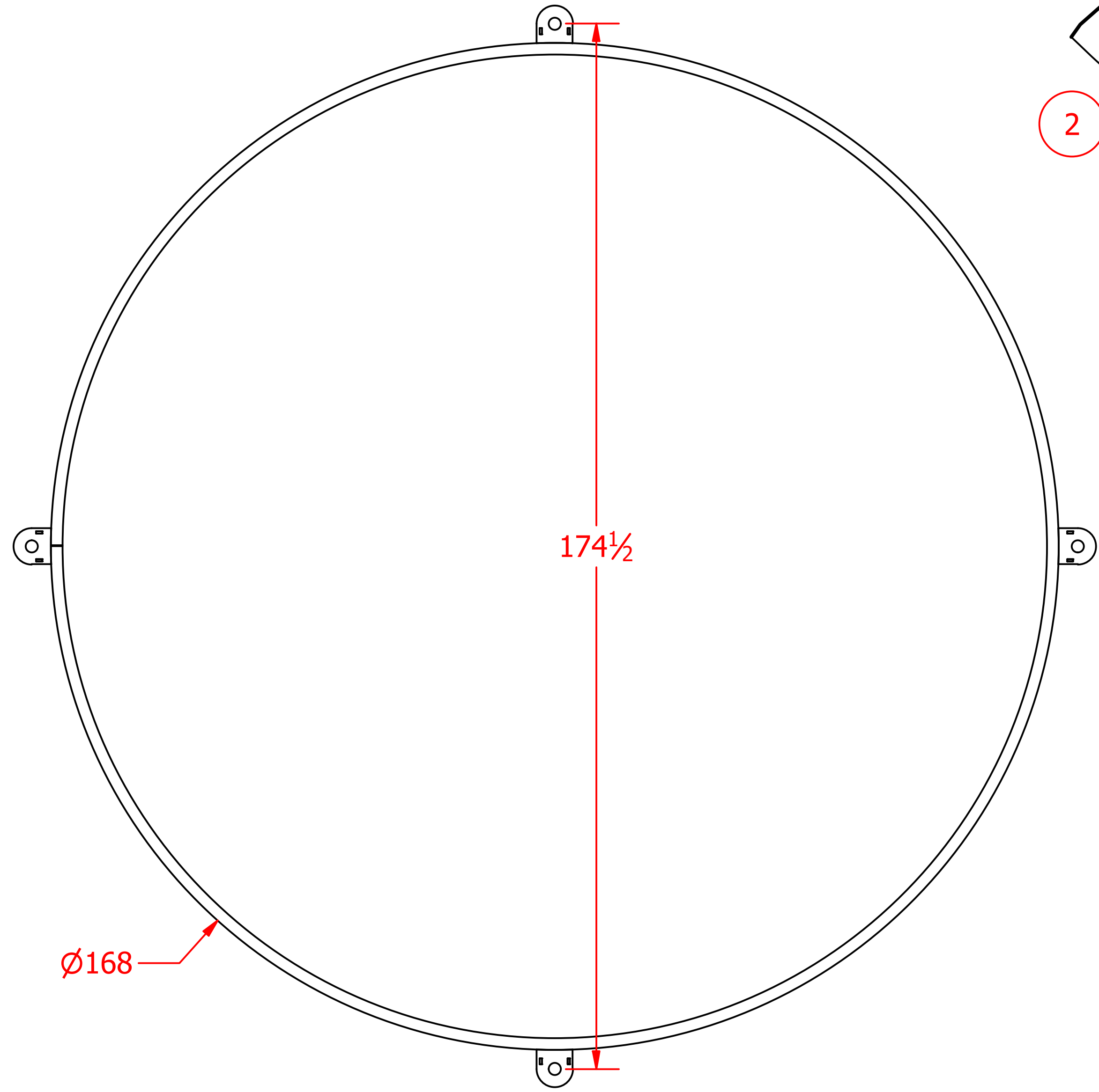
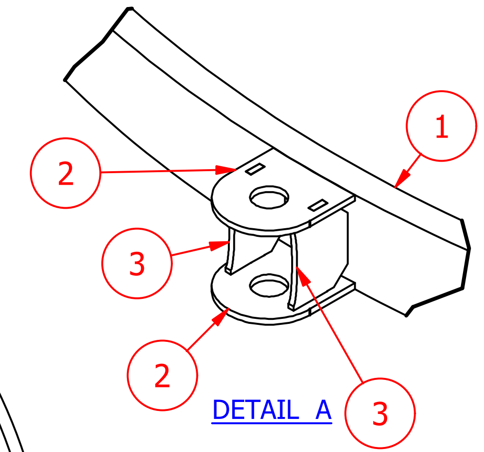
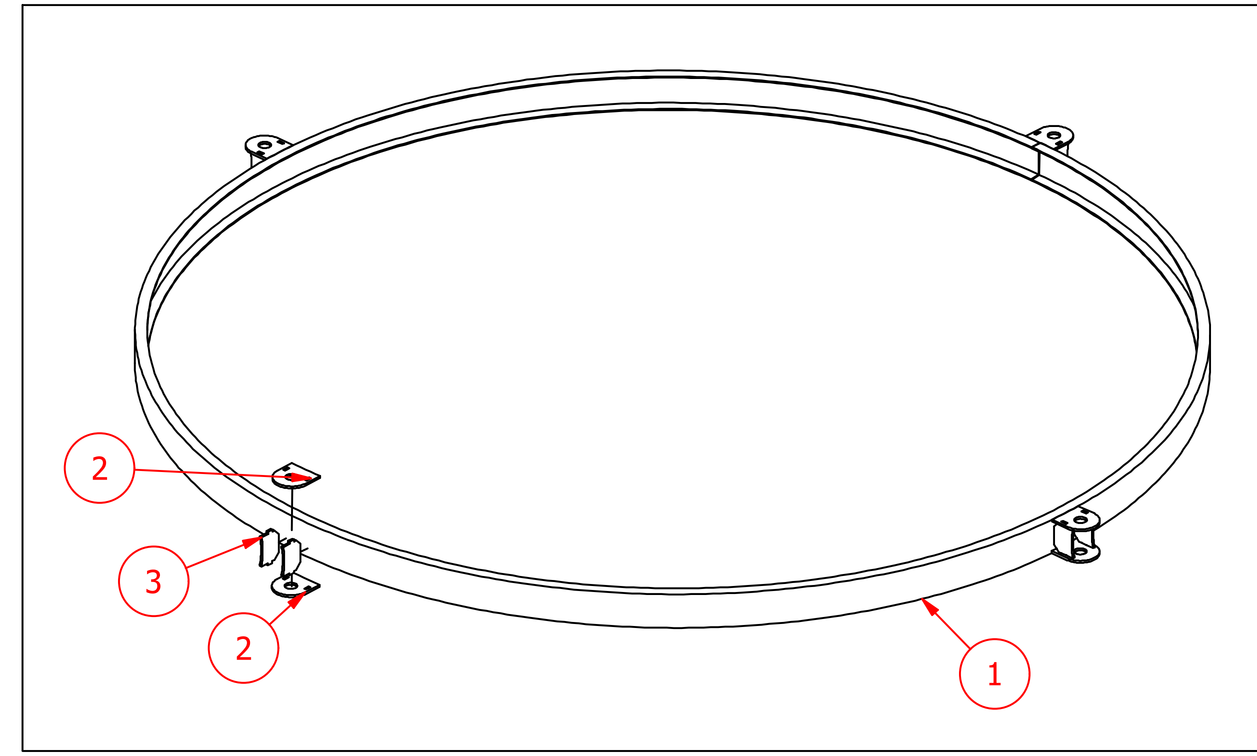
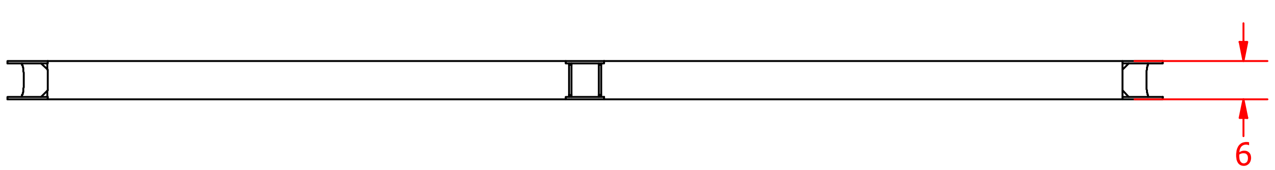
DATE	PROJECT	DESCRIPTION	DRAWING NUMBER	SHEET NUMBER
3/23/23	SWANSTON	Two C168-48EA	SWANSTON-LAYOUT 3	2 of 2
APP'D BY RUSSELL BERRY IV		MATERIAL: LAYOUT	MASS	
DRAWN BY JACOB CHAPIN				
"B" SHEET SCALE				

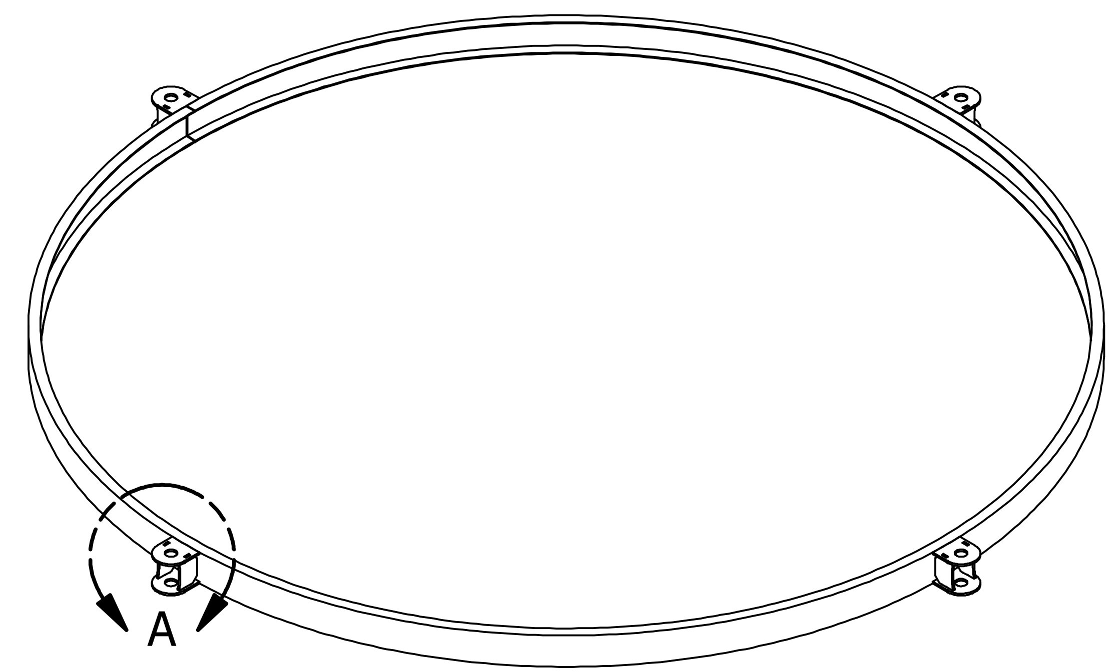






ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	SW2-TR01-01	RISER RING CHANNEL	C6 X 8.2 STEEL CHANNEL
2	8	SW2-TR01-02	TAB	3/8" A36 PLATE
3	8	SW2-TR01-03	GUSSET	3/8" A36 PLATE





REV	DESCRIPTION	DATE	APPROVED

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DATE 3/23/2023
APP'D BY RUSSELL BERRY IV
DRAWN BY JACOB CHAPIN
"B" SHEET SCALE

PROJECT SW2

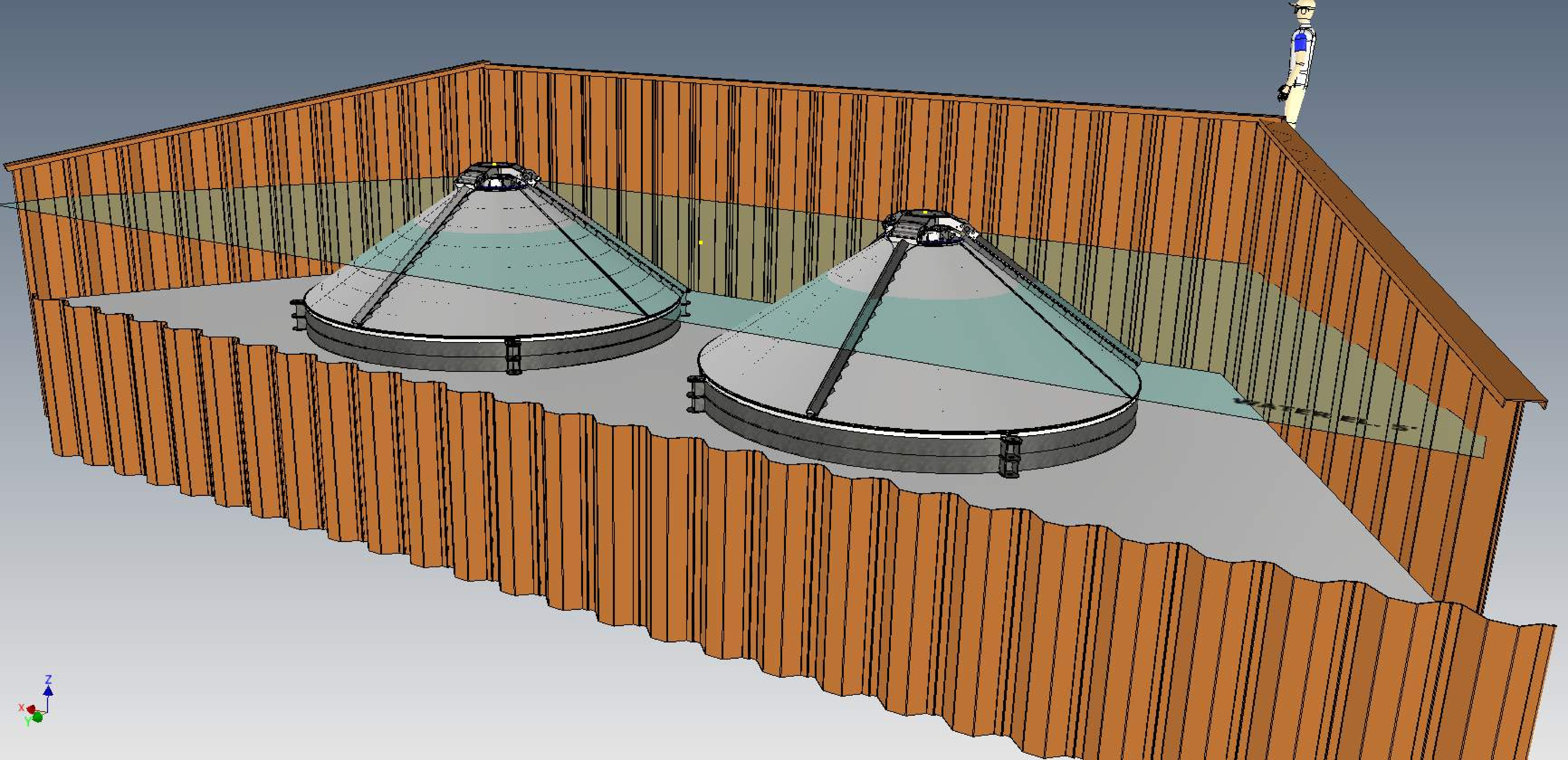
DESCRIPTION 6" RISER, 14' CONE SCREEN

MATERIAL WELDED STEEL / EPOXY COATED

DRAWING NUMBER SW2-TR01

MASS 361.5 lbmass

SHEET NUMBER 1 of 1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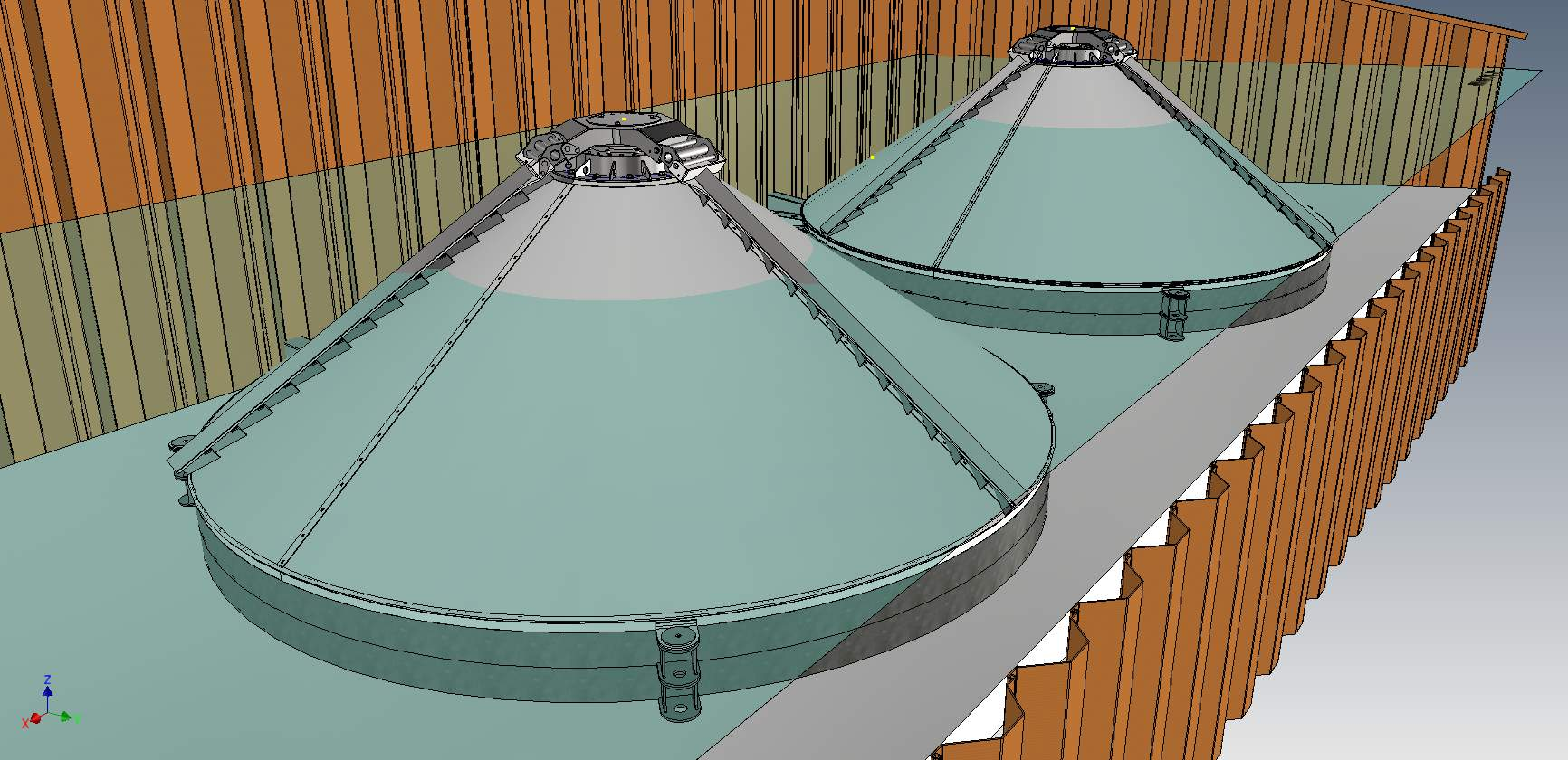
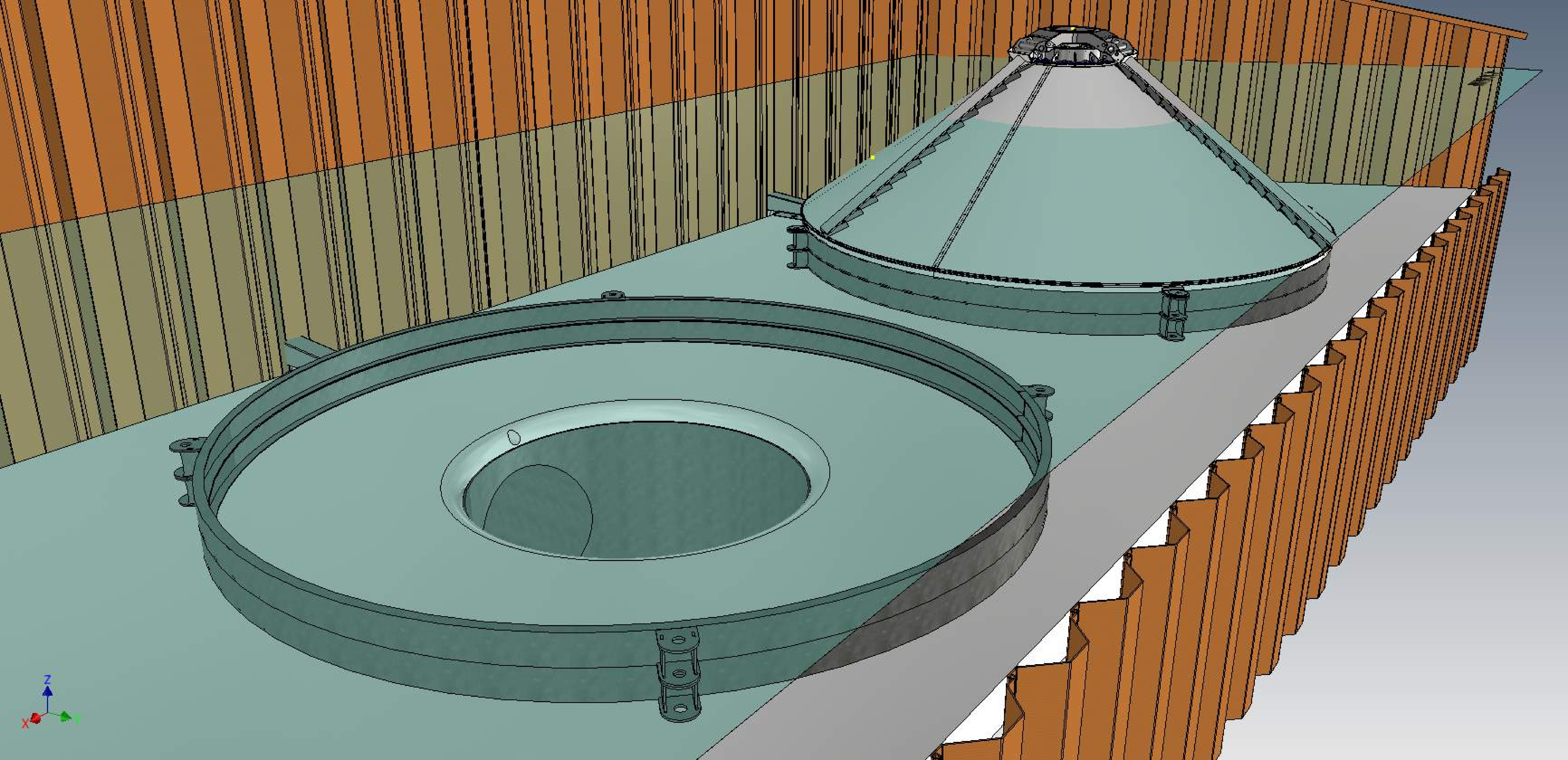

Z
X
Y


Z
X
Y

Appendix B
Emissions Model Outputs

Swanson Construction Custom Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Swanson Construction
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	3.60
Precipitation (days)	35.4
Location	38.575458964642195, -121.64845162731592
County	Yolo
City	Unincorporated
Air District	Yolo/Solano AQMD
Air Basin	Sacramento Valley
TAZ	317
EDFZ	4
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
User Defined Linear	1.00	Mile	1.10	0.00	—	—	—	—

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.37	51.8	43.1	0.09	2.21	46.2	46.7	2.03	6.83	8.87	—	9,510	9,510	0.39	0.18	3.04	9,557
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.55	5.19	4.69	0.01	0.21	10.1	10.3	0.19	1.17	1.36	—	1,147	1,147	0.05	0.04	0.27	1,159
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.10	0.95	0.86	< 0.005	0.04	1.84	1.87	0.04	0.21	0.25	—	190	190	0.01	0.01	0.05	192

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	5.37	51.8	43.1	0.09	2.21	46.2	46.7	2.03	6.83	8.87	—	9,510	9,510	0.39	0.18	3.04	9,557
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.55	5.19	4.69	0.01	0.21	10.1	10.3	0.19	1.17	1.36	—	1,147	1,147	0.05	0.04	0.27	1,159
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.10	0.95	0.86	< 0.005	0.04	1.84	1.87	0.04	0.21	0.25	—	190	190	0.01	0.01	0.05	192

3. Construction Emissions Details

3.1. Linear, Grubbing & Land Clearing (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.17	50.7	40.9	0.08	2.18	—	2.18	2.01	—	2.01	—	8,890	8,890	0.36	0.07	—	8,920
Dust From Material Movement	—	—	—	—	—	7.69	7.69	—	3.42	3.42	—	—	—	—	—	—	—
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	1.39	1.12	< 0.005	0.06	—	0.06	0.06	—	0.06	—	244	244	0.01	< 0.005	—	244
Dust From Material Movement	—	—	—	—	—	0.21	0.21	—	0.09	0.09	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.25	0.20	< 0.005	0.01	—	0.01	0.01	—	0.01	—	40.3	40.3	< 0.005	< 0.005	—	40.5

Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.90	0.00	0.00	16.1	16.1	0.00	1.63	1.63	—	161	161	0.01	0.01	0.66	164
Vendor	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
Hauling	0.01	0.55	0.19	< 0.005	0.01	9.68	9.68	0.01	0.99	0.99	—	435	435	0.02	0.07	0.95	457
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	0.44	0.44	0.00	0.04	0.04	—	4.04	4.04	< 0.005	< 0.005	0.01	4.10
Vendor	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
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	0.27	0.27	< 0.005	0.03	0.03	—	11.9	11.9	< 0.005	< 0.005	0.01	12.5
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.08	0.08	0.00	0.01	0.01	—	0.67	0.67	< 0.005	< 0.005	< 0.005	0.68
Vendor	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
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.05	0.05	< 0.005	< 0.005	< 0.005	—	1.97	1.97	< 0.005	< 0.005	< 0.005	2.07

3.3. Linear, Grading & Excavation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.53	24.8	19.9	0.05	1.03	—	1.03	0.95	—	0.95	—	5,445	5,445	0.22	0.04	—	5,464
Dust From Material Movement	—	—	—	—	—	1.30	1.30	—	0.14	0.14	—	—	—	—	—	—	—
Onsite truck	< 0.005	0.03	0.02	< 0.005	< 0.005	1.33	1.33	< 0.005	0.13	0.13	—	6.91	6.91	< 0.005	< 0.005	0.01	7.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.68	0.54	< 0.005	0.03	—	0.03	0.03	—	0.03	—	149	149	0.01	< 0.005	—	150
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.04	0.04	< 0.005	< 0.005	< 0.005	—	0.19	0.19	< 0.005	< 0.005	< 0.005	0.20
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.10	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	24.7	24.7	< 0.005	< 0.005	—	24.8
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	0.03	0.03	< 0.005	< 0.005	< 0.005	0.03
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.51	0.00	0.00	9.20	9.20	0.00	0.93	0.93	—	92.2	92.2	< 0.005	< 0.005	0.38	93.6
Vendor	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
Hauling	0.02	1.09	0.39	0.01	0.02	19.4	19.4	0.02	1.97	1.99	—	870	870	0.05	0.14	1.89	913
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.25	0.25	0.00	0.03	0.03	—	2.31	2.31	< 0.005	< 0.005	< 0.005	2.34
Vendor	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
Hauling	< 0.005	0.03	0.01	< 0.005	< 0.005	0.53	0.53	< 0.005	0.05	0.05	—	23.8	23.8	< 0.005	< 0.005	0.02	25.0
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.05	0.05	0.00	< 0.005	< 0.005	—	0.38	0.38	< 0.005	< 0.005	< 0.005	0.39
Vendor	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
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.10	0.10	< 0.005	0.01	0.01	—	3.95	3.95	< 0.005	< 0.005	< 0.005	4.14

3.5. Linear, Grading & Excavation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.26	51.4	41.4	0.08	2.21	—	2.21	2.03	—	2.03	—	8,976	8,976	0.36	0.07	—	9,007

Dust From Material Movement	—	—	—	—	—	7.68	7.68	—	3.42	3.42	—	—	—	—	—	—	—
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	1.41	1.14	< 0.005	0.06	—	0.06	0.06	—	0.06	—	246	246	0.01	< 0.005	—	247
Dust From Material Movement	—	—	—	—	—	0.21	0.21	—	0.09	0.09	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.26	0.21	< 0.005	0.01	—	0.01	0.01	—	0.01	—	40.7	40.7	< 0.005	< 0.005	—	40.9
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.11	0.08	1.54	0.00	0.00	27.6	27.6	0.00	2.79	2.79	—	276	276	0.01	0.01	1.13	281
Vendor	< 0.005	0.14	0.06	< 0.005	< 0.005	2.84	2.84	< 0.005	0.29	0.29	—	112	112	< 0.005	0.02	0.30	118
Hauling	< 0.005	0.18	0.06	< 0.005	< 0.005	3.23	3.23	< 0.005	0.33	0.33	—	145	145	0.01	0.02	0.32	152

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.76	0.76	0.00	0.08	0.08	—	6.93	6.93	< 0.005	< 0.005	0.01	7.02
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.08	0.08	< 0.005	0.01	0.01	—	3.08	3.08	< 0.005	< 0.005	< 0.005	3.22
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.09	0.09	< 0.005	0.01	0.01	—	3.97	3.97	< 0.005	< 0.005	< 0.005	4.17
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.14	0.14	0.00	0.01	0.01	—	1.15	1.15	< 0.005	< 0.005	< 0.005	1.16
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	0.51	0.51	< 0.005	< 0.005	< 0.005	0.53
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	0.66	0.66	< 0.005	< 0.005	< 0.005	0.69

3.7. Linear, Drainage, Utilities, & Sub-Grade (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	2.11	2.53	< 0.005	0.07	—	0.07	0.07	—	0.07	—	354	354	0.01	< 0.005	—	355
Dust From Material Movement	—	—	—	—	—	0.03	0.03	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	< 0.005	0.03	0.02	< 0.005	< 0.005	1.33	1.33	< 0.005	0.13	0.13	—	6.91	6.91	< 0.005	< 0.005	0.01	7.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.25	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	—	41.7	41.7	< 0.005	< 0.005	—	41.9
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.16	0.16	< 0.005	0.02	0.02	—	0.82	0.82	< 0.005	< 0.005	< 0.005	0.86
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.91	6.91	< 0.005	< 0.005	—	6.93
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.03	0.03	< 0.005	< 0.005	< 0.005	—	0.14	0.14	< 0.005	< 0.005	< 0.005	0.14
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.90	0.00	0.00	16.1	16.1	0.00	1.63	1.63	—	161	161	0.01	0.01	0.66	164
Vendor	0.01	0.50	0.19	< 0.005	0.01	9.93	9.93	0.01	1.01	1.02	—	393	393	0.01	0.06	1.06	412
Hauling	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	1.90	1.90	0.00	0.19	0.19	—	17.4	17.4	< 0.005	< 0.005	0.03	17.6
Vendor	< 0.005	0.06	0.02	< 0.005	< 0.005	1.17	1.17	< 0.005	0.12	0.12	—	46.3	46.3	< 0.005	0.01	0.05	48.5

Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.35	0.35	0.00	0.03	0.03	—	2.88	2.88	< 0.005	< 0.005	0.01	2.92
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.21	0.21	< 0.005	0.02	0.02	—	7.67	7.67	< 0.005	< 0.005	0.01	8.03
Hauling	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

