Delta Smelt and Native Species Preservation Project

Mitigated Negative Declaration

The Metropolitan Water District of Southern California
700 North Alameda Street
Los Angeles, CA 90012

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1. Project Description

1.1 Background

The Metropolitan Water District of Southern California (Metropolitan) is the primary wholesale water supplier for Southern California and comprises 26 member agencies, which provide water to nearly 19 million Southern California residents. Metropolitan has a service area that spans through six counties within a 5,200-square-mile area. Additionally, Southern California has an important stake in the Delta region and its existing infrastructure. As a State Water Project (SWP) contractor, Metropolitan has invested and will continue to invest significantly in the SWP, encourage efforts to restore sensitive fish populations in the Delta watershed, and promote scientific research into the causes of decline in fish native to the Delta.

1.2 Proposed Project Purpose and Need

Metropolitan is proposing the Delta Smelt and Native Species Preservation Project (Proposed Project), as part of a state and federal partnership. In cooperation with funding partners, and with the aid and assistance of the state and federal interagency Culture and Supplementation of Smelt (CASS) team[1] and University of California (UC) Davis, Metropolitan is promoting a Proposed Project that would utilize a portion of the Bouldin Island property currently owned by Metropolitan in the Sacramento-San Joaquin Delta to further delta smelt (*Hypomesus transpacificus*) and other native fish research, and research of potentially future propagation viability.

Supplementation of the wild population of delta smelt with cultured fish is considered to be a vital step in preventing extirpation from the wild. The recovery of delta smelt is important because it is an indicator species for the ecosystem health and, in part, because its presence in designated critical habitat in the Sacramento-San Joaquin Delta plays a key role in regulations affecting California's water supply. While delta smelt have declined in the wild, scientists have successfully cultured delta smelt in captivity at the UC Davis Fish Conservation and Culture Laboratory (FCCL), and, as described in the 2019 United States Fish and Wildlife Service's (USFWS's) Biological Opinion for the Reinitiation of Consultation on the Coordinated Operations of the Central Valley Project and State Water Project, by 2030, the United States Bureau of Reclamation (USBR) proposes to work with the California Department of Water Resources (DWR) to support a larger conservation hatchery to breed and propagate a stock of fish with equivalent genetic resources to the native stock and at sufficient quantities to effectively augment the existing wild population so that they can be returned to the wild to reproduce naturally in their habitat. Additional research is required to support this effort. The Proposed Project would provide research opportunities and a potential location for an additional hatchery population.

The USFWS has recently developed its Delta Smelt Supplementation Strategy (DSSS) to provide a scientific and regulatory roadmap for achieving successful reintroduction of delta smelt (USFWS 2020). The DSSS capitalized on an initial period of research, monitoring, and evaluation of the

[1] Consulting partners primarily include the United States Geological Survey (USGS), DWR, and USFWS. Other consulting agencies include the USBR and the California Department of Fish and Wildlife (CDFW). CASS is an interagency team, composed of the CDFW, DWR, USBR, and USFWS, created in 2019 to implement science-based management activities to secure and stabilize the delta smelt wild population through a coordinated captive propagation and supplementation program.

efficacy and effects of hatchery production and contained release of cultured delta smelt (e.g., Israel et al. 2011; Lessard et al. 2018; Hung et al. 2019).

One key initial finding was that cultured delta smelt could survive the 4-week study period in net pen enclosures in the wild (Baerwald et al. 2019). This study further demonstrated that cultured fish survived in ambient water quality and temperature and that they successfully transitioned from pellets to naturally produced wild prey within enclosures set in natural conditions during the 4-week period. An important next step highlighted in the DSSS is the development of science to guide uncontained releases of delta smelt into the wild. However, it is uncertain whether cultured delta smelt would survive and complete their life cycle when introduced freely into a natural habitat. The Proposed Project would address this question, including the development of methods for successful reintroduction.

Project Objectives

The objectives of the Proposed Project are:

- Establish a marsh-pond complex where research can occur to determine if the marsh-pond complex can support cultured delta smelt and other native fish that will survive and complete their life cycle when introduced freely into a natural habitat.
- Conduct further delta smelt and native fish research, and research of potential future propagation.
- Inform future design of native fish habitat projects through beta testing of various design concepts
- Research the potential of the marsh-pond complex to support a hatchery population in a more natural environmental setting using wetlands to provide a food source (food marsh) and a source of cold water (cooling marsh).

1.3 Project Location and Description

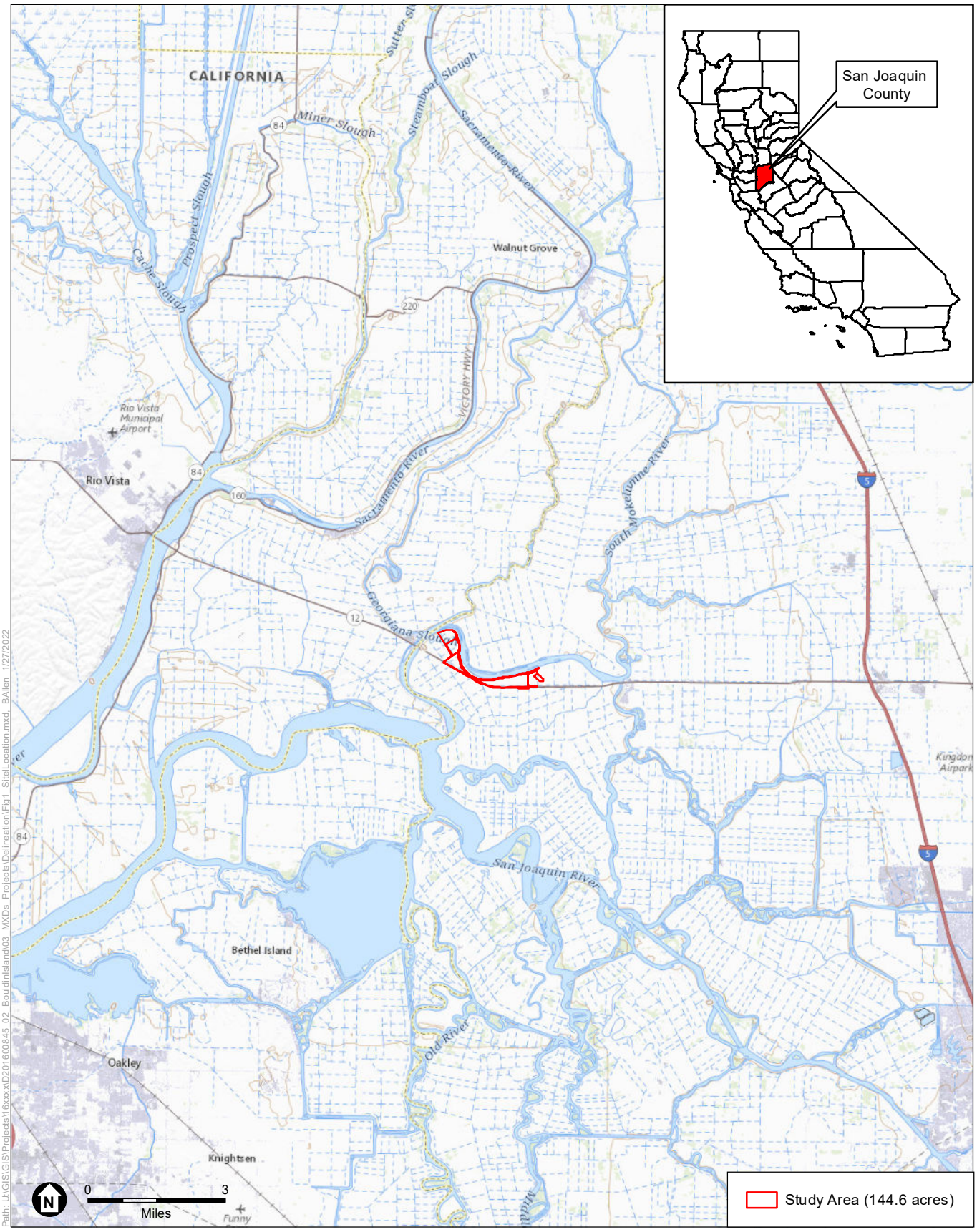
Project Location

The Proposed Project covers approximately 145 acres across two parcels and includes two "marsh-pond complexes," a tule harvest area, and several connecting access roads. The Proposed Project site is within the Sacramento-San Joaquin Delta on Bouldin Island, which is owned by Metropolitan and located adjacent to the confluence of the North and the South Forks of the Mokelumne River in unincorporated San Joaquin County, California (**Figures 1-1 and 1-2**).

Project Description

The Proposed Project would include the construction of two marsh-pond complexes that would house native fish for experimental study.[2] Each marsh-pond complex consists of a propagation pond, a cooling marsh, and a food marsh that would be constructed in two phases. The first phase is a smaller demonstration pilot, and the second larger phase will capitalize on what was learned in the first phase. The tule marshes would be of varying sizes and serve two distinct functions: the

[2] The Proposed Project is not a habitat or ecosystem restoration project. The marsh-pond complexes will be highly managed for the sole purpose of scientific research.



SOURCE: USGS, 2022; ESA, 2022

Delta Smelt Preservation Project

Figure 1-1
Project Site Location

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SOURCE: MAXAR, 2021; ESA, 2022

Delta Smelt Preservation Project

Figure 1-2
Project Study Area

ESA

first type of marsh would be designed to optimize cooling of water temperatures (cooling marsh) and the second type is for production of food for the native fish (food marsh). The propagation ponds would contain the fish and would be connected to the cooling and food marshes through screened concrete-lined canals. Research conducted at these ponds would help refine future research on delta smelt and the establishment of a marsh-pond complex that could support delta smelt. This Proposed Project assumes, prior to any transport and stocking of hatchery delta smelt, that fish are available from the FCCL and their release and rearing in the propagation ponds is approved by the USFWS and California Department of Fish and Wildlife (CDFW).

Project Construction

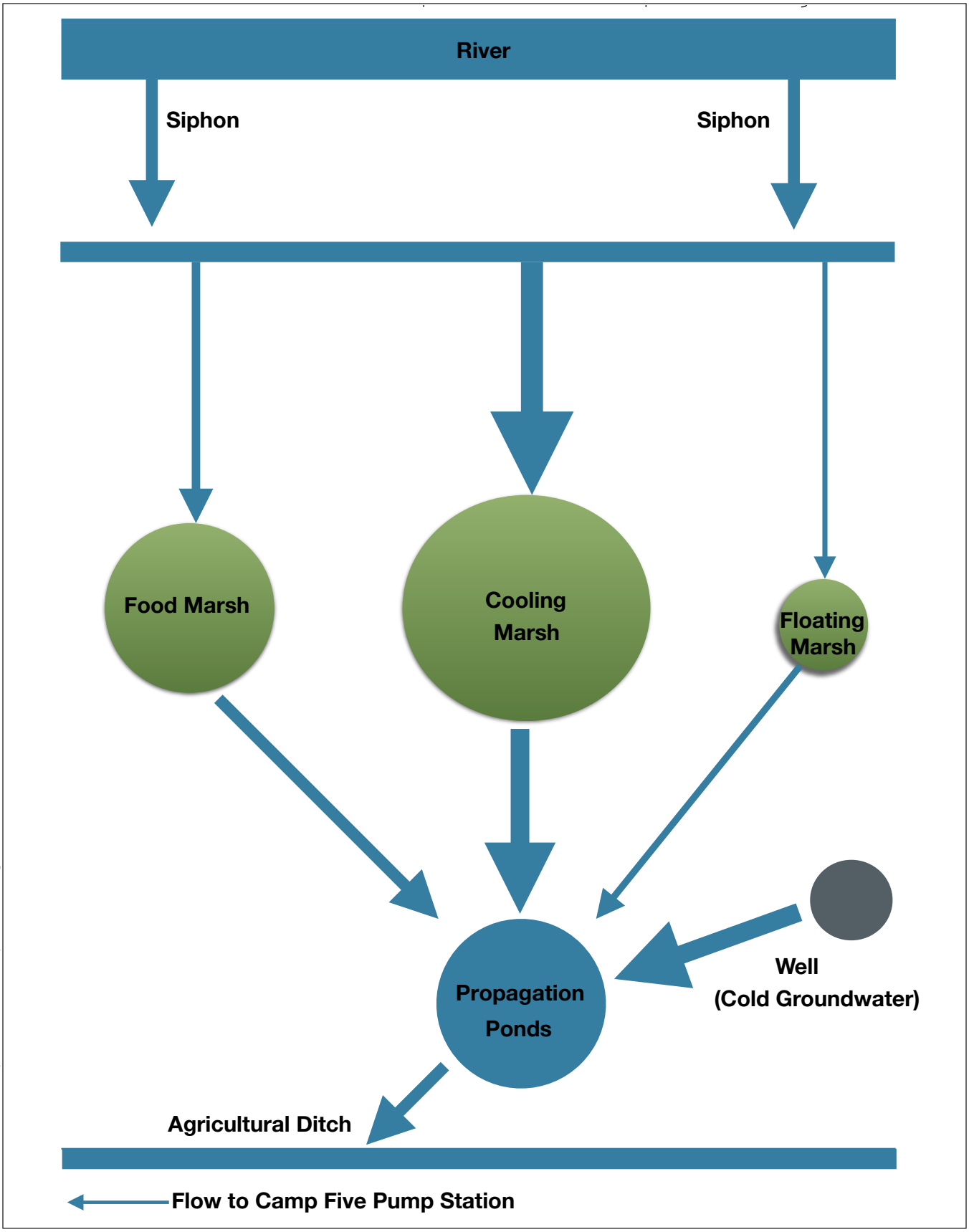
As discussed above, the Proposed Project would include the construction of native fish habitat marsh-pond complexes, which would be completed in two phases. Each phase would include a complete marsh-pond complex with a cooling marsh, food marsh, and a propagation pond (**Figure 1-3, Appendix A**). Phase I would include a 2-acre cooling marsh, a 0.3-acre food marsh, and an 0.5-acre propagation pond. Phase II would include a 3.5-acre cooling marsh, a 2-acre food marsh and a 1.5-acre propagation pond. A 0.3-acre floating peat marsh, which replicates historic floating tule mats, may also be constructed in Phase II if current ongoing research warrants. The entire marsh-pond complex footprint for the total Proposed Project, including all the associated staging area, water distribution system and access roads would be up to 25 acres.

Access and Staging

Construction access to the site from Highway 12 would consist of two roads labeled Road 1 and Road 2, including an existing road that is 15 to 20 feet wide and a new access road to be designed with a width of approximately 20 to 30 feet (Figure 1-2). The improved access road at the toe of the levee would be graded to remove existing ruts, and then a 4-inch layer of 0.75-inch class crushed aggregate base would be added with no change to the existing dimensions of the roads to improve mobility for vehicles, all-terrain vehicles, and foot traffic to key Proposed Project facilities, including wells, testing sites, screens, gates, and observation areas.

There are two construction material and equipment staging areas (**Figure 1-4**). Staging Area 1 is located immediately south of Cooling Marsh A along the west side of the Proposed Project area. Staging Area 2 is located immediately to the west of Food Marsh B along the southern edge of the Proposed Project area The staging areas would be approximately 1,500 square feet in size. Crushed aggregate of 0.75 inches in size would be applied to the areas at a depth of approximately 6 inches.

All vehicles and equipment brought on-site shall be decontaminated in accordance with federal and state regulations and guidelines for controlling the spread of noxious weeds, invasive species, and disease, which includes inspecting all vehicles, tools, boots, and other Project-related equipment, and removing all visible soil/mud, plant materials, and animal remnants prior to entering and exiting the Project site. This decontamination process must be completed each time Project-related equipment is brought on-site. Transportation of off-hauled material would be conducted per state and federal regulations. All materials would be taken to an approved storage, recycle, or waste facility.



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SOURCE: ESA, 2022

Delta Smelt Preservation Project

Figure 1-3
Delta Smelt and Native Species Preservation Project Conceptual Diagram

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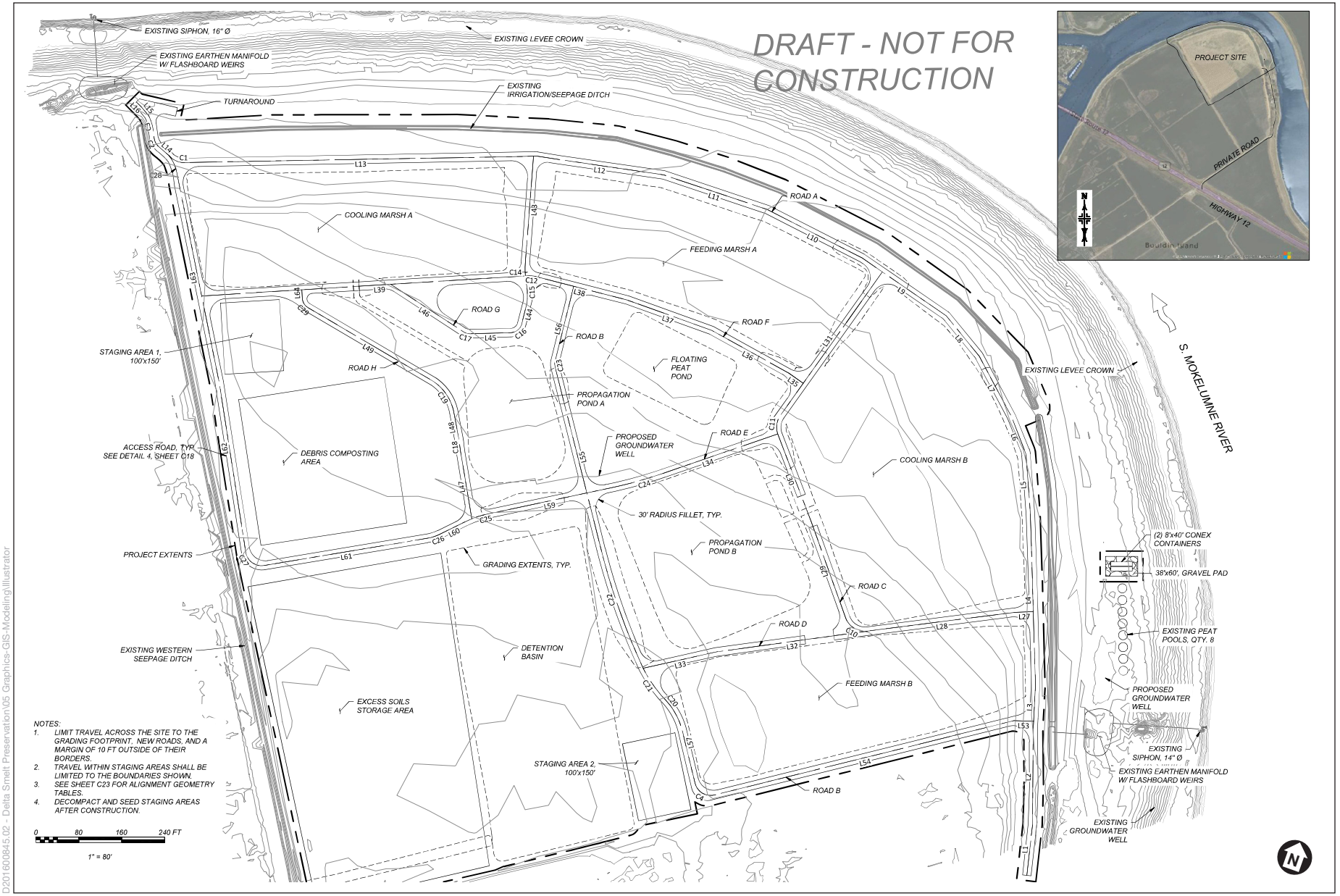

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SOURCE: cbec, 2022

Delta Smelt Preservation Project

Figure 1-4
Site Plan Overview

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Cooling and Food Marshes

The cooling and food marshes would be excavated with heavy equipment and the material removed would be used to create berms around the exterior of the two marshes and internal berms to direct the flow of water within the marshes. Initial land preparation would include disking and land leveling of up to 1 foot (plus or minus) within each marsh containment berm. Earth-moving includes constructing wetland by excavating soils and constructing perimeter berms (maximum of 3-foot height and 20-foot toe width) for water containment. These berms would be constructed using scrapers, graders, dozers, and water wagons. The sloped design and internal berms, with flashboard weirs, would allow water to be drained from the pond and isolate pond sections.

Both marshes would be planted with locally harvested tule rhizomes that would be excavated from the harvest area in 2-foot by 2-foot blocks, as described in the *Tule Harvesting* section below. The blocks would be offloaded with an excavator and placed in the cooling and food marsh ponds on 5-foot centers. Once the tule rhizome placement is completed, the area would be flooded to a depth of approximately 1 foot and held at that depth using the new water distribution features described in the *Surface Water/Groundwater Distribution, Control, and Screening* section below.

Supplemental Floating Peat Marshes

Eight 18-foot-diameter floating peat marshes currently exist in round aboveground pools immediately adjacent to the eastern border of the proposed marsh-pond complex site. Scientific monitoring of these floating peat marshes indicates good productivity of invertebrates that delta smelt feed on. If constructed in Phase II, a larger 0.3-acre floating peat marsh would supplement food from the Phase 1 food marsh for use in the propagation ponds. It would be constructed by excavating up to 3 feet of existing grade and using the excavated material to create perimeter berms, which would be covered with a construction-grade plastic sheeting called visqueen on the waterside embankments to reduce seepage and erosion. The anticipated depth of the water within the floating marshes would be around 6 to 8 feet. Water to the floating peat marsh pond would be conveyed using the existing siphons and the new water distribution features, including ditches, pipes, pumps and water control features, described in the *Water/Groundwater Distribution, Control, and Screening* section.

Propagation Ponds

The Proposed Project would include the construction of propagation ponds, which would be completed in two phases. Phase I would include one propagation pond roughly 0.5 acres in size. Phase II would include an additional propagation pond roughly 1.5 acres in size.

The locations of the ponds, berms, screens, siphons, wells, and water control structures are shown in Figure 1-4. The propagation ponds would be excavated to achieve the desired 20:1 side slope and a maximum water depth of up to 15 feet. Berms would be constructed with a 3:1 side slope. Excavated soil from the ponds would be used on-site to construct berms, footpaths, and roadways. Soil cut and fill would be balanced on-site. Potential shading features may include native woody vegetation around the perimeter of the containment areas. Aeration systems, which may include bubblers, would be added as needed depending upon dissolved oxygen conditions. The aeration system feature would include a diffused aeration system using an electric 1 horsepower (hp) pump or windmill to provide for power requirements. Pond fountains may be used to enhance biosecurity and limit avian predation. Biosecurity could also include perimeter fencing, additional non-lethal

bird deterrent techniques (e.g., netting or overhead wires strung along shoreline or across pond, noise, or visual scare devices), sunshade nettings over waterbody areas, and other security monitoring systems. The Proposed Project may also include fish cages/enclosures within each pond. This could allow for corralling the fish and ease monitoring while still benefiting from the attributes being designed into the impoundments.

The propagation ponds would be designed to be drained and filled when needed. The ponds would be fillable in a manageable timeframe to bring the ponds back online without too much loss of time for their primary function. These propagation ponds would receive water screened from the marsh-pond complexes and would be monitored and managed to eliminate the propagation of invasive species. Identification of invasive species would initiate the appropriate measures to remove the invasive species, such as the draining of the ponds. Draining would provide another form of biosecurity by making these ponds inhospitable for all invasive fish species and most invasive aquatic vegetation species (such as Brazilian waterweed and water hyacinth). Draining the ponds would also allow for mechanical removal of other invasive weeds. In addition, the outlets of the ponds are screened and are not directly connected to the Delta waterways (i.e., are not tidal aquatic habitat) and thus aquatic transmission of invasive species into Delta waterways would be avoided.

To facilitate scientific evaluations, Propagation Pond B would be divided into three equal-area cells using two float-anchor fabric curtains or equivalent. The curtains would be secured running from the shallow to the deep end of the ponds, suspended by floatation and the fabric held down on the pond bottom by weights. Each curtain would have anchors above and below the water that are appropriate to secure the curtains in place and prevent shifting during inflows and windy conditions.

Tule Harvesting

Harvest of native vegetation would occur within the existing on-island tule wetlands in the harvest area (Figure 1-2). Haul trucks would traverse the island on the existing roads that occur, on top of the levee, along the farm fields, and around the harvest pond to access the site from the marsh pond complex. Temporary access into the ponds for excavation and hauling equipment may use placement of Geoterra mats or similar protective mats to gain further access into the harvest area and minimize impacts to surrounding habitat. Alternatively, if the site is dry and equipment can access the harvest area without mats and without soil compaction or creating ruts, the access routes within the harvest area may be mowed to prevent a vegetation fire. Approximately 6 acres would be temporarily disturbed for access to the harvest areas. This would include minimal vegetative disturbance from mats, mowing, or haul trucks driving beside the excavator to collect the harvest. No grading or ground disturbance is anticipated in access areas not proposed for harvest. An estimated 1.5 acres would be harvested and would include harvesting up to 16,500 2-foot by 2-foot tule rhizomes blocks. The rhizome blocks would be removed by an excavator and/or hand tools in long parallel 2-foot-wide strips that would parallel the haul truck access route. The blocks would then be transported using the excavator to a haul truck which would drive beside the excavator. Then the blocks would be hauled to the marsh-pond complex site. In total, there would be up to 330 round trips transporting the rhizomes to the marsh-pond complexes from the harvesting area for both phases.

Based on the tule growth rates of greater than 18 feet of spread in one growing season, it is anticipated that disturbed areas would revegetate within one growing season (Tilley 2012). If 75 percent coverage in disturbed areas has not been met within 365 days of the end of construction, then Metropolitan would reassess unvegetated areas and would monitor for another year, with optional replanting.

Surface Water/Groundwater Distribution, Control, and Screening

The propagation ponds would be filled using either surface water or groundwater to ensure consistent regulated temperatures. The water distribution system would be a combination of earthen and concrete-lined open ditches (6 feet wide) and pipes (ranging between 4 and 24 inches in diameter) to provide surface water from existing siphons or pumped from the existing groundwater aquifer. Under normal conditions, surface water would flow by gravity from the siphons through the cooling and food marshes and be screened before entering the propagation ponds (Figure 1-3, Appendix A). The surface water elevations in the food marsh would be adaptively managed to enhance fish food production. The surface water would originate from existing siphons that pull from the Mokelumne River within the Proposed Project site, including siphons #25 (16-inch diameter with max capacity of 18 cubic feet per second [cfs]) and #26 (14-inch diameter with max capacity of 12 cfs; Figure 1-4). In coordination with the irrigation needs of adjacent farms that use these siphons, a portion of the siphon flows (up to 10 cfs) would be used for the Proposed Project. The balance of the available siphon flow would remain available for agricultural purposes. The surface water distribution system would be screened between the marsh area and the native fish propagation area to enhance biosecurity.

The groundwater system would include the use of a new well (see Figure 1-4) to be constructed within the Proposed Project site. The new groundwater well is expected to be up to 300 feet deep. The well would not be hydraulically connected to any local surface water. The capacity of the new well would be up to 1,000 gallons per minute (gpm), with an approximately 8-inch-diameter discharge pipe. Well construction would cause a temporary ground disturbance with a construction footprint of up to 1,600 square feet. The transportation pipeline would be buried from the well location to Proposed Project at a depth of up to 24 inches.

Water Use Monitoring and Outlet Control

Water use would be monitored and documented through a set of water meters installed on both the existing surface water siphons and proposed groundwater well. The water supply system would include replumbing and rehabilitation of existing siphons, construction of a screened outlet on one side of the propagation containment areas and installation of operable slide gates for controlling water levels in the tule marshes and construction of tailwater ditches (up to 5 feet deep) (Figure 1-4). The design of the outlet system would use screens of appropriate size to prevent fish from escaping while also avoiding fish impingement.[3]

[3] To prevent water passing through the screen from impinging fish, the screened-in area would be large enough that the approach velocity of water into the intake is sufficiently low that fish may swim to avoid the screen. An approach velocity less than 0.2 feet per second is recommended to prevent impingement of Delta smelt (California Fish and Game 2010).

Water Management Features

An earthen manifold with three operable flashboard weirs would be installed to meter and distribute the desired flows and volumes for the Proposed Project, the adjacent farming operations and any overflows to the agricultural ditch. Project water would be diverted from the manifold into an existing but newly constructed agricultural ditch that runs along the outer perimeter of the Proposed Project marshes. The ditch was realigned in early 2022 by the tenant farmer as part of agricultural operations as shown in Figure 1-4. Five small low-lift pumps would transfer Proposed Project water from the toe drain into the two cooling marshes, the two food marshes, and the floating marsh. No disturbance of existing agricultural ditches or toe drains would occur during siphon manifold installation. The five low- lift pumps would be placed upon 5-foot by 5-foot gravel pads alongside the Reclamation District (District) toe drain at the sites shown on the engineering plans (Appendix A). District 756 maintains the District's levee system that protects approximately 6,000 acres of agricultural land, local infrastructure and on-island assets on Bouldin Island. Pipes would transport pumped water directly into the five marshes.

Detention Basin

To avoid overwhelming channels with pond discharges, water discharged from the propagation ponds would be directed into the detention (surge) basin located in the southern corner of the Proposed Project (Figure 1-4). This basin has a surface area of about 6 acres. It is designed to hold 12 acre-feet of water with a maximum depth of 2 feet. The detention basin would be excavated to a depth of 3 feet and bermed slopes would be constructed with a 4:1 external side slope and 3:1 internal side slope to achieve the desired slope. Excavated soil from the ponds would be used on-site to construct berms, footpaths and roadways. Soil cut and fill would be balanced on-site. On the downstream end of the basin, a control structure would be used to slow the discharge of the Proposed Project water to a rate that can be handled by the island drainage system. Most of the water flowing out of the propagation ponds would be discharged into the detention basin over a 3-hour period in the morning. The detention basin is intended to drain this water over an 18- to 20-hour period throughout the subsequent day and night. The downstream water control structure would be adjustable to allow for better control of the discharge during the 18- to 20-hour period. The control structure would discharge flows into a newly created ditch that would connect to the adjacent agricultural ditch, by removing a portion of the bank and teeing into the existing ditch. No fill of the existing feature would occur. The flows would be monitored to ensure that agricultural ditch capacities are not exceeded.

Power Source

Power for the electric motor on the proposed new well, the low-lift pumps, and the water control structures would be provided from the existing clubhouse located near the marsh-pond complex site or from Pacific Gas and Electric Company (PG&E) powerlines that parallel the toe drain. Both sources of power would be served by the PG&E. An additional transformer may be required but would not result in additional ground disturbance.

Debris Composting Area

When the ponds are operational, debris could build up on the screens and impede flow, mainly during the fall as wetland plants die back from the colder weather. As needed to maintain flows, the screens would be manually raked, and the wetland plant detritus would be loaded into a trailer

pulled by a small Kabota-type tractor to the debris-composting area (Figure 1-4). Spreading and discing would occur daily during the periods of debris clearing. A maximum of approximately 0.5 cubic yards of material would be collected per day of screen clearing (which would occur up to 50 times per year). The debris composting area would be accessed via compact gravel roads between the screen facilities and the composting areas.