3.9. Linear, Drainage, Utilities, & Sub-Grade (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.26	10.5	12.9	0.02	0.46	—	0.46	0.42	—	0.42	—	1,976	1,976	0.08	0.02	—	1,983
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	< 0.005	0.03	0.02	< 0.005	< 0.005	1.33	1.33	< 0.005	0.13	0.13	—	6.91	6.91	< 0.005	< 0.005	0.01	7.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.66	0.81	< 0.005	0.03	—	0.03	0.03	—	0.03	—	125	125	0.01	< 0.005	—	125
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—

Onsite truck	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.08	0.08	< 0.005	0.01	0.01	—	0.44	0.44	< 0.005	< 0.005	< 0.005	0.46
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.15	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	20.6	20.6	< 0.005	< 0.005	—	20.7
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	0.07	0.07	< 0.005	< 0.005	< 0.005	0.08
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.07	1.41	0.00	0.00	25.3	25.3	0.00	2.56	2.56	—	253	253	0.01	0.01	1.03	257
Vendor	0.01	0.50	0.19	< 0.005	0.01	9.93	9.93	0.01	1.01	1.02	—	393	393	0.01	0.06	1.06	412
Hauling	0.01	0.55	0.19	< 0.005	0.01	9.68	9.68	0.01	0.99	0.99	—	435	435	0.02	0.07	0.95	457
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.07	0.00	0.00	1.59	1.59	0.00	0.16	0.16	—	14.6	14.6	< 0.005	< 0.005	0.03	14.8
Vendor	< 0.005	0.03	0.01	< 0.005	< 0.005	0.63	0.63	< 0.005	0.06	0.06	—	24.8	24.8	< 0.005	< 0.005	0.03	25.9
Hauling	< 0.005	0.04	0.01	< 0.005	< 0.005	0.61	0.61	< 0.005	0.06	0.06	—	27.4	27.4	< 0.005	< 0.005	0.03	28.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.29	0.29	0.00	0.03	0.03	—	2.42	2.42	< 0.005	< 0.005	< 0.005	2.45
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.11	0.11	< 0.005	0.01	0.01	—	4.10	4.10	< 0.005	< 0.005	< 0.005	4.30
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.11	0.11	< 0.005	0.01	0.01	—	4.54	4.54	< 0.005	< 0.005	< 0.005	4.76

3.11. Linear, Drainage, Utilities, & Sub-Grade (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.63	5.88	4.92	0.01	0.23	—	0.23	0.21	—	0.21	—	1,268	1,268	0.05	0.01	—	1,273
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.19	0.16	< 0.005	0.01	—	0.01	0.01	—	0.01	—	41.7	41.7	< 0.005	< 0.005	—	41.8
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.90	6.90	< 0.005	< 0.005	—	6.93

Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.13	0.00	0.00	2.30	2.30	0.00	0.23	0.23	—	23.0	23.0	< 0.005	< 0.005	0.09	23.4
Vendor	< 0.005	0.07	0.03	< 0.005	< 0.005	1.42	1.42	< 0.005	0.14	0.15	—	56.2	56.2	< 0.005	0.01	0.15	58.9
Hauling	0.01	0.36	0.13	< 0.005	0.01	6.45	6.46	0.01	0.66	0.66	—	290	290	0.02	0.05	0.63	304
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.08	0.08	0.00	0.01	0.01	—	0.69	0.69	< 0.005	< 0.005	< 0.005	0.70
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.05	0.05	< 0.005	< 0.005	< 0.005	—	1.85	1.85	< 0.005	< 0.005	< 0.005	1.93
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.21	0.21	< 0.005	0.02	0.02	—	9.53	9.53	< 0.005	< 0.005	0.01	10.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	0.11	0.11	< 0.005	< 0.005	< 0.005	0.12
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	0.31	0.31	< 0.005	< 0.005	< 0.005	0.32
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.04	0.04	< 0.005	< 0.005	< 0.005	—	1.58	1.58	< 0.005	< 0.005	< 0.005	1.66

3.13. Linear, Drainage, Utilities, & Sub-Grade (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.50	4.60	3.82	0.01	0.18	—	0.18	0.17	—	0.17	—	977	977	0.04	0.01	—	980
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.30	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	—	64.2	64.2	< 0.005	< 0.005	—	64.4
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	10.6	10.6	< 0.005	< 0.005	—	10.7
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.13	0.00	0.00	2.30	2.30	0.00	0.23	0.23	—	23.0	23.0	< 0.005	< 0.005	0.09	23.4
Vendor	< 0.005	0.07	0.03	< 0.005	< 0.005	1.42	1.42	< 0.005	0.14	0.15	—	56.2	56.2	< 0.005	0.01	0.15	58.9
Hauling	< 0.005	0.18	0.06	< 0.005	< 0.005	3.23	3.23	< 0.005	0.33	0.33	—	145	145	0.01	0.02	0.32	152
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.15	0.15	0.00	0.02	0.02	—	1.39	1.39	< 0.005	< 0.005	< 0.005	1.40
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.09	0.09	< 0.005	0.01	0.01	—	3.69	3.69	< 0.005	< 0.005	< 0.005	3.87
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.21	0.21	< 0.005	0.02	0.02	—	9.53	9.53	< 0.005	< 0.005	0.01	10.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.03	0.03	0.00	< 0.005	< 0.005	—	0.23	0.23	< 0.005	< 0.005	< 0.005	0.23
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	0.61	0.61	< 0.005	< 0.005	< 0.005	0.64
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.04	0.04	< 0.005	< 0.005	< 0.005	—	1.58	1.58	< 0.005	< 0.005	< 0.005	1.66

3.15. Linear, Drainage, Utilities, & Sub-Grade (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.19	1.82	1.56	< 0.005	0.07	—	0.07	0.07	—	0.07	—	424	424	0.02	< 0.005	—	426

Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	14.0	14.0	< 0.005	< 0.005	—	14.0
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	2.31	2.31	< 0.005	< 0.005	—	2.32
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.13	0.00	0.00	2.30	2.30	0.00	0.23	0.23	—	23.0	23.0	< 0.005	< 0.005	0.09	23.4
Vendor	< 0.005	0.07	0.03	< 0.005	< 0.005	1.42	1.42	< 0.005	0.14	0.15	—	56.2	56.2	< 0.005	0.01	0.15	58.9
Hauling	< 0.005	0.18	0.06	< 0.005	< 0.005	3.23	3.23	< 0.005	0.33	0.33	—	145	145	0.01	0.02	0.32	152

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.08	0.08	0.00	0.01	0.01	—	0.69	0.69	< 0.005	< 0.005	< 0.005	0.70
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.05	0.05	< 0.005	< 0.005	< 0.005	—	1.85	1.85	< 0.005	< 0.005	< 0.005	1.93
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	0.11	0.11	< 0.005	0.01	0.01	—	4.77	4.77	< 0.005	< 0.005	< 0.005	5.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	0.11	0.11	< 0.005	< 0.005	< 0.005	0.12
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	0.31	0.31	< 0.005	< 0.005	< 0.005	0.32
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	0.79	0.79	< 0.005	< 0.005	< 0.005	0.83

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Move in and prep	Linear, Grubbing & Land Clearing	5/1/2024	5/14/2024	5.00	10.0	—
Pre grading	Linear, Grading & Excavation	5/15/2024	5/28/2024	5.00	10.0	—
Backfill and clean up	Linear, Grading & Excavation	5/29/2024	6/11/2024	5.00	10.0	—
Trenching	Linear, Drainage, Utilities, & Sub-Grade	6/12/2024	8/11/2024	5.00	43.0	—
Pipe installation	Linear, Drainage, Utilities, & Sub-Grade	8/12/2024	9/11/2024	5.00	23.0	—
Sheet pipe and dewater	Linear, Drainage, Utilities, & Sub-Grade	6/12/2024	6/25/2024	6.00	12.0	—
Sheet pipe alcove and concrete	Linear, Drainage, Utilities, & Sub-Grade	6/26/2024	7/23/2024	6.00	24.0	—

Screen conduit and wiring	Linear, Drainage, Utilities, & Sub-Grade	7/24/2024	8/6/2024	6.00	12.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Move in and prep	Rubber Tired Dozers	Diesel	Average	2.00	10.0	367	0.40
Move in and prep	Graders	Diesel	Average	1.00	10.0	148	0.41
Move in and prep	Scrapers	Diesel	Average	2.00	10.0	423	0.48
Pre grading	Graders	Diesel	Average	1.00	10.0	148	0.41
Pre grading	Scrapers	Diesel	Average	2.00	10.0	423	0.48
Backfill and clean up	Rubber Tired Dozers	Diesel	Average	2.00	10.0	367	0.40
Backfill and clean up	Graders	Diesel	Average	1.00	10.0	148	0.41
Backfill and clean up	Scrapers	Diesel	Average	2.00	10.0	423	0.48
Backfill and clean up	Plate Compactors	Diesel	Average	2.00	10.0	8.00	0.43
Trenching	Excavators	Diesel	Average	2.00	10.0	36.0	0.38
Pipe installation	Excavators	Diesel	Average	3.00	10.0	36.0	0.38
Pipe installation	Rubber Tired Loaders	Diesel	Average	1.00	10.0	150	0.36
Pipe installation	Forklifts	Diesel	Average	2.00	10.0	82.0	0.20
Pipe installation	Generator Sets	Diesel	Average	2.00	10.0	14.0	0.74
Pipe installation	Excavators	Diesel	Average	1.00	10.0	36.0	0.38
Sheet pipe and dewater	Cranes	Diesel	Average	1.00	8.00	367	0.29
Sheet pipe and dewater	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Sheet pipe and dewater	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Sheet pipe and dewater	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43
Sheet pipe alcove and concrete	Cranes	Diesel	Average	1.00	6.00	367	0.29

Sheet pipe alcove and concrete	Excavators	Diesel	Average	1.00	6.00	36.0	0.38
Sheet pipe alcove and concrete	Pumps	Diesel	Average	1.00	10.0	11.0	0.74
Sheet pipe alcove and concrete	Plate Compactors	Diesel	Average	1.00	6.00	8.00	0.43
Screen conduit and wiring	Cranes	Diesel	Average	1.00	3.00	367	0.29
Screen conduit and wiring	Excavators	Diesel	Average	1.00	3.00	36.0	0.38

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Move in and prep	—	—	—	—
Move in and prep	Worker	14.0	14.3	LDA,LDT1,LDT2
Move in and prep	Vendor	0.00	8.80	HHDT,MHDT
Move in and prep	Hauling	6.00	20.0	HHDT
Move in and prep	Onsite truck	0.00	0.00	HHDT
Pre grading	—	—	—	—
Pre grading	Worker	8.00	14.3	LDA,LDT1,LDT2
Pre grading	Vendor	0.00	8.80	HHDT,MHDT
Pre grading	Hauling	12.0	20.0	HHDT
Pre grading	Onsite truck	2.00	0.50	HHDT
Trenching	—	—	—	—
Trenching	Worker	14.0	14.3	LDA,LDT1,LDT2
Trenching	Vendor	14.0	8.80	HHDT,MHDT
Trenching	Hauling	0.00	20.0	HHDT

Trenching	Onsite truck	2.00	0.50	HHDT
Pipe installation	—	—	—	—
Pipe installation	Worker	22.0	14.3	LDA,LDT1,LDT2
Pipe installation	Vendor	14.0	8.80	HHDT,MHDT
Pipe installation	Hauling	6.00	20.0	HHDT
Pipe installation	Onsite truck	2.00	0.50	HHDT
Backfill and clean up	—	—	—	—
Backfill and clean up	Worker	24.0	14.3	LDA,LDT1,LDT2
Backfill and clean up	Vendor	4.00	8.80	HHDT,MHDT
Backfill and clean up	Hauling	2.00	20.0	HHDT
Backfill and clean up	Onsite truck	0.00	0.00	HHDT
Sheet pipe and dewater	—	—	—	—
Sheet pipe and dewater	Worker	2.00	14.3	LDA,LDT1,LDT2
Sheet pipe and dewater	Vendor	2.00	8.80	HHDT,MHDT
Sheet pipe and dewater	Hauling	4.00	20.0	HHDT
Sheet pipe and dewater	Onsite truck	0.00	0.00	HHDT
Sheet pipe alcove and concrete	—	—	—	—
Sheet pipe alcove and concrete	Worker	2.00	14.3	LDA,LDT1,LDT2
Sheet pipe alcove and concrete	Vendor	2.00	8.80	HHDT,MHDT
Sheet pipe alcove and concrete	Hauling	2.00	20.0	HHDT
Sheet pipe alcove and concrete	Onsite truck	0.00	0.00	HHDT
Screen conduit and wiring	—	—	—	—
Screen conduit and wiring	Worker	2.00	14.3	LDA,LDT1,LDT2
Screen conduit and wiring	Vendor	2.00	8.80	HHDT,MHDT
Screen conduit and wiring	Hauling	2.00	20.0	HHDT
Screen conduit and wiring	Onsite truck	0.00	0.00	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Move in and prep	2,500	0.00	0.00	0.00	—
Pre grading	3,000	0.00	0.00	0.00	—
Backfill and clean up	0.00	0.00	0.00	0.00	—
Trenching	33,600	0.00	0.00	0.00	—
Pipe installation	0.00	0.00	0.00	0.00	—
Sheet pipe and dewater	5,000	0.00	0.25	0.00	—
Sheet pipe alcove and concrete	0.00	0.00	0.00	0.00	—
Screen conduit and wiring	0.00	0.00	0.00	0.00	—

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	Per engineers
Construction: Off-Road Equipment	Per engineers. Pipe installation includes excavator for floating debris option.
Construction: Dust From Material Movement	Per engineers
Construction: Trips and VMT	Pipe installation includes worker for optional floating debris. Haul truck trips account for material balanced onsite. Onsite haul based on travel on access road before and after construction each day.

Appendix C

Biological Resources Technical Report

Biological Resources Technical Report

Upper Swanston Ranch, Inc. Irrigation and Fish Passage Improvement Project

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Contents

Tables and Figures

Table **Page**

Figures

Acronyms and Abbreviations

BIOS	Biogeographic Information & Observation System
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CM	conservation measures
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
CRPR	California Rare Plant Ranks
CWA	Clean Water Act
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ICF	ICF International, Inc.
LSA	Lake or Streambed Alteration
MBTA	Migratory Bird Treaty Act
Natural Communities List	CDFW's List of Vegetation Alliances and Associations
NMFS	National Marine Fisheries Service
NMP	Nationwide Permit
OHWM	ordinary high water mark
PBO	Programmatic Biological Opinion
RWQCB	Regional Water Quality Control Board
State Board	State Water Resources Control Board
USC	U.S. Government Code
USFWS	U.S. Fish and Wildlife Service
VegCAMP	Vegetation Classification and Mapping Program
WBWG	Western Bat Working Group

Chapter 1
Introduction

ICF has completed a field investigation and subsequent analysis of biological resources occurring or potentially occurring on the Department of Water Resources (DWR), Upper Swanston Ranch, Irrigation and Fish Passage Improvement Project (project) site in Yolo County, California. This report describes the methods and results of that field investigation and subsequent analysis of special-status plants, animals, natural communities, and potentially jurisdictional features present to support the DWR's preparation of documentation under the California Environmental Quality Act, and to provide supporting information for regulatory permit applications. A summary of federal and state environmental laws and regulations relevant to the project is attached as Appendix A.

Project Location

The project site is located in Yolo County, within the Sacramento West U.S. Geological Survey 7.5-minute quadrangle, west of the city of West Sacramento and north of Interstate 80 (Figure 1). The site is along Tule Canal, at 38.583638°N, -121.58459°W (latitude, longitude in decimal degrees), near the east side of the Yolo Bypass Wildlife Area and south of the Sacramento Bypass Wildlife Area. The project site is within the Yolo Habitat Conservation Plan/Natural Community Conservation Plan (Yolo HCP/NCCP 2018) planning area (Yolo Habitat Conservancy 2018a).

Project Description

The project consists of modifying Tule Canal to avoid fish entrainment by installing a new fish-friendly water intake structure within Tule Canal; installing a new pump station site west of Tule Canal that would pull water from the proposed water intake screens through two 36-inch pipes that extend back to the pump station before sending the water through one 48-inch buried irrigation pipe beneath an agricultural pasture to an improved holding reservoir to the north; and installing a new splash board riser, one fish-friendly flap culvert pipe and backfill at the existing east/west diversion point, to create a barrier to fish entry from Tule Canal. The water held in the holding reservoir would be available for diversion north from the reservoir for use in irrigated fields.

The proposed project will aid in the improvement of fish passage and connectivity to the Sacramento River in Tule Canal, located north of the Yolo Bypass Wildlife Area.

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Chapter 2
Methods

Biological Study Area

The biological study area includes a segment of Tule Canal, two unnamed canals, two agricultural ditches, the access road, and the staging area (Figure 2). The Biological Study Area encompasses all areas proposed for potential project activities and represents the limits of direct disturbance.

Literature Review

Prior to performing the biological and botanical surveys, ICF reviewed publicly available data and subscription-based biological resources data. Data sources that assisted in this analysis include:

- Online soil maps from the National Resources Conservation Service (NRCS, 2023a and 2023b);
- The CDFW California Natural Diversity Database (CNDDB) list of plant and wildlife species documented on the Sacramento West and 8 surrounding quadrangles (CDFW 2023b);
- The California Native Plant Society (CNPS) online database of plant species documented on the Sacramento West and 8 surrounding quadrangles (CNPS 2023);
- A U.S. Fish and Wildlife Service (USFWS) list of species that may occur in the vicinity of the project (USFWS 2023);
- A National Marine Fisheries Service (NMFS) list of species that may occur in the vicinity of the project (NMFS 2016) (Sacramento West and Davis quadrangles); and
- CDFW's *Fish Species of Special Concern in California* (Moyle et al. 2015).

The CNDDB and CNPS lists include special-status species documented on the following 9 quadrangles:

- Clarksburg
- Davis
- Florin
- Grays Bend
- Rio Linda
- Sacramento East
- Sacramento West
- Saxon
- Taylor Monument

The USFWS, NMFS, CDFW, and CNPS lists were updated in 2023 and the updated lists are provided in Appendix B.

Special-Status Species

For the purposes of this report, *special-status species* are those with one or more of the following characteristics.

- Plants or animals listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (ESA).
- Plants or animals that are candidates for possible future listing as threatened or endangered under the ESA.
- Plants or animals listed or proposed for listing as threatened or endangered under the California Endangered Species Act (CESA).
- Plants listed as rare under the California Native Plant Protection Act (California Fish and Game Code Section 1900 et seq.).
- Plants assigned to one of five California Rare Plant Ranks (CRPR) by the California Native Plant Society (CNPS) and collaborators.[1]
- 1A – Presumed extirpated in California and either rare or extinct elsewhere.
- 1B – Rare, threatened, or endangered in California and elsewhere.
- 2A – Presumed extirpated in California, but more common elsewhere.
- 2B – Rare, threatened, or endangered in California, but more common elsewhere.
- 3 – A review list of plants about which more information is needed.
- 4 – A watch list of plants of limited distribution.
- Animal species, subspecies, or distinct populations designated as Species of Special Concern by CDFW.
- Animals designated as Fully Protected under Sections 3511 (birds), 4700 (mammals), 5515 (fish), and 5050 (reptiles and amphibians) of the California Fish and Game Code.
- Plants or animals determined to meet the definitions of rare or endangered under Section 15380 of the California Environmental Quality Act (CEQA) Guidelines.
- Plants or animals with no formal special status but considered by experts to be rare or in serious decline and that may warrant special status based on recent information.

[1] See http://www.cnps.org/cnps/rareplants/ranking.php for more information.

Field Survey Methods

Wildlife Habitat Assessment

ICF Senior Biologist Kelly Bayne conducted a general biological survey including a habitat assessment on November 14, 2022. The survey included inventorying all wildlife species observed utilizing habitat within the study area and documenting the presence and suitability of habitat for special-status species with the potential to occur within the project site. A list of wildlife observed is provided in Appendix C.

Botanical Surveys

ICF Senior Botanist Kate Carpenter conducted botanical inventories on June 16, 2022, August 5, 2022, and November 14, 2022. The surveys consisted of conducting a botanical inventory and evaluating vegetative communities. Botanical surveys were floristic and were conducted to coincide with bloom periods of special-status plant species potentially present on the site. The natural communities were characterized and mapped in the field using aerial photography, and the boundaries were subsequently digitized using Geographic Information System (GIS) software in the State Plane coordinate system (NAD 83) with units as "survey feet." A list of plants observed is provided in Appendix C.

Aquatic Resources Delineation

ICF Senior Botanist Kate Carpenter conducted aquatic resources delineations on June 16, 2022, August 5, 2022, and November 14, 2022. The results of the aquatic resources delineation are summarized herein and are discussed in detail in a separate Aquatic Resources Delineation Report (ICF 2023). Aquatic features were characterized and mapped in the field using aerial photography, and wetland boundaries were subsequently digitized using Geographic Information System (GIS) software in the State Plane coordinate system (NAD 83) with units as "survey feet.

Chapter 3
Results

Land Cover Types/Vegetation Communities

Land Cover

The biological study area includes terrestrial and aquatic land cover types (Figure 3). Terrestrial land cover types consisting of fallow rice, ruderal grassland, valley foothill riparian vegetation, and barren (i.e., roads). The aquatic land cover types include freshwater emergent wetlands and riverine features (i.e., agricultural canals and ditches). Representative photographs of landcover in the biological study area are attached in Appendix D and the terrestrial and aquatic land cover types are described in detail below.

Terrestrial Land Cover Types

The terrestrial land cover types in the biological study area include fallow rice, ruderal grassland, valley foothill riparian areas, and barren areas. Nomenclature of the land cover types are consistent with the descriptions and categories in the Yolo HCP/NCCP (Yolo Habitat Conservancy 2018a), though some names have been slightly modified for readability. The HCP/NCCP names, where different, are identified in parentheses below.

Fallow Rice

No rice production has occurred within the study area for over three years. Unlike surrounding fields that are managed for waterfowl, the fallow rice field in the study area has not been flooded since August 2018 (Google Earth aerial imagery 2018-2022). Any flooding of the fallow rice fields in the study area is temporary and a result of overtopping of the Fremont weir. The fallow rice within the biological study area has ruderal vegetation similar to the surrounding ruderal areas, however the vegetation is stunted and cutting of the ruderal vegetation has occurred. Dominant species observed include Canadian horseweed (*Erigeron canadensis*), bristly ox-tongue (*Helminthotheca echioides*), prostrate knotweed (*Polygonum aviculare*), Annual beard grass (*Polypogon monspeliensis*), with associates including cocklebur (*Xanthium strumarium*), and toothpick weed (*Ammi visnaga*).

Ruderal Grassland (Vegetated Corridor)

Ruderal grassland occurs in the study area along roadsides and rice field edges. This community is dominated by nonnative grasses and broadleaf herbaceous plants (forbs). Annual grasses found in the study area include wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), Italian rye grass (*Festuca perennis*), and soft chess (*Bromus hordeaceus*). The ruderal grassland also supports Bermuda grass (*Cynodon dactylon*), a perennial species, and nonnative forb species, such as mustard (*Hirschfeldia incana*), willow lettuce (*Latuca saligna*), and alkali mallow (*Malvella leprosa*), and toothpick weed (*Ammi visnaga*).

Ruderal grassland is habitat for pappose tarweed (*Centromadia parryi ssp. rudis*) which is ranked as CRPR 4.2. This plant was not observed within the biological study area during surveys. However, this plant was found a quarter of a mile west of the study area during surveys, growing within regularly maintained ruderal grassland along the margins of the dirt road.

Valley Foothill Riparian

In the biological study area, valley foothill riparian vegetation occurs sporadically along the banks of the canals where the bank slope is terraced. This community occurs below the high tide line and is supported by the perennial water regime of the canals. Dominant tree species include arroyo willow (*Salix lasiolepis*) and sandbar willow (*Salix exigua var. hindsiana*). Vegetation in the understory includes, sandbar willow saplings, willowherb (*Epilobium brachycarpum*) and California rose (*Rosa californica*). No special-status plant species were observed within the valley foothill riparian areas.

Barren (Incidental to Agriculture)

The barren land cover type consists of a gravel road which is characterized by compacted soil, regular maintenance activities, and little to no vegetation.

Aquatic Land Cover Types

The aquatic land cover types in the biological study area include freshwater emergent wetland, agricultural ditch, and canal. Corresponding land cover types within the Yolo HCP/NCCP (Yolo Habitat Conservancy 2018a) are included in parentheses.

Freshwater Emergent Wetland

The banks of the canals within the biological study area are vegetated by freshwater tidal wetland vegetation that grows below the high tide line of the canals. The vegetation within the freshwater emergent wetland is comprised of two species, six petal water primrose (*Ludwigia hexapetala*), an invasive species, and mosquito fern (*Azolla filiculoides*), a native aquatic fern. Vegetation cover is 70 percent with water primrose growing closest to the bank and the mosquito fern floating at the water margins and into the center of the canal. No special-status plant species were observed within the freshwater emergent wetlands.

Agricultural Ditch (Open Water)

Agricultural ditches within the biological study area are excavated channelized features that are less than 10 feet wide. The ditches receive water via gates from the canals to the north and release water to flood the downslope rice fields during the growing season. At other times of the year the ditches are dry. The agricultural ditches terminate within the fields where water flow continues through excavated contours to flood irrigate large fields. These features receive water from an irrigation system and release water within the same system. Agricultural ditches within the biological study area do not have a connection to a navigable water and are considered as potentially non-jurisdictional features. The agricultural ditches are regularly maintained and do not have a regular water regime. For these reasons, agricultural ditches do not provide habitat for special-status plants.

Canal (Open Water)

Canals within the biological study area are excavated channelized features that are greater than 10 feet wide. The canals include portions of Tule Canal and two unnamed agricultural canals. The canal banks have steep to gentle slopes and support freshwater marsh vegetation and valley foothill riparian vegetation where the slopes are less steep. Tule Canal is considered a tidal perennial stream and has a rise of approximately two feet in elevation. The two agricultural canals are perennial but not tidally influenced. The hydrology of the two agricultural canals is part of the irrigation system that supports controlled flooding of the surrounding fields for rice production and waterfowl recreation. One of the agricultural canals within the biological study area does not have a connection to a navigable water and is considered as a potentially non-jurisdictional feature. In contrast, Tule Canal and the agricultural canal abutting it meet the criteria to be considered as non-wetland jurisdictional water features. No special-status plant species were observed within the canals.

Wildlife Habitat

Both terrestrial and aquatic habitat types within the biological study area are known to support various wildlife species that utilize agricultural areas for foraging, breeding, and dispersal. The Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Yolo HCP/NCCP characterizes the habitat types within the Plan Area, which includes the Yolo Bypass and the entirety of the biological study area (Yolo Habitat Conservancy 2018b).

Rice provides both wetland habitat during the growing season when fields are flooded, and upland habitat during maturation and harvest when the fields are dry and during years when fields are left fallow. Rice fields support various bird, mammal, and reptile species including giant garter snake through provision of foraging habitat and are an important food source for wintering waterfowl. Ruderal grassland and agricultural fields provide foraging habitat for avian species and may provide primary habitat for small mammals such as rodents and lagomorphs (rabbits). Raptors and bats may also forage over ruderal grassland and plowed fields. Freshwater emergent wetlands provide foraging habitat for a variety of avian species including raptors, shorebirds, wading birds, blackbirds, and sparrows, and wrens, as well as the giant garter snake, and provide breeding habitat for a subset of those species. Areas of open water provide foraging habitat for raptors and waterfowl, and both breeding and foraging habitat for reptiles and amphibians. Field crops and truck and berry crops referenced in the Yolo HCP/NCCP in the Plan Area that are adjacent to the biological study area provide similar foraging and potential primary habitat for avian and mammal species as that found in ruderal grassland and agricultural fields.

Among the 18 bird species detected by ICF during the November 14, 2022 site visit were red-winged blackbird (*Agelaius phoeniceus*), red-tailed hawk (*Buteo jamaicensis*), Brewer's blackbird (*Euphagus cyanocephalus*), and white-crowned sparrow (*Zonotrichia leucophrys*). The mammal species observed were black-tailed jackrabbit (*Lepus californicus*), river otter (*lontra canadensis*), California ground squirrel (*Spermophilus beecheyi*), and Audubon's cottontail (*Sylvilagus audubonii*). No reptiles, amphibians, or invertebrates were observed during the site visit.

Fish and Aquatic Species Habitat

Aquatic habitats in the Yolo Bypass include stream and slough channels for fish migration and when flooded, seasonal spawning habitat and productive rearing habitat (Sommer et al. 2001a; CALFED Bay-Delta Program 2000a, 2000b). During years when the Yolo Bypass is flooded, it serves as an important migratory route for juvenile Chinook salmon and other native migratory and anadromous fishes moving downstream. During these times, it provides juvenile anadromous salmonids an alternative migration corridor to the lower Sacramento River (Sommer et al. 2003) and, sometimes, better rearing conditions than the adjacent Sacramento River channel (Sommer et al. 2001a, 2005). When the floodplain is activated, juvenile salmon can rear for weeks to months in the Yolo Bypass floodplain before migrating to the estuary (Sommer et al. 2001b). Research on the Yolo Bypass has found that juvenile salmon grow substantially faster in the Yolo Bypass floodplain than in the adjacent Sacramento River, primarily because of the greater availability of invertebrate prey in the floodplain (Sommer et al. 2001b, 2005). Increased frequency and duration of connectivity between the Sacramento River and the Yolo Bypass may increase off channel rearing opportunities that expand the life history diversity portfolio for Central Valley Chinook salmon (Takata et al. 2017). When not flooded, the lower Yolo Bypass provides tidal habitat for young fish that enter from the lower Sacramento River via Cache Slough Complex—a network of tidal channels and flooded islands that includes Cache Slough, Lindsey Slough, Liberty Island, the Sacramento Deepwater Ship Channel, and the Yolo Bypass (Mahardja et al. 2019).

Sommer et al. (1997) demonstrated that the Yolo Bypass is one of the single most important habitats for Sacramento splittail. Because the Yolo Bypass is dry during summer and fall, nonnative species (e.g., predatory fishes) generally are not present year-round except in perennial water sources (Sommer et al. 2003). In addition to providing important fish habitat, winter and spring inundation of the Yolo Bypass supplies phytoplankton and detritus that may benefit aquatic organisms downstream in the brackish portion of the San Francisco Estuary (Sommer et al. 2004; Lehman et al. 2008a).

The benefit of seasonal inundation of the Yolo Bypass has been studied by DWR as part of the Delta Smelt Resiliency Strategy, which was developed by DWR and other state and federal resource agencies to boost both immediate- and near-term reproduction, growth rates, and survival of delta smelt (California Natural Resources Agency 2016; Mahardja et al. 2019). The Yolo Bypass has been identified as a significant source of phytoplankton and zooplankton biomass to the Delta in the winter and spring during floodplain inundation. However, little has been known about its contribution to the food web during the drier summer and fall months.

Adult winter-run, spring-run, and fall-run Chinook salmon and white sturgeon have been documented to migrate into the Yolo Bypass via the Toe Drain and Tule Canal when there is no flow into the floodplain over the Fremont Weir (National Marine Fisheries Service 2009). Fyke trap monitoring by DWR has shown that adult salmon and steelhead migrate up the Toe Drain in autumn and winter regardless of whether the Fremont Weir spills (Harrell and Sommer 2003; Sommer et al. 2014). The Toe Drain does not extend to the Fremont Weir because the channel is fully or partially blocked by roads or other higher ground at several locations and fish are often unable to reach upstream spawning habitat in the Sacramento River and its tributaries (Harrell and Sommer 2003; Sommer et al. 2014). Other structures in the Yolo Bypass, such as the Lisbon Weir located on the Toe Drain downstream of the study area, and irrigation dams in the northern end of the Tule Canal may also impede upstream passage of adult anadromous fish (National Marine Fisheries Service 2009).

Currently, the Lisbon Weir is only passable during high tide events. The Fremont Weir Adult Fish Modification Project modified Fremont Weir by expanding the existing fish ladder and removed or replaced road crossings with an open channel design to improve fish passage (California Eco Restore 2018).

Modifications to Fremont Weir have made it easier for Chinook salmon, steelhead, sturgeon, and other fish species to get through the Fremont Weir and back into the Sacramento River at the north end of Tule Canal (U.S. Bureau of Reclamation 2021). Tule Canal in the study area is a low velocity waterway surrounded by agricultural fields with associated drainage ditches from Tule Canal to the agricultural fields. Vegetation along the canal is ruderal grasslands with some riparian vegetation consisting of willow species (Figure 3). Six petal water primrose (*Ludwigia hexapetala*), an invasive species, and mosquito fern (*Azolla filiculoides*), a native aquatic fern, was present in the canal during surveys in November.

Special-Status Species

Reviews of species lists from CDFW, CNPS, USFWS, and NMFS returned 71 special-status species (33 plants, 25 animals, and 13 fish) that had the potential to occur in the project vicinity. Based on the results of the CNDDB search and biological surveys performed during the site visits, ICF identified 21 of those species (0 plants, 8 animals, and 13 fish) to have a moderate or high/present potential to occur (Table 1 and Table 2) within the biological study area (Figure 2). These 21 species are discussed below.

The remaining 50 species (33 plants and 17 animals) were determined to have a no or low potential to occur due to lack of suitable habitat and/or known occurrences within a 5-mile radius of the biological study area and within the region.

Table 1. Special-Status Plant Species Potentially Occurring in the Vicinity of Tule Canal, Upper Swanston Ranch, Inc., Yolo County, California

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Plants					
Depauperate milk-vetch *Astragalus pauperculus*	–/–/4.3	Butte, Shasta, and Tehama Counties.	Chaparral, cismontane woodland, valley and foothill grasslands; 195-3,985 feet.	Mar-Jun	**None.** No potential habitat present; species not observed during surveys.
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	–/–/1B.1	Historical range included the Central Valley from Butte to Alameda County but currently only occurs in Butte, Glenn, Colusa, and Yolo Counties.	Meadows and seeps (vernally mesic), valley and foothill grassland, which is occasionally subalkaline flats; 5-245 feet.	Apr-May	**None.** No potential habitat present; species not observed during surveys.
Alkali milk-vetch *Astragalus tener* var. *tener*	–/–/1B.2	Southern Sacramento Valley, northern San Joaquin Valley, eastern San Francisco Bay Area.	Playas and vernal pools in valley and foothill grassland, alkali flats and flooded lands; 5-195 feet.	Mar-Jun	**None.** No potential habitat present; species not observed during surveys.
Heartscale *Atriplex cordulata var. cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills.	Alkaline flats and scalds, sandy soils in Chenopod scrub, valley and foothill grassland, meadows and seeps; below 1,835 feet.	Apr-Oct	**None.** No potential habitat present; species not observed during surveys.
Brittlescale *Atriplex depressa*	–/–/1B.2	Western and eastern Central Valley and adjacent foothills on west side of Central Valley.	Alkali grassland, alkali meadow, and alkali scrub; 5-1,050 feet.	Apr-Oct	**None.** No potential habitat present; species not observed during surveys.
Valley Brodiaea *Brodiaea rosea* ssp. *vallicola*	–/–/4.2	Butte, Calaveras, Nevada, Placer, Sacramento, San Joaquin, Sutter, and Yuba Counties.	Valley and foothill grasslands, vernal pools; 35-1100 feet.	Apr-May	**None.** No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Bristly sedge *Carex comosa*	–/–/2B.1	Scattered occurrences throughout California; Oregon, Washington, and elsewhere.	Coastal prairie, marshes and Swamps at lake margins, valley and foothill grassland; below 2,050 feet.	May-Sep	**None.** No potential habitat present; species not observed during surveys.
Pappose tarplant *Centromadia parryi* ssp. *parryi*	–/–/1B.2	North and Central Coast Ranges, the southern Sacramento Valley; occurrences in Butte, Colusa, Glenn, Lake, Napa, San Mateo, and Solano Counties.	Chaparral, coastal prairie, coastal salt marshes and swamps, meadows and seeps, alkaline soils in vernally mesic valley and foothill grassland; below 1,380 feet.	May-Nov	**None.** No potential habitat present; species not observed during surveys.
Pappose tarweed *Centromadia parryi* ssp. *rudis*	–/–/4.2	Inner North Coast Ranges, Sacramento Valley, northern San Joaquin Valley.	Valley and foothill grassland, vernal pools, often in clay or alkaline soils; below 330 feet.	May-Oct	**None.** Species was found during June 2022 surveys ¼ mile from study area. Species was not found within study area.
Palmate-bracted bird's-beak *Chloropyron palmatum*	FE/SE/1B.1	Livermore Valley and scattered locations in the Central Valley from Colusa County to Fresno County.	Alkaline sites in valley and foothill grassland and chenopod scrub; 15-510 feet.	May-Oct	**None.** No potential habitat present; species not observed during surveys.
Peruvian dodder *Cuscuta obtusiflora* var. *glandulosa*	–/–/2B.2	Not seen since 1948; occurrences in Butte, Los Angeles, Merced, Sacramento, San Bernardino*, and Sonoma Counties; Baja California and elsewhere.	Freshwater marshes and swamps; 50-920 feet.	Jul-Oct	**None.** No potential habitat present; species not observed during surveys.
Dwarf downingia *Downingia pusilla*	–/–/2B.2	Inner North Coast Ranges, southern Sacramento Valley, northern and central San Joaquin Valley.	Wet areas in valley and foothill grassland, vernal pools; 5-1,460 feet.	Mar-May	**None.** No potential habitat present; species not observed during surveys.
Jepson's coyote-thistle *Eryngium jepsonii*	–/–/1B.2	Southern Interior North Coast Ranges, deltaic Great Valley, San Francisco Bay Area.	Valley and foothill grassland, vernal pools; 10-985 feet.	Apr-Aug	**None.** No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
San Joaquin spearscale *Extriplex joaquinana*	–/–/1B.2	Eastern San Francisco Bay Area, west edge of Central Valley from Glenn County to Fresno County.	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland; 5-2,740 feet.	Apr-Oct	**None.** No potential habitat present; species not observed during surveys.
Stinkbells *Fritillaria agrestis*	–/–/4.2	Alameda, Contra Costa, Fresno, Kern, Mendocino, Monterey, Merced, Monterey, Mariposa, Placer, Sacramento, Santa Barbara, San Benito, San Luis Obispo, San Mateo, Stanislaus, and Tuolumne Counties.	Chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland, on clay or serpentinite substrate; 35-5,100 feet.	Mar-Jun	**None.** No potential habitat present; species not observed during surveys.
Boggs Lake hedge-hyssop *Gratiola heterosepala*	–/SE/1B.2	Inner North Coast Ranges, Central Sierra Nevada foothills, Sacramento Valley and Modoc Plateau in Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, and Tehama Counties; and Oregon.	Clay soils in areas of shallow water, lake margins of swamps and marshes, vernal pool margins; 35-7,790 feet.	Apr-Aug	**None.** No potential habitat present; species not observed during surveys.
Hogwallow starfish *Hesperevax caulescens*	–/–/4.2	Broadly ranging in California, primarily in Great Valley and adjacent foothills, also in South Coast Ranges, Peninsular Ranges.	Mesic clay soils in valley and foothill grassland, shallow vernal pools; below 1,655 feet.	Mar-Jun	**None.** No potential habitat present; species not observed during surveys.
Woolly rose-mallow *Hibiscus lasiocarpos* var. *occidentalis*	–/–/1B.2	Scattered locations in the Central Valley, including the Delta, from Butte County to San Joaquin County.	Freshwater marshes and swamps; below 395 feet.	Jun-Sep	**None.** Species has a moderate potential to occur within the study area, however it was not found during botanical surveys conducted during blooming period.
Alkali-sink goldfields *Lasthenia chrysantha*	–/–/1B.1	Fresno, Kern, Kings, Madera, Merced, Sacramento, Solano, Stanislaus, Tulare Counties.	Vernal pools, below 655 feet.	Feb-Apr	**None.** No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Legenere *Legenere limosa*	–/–/1B.1	Primarily in the lower Sacramento Valley, also from North Coast Ranges, northern San Joaquin Valley, and the Santa Cruz mountains.	Vernal pools; 5-2,885 feet.	Apr-Jun	**None.** No potential habitat present; species not observed during surveys.
Heckard's pepper-grass *Lepidium latipes* var. *heckardii*	–/–/1B.2	Southern Sacramento Valley in Glenn, Merced, Sacramento, Solano, and Yolo Counties.	Alkaline flats in valley and foothill grassland; 5-655 feet.	Mar-May	**None.** No potential habitat present; species not observed during surveys.
Mason's lilaeopsis *Lilaeopsis masonii*	–/CR/1B.1	Southern Sacramento Valley, Sacramento-San Joaquin River Delta, northeast San Francisco Bay Area in Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, Solano, and Yolo Counties.	Freshwater or brackish marsh, riparian scrub, in tidal zone; below 35 feet.	Apr-Nov	**None.** Species has a moderate potential to occur within the study area, however it was not found during botanical surveys conducted during blooming period.
Little mousetail *Myosurus minimus* ssp. *apus*	–/–/3.1	Central Valley and South Coast from Butte County south to San Diego County; Baja California, Oregon.	Valley and foothill grassland, alkaline vernal pools; 65-2,100 feet.	Mar-Jun	**None.** No potential habitat present; species not observed during surveys.
Cotula navarretia *Navarretia cotulifolia*	–/–/4.2	Inner North Coast Ranges, western Sacramento Valley, San Francisco Bay Area, Inner South Coast Ranges.	Chaparral, cismontane woodland, valley and foothill grassland, on adobe soils; 15-6,005 feet.	May-Jun	**None.** No potential habitat present; species not observed during surveys.
Baker's navarretia *Navarretia leucocephala* ssp. *bakeri*	–/–/1B.1	Inner North Coast Range, western Sacramento Valley: Colusa, Glenn, Lake, Mendocino, Marin, Napa, Solano, Sonoma, Tehama, and Yolo Counties.	In mesic areas in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, and vernal pools; 15-5,71- feet.	Apr-Jun	**None.** No potential habitat present; species not observed during surveys.
Colusa grass *Neostapfia colusana*	FT/SE/1B.1	Central Valley with scattered occurrences from Colusa to Merced Counties.	Vernal pools, in adobe clay soils; 15-655 feet.	May-Aug	**None.** No potential habitat present; species not observed during surveys.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Blooming Period	Potential for Occurrence
Bearded popcornflower *Plagiobothrys hystriculus*	–/–/1B.1	Montezuma Hills in Napa, Solano, and Yolo Counties.	Mesic valley and foothill grassland, vernal pool margins; below 900 feet.	Apr-May	**None.** No potential habitat present; species not observed during surveys.
California alkali grass *Puccinellia simplex*	–/–/1B.2	Scattered locations in the San Francisco Bay Area, Great Valley, Tehachapi Mountains, western Mojave Desert.	Chenopod scrub, meadows and seeps, valley and foothill grassland, vernal pools; 5-3,050 feet.	Mar-May	**None.** No potential habitat present; species not observed during surveys.
Sanford's arrowhead *Sagittaria sanfordii*	–/–/1B.2	Scattered locations in Central Valley and Coast Ranges.	Shallow freshwater swamps and marshes; , sloughs, canals, and other slow-moving shallow water habitats; below 2,135 feet.	May-Oct	**None.** No potential habitat present; species not observed during surveys.
Keck's checkerbloom *Sidalcea keckii*	FE/–/1B.1	Known historically from only three occurrences in Fresno, Merced, and Tulare Counties; similar plants from Inner North Coast Ranges in Colusa, Napa, Solano, and Yolo Counties treated as this species until further studies completed.	Cismontane woodland, valley and foothill grassland, in clay and serpentinine substrates; 245-2,135 feet.	Apr-May	**None.** No potential habitat present; species not observed during surveys.
Suisun Marsh aster *Symphyotrichum lentum*	–/–/1B.2	Sacramento–San Joaquin Delta, Suisun Marsh, Suisun Bay: Contra Costa, Napa, Sacramento, San Joaquin, and Solano Counties.	Brackish and freshwater marshes and swamps; below 10 feet.	May-Nov	**None.** No potential habitat present; species not observed during surveys.
Saline clover *Trifolium hydrophilum*	–/–/1B.2	Sacramento Valley, central western California.	Marshes and swamps, mesic alkaline areas in valley and foothill grasslands, vernal pools; below 985 feet.	Apr-Jun	**None.** No potential habitat present; species not observed during surveys.
Crampton's tuctoria *Tuctoria mucronata*	FE/SE/1B.1	Southwestern Sacramento Valley in Solano and Yolo Counties.	Mesic valley and foothill grassland, vernal pools; 15-35 feet.	Apr-Aug	**None.** No potential habitat present; species not observed during surveys.

Table 2. Special-Status Animal Species Potentially Occurring in the Vicinity of Tule Canal, Upper Swanston Ranch, Inc., Yolo County, California

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Amphibians				
California tiger salamander *Ambystoma californiense*	FT/ST/SSC	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to northeastern San Luis Obispo County.	Grassland and oak woodland with seasonal ponds and/or pools for breeding; small mammal burrows in vicinity of breeding sites for underground retreats during the dry season.	**None.** Breeding habitat not present; no occurrences within 5 miles.
Reptiles				
Western pond turtle *Actinemys* (*Emys*) *marmorata*	–/–/SSC	California range includes Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada.	Ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and aquatic vegetation in woodland, grassland, and open forest.	**Moderate.** Potential aquatic habitat in Tule Canal. No known occurrences within 5 miles of site.
Giant garter snake *Thamnophis gigas*	FT/ST/–	Endemic to wetlands in the Sacramento and San Joaquin Valleys from Chico, south to the Mendota Wildlife Area in Fresno County.	Found in agricultural wetlands and other wetlands such as irrigation and drainage canals, low gradient streams, marshes, ponds, sloughs, small lakes, and their associated uplands. Upland habitat should have burrows or other soil crevices suitable for snakes to reside during their dormancy period (November – mid March).	**Moderate.** Tule canal provides habitat and is connected to other, similar waterways. There are multiple CNDDB occurrences in the area.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Invertebrates				
Crotch bumble bee *Bombus crotchii*	–/SCE/–	Occurs throughout the Pacific Coast, Western Desert, and adjacent foothills throughout most of the state's southwestern region.	Found in open grassland and scrub. Nests underground in abandoned rodent burrows. Colonies are annual and only the newly mated queens overwinter. The queens emerge from hibernation in early spring to search for nest sites. Host plant food includes milkweed (*Asclepias* sp.), pincushion (*Chaenactis* sp.), lupine (*Lupinus* sp.), bur clover (*Medicago* sp.), phacelia (*Phacelia* sp.), and sage (*Salvia* sp.).	**Low.** Although potential food plant *Medicago* was observed within the study area, it was not present in large concentrations and the majority of the study area is agricultural. No CNDDB occurrences within 5 miles.
Western bumble bee *Bombus occidentalis*	–/SCE/–	Historic range extends throughout California, although current populations are primarily found in high elevation sites in the Sierra Nevada	Found in open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows. Nests underground in abandoned rodent burrows or other cavities but may also nest above ground in structures including logs and railroad ties. Host plant food includes ceanothus (*Ceanothus* sp.), thistle (*Centaurea* sp.), rabbitbrush (*Chrysothamnus* sp.), geranium (*Geranium* sp.), gumplant (*Grindelia* sp.), lupine (*Lupinus* sp.), sweetclover (*Melilotus* sp.), monardella (*Monardella* sp.), blackberry (*Rubus* sp.), goldenrod (*Solidago* sp.), and clover (*Trifolium* sp.).	**Low.** Although potential food plants Centaurea, Cirsium, Melilotus, Rubus, and Trifolium were observed in the study area, there are no recent occurrences of this species within the region.
Conservancy fairy shrimp *Branchinecta conservatio*	FE/–/–	Northern two-thirds of the Central Valley. It ranges from Vina Plains of Tehama County; Sacramento NWR in Glenn County; Jepson Prairie Preserve and surrounding area east of Travis Air Force Base, Solano County; Mapes Ranch west of Modesto, Stanislaus County.	Large vernal pools and seasonal wetlands, ~1 acre in size.	**None.** Habitat not present; no CNDDB occurrences within 5 miles of site.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/–/–	Endemic to the Central Valley, Central Coast Mountains, and South Coast Mountains of California. It ranges from the Vina Plains in Tehama County, through the Central Valley, and south along the Central Coast to northern Santa Barbara County.	Endemic to the grasslands of the Central Valley, central coast mountains, and south coast mountains. Inhabits the ephemeral water of swales and vernal pools. It is most commonly found in grassed or mud bottomed swales, earth sump, or basalt flow depression pools in unplowed grasslands.	**None**. Habitat not present; no CNDDB occurrences within 5 miles of site.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT/–/–	Occurs only in the Central Valley and surrounding foothills below 3,000 feet elevation (USFWS 1980).	Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus nigra* ssp. *caerulea*). Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	**None**. Elderberry shrubs not present in the study area.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE/–/–	Endemic to the northern portion of the Central Valley of California. This species occurs from the Millville Plains and Stillwater Plains in Shasta County south throughout the Central Valley to Merced County.	Found in a variety of natural and artificial seasonally ponded Sacramento valley habitat types including vernal pools, swales, ephemeral drainages, stock ponds, reservoirs, ditches, backhoe pits, and ruts caused by vehicular activities.	**None.** Habitat not present; no CNDDB occurrences within 5 miles of site.
Monarch butterfly *Danaus plexippus*	FC/–/–	Adults breed and migrate throughout California and overwinter along the California coast and in central Mexico.	Open habitats including fields, meadows, weedy areas, marshes, and roadsides. Monarch butterflies roost in wind-protected tree groves (such as eucalyptus) with nectar and water sources nearby. Caterpillar host plants are native milkweeds.	**Low**. Adults may forage and migrate through the site, but no host milkweed plants were found in the study area during surveys and there are no CNDDB occurrences within 5 miles.
Birds				
White-tailed kite *Elanus leucurus*	–/–/CFP	Lowland areas west of Sierra Nevada from the upper Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border.	Open grasslands, meadows, or marshes; require dense-topped trees or shrubs for nesting and perching.	**High.** Potential nesting and foraging habitat is present within 0.5 mile of site. One CNDDB occurrence within 5 miles of the study area.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Tricolored blackbird *Agelaius tricolor*	–/ST/SSC	A resident in California found throughout the Central Valley and in coastal districts from Sonoma County south. Found locally in northeastern California. In winter, more widespread along central coast, and San Francisco Bay area.	Nests in dense blackberry, cattail, tules, bulrushes, sedges, willow, or wild rose within freshwater marshes. Nests in large colonies of at least 50 pairs (up to thousands of individuals).	**Moderate.** Vegetation along canal is too sparse to support nesting but there is = suitable foraging habitat in and adjacent to the study area. Historic CNDDB occurrence notes that the colony has been extirpated.
Grasshopper sparrow *Ammodramus savannarum*	–/–/SSC	Uncommon and local, summer resident and breeder in foothills and lowlands west of Cascade-Sierra Nevada crest from Mendocino and Trinity counties south to San Diego County Also found in Shasta Valley, Siskiyou County, coastal southern California.	Found in dense grasslands on rolling hills, lowland plains, in valleys and on hillsides on lower mountain slopes. Favors native grasslands with a mix of grasses, forbs and scattered shrubs.	**None**. Habitat not suitable. Vegetation is managed and adequate cover is not present.
Burrowing owl *Athene cunicularia*	–/–/SSC	Central and southern coastal habitats, Central Valley, Great Basin, and deserts. Formerly common in appropriate habitat throughout the state, excluding humid northwest coastal forests and high mountains. Present on larger offshore islands.	Open annual grasslands or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Dependent upon burrowing mammals (especially California ground squirrel) for burrows.	**Moderate.** Fallow rice fields and ruderal areas may provide suitable habitat for burrows. Three recent CNDDB occurrences are noted within 5 miles of site. Additional records exist in the area but note that colonies are either extirpated or possibly extirpated.
Swainson's hawk *Buteo swainsoni*	–/ST/–	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, Northeastern plateau, Lassen County, and Mojave Desert.	Nests peripherally to valley riparian systems in lone trees or groves of trees in agricultural fields. Valley oak, Fremont cottonwood, walnut, and large willow trees, ranging in height from 41 to 82 feet, are the most commonly used nest trees in the Central Valley.	**High**. Well-documented presence with numerous occurrences in area. Potential nesting habitat is present within 0.5 mile of site.

Common Name *Scientific Name*	**Status[1] (Federal/ State/Other)**	**Distribution in California**	**Habitat Requirements**	**Potential for Occurrence**
Western snowy plover *Charadrius nivosus nivosus*	FT/–/SSC	Along the west coast states, with inland nesting taking place at the Salton Sea, Mono Lake, and at isolated sites on the shores of alkali lakes in northeastern California, in the Central Valley, and southeastern deserts.	Nests, feeds, and takes cover on sandy or gravelly beaches along the coast, on estuarine salt ponds, alkali lakes, and at the Salton Sea.	**None.** Suitable habitat is not present in the vicinity of the study area.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	FT/SE/–	Uncommon to rare summer resident in scattered locations throughout California. Breeding population along Colorado river, Sacramento and Owen Valley, along South Fork of Kern River, Santa Ana River and Amargosa River. May be present along San Luis Rey River.	Deciduous riparian thickets or forests with dense, low-level or understory foliage, and which abut on slow-moving watercourses, backwaters, or seeps. Willow almost always a dominant component of the vegetation. In Sacramento Valley, also utilizes adjacent orchards, especially of walnut. Nests in sites with some willows, dense low-level or understory foliage, high humidity, and wooded foraging spaces.	**Low.** Nesting habitat not present at site. Individuals may use riparian habitat northwest of the study area during migration. One CNDDB occurrence within 5 miles from 1877.
California black rail *Laterallus jamaicensis coturniculus*	–/ST/CFP	Approximately 90% are found in the tidal salt marshes of the northern San Francisco Bay region, primarily in San Pablo and Suisun Bays. Smaller populations occur in San Francisco Bay, the outer coast of Marin County, freshwater marshes in the foothills of the Sierra Nevada, and in the Colorado River Area.	Nests and forages in saline, freshwater, or brackish emergent marshes with gently grading slopes and upland refugia with vegetative cover beyond the high-water line.	**Low.** Tule canal lacks suitable vegetation for nesting.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Song sparrow "Modesto" population *Melospiza melodia* pop. 1	–/–/SSC	Endemic to California, resides only in the north-central portion of the Central Valley.	Nests and forages primarily in emergent marsh, riparian scrub, and early successional riparian forest habitats, and infrequently in mature riparian forest and sparsely vegetated ditches and levees.	**Moderate.** Suitable nesting and foraging habitat in and adjacent to the study area. One recent CNDDB breeding occurrence from 2011; previous nest occurrence from 1900 notes that suitable habitat in the area was lost to development.
Purple martin *Prognis subis*	–/–/SSC	In the south, found on the coast and interior mountain ranges. Absent from higher desert regions. In the north, found on coast and inland to Modoc and Lassen counties. Absent from higher slopes of Sierra Nevada. Current breeding populations are known from western Santa Clara and Alameda counties, and western Placer County.	Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine and Monterey pine. Uses open habitats during migration, including grassland, wet meadows, and fresh emergent wetlands. Nests in cavities: woodpecker holes, snags, buildings, cliffs.	**Low**. May forage aerially over site but nesting habitat is absent.
Bank swallow *Riparia riparia*	–/ST/–	A neotropical migrant found primarily in riparian and other lowland habitats in California west of the deserts during the spring-fall period. Main breeding population in California occurs along banks of the Sacramento and Feather rivers in the northern Central Valley. Casual in southern California in winter. Other colonies along the northern coast from Humboldt to Del Norte counties, and along the central coast from Monterey to San Francisco counties.	Requires vertical or nearly vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, lakes, and the ocean for nesting. Can also utilize banks found in upland habitats, including those in artificial sand or gravel pits. Feeds primarily over grassland, shrub land, savannah, and open riparian areas during breeding season and over grassland, brushland, wetlands, and cropland during migration.	**Low**. May forage aerially over site but nesting habitat is absent.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Least Bell's vireo *Vireo bellii pusillus*	FE/SE/–	California to northern Baja. Rare, local, summer resident below about 600m (2000ft), mostly in San Benito and Monterey counties. Present in coastal southern CA from Santa Barbara County south. Formerly a common and widespread summer resident throughout Sacramento and San Joaquin valleys and in the coastal valleys and foothills but the species has been extirpated from much of its California range.	Inhabits low, dense riparian growth along water or along dry parts of intermittent streams. Typically associated with willow, cottonwood, Baccharis, wild blackberry, or mesquite in desert localities.	**Low.** The species has been documented in the Yolo Bypass Wildlife Area; however, the most recent CNDDB occurrence notes that breeding attempts were likely unsuccessful. Suitable riparian habitat is present northwest of the project footprint.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	–/–/SSC	Breeds east of Cascade range and Sierra Nevada, Imperial and Colorado River valley, in Central Valley and select locations in coast range west of Central Valley. Common in winter in Imperial Valley. Found as high as 2000m (6600ft) in San Bernardino Mountains.	Associated with freshwater emergent wetlands along lakes and ponds. Nesting timed with maximum emergence of aquatic insects. Feeds on cultivated grains, in emergent vegetation, and in nearby grasslands and croplands. Nests in large wetlands, but also in mountain meadows and along the edges of ponds and rivers.	**Moderate.** Suitable foraging habitat in and adjacent to the study area but nesting habitat is absent. No recently active colony occurrences within 5 miles.
Mammals				
Pallid bat *Antrozous pallidus*	–/–/SSC, WBWG: High priority	Occurs throughout California, except the high Sierra, from Shasta to Kern County and the northwest coast, primarily at lower and mid elevations	Occurs in a variety of habitats but most common in dry, rocky areas; day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, tree hollows, and various human structures (e.g., bridges, barns, porches)	**Low.** May forage over site but roosting habitat is absent.
American badger *Taxidea taxus*	–/–/SSC	Throughout most of California except northern North Coast area.	Shrub, forest, and herbaceous cover types with friable soils for digging burrows.	**None.** Habitat not present.

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Fish				
Delta Smelt *Hypomesus transpacificus*	T/E/–	Found primarily in the Sacramento–San Joaquin Estuary near sea-level but has been found as far upstream as Knights Landing (Vincik and Julienne 2012) on the Sacramento River and Mossdale on the San Joaquin River; range extends downstream to San Pablo Bay.	Occurs in estuary habitat in the Delta where freshwater and brackish water mix in the salinity range of 2 to 7 parts per 1,000 (Moyle 2002).	**Low.** Primarily present in the Toe Drain from January to June (IEP 2022).
Longfin Smelt *Spirinchus thaleichthys*	–/T/–	Within California, mostly in the Sacramento River–San Joaquin River Delta, but also in Humboldt Bay, Eel River estuary, and Klamath River estuary. Also found in South San Francisco Bay and sloughs in Coyote Creek, Alviso Slough, and nearby salt ponds (Rosenfield and Baxter 2007).	Salt or brackish estuary waters with freshwater inputs for spawning.	**Low.** Present in the Toe Drain in January and April – June (IEP 2022).
Green Sturgeon – Southern DPS *Acipenser medirostris*	T/SSC/–	Occurs in Sacramento, San Joaquin, Stanislaus, Klamath, and Trinity rivers (Moyle 2002; Jackson and Van Eenennaam 2013).	The species spawns in large river systems with well-oxygenated water, with temperatures from 8.0 to 14°C (Moyle 2002).	**High.** Present in the Yolo Bypass when flows are high in the spring and winter during flooding events (U.S. Bureau of Reclamation 2018).
Steelhead – California Central Valley DPS *Oncorhynchus mykiss irideus*	T/–/–	Sacramento and San Joaquin rivers and their tributaries.	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 7.8 to 18°C (Moyle 2002). Habitat types are riffles, runs, and pools.	**High.** Present in the Toe Drain and Tule Canal from October through June (IEP 2022) when flows are high in the spring and winter during flooding events and also when the Yolo Bypass is not inundated (Harrell and Sommer 2003; Sommer et al. 2014).

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Central Valley Spring-run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	T/T/–	Upper Sacramento River, Feather River, and Yuba River, and several perennial tributaries of the Sacramento River (Battle, Butte, Clear, Deer, and Mill Creeks).	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5 °Celsius (°C); habitat types are riffles, runs, and pools (Moyle 2002).	**High**. Juveniles may occur in Yolo Bypass and Tule Canal when flows are high in the winter and spring through May during flooding events. Adults may stray into the Toe Drain and Tule Canal from March to early October to migrate upstream when the Yolo Bypass is not inundated (National Marine Fisheries Service 2009, 2019:83).
Sacramento Winter-run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	E/E/–	Mainstem Sacramento River below Keswick Dam (Moyle 2002).	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5 °Celsius (°C); habitat types are riffles, runs, and pools (Moyle 2002).	**High**. Juveniles may occur in Yolo Bypass and Tule Canal when flows are high in the winter and spring through March during flooding events. Adults may stray into the Toe Drain and Tule Canal from November through July to migrate upstream when the Yolo Bypass is not inundated (National Marine Fisheries Service 2009, 2019:67, 2021).
Central Valley Fall- and Late Fall–Run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	SC/SSC/–	Sacramento and San Joaquin Rivers and tributary Central Valley streams and rivers below impassable barriers.	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C; habitat types are riffles, runs, and pools (Moyle 2002).	**High.** Present in the Toe Drain and Tule Canal from September to June (IEP 2022) when flows are high in the spring and winter during flooding events. Use Tule Canal to migrate upstream when the Yolo Bypass is not inundated (National Marine Fisheries Service 2009).

Common Name *Scientific Name*	**Status[1] (Federal/ State/Other)**	**Distribution in California**	**Habitat Requirements**	**Potential for Occurrence**
White Sturgeon *Acipenser transmontanus*	–/SSC/–	Occurs in larger rivers in the Sacramento-San Joaquin River; spawns in upper Sacramento River, San Joaquin River, and possibly Feather River.	Spawns from late February to early June at temperatures from 8.0 to 19.0 °C (Moyle et al. 2015; Jackson et al. 2016).	**High.** Present in the Yolo Bypass and Tule Canal from December to May (IEP 2022) when flows are high in the spring and winter during flooding events. Use Tule Canal to migrate upstream when the Yolo Bypass is not inundated (National Marine Fisheries Service 2009).
Pacific Lamprey *Entosphenus tridentatus*	SC/SSC/–	Sacramento and San Joaquin Rivers and their tributaries below impassable barriers; tributaries of the San Francisco Estuary; and coastal streams throughout California.	Lamprey occur in clear, cold, water with clean gravel for spawning. Presence of cover such as boulders, riparian vegetation, logs, etc., are also important for spawning. Additional habitat requirements include areas with low velocities and fine sediments for rearing that are not excessively scoured under high flows (Moyle et al. 2015).	**High.** Present in the Toe Drain and Tule Canal December through March (IEP 2022).
River Lamprey *Lampetra ayresi*	–/SSC/–	Occurs in lower Sacramento and lower San Joaquin rivers, and tributaries to lower Russian River, and Eel Rivers (Moyle et al. 2015).	Lamprey occur in clear, cold, water with clean gravel for spawning. Also need sandy to silty backwaters for ammocoetes to rear (Moyle et al. 2015).	**High.** Present in the Toe Drain and Tule Canal December through March (IEP 2022).
Sacramento Hitch *Lavinia exilicauda exilicauda*	–/SSC/–	Scattered populations are found in the Sacramento River drainage, the San Joaquin River drainage downstream of the Merced River, a few larger tributaries to the San Francisco Estuary, and the Delta (Moyle et al. 2015).	Occurs in warm, low elevation waters including clear streams, turbid sloughs, lakes, and reservoirs; found in pools or runs among aquatic vegetation; may occur in riffles; can survive temperatures as high as 38 °C and salinities up to 9 parts per thousand (Moyle 2002).	**High.** Present in the Toe Drain and Tule Canal year round (IEP 2022).