Research Access

Prefabricated articulating mats would be used to create ramps with shallow grades from the perimeter berms into the ponds to provide a means for collecting fish. The ramps would have an approximate footprint of 500 square feet for each impoundment. Storage for all science and monitoring equipment would be in shipping storage containers brought onto the site and located near the existing clubhouse (Figure 1-4).

Construction Process and Schedule

Construction activities for the Proposed Project would be completed in two phases with Phase I starting in spring 2023 and lasting for approximately 2 months. If Phase I is successful, Phase II construction would start in spring 2024 and last for approximately 2 months. Construction would require approximately 12 workers total for each phase. Six workers for general construction and six workers for tule transplanting. Construction would occur 6 days per week (Monday through Saturday) with 8-hour days shifted to daylight hours as necessary. The equipment presented in **Table 1-1** would be used during construction.

Table 1-1. Construction Equipment and Personnel Utilization

Equipment	Model/Capacity	Horsepower (HP)	Max. Number Used per Day	Total Operation Days	Number of Workers
Articulated 3-axle hauler	23 cubic yard (CY)/30-ton	375HP	1	14	1
Four-tire pull scraper	John Deere 1810E	NA	1	14	1
Two-axle tractor	John Deere 7520	200HP	1	14	1
Two-axle backhoe	Caterpillar (Cat) 450/2CY bucket	131HP	1	14	1
Dozer	Cat D7	Up to 265HP	1	14	1
Sheep's-foot compactor	Cat	249HP	1	14	1
AWD motor grader	Cat	180HP	1	14	1
Long-reach track excavator	To be determined	200HP	1	14	1
Water tender/truck	2,000 gallon	362HP	1	14	1
Flatbed truck	F250 (gasoline)		1	28	1
Truck-mounted water-well-drilling rig	Watertec 24	570HP	1	3	2
Portable toilets	NA	NA	1		
Fish-transport truck	DWR/CDFW fish tanker trucks	TBD	1	1	1
Two-axle boom mower	Cat levee mower	100HP	1	1	1

Metropolitan Standard Construction Practices

As part of standard construction practice, Metropolitan would incorporate a variety of standard measures as part of the proposed Project. These measures, which are defined in the contractor specifications, are included in and implemented as part of all Metropolitan construction projects. These practices are relatively standardized and/or compulsory (i.e., regulatory requirement); they represent sound and proven methods to reduce potential effects of construction activities. Specific standard construction practices identified for the Proposed Project are discussed throughout the document.

- **Worker Environmental Awareness Protections Training.** Metropolitan routinely conducts pre-construction Worker Environmental Awareness Protections Training (WEAP) for both capital projects and operations and maintenance activities. WEAP trainings are project-specific and cover potential environmental concerns or considerations including, but not limited to, awareness of biological resources, special status species near project sites, jurisdictional waters, cultural resources, paleontological resources, environmentally sensitive areas, and/or avoidance areas.
- **Environmental Assessment.** As an internal practice, Metropolitan conducts Environmental Assessments or similar studies prior to project commencement to determine if any sensitive resources have the potential to be present at a project site. Resources assessed typically include biological, cultural paleontological resources, noise sensitivity, and sensitive receptors in the vicinity of the project area.

Project Operations and Maintenance

Operations

The Proposed Project would have a 5-year project life with the possibility to extend based upon results. Equipment and personnel utilization for operations and maintenance during this period are provided in **Table 1-2**. When fish are on-site, staff from UC Davis using pickup trucks would be on-site daily for approximately 2 months in the spring and 2 months in the fall. It is anticipated that operations and maintenance of the Proposed Project would require four workers, using pickup trucks, to be on-site twice per week when ponds are operational and fish are on-site.

Table 1-2. Operations and Maintenance Equipment and Personnel Utilization

Equipment	Model/Capacity	Horsepower (HP)	Max. Number Used per Day	Total Operation Days	Number of Workers
Pickup truck			2		4
Fish transport truck	DWR/CDFW fish tanker trucks	TBD	1	1	1
Two-axle Boom mower	Cat levee mower	100HP	1	1	1
Low-lift pump (year-round operations)			5	365	0

Note: Assumes 5-year project life, ponds operating daily for entire period

Propagation Ponds

The propagation ponds would require a constant inflow of 3 cfs. The water outlet is an overflow weir with flashboards and fish screen. Mechanical aeration may be required but is not anticipated at this time and the type of equipment has not been determined. The propagation ponds would also be designed to be drained and quickly filled when needed. As noted above, draining and drying of the ponds would serve as another form of biosecurity by making it inhospitable for all invasive fish species and preventing most invasive aquatic plant species from flourishing. As discussed above, draining the ponds would also allow for mechanical removal of other invasive weeds. In addition, the ponds are not directly connected to the Delta waterways (i.e., are not tidal aquatic habitat) and thus aquatic transmission of invasive species would be avoided.

Transport and Stocking of Hatchery Delta Smelt

This task involves the physical process of transporting delta smelt from the UC Davis FCCL in Byron, California, to the Proposed Project site and introducing them into the propagation ponds. The logistics and protocols for transferring the fish from the FCCL and introducing them into the ponds would mirror those used in previous efforts (Hung et al. 2019) with specific nuances required for this study to be determined and developed as needed. UC Davis would be a partner regarding the handling and transport of delta smelt. UC Davis has the permits to handle and transport the fish as the hatchery is a UC Davis facility, and hatchery affiliated staff would always be available to supervise or carry out the work. In addition, should the need arise, the US Geological Survey (USGS) also has the permits to handle and transport delta smelt.

If FCCL-sourced delta smelt are not available for release in the ponds, other fish species, including silversides and shads (which are non-native delta smelt surrogates) or native splittail, may be stocked to test the operations and habitat function of the ponds.

Water Use Monitoring and Outlet Control

Automated controllers would allow remote and manual operations and ensure appropriate flows that maintain required water temperatures, elevation, and water quality in the marsh and propagation ponds. The water inlet at the cooling marshes would consist of a pump on a timer that fills the cooling marsh from 5 p.m. to 9 p.m. daily, at a rate of approximately 7 to 8 cfs. The water outlet is an automatic slide gate that releases water at 4 a.m. for roughly 2 hours. The slide gates would have screens to limit unwanted weeds or aquatic species from entering the propagation ponds. Outflow is anticipated to be about 3 cfs continuously with higher flows during the pulse flow from the cooling marshes.

The water inlet at the food marshes would consist of a pump delivering a constant 0.07 cfs; however, the rate may fluctuate by 10 percent based on food concentrations required to supply pond and residence time would completely change out every 10 to 14 days. Internal water controls at the food marshes include six 3-foot-wide flashboard weirs. The water outlet at each food marsh consists of a flashboard weir.

Flows exiting the marsh area would be screened and controlled through a set of slide-gates. The screens would be designed to pass fish food, but limit access of non-native species into the native fish propagation area. When the ponds are operational, the screens would be routinely cleaned and maintained which would occur up to 50 times per year. Flows exiting the native fish propagation area would be managed to eliminate passage of native fish species to the adjacent agriculture water

distribution system. Water from the food marshes would be on a continual flow basis, whereas water from the cooling marshes would be operated on a batch cycle. Water releases from the cooling marshes would occur over a roughly 2-hour time frame when the water is coldest in the morning hours.

The propagation pond water discharging through the exit screens would enter an agricultural ditch where the water surface elevation would be controlled to manage the hydraulic gradient and approach velocity (less than 2 feet per second (CDFG 2010)) through the screens and the flow rate. This ditch connects the propagation pond water to the detention basin. Water from the detention basin would enter the existing agricultural ditch connected to the island drainage system where it would ultimately be pumped off the island at the existing Camp Five pump station (Figures 1-2 and 1-4).

Drainage Features

Outlet water from the detention basin would drain to the existing agricultural ditch on the south-west side of the field. On the downstream end of the basin, a control structure would be used to slow the discharge of the Proposed Project water to a rate that can be handled by the island drainage system. Most of the water flowing out of the propagation ponds would be discharged into the detention basin over a 3-hour period in the morning. The detention basin is intended to drain this water over an 18- to 20-hour period throughout the subsequent day and night. The downstream water control structure would be adjustable to allow for better control of the discharge during the 18- to 20-hour period. The discharge of flows into the adjacent agricultural ditches would be monitored to ensure that agricultural ditch capacities are not exceeded.

On-Site Storage

Limited hazardous materials would be stored in the storage containers on-site, including 5 to 10 liters (L) of ethanol or formalin, and three 10 L cryogenic containers of liquid nitrogen. These substances would be appropriately stored according to physical and chemical properties and storage recommendations for the limited volumes detailed in their respective Materials Safety Data Sheets.

Optional Monitoring of Native Fish in Ponds

Acoustic cameras may be used to observe native fish behavior, dispersal, and survival at the time they are introduced into the ponds because water clarity would be insufficient for direct visual observation. Additional systematic observations of the introduced native fish may also be made with acoustic cameras to minimize disturbances to the habitat and aggravating the fish that would be associated with any other type of passive or active capture methods. Sampling for the presence of eggs and larvae would be conducted during the spring to determine if the native fish successfully reproduced in the ponds. This sampling may include the collection of eggs with artificial substrates and the collection of larvae with nets or light traps. Individual native fish may also be occasionally culled from the ponds to examine their health, condition, and feeding habits.

Water Quality Monitoring

Water quality conditions in the ponds that have been stocked with native fish and prevailing local weather conditions would be tracked with fixed-station continuous high-frequency monitoring. Fixed stations would be installed on pilings, buoys, or other semi-permanent infrastructure. Water

quality parameters to be measured include temperature, specific conductance, turbidity, pH, dissolved oxygen concentration, chlorophyll-a, and fluorescent dissolved organic matter. Local weather parameters to be measured include air temperature, relative humidity, vapor pressure, barometric pressure, wind (speed, gust, and direction), solar radiation, and precipitation. Water quality measurements would be made by Yellow Springs Instruments EXO2 (or similar device) and weather measurements would be made by ClimaVue50 (or similar device). All data would be telemetered from the field into the National Water Inventory System so that they can be closely monitored (daily during late spring through late summer when air temperatures are highest) to minimize the risk of potential catastrophic mortality of stocked native fish due to water quality issues.

Adaptive Management Operations

Adaptive management would be a key element of this new and innovative research effort. Flows would be adaptively managed through the marsh-pond complexes to maximize productivity and to maintain cool water temperatures. West-side tree/wind-break plantings may be tested to reduce wind waves and increase thermal stratification. Undetermined science experiments may be implemented, but they would not occur outside of the Proposed Project site, and they would fall within the existing operations and management parameters of the Proposed Project.

Vegetation

It is anticipated that the tule harvesting area would revegetate with native vegetation within one growing season. Weed control would be done with a boom rotary cutter/mower. Earthen ditches would be maintained consistent with agricultural ditch maintenance practices by using a small excavator or backhoe to restore channel dimensions as needed to maintain open flows and reduce buildup of vegetation. Removed vegetated materials would be placed in the debris composting area. Concrete-lined canals would be cleaned as needed to remove sediment buildup, and removed materials would also be placed in the compost pile.

There would be no need for application of pesticides, herbicides, or fertilizers on the Proposed Project site; however, adjacent farming practices on agricultural fields and levee maintenance utilize chemical pest control as well as the use of sheep for cultural weed control. The Project plans to use both mechanical and cultural methods of weed control.

Invasive and Predator Species Management

The Proposed Project would develop and implement an invasive species management plan to ensure that invasive plant and wildlife species and populations are kept below preconstruction abundance and distribution levels.

An avian deterrent plan would also be developed that would include a maintenance and monitoring plan for avian deterrent devices. The plan would prescribe maintenance procedures and appropriate monitoring to ensure that deterrent devices are safe for avian species. Regular monitoring would be required if netting is used to ensure that netting is in good repair to prevent birds and other wildlife from becoming entangled.

1.4 Project Baseline and Existing Conditions

The Mokelumne River borders Bouldin Island on the north and east sides and is separated from the Proposed Project by a man-made levee system. The south and west sides of the marsh-pond

complex are bound by agricultural ditches and active farm fields that are typically planted in corn (Figure 1-2). The portion of the Proposed Project site where the marsh-pond complexes would be constructed is currently a fallow wheat field that has most recently been dryland farmed. The tule harvest area is located approximately 2.5 miles, by levee road, to the east of the marsh-pond complex. It consists of a tule marsh vegetated with tule, cattails, and willows. Access routes to both the marsh-pond complexes and tule harvest area are regularly maintained gravel roads that include the levee road around the exterior of the island and internal access roads that are accessible from Highway 12.

With the exception of a period of time in the early 20th century, Bouldin Island has been farmed continuously for over 140 years. Ongoing subsidence of peat soils has resulted in land surface elevations that are now between 5 and 25 feet below sea level. Land surface elevations where the marsh-pond complexes would be located range from 5 to 16 feet below mean sea level (National Geodetic Vertical Datum (NGVD) 29 datum). A toe-drain is located at the landside base of the levee and is periodically overgrown with blackberry shrubs.[4] The agricultural ditches to the south and west are regularly maintained and have only sparse vegetation. A clubhouse is located approximately a 0.5 mile from the center of the proposed marsh-pond complexes on the opposite side of the levee and a single-family residence is situated just a little further than 0.5 mile from the center. Power and phone lines follow the levee system. Highway 12 lies approximately 0.5 mile south of the proposed marsh-pond complexes (Figure 1-4).

1.5 Permits and Approvals That May Be Required

Table 1-3 summarizes the permits and/or approvals that may be required before construction of the Proposed Project.

Table 1-3. Permits and Approvals That May Be Required

Federal or State Approval	Agency/ Department	Permit/Approval	Description
Federal	US Army Corps of Engineers	Clean Water Act Section 404 Permit	Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into all waters of the United States, including wetlands.
Federal	USFWS & National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service	Section 7 of the Federal Endangered Species Act Consultation/Biological Opinions	Federal agencies must consult with the USFWS if any project or action they authorize may affect a listed species or designated critical habitat.
State of California	Central Valley Regional Water Quality Control Board	401 Water Quality Certification (required for 404 Permit), NPDES General Permit for Stormwater Discharge Associated with Construction, Porter-Cologne Waste Discharge Requirements (WDR)	Project proponents are required to submit a Notice of Intent to the RWQCB for coverage under the General Construction Permit for projects with disturbance over 1 acre. Section 401 Water Quality Certification is necessary when Section 404 permits are required. WDRs are issued for discharges of dredged or fill material to waters of the State.

Notes: N/A (not applicable), NPDES (National Pollutant Discharge Elimination System).

[4] The toe-drains are regularly maintained by the local reclamation districts and the agricultural ditches are maintained as part of regular farming operations. The conditions described were based on surveys from December 2021.

2. Initial Study

This document is a proposed Initial Study and Mitigated Negative Declaration (IS/MND), which addresses the potential environmental effects resulting from the Proposed Project.

2.1 Legal Authority and Findings

This Initial Study was prepared in accordance with the California Environmental Quality Act (CEQA) Guidelines and relevant provisions of CEQA of 1970, as amended.

Initial Study. Section 15063 of the CEQA Guidelines describes an Initial Study as a preliminary method for analyzing the potential environmental consequences of a project. The purposes of an Initial Study include:

(1) Providing the Lead Agency with the necessary information to decide whether to prepare an Environmental Impact Report (EIR) or a Negative Declaration;

(2) Enabling the Lead Agency to modify a project during the planning stage by mitigating adverse impacts prior to preparation of CEQA documentation, thus avoiding the need to prepare an EIR; and

(3) Providing documentation of the factual basis for the finding in a Mitigated Negative Declaration that the significant environmental impacts of a project have been mitigated to a less-than significant level.

Negative Declaration or Mitigated Negative Declaration. Section 15070 of the CEQA Guidelines states that a public agency shall prepare a Negative Declaration or Mitigated Negative Declaration for a project subject to CEQA when:

(a) The Initial Study shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment; or

(b) The Initial Study identifies potentially significant effects but:

1. Revisions in the project plans or proposals made by, or agreed to by the applicant before a proposed Mitigated Negative Declaration and Initial Study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur; and

2. There is no substantial evidence, in light of the whole record before the agency, that the project as revised may have a significant effect on the environment.

An IS/MND may be used to satisfy the requirements of CEQA when a proposed project would have no significant unmitigable effects on the environment. As discussed further in subsequent sections of this document, implementation of the Proposed Project would not result in any significant effects on the environment that cannot be reduced to below a level of significance with the mitigation measures included herein.

2.2 Impact Analysis and Significance Classification

The following sections of this IS/MND provide discussions of the possible environmental effects of the Proposed Project for specific issue areas as identified on the CEQA Environmental Checklist Form in Appendix G of the CEQA Guidelines (as updated in December 2018). For each issue area, potential effects are discussed and evaluated.

A "significant effect on the environment" is defined by Section 15382 of the CEQA Guidelines as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by a project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." According to the CEQA Guidelines, "an economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant."

Following the evaluation of each environmental effect determined to be potentially significant is a discussion of mitigation measures and the residual effects or level of significance remaining after the implementation of the measures.

2.3 Initial Study and Environmental Checklist Form

a)	Project Title:	Delta Smelt and Native Species Preservation Project (Proposed Project)
b)	Lead Agency Name and Address:	The Metropolitan Water District of Southern California 700 North Alameda Street Los Angeles, CA 90012
c)	Contact Person and Phone Number:	Sean Carlson, Team Manager The Metropolitan Water District of Southern California (213) 217-6276
d)	Project Location:	The Proposed Project includes Bouldin Island. Figure 1-2 provides an overview of the entire project, with the locations of the Proposed Project shown in more detail on Figure 1-4.
e)	Project Sponsor's Name and Address:	The Metropolitan Water District of Southern California 700 North Alameda Street Los Angeles, CA 90012
f)	General Plan Designation:	San Joaquin County General Plan: General Agriculture.

g)	Zoning:	Ag-40 General Agriculture
h)	Description of Project:	Refer to Section 1 (Project Description).
i)	Surrounding Land Uses and Setting:	Refer to Section 1 (Project Description).
j)	Other Agencies Whose Approval May be Required:	Refer to Table 1-3.
k)	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, has consultation begun?	No California Native American tribes traditionally and culturally affiliated with the project area have contacted Metropolitan pursuant to Public Resources Code Section 21080.3.1. No tribes have requested consultation.

2.4 Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by the Proposed Project, requiring implementation of mitigation. These environmental factors are indicated by "Less Than Significant With Mitigation Incorporated" in the checklist on the following pages."

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

2.5 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 would be prepared.

☒ 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 in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION would 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 a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, 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 EIR pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Jennifer Harriger — 02/08/23

Jennifer Harriger — Date

Manager, Environmental Planning Section

3. Evaluation of Environmental Impacts

The following discussion addresses impacts to various environmental resources, per the Environmental Checklist Form contained in Appendix G of the State CEQA Guidelines.

3.1 Aesthetics

AESTHETICS Except as provided in Public Resources Code Section 21099, would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?	☐	☐	☐	☒
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?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

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

No Impact. No, the Proposed Project would not have a substantial adverse effect on a scenic vista. A scenic vista is defined as a viewpoint that provides panoramic or focused views of a highly valued landscape or scenic resource for the benefit of the general public. No designated scenic vistas or notable geographic features have been identified near the Project site in the San Joaquin County General Plan (San Joaquin County 2016). Thus, the Proposed Project would not result in substantial adverse effects on a scenic vista, no impact would occur.

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

No Impact. No, the Proposed Project would not substantially damage scenic resources within a state scenic highway. A review of the current California Department of Transportation (Caltrans) Map of Designated Scenic Routes indicates one officially designated state scenic highway in San Joaquin County, which is I-580 (Caltrans 2022). I-580 is officially designated as a scenic route in San Joaquin County from the Stanislaus County line to the Alameda County line; however, the interstate is more than 30 miles south of the Proposed Project site. California State Route (SR) 160 in Sacramento County is officially designated as a scenic route but is located over 2 miles northwest of the Project site. Therefore, the Proposed Project site would not be visible to travelers on SR 160 and would not affect the scenic quality of the landscape or intrude upon travelers' enjoyment of the view. Thus, there would be no impacts on scenic resources within a state scenic highway.

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?

No Impact. No, the Proposed Project would not substantially degrade the existing visual character or quality of public views of the site and its surroundings. Although the Proposed Project would alter the existing visual conditions of the Project site with development of the marsh-pond complexes and associated infrastructure, the changes would be consistent with the area's existing visual character and aesthetic quality, which includes agriculture, waterways, recreation, and water supply infrastructure. Therefore, there would be no impacts that result in degradation of the existing visual character or quality of public views of the site and its surroundings.

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

No Impact. No, the Proposed Project would not create new sources of substantial light or glare that would adversely affect day or nighttime views in the area. Construction of the Proposed Project would occur during the daytime and would not require nighttime lighting. The Project does not propose any new light sources or reflective surfaces that would result in new sources of light or glare, thus no impacts would occur.

3.2 Agricultural Resources

AGRICULTURE AND FORESTRY RESOURCES

In determining whether impacts to 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 to 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 Forest Protocols adopted by the California Air Resources Board. Would the project:

	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	☒	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☒	☐
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))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, 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?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. 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?

Less than Significant Impact. The Proposed Project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The Project site is designated as Prime Farmland. The Proposed Project covers approximately 145 acres across two parcels and involves a marsh-pond complex where research can occur. The Proposed Project would last approximately 5 years with the option to extend longer; however, the Proposed Project would not be permanent or result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. As such, the Proposed Project would have a less than significant impact on Prime Farmland, Unique Farmland, or Farmland of Statewide Importance would occur as a result of the Proposed Project.

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

Less than Significant Impact. No, the Proposed Project would not conflict with existing zoning for agricultural use, or a Williamson Act contract. The Project site is not under a Williamson Act contract. The Proposed Project would be considered a compatible agricultural use. The Proposed Project would establish a marsh-pond complex where research can occur to determine if the marsh-pond complex can support cultured delta smelt and other native fish that would survive and complete their life cycle when introduced freely into a natural habitat. In addition, the Proposed Project would last approximately 5 years with the option to extend longer; however, the Proposed Project would not be permanent or conflict with existing zoning for agricultural use, or a Williamson Act contract, and no zoning changes are proposed. This impact would be less than significant.

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 Impact. No, the Proposed Project site is not zoned as forest land or timberland or zoned for timberland production. Therefore, implementing the Proposed Project would not conflict with existing zoning for, or cause rezoning of, forest land or timberland zoned for Timberland Production. No impacts to existing zoning for forest land or timberland would occur.

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

No Impact. No, the Proposed Project site does not contain forest or forest land. Therefore, the Proposed Project would not result in the loss of forest land or conversion of forest land to non-forest use. No impacts related to the loss of forest land or conversion of forest land to non-forest use would occur.

e. Involve other changes in the existing environment which, 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?

Less than Significant Impact. No, the Proposed Project does not 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. The Proposed Project would establish a marsh-pond complex where research can occur to determine if the marsh-pond complex can support cultured delta smelt and other native fish that would survive and complete their life cycle when introduced freely into a natural habitat. In addition, the Proposed Project would last approximately 5 years with the option to extend longer; however, the Proposed Project would not be permanent or result in the conversion or loss of agriculture or forest land. This impact is less than significant.

3.3 Air Quality

AIR QUALITY

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:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard?	☐	☐	☒	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

Overview

San Joaquin County is located within the San Joaquin Valley Air Basin (SJVAB), which is under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). The topography and meteorology of the SJVAB provide ideal conditions for trapping air pollution for long periods of time and producing harmful levels of air pollutants. Low precipitation levels, cloudless days, high temperatures, and light winds during the summer in the SJVAB are conducive to high ozone levels resulting from the photochemical reaction of precursors nitrogen oxides (NO_x) and volatile organic compounds (VOC) in the presence of sunlight.

The federal Clean Air Act (CAA) requires the United States Environmental Protection Agency (US EPA) to set ambient air quality standards for the following seven criteria air pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter with a diameter of up to 10 microns (PM_{10}), particulate matter with a diameter of up to 2.5 microns ($PM_{2.5}$), and lead. Standards are set at levels of air quality deemed necessary, with an adequate margin of safety, to protect public health. In addition, the California Air Resources Board (CARB) has established ambient air quality standards for these and other pollutants, which are typically more stringent than the federal standards. The CARB is the agency responsible for coordination

and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA).

Under amendments to the federal CAA, the US EPA has classified air basins or portions thereof as either "attainment" or "non-attainment" for each criteria air pollutant, based on whether or not the national standards have been achieved. The CCAA, which is patterned after the federal CAA, also requires areas to be designated as "attainment" or "non-attainment" for the state standards. Thus, areas in California have two sets of attainment/non-attainment designations: one set with respect to the national standards and one set with respect to the state standards.

Attainment Status of the SJVAB

The SJVAB is currently designated as non-attainment for the national 8-hour ozone standard and for the California 1-hour and 8-hour ozone standard. The SVAB is also currently designated as non-attainment for California 24-hour PM_{10} standards. In addition, the SJVAB is currently designated as non-attainment for both the national and California 24-hour $PM_{2.5}$ standard. The air basin is designated as unclassified or in attainment for the remaining criteria air pollutants (SJVAPCD 2022).

Toxic Air Contaminants

The CARB has identified the diesel particulate matter (DPM) in diesel exhaust as a carcinogenic toxic air contaminant (CARB 2022). The majority of DPM emitted from the Proposed Project would be from construction equipment and diesel trucks.

Sensitive Receptors

Sensitive receptors are individuals with increased susceptibility to the health effects from air pollutants; these include children, the elderly, and the ill. Residential dwellings, schools, hospitals, playgrounds, and similar facilities are of primary concern because of the presence of individuals particularly sensitive to pollutants and/or the potential for increased and prolonged exposure of individuals to pollutants.

The land surrounding the Proposed Project site is composed of agricultural ditches and active farm fields. Highway 12 is approximately 0.5 miles south of the proposed site. There are no sensitive receptors within 1,000 feet of the Proposed Project site.

SJVAPCD Air Quality Thresholds of Significance

For purposes of this Initial Study, air quality impacts may be considered significant if construction and/or operation of the Proposed Project would result in the following impacts in **Table 3.3-1** (SJVAPCD 2015a). Threshold values are in tons per year (tpy) for both construction and operational emissions and can be found in the SJVAPCD's Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI).

Table 3.3-1. SJVAPCD Thresholds of Significance

Pollutant/Precursor	Construction Emissions Emissions (tpy)	Operational Emissions	
		Permitted Equipment and Activities Emissions (tpy)	Non-permitted equipment and Activities Emission (tpy)
CO	100	100	100
NO_x	10	10	10
ROG	10	10	10
Sox	27	27	27
PM_{10}	15	15	15
$PM_{2.5}$	15	15	15

Discussion. Would the project:

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

Less than Significant Impact. No, the Proposed Project would not conflict with or obstruct implementation of the applicable air quality plan.

Based on the GAMAQI a project's air quality impacts during construction would be considered significant if emissions generated exceed 10 tons per year of reactive organic gases (ROG) or NO_x, 15 tons per year of PM_{10} or $PM_{2.5}$, or 100 tons per year of CO. These thresholds of significance are based on the SJVAPCD's New Source Review offset requirements and are applied to evaluate regional impacts of project-specific emissions of air pollutants and their impact on the region's ability to reach attainment (SJVAPCD 2015b). The SJVAPCD's attainment plans demonstrate that project-specific emissions below the offset thresholds would have a less than significant impact on air quality (SJVAPCD 2015b). Thus, the SJVAPCD concludes that use of New Source Review offset requirements as its thresholds of significance for criteria pollutants is an appropriate and effective means of promoting consistency in significance determinations within the environmental review process. Therefore, projects with emissions below the thresholds of significance for criteria pollutants would be determined to not conflict or obstruct implementation of the SJVAPCD's air quality plans.

Construction

Project construction activities would result in emissions of ozone precursors (ROG and NO_x) and PM in the form of fugitive dust and exhaust. Emissions of ozone precursors and PM are primarily a result of the combustion of fuel from on-road vehicles and off-road construction equipment. The Project is proposed to take place in two phases, with Phase I starting in the spring of 2023. The Phase II construction start date is reliant on the success of Phase I and is slated to start in the spring of 2024. Construction emissions were calculated for Phase I, with the assumption that Phase II is similar in schedule and impact to Phase I and therefore emissions calculations can be used to represent the impacts for both phases. Pollutant emissions associated with Proposed Project construction would be generated from the following general construction activities: (1) grading, excavation, and dozing; (2) vehicle trips from workers traveling to and from the construction areas; (3) trips associated with delivery of construction supplies to, and hauling debris from, the

construction areas; and (4) fuel combustion by on-site construction equipment. The amount of emissions generated on a daily basis would vary, depending on the intensity and types of construction activities occurring simultaneously. Overall, construction associated with Phase I is expected to last 2 months with work conducted 6 days per week.

PM is among the pollutants of greatest localized concern with respect to construction activities. Construction emissions of PM can vary greatly depending on the level of activity, the specific operations taking place, the number and types of equipment operated, local soil conditions, weather conditions, and the amount of earth disturbance. Fugitive dust emissions from construction would be regulated by SJVAPCD's Rule VIII, which limits fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities. The Proposed Project would be required to comply with these limits.

Construction emissions were estimated using the California Emissions Estimator Model (CalEEMod), version 2020.4.0, and are presented in **Table 3.3-2**. Project-specific information was used for modeling when possible. Where project-specific data was unavailable, CalEEMod defaults were used as inputs. CalEEMod assumptions and detailed output can be found in **Appendix B**. The table shows the Proposed Project's annual emissions and compares them to the SJVAPCD significance thresholds for construction.

Table 3.3-2. Maximum Annual Construction Emissions (tons/year)

	NOX	PM10	PM2.5	ROG	CO	SO_X
Maximum Construction Emissions	0.24	0.09	0.03	0.02	0.17	<0.01
SJVAPCD Regional Significance Thresholds	10	15	15	10	100	27
Significant (Exceeds Thresholds)?	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*

Notes: NO_X (nitrogen oxides), PM_{10} (particulate matter 10 micrometers or less in diameter), $PM_{2.5}$ (particulate matter 2.5 micrometers or less in diameter), ROG (reactive organic gases), CO (carbon monoxide), SO_X (sulfur oxides).

Source: Appendix B; SJVAPCD 2015a.

As shown in Table 3.3-2, annual construction emissions of ROG, NO_x, CO, SO_x, PM_{10}, and $PM_{2.5}$ would not exceed the SJVAPCD significance thresholds for construction. In addition, Proposed Project construction would be required to comply with the requirements of SJVAPCD Rule VIII (SJVAPCD 2004), which aims to limit fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities (SJVAPCD 2004). Control measures required and enforced by the SJVAPCD under Regulation VIII would further reduce the PM emissions shown in Table 3.3-2 and the impact would be less than significant.

Operations

Once operational, the Proposed Project would not create any substantial sources of air pollutant emissions. There would be a need for four UC Davis personnel to visit the site two times a week for approximately 2 months in the fall and 2 months in the spring to check fish on-site in pickup trucks. There would also be transport trucks being used to transport fish from the UC Davis FCCL to the Project site. The emissions associated with the operational trips were calculated using outputs modeled with the EMFAC2021 web tool (EMFAC2021 v1.0.2) Although there would be emissions associated with operations, the annual emissions are negligible, less than 0.01 ton per

year for each pollutant, and therefore do not conflict with or obstruct implementation of the applicable air quality plans.