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence
Sacramento Splittail *Pogonichthys macrolepidotus*	–/SSC/–	Occur in the Sacramento River, Suisun Bay, Suisun Marsh, Napa River, Petaluma River, and the Delta (Moyle et al. 2015).	Estuarine species with a large range of salinity and temperature tolerances, preferring shallow water (< 4 m deep) and low water velocities. Need flooded vegetation for spawning and rearing (Moyle et al. 2015).	**High.** Present in the Toe Drain and Tule Canal year round (IEP 2022).
Hardhead *Mylopharodon conocephalus*	–/SSC/–	Occurs in tributary streams in the San Joaquin River drainage; large tributary streams in the Sacramento River and the mainstem; and in low to mid-elevation streams of the Central Valley (Moyle 2002).	Prefers clear, deep pools and runs with slow velocities.	**High.** Low numbers present in the Toe Drain and Tule Canal all months except March, July and August (IEP 2022).

[1] Status codes:

Federal

FE = Federally listed as Endangered under federal Endangered Species Act (ESA)
FT = Federally listed as Threatened under ESA
FC = Federal candidate for listing under ESA
SC = Federally listed as a Species of Concern

State

SE = State listed as Endangered under California Endangered Species Act (CESA)
ST = State listed as Threatened under CESA
SCE = State candidate for listing as Endangered under CESA

Other

SSC = California Species of Special Concern
CFP = California Fully Protected Species
WBWG = Western Bat Working Group (WBWG) priority species (http://wbwg.org/matrices/species-matrix/):
High = species imperiled or at high risk of imperilment
Medium = more research and closer attention needed to adequately assess species' status and needed conservation actions
Low = most of existing data support stable population of species; potential for major changes in status in near future unlikely

Common Name Scientific Name	Status[1] (Federal/ State/Other)	Distribution in California	Habitat Requirements	Potential for Occurrence

California Rare Plant Rank[2]
A = presumed extinct.
1B = rare, threatened, or endangered in California and elsewhere.
2B = rare, threatened, or endangered in California only.
3 = plants about which more information is needed to determine their status.
4 = plants of limited distribution.
.1 = seriously endangered in California.
.2 = fairly endangered in California.
.3 = not very endangered in California.

Distribution in California
* = known populations believed extirpated from that County.

The determinations of the potential for each species to occur in the study area is based on the following general criteria:

None: No individuals and/or suitable habitat for the species was found in the study area during surveys.
Low: Species not likely to occur because of marginal habitat quality, distance from known occurrences, or lack of recent occurrences within or in the vicinity of the study area.
Moderate: Some or all of the species' life history requirements are provided by habitat in the study area; populations may not be known to occur in the study area or immediate vicinity but are known to occur in the Region.
High/Present: All of the species' specific life history requirements can be met by habitat present in the Plan Area, and populations are known to occur in the study area or immediate vicinity.

[2] In March 2010, CDFW changed the name of "CNPS List" or "CNPS Ranks" to "California Rare Plant Rank" (or CRPR). This was done to reduce confusion over the fact that CNPS and CDFW jointly manage the Rare Plant Status Review groups (300+ botanical experts from government, academia, non-governmental organizations, and the private sector) and that the rank assignments are the product of a collaborative effort and not solely a CNPS assignment.

Special-Status Wildlife Species

Western Pond Turtle

Western pond turtle (*Actinemys marmorata*) is a California Species of Special Concern (CDFW 2023a:54) that is currently under review for federal listing under ESA (USFWS 2023). The study area is within the range of this species, as shown by Thomson et al. (2016:2970). Western pond turtle occurs throughout California from the coast to the western slopes of the Sierra Nevada up to 6,700 feet (Thomson et al. 2016:300) in a variety of aquatic habitats. Suitable habitats include ponds, rivers, streams, lakes, permanent and seasonal wetlands, marshes, and reservoirs with adequate cover and basking sites for thermoregulation (e.g., partially submerged logs, stumps, boulders, muddy banks, and mats of floating vegetation). Upland habitat with low disturbance and substrates that allow for burrowing are required for nesting from the spring through early summer, and for overwintering and dispersal (Thomson et al. 2016:299-300). Proximity of nesting site to aquatic habitat is dependent on availability, and the nest site is usually within 330 feet of the aquatic habitat but can be up to 1,640 feet away (Thomson et al. 2016:299).

Western pond turtles are active year-round in warmer locations but will spend winter months in colder climates in a state of dormancy, often burrowing into loose soil or leaf litter on land, or using undercut banks, snags, rocks or bottom mud in ponds (Thomson et al. 2016:299). Breeding occurs from spring through fall, with nesting taking place from spring to early summer. Females lay from one to 13 eggs, which will hatch in the fall, although the young will remain in the nest until the following spring (Thomson et al. 2016:299).

The CNDDB does not include any western pond turtle occurrences within 5 miles of the site. No western pond turtles were observed during the November 14, 2022 site visit, although this does not indicate absence of the species as the visit occurred during the dormancy period for western pond turtle. The Tule Canal provides potentially suitable aquatic habitat with adequate vegetative cover, and the fallow rice field to the west of the Tule Canal provides potential upland nesting and dispersal habitat if left undisturbed during the breeding and nesting season. Thus, the potential for western pond turtle to occur within the study area is moderate.

Giant Garter Snake

Giant garter snake (*Thamnophis gigas*) is listed as threatened under both CESA and ESA (CDFW 2023a:59) and is endemic to California. Critical habitat has not been designated for giant garter snake. This species historically occurred throughout California's Central Valley, but the current known distribution consists of fragmented populations from Chico in Butte County, south to the Mendota Wildlife Area in Fresno County (USFWS 2020:4). The nine following recovery units designated by USFWS in the 2017 species recovery plan coincide with the geographically and genetically distinct populations that persist, and are: Butte Basin, Colusa Basin, Sutter Basin, American Basin, Yolo Basin, Delta Basin, Cosumnes-Mokelumne Basin, San Joaquin Basin, and Tulare Basin (USFWS 2017:iii). The study area falls within the current range of giant garter snake, within the Yolo Basin Unit (USFWS 2017:II-9). Giant garter snake inhabits remaining natural wetland habitats within its range, which include marshes, ponds, small lakes, low-gradient streams with silt substrates, and managed waterways (USFWS 2017:I-2). They are also known to use agricultural areas, which include irrigation ditches, drainage canals, rice fields, and their adjacent uplands, due to widespread loss of suitable wetland habitat (USFWS 2017:I-2). Though a highly aquatic species, they do use adjacent uplands for thermoregulation, summer shelter in burrows, and as refugia for winter hibernacula (USFWS 2017:I-2).

In aquatic habitats, giant garter snakes are most commonly found in areas with emergent vegetation, in particular tule (*Schoenoplectus acutus*), which provide cover and potential basking substrates (USFWS 2020:17). Reyes et al. (2017:70) found a strong positive association between giant garter snakes and canals associated with rice fields, as the canals provide a more stable water level than the rice fields. Reyes et al. (2017:70) proposed that canals associated with rice fields in particular were likely beneficial due to higher prey availability, higher dispersion of predators, and more reliable availability of water than that found in canals for other agricultural practices.

Terrestrial habitat adjacent to suitable aquatic habitat is also an important resource for giant garter snake (Halstead et al. 2015:633). Near aquatic habitat, upland can be used for thermoregulation and summer shelter in nearby burrows; further away from aquatic habitat and above the high winter waters, the upland can provide refugia for brumation (USFWS 2017:I-2). During the colder winter months (generally October 1 to April 1), giant garter snakes over-winter in upland areas that provide sufficient cover, which are usually mammal burrows and include human-made features such as riprap (USFWS 2017:I-3-I-5). They may over-winter as far as 656 to 820 feet from the edge of aquatic habitat (USFWS 2017:I-3). A study by Halstead et al. (2015:638) found that giant garter snakes spend more than half of their time in terrestrial habitat during the summer. They further found the average snake to be within 33 feet of water 95% of the time in mid-summer, with females in winter and the average underground snake occurring more than 65 feet from water about 10% of the time (Halstead et al. 2015:639). Halstead et al. (2015:639) noted however that some individuals could be as far as 571 feet away from water according to their models.

Depending on annual conditions, giant garter snakes usually move underground into mammal burrows, crevices, or other similar cover around October 1 to avoid the cool temperatures of fall and winter (USFWS 2017:I-5). Snakes emerge from winter retreats as early as April 1, although emergence is dependent on weather conditions (USFWS 2017:I-6). Breeding occurs from March through May with neonates born in July through September (USFWS 2017:I-5).

Multiple recent CNDDB records for giant garter snake exist within a 5-mile radius of the study area (Figure 4). The closest, Occurrence No. 292 from 2009, is located about 1.52 miles northwest of the site and approximately 1.28 miles west of the Tule Canal, and involves the capture of multiple snakes in a drainage canal (CDFW 2023b). There is one record of giant garter snake occurrence (Occurrence No. 154) in Tule Canal, approximately 4.5 miles upstream of the northern end of the study area. The record is dated 1999, and consists of one snake observed possibly during or prior to a levee recontouring project (CDFW 2023b). No snakes were observed during the November 14, 2022 site visit, but this does not indicate absence of the species as the visit occurred during the dormancy period for giant garter snake. The Tule Canal provides suitable aquatic habitat for this species within the study area and is connected to other waterways that could facilitate movement of giant garter snake into and through the site. The ruderal areas within the study site may also provide suitable upland habitat for the species. Thus, there is a moderate potential for giant garter snake to occur within the study area.

White-tailed Kite

White-tailed kite (*Elanus leucurus*) is a California Fully Protected species (CDFW 2023a:66). White-tailed kite is present year-round in California and Oregon. Within North America, the white-tailed kite breeding range is concentrated in California (Dunk 2020). The species occupies nearly all areas up to the western Sierra Nevada foothills and southeastern deserts and is a common year-round resident in the Central Valley, other lowland valleys, and along the entire length of the coast (Dunk 2020). This range includes the entirety of the study area. Although the white-tailed kite is resident through most of its breeding range, dispersal occurs during the nonbreeding season, leading to a winter range expansion that includes most of California (Dunk 2020).

White-tailed kite inhabits low-elevation grasslands, agricultural areas, wetlands, oak woodlands, and riparian areas adjacent to open habitats (Dunk 2020). White-tailed kites nest in a variety of forested habitats including riparian woodlands, oak woodlands, and oak savannah and typically occupy narrow riparian habitats in addition to roadside trees or tree rows (Estep 2007:37).

White-tailed kite nests have been documented in a variety of tree species, including valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), willows (*Salix* spp.), live oak (*Quercus agrifolia*), ornamental trees, and occasionally in tall shrubs (Dixon et al. 1957:159; Estep 2007:Table A-2; Estep 2008:Appendix C; Dunk 2020). Nest trees are selected for structure and security, and typically have a dense canopy or are within a dense group of trees, such as riparian forest or oak woodland. Territory size is variable and regulated primarily by prey abundance and vegetation structure (i.e., accessibility of prey; Dunk 2020). During the breeding season, kites generally restrict their foraging territories to within 0.06 mile of the nest, although they may range up to 1.86 miles away (Warner and Rudd 1975:227).

White-tailed kites use a variety of foraging habitat types, but those that support larger and more accessible prey populations are more suitable. The presence and abundance of white-tailed kites is strongly correlated with the presence of voles (Hawbecker 1940:110; Dixon et al. 1957:158; Niemela 2007:39). As a result, population cycles of voles can also influence nesting and wintering abundance of white-tailed kites. Preferred foraging habitat includes alfalfa and other hay crops, irrigated pastures, and some cultivated habitats, particularly sugar beets and tomatoes, both of which can support relatively large populations of voles (Estep 1989:18) and which have been highly correlated with the density of white-tailed kite nest sites (Erichsen 1995:5). The species also forages in dry pastures, annual grasslands, rice stubble fields, and occasionally in orchards (Erichsen 1995:25).

White-tailed kites roost communally during the winter, sometimes in concentrations of hundreds of birds. This roosting behavior usually occurs in large trees, but sometimes occurs in other upland habitats (Polite 2005).

The breeding season is from approximately February to October, with peak activity from May through August (Polite 2005). Females typically incubate eggs for approximately 28 days, and young fledge in approximately 35 to 40 days (Polite 2005). While kite population changes and local and regional movements appear to be somewhat predictable based on vole and other rodent cycles (Dunk and Cooper 1994:593), it remains unknown whether in northern California this constitutes a migration movement or nomadic response to changes in the prey populations (Dunk 2020).One CNDDB occurrence for white-tailed kite exists within a 5-mile radius of the study area (Figure 4). CNDDB Occurrence No. 182 from 2017 was recorded approximately 2.92 miles southeast of the study area for a kite nest located in a residential neighborhood (CDFW 2023b). Although the site visit by ICF occurred too late in the year to determine breeding presence, white-tailed kite may breed and forage within and directly adjacent to the study area; thus, the potential to occur at the site is high.

Tricolored Blackbird

Tricolored blackbird (*Agelaius tricolor*) is listed as threatened under CESA and while it is not listed under ESA, it is considered a Bird of Conservation Concern by USFWS (CDFW 2023a:79). Tricolored blackbird is a colonial nesting passerine that is largely restricted to California. The species forms some of the largest colonies of any North American passerine, which may contain tens of thousands of breeding pairs (Beedy et al. 2020). Most of the California breeding population of tricolored blackbird occurs in the Central Valley (CDFW 2018:40; Beedy et al. 2020), which includes the study area. Statewide surveys conducted in 2017 documented 51% of breeding birds in Merced and Kern Counties (Meese 2017:11). While the geographic extent of tricolored blackbird's range has been largely unchanged since the 1930s (Neff 1937:61–81; DeHaven et al. 1975:168–171, 178–179; Beedy et al. 1991:1; Beedy 2008:437–439; Hamilton 1998:225; CDFW 2018:40; Beedy et al. 2020), substantial annual variation in centers of breeding abundance have been regularly documented since then, particularly between the Sacramento and San Joaquin Valleys (CDFW 2018:59). These shifts in abundance are indicative of the tricolored blackbird's ability to acclimatize to variation in food supply and nesting substrate (CDFW 2018:59). Wintering tricolored blackbirds often form huge, mixed species flocks that forage across the landscape. The Sacramento-San Joaquin Delta and central coast are recognized as major wintering areas for tricolored blackbirds (Beedy 2008:439; CDFW 2018:14).

Tricolored blackbirds nest colonially, enabling them to synchronize their timing of nest building and egg laying (Beedy et al. 2020). Tricolored blackbird typically nests in areas with open accessible water, a nesting substrate that is protected from ground predators (e.g., vegetation that is flooded, thorny, or spiny), and suitable foraging habitat (e.g., pastures, dry seasonal pools, agricultural fields such as alfalfa and sunflower) that provides abundant insect prey (Hamilton et al. 1995:25; CDFW 2018:27-28; Beedy et al. 2020). Open water within 1,640 feet (500 meters) of nesting substrate is a requirement for colony settlement (Hamilton 2004). Breeding colonies have been recorded in freshwater marshes, willows, blackberries, thistles, and nettles, and more recently in triticale and other grain fields in the San Joaquin Valley (CDFW 2018:24–27). Most breeding tricolored blackbirds forage within 3 miles of their colony sites, although individuals have been observed foraging up to 8 miles away (CDFW 2018:30; USFWS 2019:24). Foraging is typically concentrated in areas that support abundant insect populations, a vital food resource for provisioning nestlings (Beedy 2008:440). Foraging habitat includes grasslands, alkaline seasonal wetlands, vernal pools, pastures and agricultural crops such as alfalfa and rice, which produce a high abundance of insects and other plant material for consumption, in addition to cattle feedlots and dairies, which supply grains for foraging individuals (CDFW 2018:28; Beedy et al. 2020).

Roosting by tricolored blackbirds during the fall generally occurs in emergent wetlands consisting of cattails (*Typha* spp.) and bulrushes (*Schoenoplectus* spp.) near abundant food supplies such as cultivated rice (*Oryza sativa*) and water grass (*Echinochloa crus-galli*) (Beedy et al. 2020; USFWS 2019:12). During winter, many tricolored blackbirds move from the Sacramento Valley to the Delta, central coast, and northern San Joaquin Valley. Historically, overwintering colonies occurred near dairies in Marin County, and feedlots in Solano and Merced Counties (USFWS 2019:12).

In the Central Valley, breeding typically occurs between mid-March and early August (CDFW 2018:31). Females typically lay 3 to 4 eggs and incubate them for 11 to 14 days (Emlen 1941:216–217; Orians 1961:295; USFWS 2019:10); then both parents feed young until they fledge approximately 9 to 14 days after hatching (USFWS 2019:11). The colony itself remains active and in various stages of the breeding cycle for an extended period, which may last more than 90 days, although a complete breeding cycle generally lasts between 41-45 days (Beedy et al. 2020). Individual tricolored blackbirds may occupy and breed at several sites, or renest at the same site during a given breeding season, depending on environmental conditions and their previous nesting success (Hamilton 1998:224-225; Beedy et al. 2020; Meese 2006:5).

Multiple CNDDB occurrences for tricolored blackbird colonies exist within 5 miles of the study area (Figure 4), however, all note that the colonies were either extirpated or likely extirpated. Occurrence No. 162, generally mapped to the Port of West Sacramento approximately 1.05 mile southeast of the study area, notes that a flock of 80 birds was observed foraging in 2014, but that no birds were observed during a subsequent 2015 survey (CDFW 2023b). No tricolored blackbirds were observed during the November 14, 2022 site visit, but this does not indicate absence of the species as the visit occurred during the winter period when birds often leave the Sacramento Valley. Thus, there is a moderate potential for the species to occur within the study area given these nearby occurrences and the presence of suitable foraging habitat both within and adjacent to the site.

Burrowing Owl

Burrowing owl (*Athene cunicularia*) is a California Species of Special Concern and while it is not listed under ESA, it is considered a Bird of Conservation Concern by USFWS (CDFW 2023a:71). Burrowing owls were once widespread and generally common over western North America. The owl's range has contracted in recent decades, however, and populations have generally diminished throughout the species range (Poulin et al. 2020). In California, burrowing owls are widely distributed in suitable habitat throughout the lowland portions of the state (Gervais et al. 2008:219) and approximately 70% of the statewide burrowing owl population occurs in the agricultural region of the Imperial Valley (Wilkerson and Siegel 2010:11). Burrowing owls appear to be resident year-round throughout much of central and southern California, and migrants from other areas of western North America may also winter in California (Gervais et al. 2008:219; Poulin et al. 2020). Breeding populations in the middle Central Valley occur primarily in lowland areas of Yolo, Solano, Sacramento, Contra Costa, and San Joaquin Counties (Wilkerson and Siegel 2010:9). The entirety of the study area is within the year-round range of burrowing owl in California (Burkett 2008).

Burrowing owls are found in open, well-drained grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals. They also occupy golf courses, airports, road and levee embankments, and other disturbed sites where there is sufficient friable soil for burrows (Wilkerson and Siegel 2010:29; Gervais et al. 2008:221–222; Poulin et al. 2020). Because burrowing owls typically use the burrows created by other species, particularly the California ground squirrel, presence of these species is usually a key indicator of potential occurrence of owls (Poulin et al. 2020). In northern California, most reported nest sites occur in abandoned ground squirrel burrows. Other mammal burrows and various burrow surrogates, such as culverts, pipes, rock piles, and artificially constructed burrows are also used (Rosenberg et al. 1998:14). Burrowing owls favor areas with short, sparse vegetation to facilitate detection of predators and hunting (Coulombe 1971:163; Zarn 1974:14; Plumpton and Lutz 1993a:177–178). Typical habitats are treeless, with minimal shrub cover and woody plant encroachment, and have low vertical density of vegetation and low foliage height diversity (Plumpton and Lutz 1993a:176–178; Poulin et al. 2020).

Burrowing owls are tolerant of human-altered open spaces, such as areas surrounding airports, golf courses, and military lands where burrows may be readily adopted (Thomsen 1971:177; Gervais et al. 2008:221; Rosenberg et al. 2009:7). Burrowing owls may use burrows in open areas adjacent to unimproved and improved roads (Brenckle 1936:167; Gervais et al. 2008:221; Wilkerson and Siegel 2010:29). A modest volume of vehicle traffic does not appear to significantly affect behaviors or reproductive success (Plumpton and Lutz 1993b:615), but presumably may also be a source of collision-related mortality (Rosenberg et al. 2009:43). As semicolonial raptors, colony size is indicative of habitat value and quantity. Colony size is also positively correlated with annual site reuse by breeding burrowing owls; larger colonies are more likely to persist over time than colonies containing fewer pairs or single nesting pairs (DeSante et al. 1997:45).

Burrowing owls forage in open grasslands, pastures, agricultural fields and field edges, fallow fields, and along the edges of roads and levees. Low vegetation aids in maximizing visibility and access. Short perches such as fence posts are often used to enhance visibility (Poulin et al. 2020). Burrowing owls will defend the immediate vicinity of the nest, and average territory size within which they may forage ranges between 280 acres in heavily irrigated agricultural areas to 450 acres in mixed agricultural lands (Poulin et al. 2020; California Department of Fish and Game 2012:21).

The breeding season (defined as starting at pair bonding and lasting to fledging) generally occurs from February to August, with peak activity occurring from April through July (California Department of Fish and Game 2012:20; Poulin et al. 2020). Pairs may be resident at breeding sites throughout the year or disperse out of the area during the nonbreeding season. Burrowing owls have a strong affinity for previously occupied nesting and wintering habitats and often return to burrows used in previous years, especially if they were reproductively successful (Poulin et al. 2020; DeSante et al. 1997:45).

There are multiple CNDDB occurrences of burrowing owls observed at burrows within 5 miles of the study area (Figure 4) although the three closest observations are either extirpated or presumed extirpated due to habitat destruction caused by construction activities. The closest extant observation is Occurrence No. 1239 from 2009, which recorded two adults and one juvenile at a nest on a road shoulder located about 4.74 miles southwest of the study area (CDFW 2023b). No burrowing owls were observed during the November 14, 2022 site visit, but this does not necessarily indicate absence of the species, as the visit occurred outside of the nesting season when not all birds remain at their breeding location. There is a moderate potential for the species to occur within the study area given the nearby occurrences and the presence of fallow rice field and ruderal areas that may provide suitable breeding habitat near the biological study area.

Swainson's Hawk

Swainson's hawk (*Buteo swainsoni*) is listed as threatened under CESA (CDFW 2023a:66). Swainson's hawk nests in the grassland plains and agricultural regions of western North America from southern Canada (and possibly in the northern provinces and territories and Alaska) to northern Mexico (CDFW 2016:5; Bechard et al. 2020). The entirety of the study area is within the breeding range of burrowing owl. Other than a few documented small wintering populations in the United States (Herzog 1996:876–878), most populations in the species winter primarily in the pampas of Argentina (Bechard et al. 2020). The Central Valley population, however, winters mainly between Mexico and central South America (Airola et al. 2019:237). During CDFW's 2005-2006 statewide survey for Swainson's hawk, approximately 95% of the state's population occurred in the Central Valley and almost 17% of the statewide population occurred within Yolo County (Anderson et al. 2007:3-4).

In the Central Valley, nests are constructed in riparian woodlands, isolated trees, trees along roadsides, bordering fields, along the edges of remnant oak woodlands, and in small groves (Estep 2008:4-5). The majority of known nests in the Central Valley occur along narrow stringers of remnant riparian forest (Estep 2008:4-5; Estep 1984:20–21; Schlorff and Bloom 1984:615; Bechard et al. 2020). Nest construction usually occurs as close to the top of the tree as possible due to optimal visibility and nest protection from predators (Estep 2008:4-5). Swainson's hawks most commonly nest in large native trees such as valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), Hinds' walnut (*Juglans hindsii*), and willows (*Salix* spp.), and in nonnative trees, such as eucalyptus (*Eucalyptus* spp.) (Estep 2007:33, 2008:4–5, 6–15). Nesting pairs will often use the same nesting territories and nesting trees year after year (Estep 2008:4–5). Many nest sites in the Central Valley have been occupied annually since 1979 and banding studies have shown a high degree of both nest and mate fidelity (Estep 2008:4–5).

Swainson's hawk historically foraged in open grasslands and prairies; however, with substantial conversion of grasslands for farming practices, Swainson's hawks have shifted their foraging to include agricultural lands that provide large rodent prey populations amid low, open vegetation (CDFW 2016:5, 7). Foraging habitat value is a function of patch size, the ability to access prey (vegetation cover), and prey abundance (Estep 2008:4–7, 2009:2). In the Central Valley, land use or specific crop type and management practices determine the foraging value of a field at any given time. Important land cover or agricultural crops for foraging are alfalfa and other hay, disked fields, fallow fields, dryland pasture, and perennial grassland (Estep 1989:33; Babcock 1995:197; Woodbridge 1998:9–10). Central Valley Swainson's hawk preys on small mammals, birds, toads, crayfish, and insects. The primary prey species during the breeding season are California voles (*Microtus* spp.), pocket gophers (*Thomomys bottae*), and deer mice (*Peromyscus maniculatus*) (Estep 1989:19–20).

Home ranges are highly variable depending on landcover type, and fluctuate throughout the breeding season with changes in vegetation structure from growth and harvesting of crops, and annually from crop rotation (Estep 1989:24; Woodbridge 1991:40–41; Babcock 1995:196). High-value crop types such as alfalfa, fallow fields, and pastures allow for smaller home ranges, whereas larger home ranges are associated with landcover with reduced prey availability, such as vineyards and orchards, or reduced prey abundance such as flooded fields (Estep 1989:30; Woodbridge 1991:40–41; Babcock 1995:197). Although Swainson's hawk have been recorded foraging up to 18 miles from a nest site, traveling more than 3 to 5 miles from a nest site to find high-value foraging sites may reduce reproductive success (Estep 1989:23, 40, 2008:4-8; England et al. 1995:185).

Swainson's hawks arrive on their breeding grounds in the Central Valley between March and April and begin nest-building and egg-laying shortly after arrival (CDFW2016:5). Incubation of eggs lasts approximately 35 days and most young fledge approximately 6 weeks after hatching (typically by early July; CDFW 2016:5–6). Post-breeding foraging flocks of up to 100 birds, often congregate on recently mowed or disked fields such as alfalfa or other row crops (CDFW 2016:9). Migration back to the wintering grounds begins mid-August and most individuals leave California by October (CDFW 2016:6).

Sixty-six CNDDB Swainson's hawk breeding occurrences exist within 5 miles of the study area (Figure 4). Within a 10-mile radius of the site, that number is more than tripled to 220 nest occurrences (Figure 5). The closest active nest to the study area was recorded in 2007 in a willow located about 0.24 miles southeast of the site (Occurrence No. 2231, CDFW 2023b). No Swainson's hawks were observed during the November 14, 2022 site visit, but this does not necessarily indicate absence of the species as the visit occurred after most individuals have migrated out of California. Swainson's hawk has a high potential to occur within the study area due to the extensively documented breeding presence and the existence of suitable nesting habitat within 0.5 mile of the site.

Song Sparrow ("Modesto" population)

The Modesto population of song sparrow (*Melospiza melodia* pop. 1[3]) is a California Species of Special Concern (CDFW 2023a:78). Song sparrows are found year-round throughout California, except for higher mountains and much of the southeastern deserts. The taxonomic status of the Modesto song sparrow is currently under review, and further research is necessary to determine its status as a valid subspecies [Gardali 2008:401).The Modesto population of song sparrow is endemic to the north-central portion of the Central Valley, with the highest densities occurring in the Butte Sink and Delta (Grinnell and Miller 1944:551; Gardali 2008:401). This year-round range includes the entirety of the study area (Gardali 2008:400).

Little is known about the specific habitat requirements for the Modesto song sparrow (Gardali 2008:402). However, emergent marsh and riparian scrub provide breeding habitat (Grinnell and Miller 1944:551). In addition, the species has been observed to nest in valley oak (*Quercus lobata*) riparian forests with a dense blackberry (*Rubus* ssp.) understory, along vegetated irrigation canals and levees, and in recently planted valley oak restoration sites (Dybala et al. 2017:7; Gardali 2008:402). Nests are commonly concealed by overhead vegetation and placed on the ground or below 1 meter in vegetation (Arcese et al. 2020; Gardali 2008:402). Song sparrows forage on bare ground and leaf litter under and around bushes for seeds and insects (Marshall 1948:213; Gardali 2008:402).

Breeding occurs from mid-March to early August (Gardali 2008:401). Clutch size for song sparrow typically ranges from between 3-5 eggs, and hatching occurs after 12-15 days of incubation (Arcese et al. 2020).

There are two CNDDB breeding records for the Modesto population of song sparrow within 5 miles of the study area (Figure 4). One is a historical record from 1900 (Occurrence No. 83), but a recent record from 2011 (Occurrence No. 84) was recorded about 4.76 miles southwest of the study area (CDFW 2023b). The 2011 occurrence consisted of two adults feeding two fledglings in a nest located in riparian scrub habitat along a riverine feature in the Yolo Bypass Wildlife Area (CDFW 2023b). No Modesto song sparrows were observed during the November 14, 2022 site visit, but this does not necessarily indicate absence of the species, as the visit occurred outside of the nesting season. Modest song sparrow has a moderate potential to occur within the study area due to the presence of suitable nesting and foraging habitat and previous documentation of a nest within 5 miles.

[3] Population 1 for this species is the designation given to the Modesto population.

Yellow-headed Blackbird

Yellow-headed blackbird (*Xanthocephalus xanthocephalus*) is a California Species of Special Concern (CDFW 2023a:79). In California, yellow-headed blackbird breeds east of the Cascade Range and Sierra Nevada, in the Central Valley, portions of the Coast ranges, and in southern California in the Imperial and Colorado River valleys (Granholm 2008). In winter, yellow-headed blackbirds occur in the Central Valley and the Imperial and Colorado River valleys (Jaramillo 2008:445; Granholm 2008).

Yellow-headed blackbirds breed in colonies in emergent wetland with dense vegetation, such as cattails and tules (Granholm 2008). Nests are placed within emergent vegetation, typically 0.5 to 3 feet above the water surface and over water from 2 to 4 feet deep. Emergent vegetation is also used for roosting and cover (Bent 1958:104–105; Granholm 2008).

During the breeding season, yellow-headed blackbirds feed primarily on aquatic insects, and forage within breeding territories (when resources are abundant), or in uplands adjacent to wetlands. In the non-breeding season, the species forages for seeds in agricultural fields, such as small grain, milo, sunflower, and corn fields, as well as in fallow fields (Twedt and Crawford 2020). Yellow-headed blackbirds will also forage in open pastures, cattle pens, and feedlots (Kaufman 1996).

Yellow-headed blackbird occurs in California as a migrant and summer resident from April to September or early October, and breeds from mid-April to late July (Jaramillo 2008:445; Granholm 2008). Clutch size ranges between 2-5 eggs, and incubation lasts between 10-13 days. Fledging does not occur until chicks are around 20 days old, although they will leave the nest at around 9-12 days of age (Granholm 2008).

Three colonies are recorded in the CNDDB within 5 miles of the study site (Figure 4), however one is a historical record from 1934 and was presumed extirpated in 1991 (Occurrence No. 486; CDFW 2023b). The two remaining colony occurrences (Occurrence No. 162, Occurrence No. 487) include more recent records, although 2005 surveys of both locations noted that breeding presence was not confirmed for either and that both colonies are possibly extirpated (CDFW 2023b). The two occurrences were recorded about 1.05 miles and 3.31 miles southeast of the study area, respectively (CDFW 2023b). No yellow-headed blackbirds were observed during the November 14, 2022 site visit, but this does not necessarily indicate absence of the species as the visit occurred outside of the breeding season. Despite the lack of recently active colony sightings, suitable foraging habitat is present within and adjacent to the study area, and thus the potential for this species to occur is moderate.