As previously discussed, based on the SJVAPCD's approach to air quality planning, as the Project's construction and operational emissions would be well below applicable SJVAPCD significance thresholds, the Project would be considered to be consistent with the region's air quality plans and the impacts would be less than significant.

b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard?

Less than Significant Impact. No, the Proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Proposed Project region is in non-attainment under an applicable federal or state ambient air quality standard.

As discussed above and shown in Table 3.3-2, Project construction emissions would be less than the SJVAPCD recommended thresholds of significance for construction emissions. Emissions associated with operations would be negligible. Therefore, the Proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Proposed Project region is in non-attainment under an applicable federal or state ambient air quality standard and the impact would be less than significant.

c. Expose sensitive receptors to substantial pollutant concentrations?

Less than Significant Impact. No, the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations. Sensitive receptors include schools, childcare centers, long-term health care facilities, rehabilitation centers, convalescent homes, hospitals, retirement homes, and residences. While there would be pollutant emissions from construction equipment in each phase, there are no sensitive receptors within 1,000 feet of the Proposed Project site, with the nearest residences over 2 miles west of the Project site. Although the sensitive receptors are greater than 1,000 feet from the Project site, they still could experience low levels of emissions. Given the distance from the Project site, the impact would be less than significant.

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

Less than Significant Impact. No, the Proposed Project would not result in other emissions, such as odors, that adversely affect a substantial number of people.

Odor sources of concern include wastewater treatment plants, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, auto body shops, and rendering plants. There would be temporary emissions from construction activity, and these could result in diesel exhaust odors. However, the construction activities are greater than 2 miles from the nearest residence, so the impact would be less than significant.

3.4 Biological Resources

BIOLOGICAL RESOURCES Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
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 Game or US Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
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?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
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?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Overview

Environmental Science Associates (ESA) prepared a Biological Resource Assessment Report in July 2022 (**Appendix C**) to document existing conditions and to evaluate the potential for impacts to biological resources during implementation of the Proposed Project. ESA biologists Joe Sanders and Christy Dawson conducted reconnaissance-level surveys of the Project survey area on October 8, 2021, and botanist Seth Kirby conducted a special-status plant survey on July 11, 2022. The surveys were conducted (1) to document vegetation communities that could provide habitat for sensitive species and other wildlife observed in and adjacent to the Proposed Project area and (2) to confirm that the previous aquatic resources delineation encompassed all aquatic resources in the Proposed Project area and was still accurate (**Appendix D**). Aquatic resources on Bouldin Island were mapped previously by DWR in 2020. That Preliminary Jurisdictional Determination was verified by the US Army Corps of Engineers on June 18, 2020 (SPK-2019-00899).

All biological resource field surveys were informed by a desktop review of historic and current aerial imagery, subscription-based biological resource databases, publicly available citizen science data, and the Biological Resource Assessment Report (Appendix C). This section describes the terrestrial and aquatic biological resources that are known or that have the potential to occur in the Proposed Project area. Biological resources are common vegetation, wildlife, and fisheries resources; sensitive habitats; plant communities; and special-status plant, wildlife, and fish species. Appendix C contains tables that identify all the special-status species that could potentially occur in

the Proposed Project area, their legal status, their habitat or flowering period, and their potential to occur in the area. An aquatic resources memorandum was also prepared for the Proposed Project that discusses state and federal waters and wetlands that occur within the Proposed Project (Appendix D).

The impact analysis presented in this section focuses on those biological resources identified as potentially significant in the Environmental Checklist. The Proposed Project's potential impacts on biological resources are analyzed below. All potential impacts would be mitigated to less than significant levels.

Discussion. 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 Game or US Fish and Wildlife Service?*

Less than Significant with Mitigation Incorporated. No, the Proposed Project would not 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 CDFW or USFWS with incorporation of mitigation measures.

The California Natural Diversity Database (CNDDB), USFWS Official Species List and the California Native Plant Society documented 22 special-status plant and 34 wildlife species within a USGS 7.5-minute topographic map nine quad search of the Proposed Project (CDFW 2021, USFWS 2021). Habitats within the Proposed Project area were assessed for their potential to support special-status species using information about local species occurrences and species' habitat requirements, in combination with the site visits described above.

Special-Status Plants

No special-status plant species were observed within the Proposed Project area during floristic surveys. The marsh-pond complex area is heavily disturbed by active farming operations and maintenance of agricultural ditches. Although the tule harvest area is less disturbed it did not provide suitable habitat for species that had the potential to occur. However, because there are known occurrences within the 5-mile radius, focused botanical surveys would be conducted within 2 years of the start of construction in both locations prior to the start of construction to confirm absence of the four species that have the potential to occur in accordance with Mitigation Measure BIO-2.

Special-Status Wildlife

Of the 34 wildlife species listed, 13 special-status wildlife species have moderate to high potential to occur within the Proposed Project area. The marsh-pond complex is heavily disturbed from farming activities and in most cases offers limited habitat for special-status wildlife species. Proposed construction activities include excavation, dirt moving, materials storage, and heavy equipment use. These activities could temporarily increase sound and vibration levels and potential exposure to dust at the sites and thus reduce the likelihood that special-status wildlife species would be present. The short-term human presence and earthwork required for construction of the marsh-pond complex would be similar to farming activities that are currently occurring at the Project area. In the long term, the Project would have a positive effect on special-status species

because additional information would be obtained to increase conservation efforts for native fish. Additionally, the created habitat would provide habitat for native species. **Table 3.4-1** lists the special-status species with potential to occur at the Project site, which are discussed in further detail below.

Table 3.4-1. Special-Status Wildlife with Potential to Occur Within the Project Site

Common Name	Scientific Name	Status
Northwestern pond turtle	*Actinemys marmorata*	CDFW SSC
Giant garter snake	*Thamnophis gigas*	State/Federally Threatened
Burrowing owl	*Athene cunicularia*	CDFW SSC
Swainson's hawk	*Buteo swainsoni*	State Threatened
Northern harrier	*Circus cyaneus*	CDFW SSC
White-tailed kite	*Elanus leucurus*	CDFW Fully Protected Watch List
Short-eared owl	*Asio flammeus*	CDFW SSC
Loggerhead shrike	*Lanius ludovicianus*	CDFW SSC
Lesser sandhill crane	*Antigone canadensis*	CDFW SSC
Greater sandhill crane	*Antigone canadensis tabida*	State Threatened/ CDFW Fully Protected
California black rail	*Laterallus jamaicensis coturniculus*	State Threatened/ CDFW Fully Protected
Song sparrow – "Modesto" population	*Melospiza melodia*	CDFW SSC
Western red bat	*Lasiurus blossevillii*	CDFW SSC

Notes: CDFW (California Department of Fish and Wildlife), SSC (Species of Special Concern)

Northwestern Pond Turtle

The northwestern pond turtle is a California species of special concern. This moderate-sized aquatic turtle is commonly found in ponds, lakes, marshes, rivers, streams, and agricultural ditches with rocky or muddy substrates. Northwestern pond turtle habitat often includes shoreline basking areas that may or may not be bordered by aquatic vegetation. Aquatic sites are often within woodlands, grasslands, and open forests, between sea level and 6,000 feet in elevation. Northwestern pond turtles bask on logs or other objects when water temperatures are lower than air temperatures. Their nests are created in upland areas with friable soils, often up to 0.25 miles from an aquatic site (Jennings and Hayes 1994; Stebbins, 2003; Zeiner et al. 1988).

Northwestern pond turtles are discontinuously distributed throughout California west of the Cascade-Sierran crest (Jennings and Hayes 1994). There is a CNDDB-documented occurrence on Bouldin Island in an irrigation plunge pool in 2001, approximately halfway between the pond and harvest areas near the access route, just north of Highway 12. The agricultural ditches and harvest area provide suitable aquatic habitat for the northwestern pond turtle when water is present.

Giant Garter Snake

Giant garter snake is state and federally listed as threatened by CDFW and the USFWS, respectively. Giant garter snakes inhabit agricultural wetlands, including agricultural ditches, sloughs, ponds, small lakes, low-gradient streams, and adjacent uplands in the Central Valley.

Giant garter snakes are often found within these aquatic features especially when emergent vegetation, including cattails and bulrushes, are present. Because most of its natural habitat has been lost, the giant garter snake also lives in rice fields (USFWS 2017). Rice fields provide surface water during the summer when the snakes are active and marsh-like conditions provide the cover, habitat, and prey required for giant garter snake to survive (Halstead et al. 2010). The active season extends from April 1 to October 1. Giant garter snakes inhabit small-mammal burrows and other soil crevices above flood elevations during the inactive period (USFWS 2017).

There are two giant garter snake CNDDB occurrences documented within 5 miles of the survey area. One occurrence is from 2016 and is approximately 5 miles west of the survey area. The record of this occurrence states it was mapped on the south side of Twitchell Island on the San Joaquin River. The other occurrence is from 2010 and is approximately 4.5 miles south of the survey area just northeast of Venice Island. The record of this occurrence states that three individuals were found dead on the road and one live snake was basking on the shoulder of the road and then retreated into the riprap.

The agricultural ditch could provide suitable habitat for giant garter snake if they contain water during the active season. However, based on the lack of remnant aquatic vegetation, the agricultural ditches are either regularly maintained or do not pond water for a significant period of time to support aquatic vegetation. The toe drains were completely covered by dense blackberry shrubs and are not considered giant garter snake habitat. The small-mammal burrows present on the sides of the agricultural ditches within the survey area and on the graded levee provide suitable upland habitat.

Western Burrowing Owl

The western burrowing owl is listed by CDFW as a California species of special concern. They inhabit grassland, desert, and open shrub habitats throughout the state from sea level to approximately 5,300 feet (CDFW 1999). Unlike many sensitive species, burrowing owls persist and even thrive in some landscapes that are highly altered by human activity. The characteristics of suitable habitat are burrows for roosting and nesting, and relatively short vegetation with only sparse shrubs and taller vegetation. Individuals in agricultural environments nest along roadsides and water conveyance structures. Breeding occurs February through August (CDFW 2012).

Although burrowing owls are not common in the Delta, there is habitat available and potential for burrowing owl to be present in the survey area. Suitable habitat is present along the levees and in agricultural fields. Ground squirrel burrows were observed adjacent to the survey area, but no burrowing owls or signs were observed.

Swainson's Hawk

Swainson's hawk is state listed as threatened. It once occupied large grassland and shrub steppe habitats, as well as canyons, foothills, and smaller interior valleys in otherwise mountainous regions. Currently, the species is most common in the Central Valley and Great Basin. Nesting habitat for Swainson's hawk includes mature trees with relatively dense canopies such as oaks or cottonwoods in or near riparian habitat, agricultural fields, or suburban neighborhoods near suitable foraging habitat. They forage in grasslands, irrigated pastures, and grain fields. In California, Swainson's hawks begin nesting in late March, and the young usually leave the nest (fledge) by August.

There are numerous documented CNDDB occurrences within 5 miles of the survey area. The large trees within the riparian corridor and adjacent areas could provide nesting sites and the agricultural fields provide suitable foraging habitat.

Northern Harrier

Northern harrier is listed by CDFW as a California species of special concern. This raptor breeds widely but locally in North America from northern Alaska and Canada south to midlatitudes and lower latitudes of the United States and northern Baja, California; it is found year-round in much of its breeding range in the contiguous United States and locally in southwestern and southeastern Canada. Northern harriers breed and forage in a variety of open habitats that provide adequate vegetative cover, an abundance of suitable prey, and scattered hunting perches, such as shrubs or fence posts. In California, such habitats include freshwater marshes, brackish and saltwater marshes, wet meadows, weedy borders of lakes, rivers and streams, annual and perennial grasslands (including those with vernal pools), ungrazed or lightly grazed pastures, some croplands, sagebrush flats, and desert sinks. The species occurs more broadly and in much greater numbers during migration and winter than during the breeding season. Northern harriers nest on the ground from March through August mostly in patches of dense, often tall shrubby/scrubby vegetation in undisturbed areas (Davis and Niemela 2008). Northern harriers require approximately 4 to 6 weeks to fledge young (Smith et al. 2011), and undisturbed nesting habitat must be available to avoid nest depredation and destruction (Cripe 2000).

The potential for northern harriers to occur in the survey area is high. Open habitats on levees and in the survey area provide foraging habitat and potentially suitable nesting habitat for this species occurs in the harvest area as well as in adjacent agricultural lands.

White-Tailed Kite

The white-tailed kite is a fully protected species under the California Fish and Game Code. This species nests primarily in riparian and lowland habitats often associated with agricultural areas throughout cismontane California. White-tailed kites typically nest in dense vegetation at the tops of oaks, willows, or other native trees. They prey primarily on voles and other diurnal mammals (CDFW 2005). Their numbers and range have increased in the past few decades (CDFW 2005).

There are no documented occurrences in the vicinity of the survey area and they were not observed during the survey; however, white-tailed kites are underreported in CNDDB and they could use the survey area for foraging.

Short-eared Owl

Short-eared owl is listed by CDFW as a California species of special concern. While small resident populations of short-eared owls remain in the Great Basin region and locally in the Sacramento–San Joaquin Delta, most recent breeding from coastal central California and the San Joaquin Valley has been episodic. The breeding range retracts dramatically in drought conditions and during prey reductions.

Nesting short-eared owls require open grassland that supports concentrations of microtine rodents and herbaceous cover sufficient to conceal their ground nests from predators (Holt and Leasure 1993). Suitable habitats may include salt- and freshwater marshes, irrigated alfalfa or grain fields, and ungrazed grasslands and old pastures. Tule marsh or tall grasslands with cover of 30 to 50 cm

in height can support nesting pairs (Holt and Leasure 1993). Productive habitat for resident owls is now almost entirely limited to wildlife refuges and management areas (Roberson 2008). Management of refuges and restoration areas for herbaceous cover has been successful in maintaining resident owls, even when prey dwindle.

A short-eared owl was flushed during surveys of the harvest area. The owl is likely a winter migrant, which is common in the Central Valley.

Lesser and Greater Sandhill Crane

Lesser and greater sandhill cranes are winter residents and migrants in the Delta, arriving during early September and reaching maximum densities during December and January and departing during early March. Sandhill cranes vocalizations were heard on the adjacent Staten Island, which occurs approximately 1,500 feet to the north of the survey area and is a known roost area.

Lesser sandhill crane is a California species of special concern. Lesser sandhill crane is a large gray, heavy-bodied bird with a long neck, long legs, and red plumage on top of the head. The subspecies range includes much of North America; the population that occurs in the Study Area breeds in southwestern and southcentral Alaska and migrates to the Central Valley of California to overwinter (Shuford and Gardali 2008).

Greater sandhill crane is state listed as threatened and is fully protected under California Fish and Game Code. Greater sandhill crane is the largest sandhill crane subspecies, with gray plumage, heavy body, long neck and legs, and red plumage on top of the head. The subspecies range includes much of North America; the population that occurs in the Study area breeds in small numbers in northeastern California, with larger populations coming from Washington, Oregon, and western Canada, and migrates to the Central Valley of California to overwinter (CDFW 1994).

Foraging habitat between the two subspecies is similar (although there are some individual crop preferences) and consists mainly of harvested corn fields, winter wheat, irrigated pastures, alfalfa fields, and fallow fields. Mid-day loafing typically occurs in wetlands and flooded fields. Greater and lesser sandhill cranes occasionally forage and opportunistically consume small rodents, birds, and invertebrates along agricultural field borders, levees, rice checks, and ditches, and in alfalfa fields or pastures. Night roosting is in shallowly flooded open fields and open wetlands interspersed with uplands and tend to congregate in small to large flocks. Greater and lesser sandhill cranes use similar roost sites and are both sensitive to human disturbance (Littlefield and Ivey 2000).

Staten Island, just to the north of Bouldin Island, is a known sandhill crane refuge, where a significant portion of the Delta populations reside in the winter. They have also been documented on Bouldin Island (Littlefield and Ivey 2000). Vocalizations from Staten Island were heard during the field visit. Greater sandhill cranes that roost on Staten Island are documented to use the north portion of Bouldin Island to forage for corn and winter wheat (Ivey et al. 2014). During field surveys the Proposed Project area consisted of a fallowed winter wheat field. Therefore, the Proposed Project area provides suitable foraging habitat for the greater sandhill cranes when residual wheat or corn from recent plantings is present.

California Black Rail

The California black rail is State listed as threatened. It is a scarce and rarely seen bird with little known about its life history. It occurs yearlong in the San Francisco Bay area, Sacramento-San Joaquin Delta, coastal southern California, the Salton Sea, and lower Colorado River area. It can be found in saline, brackish, and fresh emergent wetlands. It often occurs in association with pickleweed in tidal and brackish wetlands or with bulrushes, cattails, and saltgrass in freshwater wetlands (Manolis 1977). It builds its nests in dense vegetation at ground level or elevated several inches (Stephens 1909). Nests with eggs have been observed from mid-March to early June (Bent 1926, Wilbur 1974). One California black rail was reported responding to a taped call on Davis Island, which is just east of Bouldin Island and is densely vegetated with little human activity. The harvest area could provide marginal habitat.

Loggerhead Shrike

The loggerhead shrike is listed by CDFW as a California species of special concern, and is a year-round resident, distributed throughout much of California, except in higher-elevation and heavily forested mountainous regions (Humple 2008). Shrikes nest earlier than most other passerines. The breeding season for the species may begin as early as late February and lasts through July (Yosef 1996). Loggerhead shrikes establish breeding territories in open habitats with relatively short vegetation that allows for visibility of prey such as arthropods, small reptiles, amphibians, rodents, and birds. They can be found in grasslands, scrub habitats, riparian areas, other open woodlands, ruderal habitats, and developed areas, including golf courses and agricultural fields (Yosef 1996). Loggerhead shrikes require the presence of structures for impaling their prey. These structures most often take the form of thorny or sharp-stemmed shrubs or barbed wire (Humple 2008). Ideal breeding habitat for loggerhead shrikes is short grass habitat with many perches, shrubs, or trees for nesting and sharp branches or barbed wire fences for impaling prey.

Loggerhead shrikes are known to occur throughout the Central Valley, and suitable habitat, such as the riparian areas, blackberry shrubs, and areas with adjacent foraging sites, such as fallow fields and agricultural crops, are present in the survey area; therefore, there is a moderate potential for the loggerhead shrike to be present in the survey area.

Song Sparrow ("Modesto" population)

The song sparrow has the greatest number of genetically distinct populations of any bird in North America, including seven subspecies that breed in California, six of which are endemic to the State. The "Modesto" population was once considered to be a distinct subspecies (*M. m. mailliardi*), but it has recently been classified as a race and merged with the *heermanni* subspecies (Patten and Pruett 2009). Because it is debatable that the Modesto population is genetically distinct, it is considered a California species of special concern (Gardali 2008) until further genetic studies are conclusive.

Song sparrows are year-round residents that breed from mid-March through early August in the Sacramento Valley, Delta, and northern San Joaquin Valley, with centers of abundance in the Delta and Butte Sink areas (Gardali 2008). They generally breed in freshwater and saline emergent wetlands and riparian willow thickets. However, breeding has been documented in sparsely vegetated agricultural ditches, and levees, especially in areas adjacent to the Butte Sink, in the

northernmost limit of Little Butte Creek, and in roadside agricultural ditches east of the Sacramento River above the Tisdale Bypass (Gardali 2008).

The Modesto song sparrow is known to occur in the sloughs around Bouldin Island. Because suitable habitat is present adjacent to the survey area and marginal habitat occurs in the survey area the Modesto song sparrow has a moderate to high potential to be present in the survey area.

Other Breeding and Migratory Birds

The federal Migratory Bird Treaty Act and Section 3513 of the California Fish and Game Code protect raptors, most native migratory birds, and breeding birds that could be present in the survey area. The survey area provides high-quality foraging and nesting opportunities for a variety of resident and migratory birds. Common raptor species that may nest in the mature trees in the survey area could include red-tailed hawk, red-shouldered hawk, and great horned owl (observed near survey area). Wading birds such as the great egret and the great blue heron are known to nest on the nearby Venice and Decker Islands and could use the agricultural ditches for foraging.

Western Red Bat

The western red bat is listed by CDFW as a California species of special concern. This is a riparian obligate species (i.e., dependent on riparian habitat) that is ubiquitous throughout California except the northern Great Basin region. Western red bats roost individually in dense clumps of tree foliage in riparian areas, orchards, and suburban areas. They are primarily moth specialists but will forage for a variety of other insects. Individuals have been observed foraging around streetlamps and floodlights in suburban areas (WBWG 2005).

Based on its tendency to roost within tree foliage, this species may be intermittently present in the riparian areas; the closest and most recent CNDDB occurrence within 5 miles was from 1999 and was located 4 miles to the west.

Potential Adverse Effects on Special-Status Wildlife

Construction and maintenance activities could have direct and indirect adverse impacts on several special-status wildlife species. All maintenance activities that involve the use of heavy equipment; or produce disturbances such as noise, dust, smoke, vibrations, and visual disturbance; or that could accidentally release hazardous materials could have impacts. This section describes an assessment of those potential effects and describes mitigation measures for those impacts.

General Construction and Maintenance Activities

The use of vehicles and heavy equipment could result in mortality of giant garter snakes, northwestern pond turtles, and burrowing owls through vehicle strikes when these animals are aboveground, basking on or crossing roads. These species, along with other species using burrows (i.e., burrowing owls), may also be crushed or entombed by vehicles and heavy equipment, resulting in direct mortality. In addition, the potential exists for contaminants, including fuel, oil, other petroleum products, and other chemicals used in maintenance activities, to be accidentally introduced into waterways. In sufficient concentrations, these contaminants would be toxic to special-status aquatic wildlife (i.e., special-status plants, giant garter snake, northwestern pond turtle) and their prey species.

Noise, dust, vibrations, and visual disturbance related to the use of vehicles and heavy equipment during construction and maintenance activities, as well as disturbances associated with the presence of persons conducting maintenance activities, could indirectly affect giant garter snake, northwestern pond turtle, and all species of special-status birds by negatively altering behaviors such as foraging, thermoregulation, brumation, nesting, incubation, and feeding. It is also possible that such disturbances could modify predator-prey relationships (e.g., by increasing predator populations through habitat alterations that benefit predators or through disposal of refuse that attracts predators).

Exposing special-status wildlife species to disturbances that alter these natural behaviors or increase predators could potentially result in decreased reproductive success and increased mortality of adults or juveniles (e.g., through nest abandonment).

Because connecting to agricultural ditches would require ground disturbance, equipment access, the removal of vegetation from channels, and construction of gates and weirs, the Proposed project has the potential to cause direct mortality or injury of a number of species, including: northwestern pond turtle, giant garter snake, burrowing owl, Modesto song sparrow, and northern harrier.

Vegetation Harvesting

Harvesting of aquatic vegetation using an excavator could result in both direct and indirect effects on giant garter snake, northwestern pond turtle, Modesto song sparrow, northern harrier, Swainson's hawk, and California black rail.

Aquatic vegetation removal from the harvest area when inundated could result in mortality or injury of giant garter snakes and northwestern pond turtles if they were captured or crushed by the excavator or other heavy equipment while active in aquatic habitats or basking along the upland edges. Additionally, snakes found in upland refugia and northwestern pond turtle nests along canal banks could be crushed or have their burrows or nests collapsed and crushed by heavy equipment operating within the harvest area edges.

In addition, birds that nest or roost in freshwater emergent vegetation, including cattails and bulrush (e.g., Modesto song sparrow, northern harrier, and California black rail), could be directly affected by aquatic vegetation removal. These species are particularly vulnerable to vegetation removal activities during the breeding season (February 1 through September 15), when they nest in dense stands of cattails and bulrush and other freshwater emergent vegetation. The removal of emergent vegetation supporting nests of these three species could therefore cause mortality and injury of adults and young as well as abandonment and subsequent failure of a nest. Nesting birds could also be directly affected by the noise, vibration, dust, and visual disturbance of these activities, which could potentially cause decreased nest attendance, nest abandonment, and nest failure.

The harvesting of aquatic vegetation could also result in temporary, indirect effects on giant garter snakes and northwestern pond turtles by modifying the aquatic component of their habitats. Removal of emergent vegetation would decrease available cover, foraging habitat, and basking sites (e.g., mats of downed cattails) for species. Vegetation removal could also affect both species by degrading water quality through temporary increases in turbidity and potential release of contaminants or by reducing production of invertebrates and other prey for these species. These indirect effects, although not directly resulting in mortality, could disrupt breeding and foraging behaviors; reduce the availability of breeding and foraging habitat; and potentially expose giant

garter snakes and northwestern pond turtles to predation, mortality, or other impacts when animals are displaced from their habitat or when habitat is altered in quality or quantity such that it no longer meets all the species' life history needs.

Removing emergent vegetation could indirectly affect Modesto song sparrow, northern harrier, and California black rail because the emergent habitat used by these species would be altered or removed. This would temporarily reduce the amount of available nesting habitat for these species in the harvest area and displace birds from potentially suitable nesting habitat. Additionally, aquatic vegetation harvesting could expose bird nests to increased disturbance and risk of predation by avian and mammalian predators. Decreased prey production would decrease foraging success for these birds and could potentially result in decreased survivorship of adults and young.

Vegetation Management

Herbaceous vegetation management around ponds and access roads, including mowing, disking, and weed trimming, could directly affect species that occur in burrows, nest on the ground, or otherwise use the ground surface for basking or movement. These species include giant garter snakes, northwestern pond turtles, northern harriers, and burrowing owls.

Maintenance of Water Control Structures

Water control structures require regular maintenance to remove built-up debris and sediments around inlet and outlet structures and screens. Aquatic vegetation removal from the marsh-pond complex could result in mortality or injury of giant garter snakes and northwestern pond turtles if they were captured during structure maintenance while active in aquatic habitats or basking along marsh-pond banks. Additionally, snakes found in upland refugia and northwestern pond turtle nests along banks could be crushed or have their burrows or nests collapsed and crushed by vehicles accessing banks.

Additionally, birds that nest in freshwater emergent vegetation including cattails and bulrush (e.g., Modesto song sparrow, northern harrier, and California black rail) could be directly affected by aquatic vegetation removal or disturbance. These species are particularly vulnerable to vegetation removal activities during the breeding season (February 1 through September 15) when they nest in dense stands of cattails and bulrush and other freshwater emergent vegetation. The removal of emergent vegetation supporting nests of these three species could therefore cause mortality and injury of adults and young as well as abandonment and subsequent failure of a nest. Nesting birds could also be directly affected by the noise, vibration, dust, and visual disturbance of these activities, which could potentially cause decreased nest attendance, nest abandonment, and nest failure.

Summary

Adverse effects on special-status wildlife could occur as a result of construction and maintenance activities. As described previously, these adverse effects include mortality, injury, and harassment of individuals, along with the permanent or temporary loss or modification of habitat.

The most substantial impact would result from harvesting aquatic vegetation (emergent plants with roots and associated sediment) from the harvest area. Up to 1.5 acres would be harvested within in an approximately 6.5-acre disturbance area during construction activities. Metropolitan's Standard Practices for construction projects require that pre-construction Worker Environmental

Awareness Protections Training (WEAP) is conducted for both capital projects and operations and maintenance activities. WEAP trainings are project-specific and cover potential environmental concerns or considerations including, but not limited to, awareness of biological resources, special status species near project sites, jurisdictional waters, environmentally sensitive areas, and/or avoidance areas. Because special-status wildlife species supported by the affected habitats are considered to be declining, rare, threatened, or endangered by California or federal fish and wildlife agencies, the loss or modification of habitat for these species or harassment or mortality of individuals is considered a potentially significant impact.

Mitigation Measures

Implementation of the following mitigation measures would reduce this impact to a less than significant level. This list includes general measures that apply to all maintenance activities.

BIO-1 Special-Status Plant Species Surveys

Surveys for special-status plants shall be completed within 2 years of the start of construction activities, including any vegetation removal, grubbing, or staging and mobilization. The surveys shall be seasonally timed to coincide with the target species identified in Appendix C. All plant surveys shall be conducted by a monitoring biologist no more than 2 years before initial ground disturbance associated with construction activities and shall cover the entire area proposed for disturbance (including areas for staging and mobilization). All special-status plant species identified on-site shall be mapped onto a site-specific aerial photograph and topographic map. Surveys shall be conducted in accordance with the most current protocols established by the CDFW and USFWS. If federally listed, state listed, or California Rare Plant Rank 1B species are found, avoidance and minimization measures shall be implemented in accordance with Mitigation Measure BIO-3.

BIO-2 Special-Status Plant Species Avoidance and Minimization

If federally listed, state listed, or California Rare Plant Rank 1B species are found during special-status plant surveys conducted pursuant to Mitigation Measure BIO-2, then avoidance measures shall be implemented to avoid impacting these plant species, if feasible. Rare plant occurrences that are not within the immediate disturbance footprint but are located within 50 feet of disturbance limits shall be protected at least 30 feet beyond their extent or other distance as approved by a monitoring biologist or have a suitable barrier, such as a bermed levee or bank, to protect them from harm. If avoidance of federally listed, state listed, or California Rare Plant Rank 1B plant species is not feasible, impacts shall be fully offset through implementation of a restoration plan that results in no net loss in accordance with Mitigation Measure BIO-3.

BIO-3 Special-Status Plant Species Revegetation

If avoidance of state listed, federally listed, or California Rare Plant Rank 1B species is not feasible, the individuals shall be transplanted, and surrounding topsoil shall be salvaged to be incorporated into the revegetation process for the site. A special-status plant restoration plan shall be prepared and implemented that includes the following criteria at minimum:

- The number of specimens affected for each species
- Identification of on-site or off-site preservation location(s)
- Methods for restoration, enhancement, and/or transplanting, including topsoil salvage and planting seeds of the affected species
- A performance standard replacement ratio of 1:1 per impacted specimen to be achieved within 3 to 5 years
- Monitoring of on-site and off-site preservation location(s) to verify performance shall occur in conjunction with special-status plant growing seasons, and no less than annually until performance standards are achieved

BIO-4 Special-Status Wildlife Species Surveys

Prior to the start of construction, Metropolitan shall conduct general pre-construction wildlife surveys. Pre-construction surveys for special-status species with moderate to high potential to occur shall be conducted where suitable habitat is present not more than 72 hours prior to the start of construction activities or maintenance activities that require vegetation removal during the nesting or giant garter snake active season. The pre-construction survey area shall include the Proposed Project area and all ingress/egress routes, plus a 200-foot buffer. If the results of the site-specific pre-activity surveys determine a candidate, sensitive, or special-status species identified in local or regional plans, policies, or regulations is present within a 200-foot buffer of the Project area, implementation of appropriate avoidance measures shall be required in accordance with Mitigation Measure BIO-5.

BIO-5 Special-Status Wildlife Species Avoidance and Minimization

If the results of the pre-activity surveys conducted pursuant to Mitigation Measure BIO-4 determine a candidate, sensitive, or special-status species identified in local or regional plans, policies, or regulations is present within a 200-foot buffer of the Proposed Project area, Metropolitan shall develop and implement appropriate avoidance measures listed below and in BIO 6 and 7 Avoidance measures may include but are not limited to:

- Installation of Environmentally Sensitive Area/avoidance fencing
- Flagging or fencing of any special-status species burrows by a monitoring biologist to ensure avoidance during Project activities
- Monitoring by a monitoring biologist during all initial ground disturbing activities. Once initial ground disturbing activities have been completed, the biologist shall conduct daily pre-activity clearance surveys, as necessary
- If at any time during Project construction or maintenance activities, a special-status species enters the Project area or otherwise may be impacted by the Project, all activities at the area where the find occurred shall cease. At that point, a monitoring biologist shall be consulted and recommend an appropriate course of action

BIO-6 Giant Garter Snake Avoidance and Minimization

The Proposed Project area provides marginal habitat for giant garter snake. However, suitable habitat occurs within 200 feet of the Proposed Project area. Thus, Metropolitan proposes to implement standard avoidance and minimization measures during construction activities. The following measures shall be implemented to avoid impacts to giant garter snake:

- Confine movement of heavy equipment to existing roadways to minimize habitat disturbance. Maintain a speed limit of 10 mph on all roadways within the construction area.
- Check under all equipment and materials prior to moving them. Do not store construction materials or stockpiles within 200 feet of giant garter snake habitat.
- All construction activities that occur within 200 feet of giant garter snake habitat shall occur between May 1 and October 1. This is the active period for giant garter snakes and direct mortality is lessened, because snakes are expected to actively move and avoid danger.
- If dewatering is necessary, Metropolitan shall dewater construction areas that could provide aquatic habitat for giant garter snakes to the extent feasible. Any dewatered aquatic habitat shall be kept dry for at least 15 consecutive days before conducting construction activities. If 15 consecutive days is not feasible then Metropolitan shall consult with the USFWS to apply appropriate measures. If dewatering cannot remove all water, potential giant garter snake prey (i.e., fish and tadpoles) would be removed so that giant garter snakes and other wildlife are not attracted to the construction area. The connection of the marsh-pond complex to the existing agricultural ditch requires temporary disturbance of potentially suitable aquatic habitat. These areas are small (generally less than 0.02 acre) and construction-related activities generally require 1 day. Since implementation of the 15-day dewatering period in these scenarios necessitates fill in multiple locations and a culvert or pumping/ piping system in the surrounding upland area to reroute irrigation or drainage water, resulting in more disturbance to potential aquatic habitat than the primary fill itself, a modification is proposed. This includes conducting a preconstruction survey; having a Service-approved biological monitor oversee initial ground disturbance in suitable upland habitat and thereafter be available during work; if limited dewatering is necessary, concentrating dewatering to pump water out of the area; and requiring that biological monitor checks the dewatered area for the snake and prey, and relocates prey species out of the work area.
- Confine clearing to the minimal area necessary to facilitate construction activities. Flag and designate avoided giant garter snake habitat within or adjacent to the Proposed Project area as Environmentally Sensitive Areas.
- Construction personnel shall receive worker environmental awareness training. This training shall instruct workers to recognize giant garter snakes and their habitat(s).

- 24 hours prior to construction activities, the Proposed Project area shall be surveyed for giant garter snakes. Survey of the Proposed Project area shall be repeated if a lapse in construction activity of 2 weeks or greater has occurred.
- If a snake is encountered during construction, activities shall cease until appropriate corrective measures have been completed or it has been determined that the snake would not be harmed.
- After completion of construction activities, all temporary construction debris and materials shall be removed, and habitat within temporary impact areas would be restored to pre-Project conditions.

BIO-7 Northwestern Pond Turtle Avoidance and Minimization

Metropolitan shall implement the following measures to avoid and minimize effects on northwestern pond turtle:

- A qualified biologist shall conduct a pre-construction survey within 7 days before the start of Project activities. If no northwestern pond turtles are observed, Metropolitan would document that information for the file, and no additional measures shall be required.
- Should any northwestern pond turtles be detected on land during the pre-construction survey, the qualified biologist would identify the location using GPS coordinates. The qualified biologist may relocate any northwestern pond turtles found on land or in aquatic habitat within the construction footprint to suitable aquatic habitat at least 200 feet away from the construction footprint.
- If northwestern pond turtles are observed on land within the construction footprint during construction activities, Metropolitan would stop work within approximately 200 feet of the turtle, and a qualified biologist would be notified immediately. If possible, the turtle would be allowed to leave on its own and the qualified biologist would remain in the area until the biologist deems his or her presence no longer necessary to ensure that the turtle is not harmed. Alternatively, the qualified biologist may capture and relocate the turtle unharmed to suitable habitat at least 200 feet outside the construction footprint. If a northwestern pond turtle nest is unintentionally uncovered during construction activities, work would stop in the vicinity of the nest until a qualified biologist could evaluate the situation and notify the appropriate agencies.

BIO-8 Nesting Birds Avoidance and Minimization

To avoid and minimize effects on nesting birds and achieve compliance with the Migratory Bird Treaty Act and California Fish and Game Code Sections 3503, 3503.5, and 3513, Metropolitan shall implement the following measures:

- Where feasible, construction and maintenance activities that have the potential to affect special-status nesting birds and common nesting birds shall occur at times of the year when adverse effects on those species would be avoided. If activities are conducted outside the nesting seasons no additional measures are required to mitigate adverse effects on nesting birds.

- If construction is scheduled to occur during the nesting season, a breeding season survey for nesting birds shall be conducted by a qualified biologist for all vegetation to be removed, harvested or disturbed that are located within 500 feet of construction activities, including grading. Swainson's hawk surveys shall be completed during at least two of the following survey periods: January 1 to March 20, March 20 to April 5, April 5 to April 20, and June 10 to July 30. An area with a radius of 0.5 miles from construction activities shall be surveyed for Swainson's hawk nests. No fewer than three surveys shall be completed in at least two survey periods, and at least one of these surveys would occur immediately before Proposed Project initiation (SWHA Technical Advisory Committee 2000).
- Western burrowing owl surveys shall follow suggested guidelines set forth in CDFW's *Staff Report on Burrowing Owl Mitigation* such as prior to the start of construction a biologist should conduct three or more daytime survey visits at least 3 weeks apart during the peak of breeding season from April 15 to July 15 or 4 surveys spread evenly throughout the non-breeding season (CDFW 2012). Other migratory bird nest surveys could be conducted concurrent with Swainson's hawk surveys, with at least one survey to be conducted no more than 48 hours from the initiation of Proposed Project activities to confirm the absence of nesting. If the biologist determines that the area surveyed does not contain any active nests, construction activities, including removal or pruning of trees and shrubs, could commence without any further mitigation. If at any time during the nesting season construction stops for a period of 2 weeks or longer, pre-construction surveys would be conducted before construction resumes. If construction occurs outside the nesting window for burrowing owls, a pre-construction survey shall be conducted to ensure no burrowing owls are present.
- If nesting birds have been identified within or adjacent to the construction footprint, Metropolitan would establish appropriate avoidance buffers (50 feet for passerines, 300 feet for raptors *except Swainson's hawk and burrowing owls*, and 200 feet for heron or egret rookeries). Reduced buffers may be implemented if recommended by the monitoring biologist. Buffers would be marked in the field by a qualified biologist using temporary fencing, high-visibility flagging, or other means that are equally effective in clearly delineating the buffers. The specific buffer distance for Swainson's hawk is 0.25 miles, and buffer distances for burrowing owl, which vary depending on time of year and level of disturbance, are presented in **Table 3.4-2** in accordance with CDFW's *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). Reduced buffers for Swainson's hawk and burrowing owl may be implemented if recommended by the monitoring biologist, due to the nature of the activity. Any needed burrowing owl exclusion and burrow closure would occur during the non-breeding season only, following the methodology in the CDFW Staff Report.
- To minimize and avoid the potential indirect impacts to lesser and greater sandhill crane that may occur within or adjacent to the Project area between September 15 through March 15, during roosting season, pre-activity surveys and an assessment of known roost sites shall be conducted within 0.25 miles of the

Project area by a qualified biologist. If roost sites are identified within 0.25 miles of the Project area, the start of large equipment used for construction activities would be delayed to an hour after sunrise and stop an hour before sunset.

- Vegetation clearing and harvesting shall not be conducted during the nesting season (generally February 1 through September 15, depending on the species and environmental conditions for any given year) where feasible.

Table 3.4-2. Recommended Restricted Activity Dates and Setback Distances by Level of Disturbance for Burrowing Owls

Time of Year	Distance of Disturbance (feet) from Occupied Burrows Low Disturbance	Distance of Disturbance (feet) from Occupied Burrows Medium Disturbance	Distance of Disturbance (feet) from Occupied Burrows High Disturbance
April 1 to August 15	600	1,500	1,500
August 16 to October 15	600	600	1,500
October 16 to March 31	150	300	1,500

Notes:
Low = Presence of maintenance staff on foot or in vehicles conducting work with light equipment (maintenance trucks, all-terrain vehicles).
Medium = Heavy equipment use with moderate noise levels (approximately 50–75 A-weighted decibels [dBA]).
High = Heavy equipment with high noise levels (more than 75 dBA).
Source: California Department of Fish and Game. 2012. *Staff Report on Burrowing Owl Mitigation*. March 7, 2012.

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

Less than Significant with Mitigation Incorporated. The Proposed Project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service because no riparian vegetation will be removed as part of this project. Additionally, impacts to fresh emergent wetland will be temporary in nature and will be passively restored as described in Mitigation Measures BIO-9 thereby reducing these impacts to a less-than-significant level.

The marsh-pond complex is proposed to be constructed within land that has been regularly dry-land farmed. There is a small area of riparian habitat adjacent to the marsh-pond complex, but the riparian habitat would be avoided during construction, including for staging and access. The harvest area consists of fresh emergent wetland with some willow trees. No trees would be removed during the Proposed Project and no riparian habitat would be impacted. Fresh emergent wetland in the harvest area would be temporarily impacted but would be restored through passive restoration. See wetland discussion in Section C for additional information. No other sensitive natural communities were identified in the Proposed Project area.

Tule harvesting would have minimal temporary impacts. Based on the tule growth rates of greater than 18 feet of spread in one growing season, it is anticipated that disturbed areas would revegetate within one growing season (Tilley 2012). Dispersing the sections would allow the tule to revegetate disturbed areas within one year resulting in minimal temporary impacts to the habitat. Similar harvesting techniques were used for experimental work by Metropolitan on Twitchell Island in 2019 and there was 100 percent tule recovery by the following year (ESA 2019).

BIO-9 Metropolitan proposes to monitor tule growth for 1 year. As discussed in the Project Description, if 75 percent coverage in disturbed areas has not been met within 365 days of the end of construction, Metropolitan would reassess unvegetated areas and would monitor for another year, with optional replanting. If 75 percent coverage is not met at the end of year two, Metropolitan will replant the disturbed area with appropriate native vegetation.

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

Less than Significant. No, the Proposed Project would not have a substantial adverse effect on state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means. Implementation of standard erosion control measures and implementation of Mitigation Measure BIO-9 to ensure successful restoration of temporarily disturbed habitat will reduce temporary impacts to a less-than-significant level.

Jurisdictional waters were identified within the marsh-pond complex and harvest area. Although the intent is to avoid jurisdictional waters to the extent feasible, potential temporary impacts to jurisdictional waters would occur during the connection of agricultural ditches.

Indirect impacts could include runoff of sediment and dust into jurisdictional areas during operation of heavy equipment. All areas temporarily impacted would also be revegetated with native seeds or as described above for the harvest area.

The Proposed Project would not permanently impact jurisdictional waters because no permanent structures, direct removal, or filling is proposed for the Project. Furthermore, when Project activities are complete, more native vegetation is expected to be in place, which would enhance fresh emergent wetlands or other sensitive natural communities. Therefore, no permanent impacts to potentially jurisdictional waters would occur.

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?

No Impact. No, the Proposed Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or disrupt native nursery sites. No known fish or wildlife movement corridors occur within the Proposed Project area. Therefore, no direct or indirect impacts would occur.

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

No Impact. No, the Proposed Project would not conflict with any local policies or ordinances protecting biological resources as there are no local policies or ordinances protecting biological resources in the Project area. As such, there would be no impact related to conflicting with policies or ordinances protecting biological resources.

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?

No Impact. No, the Proposed Project would not 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 survey area is not within an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan; therefore, the Proposed Project is not in conflict with any plans and no impacts would occur.

3.5 Cultural Resources

CULTURAL RESOURCES Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☒	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

Overview

This section examines the potential impacts of the Proposed Project on cultural resources. For purposes of this analysis, the term *cultural resource* is defined as follows:

> Pre-contact and historic-era sites, structures, districts, and landscapes, or other evidence associated with human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reason. These resources include the following types of CEQA-defined resources: historical resources, archaeological resources, and human remains.

The term *pre-contact* is used as a chronological adjective to refer to the period prior to Euroamerican arrival in the Proposed Project area.

This section relies on the information and findings presented in the Proposed Project's confidential cultural resources technical report: *Delta Smelt and Native Species Preservation Project, San Joaquin County, California: Cultural Resources Inventory Report* (Hoffman et al. 2022). That report included an overview of the environmental, ethnographic, and historic background of the Proposed Project area, with an emphasis on aspects related to human occupation. Please contact Metropolitan to inquire about reviewing this report.

CEQA Area of Potential Effects

For purposes of this analysis, the CEQA Area of Potential Effects (C-APE) is defined as both the horizontal and vertical maximum extents of potential direct impacts of the Proposed Project on cultural resources. This area encompasses the footprint of Proposed Project actions, including

staging and access areas. The C-APE comprises approximately 145 acres and extends vertically to the maximum depth of the Proposed Project's ground-disturbing activities, varying according to specific location. **Table 3.5-1** details the vertical C-APE by Proposed Project activity.

Table 3.5-1. Vertical C-APE by Project Component/Activity

Component	Activity	Project Location	Depth of Ground Disturbance (ft)
Tule Food and Cooling Marshes	Disking and land leveling	Work Area	1.0
	Wetland construction	Work Area	2.0
	Tule planting	Work Area	0.0
Tule Harvesting	Tule removal/harvesting	Collection Area	2.0
Native Fish Propagation Ponds	Pond excavation	Work Area	15.0
	Berm construction	Work Area	0.0
Water Distribution, Control, and Screening	Well construction	Work Area	300.0
	Transportation pipeline installation	Work Area	3.0
Water Use Monitoring and Outlet Control	Tailwater ditches excavation	Work Area	5.0
Drainage Features	Agricultural ditch excavation	Work Area	5.0
Supplemental Floating Peat Marshes	Floating peat marsh excavation	Work Area	3.0
Access Roads	Gravelling existing roads	Work Area	0.0
	Use of existing roads	Access Roads	0.5
Operations and Maintenance	Weed control	Work Area	0.0
	Agricultural ditch cleaning	Work Area	5.0

Records Search

In November 2021, ESA requested cultural resources records searches for the C-APE and vicinity from staff at the Central California Information Center (CCIC) at California State University Stanislaus, and the North Central Information Center at California State University Sacramento. The study area for the records searches consisted of the C-APE with a 0.5-mile buffer. The California Historical Resources Information System (CHRIS) has record of ten previously recorded cultural resources mapped within 0.5 mile of the C-APE, one of which (P-39-000322) is mapped within the C-APE. The CCIC reply letter erroneously stated that two additional previously recorded resources (P-39-000033, -004541) are in the C-APE; a review of the geospatial data and site records associated with these resources, as provided to ESA by the CCIC, clearly show them both to be outside the C-APE. Of the ten cultural resources previously recorded within 0.5 mile of the C-APE, seven are historic-era archaeological resources and three are historic-era architectural resources. The one previously recorded cultural resource mapped within the C-APE, P-39-000322, is an historic-era archaeological site consisting of a refuse scatter that does not appear to have ever been evaluated for eligibility for listing in the National Register of Historic Places (National Register) or California Register of Historical Resources (California Register).

Additional Archival Research

The National Oceanic and Atmospheric Administration (NOAA) maintains an online database of shipwrecks derived from historic nautical charts at https://wrecks.nauticalcharts.noaa.gov/viewer/. ESA conducted a search of this database for the C-APE and vicinity on November 16, 2021. ESA

conducted a review of the following sources of historic maps: Library of Congress (https://www.loc.gov/); David Rumsey Historical Map Collection (www.davidrumsey.com); USGS's TopoView (https://ngmdb.usgs.gov/topoview/); University of California Santa Barbara's FrameFinder database (https://mil.library.ucsb.edu/ap_indexes/FrameFinder/); and NOAA Historical Shoreline Surveys Google Earth layer, which provides access to nautical charts from the US Coast Survey (later the US Coast and Geodetic Survey) and US National Ocean Service. The historic map and photography review focused on the C-APE and vicinity, and did not reveal any potential architectural or archaeological resources in the C-APE other than the existing levee. ESA conducted a review of ethnographic literature for the C-APE and vicinity to gather information on potential Native American villages, place names, or documented use of the area. This review revealed that no documented Native American villages are mapped in or in the immediate vicinity of the C-APE. The nearest ethnographic villages appear to have been the Plains Miwok villages *Guaypemne*, mapped approximately 1.5 miles northeast of the C-APE (Bennyhoff 1977; Heizer 1978), and *Musupumne*, mapped approximately 3.0 miles northeast of the C-APE (Bennyhoff 1977; Heizer 1978).

Native American Correspondence

ESA contacted the California Native American Heritage Commission (NAHC) on November 11, 2021, in request of a search of the NAHC's Sacred Lands File (SLF) and a list of Native American representatives who may have interest in the Proposed Project. The NAHC reply, dated January 3, 2022, stated that the SLF has no record of sacred sites in the C-APE.

Field Survey

On December 28, 2021, ESA archaeologist Robin Hoffman conducted a pedestrian surface survey of the entire C-APE. Intensive pedestrian methods were used during the survey, consisting of walking the ground surface in parallel transects no greater than 20 meters apart and inspecting the ground surface for evidence of cultural material (archaeological or architectural). Field methods were augmented for the close inspection of the location of P-39-000322, as previously recorded. These augmented methods entailed reducing parallel transect spacing to no greater than 5 meters, examining surface sediments and debris for remains of a refuse deposit described in the original site record for the resource.

No archaeological resources, including any evidence of P-39-000322, were observed in the C-APE during the survey. One architectural resource, San Joaquin County Levee 54 (later designated by CHRIS as P-39-005454), was identified in the C-APE during the survey; the resource was previously unrecorded.

Archaeological Sensitivity Analysis

Holocene Delta mud deposits underlie the entire C-APE (Dawson 2009), and native soils in the C-APE consist of Ryde series clay loams (majority of Work Area), Piper series sandy loams (majority of Collection Area), and Rindge series muck (portions of Collection Area) (USDA 2021). Rindge series muck is of historic-era/modern age (150 BP–present) (Meyer and Rosenthal 2008), and Ryde series clay loams and Piper series sandy loams are of estimated Latest Holocene age (2000–150 BP). Based on the ages of the mapped soil units in the C-APE, and that the C-APE is in proximity to a large, perennial freshwater body, the C-APE's theoretical potential for presence

of buried Native American archaeological deposits is high to very high (Meyer and Rosenthal 2008:160–161). Historic-era and modern engineering of the landscape, notably through the construction of the levees and roads have disturbed the access road portions of the C-APE, while historic-era and modern agricultural activities (e.g., row crops) have disturbed portions of the C-APE, notably the Work Area. It is likely, though not certain, that the deep plowing associated with historic-era and modern agricultural activities in the C-APE, particularly Work Area portion thereof, would have resulted in some manifestation (etc., fragmented artifacts or faunal remains) of any shallow buried archaeological deposits. Given that no archaeological material was identified during the field survey conducted for the current study, we conclude that the actual potential for presence of buried and surficial Native American archaeological deposits in the C-APE is moderate. Based on the above analysis, the C-APE has a moderate sensitivity for both surficial and buried Native American archaeological resources.

No signs of historic-era development activities and associated use that may have resulted in the creation of surficial and buried historic-era archaeological deposits in the C-APE were observed in a review of historic photographs or maps, or during the field survey. Therefore, the potential presence for both surficial and buried historic-era archaeological deposits in the C-APE is low. Background research of historic topographic maps and photographs did not indicate any clear avenues for significance for the California Register for any buried historic-era archaeological deposits in the C-APE, if present. Also, based on known historic-era archaeological resources previously recorded in similar settings in the Proposed Project vicinity, the potential significance of any intact historic-era archaeological resources in the C-APE is low. Therefore, the C-APE has a low sensitivity for historic-era archaeological resources, both buried and surficial (low potential presence with low potential significance).

Summary of Cultural Resources Identified

Through background research, one previously recorded cultural resource, P-39-000322 (historic-era refuse scatter), and one previously unrecorded cultural resource, San Joaquin County Levee 54, were identified in the C-APE. During the field survey conducted for the Proposed Project, no evidence of P-39-000322 was observed in the C-APE, and the San Joaquin County Levee 54 (subsequently assigned the designation P-39-005454), was identified in the C-APE. P-39-005454 is an historic-era architectural resource consisting of the San Joaquin County Levee 54, an earthen levee that surrounds the whole of Bouldin Island, and is in the Levee Access Road portion of the C-APE. The levee measures approximately 17.89 miles long, and protects 9.2 square miles of agricultural land. Within the C-APE, the levee measures 12 feet wide at the crown, 35 feet wide at the base, and 8 feet tall, with a gravel access road topping the levee. The levee is a locally owned, operated, and maintained levee. Per archival review, the earliest levees on the island date to the 1870s, and a levee appears in the same location as the resource on the earliest historic topographic maps dating to 1910. ESA evaluated P-39-005454 for California Register-eligibility, recommending it not eligible for the California Register (Hoffman et al. 2022).

In summary, no cultural resources that qualify as historical resources or unique archaeological resources, as defined by CEQA, were identified in the C-APE.

Discussion. Would the project:

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

No Impact. No, the Proposed Project would not cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5. One historic-era architectural resource (P-39-005454: San Joaquin County Levee 54) was identified in the C-APE, though it is not eligible for the California Register and, therefore, P-39-005454 does not qualify as an historical resource, pursuant to CEQA Guidelines § 15064.5. Therefore, the Proposed Project would have no impact on historical resources, pursuant to CEQA Guidelines § 15064.5.

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

Less than Significant. No, the Proposed Project would not cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5. Background research identified one archaeological resource (P-39-000322: historic-era refuse deposit) within a portion of the C-APE. However, no evidence of the resource was observed in the C-APE during the field survey and this study concludes that the resource is no longer present in the C-APE.

Although there is no substantial evidence that archaeological resources are present in the C-APE, the Proposed Project would involve ground-disturbing activities that may extend into undisturbed soil, and the archaeological sensitivity analysis conducted for the Proposed Project concluded that the C-APE has a moderate sensitivity for both surficial and subsurface Native American archaeological resources. Metropolitan's Standard Practices for construction projects require that, in the event unanticipated archaeological resources are discovered during Proposed Project activities, all work would cease within 50 feet of the discovery to protect the area until a qualified archaeologist can evaluate the discovery and recommend additional measures for proper handling and treatment.

As no known archaeological resources that may qualify as historical resources (as defined in CEQA Guidelines § 15064.5) or unique archaeological resources (as defined in PRC § 21083.2[g]) are present in the C-APE, the Proposed Project is not expected to impact any archaeological resource, pursuant to CEQA Guidelines § 15064.5, and impacts are less than significant.

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

Less than Significant. Archival research and the field survey of the C-APE did not find any evidence of the presence of human remains. Also, the land use designations for the C-APE do not include cemetery uses, and no known human remains exist within the C-APE. Therefore, the Proposed Project is not anticipated to disturb any human remains. Should human remains be encountered, Metropolitan would comply with the State of California's Health and Safety Code Section 7050.5, which states that no further disturbance would occur until the appropriate county coroner has made a determination of origin and disposition of the remains pursuant to PRC Section 5097.98. Adherence to State of California's Health and Safety Code Section 7050.5 would result in the proper handling and treatment of unexpected human remains. Therefore, impacts to human remains would be less than significant.

3.6 Energy

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

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. 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?

Less than Significant Impact. No, the Proposed Project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation. During construction of the Proposed Project, fuel consumption would result from the use of construction tools and equipment, truck trips to haul material, and construction workers' commutes to and from the Project site. Construction of the Proposed Project is anticipated to last for 4 months total, in two phases of 2 months each.

Construction activities and corresponding fuel energy consumption would be temporary and localized, as the use of diesel fuel and heavy-duty equipment would not be a long-term condition of the Proposed Project. In addition, the Proposed Project has no unusual characteristics that would require using construction equipment or haul vehicles that would be less energy efficient than equipment and vehicles used at similar construction sites elsewhere in California. In conclusion, construction-related fuel consumption by the Proposed Project would not result in inefficient, wasteful, or unnecessary energy use compared with other construction sites in the region. This impact would be less than significant.

Operation of the Proposed Project would require staff from UC Davis using pickup trucks to be on-site daily for approximately 2 months in the spring and 2 months in the fall, when fish are on-site. It is anticipated that operations and maintenance of the Proposed Project would require four workers, using pickup trucks, to be on-site twice per week. Because the Proposed Project's operational impacts on energy resources would be driven primarily by limited maintenance and research activities, energy use would be minimal. Therefore, the Proposed Project would not include the wasteful, inefficient, or unnecessary consumption of energy resources and would have no potential for significant energy impacts.

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

Less than Significant Impact. No, the Proposed Project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

The transportation sector is a major end user of energy in California, accounting for approximately 34 percent of the state's total energy consumption in 2020 (US Energy Information Administration 2022). Energy is also consumed in connection with construction and maintenance of transportation

infrastructure, such as streets, highways, freeways, rail lines, and airport runways. In 2015, California's 30 million vehicles consumed more than 15 billion gallons of gasoline and more than 4.2 billion gallons of diesel, making California the second largest consumer of gasoline in the world (CEC 2016).

Existing standards for transportation energy are promulgated through the regulation of fuel refineries and products, such as the Low Carbon Fuel Standard, which mandated a 10 percent reduction in the non-biogenic carbon content of vehicle fuels by 2020. In 2018, the Board approved amendments to the regulation, which included strengthening and smoothing the carbon intensity benchmarks through 2030 in line with California's 2030 greenhouse gas (GHG) emission reduction target enacted through Senate Bill (SB) 32, adding new crediting opportunities to promote zero emission vehicle adoption, alternative jet fuel, carbon capture and sequestration, and advanced technologies to achieve deep decarbonization in the transportation sector. Other regulatory programs with emissions and fuel efficiency standards have been established by the US Environmental Protection Agency and the CARB, such as Pavley II/Low Emission Vehicle III from California's Advanced Clean Cars Program and the Heavy-Duty (Tractor-Trailer) Greenhouse Gas Regulation.

In 2020, Governor Gavin Newsom signed Executive Order N-79-202 which established a goal that 100 percent of California sales of new passenger cars and trucks be zero-emission by 2035. In addition, the Governor's order set a goal to transition all drayage trucks to zero-emission by 2035, all off-road equipment to zero-emission where feasible by 2035, and the remainder of medium- and heavy-duty vehicles to zero-emission where feasible by 2045. Under the order, CARB is tasked to work with their state agency partners to develop regulations to achieve these goals taking into account technological feasibility and cost effectiveness (CARB 2021). Further, construction sites need to comply with state requirements designed to minimize idling and associated emissions, which also minimizes fuel use. Specifically, idling of commercial vehicles and off-road equipment is limited to 5 minutes in accordance with the Commercial Motor Vehicle Idling Regulation and the Off-Road Regulation (California Code of Regulations Title 13, Section 2485).

San Joaquin County has not implemented energy action plans. The Proposed Project is consistent with the state goals and would not impede progress toward achieving these goals. The Proposed Project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency or impede progress toward achieving any goals and targets. This impact would be less than significant.

3.7 Geology and Soils

GEOLOGY AND SOILS Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) 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.	☐	☐	☐	☒
ii) Strong seismic groundshaking?	☐	☐	☒	☐

GEOLOGY AND SOILS Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on geologic units or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Section 1803.5.3 of the California Building Code (2010), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

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

i) 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.

No Impact. No, the Proposed Project would not directly or indirectly cause a potential substantial adverse effect involving rupture of a known earthquake fault. The Proposed Project site is not located within an Alquist-Priolo earthquake fault zone (DOC 2022). Therefore, no impact related to rupture of a known earthquake fault would occur.

ii) Strong seismic groundshaking?

Less than Significant Impact. No, the Proposed Project would not directly or indirectly cause potential substantial adverse effects involving strong seismic groundshaking. Earthquakes associated with the active faults in the Project area may cause strong ground shaking at the Proposed Project site. The region of the Great Valley Fault closest to the Proposed Project site is estimated to have an approximately 0.48 percent chance of a Mw 6.7 or greater earthquake over the next 30 years (WGCEP 2015). The Proposed Project would be constructed to industry standards to protect against potential adverse geological impacts of seismic activity and other site-specific soils and geology constraints, including compliance with the American Society of Civil Engineers standards. Implementation of the regulatory requirements, to ensure that all improvements are constructed in compliance with the law, is the responsibility of the project engineers and building officials. With compliance with these standards, the impact related to seismic shaking would be less than significant.

iii and iv) Seismic-related ground failure, including liquefaction or landslides?

No Impact. No, the Proposed Project would not directly or indirectly cause potential substantial adverse effects involving seismic-related ground failure or liquefaction. Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cyclic loading. Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, triggered by either static forces (i.e., gravity) or dynamic forces (i.e., earthquakes). The Project area is not known to be susceptible to landslides or liquefaction and is within a flat area. In addition, the Proposed Project would be subject to compliance with the American Society of Civil Engineers standards. Therefore, no impact would occur.

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

Less than Significant Impact. No, the Proposed Project would not result in substantial soil erosion or the loss of topsoil. Soils in the Project area have low potential for erosion (NRCS 2022); however, earthmoving and grading activities during construction of the Proposed Project have the potential to cause erosion. Routine Project operations and maintenance activities are not anticipated to result in substantial soil erosion or loss of topsoil. Construction would be required to adhere to BMPs associated with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit for Discharges of Stormwater Associated with Construction Activities, also known as the Construction General Permit, to control sediment in stormwater runoff from the Project area (see checklist item a in Section 3.10, *Hydrology and Water Quality*). Therefore, impacts of the Proposed Project related to soil erosion would be less than significant.

c and d. Be located on geologic units or soil that is expansive or unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Less than Significant Impact. No, the Proposed Project would not be located on geologic units or soil that is unstable, or that would become unstable as a result of the Proposed Project. According to the soil survey data for San Joaquin County, close to half of the upper 5 feet of soils throughout the county have a low shrink-swell potential, a lesser portion is considered to have a moderate potential, and about an eighth of the area (primarily in the southwestern end of the county) has been mapped with a high potential (San Joaquin County 2014). There are no nearby structures that could be damaged and the Proposed Project would not construct any structures. Therefore, the Proposed Project would not expose people or structures to potential substantial adverse effects caused by a seismic event or other phenomena that create unstable ground at the Proposed Project site. Less than significant impacts resulting from unstable or expansive soils would result from the Proposed Project.