Special-Status Fish Species

Information for special-status fish species presence in the Toe Drain/Tule Canal was taken from data collected by DWR from 1998-2020. Sampling is done with fyke nets (October through June), rotary screw trap (January through June), and beach seining (year-round). There are 8 sites below Lisbon Weir on the Toe Drain, and 6 sites on Tule Canal between Lisbon and Fremont Weir. (IEP 2022)

Delta Smelt

Delta smelt (*Hypomesus transpacificus*) was listed as a threatened species under the Federal Endangered Species Act and California Endangered Species Act (CESA) in 1993. In 2009, the California Fish and Game Commission elevated the status of delta smelt to endangered under CESA.

The USFWS designated critical habitat for the delta smelt on December 19, 1994 (59 FR 65256). The geographic area encompassed by the designation includes all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker Bays); the length of Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma Sloughs; the Napa River; and the existing contiguous waters contained within the legal Delta, as defined in section 30 12220 of the California Water Code (59 FR 65256). Tule Canal is located north of the legal Delta and is not designated as critical habitat for delta smelt.

Delta smelt are endemic to the San Francisco Estuary and Sacramento–San Joaquin Delta (Delta) where they occupy open-water habitats in Suisun Bay, Suisun Marsh, and the Delta, generally away from shore but also nearer to shore to facilitate migration or to remain within preferred habitats (Feyrer et al. 2013, Bennett and Burau 2015). On occasion, delta smelt distribution can extend up the Sacramento River to about Garcia Bend in the Pocket-Greenhaven neighborhood of Sacramento, the Sacramento Deepwater Ship Channel, up the San Joaquin River from Antioch to areas near Stockton, up the lower Mokelumne River system, and west throughout the Napa River. On rare occasion, delta smelt have been detected in San Francisco Bay, as far downstream as Berkeley, and in the Sacramento River as far upstream as Knights Landing (Merz et al. 2011; Vincik and Julienne 2012).

Typically, delta smelt complete their entire life cycle within the low-salinity zone of the Upper San Francisco Estuary, in the tidal freshwater region of the Cache Slough Complex or move between the two regions of fresh water and low salinity (Bennett 2005; Sommer and Mejia 2013; Hobbs et al. 2019).[4] Komoroske et al. (2016) found that delta smelt can acclimate to salinities greater than 6 parts per thousand (ppt) in the laboratory, but observations of delta smelt presence in waters having salinities exceeding 6 ppt in the wild are comparatively rare (92% of fish caught are at salinity < 6 ppt; Komoroske et al. 2016).

Many delta smelt disperse to landward[5] habitats sometime after the first significant precipitation event of the winter for staging while sexual maturity is completed (Grimaldo et al. 2009; Sommer et al. 2011; Polansky et al. 2018). Some adult delta smelt exhibit very limited dispersal during the spawning season (Murphy and Hamilton 2013; Polansky et al. 2018).

A total of 741 Delta smelt have been captured during DWR surveys. Delta smelt have been captured in the Toe Drain and Tule Canal from January to July, with the majority captured February, March, May and June. A total of 4 smelt were captured in October and November. The last time delta smelt were captured during surveys was May 2016 (IEP 2022).

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[4] The low-salinity zone is frequently defined as waters with a salinity range of about 0.5 to 6 parts per thousand (Kimmerer 2004).

[5] Note that 'landward' in this context does not necessarily mean 'upstream,' as there could be lateral movements (Murphy and Hamilton 2013).

Longfin Smelt—Bay-Delta Distinct Population Segment

On June 26, 2009, the California Fish and Game Commission ruled to list the status of longfin smelt as threatened under CESA. Longfin smelt is not listed under ESA, but listing has been found to be warranted for the San Francisco Bay/Sacramento–San Joaquin Delta (Bay-Delta) Distinct Population Segment (DPS) (77 Code of Federal Regulations Part 19756).

Longfin smelt reside and rear in San Francisco Bay and in the nearshore ocean outside the Golden Gate (Garwood 2017). They spawn in tidal fresh water in the estuary's low-salinity zone where brackish and fresh waters meet (Grimaldo et al. 2017) and in freshwater in tributaries to the Bay (Lewis et al. 2020).

Longfin smelt are anadromous and semelparous, moving from saline to brackish or fresh water for spawning from November to May (Grimaldo et al. 2017; Lewis et al. 2020). During late summer and early fall, juvenile and adult longfin smelt within the San Francisco Estuary are more common throughout San Francisco Bay than in other landward areas (Rosenfield and Baxter 2007; MacWilliams et al. 2016), although the extent of marine migration has yet to be quantified. During the spawning period in late fall and early winter, adults are more commonly found in San Francisco Bay tributaries and marshes (Lewis et al. 2020; Grimaldo et al. 2020), Suisun Bay, and the Delta (Rosenfield and Baxter 2007). Larval longfin smelt are broadly distributed throughout San Francisco Bay and its associated tributaries during wet years (MacWilliams et al. 2016; Lewis et al. 2020; Parker et al. 2017; Grimaldo et al. 2020). Analyses of multiple surveys by Garwood (2017) found that larvae were more frequently detected in the Delta in drier years than in wet years.

A total of 152 longfin smelt have been captured during DWR surveys. Longfin smelt have been captured in the Toe Drain/Tule Canal in January, and April to June. Highest numbers were captured in May (IEP 2022).

North American Green Sturgeon—Southern DPS

The southern Distinct Population Segment (DPS) of green sturgeon includes all populations south of the Eel River. The Southern DPS is found in the Central Valley, including the Sacramento River. The Sacramento River basin supports the southernmost spawning population of green sturgeon (Moyle 2002). NMFS listed the southern DPS of North American green sturgeon as threatened under the ESA on April 7, 2006 (71 FR 17757–17766). Green sturgeon is not listed under CESA; however, CDFW considers green sturgeon to be a California species of special concern (Moyle et al. 2015).

NMFS designated critical habitat for green sturgeon on October 9, 2009 (74 FR 52300), including the water column, river bottom, and adjacent riparian zone of the Sacramento River up to the OHWM. Tule Canal is not designated as critical habitat for green sturgeon.

The green sturgeon is anadromous, but it is the most marine-oriented species in the sturgeon family (Moyle 2002). The Sacramento River provides habitat for green sturgeon spawning, adult holding, foraging, and juvenile rearing. Sturgeon spawn in deep pools (averaging about 28 feet [8.5 meters] deep) (National Marine Fisheries Service 2018). Suitable spawning temperatures and spawning substrate exist for green sturgeon in the Sacramento River upstream and downstream of RBDD (U.S. Bureau of Reclamation 2008).

Adults enter San Francisco Bay around late winter through early spring and generally migrate to spawning areas from late February through April. Spawning mainly occurs April through late July, with some occurring in late summer and early fall (Heublein et al. 2017).

Green sturgeon use the Sacramento River as a migration corridor during upstream (adult) and downstream (adult, juvenile, larvae) migration, for holding and spawning (adult), and rearing (larvae, juveniles). They have been captured in the Yolo Bypass (U.S. Bureau of Reclamation 2018). Spawning and egg incubation do not occur in the study area. They have not been captured in the DWR surveys of the Toe Drain and Tule Canal study (IEP 2022).

Steelhead—California Central Valley DPS

The California Central Valley (CCV) steelhead (*Oncorhynchus mykiss irideus)* DPS was federally listed as threatened on March 19, 1998 (63 FR 13347). The DPS includes all naturally spawned populations of steelhead in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries. The CCV steelhead DPS is not listed under CESA but is designated as a California species of special concern.

Critical habitat for CCV steelhead was designated by NMFS on September 2, 2005 (70 FR 52488) and includes all stream reaches accessible to CCV steelhead in the Sacramento and San Joaquin Rivers and their tributaries. Also included are adjacent riparian zones within the OHWM (70 FR 52537, September 2, 2005). Within the study area, Tule Canal is designated as critical habitat for this species (70 FR 52604, September 2, 2005).

Steelhead exhibit highly variable life history patterns throughout their range but are broadly categorized into winter and summer reproductive ecotypes. Winter steelhead, the most widespread reproductive ecotype, is the only type currently present in Central Valley streams (McEwan and Jackson 1996). Winter steelhead become sexually mature in the ocean; enter spawning streams in summer, fall, or winter; and spawn a few months later in winter or spring (Meehan and Bjornn 1991; Behnke 1992).

Adult steelhead immigration into Central Valley streams typically begins in August, continues into March or April (McEwan 2001; National Marine Fisheries Service 2014), and generally peaks during January and February (Moyle 2002); but adult steelhead immigration potentially can occur during all months of the year (National Marine Fisheries Service 2009). Steelhead spawning generally occurs from December through April, with peaks from January through March, in small streams and tributaries (National Marine Fisheries Service 2009).

Steelhead fry and fingerlings rear and migrate downstream in the Sacramento River during most months of the year, but the primary period of emigration is January to June (Hallock et al. 1961; McEwan 2001). Because of their varied freshwater residence times, steelhead fry and juveniles can be rearing and migrating in the Sacramento River year-round (McEwan 2001).

The Sacramento River functions primarily as a migration channel, although some rearing habitat remains in areas with setback levees (primarily upstream of Colusa) and flood bypasses (e.g., Yolo Bypass) (National Marine Fisheries Service 2009).

Steelhead use the Toe Drain/Tule Canal for migration when there is no flooding from the Sacramento River (Harrell and Sommer 2003; Sommer et al. 2014) and also enter the Yolo Bypass when flooding occurs. A total of 119 steelhead have been captured during DWR surveys. They have been captured during the DWR surveys from October through June, with highest numbers in March (IEP 2022). Spawning and egg incubation do not occur in the study area.

Winter-Run Chinook Salmon—Sacramento River ESU

The Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) evolutionarily significant unit (ESU) is listed as endangered under the Endangered Species Act (ESA) (59 Federal Register [FR] 440; January 4, 1994). The ESU consists of one population in the mainstem of the upper Sacramento River in California's Central Valley below Keswick Dam, though efforts to reintroduce the run in Battle Creek have had success in recent years with at least 700 subadults and adults returning in 2020 as a result of juvenile releases undertaken in 2018 and 2019 (U.S. Fish and Wildlife Service 2020). The Sacramento River winter-run Chinook salmon ESU was listed as endangered under the California Endangered Species Act (CESA) in September 1989.

NMFS designated critical habitat for Sacramento River winter-run Chinook salmon on June 16, 1993 (58 FR 33212–33219); critical habitat includes the water column, river bottom, and adjacent riparian zones of the Sacramento River up to the ordinary high water mark (OHWM), as defined by the U.S. Army Corps of Engineers (USACE) in 33 Code of Federal Regulations (CFR) 329.11. The Yolo Bypass and Tule Canal in the study area are not included in the critical habitat designation.

Sacramento River winter-run Chinook salmon habitat also is protected under the MSA as EFH. The Yolo Bypass, including the portion within the BSA and Tule Canal, is considered EFH for Chinook salmon (all runs). Although critical habitat and EFH are managed differently from a regulatory standpoint, they are biologically equal for the conservation of Central Valley Chinook salmon.

Winter-run Chinook salmon currently are found in the mainstem Sacramento River downstream of Keswick Dam and in Battle Creek where a nascent reintroduction effort is underway. The current population in the Sacramento River is maintained through cold water releases from Shasta Reservoir that create spawning and rearing habitat in the reach between Keswick Dam (river mile [RM] 302) and the Red Bluff Diversion Dam (RBDD) (RM 243).

Adult winter-run Chinook salmon leave the ocean and migrate up the Sacramento River from December through July, with the majority of the run passing the RBDD from January through May, peaking in mid-March (National Marine Fisheries Service 2009, 2014). Adults spawn from mid-April through August, peaking in June and July. Current spawning is confined to the mainstem of the Sacramento River above RBDD (RM 243) and below Keswick Dam (RM 302) (National Marine Fisheries Service 2014). Fry emerge from the gravel beginning in late June, with emergence continuing through October (Fisher 1994). Juvenile winter-run Chinook salmon have been observed emigrating past RBDD from early July to early June in the following year.

During juvenile rearing and downstream movement, salmonids prefer stream margin habitats with sufficient depths and velocities to provide suitable cover and foraging opportunities. Ephemeral habitats, such as floodplains and the lower reaches of small streams, also are very important to rearing Chinook salmon as these areas can be much more productive than the main channel and provide refuge from predatory fishes (Maslin et al. 1997; Sommer et al. 2001b). For example, juveniles have also been found to rear in areas such as the lower American River, lower Feather River, Battle Creek, Mill Creek, Deer Creek, and the Delta (Phillis et al. 2018).

Adult winter-run Chinook salmon enter the Sacramento River basin from November through July and can stray into the Toe Drain/Tule Canal during their upstream migration when there is no flooding from the Sacramento River (National Marine Fisheries Service 2009, 2019:67, 2021). Juvenile winter-run Chinook salmon have access to floodplain habitat in the Yolo Bypass only during mid- to high water years when the Fremont Weir is spilling and could be present in the Yolo Bypass and Tule Canal through March, based on rotary screw trap sampling in the Sacramento River at Knights Landing upstream of the Fremont Weir (National Marine Fisheries Service 2019:67). Spawning and egg incubation do not occur in the study area.

Spring-Run Chinook Salmon—Central Valley ESU

The Central Valley (CV) spring-run Chinook salmon (*Oncorhynchus tshawytscha*) ESU is federally listed as threatened (70 FR 37160; June 28, 2005). The ESU includes naturally spawned populations in the Sacramento River and its tributaries, including Antelope, Battle, Big Chico, Butte, Clear, Cottonwood, Deer, and Mill Creeks, and the Yuba River, as well as artificially propagated fish from the Feather River Fish Hatchery (National Marine Fisheries Service 2016). The CV spring-run Chinook salmon ESU was listed as threatened under CESA in February 1999.

Critical habitat for CV spring-run Chinook salmon includes the water column, river bottom, and adjacent riparian zone of the Sacramento River up to the OHWM, as defined by the USACE in 33 CFR 329.11. Tule Canal in the study area is included in the critical habitat designation for the species (70 FR 52590, September 2, 2005).

Central Valley spring-run Chinook salmon habitat also is protected under the MSA as EFH. The Yolo Bypass, including the portion within the BSA and Tule Canal, is considered EFH for Chinook salmon (all runs). Although critical habitat and EFH are managed differently from a regulatory standpoint, they are biologically equal for the conservation of Central Valley Chinook salmon.

Spring-run Chinook salmon share some similar life history and habitat requirements as those described for winter-run Chinook salmon, with differences primarily in the duration and time of year that the spring-run Chinook salmon ESU occupies freshwater habitat. Adult spring-run Chinook salmon enter the mainstem Sacramento River from mid-February and July, with the peak upstream migration occurring from May through June (Yoshiyama et al. 1998). Adults generally enter tributaries from the Sacramento River between mid-April and mid-June (National Marine Fisheries Service 2006). Spring-run Chinook salmon are sexually immature during upstream migration; and adults hold in deep, cold pools near spawning habitat until spawning commences in late summer and fall. Spawning habitat occurs in the upper reaches of the Sacramento River (between Keswick Dam [RM 302] and RBDD [RM 243]) and tributaries, including Big Chico and Butte Creeks upstream of Chico.

Juvenile spring-run Chinook salmon typically spend up to 1 year rearing in fresh water before migrating to sea as yearlings, but some may migrate downstream as young-of-year juveniles. Juvenile spring-run Chinook salmon have been observed emigrating past RBDD from mid-October to July.

Juveniles prefer stream margin habitats with enough depth and velocities to provide suitable cover and foraging opportunities during rearing and downstream movement. Off-channel areas and floodplains can provide important rearing habitat. A greater availability of prey and favorable rearing conditions in floodplains increases juvenile growth rates compared with conditions in the mainstem Sacramento River, which can lead to improved survival rates during both their migration through the Delta and later in the marine environment (Sommer et al. 2001b).

Adult spring-run Chinook salmon enter the Sacramento River basin from March to early October and, like adult winter-run Chinook salmon, can stray into the Toe Drain/Tule Canal during their upstream migration when there is no flooding from the Sacramento River (National Marine Fisheries Service 2009, 2019:83). Like juvenile winter-run Chinook salmon, juvenile spring-run Chinook salmon have access to floodplain habitat in the Yolo Bypass only during mid- to high water years when the Fremont Weir is spilling and could be present in the Yolo Bypass and Tule Canal through May, based on rotary screw trap sampling in the Sacramento River at Knights Landing upstream of the Fremont Weir (National Marine Fisheries Service 2019:83). Spawning and egg incubation do not occur in the study area.

Fall- and Late Fall–Run Chinook Salmon–Central Valley ESU

The CV fall-run and late fall–run Chinook salmon (*Oncorhynchus tshawytscha*) ESU includes all naturally spawned populations of fall-run and late fall-run Chinook salmon in the Sacramento and San Joaquin River basins and their tributaries east of the Carquinez Strait in California (64 FR 50394). On April 15, 2004, the CV fall- and late fall–run Chinook salmon ESU was identified by NMFS as a species of concern (69 FR 19975). The CV fall- and late fall–run Chinook salmon ESU is not listed under CESA but is considered a California species of special concern (Moyle et al. 2015). CDFW classifies the current status of late fall–run Chinook salmon as High Concern and fall-run Chinook salmon as Moderate Concern (Moyle et al. 2015). Critical habitat is not designated for fall- and late fall–run Chinook salmon because the species is not listed under the ESA.

Central Valley fall-run and late fall–run Chinook salmon habitats also are protected under the MSA as EFH. The Yolo Bypass, including the portion within the BSA and Tule Canal, is considered EFH for Chinook salmon (all runs). Although critical habitat and EFH are managed differently from a regulatory standpoint, they are biologically equal for the conservation of Central Valley Chinook salmon. Adult fall-run Chinook salmon migrate through the Delta and into Central Valley rivers from June through December. Adult late fall–run Chinook salmon migrate through the Delta and into the Sacramento River from October through April. Currently, fall-run Chinook salmon spawn below rim dams and barriers to migration in the Sacramento and San Joaquin Rivers and their tributaries. Late fall–run Chinook salmon currently spawn almost exclusively in the upper Sacramento River from Keswick Dam (RM 302) to RBDD (RM 243).

Similar to spring-run, adult late fall–run Chinook salmon typically hold in the river for 1 to 3 months before spawning, while fall-run Chinook salmon generally spawn shortly after entering fresh water. Fall-run Chinook salmon migrate upstream past RBDD on the Sacramento River between July and December, typically spawning in upstream reaches from October through March. Late fall–run Chinook salmon migrate upstream past RBDD from August to March and spawn from January to April (National Marine Fisheries Service 2009; Tehama-Colusa Canal Authority 2008).

CV fall-run Chinook salmon fry (i.e., juveniles shorter than 2 inches long) generally emerge from December through March, with peak emergence occurring by the end of January. Most fall-run Chinook salmon fry rear in fresh water from December through June, with smolt emigration occurring primarily from April through June. Smolts that arrive in the estuary after rearing upstream migrate quickly through the Delta and Suisun and San Pablo Bays. Juvenile fall-run Chinook salmon have been observed emigrating past RBDD in all months of the year, with most passing through the area mid-December to late June, based on USFWS RST data from 2006 to 2020 (SacPAS 2021).

In the Sacramento River, CV late fall-run Chinook salmon fry generally emerge from April through June. Late fall-run fry rear in fresh water from April through the following April and emigrate as smolts from October through February (Snider and Titus 2000). Juvenile late fall-run Chinook salmon have been observed emigrating past RBDD from April to early March, with most (80 percent) passing through the area in from early April to mid-December, based on USFWS RST data from 2006 to 2020 (SacPAS 2021).

Fall and late fall-run Chinook salmon use the Toe Drain/Tule Canal for migration when there is no flooding from the Sacramento River (National Marine Fisheries Service 2009) and also when the Yolo Bypass is flooded. A total of 30,884 Chinook salmon have been captured during DWR surveys. This includes all races of Chinook salmon. They have been captured during the DWR surveys from January to June and September to December, with the most fish captured January through May (IEP 2022). Spawning and egg incubation do not occur in the study area.

White Sturgeon

White sturgeon (*Acipenser transmontanus*) is not presently listed under ESA or CESA but is a California species of special concern (Moyle et al. 2015:102–117). CDFW classifies the current status of the species as High Concern (Moyle et al. 2015). White sturgeon is a recreationally important species in the Delta, and CDFW has established special angling regulations (e.g., slot and bag restrictions) for white sturgeon to protect the declining population within the San Francisco Estuary and its tributaries (California Department of Fish and Game 2012).

White sturgeon are generally similar to green sturgeon in terms of their biology and life history. Like green sturgeon and other sturgeon species, white sturgeon are late-maturing and infrequent spawners, which makes them vulnerable to overexploitation and other sources of adult mortality. White sturgeon are believed to be most abundant within the San Francisco Estuary and Delta region, but the population spawns mainly in the Sacramento River (Moyle 2002). White sturgeon larvae rear primarily in the Sacramento River and the Delta (Moyle 2002; Israel et al. 2008). White sturgeon are found in the Sacramento River primarily downstream of RBDD (Tehama-Colusa Canal Authority 2008), with most spawning occurring between Knights Landing and Colusa (Schaffter 1997).

Spawning adults generally move into the lower reaches of rivers during winter prior to spawning and migrate upstream in response to higher flows to spawn from February to early June (McCabe and Tracy 1994; Schaffter 1997). Young white sturgeon use river edge habitats, especially floodplain and backwater habitats containing flooded riparian vegetation and rocky substrates (Moyle et al. 2015). After absorbing yolk sacs and initiating feeding, young-of-year white sturgeon make an active downstream migration that disperses them widely to rearing habitat throughout the lower Sacramento River and the Delta (McCabe and Tracy 1994; Israel et al. 2008).

White sturgeon use the Toe Drain and Tule Canal for migration when the Sacramento River is not flooding (National Marine Fisheries Service 2009) and also when the Yolo Bypass is flooded. A total of 1,044 green sturgeon have been captured during DWR surveys. White sturgeon have been captured in the DWR studies from January through May, one was captured in August and one in December. Most white sturgeon were captured in February through April (IEP 2022).

Pacific Lamprey

Pacific lamprey (*Entosphenus tridentatus*) is a federal species of concern and a California species of special concern (Moyle et al. 2015; California Department of Fish and Wildlife 2022). CDFW classifies the current status of the species as Moderate Concern (Moyle et al. 2015). Critical habitat for Pacific lamprey has not been designated because the species has not been listed.

Adult Pacific lamprey spend the predatory phase of the life in the ocean and migrate into freshwater streams to spawn (Moyle 2002). Pacific lamprey adults enter the Sacramento River from the Delta primarily during about March through June and hold in the river for about a year prior to spawning (Moyle et al. 2015). Spawning occurs in gravel redds in the upper river from March through July. Adults spawn by constructing a nest in gravelly areas of streams containing relatively fast velocities and with depths of 1 to 5 feet (Moyle 2002). The eggs and pro-larvae incubate for about 1 to 1.5 months. After the larvae (ammocoetes) emerge, they drift downstream and burrow into fine sediments primarily in off-channel habitats, where they rear (Schultz et al. 2014; Moyle et al. 2015). After 5 or more years, the ammocoetes metamorphose to the macropthalmia (juvenile) stage and migrate downstream to the Delta and ocean. Migration downstream is closely associated with rainfall events, with most migrants sampled in the upper Sacramento River being collected on the day of a rainfall event or the following 2 days (Goodman et al. 2015).

A total of 501 Pacific lamprey have been captured during DWR surveys. Pacific lamprey use the Toe Drain and Tule Canal for migration and were captured from December to April, with most lamprey caught in January and February (IEP 2022). It is likely they use the Yolo Bypass when flows are high and flooding.

Western River Lamprey

The western river lamprey (*Lampetra ayresi*) is not listed under ESA or CESA. Critical habitat for river lamprey has not been designated because the species has not been listed. The river lamprey is considered a California species of special concern (Moyle et al. 2015). CDFW classifies the current status of the species as Moderate Concern (Moyle et al. 2015).

River lamprey life history is poorly known, especially in California (Moyle et al. 2015). The adults migrate from the ocean to spawning areas during the fall and late winter (Beamish 1980). Spawning is believed to occur February through May in small tributary streams (Moyle 2002). The redds are built at the upstream end of small riffles (Moyle 2002). After the larvae (ammocoetes) emerge, they drift downstream and burrow into sediments in pools or side channels where they rear. After several years, the larvae metamorphose in late July and the juveniles (macropthalmia) migrate downstream in the following year from May to July (Moyle 2002).

In the Sacramento River, they have been documented upstream to RBDD (Hanni et al. 2006; Moyle et al. 2009). River lamprey have also been collected in the Feather and American Rivers and Mill and Cache Creeks (Vladykov and Follett 1958; Hanni et al. 2006; Moyle et al. 2009).

A total of 126 river lamprey have been captured during DWR surveys. They use the Toe Drain and Tule Canal for migration and were captured from December to April, with most lamprey caught in January and February (IEP 2022). It is likely they use the Yolo Bypass when flows are high and flooding.

Sacramento Hitch

Sacramento hitch (*Lavinia exilicauda exilicauda*) is not listed under ESA or CESA, and critical habitat has not been designated for the species. However, Sacramento hitch is a California species of special concern (Moyle et al. 2015). CDFW classifies the current status of the species as Moderate Concern (Moyle et al. 2015).

Sacramento hitch are found in the Sacramento River drainage, the San Joaquin River drainage downstream of the Merced River, a few larger tributaries to the San Francisco Estuary, and the Delta. Populations also have become established in several reservoirs in California as a result of introductions, including populations in several Southern California reservoirs that receive water from the California Aqueduct. (Moyle et al. 2015.)

Sacramento hitch inhabit a wide range of habitats, including clear streams, turbid sloughs, lakes, and reservoirs. In streams, they generally prefer shallow (less than 3 feet deep) stream habitats where they inhabit pools or runs containing aquatic vegetation and substrates ranging from mud to small gravel. Young Sacramento hitch also will use riffles. Sacramento hitch can withstand a wide range of water temperatures (up to 38 degrees Celsius [°C] [100.4 degrees Fahrenheit (°F)] for short periods of time with proper acclimation), although they are most abundant in the wild in habitats that remain cooler than 25°C (77°F) in summer. Although found primarily in fresh water, they can tolerate salinities as high as 9 parts per thousand (ppt). The spawning habits and requirements of Sacramento hitch are poorly understood; however, spawning has been documented in streams, ponds, and reservoirs from May to July. In streams, Sacramento hitch spawn mainly in riffles and have been observed to spawn on vegetation. Spawning occurs at temperatures ranging from 14 to 26°C (57.2 to 78.8°F). In the first few months, young hitch occupy shallow water, often in close association with aquatic vegetation such as emergent tules. At about 50 mm fork length, juvenile hitch leave the shallows in favor of more open water. Young also will use floodplain habitats when available.

A total of 445 hitch have been captured during DWR surveys. Sacramento hitch were captured during all months of the year with the highest numbers in June and July (IEP 2022). This indicates they are using the Toe Drain and Tule Canal during all times of the year and when the bypass is not flooded.

Sacramento Splittail

Sacramento splittail (*Pogonichthys macrolepidotus*) is not listed under ESA or CESA, and critical habitat has not been designated for the species. However, Sacramento splittail is designated as a California species of special concern by the CDFW. CDFW classifies the current status of the species as Moderate Concern (Moyle et al. 2015).

Sacramento splittail are found primarily in marshes, turbid sloughs, and slow-moving river reaches throughout the Delta subregion (Sommer et al. 1997, 2008). Sacramento splittail are most abundant in moderately shallow, brackish tidal sloughs and adjacent open-water areas, but they also can be found in freshwater areas with tidal or riverine flow (Moyle et al. 2004).

Adult Sacramento splittail typically migrate upstream from brackish areas in January and February and spawn in fresh water, particularly on inundated floodplains when they are available, in March and April (Sommer et al. 1997; Moyle et al. 2004; Sommer et al. 2008). A substantial amount of

Sacramento splittail spawning occurs in the Yolo and Sutter Bypasses and the Cosumnes River area of the Delta (Moyle et al. 2004). During drier years there is evidence that spawning occurs farther upstream (Feyrer et al. 2005). Adult Sacramento splittail migrate upstream in the lower Sacramento River to above the mouth of the Feather River and into the Sutter and Yolo Bypasses (Sommer et al. 1997; Feyrer et al. 2005; Sommer et al. 2007). In the Sacramento drainage, the most important spawning areas appear to be the Yolo and Sutter Bypasses, in years that they are inundated. However, some spawning occurs almost every year along inundated river edges and backwaters created by small increases in flow. Sacramento splittail spawn in the Sacramento River from Colusa to Knights Landing in most years (Feyrer et al. 2005).

Although juvenile Sacramento splittail are known to rear in upstream areas for a year or more (Baxter 1999), most move to the Delta after only a few weeks or months of rearing in floodplain habitats along the rivers (Feyrer et al. 2006). Juveniles move downstream into the Delta from April to August (Meng and Moyle 1995; Feyrer et al. 2005).

A total of 73,083 Sacramento splittail have been captured during DWR surveys. Sacramento splittail use the Toe Drain and Tule Canal all months of the year with the highest numbers present from January to June, with May having the highest numbers (IEP 2022). Lowest numbers (less than 30) occur from August to November. They use the Yolo Bypass for spawning and rearing. They are using the Yolo Bypass year round regardless of flooding.

Hardhead

Hardhead (*Mylopharodon conocephalus*) is not listed under ESA or CESA, and critical habitat has not been designated for the species. However, the species is a California species of special concern (Moyle et al. 2015). CDFW classifies the current status of the species as Moderate Concern (Moyle et al. 2015).

The species is found throughout the Sacramento–San Joaquin River basin and is fairly common in the Sacramento River and the lower reaches of the American and Feather Rivers. Hardhead also inhabit reservoirs and are abundant in a few impoundments where water level fluctuations prevent black bass from reproducing in large numbers (Moyle 2002). Hardhead tend to be absent from areas that have been highly altered (Moyle et al. 2015) or that are dominated by introduced fish species, especially centrarchids (species of the black bass and sunfish) (Moyle et al. 2015).

Hardhead spawn mainly in April and May, but some may spawn as late as August in the foothill regions of the upper San Joaquin River (Wang 2010). They migrate upstream and into tributary streams as far as 45 miles (72.4 km) to spawning sites. Spawning behavior has not been documented, but it is assumed to be similar to that of Sacramento pikeminnow, which deposit their eggs over gravel-bottomed riffles, runs, and at the head of pools (Moyle et al. 2015). Spawning substrates may also include sand and decomposed granite (Wang 2010).

Hardhead larvae and juveniles likely inhabit stream margins with abundant cover and move into deeper habitats as they grow larger. Adults occupy the deepest part of pools. Juvenile and adult hardhead are present in the Sacramento River year-round. They tend to prefer water temperatures near 67°F (19.4°C) (Thompson et al. 2012), but have been captured at RBDD, where water temperatures are generally much cooler (Tucker et al. 1998).

A total of 28 hardhead have been captured during DWR surveys. Small numbers (maximum of 6 for entire IEP study) of hardhead occur in the Toe Drain and Tule Canal during most months of the year except for March, July and August.