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

No Impact. The Proposed Project would not include the use of septic tanks or alternative wastewater disposal systems. Therefore, soil suitability for septic tanks or alternative wastewater disposal systems is not applicable, and the Proposed Project would have no impacts associated

with septic systems. No impacts related to soils necessary to support septic tanks or other alternative wastewater disposal systems would occur.

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

Less than Significant. No, the Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. The Society of Vertebrate Paleontology (SVP) considers remains of 5,000 years and older to be a significant resource. This also means that geologic units that have ages younger than 5,000 have a low potential as a paleontological resource. Rock formations that are considered paleontologically sensitive are those rock units that have yielded significant vertebrate or invertebrate fossil remains (SVP 2010). The vast majority of paleontological specimens from San Joaquin County have been found in rock formations in the foothills of the Diablo Mountain Range. However, remains of extinct animals such as mammoth, could be found virtually anywhere in the county, especially along watercourses such as the San Joaquin River and its tributaries (San Joaquin County 2014). However, the Project Site has an extensive history of agricultural production, no fossil specimens in institutional collections have been found near the Proposed Project site, and the majority of excavation would occur within the top 5 feet. The Native Fish Propagation Ponds would be excavated to a depth of 15 feet. Considering the soils at the Project Site and its historical use, the potential for paleontological resources is low. Furthermore, part of Metropolitan Standard Practices, if unanticipated paleontological resources are discovered during construction activities, the Project Contractor(s) would be required to comply with Metropolitan standard practices related to the protection of paleontological resources as outlined in Section 01065 of the construction contractor specifications. Therefore, impacts to paleontological resources would be less than significant.

3.8 Greenhouse Gas Emissions

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

Significance criteria established by CEQA Guidelines, Appendix G.

Overview

GHG emissions worldwide cumulatively contribute to the significant adverse environmental impacts of global climate change. No single project could generate sufficient GHG emissions on its own to noticeably change the global average temperature. The combination of GHG emissions from past, present, and future projects in the San Joaquin Valley; the entire state of California; across the nation; and around the world contribute cumulatively to the phenomenon of global climate change and its associated environmental impacts.

Assembly Bill 32 (AB 32) also known as the Global Warming Solutions Act of 2006, codifies the State of California's GHG emissions target by directing CARB to design and implement feasible

and cost-effective emissions limits, regulations, and other measures, such that statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25-percent reduction in emissions). The CARB identified a GHG reduction target of 15 percent from current levels for local governments (municipal and community-wide) and noted that successful implementation of the plan relies on local governments' land use planning and urban growth decisions because local governments have primary authority to plan, zone, approve, and permit land development to accommodate population growth and the changing needs of their jurisdictions. The AB 32 emissions reduction limit was achieved in 2017, 3 years prior to the 2020 goal.

In response to AB 32 GHG reduction goals, CARB adopted the Climate Change Scoping Plan, which outlined a framework for achieving the emission reduction goals set in the California Global Warming Solutions Act. The Scoping Plan was most recently updated in 2017 to address California's 2030 GHG target and identifies how the State can reach the 2030 climate target established by SB 32 while making substantial advancements toward the 2050 climate goal established by Executive Order S-3-05 (2005).

Discussion. Would the project:

a and b. Conflict with or obstruct implementation of the applicable air quality plan or result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard?

Less than Significant Impact. The SJVAPCD does not recommend quantitative significance thresholds for the analysis of the impact of a project's GHG emissions on the environment. Instead, the SJVAPCD's approach relies on the application of performance-based standards to assess project-specific GHG emission impacts on global climate change. This is based on the principle that projects whose emissions have been reduced or mitigated consistent with AB 32 should be considered to have a less than significant impact on global climate change (SJVAPCD 2015c). SJVAPCD's policy provides for the following tiered approach in assessing significance of project]-specific GHG emission increases:

- Projects complying with an approved GHG emission reduction plan or GHG mitigation program which avoids or substantially reduces GHG emissions within the geographic area in which the project is located would be determined to have a less than significant individual and cumulative impact for GHG emissions. Projects complying with an approved GHG emission reduction plan or GHG mitigation program would not be required to implement best performance standards (BPS).
- Projects implementing BPS would not require quantification of project-specific GHG emissions and would be determined to have a less than significant individual and cumulative impact for GHG emissions.
- Projects not implementing BPS would require quantification of project-specific GHG emissions and demonstration that project-specific GHG emissions would be reduced or mitigated by at least 29 percent compared to business as usual, including GHG emission reductions achieved since the 2002–2004 baseline period, consistent with GHG emission reduction targets established in California Air Resources Board's AB 32 Scoping Plan. Projects achieving at least a 29 percent GHG emission reduction compared to business as usual would be determined to have a less than significant individual and cumulative impact for GHG emissions.

In May 2022, Metropolitan adopted a Climate Action Plan (CAP) and certified the associated Program Environmental Impact Report (PEIR). Metropolitan's CAP complies with the requirements of CEQA Guidelines Section 15183.5(b)(1) for a qualified greenhouse gas (GHG) emissions reduction plan, and as such, can be used to streamline and tier GHG CEQA analysis and mitigate for GHG impacts associated with construction and operational activities.5 The CAP includes a baseline GHG emissions inventory of Metropolitan's operations from 1990 through 2020 and a GHG emissions forecast through 2045. It also establishes actions and policies that Metropolitan could implement to achieve its GHG reduction target. The CAP established Metropolitan's GHG emissions reduction targets to be consistent with Senate Bill (SB) 32 (40 percent reduction below 1990 levels by 2030) and Assembly Bill (AB) 1279, which codifies the state goal of achieving carbon neutrality by 2045.

Metropolitan's CAP is a qualified GHG emissions reduction plan and can be used with later activities in the cumulative analysis of future projects. More specifically, an environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project, per CEQA Guidelines Section 15183.5(b)(2).

Using a qualified CAP allows Metropolitan to tier future project-level GHG emissions analyses from the CAP, if those projects demonstrate consistency with the CAP. Consistency will be determined by conducting annual GHG emissions inventories to ensure Metropolitan is meeting its adopted GHG reduction goals. The Proposed Project's estimated construction and operation emissions are consistent with the CAP. Where applicable, the Proposed Project would follow the measures adopted in this plan, and the impact would be less than significant.

Although there are no set thresholds of significance for GHG emissions for Metropolitan projects, emissions were calculated to show the low levels of emissions associated with the Proposed Project. Construction would take place in two phases, with each phase lasting 2 months within a given year. Ongoing activities associated with Proposed Project operation would occur over 4 months each year. The Proposed Project would have a 5-year project life, over which the construction operations were amortized. The Proposed Project's GHG emission impacts associated with construction and operations were calculated using CalEEMod (Version 2020.4.0) and EMFAC2017 (v1.0.3), respectively. Emissions would come from use of diesel-powered construction equipment, and worker trips to and from the site for operational maintenance.

Table 3.8-1. Greenhouse Gas Emissions

	GHG Emissions (CO2e MT/y)
Amortized[1] Construction GHG Emissions	9.08
Operational Annual GHG Emissions	0.48
Total Annual Project GHG Emissions	9.56

Source: Appendix B

Note: CO2e MT: Metric ton of carbon dioxide equivalent

1 Emissions were amortized over a 5-year project lifespan.

[5] Metropolitan. 2022. *Climate Action Plan*. March 2022.

The Proposed Project would not conflict with the applicable CAP and the emissions would have minimal impacts on the environment; therefore, GHG impacts associated with this Proposed Project would be less than significant.

3.9 Hazards and Hazardous Materials

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

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

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

Less than Significant Impact. No, the Proposed Project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or **c**reate 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 Proposed Project's construction equipment and materials would include fuels, oils and lubricants, and concrete, which are all commonly used in construction. The routine use of or an accidental spill of hazardous materials used in construction could result in inadvertent releases, which could adversely affect construction workers, the public, and the environment.

As part of standard practice, Metropolitan complies with numerous regulations to ensure that construction-related fuels and other hazardous materials are transported, used, stored, and disposed of safely to protect worker safety, and to reduce the potential for such fuels or other hazardous materials to be released into the environment, including stormwater and downstream receiving water bodies. Contractors would be required to prepare and implement hazardous-materials plans that would require proper use of hazardous materials during construction and storage of such materials in appropriate containers with secondary containment, as needed, to contain a potential release.

In addition, construction contractors would be required to acquire coverage under the NPDES General Stormwater Permit, which requires the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) for construction activities. The SWPPP would list the hazardous materials (including petroleum products) proposed for use during construction; describe spill prevention measures, equipment inspections, and equipment and fuel storage; describe protocols for responding immediately to spills; and describe BMPs for controlling site run-on and runoff. Details regarding BMPs designed to minimize erosion are discussed in Section 3.10, *Hydrology and Water Quality*. Construction would be required to adhere to BMPs associated with the NPDES Construction General Permit for Discharges of Stormwater Associated with Construction Activities, also known as the Construction General Permit, to control sediment in stormwater runoff from the Project area.

Lastly, the transportation of hazardous materials would be regulated by the US Department of Transportation, the California Department of Transportation, and the California Highway Patrol. Together, federal and state agencies determine driver-training requirements, load-labeling procedures, and container specifications designed to minimize the risk of an accidental release.

Limited hazardous materials would be stored in the storage containers on-site, including 5 to 10 L of ethanol or formalin, and three 10 L cryogenic containers of liquid nitrogen. These substances would be appropriately stored according to physical and chemical properties and storage recommendations for the limited volumes detailed in their respective Materials Safety Data Sheets.

As part of standard Metropolitan practice, the Proposed Project would comply with the numerous laws and regulations discussed above that govern transportation, use, handling, and disposal of hazardous materials, which would limit the potential for creation of hazardous conditions due to the use or accidental release of hazardous materials. As a result, this impact would be less than significant.

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

No Impact. No, the Proposed Project would not emit hazardous emissions, materials, substances or waste within 0.25 miles of an existing or proposed school. No schools are located within 0.25 miles of the Proposed Project site. No impacts would occur related to emitting or handling hazardous materials within 0.25 miles of an existing or proposed school.

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

No Impact. No, the Proposed Project would not be located on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. Information about hazardous materials

sites on the Proposed Project site was collected by reviewing the California Environmental Protection Agency's Cortese List data resources and the State Water Resources Control Board's GeoTracker list. The Cortese List data resources provide information regarding facilities or sites identified as meeting the requirements for inclusion on the Cortese List. The Cortese List is updated at least annually, in compliance with California regulations (California Government Code Section 65964.6[a][4]), and includes federal Superfund sites, state response sites, non-operating hazardous waste sites, voluntary cleanup sites, and school cleanup sites. The GeoTracker list shows underground storage tanks. Based on a review of the Cortese List conducted in June 2022, no listed sites are located within 1 mile of the Proposed Project site (DTSC 2022). No impacts would occur related to the Proposed Project being located on a hazardous materials site.

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

No Impact. The Proposed Project would not be located within an airport land use plan. The Proposed Project site is not located within 2 miles of a public airport or public use airport. The nearest public use airport to the Proposed Project site is the Rio Vista Municipal Airport located approximately 8 miles to the northwest. No impacts would occur.

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

No Impact. The Proposed Project would not impair implementation of or physically interfere with an adopted emergency plan or evacuation plan. The construction activity and the staging of equipment and materials for the Proposed Project would occur on the Project site, which would not require road closures or lane restrictions. Construction access to and from the Project site from Highway 12 consists of two roads labeled Road 1 and Road 2, including an existing road and a new access road. Therefore, the Proposed Project would not impair implementation or physically interfere with an adopted emergency response or evacuation plan, and 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?

Less than Significant Impact. No, the Proposed Project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires. The Proposed Project site is adjacent to lands occupied by irrigated row crops. The vegetation and land use types have a low potential for wildland fires and the Proposed Project is not expected to expose people or structures to a significant risk of loss, injury, or death involving wildland fires. The Proposed Project is within a Local Responsibility Area and lies within an Unzoned fire severity zone (CAL FIRE 2007). There is no fueling on-site and Metropolitan actively maintains its fleet vehicles and equipment. Therefore, the Proposed Project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires, and no impacts would occur.

3.10 Hydrology and Water Quality

HYDROLOGY AND WATER QUALITY Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Violate Regional Water Quality Control Board water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
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 which would:				
i. Result in substantial erosion or siltation on or off site?	☐	☐	☒	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?	☐	☐	☒	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
iv. Impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

a. Violate Regional Water Quality Control Board water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Less than Significant Impact. Construction of the Proposed Project would involve the use of heavy equipment, such as excavation, grading, earthmoving, movement of spoils, installation of pipes, pumps, and water control features. Even though soil erosion potential on the Proposed Project site is generally low, construction activities have the potential to increase rates of erosion, which could increase turbidity in the agricultural ditches. In addition, the use of heavy machinery during construction would have the potential to result in an accidental release of fuels, oils, solvents, hydraulic fluid, and other construction-related fluids to the environment, thereby degrading water quality.

As described previously, soils in the Project area have low potential for erosion; however, earthmoving and grading activities during construction have the potential to cause erosion. Routine Project operations and maintenance activities are not anticipated to result in substantial soil erosion or loss of topsoil.

The contractor would be required to obtain an NPDES Construction General Permit for Discharges of Stormwater Associated with Construction Activities (Construction General Permit) from the Central Valley Regional Water Quality Control Board before initiating ground-disturbing

activities. Among the permit's conditions would be preparation and implementation of a SWPPP that would identify and require implementation of BMPs to prevent sediment and other construction-related compounds (e.g., fuel, oil) from entering stormwater runoff. Compliance with the NPDES Construction General Permit, including the implementation of BMPs described in the SWPPP, would ensure that the Proposed Project would avoid and/or minimize the potential impact of soil erosion or the loss of topsoil during construction. Therefore, this impact would be less than significant.

On the downstream end of the basin, a control structure would be used to slow the discharge of the project water to a rate that can be handled by the island drainage system. Most of the water flowing out of the propagation ponds would be discharged into the detention basin over a 3-hour period in the morning. The detention basin is intended to drain this water over an 18- to 20-hour period throughout the subsequent day and night. The downstream water control structure would be adjustable to allow for better control of the discharge during the 18- to 20-hour period. The discharge of flows into the adjacent agricultural ditches would be monitored to ensure that agricultural ditch capacities are not exceeded. Routine operation and maintenance activities for the Proposed Project would include staff from UC Davis using pickup trucks to be on-site daily for approximately 2 months in the spring and 2 months in the fall, when fish are on-site. It is anticipated that operations and maintenance of the Proposed Project would require four workers, using pickup trucks, to be on-site twice per week. There would be no significant increase in sediment or other potential pollutants discharged into receiving waters. As a result, impacts on water quality from the Proposed Project's operation and maintenance activities 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?

Less than Significant Impact. No, the Proposed Project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge. The propagation ponds would be filled using either surface water or groundwater to ensure consistent regulated temperatures. The water inlet at the cooling marshes would consist of a pump on a timer that fills the cooling marsh from 5 p.m. to 9 p.m. daily, at a rate of approximately 78 cfs. The groundwater system would include the use of a new well to be constructed within the Proposed Project site. The new groundwater well is expected to be up to 300 feet deep. The wells would not be hydraulically connected to any local surface water. The capacity of the new well would be up to 1,000 gpm, with up to an 8-inch-diameter discharge pipe. Well construction would cause a temporary ground disturbance with a construction footprint of up to 1,600 square feet. The transportation pipeline would be buried from the well location to Proposed Project fields at a depth of up to 24 inches. Because the Proposed Project would rely on a combination of surface water and groundwater and not solely groundwater, the amount of groundwater used would be relatively small. In addition, the majority of the Proposed Project site would not be covered by impervious surfaces and would allow for groundwater recharge. Therefore, a less than significant impact related to the decrease of groundwater supplies or interfere substantially with groundwater recharge would occur from the Proposed Project.

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 which would:

i) Result in substantial erosion or siltation on or off site?

Less than Significant Impact. No, the Proposed Project would not substantially alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion on- or off-site. The Proposed Project would comply with the NPDES Construction General Permit, including the implementation of BMPs described in the SWPPP to prevent water quality pollutants such as silt and sediment from entering receiving waters. In addition, the perimeter berms would be covered with visqueen on the waterside embankments to reduce seepage and erosion. Outlet water from the detention basin would be slowed by a control structure to slow the discharge of the Proposed Project water to a rate that can be handled by the island drainage system. Therefore, a less than significant impact related to the creation of substantial erosion or siltation would occur from the Proposed Project.

ii and iii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite or create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Less than Significant Impact. No, the Proposed Project would not substantially alter the existing drainage pattern of the site or area in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. Flows exiting the marsh area would be screened and controlled through a set of slide-gates. Outlet water from the detention basin would drain to the existing agricultural ditch on the south-west side of the field. On the downstream end of the basin, a control structure would be used to slow the discharge of the project water to a rate that can be handled by the island drainage system. Most of the water flowing out of the propagation ponds would be discharged into the detention basin over a 3-hour period in the morning. The detention basin is intended to drain this water over an 18- to 20-hour period throughout the subsequent day and night. The downstream water control structure would be adjustable to allow for better control of the discharge during the 18- to 20-hour period. The discharge of flows into the adjacent agricultural ditch would be monitored to ensure that agricultural ditch capacities are not exceeded. Therefore, the Proposed Project would have less than significant associated impacts related to substantially increasing the rate or amount of surface runoff and creating or contributing substantial amounts of runoff water.

iv) Impede or redirect flood flows?

Less than Significant Impact. No, the Proposed Project would not impede or redirect flood flows. The Proposed Project would include development of the marsh-pond complexes and associated infrastructure. Outlet water from the detention basin would drain to the existing agricultural ditch on the south-west side of the field. On the downstream end of the basin, a control structure would be used to slow the discharge of the Proposed Project water to a rate that can be handled by the island drainage system. Therefore, this impact would be less than significant.

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

Less than Significant Impact. No, the Proposed Project would include development of the marsh-pond complexes and associated infrastructure to serve as a surface water regulating and storage facility. Once constructed, routine operation and maintenance activities for the Proposed Project would include staff from UC Davis using pickup trucks to be on-site daily for approximately 2 months in the spring and 2 months in the fall, when fish are on-site. It is anticipated that operations and maintenance of the Proposed Project would require four workers, using pickup trucks, to be on-site twice per week. Limited hazardous materials would be stored in the storage containers on-site, including 5 to 10 L of ethanol or formalin, and three 10 L cryogenic containers of liquid nitrogen. Therefore, this impact would be less than significant.

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

Less than Significant Impact. No, the Proposed Project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. As described previously under checklist items a) and b), the Proposed Project would comply with the NPDES Construction General Permit, including the implementation of BMPs described in the SWPPP to prevent water quality pollutants such as silt, sediment, hazardous materials, and construction-related fluids from entering receiving waters. Implementing the Proposed Project would result in the addition of minimal impervious surfaces from construction of the concrete-lined open ditches; however, the Proposed Project would discharge Proposed Project water via the island drainage system. Therefore, this impact would be less than significant.

3.11 Land Use and Planning

LAND USE PLANNING Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
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?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

a and b. Physically divide an established community or 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?

No Impact. No, the Proposed Project would not physically divide an established community. The Proposed Project site is on Bouldin Island which is Metropolitan fee property. The Proposed Project site and access roads are not located within an established community and do not serve as a means of moving through or connecting a community or neighborhood. There are no communities in the vicinity of the Proposed Project site and the Proposed Project would be consistent with existing land uses, plans, policies, and regulations. For these reasons, the Proposed

Project would not physically divide an existing community, would not conflict with a land use plan, policy or regulation and no impacts would occur.

3.12 Mineral Resources

MINERAL RESOURCES Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	☐	☒
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?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

a and b. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State or resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. No, the Proposed Project would not result in the loss of availability of a known mineral resource or result in the loss of availability of a locally important mineral resource recovery site. The Proposed Project is located on a parcel zoned for agriculture and would not result in the loss of availability of a known mineral resource and would not affect a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan No impact would occur related to loss of a known mineral resource of value to the region or residents of the State.

3.13 Noise

NOISE Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) For a project 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, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Regulatory

Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves

implementation of general plan policies and noise ordinance standards. Local general plans tend to identify general principles intended to guide and influence development plans; local ordinances establish standards and procedures for addressing specific noise sources and activities.

San Joaquin County General Plan. The San Joaquin County General Plan Public Health and Safety Element contains policies and noise thresholds that are only applicable to permanent noise sources (San Joaquin County 2016). The Health and Safety Element does not contain policies that address temporary noise during construction.

San Joaquin County Code of Ordinances. San Joaquin County Ordinance Chapter 9-1025 establishes the noise control regulations in the County. Section 9-1025.9(c) identifies activities that are exempt from any noise threshold or standard identified in Ordinance Chapter 9-1025: (3). Noise sources associated with construction, provided such activities do not take place before 6 a.m. or after 9 p.m. on any day (San Joaquin County 2002).

Discussion. Would the project:

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

Less than Significant Impact. No, the Proposed Project would not generate a substantial temporary or permanent increase in ambient noise levels in excess of standards. The Proposed Project would include the construction of two marsh-pond complexes that would house native fish to create an approximately 145-acre Project site. Construction of the Proposed Project is expected to take place with Phase I starting in spring 2023 and lasting for approximately 2 months. If Phase I is successful, Phase II construction would start in spring 2024 and last for approximately 2 months. Operation and maintenance of the Proposed Project would not generate a permanent increase in ambient noise levels. Therefore, when considering noise that could exceed standards established in the local general plan or noise ordinance, only temporary construction noise generated by the Proposed Project would apply.

All construction activities associated with the Proposed Project would occur during a daytime 8-hour construction period and would therefore be consistent with the noise exemption pursuant to Section 9-1025.9(c)(3). As such, this Proposed Project would not exceed established standards of the County Code. The Proposed Project is located in the is within the Sacramento-San Joaquin Delta on Bouldin Island. Recreational uses exist surrounding the Proposed Project site. The nearest residential receptors are 0.40 miles (approximately 2,100 feet) west from the Project site. The primary noise sources in the vicinity of the Project site primarily include vehicle traffic on SR 12. Because the nearest residential receptor is over 2,000 feet away, construction noise would not result in a substantial increase in noise levels. As part of Metropolitan standard practice, work would be performed without undue noise and in a manner that prevents nuisance noise, including use of construction equipment with mufflers. A less than significant impact would occur from the Proposed Project generating substantial temporary or permanent noise levels in the vicinity of the Proposed Project area in excess of established standards.

b. Generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact. Operation and maintenance of the Proposed Project's marsh-pond complexes would not include any substantial sources of vibration. Groundborne vibration and noise associated with some construction activities, including the use of bulldozers, drill rigs and compaction equipment. vibratory rollers, can cause excessive vibration. Groundborne vibration and noise levels generated by the types of equipment required to prepare the site and construct the proposed facility would be minimal, temporary, and would not cause human annoyance or structure damage at distance of 25 feet or beyond from the source (FTA 2018). No existing historic structures that would be potentially vulnerable to vibration are located in the immediate vicinity of the Proposed Project site such that any damage related to groundborne vibration from construction activities would occur. This impact would be less than significant.

c. For a project 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, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. There are no private airstrips or public airports located within 2 miles of the Proposed Project site. The nearest airport, the Rio Vista Municipal Airport is located more than 8 miles northeast from the Proposed Project site (Rio Vista 1998). Therefore, the Proposed Project would not expose people residing or working in the Proposed Project area to excessive noise levels from aircraft activity. There would be no impact with respect to this criterion.

3.14 Population and Housing

POPULATION AND HOUSING Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

a and b. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure; or displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact. No, the Proposed Project would not induce substantial unplanned growth in an area or displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere. The Proposed Project would involve the development of the marsh-pond complexes and associated infrastructure. The Proposed Project would not include new homes. Construction would be short-term and would not require additional workers outside of the existing work force. Existing workers would be responsible for operation and maintenance of the

Proposed Project. The Proposed Project site is located on a parcel zoned for agriculture and would not displace any housing or people. Therefore, the Proposed Project would not induce substantial unplanned population growth in an area either directly or indirectly or displace substantial numbers of existing people or housing and no impact would occur.

3.15 Public Services

PUBLIC SERVICES

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, 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 public services:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Fire protection?	☐	☐	☐	☒
b) Police protection?	☐	☐	☐	☒
c) Schools?	☐	☐	☐	☒
d) Parks?	☐	☐	☐	☒
e) Other public facilities?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the Proposed Project:

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, 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 public services:

a-e. Fire protection, police protection, schools, parks, or other public facilities?

No Impact. No, the Proposed Project would not result in the construction of any new facilities or population that would generate a need for new or physically altered government facilities. The Proposed Project would not induce population growth or change the existing land use at the Project site. The Project site does not contain any existing dwelling units or structures, and none are proposed. Therefore, demand for police and fire protection and for community amenities such as schools and parks would not change relative to existing conditions, would not alter acceptable service ratios or response times, would not increase the need for new or expanded park facilities, and would not result in the need for new schools or alteration to schools or any other public facilities. No impact would occur.

3.16 Recreation

RECREATION Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Would the project 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?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

a. Would the project 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?

No Impact. No, the Proposed Project would not increase the use of existing neighborhood and regional parks or other recreational facilities. The Proposed Project would include development of the marsh-pond complexes and associated infrastructure, and would not increase demand for recreation facilities. Therefore, no impacts related to existing neighborhood and regional parks or other recreational facilities, or the deterioration of such facilities, would occur as a result of implementing the Proposed Project.

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

No Impact. No, the Proposed Project does not include recreational facilities or require the construction or expansion of recreational facilities. The Proposed Project would include development of the marsh-pond complexes and associated infrastructure. The Proposed Project would not change the existing land use at the Project site and does not include recreational facilities or require the construction or expansion of recreational facilities. The Proposed Project does not involve the development of recreational facilities that would have an adverse effect on the environment, and no impacts would occur.

3.17 Transportation

TRANSPORTATION Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	☐	☐	☒	☐
b) Would the project conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (5.g., sharp curves or dangerous intersections) or incompatible uses (5.g., farm equipment)?	☐	☐	☒	☐

TRANSPORTATION Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
d) Result in inadequate emergency access?	☐	☐	☒	☐

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

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

Less than Significant Impact. No, the Proposed Project would not conflict with a program, plan, ordinance, or policy addressing the circulation system. Construction of the Proposed Project would temporarily generate increases in vehicle trips by workers and vehicles on area roadways. There could be a minimal increase in truck trips for construction. Construction activities would be completed in two phases, lasting approximately 2 months for each phase. Construction would require approximately 12 workers total for each phase. Six workers for general construction and six workers for tule transplanting. Given the scale of the Proposed Project and the length of the construction period, the capacity of local roads used to access the Proposed Project site would not likely be substantially reduced. Operation of the Proposed Project would require staff from UC Davis using pickup trucks to be on-site daily for approximately 2 months in the spring and 2 months in the fall, when fish are on-site. It is anticipated that operations and maintenance of the Proposed Project would require four workers, using pickup trucks, to be on-site twice per week when ponds are operational and fish are on-site. Because the increase in traffic during construction and operation of the Proposed Project would be minimal, there would be no decreased levels of service. The Proposed Project would not induce population growth or changes to a transit roadway, bicycle system, or pedestrian facilities. The Proposed Project would not change the existing land use at the Project sites. The Proposed Project would not impact any county program, plan, ordinance, or policy related to transit, bicycle, or pedestrian facilities in the vicinity of the site or along local roadways. Therefore, this impact would be less than significant.

b. Would the project conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

Less than Significant Impact. No, the Proposed Project would not conflict with or be inconsistent with CEQA Guidelines Section 15064.3(b). The State CEQA Guidelines Section 15064.3(b)(3) identify vehicle miles traveled (VMT)—the amount and distance of automobile travel attributable to a project—as the most appropriate measure of transportation impacts. Other relevant considerations may include the effects of the Proposed Project on transit and nonmotorized travel. Construction activities for the Proposed Project would be completed in two phases with Phase I starting in spring 2023 and lasting for approximately 2 months. If Phase I is successful, Phase II construction would start in spring 2024 and last for approximately 2 months. Both phases of construction would use existing construction crews. Operation of the Proposed Project would not add a substantial amount of VMT to the Project area and as discussed under impact a), the Proposed Project would not impact any county program, plan, ordinance, or policy related to transit, bicycle, or pedestrian facilities in the vicinity of the site or along local roadways. Therefore, the Proposed Project would not generate any new long-term trips and would have no effect on existing VMT of the area. Therefore, this impact would be less than significant.

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

Less than Significant Impact. No, the Proposed Project would not substantially increase hazards due to a geometric design feature or incompatible uses. Construction access to and from the site from Highway 12 consists of two roads labeled Road 1 and Road 2, including an existing road which is 15 to 20 feet wide and a new access road to be designed with a width of approximately 20 to 30 feet. Based on the low number of anticipated construction trips relative to traffic volumes on local roadways and their limited duration, this impact of Proposed Project construction would be less than significant. Construction of the Proposed Project would not result in new design features on roads in the area. No pedestrian or bicycle paths are along the construction route. Further, the Proposed Project would not result in in potential traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways, given the intermittent and temporary nature of construction activities. The Proposed Project does not include installation of or modifications to any public roadways, driveways, or geometric design features. Therefore, this impact would be less than significant.

d. Result in inadequate emergency access?

Less than Significant Impact. No, the Proposed Project would not result in inadequate emergency access. Temporary construction staging would be on the Proposed Project site and would not block or interfere with emergency response vehicles. Increases in traffic volumes on local roadways providing access to the Proposed Project site could cause intermittent and temporary slowdowns in traffic flow during construction, although truck trips associated with Project operation are not expected to cause access on local roadways to deteriorate. For these reasons, the Proposed Project would not result in inadequate emergency access, and this impact would be less than significant.

3.18 Tribal Cultural Resources

TRIBAL CULTURAL RESOURCES Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
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:				
i. 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)?	☐	☐	☐	☒
ii. 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?	☐	☐	☐	☒

Native American Correspondence

No California Native American Tribes traditionally and culturally affiliated with the Proposed Project Area and vicinity have reached out to Metropolitan to be consulted with on Metropolitan projects as per PRC § 21080.3.1, 21080.3.2, and 21082.3. Therefore, no tribal consultation efforts outside of the NAHC correspondence was conducted.

See Section 3.5, *Cultural Resources*, for a summary of ESA's CCIC records search, background research, and field identification efforts for cultural resources.

Discussion. Would the project:

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:*

   i) *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)?*

   ii) *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?*

No Impact. No, the Proposed Project would not cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC § 21074, that is listed or eligible for listing in the California Register or local register of historical resources, or determined by Metropolitan to be significant pursuant to PRC § 5024.1. No California Native American Tribes traditionally and culturally affiliated with the Proposed Project Area and vicinity have reached out to Metropolitan to be consulted with on Metropolitan projects as per PRC § 21080.3.1, 21080.3.2, and 21082.3. As such, no tribal consultation efforts outside of the NAHC correspondence was conducted. Therefore, the Proposed Project is not anticipated to impact any tribal cultural resources.