Sensitive Natural Communities

Special-status or *sensitive natural communities* are communities (vegetation types) that are of limited distribution statewide or within a county or region. CDFW's Vegetation Classification and Mapping Program (VegCAMP) works to classify and map the vegetation of California and determine the rarity of vegetation types. Vegetation types with a state rarity ranking of S1 through S3 in CDFW's *List of Vegetation Alliances and Associations* (Natural Communities List) (California Department of Fish and Game 2010) are considered to be highly imperiled, and project impacts on high-quality occurrences of these vegetation types are typically considered significant under CEQA.

The CNDDB includes records of the Elderberry Savanna and Great Valley Cottonwood Riparian Forest within 5 miles of the site. However, these special-status natural communities are not present within the biological study area. None of the other upland vegetation types on the site are considered highly imperiled, but riparian plant communities are considered sensitive by CDFW due to the numerous ecosystem services they provide (e.g., wildlife habitat, groundwater recharge, flood protection), and impacts on such communities are typically addressed under Section 1602 of the California Fish and Game Code (see below).

Jurisdictional Aquatic Resources

Waters of the United States and Waters of the State

Tule canal and the agricultural canal abutting it meet the criteria to be considered waters of the United States under Section 404 of the federal Clean Water Act (CWA). Tule Canal is a tidal perennial stream and has a rise of approximately two feet in elevation. The abutting agricultural canal is perennial but not tidally influenced.

Tule canal and the agricultural canal abutting it are also considered waters of the State under the California Porter-Cologne Water Quality Control Act administered by the San Francisco Bay Regional Water Quality Control Board (RWQCB) (see Appendix A). The RWQCB and larger State Water Resources Control Board (State Board) also administer Section 401 of the federal CWA, which grants states the authority to certify federal permits for discharges to waters under state jurisdiction for the purposes of ensuring that state water quality standards are upheld.

The banks of Tule canal and the adjacent agricultural canal are vegetated by freshwater emergent wetland and valley foothill riparian areas which are located within the high tide line and are regularly inundated and therefore also likely meet the criteria for wetland waters of the United States and waters of the State.

CDFW Section 1602 Jurisdiction

As detailed in Appendix A, CDFW has the authority to regulate work that will "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake." Activities of any person, state, or local governmental agency, or public utility are regulated by CDFW under Section 1602 of the Fish and Game Code. Although the Fish and Game Code does not explicitly define the lateral extent of CDFW jurisdiction over a "river, stream, or lake," ICF's previous experience with Section 1602 Lake or Streambed Alteration (LSA) Agreements suggests that CDFW may have jurisdiction over Tule Canal and the abutting agricultural canal which would likely extend to the outer edge of tidal emergent and riparian vegetation.

Chapter 4
References

Airola, D. A., J. A. Estep, D. R. Krolick, R. I. Anderson, and J. R. Peters. 2019. Wintering Areas and Migration Characteristics of Swainson's Hawks that Breed in the Central Valley of California. *Journal of Raptor Research* 53(3):237–252.

Anderson, D. A., J. Dinsdale, and R. Schlorff. 2007. *California Swainson's Hawk Inventory: 2005–2006, Final Report*. Sacramento, CA: California Department of Fish and Game, Resource Assessment Program.

Arcese, P., M. K. Sogge, A. B. Marr, and M. A. Patten (2020). Song Sparrow (*Melospiza melodia*), version 1.0. *In Birds of the World* (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology. Ithaca, NY. Available: https://birdsoftheworld.org/bow/species/sonspa/. Accessed: January 31, 2023.

Babcock, K. W. 1995. Home Range and Habitat Use of Breeding Swainson's Hawks in the Sacramento Valley of California. *Journal of Raptor Research* 29:193–197.

Baxter, R. D. 1999. *Status of Splittail in California*. California Fish and Game 85:28–30.

Beamish, R. J. 1980. Adult Biology of the River Lamprey (Lampetra ayresi) and the Pacific Lamprey (Lampetra tridentata) from the Pacific Coast of Canada. *Canadian Journal of Fish and Aquatic Science* 53:2898–2908.

Bechard, M. J., C. S. Houston, J. H. Saransola, and A. S. England. 2020. Swainson's Hawk (*Buteo swainsoni*). In P. G. Rodewald (ed.), *The Birds of North America*. Ithaca, NY: Cornell Lab of Ornithology. Available (controlled access): https://birdsna.org/Species-Account/bna/species/swahaw. Accessed: January 30, 2023.

Beedy, E. C. 2008. Tricolored Blackbird (*Agelaius tricolor*). In W. D. Shuford and T. Gardali (eds.), *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies and Distinct Populations of Birds of Immediate Conservation Concern in California*. Studies of Western Birds 1. Camarillo, CA: Western Field Ornithologists, and Sacramento, CA: California Department of Fish and Game.

Beedy, E. C., S. D. Sanders, and D. Bloom. 1991. *Breeding Status, Distribution, and Habitat Associations of the Tricolored Blackbird (*Agelaius tricolor*) 1850–1989*. Prepared by Jones & Stokes Associates, Inc., 88–197. Prepared for U.S. Fish and Wildlife Service, Sacramento, CA.

Beedy, E. C., W. J. Hamilton, III, R. J. Meese, D. A. Airola, and P. Pyle. 2020. *Tricolored Blackbird (*Agelaius tricolor*)*, version 1.0. In Birds of the World (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.tribla.01. Accessed: January 27, 2023.

Behnke, R. J. 1992. *Native Trout of Western North America*. American Fisheries Society, Bethesda, Maryland.

Bennett, W. A. 2005. Critical Assessment of the Delta Smelt Population in the San Francisco Estuary, California. *San Francisco Estuary and Watershed Science* 3(2). Available: https://escholarship.org/uc/item/0725n5vk. Accessed: November 3, 2020.

Bennett, W. A., and J. R. Burau. 2015. Riders on the Storm: Selective Tidal Movements Facilitate the Spawning Migration of Threatened Delta Smelt in the San Francisco Estuary. *Estuaries and Coasts* 38(3):826–835. doi: http://dx.doi.org/10.1007/s12237-014-9877-3.

Bent, Arthur Cleveland. 1958. "Life Histories of North American Blackbirds, Orioles, Tanagers, and Allies." *Bulletin of the United States National Museum*. 1–549.

Brenckle, J. F. 1936. The Migration of the Western Burrowing Owl. *Bird-Banding* 7:166–168.

Burkett, E. 2008. Range Map for Burrowing Owl. Update to Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, (eds.) 1988–1990. *California's Wildlife.* Vols. I–III. California Depart. Of Fish and Game, Sacramento, California. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1872&inline=1. Accessed: January 27, 2023.

CALFED Bay-Delta Program. 2000a. Ecosystem Restoration Program Plan. Volume I: Ecological Attributes of the San Francisco Bay-Delta Watershed.

CALFED Bay-Delta Program. 2000b. Ecosystem Restoration Program Plan - Volume II: Ecological Management Zone Visions. Final Programmatic EIS/EIR Technical Appendix. Sacramento, CA.

California Department of Fish and Game. 2010. *List of Vegetation Alliances and Associations*. Vegetation Classification and Mapping Program. Sacramento, CA. September.

California Department of Fish and Game. 2012. *Staff Report on Burrowing Owl Mitigation*. 34 pp.

California Department of Fish and Wildlife. 2016. *Five Year-Status Report for Swainson's Hawk (*Buteo swainsoni*)*. Wildlife and Fisheries Division Nongame Wildlife Program. Sacramento, California.

California Department of Fish and Wildlife. 2018. *A Status Review of the Tricolored Blackbird (*Agelaius tricolor*) in California*. Report to the Fish and Game Commission. February.

California Department of Fish and Wildlife. 2022. *Pacific Lamprey, Entosphenus tridentatus.* Available: https://wildlife.ca.gov/Conservation/Fishes/Pacific-Lamprey. Accessed: March 16, 2022.

California Department of Fish and Wildlife. 2023a. Special Animals List. *California Natural Diversity Database (CNDDB)*. Periodic publications. January.

California Department of Fish and Wildlife. 2023b. *California Natural Diversity Database (CNDDB),* Rarefind 5. Commercial version updated January 3, 2023. Search of the Sacramento West and 8 surrounding USGS 7.5-minute quadrangles. Available: https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed: 2022. Updated: January 5, 2023.

California Eco Restore. 2018. Fremont Weir Adult Fish Passage Modification Project. 23aAvailable: FAQs_FremontWeir_Final.pdf (ca.gov). Accessed: January 30, 2023.

California Native Plant Society. 2023. Rare Plant Program Inventory of Rare and Endangered Plants of California (online edition, v9.5). Available: https://www.rareplants.cnps.org. Accessed: June 2, 2022. Updated: January 5, 2023.

California Natural Resources Agency. 2016. Delta Smelt Resiliency Strategy – July 2016.

Central Valley Prediction Assessment of Salmon database (SacPAS). 2021. *Daily Estimate of Juvenile Salmon Passage at Red Bluff Diversion Dam*. Available: http://www.cbr.washington.edu/sacramento/. Accessed: December 2, 2021.Coulombe, H. N. 1971. Behavior and Population Ecology of the Burrowing Owl, *Speotyto cunicularia*, in the Imperial Valley of California. *Condor* 73:162–176.

DeHaven, R. W., F. T. Crase, P. D. Woronecki. 1975. Breeding Status of the Tricolored Blackbird, 1969–1972. *California Fish & Game* 61:166–180.

DeSante, D. F., E. D. Ruhlen, S. L. Adamany, K. M. Burton, and S. Amin. 1997. A census of Burrowing Owls in central California in 1991. Journal of Raptor Research Report 9:38–48.

Dixon, K. L., R. E. Dixon, and J. E. Dixon. 1957. Natural History of the White-Tailed Kite in San Diego County, California. *Condor* 59(3):156–165.

Dunk, J. R. 2020. White-tailed Kite (*Elanus leucurus*), version 1.0. In Birds of the World (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. Available: https://doi.org/10.2173/bow.whtkit.01. Accessed: January 26, 2023.

Dunk, J. R. and R. J. Cooper. 1994. Territory-Size Regulation in Black-Shouldered Kites. *Auk* 111:588–595.

Dybala K. E., Seavy, N. E., and T. Gardali. 2017. Avian community response to a large-scale restoration experiment at the Cosumnes River Preserve, 2011–2017. *Point Blue Conservation Science*, Petaluma, CA. This is Point Blue Contribution No. 2153.

Emlen. J. T. 1941. An Experimental Analysis of the Breeding Cycle of the Tricolored Red-Wing. *Condor* 43(5):209–219.

England, A. S., J. A. Estep, and W. R. Holt. 1995. Nest-Site Selection and Reproductive Performance of Urban-Nesting Swainson's Hawks in the Central Valley of California. *Journal of Raptor Research* 29:179–186.

Erichsen, A. L. 1995. *The White-Tailed Kite (*Elanus leucurus*): Nesting Success and Seasonal Habitat Selection in an Agricultural Landscape.* MS thesis. University of California at Davis. Davis, CA.

Estep, J. A. 1984. *Diurnal Raptor Eyrie Monitoring Program. Nongame Wildlife Investigations.* Project Report W-65-R-1, Job No. II-2.0. Sacramento, CA: California Department of Fish and Game.

Estep, J. A. 1989. *Biology, Movements, and Habitat Relationships of the Swainson's Hawk in the Central Valley of California,* 1986–1987. California Department of Fish and Game, Nongame Bird and Mammal Section, Sacramento, CA.

Estep, J. A. 2007. *The Distribution, Abundance, and Habitat Associations of the Swainson's Hawk (*Buteo swainsoni*) in South Sacramento County.* Prepared by Estep Environmental Consulting for the City of Elk Grove.

Estep, J. A. 2008. *The Distribution, Abundance, and Habitat Associations of the Swainson's Hawk (*Buteo swainsoni) *in Yolo County.* Prepared by Estep Environmental Consulting for Technology Associates International Corporation and the Yolo County Habitat/Natural Community Conservation Plan JPA. Estep, J. A. 2009. *The Influence of Vegetation Structure on Swainson's Hawk Foraging Habitat Suitability in Yolo County*. Prepared for Technology Associates International Corporation and Yolo Natural Heritage Program. Woodland, CA.

Feyrer F., D. Portz, D. Odum, K.B. Newman, T. Sommer, D. Contreras, R. Baxter, S. B. Slater, D. Sereno, E. Van Nieuwenhuyse. 2013. SmeltCam: Underwater Video Codend for Trawled Nets with an Application to the Distribution of the Imperiled Delta Smelt. PLOS ONE 8(12): 10.1371/annotation/0c42ea0f-6d99-44a7-84ff-aeec57133f13. Available: https://doi.org/10.1371/annotation/0c42ea0f-6d99-44a7-84ff-aeec57133f13

Feyrer, R., T. R. Sommer, and R. D. Baxter. 2005. Spatial-Temporal Distribution and Habitat 28 Associations of Age-0 Splittail in the Lower San Francisco Watershed. *Copeia* 2005(1):159–168.

Feyrer, F., T. Sommer, and W. Harrell. 2006. Managing Floodplain Inundation for Native Fish: Production Dynamics of Age-0 Splittail (Pogonichthys macrolepidotus) in California's Yolo Bypass. *Hydrobiologia* 573:213–226.

Fisher, F. 1994. Past and Present Status of Central Valley Chinook Salmon. *Conservation Biology* 8(3): 870–873.

Gardali, T. 2008. Song Sparrow (*Melospiza melodia*) ("Modesto" population). In: Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. *Studies of Western Birds 1*:400–404. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Garwood, R. S. 2017. Historic and Contemporary Distribution of Longfin Smelt (*Spirinchus thaleichthys*) along the California Coast. *California Fish and Game* 103(3):96–117.

Gervais, J. A., D. K. Rosenberg, and L. A. Comrack. 2008. Burrowing Owl (Athene cunicularia). In Shuford, W. D. and T. Gardali (eds.). *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*. Studies of Western Birds 1. Camarillo, CA: Western Field Ornithologists; Sacramento, CA: California Department of Fish and Game. Pages 218–226.

Goodman, D. H., S. B. Reid, N. A. Som, and W. R. Poytress. 2015. The Punctuated Seaward Migration of Pacific Lamprey (Entosphenus tridentatus): Environmental Cues and Implications for Streamflow Management. *Canadian Journal of Fisheries and Aquatic Sciences* 72(12):1817–1828.

Granholm, S. 2008. California Wildlife Habitat Relationships System Life History Account for Yellow-headed Blackbird *(Xanthocephalus xanthocephalus).* Originally published in D. C. Zeiner, W. F. Laudenslayer, Jr., K. E. Mayer, and M. White (eds.) 1988–1990. *California's Wildlife*. Vols. I–III. California Department of Fish and Game, Sacramento, California. Available: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2185.

Grimaldo, L., F. Feyrer, J. Burns, and D. Maniscalco. 2017. Sampling Uncharted Waters: Examining Rearing Habitat of Larval Longfin Smelt (*Spirinchus thaleichthys*) in the Upper San Francisco Estuary. *Estuaries and Coasts* 40(6):1771–1784.

Grimaldo, L., J. Burns, R. E. Miller, A. Kalmbach, A. Smith, J. Hassrick, and C. Brennan. 2020. Forage Fish Larvae Distribution and Habitat Use During Contrasting Years of Low and High Freshwater Flow in the San Francisco Estuary. *San Francisco Estuary and Watershed Science* 18(3).

Grinnell, J., and A. H. Miller. 1944. The distribution of the birds of California. *Pacific Coast Avifauna* 27.

Grimaldo, L. F., T. Sommer, N. Van Ark, G. Jones, E. Holland, P. B. Moyle, P. Smith, and B. Herbold. 2009. Factors Affecting Fish Entrainment into Massive Water Diversions in a Freshwater Tidal Estuary: Can Fish Losses Be Managed? *North American Journal of Fisheries Management* 29(5):1253–1270.

Hallock, R. J., W. F. Van Woert, and L. Shapovalov. 1961. *An Evaluation of Stocking Hatchery-Reared Steelhead Rainbow Trout* (Salmo gairdnerii gairdnerii) *in the Sacramento River System*. California Department of Fish and Game Fish Bulletin 114. 74 pp.

Halstead, B. J., S. M. Skalos, G. D. Wylie, and M. L. Casazza. 2015. Terrestrial Ecology of Semi-Aquatic Giant Gartersnakes (*Thamnophis gigas*). *Herpetological Conservation and Biology* 10(2):633–644.Hamilton, W. J. III. 1998. Tricolored Blackbird Itinerant Breeding in California. *Condor* 100(2):218–226.

Hamilton, W. J, III. 2004. Tricolored Blackbird (*Agelaius tricolor*). In *The Riparian Bird Conservation 18 Plan: A Strategy for Reversing the Decline of Riparian-Associated Birds in California*. California Partners in Flight. Available: http://www.prbo.org/calpif/htmldocs/species/riparian/tricolored_blackbird.htm. Accessed: January 27, 2023.

Hamilton, W. J. III, L. Cook, R. Grey. 1995. *Tricolored Blackbird Project 1994*. Report prepared for U.S. Fish and Wildlife Service, Portland, OR, USA.

Hanni, J., B. Poytress, and H. N. Blalock-Herod. 2006. *Spatial and Temporal Distribution Patterns of Pacific and River Lamprey in the Sacramento and San Joaquin Rivers and Delta*. Poster. U.S. Fish and Wildlife Service.

Harrell, W. C., and T. R. Sommer. 2003. Patterns of Adult Fish Use on California's Yolo Bypass Floodplain. California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration. Pages 88–93 in P. M. Faber, editor, California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration. 2001 Riparian Habitat and Floodplains Conference Proceedings. Riparian Habitat Joint Venture.

Hawbecker, A. C. 1940. A Life History Study of the White-Tailed Kite. *Condor* 44:267–276.

Herzog, S. K. 1996. Wintering Swainson's Hawks in California's Sacramento-San Joaquin River Delta. *Condor* 98(4):876–879.

Heublein, J., R. Bellmer, R. D. Chase, P. Doukakis, M. Gingras, D. Hampton, J. A. Israel, Z. J. Jackson, R. C. Johnson, O. P. Langness, S. Luis, E. Mora, M. L. Moser, L. Rohrbach, A. M. Seesholtz, T. Sommer, and J. Stuart. 2017. *Life History and Current Monitoring Inventory of San Francisco Estuary Sturgeon*. September. NOAA-TM-NMFS-SWFSC-589. National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, CA.

Hobbs, J. A., L. S. Lewis, M. Willmes, C. Denney, and E. Bush. 2019. Complex Life Histories Discovered in a Critically Endangered Fish. *Scientific Reports* 9(1):1–12.

Interagency Ecological Program (IEP). 2022. Yolo Bypass Fish Monitoring Program. Available: Yolo Bypass Fish Monitoring Program (ca.gov). Accessed: January 30, 2023.

Israel, J. A., and A. P. Klimley. 2008. *Life History Conceptual Model for North American Green Sturgeon* (Acipenser medirostris). December. University of California, Davis. Prepared for California Department of Fish and Game, Delta Regional Ecosystem Restoration and Implementation Program, Sacramento, CA.

Jackson, Z. J., and J. P. Van Eenennaam. 2013. *2012 San Joaquin River Sturgeon Spawning Survey*. U.S. Fish and Wildlife Service, Anadromous Fish Restoration Program, Stockton Fish and Wildlife Office, Stockton, CA.

Jackson, Z. J., J. J. Gruber, and J. P. Van Eenennaam. 2016. White sturgeon spawning in the San Joaquin River, California, and effects of water management. Journal of Fish and Wildlife Management 7(1):171-180; e1944-687X. doi: 10.3996/09215-JFWM-092. Available: (15) (PDF) White Sturgeon Spawning in the San Joaquin River, California, and Effects of Water Management (researchgate.net). Accessed: February 1, 2023.

Jaramillo, A. 2008. Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*). In: Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. *Studies of Western Birds 1*:144–450. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Kaufman, K. 1996. "Yellow-headed Blackbird." *Audubon Guide to North American Birds*. Adapted from Kaufman, K. *Lives of North American Birds*. Available: https://www.audubon.org/field-guide/bird/yellow-headed-blackbird. Accessed: January 31, 2023.

Komoroske, M., K. M. Jeffries, R. E. Connon, J. Dexter, M. Hasenbein, C. Verhille and N. A. Fangue. 2016. Sublethal Salinity Stress Contributes to Habitat Limitation in an Endangered Estuarine Fish. *Evolutionary Applications*. doi: http://dx.doi.org/10.1111/eva.12385.

Lehman, P. W., T. Sommer, and L. Rivard. 2008a. The Influence of Floodplain Habitat on the Quantity of Riverine Phytoplankton Carbon Produced During the Flood Season in San Francisco Estuary. Aquatic Ecology 42:363–378.

Lewis, L. S., M. Willmes, A. Barros, P. K. Crain, and J. A. Hobbs. 2020. Newly Discovered Spawning and Recruitment of Threatened Longfin Smelt in Restored and Under-Explored Tidal Wetlands. *Ecology* 101(1), e02868:1–4.

MacWilliams, M., A. J. Bever, and E. Foresman. 2016. 3-D Simulations of the San Francisco Estuary with Subgrid Bathymetry to Explore Long-Term Trends in Salinity Distribution and Fish Abundance. *San Francisco Estuary and Watershed Science* 14(2). Available: https://escholarship.org/uc/item/5qj0k0m6. Accessed: November 3, 2020.

Mahardja, B., J. A. Hobbs, N. Ikemiyagi, A. Benjamin, and A. J. Finger. 2019. Role of Freshwater Floodplain-Tidal Slough Complex in the Persistence of the Endangered Delta Smelt. PLOS ONE 14(1):e208084.

Marshall, J. T., Jr. 1948. Ecologic races of Song Sparrows in the San Francisco Bay Region. Part I. Habitat and abundance. *Condor* 50:193–215.

Maslin, P., J. Kindopp, and W. McKenney. 1997. *Intermittent Streams as Rearing Habitat for Sacramento River Chinook Salmon* (Oncorhynchus tshawytscha). Report to U.S. Fish and Wildlife Service. (Grant # 1448-0001-96729.) 95 pp.

McCabe, G. T., and C. A. Tracy. 1994. Spawning and Early-Life History of White Sturgeon, Acipenser transmontanus, in the Lower Columbia River. *Fishery Bulletin* 92(4):760–772.

McEwan, D. R. 2001. Central Valley Steelhead. In: R. Brown (ed.). Contributions to the Biology of Central Valley Salmonids. (*California Department of Fish and Game Fish Bulletin* No. 179.)

McEwan, D. R., and T. Jackson. 1996*. Steelhead Restoration and Management Plan for California*. 22 February. California Department of Fish and Game, Sacramento, CA.

Meehan, W. R. and T. C. Bjornn. 1991. Salmonid Distributions and Life Histories. Pages 47–82 in W. R. Meehan (ed.). Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. *American Fisheries Society Special Publication* No. 19. Bethesda, Maryland.

Meese, R. J. 2006. *Settlement and Breeding Colony Characteristics of Tricolored Blackbirds in 2006 in the Central Valley of California*. Sacramento and Emeryville, CA: U.S. Fish and Wildlife Service and Audubon California.

Meese, R. J. 2017. *Results of the 2017 Tricolored Blackbird Statewide Survey*. University of California, Davis.

Meng, L. and P. B. Moyle. 1995. Status of Splittail in the Sacramento–San Joaquin Estuary. *Transactions of the American Fisheries Society* 124(4):538–549.

Merz, J., P. S. Bergman, J. F. Melgo, and S. Hamilton. 2013. Longfin Smelt: Spatial Dynamics and Ontogeny in the San Francisco Estuary, California. *California Fish and Game* 99(3):122–148.

Merz, J. E., S. Hamilton, P. S. Bergman, and B. Cavallo. 2011. Spatial Perspective for Delta Smelt: A Summary of Contemporary Survey Data. *California Fish and Game* 97(4):164–189. Available: https://www.baydeltalive.com/assets/06942155460a79991fdf1b57f641b1b4/application/pdf/CFG_097-4_2011-2-DeltaSmelt1.pdf. Accessed: June 10, 2020.

Moyle, P. B. 2002. *Inland Fishes of California*. Revised and expanded. Berkeley, CA: University of California Press.

Moyle, P. B., R. M. Quiñones, J. V. Katz, and J. Weaver. 2015. *Fish Species of Special Concern in California. Sacramento: California Department of Fish and Wildlife*. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=104282&inline. Accessed: June 12, 2020.

Murphy, D. D., and S. A. Hamilton. 2013. Eastern Migration or Marshward Dispersal: Exercising Survey Data to Elicit an Understanding of Seasonal Movement of Delta Smelt. *San Francisco Estuary and Watershed Science* 11(3). Available: https://escholarship.org/uc/item/4jf862qz. Accessed: November 3, 2020.

National Marine Fisheries Service. 2009. *Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project*. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Region, Long Beach, CA.

National Marine Fisheries Service. 2014. *Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-Run Chinook Salmon and Central Valley Spring-Run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead*. California Central Valley Office, Sacramento, California. July.

National Marine Fisheries Service. 2016. Online species list on Google Earth. Accessed: January 10, 2023.

National Marine Fisheries Service. 2018. *Draft Recovery Plan for the Southern Distinct Population Segment of North American Green Sturgeon* (Acipenser medirostris). January. National Marine Fisheries Service, West Coast Region, Sacramento, CA.

National Marine Fisheries Service. 2019. Biological Opinion on Long-Term Operation of the Central Valley Project and the State Water Project. WCRO-2016-00069. October. West Coast Region, Sacramento, CA.

National Marine Fisheries Service. 2021. Species in the Spotlight, Priority Actions 2021–2025, Sacramento River Winter-Run Chinook Salmon (*Oncorhynchus tshawytscha*). April. Available: https://www.fisheries.noaa.gov/resource/document/species-spotlight-priority-actions-2021-2025-sacramento-river-winter-run-chinook. Accessed: July 30, 2023.

Natural Resources Conservation Service. 2023a. Climate Data for Davis 2 WSW EXP FARM, California. https://agacis.rcc-acis.org/?fips=06113. Accessed: January 2023.

Natural Resources Conservation Service. 2023b. Soil Survey Staff, United States Department of Agriculture. Web Soil Survey. Available online at the following link: http://websoilsurvey.sc.egov.usda.gov/. Accessed: January 2023.

Neff, J. A. 1937. Nesting Distribution of the Tricolored Red-Wing. *Condor* 39(2): 61–81.

Niemela, C. A. 2007. *Landscape Characteristics Surrounding White-tailed Kite Nest Sites in Southwestern California.* MS thesis. Humboldt State University. Humboldt, CA.

Orians. 1961. The Ecology of Blackbird (*Agelaius*) Social Systems. *Ecological Monographs* 31(3):285–312.

Parker, C., J. Hobbs, M. Bisson, and A. Barros. 2017. Do Longfin Smelt Spawn in San Francisco Bay Tributaries? *IEP Newsletter* 30(1):29–36.

Phillis, C. C., A. M. Sturrock, R. C. Johnson, P. K. Weber. 2018. Endangered Winter-Run Chinook Salmon Rely on Diverse Rearing Habitats in a Highly Altered Landscape. January. *Biological Conservation* 217:358–362.

Plumpton, D. L., and R. S. Lutz. 1993a. Nesting Habitat Use by Burrowing Owls in Colorado. *Journal of Raptor Research* 27:175–179.

Plumpton, D. L., and R. S. Lutz. 1993b. Influence of Vehicular Traffic on Time Budgets of Nesting Burrowing Owls. *Journal of Wildlife Management.* 57:612–616.

Polansky, L., K. B. Newman and M. L. Nobriga and L. Mitchell. 2018. Spatiotemporal Models of an Estuarine Fish Species to Identify Patterns and Factors Impacting Their Distribution and Abundance. *Estuaries and Coasts* 41(2):572–581.

Polite, C. 2005. White-Tailed Kite. In Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White (eds.) 1988–1990 (Updated 2005). *California's Wildlife.* Vols. I–III. California Depart. Of Fish and Game, Sacramento, California.

Poulin, R. G., L. D. Todd, E. A. Haug, B. A. Millsap, and M. S. Martell. 2020. Burrowing Owl (*Athene cunicularia*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. Available: https://doi.org/10.2173/bow.burowl.01. Accessed: January 27, 2023.

Reyes, G.A., B. J. Halstead, J. P. Rose, J. S. M. Ersan, A. C. Jordan, A. M. Essert, K. J. Fouts, A. M. Fulton, K. B. Gustafson, R. F. Wack, G. D. Wylie, and M. L. Casazza. 2017. Behavioral Response of Giant Gartersnakes (*Thamnophis gigas*) to the Relative Availability of Aquatic Habitat on the Landscape. *U.S. Geological Survey Open File Report 2017-1141*, 134 p. Available: https://doi.org/10.3133/ofr20171141.

Rosenberg, D., J. Gervais, H. Ober, and D. DeSante. 1998. *An Adaptive Management Plan for the Burrowing Owl Population at Naval Air Station Lemoore, Lemoore, California*. Report prepared for the US Navy, Engineering Field Activity West, 900 Commodore Drive, San Bruno, CA.

Rosenberg, D. K., J. A. Gervais, D. F. DeSante, and H. Ober. 2009. *An Updated Adaptive Management Plan for the Burrowing Owl Population at NAS Lemoore*. The Oregon Wildlife Institute, Corvallis, OR and The Institute for Bird Populations, Point Reyes Station, CA. OWI Contribution No. 201 and IBP Contribution No. 375.

Rosenfield, J. A., and R. D. Baxter. 2007. Population Dynamics and Distribution Patterns of Longfin Smelt in the San Francisco Estuary. *Transactions of the American Fisheries Society* 136(6):1577–1592.

SacPAS. 2021. Central Valley Prediction and Assessment of Salmon Through Ecological Data and Modeling for In-Season Management. Available: SacPAS Central Valley Prediction and Assessment of Salmon (washington.edu). Accessed: February 1. 2023.

Schaffter, R. 1997. *White Sturgeon Spawning Migrations and Location of Spawning Habitat in the Sacramento River, California*. California Department of Fish and Game 83:1–20.

Schlorff, R., and P. H. Bloom. 1984. Importance of Riparian Systems to Nesting Swainson's Hawks in the Central Valley of California. In R.E. Warner and K.M. Hendrix (eds.). *California Riparian Systems: Ecology, Conservation, and Productive Management,* pages 612–618. Berkeley, CA: University of California Press.

Schultz, L., M. Mayfield, G. Sheoships, L. Wyss, B. Clemens, B. Chasco, and C. Schreck. 2014. *The Distribution and Relative Abundance of Spawning and Larval Pacific Lamprey in the Willamette River Basin*. Final Report to the Columbia Inter-Tribal Fish Commission for Project Years 2011–2014. May 2014.

Sommer, T. and F. Mejia. 2013. A Place to Call Home: A Synthesis of Delta Smelt Habitat in the Upper San Francisco Estuary. *San Francisco Estuary and Watershed Science* 11(2). Available: https://escholarship.org/uc/item/32c8t244. Accessed: November 3, 2020.

Sommer, T. R., R. Baxter, and B. Herbold. 1997. Resilience of Splittail in the Sacramento–San Joaquin Estuary. *Transactions of the American Fisheries Society* 126(6):961–976.

Sommer, T. R., W. C. Harrell, and F. Feyrer. 2014. Large-Bodied Fish Migration and Residency in a Flood Basin of the Sacramento River, California, USA. *Ecology of Freshwater Fish* 23(3):414–423.

Sommer, T. R., W. C. Harrell, and M. L. Nobriga. 2005. Habitat Use and Stranding Risk of Juvenile Chinook Salmon on a Seasonal Floodplain. *North American Journal of Fisheries Management* 25:1493–1504.

Sommer, T. R., W. C. Harrell, M. L. Nobriga, and R. Kurth. 2003. Floodplain as Habitat for Native Fish: Lessons from California’s Yolo Bypass. Pages 81–87 in P. M. Faber, editor, California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration. 2001 Riparian Habitat and Floodplains Conference Proceedings. Riparian Habitat Joint Venture, Sacramento, CA.

Sommer, T. R. W. C. Harrell, A. M. Solger, B. Tom, W. Kimmerer. 2004. Effects of flow variation on channel and floodplain biota and habitats of the Sacramento River, California, USA, Aquatic Conservation: Marine and Freshwater Ecosystems, 10.1002/aqc.620, 14, 3: 247-261.

Sommer, T. C., Mejia, F., Nobriga, M. L., Feyrer, F., and L. Grimaldo. 2011. The Spawning Migration of Delta Smelt in the Upper San Francisco Estuary. *San Francisco Estuary and Watershed Science*, 9(2). San Francisco Estuary and Watershed Science, John Muir Institute of the Environment, UC Davis. Available: http://escholarship.org/uc/item/86m0g5sz.

Sommer, T., B. Harrell, M. Nobriga, R. Brown, P. Moyle, W. Kimmerer, and L. Schemel. 2001a. California's Yolo Bypass: Evidence that flood control can be compatible with fisheries, wetlands, wildlife, and agriculture. *Fisheries* 26(8):6–16.

Sommer, T. R., M. L. Nobriga, W. C. Harrell, W. Batham, and W. J. Kimmerer. 2001b. Floodplain Rearing of Juvenile Chinook Salmon: Evidence of Enhanced Growth and Survival. *Canadian Journal of Fisheries and Aquatic Sciences* 58: 325–333.

Sommer, T., C. Armor, R. Baxter, R. Breuer, L. Brown, M. Chotkowski, S. Culberson, F. Feyrer, M. Gingras, B. Herbold, W. Kimmerer, A. Mueller-Solger, M. Nobriga, and K. Souza. 2007. The Collapse of Pelagic Fishes in the Upper San Francisco Estuary. *Fisheries* 32(6):270–277.

Sommer, T. R., W. C. Harrell, Z. Matica, and F. Feyrer. 2008. Habitat Associations and Behavior of Adult and Juvenile Splittail (Cyprinidae: Pogonichthys macrolepidotus) in a Managed Seasonal Floodplain Wetland. *San Francisco Estuary and Watershed Science* 6(2). Available: http://www.escholarship.org/uc/item/85r15611. Accessed: July 15, 2013.

Takata, L., T. R. Sommer, J. L. Conrad, and B. M. Schreier. 2017. Rearing and migration of juvenile Chinook salmon (*Oncorhynchus tshawytscha*) in a large river floodplain. Environmental Biology of Fishes 100(9): 1105–1120.

Tehama-Colusa Canal Authority. 2008. *Fishery Resources, Appendix B. In Fish Passage Improvement Project at the Red Bluff Diversion Dam EIS/EIR*. Prepared by CH2M HILL, State Clearinghouse No. 2002-042-075. Willows, CA: Tehama-Colusa Canal Authority.

Thompson, L. C., N. A. Fangue, J. J. Cech, Jr., D. E. Cocherell, and R. C. Kaufman. 2012. *Juvenile and Adult Hardhead Thermal Tolerances and Preferences: Temperature Preference, Critical Thermal Limits, Active and Resting Metabolism, and Blood-Oxygen Equilibria*. Center for Aquatic Biology and Aquaculture Technical Report, University of California, Davis. Davis, CA.

Thomsen, L. 1971. Behavior and Ecology of Burrowing Owls on the Oakland Municipal Airport. *Condor* 73:177–192.

Thomson, R. C., A. N. Wright and B. Shaffer. 2016. *California Amphibian and Reptile Species of Special Concern*. University of California Press. Oakland, CA.

Twedt, J. and R.D. Crawford. 2020. Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*), version 1.0. In *Birds of the World* (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. Available: https://birdsoftheworld.org/bow/species/yehbla. Accessed: January 31, 2023.

U.S. Bureau of Reclamation. 2008. *Biological Assessment on the Continued Long-Term Operations of the Central Valley Project and the State Water Project. Sacramento, CA: Mid-Pacific Region*.

U.S. Bureau of Reclamation. 2018. Yolo Bypass. Fact Sheet: Yolo Bypass (usbr.gov). Accessed: January 30, 2023.

U.S. Bureau of Reclamation. 2021. Fremont Weir adult fish passage modification project. Bay-Delta office. Accessed: January 27, 2023.

U.S. Fish and Wildlife Service. 2014. Programmatic Biological Opinion on Issuance of Permits under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, Including Authorizations under 22 Nationwide Permits, for Projects that May Affect the Threatened California Red-legged Frog in Nine San Francisco Bay Area Counties, California. Sacramento Fish and Wildlife Office, Sacramento, California. June 18.

U.S. Fish and Wildlife Service. 2017. *Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*)*. U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, CA.

U.S. Fish and Wildlife Service. 2019. *Species Status Assessment for the Tricolored Blackbird (*Agelaius tricolor*), Version 1.1*. February. Sacramento, California.

U.S. Fish and Wildlife Service. 2020. *700 Winter-Run Chinook Salmon Return to Battle Creek*. October 22. Available: https://www.fws.gov/news/ShowNews.cfm?ref=700-winter-run-chinook-salmon-return-to-battle-creek&_ID=36797. Accessed: January 28, 2021.

U.S. Fish and Wildlife Service. 2020. *Giant Gartersnake (*Thamnophis gigas*) 5-Year Review: Summary and Evaluation*. June.

U.S. Fish and Wildlife Service. 2023. *IPaC Trust Resource Report. List of Federal Endangered and Threatened Species That Occur in or May Be Affected by the Project*. Available: http://www.fws.gov/sacramento/es_species/Lists/es_species_lists.cfm. Assessed: 2022. Updated: January 5, 2023.

U.S. Fish and Wildlife Service. 2023. Environmental Conservation Online System—Species Profile for Western Pond Turtle (*Actinemys marmorata*). Available: https://ecos.fws.gov/ecp/species/1833. Accessed: January 18, 2023.

Vincik, R. F. and J. M. Julienne. 2012. Occurrence of delta smelt (*Hypomesus transpacificus*) in the lower Sacramento River near Knights Landing, California. California Fish and Game 98(3):171-174.

Vladykov, V. D., and W. I. Follett. 1958. Redescription of *Lampetra ayersii* (Gunther) of Western North America, a Species of Lamprey (Petromyzontidae) Distinct from *Lampetra fluviatilis* (Linnaeus) of Europe. *Journal of the Fisheries Research Board of Canada* 15(1):47–77.

Wang, J. C. S. 2010. *Fishes of the Sacramento–San Joaquin Estuary and Adjacent Waters, California: A Guide to the Early Life Histories*. Interagency Ecological Study Program for the Sacramento–San Joaquin Estuary, Technical Report 9. Stockton, CA.

Warner, J. S. and R. L. Rudd. 1975. Hunting by the White-Tailed Kite (*Elanus leucurus*). *Condor* 77(2):226–230.

Wilkerson, R. L., and R. B. Siegel. 2010. Assessing Changes in the Distribution and Abundance of Burrowing Owls in California, 1993–2007. *Bird Populations* 10:1–36*.*

Woodbridge, B. 1991. *Habitat Selection by Nesting Swainson's Hawks: A Hierarchical Approach*. Master's thesis. Oregon State University, Corvallis.

Woodbridge, B. 1998. Swainson's Hawk (*Buteo swainsoni*). *In* The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. Available: http://www.prbo.org/calpif/htmldocs/species/riparian/swainsons_hawk.htm. Accessed: January 30, 2023.

Yolo Habitat Conservancy. 2018a. *Yolo Habitat Conservation Plan/Natural Community Conservation Plan*. Sacramento, CA. Yolo Habitat Conservancy. 2018b. *Yolo Habitat Conservation Plan/Natural Community Conservation Plan Final Environmental Impact Statement/Environmental Impact Report*. Sacramento, CA.

Yoshiyama, R. M., F. W. Fisher, P. B. Moyle. 1998. Historical Abundance and Decline of Chinook Salmon in the Central Valley Region of California. *North American Journal of Fisheries Management* 18:487–521.

Zarn, M. 1974. Burrowing Owl (*Speotyto cunicularia hypugaea*). *Habitat Management Series for Unique or Endangered Species*. Technical Note 242. Denver, CO: Bureau of Land Management.

Federal and State Endangered Species Laws

Federal Endangered Species Act

The federal Endangered Species Act (ESA) is administered by the U.S. Fish and Wildlife Service (USFWS) for terrestrial and freshwater fish species and by the National Marine Fisheries Service (NMFS) for marine and anadromous species. ESA requires these federal agencies to maintain lists of threatened and endangered species.

USFWS or NMFS can list species as either endangered or threatened. An endangered species is at risk of extinction throughout all or a significant portion of its range (ESA Section 3[6]). A threatened species is likely to become endangered within the foreseeable future (ESA Section 3[19]). Section 9 of the ESA prohibits the take of any fish or wildlife species listed under ESA as endangered or threatened. Take, as defined by ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm is defined as "any act that kills or injures the species, including significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3).

Section 7

Section 7 of the ESA requires all federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of habitat critical to such species' survival. To ensure that its actions do not result in jeopardy to listed species or in the adverse modification of critical habitat, each federal agency must consult with USFWS and/or NMFS regarding federal agency actions that may affect listed species. The issuance of Clean Water Act Section 404 permits is a federal action that triggers a Section 7 consultation. Consultation begins when the federal agency submits a written request for initiation to USFWS or NMFS, along with the agency's biological assessment of its proposed action, and when USFWS or NMFS accepts that biological assessment as complete. If USFWS or NMFS concludes that the action is not likely to adversely affect a listed species, the action may be conducted without further review under ESA. Otherwise, USFWS or NMFS must prepare a written biological opinion describing how the agency's action will affect the listed species and its critical habitat.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Management and Conservation Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267) and the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109-479), requires federal agencies to consult with NMFS on activities that may adversely affect essential fish habitat (EFH). The purpose of the MSA is to conserve and manage the fishery resources of the United States and to promote protection of EFH. EFH is the aquatic habitat necessary for fish to spawn, breed, feed, or grow to maturity that will allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem (Pacific Fishery Management Council 2014). Important components of EFH include substrate, water quality, water quantity, depth, velocity, channel gradient and stability, food, cover, habitat complexity, space, access and passage, and habitat connectivity. EFH is described for Pacific salmon fisheries (specifically Chinook salmon) in Chapter 4. The MSA requires the following.

- Federal agencies undertaking, permitting, or funding an activity that may adversely affect EFH are required to consult with NMFS.
- NMFS is required to provide conservation recommendations for any federal or state activity that may adversely affect EFH.

Within 30 days of receiving conservation recommendations from NMFS, federal agencies must provide a detailed response in writing to NMFS regarding the conservation recommendations (the response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH, or reasons for not following the recommendations).

California Endangered Species Act

The California Endangered Species Act (CESA) prohibits take of wildlife and plants listed as threatened or endangered by the California Fish and Game Commission. *Take* is defined under the California Fish and Game Code (more narrowly than under ESA) as any action or attempt to "hunt, pursue, catch, capture, or kill." Therefore, *take under CESA does not include "the taking of habitat alone or the impacts of the taking." (Environmental Council of Sacramento v. City of Sacramento*, 142 Cal. App. 4th 1018 [2006]). *Rather, the courts have affirmed that under CESA, "taking involves mortality."*

Like ESA, CESA allows exceptions to the prohibition for take that occurs during otherwise lawful activities. The requirements of an application for incidental take under CESA are described in Section 2081 of the California Fish and Game Code. Incidental take of state-listed species may be authorized if an applicant submits an approved plan that minimizes and "fully mitigates" the impacts of this take.

Other Federal and State Wildlife Laws and Regulations

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918, as amended (MBTA), implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful, as is taking of any parts, nests, or eggs of such birds (U.S. Government Code [USC], title 16, section 703). Take is defined more narrowly under the MBTA than under ESA and includes only the death or injury of individuals of a migratory bird species or their eggs. As such, take under the MBTA does not include the concepts of harm and harassment as defined under ESA. The MBTA defines migratory birds broadly; all birds native to North America are considered migratory birds under the MBTA.

California Fish and Game Code Section 3503 (Bird Nests)

Section 3503 of the California Fish and Game Code makes it "unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." Therefore, CDFW may issue permits authorizing take.

Section 3503.5 of the California Fish and Game Code prohibits the take, possession, or destruction of any birds of prey or their nests or eggs "except as otherwise provided by this code or any regulation adopted pursuant thereto."

California Fully Protected Species

In the 1960s, before CESA was enacted, the California legislature identified specific species for protection under the California Fish and Game Code. These *fully protected* species may not be taken or possessed at any time, and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of bird species for the protection of livestock. Fully protected species are described in Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code. These protections state that "…no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected [bird], [mammal], [reptile or amphibian], [fish]."

Federal and State Wetland Laws and Regulations

Clean Water Act Section 404

The Clean Water Act is the primary federal law that protects the physical, chemical, and biological integrity of the nation's waters, including lakes, rivers, wetlands, and coastal waters. Programs conducted under the Clean Water Act are directed at both point source pollution (e.g., waste discharged from outfalls and filling of waters) and nonpoint source pollution (e.g., runoff from parking lots). Under the Clean Water Act, the U.S. Environmental Protection Agency (EPA) and state agencies set effluent limitations and issue permits under Clean Water Act Section 402 governing point-source discharges of wastes to waters. The U.S. Army Corps of Engineers (Corps), applying its regulations under guidelines issued by EPA, issues permits under Clean Water Act Section 404 governing under what circumstances dredged or fill material may be discharged to waters. These Section 402 and 404 permits are the primary regulatory tools of the Clean Water Act. EPA has oversight over all Clean Water Act permits issued by the Corps.

The Corps issues two types of permits under Section 404: general permits (either nationwide permits or regional permits) and standard permits (either letters of permission or individual permits). General permits are issued by the Corps to streamline the Section 404 process for nationwide, statewide, or regional activities that have minimal direct or cumulative environmental impacts on the aquatic environment. Standard permits are issued for activities that do not qualify for a general permit (i.e., activities that may have more than a minimal adverse environmental impact).

Clean Water Act Section 401 and the Porter-Cologne Water Quality Control Act

Under Clean Water Act Section 401, states have the authority to certify federal permits for discharges to waters under state jurisdiction. States may review proposed federal permits (e.g., Section 404 permits) for compliance with state water quality standards. The permit cannot be issued if the state denies certification. In California, the State Water Resources Control Board (State Board) and the Regional Water Quality Control Boards (RWQCBs) are responsible for the issuance of Section 401 certifications.

The Porter-Cologne Water Quality Control Act is the primary state law concerning water quality. It authorizes the State Board and RWQCBs to prepare management plans such as regional water quality plans to address the quality of groundwater and surface water. The Porter-Cologne Water Quality Control Act also authorizes the RWQCBs to issue waste discharge requirements defining limitations on allowable discharge to waters of the state. In addition to issuing Section 401 certifications on Section 404 applications to fill waters, the RWQCBs may also issue waste discharge requirements for such activities. Because the authority for waste discharge requirements is derived from the Porter-Cologne Water Quality Control Act and not the Clean Water Act, waste discharge requirements may apply to a somewhat different range of aquatic resources than do Section 404 permits and Section 401 Water Quality certifications. Applicants that obtain a permit from the Corps under Section 404 must also obtain certification of that permit by the RWQCB with jurisdiction over the project site.

California Fish and Game Code Section 1602 (Lake or Streambed Alteration Program)

CDFW has jurisdictional authority over streams, lakes, and wetland resources associated with these aquatic systems under California Fish and Game Code Section 1600 et seq. California Fish and Game Code Section 1600 et seq. was repealed and replaced in October 2003 with new Sections 1600–1616 that took effect on January 1, 2004. CDFW has the authority to regulate work that will "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake." Activities of any person, state, or local governmental agency, or public utility are regulated by CDFW under Section 1602 of the Code. CDFW enters into a streambed or lakebed alteration agreement with the project proponent and can impose conditions on the agreement to ensure no net loss of values or acreage of the stream, lake, associated wetlands, and associated riparian habitat.

The lake or streambed alteration agreement is not a permit, but rather a mutual agreement between CDFW and the project proponent. Because CDFW includes under its jurisdiction streamside habitats that may not qualify as wetlands under the Clean Water Act definition, CDFW jurisdiction may be broader than Corps jurisdiction.

A project proponent must submit a *Notification of Streambed Alteration* to CDFW before construction. The notification requires an application fee for streambed alteration agreements, with a specific fee schedule to be determined by CDFW.

Local Policies

The biological study area is within the Yolo HCP/NCCP planning area (Yolo Habitat Conservancy 2018). The Yolo HCP/NCCP provides ESA permits and associated mitigation for planned covered activities including infrastructure (e.g., roads and bridges), development (e.g., agricultural processing facilities, housing, and commercial buildings), and operation and maintenance activities, and implementation of the Yolo HCP/NCCP. The plan covers several natural communities and species, including western pond turtle, giant garter snake, white-tailed kite, tricolored blackbird, Swainson's hawk, and burrowing owl.

Appendix B

California Department of Fish and Wildlife, California Native Plant Society, and U. S. Fish and Wildlife Species Lists

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE RareFind

Query Summary:
Quad IS (Sacramento West (3812155) OR Sacramento East (3812154) OR Grays Bend (3812166) OR Taylor Monument (3812165) OR Rio Linda (3812164) OR Davis (3812156) OR Saxon (3812146) OR Clarksburg (3812145) OR Florin (3812144))

Print Close

CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Occs	Returned Occs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
Accipiter cooperii	Cooper's hawk	Birds	ABNKC12040	118	3	None	None	G5	S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Cismontane woodland, Riparian forest, Riparian woodland, Upper montane coniferous forest
Acipenser medirostris pop. 1	green sturgeon - southern DPS	Fish	AFCAA01031	14	2	Threatened	None	G2T1	S1	null	AFS_VU-Vulnerable, IUCN_EN-Endangered	Aquatic, Estuary, Marine bay, Sacramento/San Joaquin flowing waters
Agelaius tricolor	tricolored blackbird	Birds	ABPBXB0020	955	22	None	Threatened	G1G2	S1S2	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered, NABCI_RWL-Red Watch List, USFWS_BCC-Birds of Conservation Concern	Freshwater marsh, Marsh & swamp, Swamp, Wetland
Ammodramus savannarum	grasshopper sparrow	Birds	ABPBXA0020	27	2	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Valley & foothill grassland
Antrozous pallidus	pallid bat	Mammals	AMACC10010	420	1	None	None	G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFS_S-Sensitive	Chaparral, Coastal scrub, Desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Riparian woodland, Sonoran desert scrub, Upper montane coniferous forest, Valley & foothill grassland
Archoplites interruptus	Sacramento perch	Fish	AFCQB07010	5	1	None	None	G1	S1	null	AFS_TH-Threatened, CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered	Aquatic, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters
Ardea alba	great egret	Birds	ABNGA04040	43	6	None	None	G5	S4	null	CDF_S-Sensitive, IUCN_LC-Least Concern	Brackish marsh, Estuary, Freshwater marsh, Marsh & swamp, Riparian forest, Wetland
Ardea herodias	great blue heron	Birds	ABNGA04010	156	7	None	None	G5	S4	null	CDF_S-Sensitive, IUCN_LC-Least Concern	Brackish marsh, Estuary, Freshwater marsh, Marsh & swamp, Riparian forest, Wetland
Astragalus tener var. ferrisiae	Ferris' milk-vetch	Dicots	PDFAB0F8R3	18	4	None	None	G2T1	S1	1B.1	null	Meadow & seep, Valley & foothill grassland, Wetland

Astragalus tener var. tener	alkali milk-vetch	Dicots	PDFAB0F8R1	65	10	None	None	G2T1	S1	1B.2	SB_UCSC-UC Santa Cruz	Alkali playa, Valley & foothill grassland, Vernal pool, Wetland
Athene cunicularia	burrowing owl	Birds	ABNSB10010	2011	87	None	None	G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFWS_BCC-Birds of Conservation Concern	Coastal prairie, Coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, Valley & foothill grassland
Atriplex cordulata var. cordulata	heartscale	Dicots	PDCHE040B0	66	1	None	None	G3T2	S2	1B.2	BLM_S-Sensitive	Chenopod scrub, Meadow & seep, Valley & foothill grassland
Atriplex depressa	brittlescale	Dicots	PDCHE042L0	60	5	None	None	G2	S2	1B.2	null	Alkali playa, Chenopod scrub, Meadow & seep, Valley & foothill grassland, Vernal pool, Wetland
Bombus crotchii	Crotch bumble bee	Insects	IIHYM24480	437	1	None	Candidate Endangered	G2	S2	null	IUCN_EN-Endangered	null
Bombus occidentalis	western bumble bee	Insects	IIHYM24252	306	1	None	Candidate Endangered	G3	S1	null	IUCN_VU-Vulnerable, USFS_S-Sensitive	null
Branchinecta conservatio	Conservancy fairy shrimp	Crustaceans	ICBRA03010	53	1	Endangered	None	G2	S2	null	IUCN_EN-Endangered	Valley & foothill grassland, Vernal pool, Wetland
Branchinecta lynchi	vernal pool fairy shrimp	Crustaceans	ICBRA03030	796	39	Threatened	None	G3	S3	null	IUCN_VU-Vulnerable	Valley & foothill grassland, Vernal pool, Wetland
Branchinecta mesovallensis	midvalley fairy shrimp	Crustaceans	ICBRA03150	144	8	None	None	G2	S2S3	null	null	Vernal pool, Wetland
Buteo regalis	ferruginous hawk	Birds	ABNKC19120	107	2	None	None	G4	S3S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Great Basin grassland, Great Basin scrub, Pinon & juniper woodlands, Valley & foothill grassland
Buteo swainsoni	Swainson's hawk	Birds	ABNKC19070	2548	313	None	Threatened	G5	S3	null	BLM_S-Sensitive, IUCN_LC-Least Concern	Great Basin grassland, Riparian forest, Riparian woodland, Valley & foothill grassland
Carex comosa	bristly sedge	Monocots	PMCYP032Y0	31	1	None	None	G5	S2	2B.1	IUCN_LC-Least Concern	Coastal prairie, Freshwater marsh, Marsh & swamp, Valley & foothill grassland, Wetland
Centromadia parryi ssp. parryi	pappose tarplant	Dicots	PDAST4R0P2	39	2	None	None	G3T2	S2	1B.2	BLM_S-Sensitive	Chaparral, Coastal prairie, Marsh & swamp, Meadow & seep, Valley & foothill grassland
Charadrius montanus	mountain plover	Birds	ABNNB03100	90	4	None	None	G3	S2S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_NT-Near Threatened, NABCI_RWL-Red Watch List, USFWS_BCC-Birds of Conservation Concern	Chenopod scrub, Valley & foothill grassland
Charadrius nivosus nivosus	western snowy plover	Birds	ABNNB03031	138	2	Threatened	None	G3T3	S3	null	CDFW_SSC-Species of Special Concern, NABCI_RWL-Red Watch List	Great Basin standing waters, Sand shore, Wetland

Chloropyron palmatum	palmate-bracted bird's-beak	Dicots	PDSCR0J0J0	25	3	Endangered	Endangered	G1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Chenopod scrub, Meadow & seep, Valley & foothill grassland, Wetland
Cicindela hirticollis abrupta	Sacramento Valley tiger beetle	Insects	IICOL02106	6	2	None	None	G5TH	SH	null	null	Sand shore
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Birds	ABNRB02022	165	2	Threatened	Endangered	G5T2T3	S1	null	BLM_S-Sensitive, NABCI_RWL-Red Watch List, USFS_S-Sensitive	Riparian forest
Cuscuta obtusiflora var. glandulosa	Peruvian dodder	Dicots	PDCUS01111	6	1	None	None	G5T4?	SH	2B.2	null	Marsh & swamp, Wetland
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Insects	IICOL48011	271	24	Threatened	None	G3T2T3	S3	null	null	Riparian scrub
Downingia pusilla	dwarf downingia	Dicots	PDCAM060C0	132	6	None	None	GU	S2	2B.2	null	Valley & foothill grassland, Vernal pool, Wetland
Egretta thula	snowy egret	Birds	ABNGA06030	20	1	None	None	G5	S4	null	IUCN_LC-Least Concern	Marsh & swamp, Meadow & seep, Riparian forest, Riparian woodland, Wetland
Elanus leucurus	white-tailed kite	Birds	ABNKC06010	184	18	None	None	G5	S3S4	null	BLM_S-Sensitive, CDFW_FP-Fully Protected, IUCN_LC-Least Concern	Cismontane woodland, Marsh & swamp, Riparian woodland, Valley & foothill grassland, Wetland
Elderberry Savanna	Elderberry Savanna	Riparian	CTT63440CA	4	3	None	None	G2	S2.1	null	null	Riparian scrub
Emys marmorata	western pond turtle	Reptiles	ARAAD02030	1421	7	None	None	G3G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_VU-Vulnerable, USFS_S-Sensitive	Aquatic, Artificial flowing waters, Klamath/North coast flowing waters, Klamath/North coast standing waters, Marsh & swamp, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing waters, South coast standing waters, Wetland
Eryngium jepsonii	Jepson's coyote-thistle	Dicots	PDAPI0Z130	19	2	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Valley & foothill grassland, Vernal pool
Extriplex joaquinana	San Joaquin spearscale	Dicots	PDCHE041F3	127	9	None	None	G2	S2	1B.2	BLM_S-Sensitive, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Alkali playa, Chenopod scrub, Meadow & seep, Valley & foothill grassland
Falco columbarius	merlin	Birds	ABNKD06030	37	6	None	None	G5	S3S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Estuary, Great Basin grassland, Valley & foothill grassland
Fritillaria agrestis	stinkbells	Monocots	PMLIL0V010	32	2	None	None	G3	S3	4.2	null	Chaparral, Cismontane woodland, Pinon & juniper woodlands, Ultramafic, Valley & foothill grassland
Gonidea angulata	western ridged mussel	Mollusks	IMBIV19010	157	1	None	None	G3	S1S2	null	IUCN_VU-Vulnerable	Aquatic

Gratiola heterosepala	Boggs Lake hedge-hyssop	Dicots	PDSCR0R060	99	1	None	Endangered	G2	S2	1B.2	BLM_S-Sensitive	Freshwater marsh, Marsh & swamp, Vernal pool, Wetland
Great Valley Cottonwood Riparian Forest	Great Valley Cottonwood Riparian Forest	Riparian	CTT61410CA	56	1	None	None	G2	S2.1	null	null	Riparian forest
Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	Dicots	PDMAL0H0R3	173	10	None	None	G5T3	S3	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_UCBG-UC Botanical Garden at Berkeley	Freshwater marsh, Marsh & swamp, Wetland
Hypomesus transpacificus	Delta smelt	Fish	AFCHB01040	29	1	Threatened	Endangered	G1	S1	null	AFS_TH-Threatened, IUCN_CR-Critically Endangered	Aquatic, Estuary
Lasionycteris noctivagans	silver-haired bat	Mammals	AMACC02010	139	1	None	None	G3G4	S3S4	null	IUCN_LC-Least Concern	Lower montane coniferous forest, Oldgrowth, Riparian forest
Lasiurus cinereus	hoary bat	Mammals	AMACC05032	238	2	None	None	G3G4	S4	null	IUCN_LC-Least Concern	Broadleaved upland forest, Cismontane woodland, Lower montane coniferous forest, North coast coniferous forest
Lasthenia chrysantha	alkali-sink goldfields	Dicots	PDAST5L030	55	1	None	None	G2	S2	1B.1	null	Vernal pool
Laterallus jamaicensis coturniculus	California black rail	Birds	ABNME03041	303	1	None	Threatened	G3T1	S1	null	BLM_S-Sensitive, CDFW_FP-Fully Protected, IUCN_EN-Endangered, NABCI_RWL-Red Watch List	Brackish marsh, Freshwater marsh, Marsh & swamp, Salt marsh, Wetland
Legenere limosa	legenere	Dicots	PDCAM0C010	83	7	None	None	G2	S2	1B.1	BLM_S-Sensitive, SB_UCBG-UC Botanical Garden at Berkeley	Vernal pool, Wetland
Lepidium latipes var. heckardii	Heckard's pepper-grass	Dicots	PDBRA1M0K1	14	7	None	None	G4T1	S1	1B.2	null	Valley & foothill grassland, Vernal pool
Lepidurus packardi	vernal pool tadpole shrimp	Crustaceans	ICBRA10010	329	26	Endangered	None	G4	S3	null	IUCN_EN-Endangered	Valley & foothill grassland, Vernal pool, Wetland
Lilaeopsis masonii	Mason's lilaeopsis	Dicots	PDAPI19030	198	1	None	Rare	G2	S2	1B.1	null	Freshwater marsh, Marsh & swamp, Riparian scrub, Wetland
Linderiella occidentalis	California linderiella	Crustaceans	ICBRA06010	508	42	None	None	G2G3	S2S3	null	IUCN_NT-Near Threatened	Vernal pool
Melospiza melodia pop. 1	song sparrow ("Modesto" population)	Birds	ABPBXA3013	92	10	None	None	G5T3?Q	S3?	null	CDFW_SSC-Species of Special Concern	Artificial flowing waters, Freshwater marsh, Riparian forest, Riparian scrub, Riparian woodland, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters
Myrmosula pacifica	Antioch multilid wasp	Insects	IIHYM15010	4	1	None	None	GH	SH	null	null	Interior dunes
Nannopterum auritum	double-crested cormorant	Birds	ABNFD01020	39	3	None	None	G5	S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Riparian forest, Riparian scrub, Riparian woodland
Navarretia leucocephala ssp. bakeri	Baker's navarretia	Dicots	PDPLM0C0E1	64	2	None	None	G4T2	S2	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Cismontane woodland, Lower montane coniferous forest, Meadow & seep, Valley &

												foothill grassland, Vernal pool, Wetland
Neostapfia colusana	Colusa grass	Monocots	PMPOA4C010	66	3	Threatened	Endangered	G1	S1	1B.1	null	Vernal pool, Wetland
Northern Claypan Vernal Pool	Northern Claypan Vernal Pool	Herbaceous	CTT44120CA	21	1	None	None	G1	S1.1	null	null	Vernal pool, Wetland
Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	Herbaceous	CTT44110CA	126	8	None	None	G3	S3.1	null	null	Vernal pool, Wetland
Nycticorax nycticorax	black-crowned night heron	Birds	ABNGA11010	37	4	None	None	G5	S4	null	IUCN_LC-Least Concern	Marsh & swamp, Riparian forest, Riparian woodland, Wetland
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Fish	AFCHA0209K	31	5	Threatened	None	G5T2Q	S2	null	AFS_TH-Threatened	Aquatic, Sacramento/San Joaquin flowing waters
Oncorhynchus tshawytscha pop. 11	chinook salmon - Central Valley spring-run ESU	Fish	AFCHA0205L	13	1	Threatened	Threatened	G5T2Q	S2	null	AFS_TH-Threatened	Aquatic, Sacramento/San Joaquin flowing waters
Oncorhynchus tshawytscha pop. 7	chinook salmon - Sacramento River winter-run ESU	Fish	AFCHA0205B	2	1	Endangered	Endangered	G5T1Q	S2	null	AFS_EN-Endangered	Aquatic, Sacramento/San Joaquin flowing waters
Plagiobothrys hystriculus	bearded popcornflower	Dicots	PDBOR0V0H0	15	1	None	None	G2	S2	1B.1	null	Valley & foothill grassland, Vernal pool, Wetland
Plegadis chihi	white-faced ibis	Birds	ABNGE02020	20	1	None	None	G5	S3S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Marsh & swamp, Wetland
Pogonichthys macrolepidotus	Sacramento splittail	Fish	AFCJB34020	15	1	None	None	G3	S3	null	AFS_VU-Vulnerable, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Aquatic, Estuary, Freshwater marsh, Sacramento/San Joaquin flowing waters
Progne subis	purple martin	Birds	ABPAU01010	71	10	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Broadleaved upland forest, Lower montane coniferous forest
Puccinellia simplex	California alkali grass	Monocots	PMPOA53110	80	8	None	None	G2	S2	1B.2	BLM_S-Sensitive	Chenopod scrub, Meadow & seep, Valley & foothill grassland, Vernal pool
Riparia riparia	bank swallow	Birds	ABPAU08010	299	1	None	Threatened	G5	S2	null	BLM_S-Sensitive, IUCN_LC-Least Concern	Riparian scrub, Riparian woodland
Sagittaria sanfordii	Sanford's arrowhead	Monocots	PMALI040Q0	143	26	None	None	G3	S3	1B.2	BLM_S-Sensitive	Marsh & swamp, Wetland
Sidalcea keckii	Keck's checkerbloom	Dicots	PDMAL110D0	50	2	Endangered	None	G2	S2	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Cismontane woodland, Ultramafic, Valley & foothill grassland
Spirinchus thaleichthys	longfin smelt	Fish	AFCHB03010	46	1	Candidate	Threatened	G5	S1	null	IUCN_LC-Least Concern	Aquatic, Estuary
Symphyotrichum lentum	Suisun Marsh aster	Dicots	PDASTE8470	175	1	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_USDA-US Dept of Agriculture	Brackish marsh, Freshwater marsh, Marsh & swamp, Wetland
Taxidea taxus	American badger	Mammals	AMAJF04010	594	3	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Alkali marsh, Alkali playa, Alpine, Alpine dwarf scrub, Bog & fen, Brackish marsh, Broadleaved upland forest, Chaparral, Chenopod