3.19 Utilities and Service Systems

UTILITIES AND SERVICE SYSTEMS Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunication facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?	☐	☐	☒	☐

UTILITIES AND SERVICE SYSTEMS Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
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?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion. Would the project:

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

Less than Significant Impact. The Proposed Project would involve the development of the marsh-pond complexes and associated infrastructure, the effects of which are analyzed throughout this document. The Proposed Project would not include or require the relocation or construction of new or expanded wastewater treatment or stormwater drainage, natural gas, or telecommunications facilities as a result of the Proposed Project. The Proposed Project would not require additional water or expanded wastewater treatment capacity or facilities. The propagation ponds would be filled using either surface water or groundwater to ensure consistent regulated temperatures. The water distribution system would be a combination of earthen and concrete-lined open ditches (6 feet wide) and pipes (ranging between 4 and 24 inches in diameter) to provide surface water from existing siphons or pumped from the existing groundwater aquifer. Power for the electric motors on the proposed new well, the low-lift pumps, and the water control structures would be provided from the existing clubhouse located near the marsh-pond complex site or from PG&E powerlines that parallel the toe drain. Both sources of power would be served by PG&E. An additional transformer may be required. Construction of the Proposed Project would comply with all wastewater requirements of the Central Valley Regional Water Quality Control Board (see Section 3.10, *Hydrology and Water Quality*, for more information). Therefore, these impacts would be less than significant.

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

Less than Significant Impact. Yes, the Proposed Project would have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years. Bouldin Island has water rights sufficient to supply the Proposed Project. The surface water would originate from existing siphons that pull from the Mokelumne River within the Project site. The groundwater system would include the use of a new well to be constructed within the Project site. The new groundwater well is expected to be up to 300 feet deep. The wells would not be hydraulically connected to any local surface water. Groundwater

depth in the Project area is under 10 feet below surface level (DWR 2022). Impacts would be less than significant related to water supplies.

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

No Impact. No, the Proposed Project would not result in a determination by a wastewater treatment provider which serves or may serve the Proposed Project that it does not have adequate capacity to serve the Proposed Project. The Proposed Project includes the development of the marsh-pond complexes and associated infrastructure. The Proposed Project would not require additional wastewater treatment capacity or facilities. No new demand on an existing wastewater treatment provider would occur as a result of the Proposed Project, thus 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?

Less than Significant Impact. No, the Proposed Project would not 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 Proposed Project involves the development of the marsh-pond complexes and associated infrastructure. Small amounts of solid waste would be generated by the Proposed Project. The Proposed Project would generate minimal waste during temporary construction activities. As of December 31, 2009, the North County Landfill & Recycling Center, the closest permitted landfill in San Joaquin County, had a permitted capacity of 41,200,000 cubic yards and a remaining capacity of 35,400,000, and the landfill is permitted through 2048 (CalRecycle 2022). The landfill that serves the Project area has the capacity to accept the minimal amount of waste generated by the Proposed Project. Therefore, this impact would be less than significant.

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

No Impact. The Proposed Project would comply with federal, state, and local management and reduction statutes and regulations related to solid waste. The Proposed Project involves development of the marsh-pond complexes and associated infrastructure. All off-hauled materials would be taken to an approved storage, recycle, or waste facility. Off-hauled material would be handled and disposed of per federal, state, and local statutes and regulations related to solid waste. Therefore, no impacts from the Proposed Project would occur related to compliance with federal, state, and local management and reduction statutes and regulations related to solid waste.

3.20 Wildfire

Wildfire If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
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 to the environment?	☐	☐	☒	☐
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?	☐	☐	☐	☒

Discussion. Would the project:

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

No Impact. No, the Proposed Project would not substantially impair an adopted emergency response plan or emergency evacuation plan. The Project site is adjacent to lands occupied by irrigated row crops. The Proposed Project is within a Local Responsibility Area and lies within an Unzoned fire severity zone (CAL FIRE 2007) and does not include modifications to any public roadways that would be used in an emergency response or evacuation plan. Construction activities would be completed in two phases, lasting approximately 2 months for each phase. Construction would require approximately 12 workers total for each phase. Six workers for general construction and six workers for tule transplanting. Given the scale of the Proposed Project and the length of the construction period, the capacity of local roads used to access the Proposed Project site would not likely be substantially reduced Therefore, the Proposed Project would not impact roadways or access routes that could be utilized for emergency response or emergency evacuation. No impacts related to substantial impairment of an adopted emergency response plan or emergency evacuation plan would occur from the Proposed Project.

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

No Impact. No, the Proposed Project would not expose Project occupants to pollutant concentrations from a wildfire due to slope, prevailing winds, or other factors. The Proposed Project is within a Local Responsibility Area and lies within an unzoned fire severity zone (CAL FIRE 2007). Generally, irrigated agricultural land poses a low risk for wildfire. Removing vegetation would lower on-site fuel sources for wildfires. The Project area is within a flat area and would not exacerbate wildfire risk from slopes. To reduce fire risk during construction, the construction contractor would adhere to standard Metropolitan construction practices, which

require fire containment and extinguishing equipment located onsite and include practices to avoid accidental ignition and leaking of fuels and other combustible materials. All gasoline-powered or diesel-powered machinery used during construction would be equipped with standard exhaust controls and muffling devices that will also act as spark arrestors. The Proposed Project would not exacerbate wildfire risks that would expose on-site employees to pollutants or uncontrolled wildfires. Therefore, 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 to the environment?

Less than Significant Impact. No, the Proposed Project would include the development of the marsh-pond complexes and associated infrastructure that would be powered by electricity. Power for the electric motors on the wells would be provided from the existing clubhouse located near the marsh-pond complex site or from powerlines that parallel the toe drain. An additional transformer may be required but would not result in additional ground disturbance. Given the low wildfire potential because of the irrigated agricultural lands surrounding the Project site, the Proposed Project is not expected to result in temporary or ongoing impacts to the environment from the installation or maintenance of infrastructure that would exacerbate wildfire risks. This impact would be less than significant.

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?

No Impact. No, the Proposed Project would not 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 Proposed Project would include the development of the marsh-pond complexes and associated infrastructure in an area used for irrigated row crops. The slope and stability of the Project site would not change as a result of the Proposed Project and would not result in runoff or drainage changes after a fire. The Proposed Project is within a Local Responsibility Area and lies within an Unzoned fire severity zone (CAL FIRE 2007), the Proposed Project does not have the potential to expose people or structures to significant risks due to post-wildfire flooding or ground instability. No impacts would occur related to exposing persons or structures to significant post-fire risks.

3.21 Mandatory Findings of Significance

MANDATORY FINDINGS OF SIGNIFICANCE Would the project:	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?	☐	☒	☐	☐

MANDATORY FINDINGS OF SIGNIFICANCE Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
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.)	☐	☒	☐	☐
c) Does the project have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

Significance criteria established by CEQA Guidelines, Appendix G.

Discussion:

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?

Less than Significant with Mitigation Incorporated. As described in the preceding impact discussions, the impacts related to the potential of the Proposed Project to substantially degrade the environment would be less than significant with mitigation measures incorporated. As described in this IS/MND, the Proposed Project has the potential for impacts related to biological resources. However, these impacts would be avoided or reduced to a less than significant level with the incorporation of avoidance and mitigation measures discussed in each section.

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.)

Less than Significant with Mitigation Incorporated. This section provides a description of other actions in the area and a discussion of the cumulative impacts of those projects in combination with the previously identified effects of the Proposed Project. State CEQA Guidelines Section 15355 states that "cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts":

(a) The individual effects may be changes resulting from a single project or a number of separate projects.

(b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the Proposed Project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

The past, present, and reasonably foreseeable future conditions of the Proposed Project site and vicinity were considered for the cumulative analysis.

Aesthetics. Completion of the Proposed Project would result in some permanent visual changes to the Proposed Project site from installation of the marsh-pond complexes and associated infrastructure. The Proposed Project would be consistent with the rural agricultural nature of the existing setting. Therefore, cumulative impacts on aesthetics would be less than significant.

Agriculture and Forestry Resources. The Project site is designated as Prime Farmland. The Proposed Project covers approximately 145 acres across two parcels and involves two marsh-pond complexes where research can occur. The Proposed Project would last approximately 5 years with the option to extend longer; however, the Proposed Project would not be permanent or result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The Proposed Project site is not under a Williamson Act contract. The Proposed Project site is not zoned as forest land or timberland or zoned for timberland production. Therefore, impacts related to agriculture would be less than significant. As such, cumulative impacts to agricultural resources would be less than significant. The Proposed Project would have no impact on forestry resources and thus would not contribute to cumulative impacts.

Air Quality and Greenhouse Gas Emissions. A number of individual projects in the vicinity of the Proposed Project may be under construction simultaneously with the Proposed Project. Depending on construction schedules and actual implementation of projects in and around San Joaquin County, generation of fugitive dust and pollutant emissions during construction may result in short-term air pollutants, which would contribute to short-term cumulative impacts on air quality. However, each individual project would be subject to San Joaquin Valley Air Pollution Control District rules, regulations, and other mitigation requirements during construction. In addition, the Proposed Project's estimated construction and operation emissions are consistent with the CAP. Where applicable, the Proposed Project would follow the measures adopted in this plan, and the impact would be less than significant. For cumulative impacts on air quality and greenhouse gas emissions and further discussion of consistency with the CAP, see Section 3.3, *Air Quality*, and Section 3.8, *Greenhouse Gas Emissions*, above. The thresholds used consider the contributions of other projects in the air basin. Additionally, greenhouse gas emissions are considered cumulative in nature because it is unlikely that a single project would contribute significantly to climate change.

Biological Resources. Adverse effects on special-status plants and wildlife could occur as a result of construction and maintenance activities, but would be reduced to less than significant through implementation of mitigation measures BIO-1 through BIO-8. Impacts to fresh emergent wetland will be temporary in nature and will be passively restored as described in Mitigation Measures BIO-9 thereby reducing these impacts to a less-than-significant level. The Proposed Project's impacts for biological resources would be limited to the Proposed Project site, and any significant impacts would be reduced to a less than significant level by implementing proposed mitigation measures. Thus, the Proposed Project would not contribute to cumulative impacts for biological resources.

Cultural Resources. The Proposed Project would have no impact on historical resources, pursuant to CEQA Guidelines § 15064.5. As no known archaeological resources that may qualify as historical resources (as defined in CEQA Guidelines § 15064.5) or unique archaeological resources (as defined in PRC § 21083.2[g]) are present in the C-APE, the Proposed Project is not expected

to impact any archaeological resource, pursuant to CEQA Guidelines § 15064.5, and impacts are less than significant. The Proposed Project is not anticipated to disturb any human remains. The Proposed Project's impacts for cultural resources would be limited to the Proposed Project site, and any significant impacts would be reduced to a less than significant level by implementing proposed mitigation measures. Thus, the Proposed Project would not contribute to cumulative impacts for cultural resources.

Energy. Construction of the Proposed Project would result in fuel consumption from the use of construction tools and equipment, truck trips to haul materials, and vehicle trips by construction workers commuting to and from the Proposed Project site. This impact would be temporary and localized. Operational energy impacts are not anticipated. Construction-related fuel consumption by the Proposed Project would not result in inefficient, wasteful, or unnecessary energy use compared with other construction sites in the region.

Geology and Soils. The Proposed Project would be constructed with adherence to regulatory requirements, which would ensure impacts related to seismic shaking would be less than significant. Construction would be required to adhere to BMPs associated with NPDES Construction General Permit for Discharges of Stormwater Associated with Construction Activities, also known as the Construction General Permit, to control sediment in stormwater runoff from the Project area which would ensure soil erosion would be less than significant. There are no nearby structures that could be damaged and the Proposed Project would not construct any structures. Therefore, the Proposed Project would not expose people or structures to potential substantial adverse effects caused by a seismic event or other phenomena that create unstable ground at the Proposed Project site. Considering the soils at the Project Site and its historical use, the potential for paleontological resources is low. Furthermore, part of Metropolitan Standard Practices, if unanticipated paleontological resources are discovered during construction activities, the Project Contractor(s) would be required to comply with Metropolitan standard practices related to the protection of paleontological resources as outlined in Section 01065 of the construction contractor specifications. Therefore, impacts to paleontological resources would be less than significant. The Proposed Project's impacts for geology and soils would be limited to the Proposed Project site, and any significant impacts would be reduced to a less than significant level by implementing proposed mitigation measures. Thus, the Proposed Project would not contribute to cumulative impacts for geology and soils.

Hazards and Hazardous Materials. The Proposed Project's impacts for these environmental issues would be limited to the Proposed Project site, and any significant impacts would be reduced to a less than significant level by implementing proposed mitigation measures. Thus, the Proposed Project would not contribute to cumulative impacts for these topics.

Hydrology and Water Quality. Implementing the Proposed Project construction activities would have the potential to increase rates of erosion, which could increase turbidity in the agricultural ditches. In addition, the use of heavy machinery during construction would have the potential to result in an accidental release of fuels, oils, solvents, hydraulic fluid, and other construction-related fluids into the environment, thereby degrading water quality. Construction contractors would be required to acquire coverage under the National Pollutant Discharge Elimination System General Stormwater Permit, which requires the preparation and implementation of an SWPPP for construction activities. The SWPPP would list the hazardous materials (including petroleum products) proposed for use during construction; describe spill prevention measures, equipment

inspections, and equipment and fuel storage; describe protocols for responding immediately to spills; and describe best management practices for controlling site run-on and runoff. Therefore, cumulative impacts would be less than significant.

Land Use and Land Use Planning. The Proposed Project would have no impact on land use and land use planning; therefore, it would not contribute to cumulative land use issues.

Mineral Resources. The Proposed Project would have no impact on mineral resources and thus would not contribute to cumulative impacts.

Noise. The Proposed Project would not generate a substantial temporary or permanent increase in ambient noise levels in excess of standards. As such, this Proposed Project would not exceed established standards of the County Code. Additionally, because the nearest residential receptor is over 2,000 feet away, construction noise would not result in a substantial increase in noise levels. Operation and maintenance of the Proposed Project's marsh-pond complexes would not include any substantial sources of vibration. Thus, cumulative noise impacts would be less than significant.

Population and Housing. The Proposed Project would have no impact on population growth in the area because it would not include any new residential or commercial development. The Proposed Project also would not result in temporary employment during construction and would not result in the permanent creation of a significant number of new jobs that would induce substantial population growth. Therefore, cumulative population and housing impacts would be less than significant.

Public Services. No commercial or residential development is proposed as part of the Proposed Project; therefore, the Proposed Project would not increase demands on fire protection or police services, nor would it affect the response time of these services. Therefore, cumulative public services impacts would be less than significant.

Recreation. The Proposed Project would have no impact on recreation and thus would not contribute to cumulative impacts.

Transportation. For cumulative impacts, see Section 3.17, *Transportation*. The Proposed Project would not impact any county program, plan, ordinance, or policy related to transit, bicycle, or pedestrian facilities in the vicinity of the site or along local roadways. Construction would utilize existing construction crews and operation would not add substantial amount of VMT to the Project Area. Construction of the Proposed Project would not result in new design features on roads in the area. No pedestrian or bicycle paths are along the construction route. Further, the Proposed Project would not result in in potential traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways, given the intermittent and temporary nature of construction activities. Increases in traffic volumes on local roadways providing access to the Proposed Project site could cause intermittent and temporary slowdowns in traffic flow during construction, although truck trips associated with Project operation are not expected to cause access on local roadways to deteriorate. Therefore, cumulative transportation impacts would be less than significant.

Tribal Cultural Resources. The Proposed Project would not cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC § 21074, that is listed or eligible for listing in the California Register or local register of historical resources, or determined by Metropolitan to be significant pursuant to PRC § 5024.1. No tribal cultural resources, as defined in PRC § 21074, were identified in or near the Proposed Project area. No California Native

American Tribes traditionally and culturally affiliated with the Proposed Project Area and vicinity have reached out to Metropolitan to be consulted with on Metropolitan projects as per PRC § 21080.3.1, 21080.3.2, and 21082.3. The Proposed Project's impacts for tribal cultural resources would be limited to the Proposed Project site, and any significant impacts would be reduced to a less than significant level by implementing proposed mitigation measures. Thus, the Proposed Project would not contribute to cumulative impacts for tribal cultural resources.

Utilities and Service Systems. The Proposed Project does not include and would not require the relocation or construction of new or expanded wastewater treatment or stormwater drainage, natural gas, or telecommunications facilities. The Proposed Project also would not require stormwater treatment. Therefore, cumulative impacts related to utilities and service systems would be less than significant.

The analyses in this draft IS/MND found that the Proposed Project and associated activities would have the potential to result in impacts on the environment in the area of biological resources. However, these potential impacts would be reduced to a less than significant level with implementation of the mitigation measures included in this document, and most impacts would be temporary (i.e., would occur only during construction). Other future projects proposed in the region and vicinity may increase the impacts identified herein, or the Proposed Project may contribute to other impacts. However, the Proposed Project is not anticipated to contribute substantially to any one impact, and the Proposed Project's impacts are not anticipated to be cumulatively considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of future projects. Thus, this impact would be less than significant with mitigation incorporated.

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

Less than Significant with Mitigation Incorporated. The Proposed Project would not result in any substantial adverse effects on human beings, either directly or indirectly, because each potentially significant impact can be reduced to a less than significant level with the implementation of the mitigation measures provided in this document. No other substantial adverse effects on human beings are anticipated as a result of the Proposed Project, resulting in a less than significant impact with mitigation incorporated.

4. List of Acronyms

AB	Assembly Bill
BMP	Best Management Practices
CAA	Clean Air Act
CCAA	California Clean Air Act
C-APE	CEQA Area of Potential Effects
CASS	Culture and Supplementation of Smelt
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CAP	Climate Action Plan
CAT	Caterpillar
CCIC	Central California Information Center
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CHRIS	California Historical Resources Information System
CNDDB	California Natural Diversity Database
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CY	Cubic Yard
dB	Decibels
dBA	A-weighted Decibels
DPM	Diesel Particulate Matter
DWR	California Department of Water Resources
DSSS	Delta Smelt Supplementation Strategy
EIR	Environmental Impact Report
ESA	Environmental Science Associates
FCCL	UC Davis Fish Conservation and Culture Laboratory
FESA	Federal Endangered Species Act
GHG	Greenhouse Gas
Hz	Hertz
IS/MND	Initial Study/Mitigated Negative Declaration
L	Liters
Metropolitan	Metropolitan Water District of Southern California
NAHC	Native American Heritage Commission
NGVD	National Geodetic Vertical Datum
NOx	Nitrous Oxides
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
OHP	State Office of Historic Preservation
PG&E	Pacific Gas and Electric Company
PM	Particulate Matter
PM_{10}	Particulate Matter less than or equal to 10 microns in diameter
$PM_{2.5}$	Particulate Matter less than or equal to 2.5 microns in diameter

PPV	Peak Particle Velocity
ROG	Reactive Organic Gas
RMS	Root Mean Square
SB	Senate Bill
SHPO	State Historic Preservation Office
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLF	Sacred Lands File
SOx	Sulfur Oxide
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
SVP	Society of Vertebrate Paleontology
TCR	Tribal Cultural Resources
UC	University of California
USBR	US Bureau of Reclamation
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VdB	Decibel Notation
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

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Appendix A

Proposed Project Construction Plans

DELTA SMELT PROPAGATION RESEARCH PROJECT

BOULDIN ISLAND, CA

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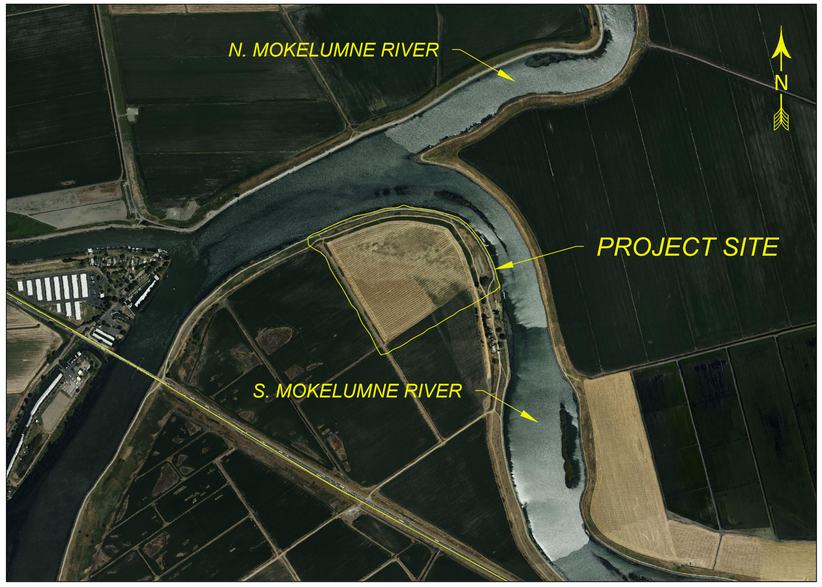

LOCATION MAP
NOT TO SCALE

VICINITY MAP
NOT TO SCALE

LEGEND

- 100 — *EXISTING GROUND CONTOURS*
- 80 — *FINISHED GRADE CONTOURS*
- × 89.4 *EXISTING GROUND SPOT ELEVATION*
- + 84.5 *FINISHED GRADE SPOT ELEVATION*
- – – – – – – *GRADING EXTENTS*
- —·— *PROJECT BOUNDARY*

CONTACTS

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cbec, INC.	*GREG SHELLENBARGER, PROJECT MANAGER*	*(916) 668-5226*
cbec, INC.	*SAM DIAZ, PROJECT ENGINEER*	*(916) 668-5235*
cbec, INC.	*CHRIS BOWLES, PROJECT DIRECTOR*	*(916) 668-5231*

NOTE: CONTOURS AND ELEVATIONS SHOWN ON PLANS CONSIST OF UNITED STATES GEOLOGICAL SURVEY (USGS) LIDAR SUPPLEMENTED WITH MBK'S SITE TOPOGRAPHY COLLECTED IN JUNE 2021 AND CBEC'S SITE TOPOGRAPHY COLLECTED IN APRIL 2022. USGS LIDAR REFERENCES NAD83 (NSRS2007) EPOCH 2017.95 HORIZONTAL DATUM, UTM ZONE 10N, METERS PROJECTION AND NAVD88 GEOID 12B US SURVEY FEET VERTICAL DATUM (CA SACRAMENTO LIDAR 2017 B16 - AIRBORNE LIDAR REPORT).

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
C1	COVER SHEET
C2	SHEET LAYOUT PLAN
C3	ACCESS, STAGING & ROADS
C4	COOLING MARSH A PLAN VIEW 1
C5	FEEDING MARSH A & FLOATING PEAT POND PLAN VIEW 2
C6	PROPAGATION POND A PLAN VIEW 3
C7	COOLING MARSH B PLAN VIEW 4
C8	FEEDING MARSH B PLAN VIEW 5
C9	PROPAGATION POND B PLAN VIEW 6
C10	DETENTION BASIN PLAN VIEW 7
C11	SITE GRADING & DRAINAGE
C12	PROFILES - 1
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C14	PROFILES - 3
C15	ROAD CROSSING PROFILES - 1
C16	ROAD CROSSING PROFILES - 2
C17	TYPICAL SECTIONS
C18	DETAILS - 1
C19	DETAILS - 2
C20	DETAILS - 3
C21	TILTING WEIR PLAN DETAIL
C22	TILTING WEIR PROFILE AND SECTION DETAILS
C23	ALIGNMENT GEOMETRY

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DESIGNED LT JCI
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APPROVED SD

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BOULDIN ISLAND DELTA SMELT PROPAGATION RESEARCH PROJECT ---- COVER SHEET CALIFORNIA

JOB NUMBER 21-1016
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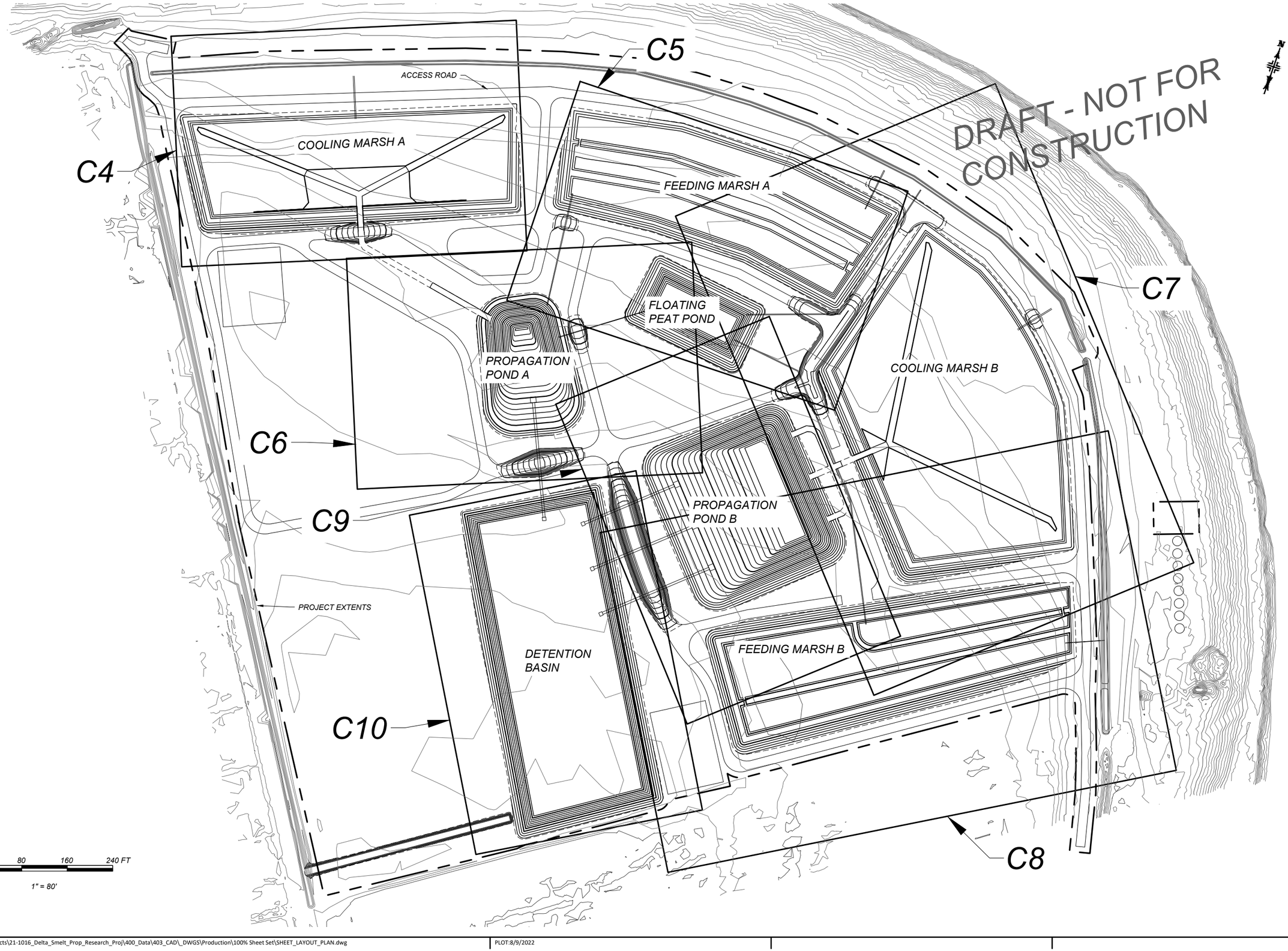
SHEET C1
1 OF 23



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SHEET LAYOUT PLAN

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SHEET	C2
	2 OF 23

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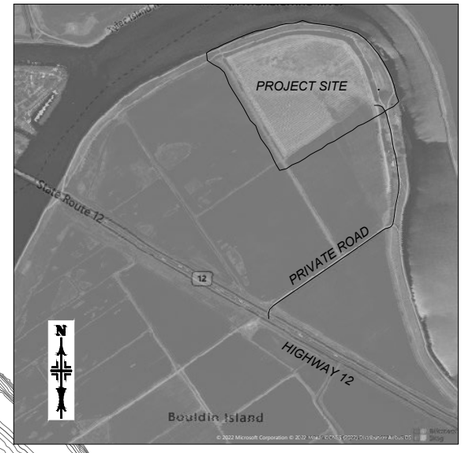
PLOT:8/9/2022



EXISTING SIPHON, 16" Ø
EXISTING EARTHEN MANIFOLD W/ FLASHBOARD WEIRS
EXISTING LEVEE CROWN
TURNAROUND
EXISTING IRRIGATION/SEEPAGE DITCH
ROAD A
COOLING MARSH A
FEEDING MARSH A
ROAD G
ROAD F
ROAD B
STAGING AREA 1, 100'x150'
FLOATING PEAT POND
ROAD H
PROPAGATION POND A
ACCESS ROAD, TYP. SEE DETAIL 4, SHEET C18
DEBRIS COMPOSTING AREA
PROPOSED GROUNDWATER WELL
ROAD E
COOLING MARSH B
30' RADIUS FILLET, TYP.
PROJECT EXTENTS
GRADING EXTENTS, TYP.
PROPAGATION POND B
ROAD C
ROAD D
EXISTING WESTERN SEEPAGE DITCH
DETENTION BASIN
FEEDING MARSH B
EXCESS SOILS STORAGE AREA
STAGING AREA 2, 100'x150'
ROAD B
EXISTING LEVEE CROWN
S. MOKELUMNE RIVER
(2) 8'x40' CONEX CONTAINERS
38'x60', GRAVEL PAD
EXISTING PEAT POOLS, QTY. 8
PROPOSED GROUNDWATER WELL
EXISTING SIPHON, 14" Ø
EXISTING EARTHEN MANIFOLD W/ FLASHBOARD WEIRS
EXISTING GROUNDWATER WELL

NOTES:
1. LIMIT TRAVEL ACROSS THE SITE TO THE GRADING FOOTPRINT, NEW ROADS, AND A MARGIN OF 10 FT OUTSIDE OF THEIR BORDERS.
2. TRAVEL WITHIN STAGING AREAS SHALL BE LIMITED TO THE BOUNDARIES SHOWN.
3. SEE SHEET C23 FOR ALIGNMENT GEOMETRY TABLES.
4. DECOMPACT AND SEED STAGING AREAS AFTER CONSTRUCTION.