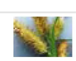
												scrub, Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal dunes, Coastal prairie, Coastal scrub, Desert dunes, Desert wash, Freshwater marsh, Great Basin grassland, Great Basin scrub, Interior dunes, Ione formation, Joshua tree woodland, Limestone, Lower montane coniferous forest, Marsh & swamp, Meadow & seep, Mojavean desert scrub, Montane dwarf scrub, North coast coniferous forest, Oldgrowth, Pavement plain, Redwood, Riparian forest, Riparian scrub, Riparian woodland, Salt marsh, Sonoran desert scrub, Sonoran thorn woodland, Ultramafic, Upper montane coniferous forest, Upper Sonoran scrub, Valley & foothill grassland
Thamnophis gigas	giant gartersnake	Reptiles	ARADB36150	373	87	Threatened	Threatened	G2	S2	null	IUCN_VU-Vulnerable	Marsh & swamp, Riparian scrub, Wetland
Trifolium hydrophilum	saline clover	Dicots	PDFAB400R5	56	8	None	None	G2	S2	1B.2	null	Marsh & swamp, Valley & foothill grassland, Vernal pool, Wetland
Tuctoria mucronata	Crampton's tuctoria or Solano grass	Monocots	PMPOA6N020	4	2	Endangered	Endangered	G1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Valley & foothill grassland, Vernal pool, Wetland
Vireo bellii pusillus	least Bell's vireo	Birds	ABPBW01114	504	2	Endangered	Endangered	G5T2	S2	null	NABCI_YWL-Yellow Watch List	Riparian forest, Riparian scrub, Riparian woodland
Xanthocephalus xanthocephalus	yellow-headed blackbird	Birds	ABPBXB3010	13	1	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Marsh & swamp, Wetland

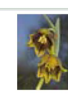
CALIFORNIA NATIVE PLANT SOCIETY

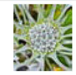
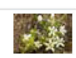
Search Results

33 matches found. Click on scientific name for details

Search Criteria: Quad is one of [**3812155:3812166:3812165:3812164:3812156:3812154:3812146:3812145:3812144**]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	GENERAL HABITATS	MICROHABITATS	LOWEST ELEVATION (FT)	HIGHEST ELEVATION (FT)	CA ENDEMIC	DATE ADDED	PHOTO
Astragalus pauperculus	depauperate milk-vetch	Fabaceae	annual herb	Mar-Jun	None	None	G4	S4	4.3	Chaparral, Cismontane woodland, Valley and foothill grassland	Vernally Mesic, Volcanic	195	3985	Yes	1974-01-01	 ©2012 Tim Kellison
Astragalus tener var. ferrisiae	Ferris' milk-vetch	Fabaceae	annual herb	Apr-May	None	None	G2T1	S1	1B.1	Meadows and seeps (vernally mesic), Valley and foothill grassland (subalkaline flats)		5	245	Yes	1994-01-01	No Photo Available
Astragalus tener var. tener	alkali milk-vetch	Fabaceae	annual herb	Mar-Jun	None	None	G2T1	S1	1B.2	Playas, Valley and foothill grassland (adobe clay), Vernal pools	Alkaline	5	195	Yes	1994-01-01	No Photo Available
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G3T2	S2	1B.2	Chenopod scrub, Meadows and seeps, Valley and foothill grassland (sandy)	Alkaline (sometimes)	0	1835	Yes	1988-01-01	 © 1994 Robert E. Preston, Ph.D.
Atriplex depressa	brittlescale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G2	S2	1B.2	Chenopod scrub, Meadows and seeps, Playas, Valley and foothill grassland, Vernal pools	Alkaline, Clay	5	1050	Yes	1994-01-01	 © 2009 Zoya Akulova
Brodiaea rosea ssp. vallicola	valley brodiaea	Themidaceae	perennial bulbiferous herb	Apr-May(Jun)	None	None	G5T3	S3	4.2	Valley and foothill grassland, Vernal pools	Alluvial Terraces, Gravelly, Sandy	35	1100	Yes	2019-01-07	 © 2011 Steven Perry
Carex comosa	bristly sedge	Cyperaceae	perennial rhizomatous herb	May-Sep	None	None	G5	S2	2B.1	Coastal prairie, Marshes and swamps (lake margins), Valley and foothill grassland		0	2050		1994-01-01	 Dean Wm. Taylor 1997

Centromadia parryi ssp. *parryi*	pappose tarplant	Asteraceae	annual herb	May-Nov	None	None	G3T2	S2	1B.2	Chaparral, Coastal prairie, Marshes and swamps (coastal salt), Meadows and seeps, Valley and foothill grassland (vernally mesic)	Alkaline (often)	0	1380	Yes	2004-01-01	No Photo Available
Centromadia parryi ssp. *rudis*	Parry's rough tarplant	Asteraceae	annual herb	May-Oct	None	None	G3T3	S3	4.2	Valley and foothill grassland, Vernal pools	Alkaline, Roadsides (sometimes), Seeps, Vernally Mesic	0	330	Yes	2007-05-22	No Photo Available
Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	May-Oct	FE	CE	G1	S1	1B.1	Chenopod scrub, Valley and foothill grassland	Alkaline	15	510	Yes	1974-01-01	No Photo Available
Cuscuta obtusiflora var. *glandulosa*	Peruvian dodder	Convolvulaceae	annual vine (parasitic)	Jul-Oct	None	None	G5T4?	SH	2B.2	Marshes and swamps (freshwater)		50	920		2011-08-24	No Photo Available
Downingia pusilla	dwarf downingia	Campanulaceae	annual herb	Mar-May	None	None	GU	S2	2B.2	Valley and foothill grassland (mesic), Vernal pools		5	1460		1980-01-01	No Photo Available
Eryngium jepsonii	Jepson's coyote-thistle	Apiaceae	perennial herb	Apr-Aug	None	None	G2	S2	1B.2	Valley and foothill grassland, Vernal pools	Clay	10	985	Yes	2016-09-13	No Photo Available
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G2	S2	1B.2	Chenopod scrub, Meadows and seeps, Playas, Valley and foothill grassland	Alkaline	5	2740	Yes	1988-01-01	No Photo Available
Fritillaria agrestis	stinkbells	Liliaceae	perennial bulbiferous herb	Mar-Jun	None	None	G3	S3	4.2	Chaparral, Cismontane woodland, Pinyon and juniper woodland, Valley and foothill grassland	Clay, Serpentinite (sometimes)	35	5100	Yes	1980-01-01	 © 2016 Aaron Schusteff
Gratiola heterosepala	Boggs Lake hedge-hyssop	Plantaginaceae	annual herb	Apr-Aug	None	CE	G2	S2	1B.2	Marshes and swamps (lake margins), Vernal pools	Clay	35	7790		1974-01-01	 ©2004 Carol W. Witham

Hesperevax caulescens	hogwallow starfish	Asteraceae	annual herb	Mar-Jun	None	None	G3	S3	4.2	Valley and foothill grassland (mesic clay), Vernal pools (shallow)	Alkaline (sometimes)	0	1655	Yes	2001-01-01	 © 2017 John Doyen
Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	Malvaceae	perennial rhizomatous herb (emergent)	Jun-Sep	None	None	G5T3	S3	1B.2	Marshes and swamps (freshwater)		0	395	Yes	1974-01-01	 © 2020 Steven Perry
Lasthenia chrysantha	alkali-sink goldfields	Asteraceae	annual herb	Feb-Apr	None	None	G2	S2	1B.1	Vernal pools	Alkaline	0	655	Yes	2019-09-30	 © 2009 California State University, Stanislaus
Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.1	Vernal pools		5	2885	Yes	1974-01-01	 ©2000 John Game
Lepidium latipes var. heckardii	Heckard's pepper-grass	Brassicaceae	annual herb	Mar-May	None	None	G4T1	S1	1B.2	Valley and foothill grassland (alkaline flats)		5	655	Yes	1994-01-01	 2018 Jennifer Buck
Lilaeopsis masonii	Mason's lilaeopsis	Apiaceae	perennial rhizomatous herb	Apr-Nov	None	CR	G2	S2	1B.1	Marshes and swamps (brackish, freshwater), Riparian scrub		0	35	Yes	1974-01-01	No Photo Available
Myosurus minimus ssp. apus	little mousetail	Ranunculaceae	annual herb	Mar-Jun	None	None	G5T2Q	S2	3.1	Valley and foothill grassland, Vernal pools (alkaline)		65	2100		1980-01-01	No Photo Available
Navarretia cotulifolia	cotula navarretia	Polemoniaceae	annual herb	May-Jun	None	None	G4	S4	4.2	Chaparral, Cismontane woodland, Valley and foothill grassland	Adobe	15	6005	Yes	2001-01-01	 © 2020 Zoya Akulova
Navarretia leucocephala ssp. bakeri	Baker's navarretia	Polemoniaceae	annual herb	Apr-Jul	None	None	G4T2	S2	1B.1	Cismontane woodland, Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland, Vernal pools	Mesic	15	5710	Yes	1994-01-01	 © 2018 Barry Rice
Neostapfia colusana	Colusa grass	Poaceae	annual herb	May-Aug	FT	CE	G1	S1	1B.1	Vernal pools (adobe clay)		15	655	Yes	1974-01-01	No Photo Available

Plagiobothrys hystriculus	bearded popcornflower	Boraginaceae	annual herb	Apr-May	None	None	G2	S2	1B.1	Valley and foothill grassland (mesic), Vernal pools (margins)		0	900	Yes	1974-01-01	No Photo Available
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	None	None	G2	S2	1B.2	Chenopod scrub, Meadows and seeps, Valley and foothill grassland, Vernal pools	Alkaline, Flats, Lake Margins, Vernally Mesic	5	3050		2015-10-15	No Photo Available
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	None	None	G3	S3	1B.2	Marshes and swamps (shallow freshwater)		0	2135	Yes	1984-01-01	 ©2013 Debra L. Cook
Sidalcea keckii	Keck's checkerbloom	Malvaceae	annual herb	Apr-May(Jun)	FE	None	G2	S2	1B.1	Cismontane woodland, Valley and foothill grassland	Clay, Serpentinite	245	2135	Yes	1974-01-01	No Photo Available
Symphyotrichum lentum	Suisun Marsh aster	Asteraceae	perennial rhizomatous herb	(Apr)May-Nov	None	None	G2	S2	1B.2	Marshes and swamps (brackish, freshwater)		0	10	Yes	1974-01-01	No Photo Available
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.2	Marshes and swamps, Valley and foothill grassland (mesic, alkaline), Vernal pools		0	985	Yes	2001-01-01	No Photo Available
Tuctoria mucronata	Crampton's tuctoria or Solano grass	Poaceae	annual herb	Apr-Aug	FE	CE	G1	S1	1B.1	Valley and foothill grassland (mesic), Vernal pools		15	35	Yes	1974-01-01	No Photo Available

Showing 1 to 33 of 33 entries

Suggested Citation:
California Native Plant Society, Rare Plant Program. 2023. Rare Plant Inventory (online edition, v9.5). Website https://www.rareplants.cnps.org [accessed 5 January 2023].

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
Phone: (916) 930-5603 Fax: (916) 930-5654

In Reply Refer To: January 05, 2023
Project Code: 2023-0030675
Project Name: Swanston

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http:// www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http:// www.towerkill.com; and http:// www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/ comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
(916) 930-5603

Project Summary

Project Code: 2023-0030675
Project Name: Swanston
Project Type: Species Habitat Preservation/Restoration/Creation
Project Description: Fish Screen Improvements Restoration
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.5842704,-121.58562727631792,14z

Counties: Yolo County, California

Endangered Species Act Species

There is a total of 8 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. 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.

Birds

NAME	STATUS
Least Bell's Vireo *Vireo bellii pusillus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5945	Endangered

Reptiles

NAME	STATUS
Giant Garter Snake *Thamnophis gigas* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (Central CA DPS) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp *Lepidurus packardi* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2246	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

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Lead Agency Contact Information

Lead Agency: Bureau of Reclamation

Appendix C
Terrestrial Species Observed

Table C.1. Plant Species Observed in the Upper Swanston Ranch, Inc. Irrigation and Fish Passage Improvement Biological Study Area

Scientific Name	Common Name	Indicator Status[a]
Acer negundo	Boxelder	FACW
*Agrostis stolonifera**	Redtop	FACW
*Alisma lanceolatum**	Water plantain	OBL
*Amaranthus albus**	Tumbleweed	FACU
*Ammi visnaga**	Toothpick weed	UPL
Amsinckia intermedia	Common fiddleneck	UPL
*Anthemis cotula**	Dog fennel	FACU
*Avena fatua**	Wildoats	UPL
Azolla filiculoides	Mosquito fern	OBL
*Brassica rapa**	Common mustard	FACU
*Bromus diandrus**	Ripgut brome	UPL
*Bromus hordeaceous**	Soft chess	FACU
*Centaurea solstitialis**	Yellow star thistle	UPL
Centromadia parryi ssp. rudis (CRPR 4.2)	Pappose tarweed	FACW
*Cichorium intybus**	Chicory	FACU
*Cirsium vulgare**	Bullthistle	FACU
*Convolvulus arvensis**	Field bindweed	UPL
Crypsis schoenoides	Swamp grass	FACW
*Cynodon dactylon**	Bermuda grass	FACU
Cyperus eragrostis	Tall cyperus	FACW
*Dipsacus fullonum**	Wild teasel	FAC
Distichlis spicata	Salt grass	FAC
Epilobium brachycarpum	Willow herb	FAC
Erigeron canadensis	Canadian horseweed	FACU
*Erodium botrys**	Big heron bill	FACU
Festuca perennis (Lolium perenne)	Italian rye grass	FAC
Helminthotheca echioides	Bristly ox-tounge	FAC
*Hirschfeldia incana**	Mediterranean hoary mustard	UPL
Hydrocotyle umbellata	Marsh pennywort	OBL
Juncus balticus	Baltic rush	FACW
Juncus effusus ssp. *pacificus*	Pacific rush	FACW
Lactuca saligna	Willow lettuce	UPL
Lactuca serriola	Prickly lettuce	FACU
*Lepidium latifolium**	Perennial pepperweed	FAC

Scientific Name	Common Name	Indicator Status[a]
Leptochloa fusca ssp. fascisularis	Bearded sprangletop	UPL
*Lotus corniculatus**	Bird’s foot trefoil	FAC
*Ludwigia hexapetala**	Six petal water primrose	OBL
Lythrum hyssopifolia	Hyssop loosestrife	OBL
Malvella leprosa	Alkali mallow	FACU
*Marrubium vulgare**	White horehound	FACU
Medicago polymorpha	Toothed medick	FACU
*Melilotus albus**	White sweetclover	UPL
*Mentha pulegium**	Pennyroyal	OBL
Paspalum dilatatum	Dallis grass	FAC
*Phalaris paradoxa**	Hood canarygrass	UPL
Phyla nodiflora	Common lippia	FACW
*Polygonum aviculare**	Prostrate knotweed	FAC
*Polypogon monspelinesis**	Annual beard grass	FACW
Populus fremontii	Fremont cottonwood	FAC
Quercus lobata	Valley oak	FACU
*Raphanus sativus**	Wild radish	UPL
Rosa californica	California wild rose	FAC
*Rubus armeniacus**	Himalayan blackberry	FAC
*Rumex acetosella**	Sheep sorrel	FAC
*Rumex crispus**	Curly dock	FAC
Salix exigua var. hindsiana	Sandbar willow	FACW
Salix lasiolepis	Arroyo willow	FACW
*Salsola tragus**	Russian thistle	FACU
Schoenoplectus acutus	Tule	OBL
*Sonchus asper**	Spiny sowthistle	FAC
*Sonchus oleraceus**	Sow thistle	UPL
*Trifolium repens**	White clover	FACU
Typha latifolia	Broadleaf cattail	OBL
*Verbena bonariensis**	Purple top vervain	FACW
Xanthium strumarium	Cocklebur	FAC

[a] Wetland indicator status categories defined on the Arid West 2020 Regional Wetland Plant List by the U.S. Army Corps of Engineers (2020):
OBL = Obligate, almost always occurs in wetlands (>99% probability of occurrence).
FACW = Facultative wetland, usually occurs in wetlands (66–99% probability of occurrence).
FAC = Facultative, equally likely to occur in wetlands or nonwetlands (34–66% probability of occurrence).
FACU = Facultative upland, usually occurs in nonwetlands but occasionally in wetlands (1–33% probability of occurrence).
UPL = Upland, or not included on the wetland indicator list.
* Invasive plant species.

Table C.2. Wildlife Species Observed in the Upper Swanston Ranch, Inc. Irrigation and Fish Passage Improvement Biological Study Area

Scientific Name	Common Name
Birds	
Agelaius phoeniceus	Red-winged blackbird
Anas platyrhynchos	Mallard
Aphelocoma californica	Western scrub-jay
Ardea alba	Great egret
Ardea herodias	Great blue heron
Branta canadensis	Canada goose
Buteo jamaicensis	Red-tailed hawk
Butorides virescens	Green heron
Calypte anna	Anna's hummingbird
Cathartes aura	Turkey vulture
Charadrius vociferous	Killdeer
Corvus brachyrhynchos	American crow
Egretta thula	Snowy egret
Euphagus cyanocephalus	Brewer's blackbird
Mimus polyglottos	Northern mockingbird
Sayornis nigricans	Black phoebe
Zenaida macroura	Mourning dove
Zonotrichia leucophrys	White-crowned sparrow
Mammals	
Lepus californicus	Black-tailed jackrabbit
Lontra canadensis	River otter
Spermophilus beecheyi	California ground squirrel
Sylvilagus audubonii	Audubon's cottontail

Wildlife observed on November 14, 2022

Appendix D
Representative Photographs

Photograph 1. Tule Canal looking north. Left side of photo is the site of proposed concrete headwall fish barrier. (June 2022)

Photograph 2. Agricultural canal, looking east. Site of proposed concrete headwall fish barrier. (June 2022)

Photograph 3. Site of proposed concrete headwall fish barrier . (June 2022)

Photograph 4. Agricultural canal, looking west. (June 2022)

Photograph 5. Looking north from southern end of action area. Showing Tule Canal, fallow rice, ruderal, and valley foothill riparian habitats. (June 2022)

Photograph 6. North end of action area within Tule Canal, looking south. Action area is on the right side photo. Showing water primrose and mosquito fern in Tule Canal. (June 2022)

Photograph 7. Staging area in fallow rice field. (November 2022)

Photograph 8. Fallow rice field and road. (November 2022)

Appendix D

Representative Photographs

Representative Photographs

Photograph 1. Tule Canal looking north. Left side of photo is the site of proposed concrete headwall fish barrier. (June 2022)

Photograph 2. Site of proposed concrete headwall fish barrier. (June 2022)

Photograph 3. Agricultural canal, looking east. Site of proposed concrete headwall fish barrier. (June 2022)

Photograph 4. Agricultural canal, looking west. (June 2022)

Photograph 5. Site of proposed fish screens looking east (see white pvc pipe indicating location of fish screens on bank).

Photograph 6. Site of proposed fish screens looking southeast.

Photograph 7. Looking north from southern end of action area. Showing site of proposed fish screens in Tule Canal, and fallow rice, ruderal, and valley riparian habitats.

Photograph 8. North end of action area within Tule Canal, looking south. Action area is on the right side photo. Showing water primrose and mosquito fern in Tule Canal. (June 2022)

Photograph 9. Fallow rice field and road. (November 2022)

Appendix E

Treatment Protocol for Handling Human Remains

YOCHA DEHE
CULTURAL RESOURCES

Treatment Protocol for Handling Human Remains and Cultural Items Affiliated with the Yocha Dehe Wintun Nation

The purpose of this Protocol is to formalize procedures for the treatment of Native American human remains, grave goods, ceremonial items, and items of cultural patrimony, in the event that any are found in conjunction with development, including archaeological studies, excavation, geotechnical investigations, grading, and any ground disturbing activity. This Protocol also formalizes procedures for Tribal monitoring during archaeological studies, grading, and ground-disturbing activities.

I. Cultural Affiliation

The Yocha Dehe Wintun Nation ("Tribe") traditionally occupied lands in Yolo, Solano, Lake, Colusa and Napa Counties. The Tribe has designated its Cultural Resources Committee ("Committee") to act on the Tribe's behalf with respect to the provisions of this Protocol. Any human remains which are found in conjunction with Projects on lands culturally-affiliated with the Tribe shall be treated in accordance with Section III of this Protocol. Any other cultural resources shall be treated in accordance with Section IV of this Protocol.

II. Inadvertent Discovery of Native American Human Remains

Whenever Native American human remains are found during the course of a Project, the determination of Most Likely Descendant ("MLD") under California Public Resources Code Section 5097.98 will be made by the Native American Heritage Commission ("NAHC") upon notification to the NAHC of the discovery of said remains at a Project site. If the location of the site and the history and prehistory of the area is culturally-affiliated with the Tribe, the NAHC contacts the Tribe; a Tribal member will be designated by the Tribe to consult with the landowner and/or project proponents.

Should the NAHC determine that a member of an Indian tribe other than Yocha Dehe Wintun Nation is the MLD, and the Tribe is in agreement with this determination, the terms of this Protocol relating to the treatment of such Native American human remains shall not be applicable; however, that situation is very unlikely.

III. Treatment of Native American Remains

In the event that Native American human remains are found during development of a Project and the Tribe or a member of the Tribe is determined to be MLD pursuant to Section II of this Protocol, the following provisions shall apply. The Medical Examiner shall immediately be notified, ground disturbing activities in that location shall cease and the Tribe shall be allowed, pursuant to California Public Resources Code Section 5097.98(a), to (1) inspect the site of the discovery and (2) make determinations as to how the human remains and grave goods should be treated and disposed of with appropriate dignity.

The Tribe shall complete its inspection and make its MLD recommendation within forty-eight (48) hours of getting access to the site. The Tribe shall have the final determination as to the disposition and treatment of human remains and grave goods. Said determination may include avoidance of the human remains, reburial on-site, or reburial on tribal or other lands that will not be disturbed in the future.

The Tribe may wish to rebury said human remains and grave goods or ceremonial and cultural items on or near the site of their discovery, in an area which will not be subject to future disturbances over a prolonged period of time. Reburial of human remains shall be accomplished in compliance with the California Public Resources Code Sections 5097.98(a) and (b).

The term "human remains" encompasses more than human bones because the Tribe's traditions call for the burial of associated cultural items with the deceased (funerary objects), and/or the ceremonial burning of Native American human remains, funerary objects, grave goods and animals. Ashes, soils and other remnants of these burning ceremonies, as well as associated funerary objects and unassociated funerary objects buried with or found near the Native American remains are to be treated in the same manner as bones or bone fragments that remain intact.

IV. Non-Disclosure of Location of Reburials

Unless otherwise required by law, the site of any reburial of Native American human remains shall not be disclosed and will not be governed by public disclosure requirements of the California Public Records Act, Cal. Govt. Code § 6250 et seq. The Medical Examiner shall withhold public disclosure of information related to such reburial pursuant to the specific exemption set forth in California Government Code Section 6254(r). The Tribe will require that the location for reburial is recorded with the California Historic Resources Inventory System ("CHRIS") on a form that is acceptable to the CHRIS center. The Tribe may also suggest that the landowner enter into an agreement regarding the confidentiality of site information that will run with title on the property.

V. Treatment of Cultural Resources

Treatment of all cultural items, including ceremonial items and archeological items will reflect the religious beliefs, customs, and practices of the Tribe. All cultural items, including ceremonial items and archeological items, which may be found at a Project site should be turned over to the Tribe for appropriate treatment, unless otherwise ordered by a court or agency of competent jurisdiction. The Project Proponent should waive any and all claims to ownership of

Tribal ceremonial and cultural items, including archeological items, which may be found on a Project site in favor of the Tribe. If any intermediary, (for example, an archaeologist retained by the Project Proponent) is necessary, said entity or individual shall not possess those items for longer than is reasonably necessary, as determined solely by the Tribe.

VI. Inadvertent Discoveries

If additional significant sites or sites not identified as significant in a Project environmental review process, but later determined to be significant, are located within a Project impact area, such sites will be subjected to further archeological and cultural significance evaluation by the Project Proponent, the Lead Agency, and the Tribe to determine if additional mitigation measures are necessary to treat sites in a culturally appropriate manner consistent with CEQA requirements for mitigation of impacts to cultural resources. If there are human remains present that have been identified as Native American, all work will cease for a period of up to 30 days in accordance with Federal Law.

VIII. Work Statement for Tribal Monitors

The description of work for Tribal monitors of the grading and ground disturbing operations at the development site is attached hereto as Addendum I and incorporated herein by reference.

ADDENDUM I

Yocha Dehe Wintun Nation
Tribal Monitors
Description of Work and Treatment Protocol

I. Preferred Treatment

The preferred protocol upon the discovery of Native American human remains is to (1) secure the area, (2) cover any exposed human remains or other cultural items, and (3) avoid further disturbances in the area.

II. Comportment

All parties to the action are strongly advised to treat the remains with appropriate dignity, as provided in Public Resource Code Section 5097.98. We further recommend that all parties to the action treat tribal representatives and the event itself with appropriate respect. For example, jokes and antics pertaining to the remains or other inappropriate behavior are ill advised.

III. Excavation Methods

If, after the Yocha Dehe Tribal representative has been granted access to the site and it is determined that avoidance is not feasible, an examination of the human remains will be conducted to confirm they are human and to determine the position, posture, and orientation of the remains. At this point, we recommend the following procedures:

(A) Tools. All excavation in the vicinity of the human remains will be conducted using fine hand tools and fine brushes to sweep loose dirt free from the exposure.

(B) Extent of Exposure. In order to determine the nature and extent of the grave and its contents, controlled excavation should extend to a full buffer zone around the perimeter of the remains.

(C) Perimeter Balk. To initiate the exposure, a perimeter balk (especially, a shallow trench) should be excavated, representing a reasonable buffer a minimum of 10 cm around the maximum extent of the known skeletal remains, with attention to counter-intuitive discoveries or unanticipated finds relating to this or other remains. The dirt from the perimeter balk should be bucketed, distinctly labeled, and screened for cultural materials.

(D) Exposure Methods. Excavation should then proceed inward from the walls of the balk as well as downward from the surface of the exposure. Loose dirt should be scooped out and brushed off into a dustpan or other collective device. Considerable care should be

given to ensure that human remains are not further impacted by the process of excavation.

(E) Provenience. Buckets, collection bags, notes, and tags should be fully labeled per provenience, and a distinction should be made between samples collected from: (1) **Perimeter Balk** (described above), (2) **Exposure** (dirt removed in exposing the exterior/burial plan and associations, and (3) **Matrix** (dirt from the interstices between bones or associations). Thus, each burial may have three bags, "Burial 1 Perimeter Balk," "Burial 1 Exposure Balk," "Burial 1 Matrix."

Please note the provisions below with respect to handling and conveyance of records and samples.

(F) Records. The following records should be compiled in the field: (1) a detailed scale drawing of the burial, including the provenience of and full for all human remains, associated artifacts, and the configuration of all associated phenomena such as burial pits, evidence for preinterment grave pit burning, soil variability, and intrusive disturbance, (2) complete a formal burial record using the consultants proprietary form or other standard form providing information on site #, unit or other proveniences, level depth, depth and location of the burial from a fixed datum, workers, date(s), artifact list, skeletal inventory, and other pertinent observations, (3) crew chief and worker field notes that may supplement or supercede information contained in the burial recording form, and (4) photographs, including either or standard photography or high-quality (400-500 DPI or 10 MP recommended) digital imaging.

(G) Stipulations for Acquisition and Use of Imagery. Photographs and images may be used only for showing location or configuration of questionable formation or for the position of the skeleton. They are not to be duplicated for publication unless a written release is obtained from the Tribe.

(H) Association. Association between the remains and other cultural materials should be determined in the field in consultation with an authorized Tribal representative, and may be amended per laboratory findings. Records of provenience and sample labels should be adequate to determine association or degree of likelihood of association of human remains and other cultural materials.

(I) Samples. For each burial, all **Perimeter Balk** soil is to be 1/8"-screened. All **Exposure** soil is to be 1/8"-screened, and a minimum of one 5-gallon bucket of excavated but unscreened Exposure soil is to be collected, placed in a plastic garbage bag in the bucket. All **Matrix** soil is to be carefully excavated, screened as appropriate, and then collected in plastic bags placed in 5-gallon buckets.

(J) Human remains are not to be cleaned in the field.

(K) Blessings. Prior to any physical action related to human remains, a designated tribal representative will conduct prayers and blessings over the remains. The archaeological consultant will be responsible for insuring that individuals and tools involved in the action are available for traditional blessings and prayers, as necessary.

IV. Lab Procedures
No laboratory studies are permitted without consultation with the tribe. Lab methods are determined on a project-specific basis in consultation with Yocha Dehe Wintun Nation representatives. The following procedures are recommended:

(A) Responsibility. The primary archaeological consultant will be responsible for insuring that all lab procedures follow stipulations made by the Tribe.

(B) Blessings. Prior to any laboratory activities related to the remains, a designated tribal representative will conduct prayers and blessings over the remains. The archaeological consultant will be responsible for insuring that individuals and tools involved in the action are available for traditional blessings and prayers, as necessary.

(C) Physical Proximity of Associations. To the extent possible, all remains, associations, samples, and original records are to be kept together throughout the laboratory process. In particular, **Matrix** dirt is to be kept in buckets and will accompany the remains to the lab. The primary archaeological consultant will be responsible for copying all field records and images, and insuring that the original notes and records accompany the remains throughout the process.

(*E) Additional Lab Finds*. Laboratory study should be done making every effort to identify unanticipated finds or materials missed in the field, such as objects encased in dirt or human remains misidentified as faunal remains in the field. In the event of discovery of additional remains, materials, and other associations the tribal representatives are to be contacted immediately.

V. Re-internment without Further Disturbance
No laboratory studies are permitted on human remains and funerary objects. The preferred treatment preference for exhumed Native American human remains is reburial in an area not subject to further disturbance. Any objects associated with remains will be reinterred with the remains.

VI. Curation of Recovered Materials

Should all, or a sample, of any archaeological materials collected during the data recovery activities – with the exception of Human Remains – need to be curated, an inventory and location information of the curation facility shall be given to tribe for our records.

Yocha Dehe Wintun Nation
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