0 80 160 240 FT

1" = 80'

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DELTA SMELT PROPAGATION RESEARCH PROJECT

ACCESS, STAGING & ROADS

JOB NUMBER 21-1016
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SHEET C3
3 OF 23

EXISTING IRRIGATION/SEEPAGE DITCH

LIFT PUMP ON TIMER

COOLING MARSH A SUMP

ACCESS ROAD, TYP
SEE DETAIL 4, SHEET C18

COOLING MARSH A SUPPLY PIPE
SEE PROFILE, SHEET C12

ROAD ALIGNMENT A

INSTALL RIPRAP APRON AT POND INLET
TO DIMENSIONS SHOWN
12" D50, 20" THICKNESS, FLUSH WITH FG

COOLING MARSH A

COOLING MARSH INTERNAL
DRAINAGE CHANNEL
SEE TYP. SECTION A, SHEET C17

COOLING MARSH A TILTING WEIR STRUCTURE
SEE SHEETS C21 & C22

COOLING MARSH A CONVEYANCE CHANNEL
SEE PROFILE, SHEET C13

4' TOP WIDTH BERM, TYP
SEE SECTION C, SHEET C17

CULVERT ROAD CROSSING
SEE DETAIL 3 , SHEET C18

COOLING MARSH A CONVEYANCE CHANNEL
SEE DETAIL 1, SHEET C18

ROAD ALIGNMENT F

ROAD ALIGNMENT G

ROAD ALIGNMENT H

0 20 40 60 FT
1" = 20'

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COOLING MARSH A PLAN VIEW 1

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SHEET C4
4 OF 23

ROAD ALIGNMENT A

INLET SUMPS FOR FEEDING MARSH A AND FLOATING PEAT POND SHOWN ON SHEET C7

FEEDING MARSH INTERNAL BERM SEE TYP. SECTION B, SHEET C17

FEEDING MARSH A SUPPLY PIPE SEE PROFILE, SHEET C12

10' Ø RIPRAP (D50=6") PAD UNDER PIPE OUTLET

RICE BOX NO. 1 SEE DETAIL 9, SHEET C20

RICE BOX NO. 2 SEE DETAIL 9, SHEET C20

FEEDING MARSH A

WEIR BOX NO. 1 SEE DETAIL 5, SHEET C19

4' TOP WIDTH BERM, TYP SEE SECTION C, SHEET C17

ROAD ALIGNMENT F

ACCESS ROAD, TYP SEE DETAIL 4, SHEET C18

ROAD ALIGNMENT B

FEEDING MARSH A OUTLET PIPE SEE PROFILE, SHEET C13

FLOATING PEAT POND

WEIR BOX NO. 2 SEE DETAIL 5, SHEET C19

WEIR BOX NO. 3 SEE DETAIL 5, SHEET C19

FLOATING PEAT POND OUTLET PIPE A SEE PROFILE, SHEET C13

FLOATING PEAT POND SUPPLY PIPE SEE PROFILE, SHEET C12

ROAD ALIGNMENT C

FLOATING PEAT POND OUTLET PIPE B SEE PROFILE, SHEET C14

0 20 40 60 FT

1" = 20'

LOCATION: D:\Work\Projects\21-1016_Delta_Smelt_Prop_Research_Proj\400_Data\403_CAD_DWGS\Production\100% Sheet Set\PLAN_VIEW_2.dwg

PLOT:6/24/2022

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FEEDING MARSH A & FLOATING PEAT POND PLAN VIEW 2

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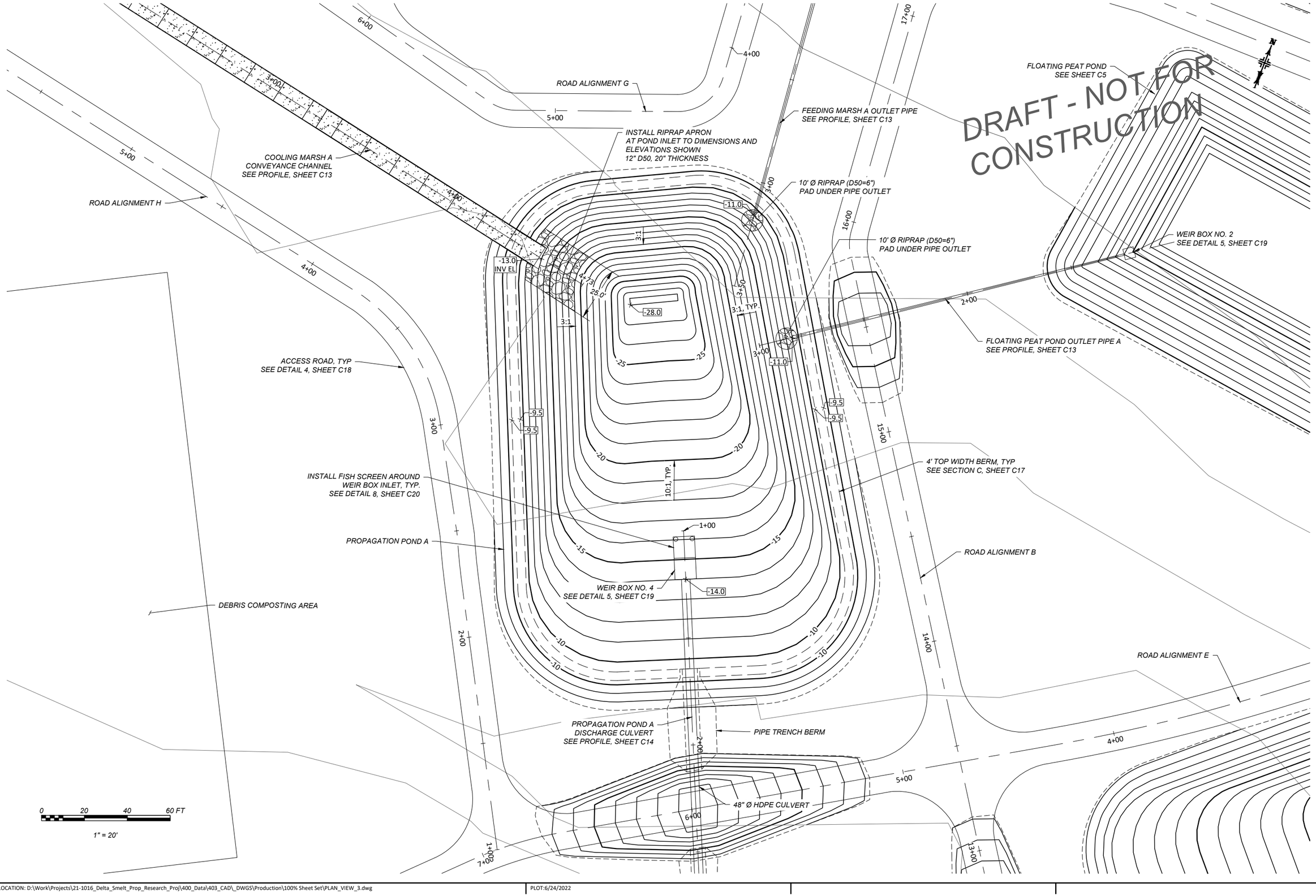
SHEET	C5
	5 OF 23



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PROPAGATION POND A PLAN VIEW 3

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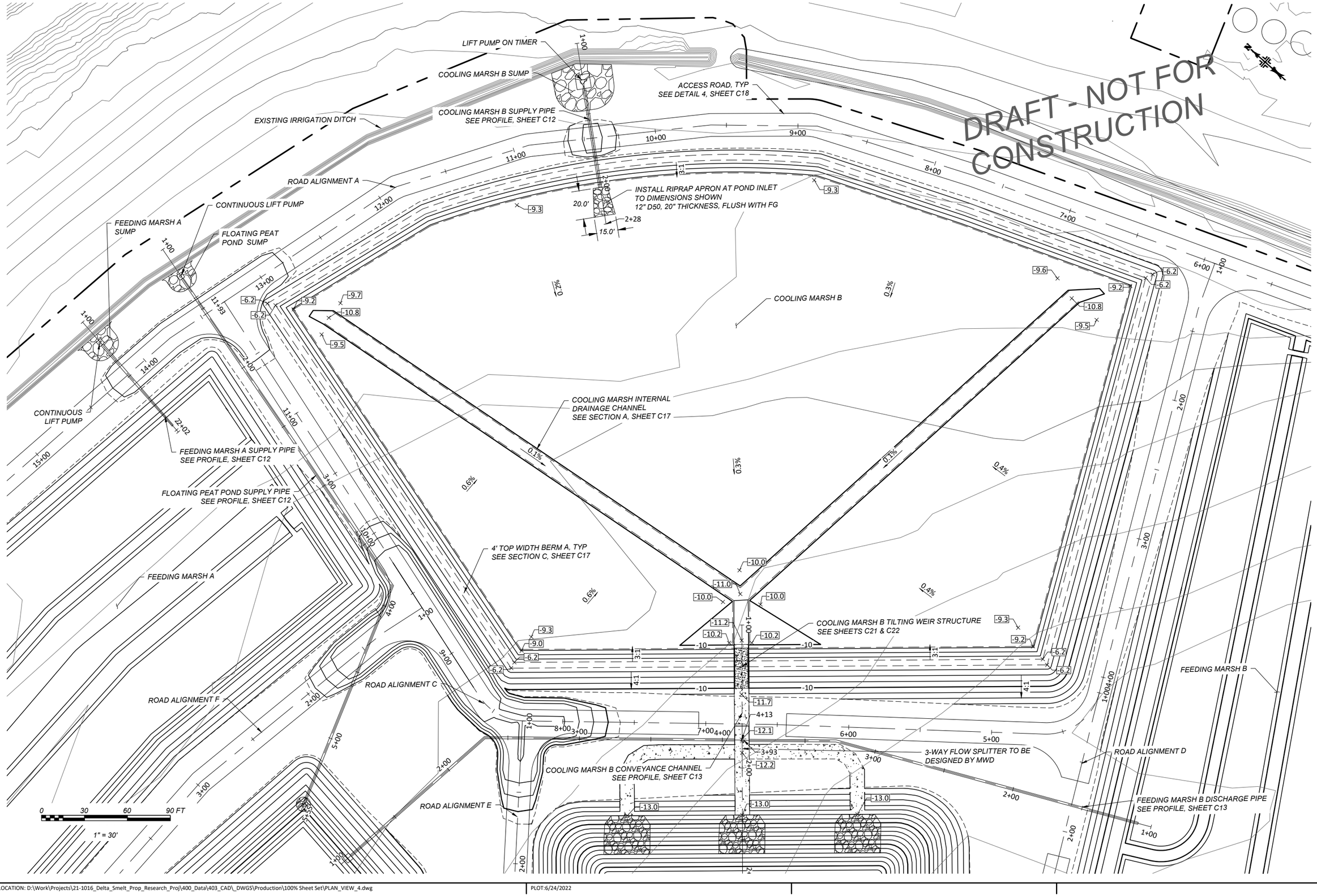
SHEET	C6
	6 OF 23



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COOLING MARSH B PLAN VIEW 4

JOB NUMBER	21-1016
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SHEET	C7
	7 OF 23

DRAFT - NOT FOR CONSTRUCTION

CONSTRUCT BERM TO SUPPORT FEEDING MARSH B DISCHARGE PIPE

FEEDING MARSH B DISCHARGE PIPE SEE PROFILE, SHEET C13

ROAD ALIGNMENT D

ROAD ALIGNMENT C

4' TOP WIDTH BERM SEE TYP. SECTION C, SHEET C17

WEIR BOX NO. 5 SEE DETAIL 5, SHEET C19

RICE BOX NO. 4 SEE DETAIL 9, SHEET C20

FEEDING MARSH B

10' Ø RIPRAP (D50=12") PAD UNDER PIPE OUTLET

RICE BOX NO. 3 SEE DETAIL 9, SHEET C20

INTERNAL BERM SEE TYP. SECTION B, SHEET C17

CONTINUOUS LIFT PUMP

FEEDING MARSH B SUPPLY PIPE SEE PROFILE, SHEET C12

STAGING AREA 2

ROAD ALIGNMENT B

ACCESS ROAD, TYP SEE DETAIL 4, SHEET C18

ROAD ALIGNMENT A

4:1, TYP.

3:1, TYP.

0.1%

1.2%

0.6%

0 30 60 90 FT

1" = 30'

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FEEDING MARSH B PLAN VIEW 5

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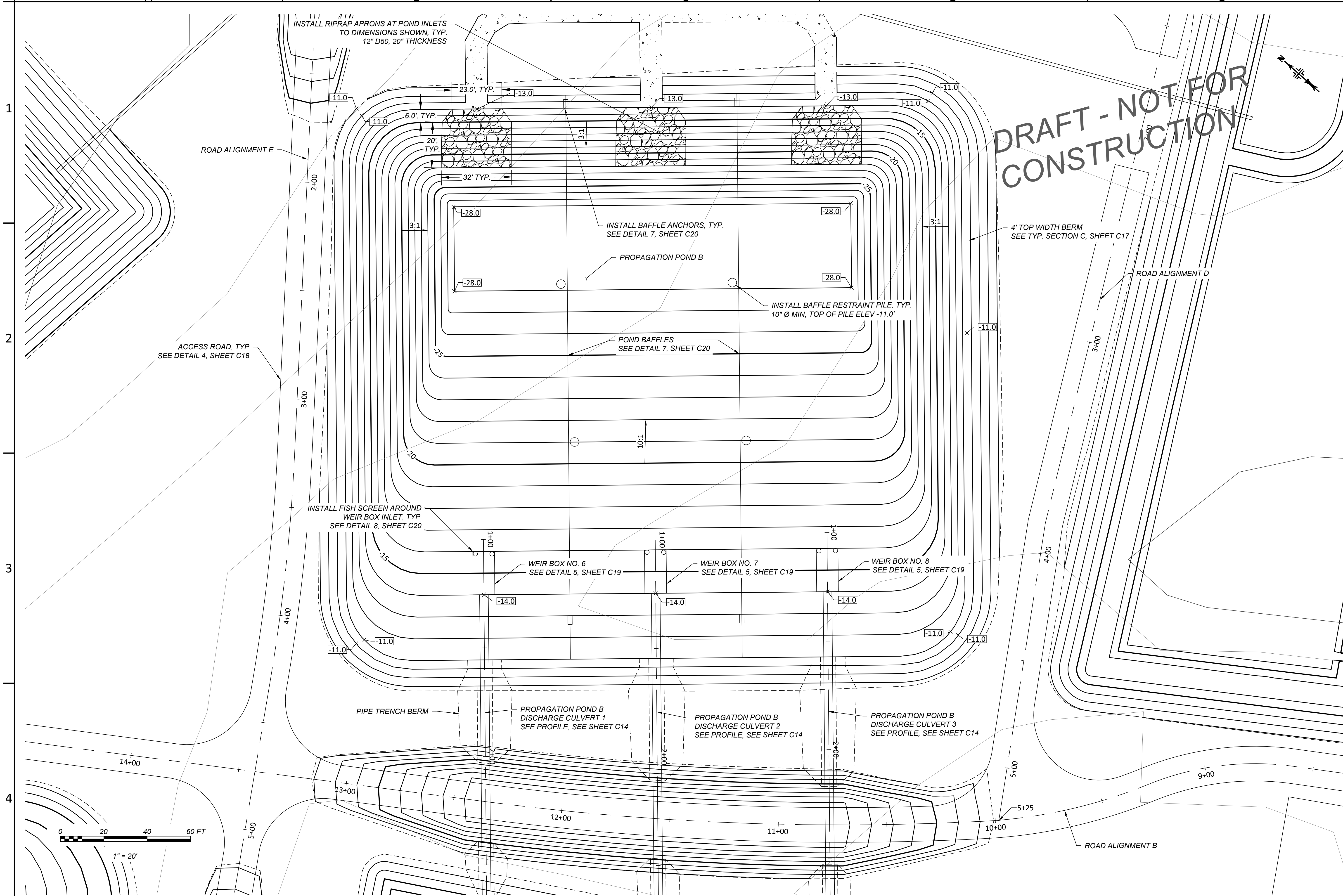
SHEET C8
8 OF 23



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PLOT:6/24/2022

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PROPAGATION POND B PLAN VIEW 6

JOB NUMBER 21-1016

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SHEET C9

9 OF 23

PROPAGATION POND B DISCHARGE CULVERT 3

PROPAGATION POND B DISCHARGE CULVERT 2

PROPAGATION POND B DISCHARGE CULVERT 1

PIPE TRENCH BERM

STAGING AREA 2

OUTFALL NO. 2 SEE DETAIL 10, SHEET C20

OUTFALL NO. 3 SEE DETAIL 10, SHEET C20

OUTFALL NO. 4 SEE DETAIL 10, SHEET C20

INSTALL RIPRAP APRONS AT POND INLETS TO DIMENSIONS SHOWN, FLUSH WITH FG 12" D50, 20" THICKNESS

OUTFALL NO. 1 SEE DETAIL 10, SHEET C20

PROPAGATION POND A DISCHARGE CULVERT

DETENTION POND

INSTALL CONCRETE PRECAST WINGWALL
INSTALL 24" CANAL GATES

4' TOP WIDTH BERM
SEE TYP. SECTION C, SHEET C17

INSTALL 24" HDPE CULVERT

OUTFALL TO PROPOSED DRAINAGE DITCH
GRADES AND INVERTS TO BE DETERMINED UPON CONSTRUCTION

DETENTION BASIN DRAINAGE DITCH
SEE TYP. SECTION D, SHEET C17

EXCESS SOILS STORAGE AREA

0 20 40 60 FT

1" = 20'

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DETENTION BASIN PLAN VIEW 7

JOB NUMBER 21-1016

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DATE AUGUST 2022

SHEET C10
10 OF 23

DRAFT - NOT FOR CONSTRUCTION

CONTINUOUS LIFT PUMP 50 GPM

CONTINUOUS LIFT PUMP 50 GPM

EXISTING IRRIGATION/SEEPAGE DITCH

LIFT PUMP ON TIMER 3,200 GPM

EXISTING EARTHEN MANIFOLD W/ FLASHBOARD WEIRS

73 LF

FEEDING MARSH A WEIR BOX

COOLING MARSH A TILTING WEIR STRUCTURE

INSTALL 105 LF 15" Ø HDPE CULVERT INVERT ELEVATIONS AT EACH END TO MATCH EG

LIFT PUMP ON TIMER 3,200 GPM

CONSTRUCT A 1' HIGH DEFLECTION BERM TO DIRECT DRAINAGE AROUND PROPAGATION POND B

CONTINUOUS LIFT PUMP 50 GPM

COOLING MARSH B TILTING WEIR STRUCTURE

CONSTRUCT A 1' HIGH DEFLECTION BERM TO DIRECT DRAINAGE AROUND PROPAGATION POND B AND ROAD BERM

PROPOSED GROUNDWATER WELL

EARTHEN MANIFOLD W/ FLASHBOARD WEIRS

FEEDING MARSH B WEIR BOX

LEGEND

RUNOFF FLOW PATH

0 80 160 240 FT

1" = 80'

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BOULDIN ISLAND CALIFORNIA

DELTA SMELT PROPAGATION RESEARCH PROJECT

SITE GRADING & DRAINAGE

JOB NUMBER 21-1016

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DATE AUGUST 2022

SHEET C11

11 OF 23

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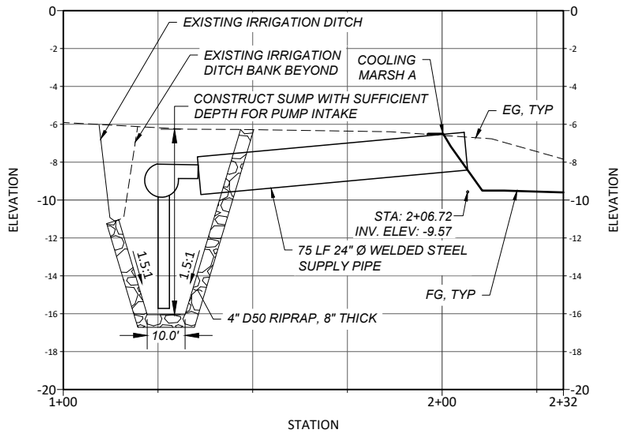
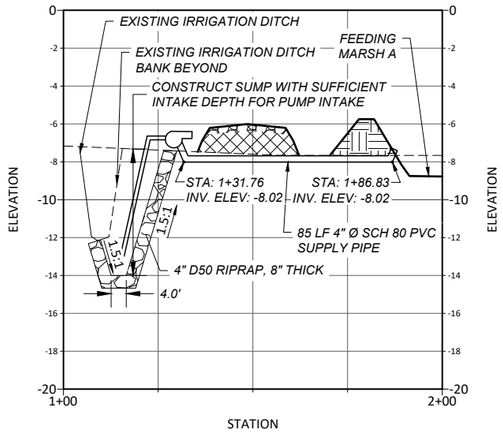
PLOT:8/9/2022



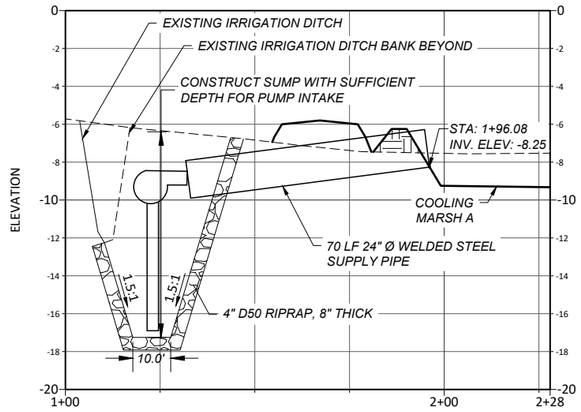
PROFILE: COOLING MARSH A SUPPLY PIPE

SCALE: H1" = 20'; V1" = 4' SHEET C4



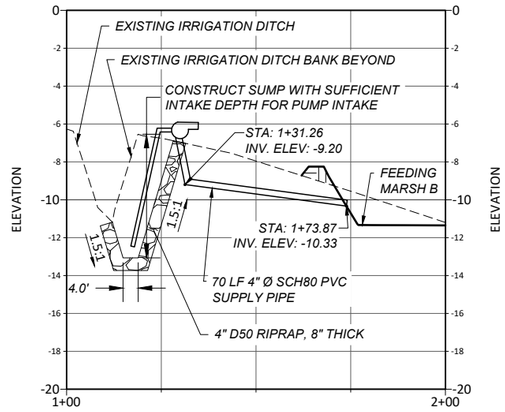
PROFILE: FEEDING MARSH A SUPPLY PIPE

SCALE: H1" = 20'; V1" = 4' SHEET C5



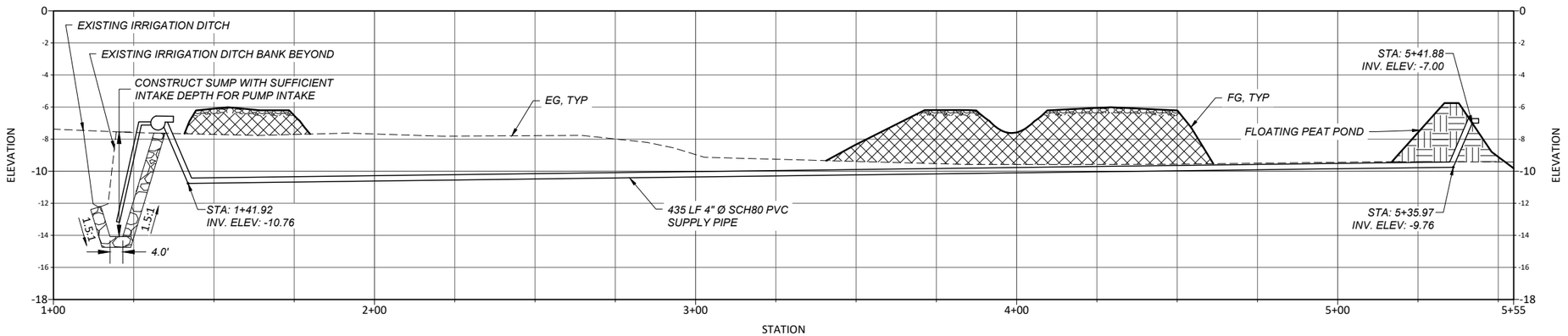
PROFILE: COOLING MARSH B SUPPLY PIPE

SCALE: H1" = 20'; V1" = 4' SHEET C7



PROFILE: FEEDING MARSH B SUPPLY PIPE

SCALE: H1" = 20'; V1" = 4' SHEET C8



PROFILE: FLOATING PEAT POND SUPPLY PIPE

SCALE: H1" = 20'; V1" = 4' SHEET C5

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METROPOLITAN WATER DISTRICT OF S. CALIFORNIA
700 NORTH ALAMEDA STREET
LOS ANGELES, CA 90012-2944
(213) 217-6000

BOULDIN ISLAND, CALIFORNIA
DELTA SMELT PROPAGATION RESEARCH PROJECT

PROFILES - 1

JOB NUMBER	21-1016
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SHEET	C12
	12 OF 23

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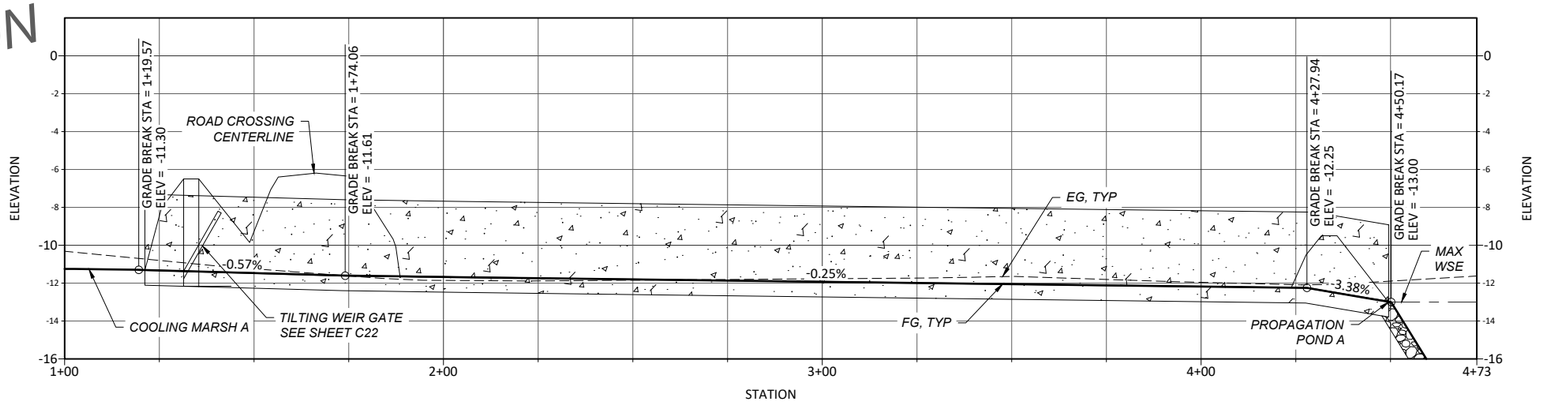

PROFILE: COOLING MARSH A CONVEYANCE CHANNEL

SCALE: H1" = 20'; V1" = 4' SHEET C4

PROFILE: COOLING MARSH B CONVEYANCE CHANNEL

SCALE: H1" = 20'; V1" = 4' SHEET C7

PROFILE: FEEDING MARSH A DISCHARGE PIPE

SCALE: H1" = 20'; V1" = 4' SHEET C5

PROFILE: FEEDING MARSH B DISCHARGE PIPE

SCALE: H1" = 20'; V1" = 4' SHEET C8

PROFILE: FLOATING PEAT POND DISCHARGE PIPE A

SCALE: H1" = 20'; V1" = 4' SHEET C5

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PROFILES - 2

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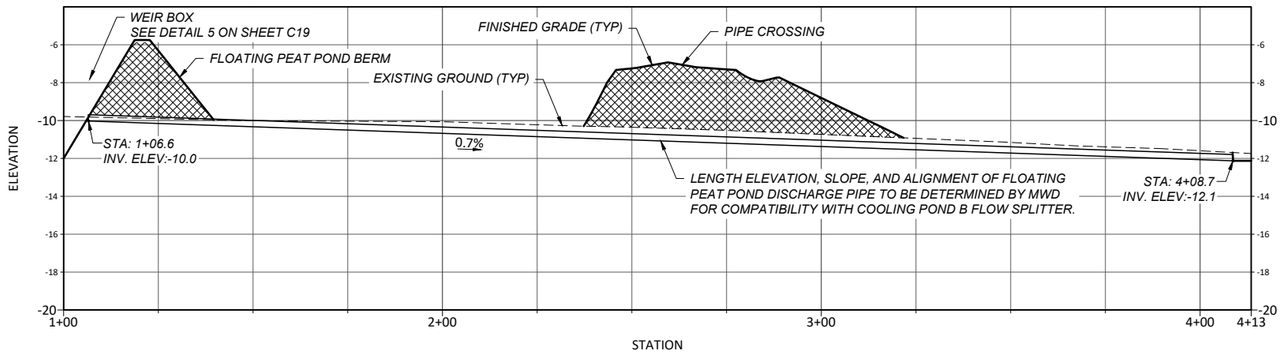
PLOT:6/24/2022



PROFILE: FLOATING PEAT POND DISCHARGE PIPE B

SCALE: H1" = 20'; V1" = 4' SHEET C5

PROFILE: PROPAGATION POND A DISCHARGE CULVERT

SCALE: H1" = 20'; V1" = 4' SHEET C6

NOTE:
1. THE NORMAL WSE IN THE PROPAGATION PONDS IS -13'. THE MAXIMUM WSE IN THE PROPAGATION PONDS IS -12'

PROFILE: PROPAGATION POND B DISCHARGE CULVERT 1

SCALE: H1" = 20'; V1" = 4' SHEET C9

NOTE:
1. THE NORMAL WSE IN THE PROPAGATION PONDS IS -13'. THE MAXIMUM WSE IN THE PROPAGATION PONDS IS -12'

PROFILE: PROPAGATION POND B DISCHARGE CULVERT 2

SCALE: H1" = 20'; V1" = 4' SHEET C9

NOTE:
1. THE NORMAL WSE IN THE PROPAGATION PONDS IS -13'. THE MAXIMUM WSE IN THE PROPAGATION PONDS IS -12'

PROFILE: PROPAGATION POND B DISCHARGE CULVERT 3

SCALE: H1" = 20'; V1" = 4' SHEET C9

NOTE:
1. THE NORMAL WSE IN THE PROPAGATION PONDS IS -13'. THE MAXIMUM WSE IN THE PROPAGATION PONDS IS -12'

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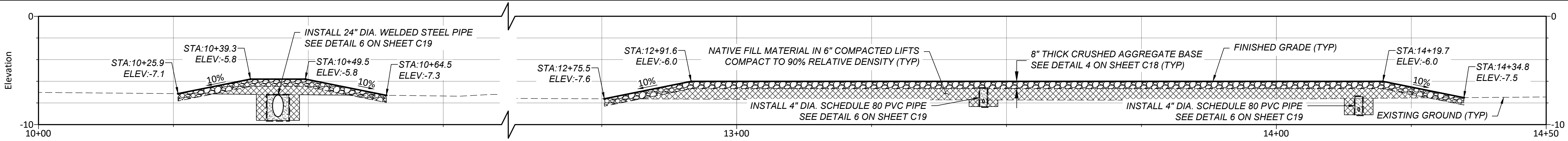
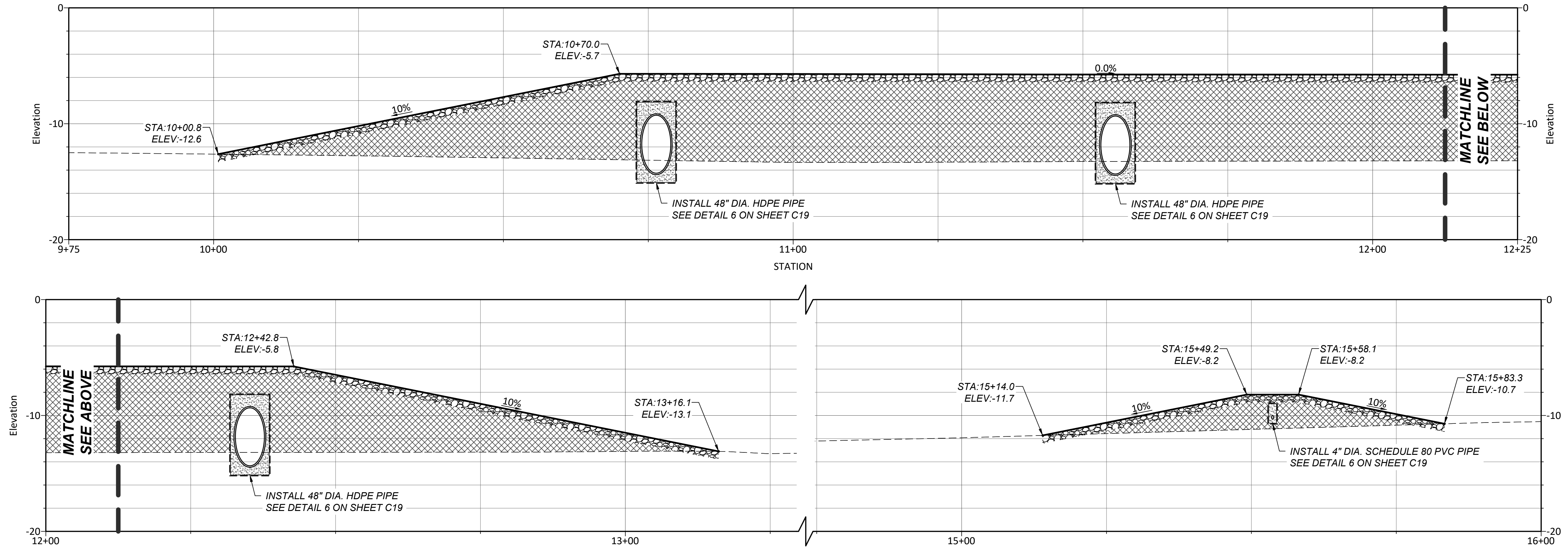
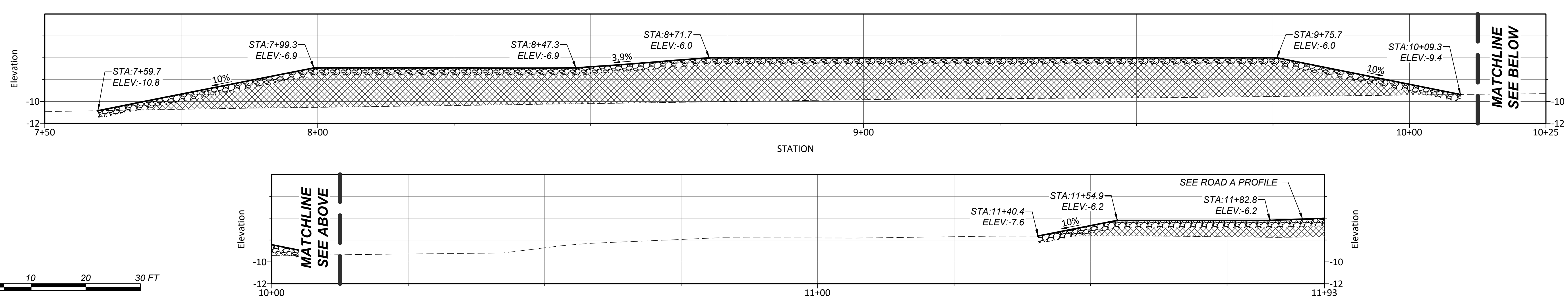


PROFILE: ROAD A - PIPE CROSSING
SCALE: H1" = 10'; V1" = 5' SHEET C7



PROFILE: ROAD B - PIPE CROSSING
SCALE: H1" = 10'; V1" = 5' SHEET C9



PROFILE: ROAD C - PIPE CROSSING
SCALE: H1" = 10'; V1" = 5' SHEET C7

0 10 20 30 FT
1" = 10'

0 5 10 15 FT
1" = 5'

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ROAD CROSSING PROFILES - 1

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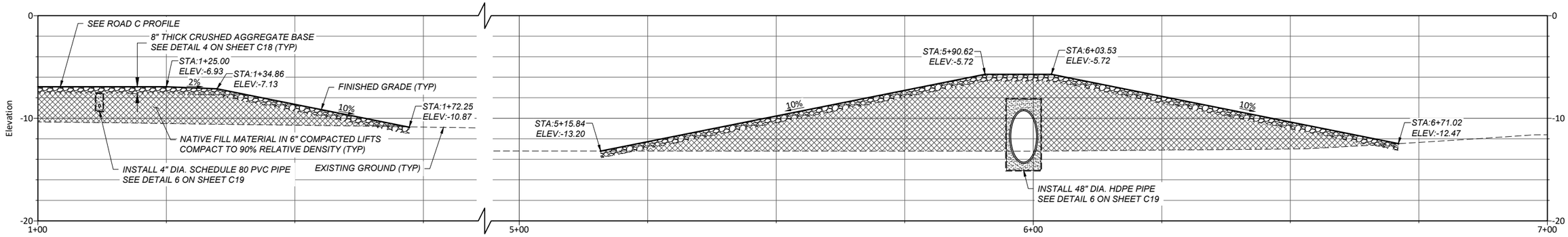
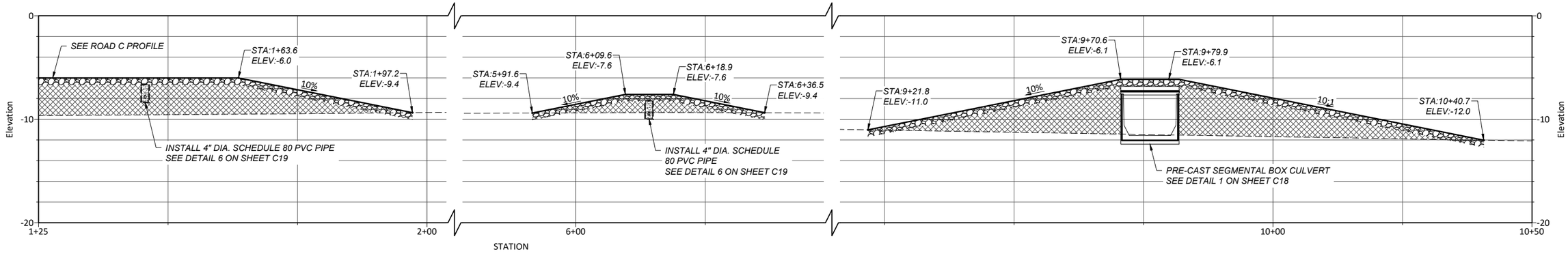
LOCATION: D:\Work\Projects\21-1016_Delta_Smelt_Prop_Research_Proj\400_Data\403_CAD_DWGS\Production\100% Sheet Set\ROAD_CROSSING_PROFILES.dwg PLOT:6/24/2022



PROFILE: ROAD E - PIPE CROSSING

SCALE: H1" = 10'; V1" = 5' SHEET C6



PROFILE: ROAD F - PIPE CROSSING

SCALE: H1" = 10'; V1" = 5' SHEET C4, C5

0 10 20 30 FT

1" = 10'

0 5 10 15 FT

1" = 5'

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ROAD CROSSING PROFILES - 2

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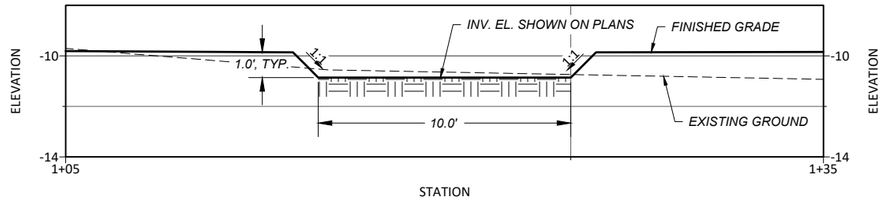
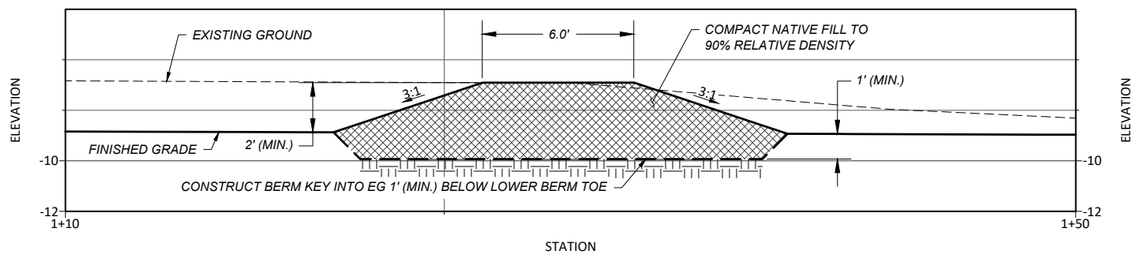
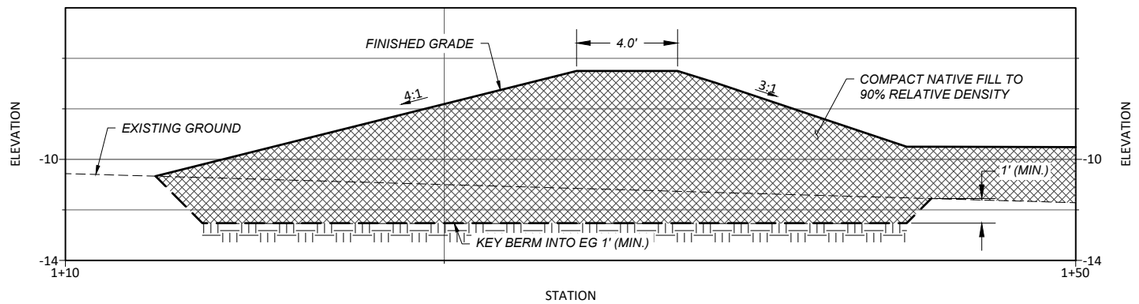


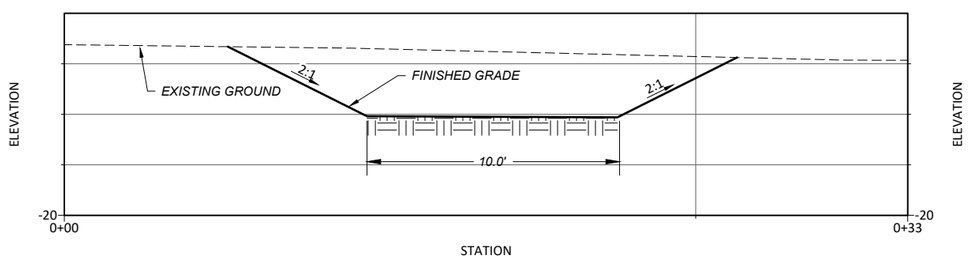
A / C4 COOLING MARSH INTERNAL DRAINAGE CHANNEL TYPICAL SECTION
SCALE: 1" = 3'



B / C5 FEEDING MARSH INTERNAL BERM TYPICAL SECTION
SCALE: 1" = 3'



C / C4 MARSH AND POND PERIMETER BERM TYPICAL SECTION
SCALE: 1" = 3'



D / C10 DETENTION BASIN DRAINAGE DITCH TYPICAL SECTION
SCALE: 1" = 3'

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TYPICAL SECTIONS
CAUFORNIA

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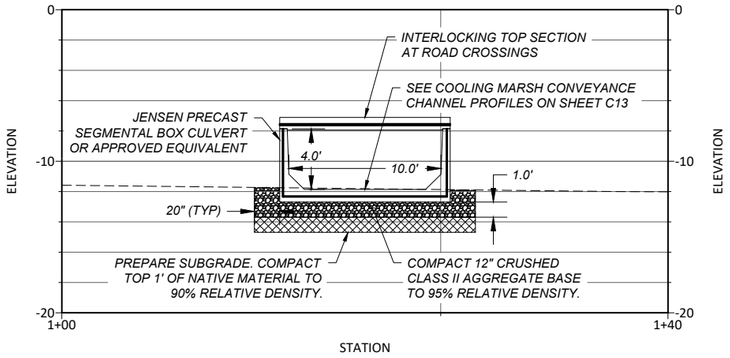
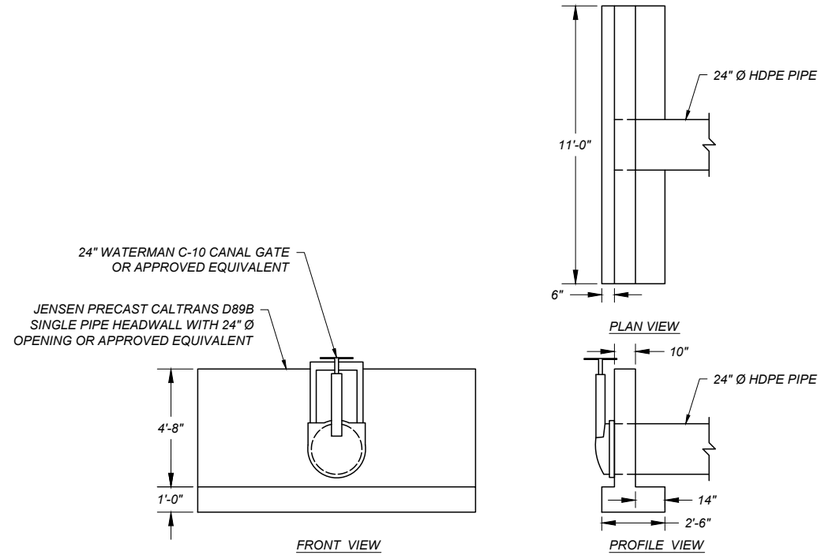
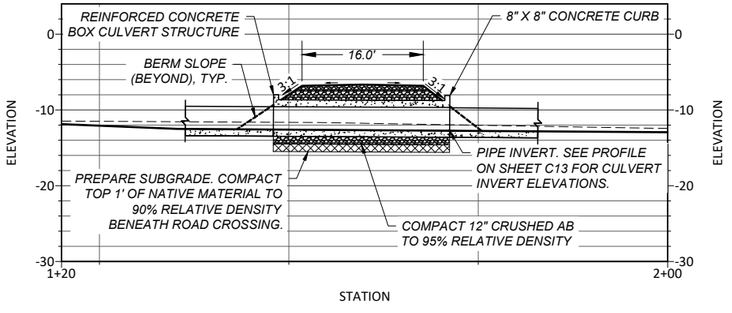
	17 OF 23

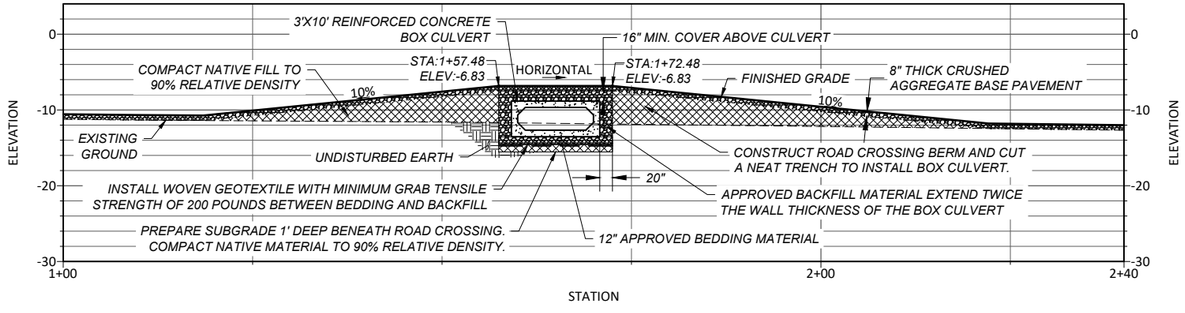


1 SEGMENTAL BOX CULVERT DETAIL
SCALE: 1" = 5'

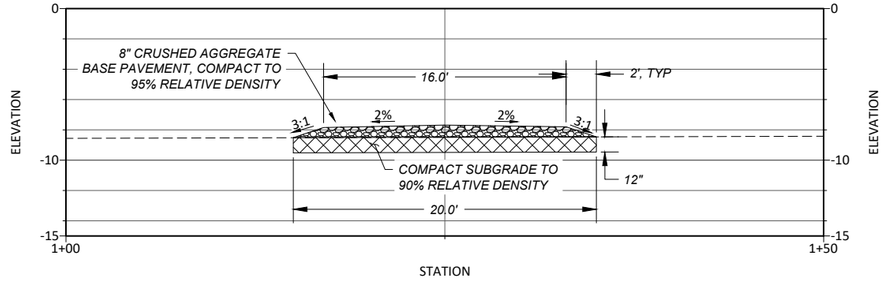


2 DETENTION BASIN OUTLET HEADWALL DETAIL
SCALE: 1" = 4'





3 C4 CULVERT CROSSING DETAIL
SCALE: 1" = 10'



4 ACCESS ROAD TYPICAL SECTION DETAIL
SCALE: 1" = 5'

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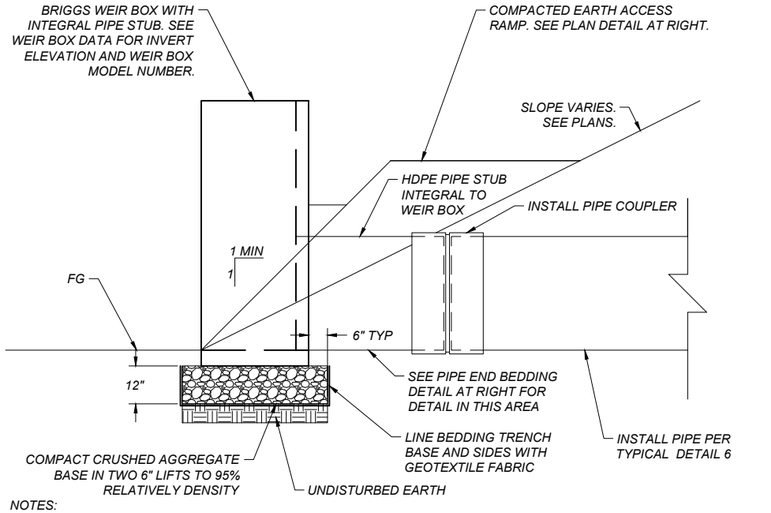
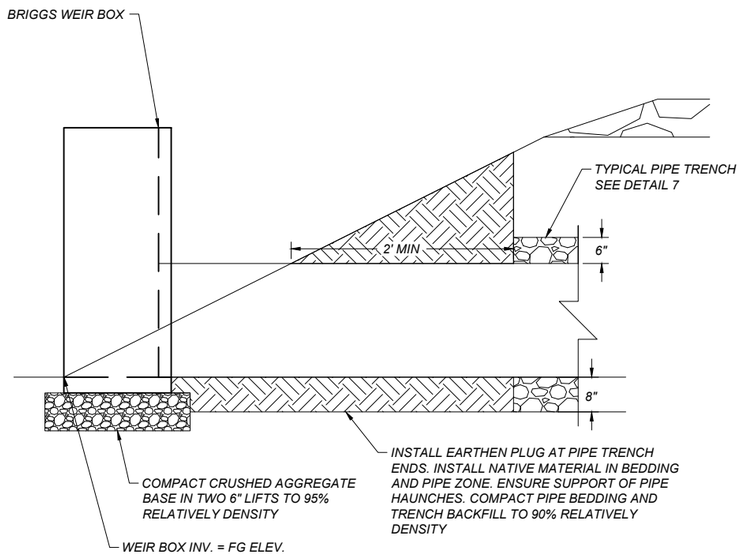
18 OF 23

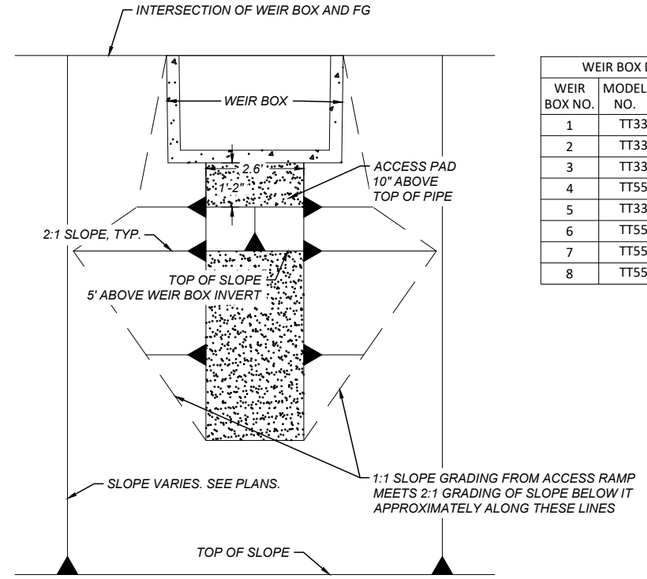


NOTES:
1. CONSTRUCT COMPACTED EARTH ACCESS RAMP TO WEIR BOX. SEE COMPACTED EARTH ACCESS RAMP GRADING DETAIL.
2. WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL SCARIFY AND RECOMPACT NATIVE SOILS TO AT LEAST 4" BELOW THE BEDDING, OR EXCAVATE TO A DEPTH REQUIRED BY THE OWNER'S REPRESENTATIVE AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE OWNER'S REPRESENTATIVE.

TYPICAL CONSTRUCTION



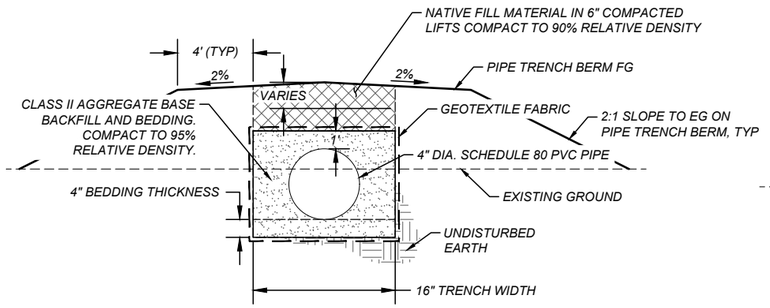
PIPE END BEDDING



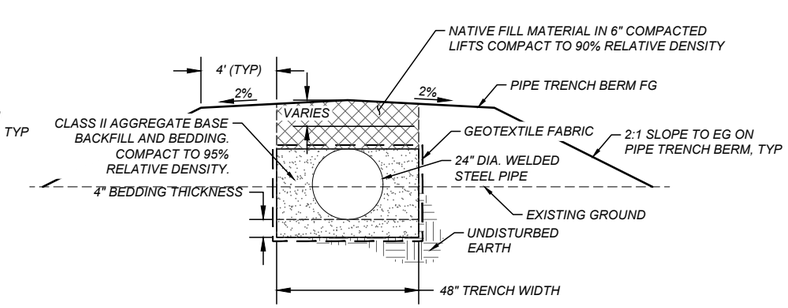
WEIR BOX DATA		
WEIR BOX NO.	MODEL NO.	INVERT ELEV. (FT)
1	TT33	-9.2
2	TT33	-9.0
3	TT33	-9.0
4	TT55	-14.0
5	TT33	-12.0
6	TT55	-14.0
7	TT55	-14.0
8	TT55	-14.0

COMPACTED EARTH ACCESS RAMP GRADING DETAIL

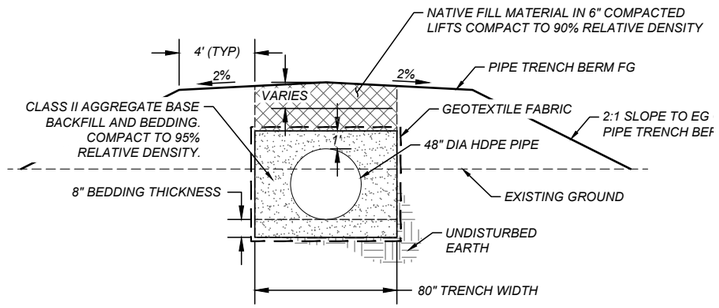
5 C4 WEIR BOX INSTALLATION DETAIL
NTS



4" DIA. SCHEDULE 80 PVC PIPE TRENCH



24" DIA. WELDED STEEL PIPE TRENCH



48" DIA. HDPE PIPE TRENCH

NOTES
1. UNSTABLE TRENCH BOTTOM MATERIAL SHALL BE EXCAVATED TO A DEPTH SPECIFIED BY THE ENGINEER AND REPLACED WITH SUITABLE MATERIAL AS DIRECTED.
2. APPROVED BEDDING AND BACKFILL MATERIAL SHALL BE CALTRANS CLASS 2 AGGREGATE BASE
3. PIPE INSTALLATION SHALL NOT OCCUR IF WATER IS PRESENT IN THE TRENCH.
4. INSTALLATION SHALL BE IN ACCORDANCE WITH ASTM D2321.
5. 2' MINIMUM COVER REQUIRED DURING HEAVY CONSTRUCTION ACTIVITIES.
6. EXPOSE FIRM, STABLE SOILS FOR THE SUBGRADE BY DRAWING THE BACKHOE BUCKET AND NOT ITS TEETH THROUGH THE SOILS.

6 -- PIPE TRENCH DETAIL
NTS

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DELTA SMELT PROPAGATION RESEARCH PROJECT

DETAILS - 2

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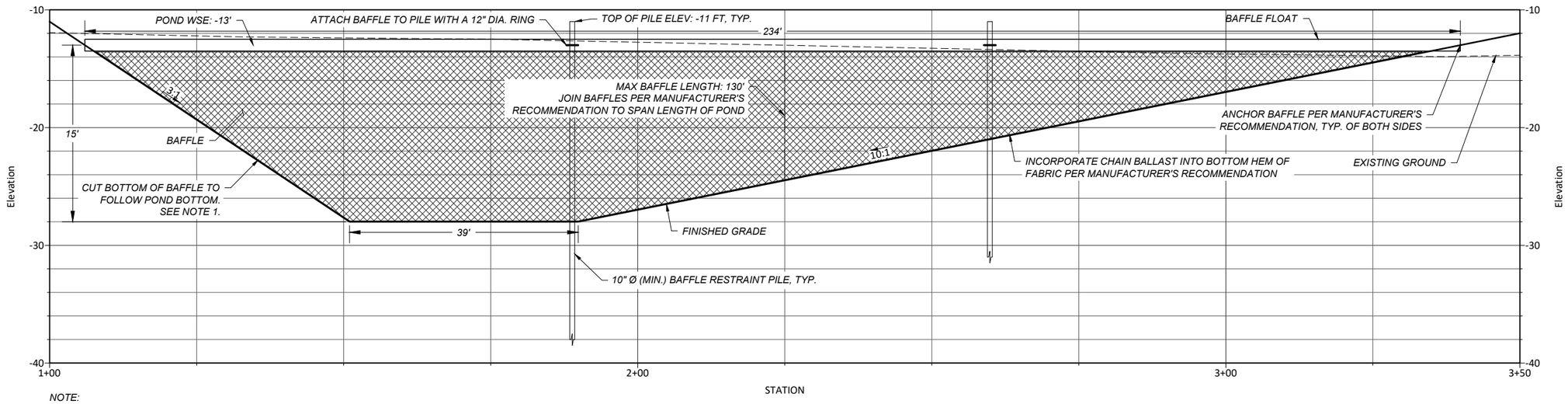
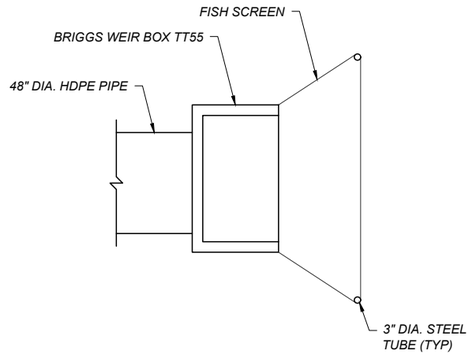
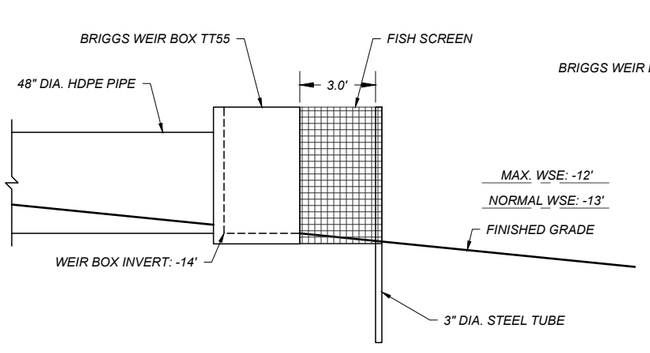
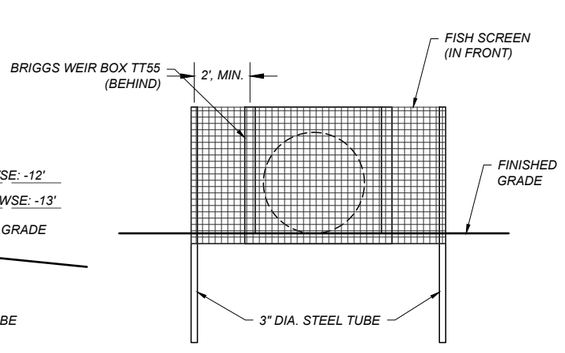


NOTE:
1. CUT BOTTOM OF BAFFLE WITH SUFFICIENT MATERIAL TO MAINTAIN SEGMENTATION OF POND AT THE MAXIMUM POND WSE (-12'), ACCORDING TO MANUFACTURER'S RECOMMENDATION.

7 / C9 BAFFLE DETAIL
SCALE: H1" = 10', V1" = 5'





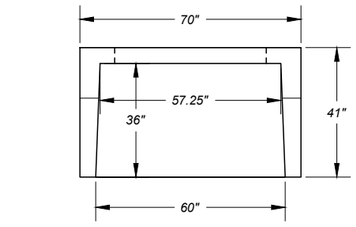


8 / C6, C9 FISH SCREEN DETAIL
SCALE: 1" = 3'

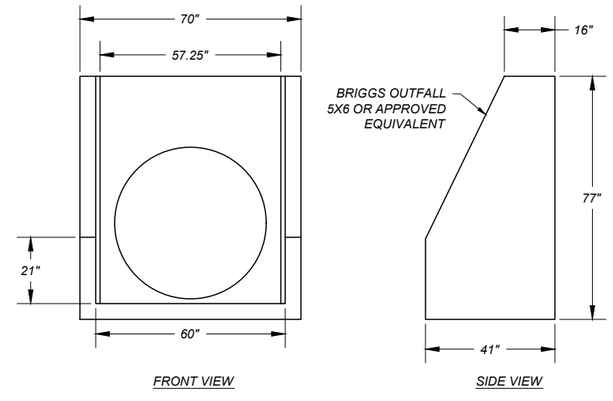
RICE BOX DATA	
RICE BOX NO.	INVERT ELEV. (FT)
1	-8.9
2	-9.1
3	-11.3
4	-11.7

NOTE:
1. INSTALL RICE BOXES IN SERIES TO SPAN THE TOE TO TOE DISTANCE OF THE FEEDING MARSH BERMS AS SHOWN ON PLANS.

9 / C5, C8 RICE BOX DETAIL
SCALE: 1" = 2'



OUTFALL DATA	
OUTFALL NO.	INVERT ELEV. (FT)
1	-16.0
2	-16.0
3	-16.0
4	-16.0



10 / C10 OUTFALL DETAIL
SCALE: 1" = 2'

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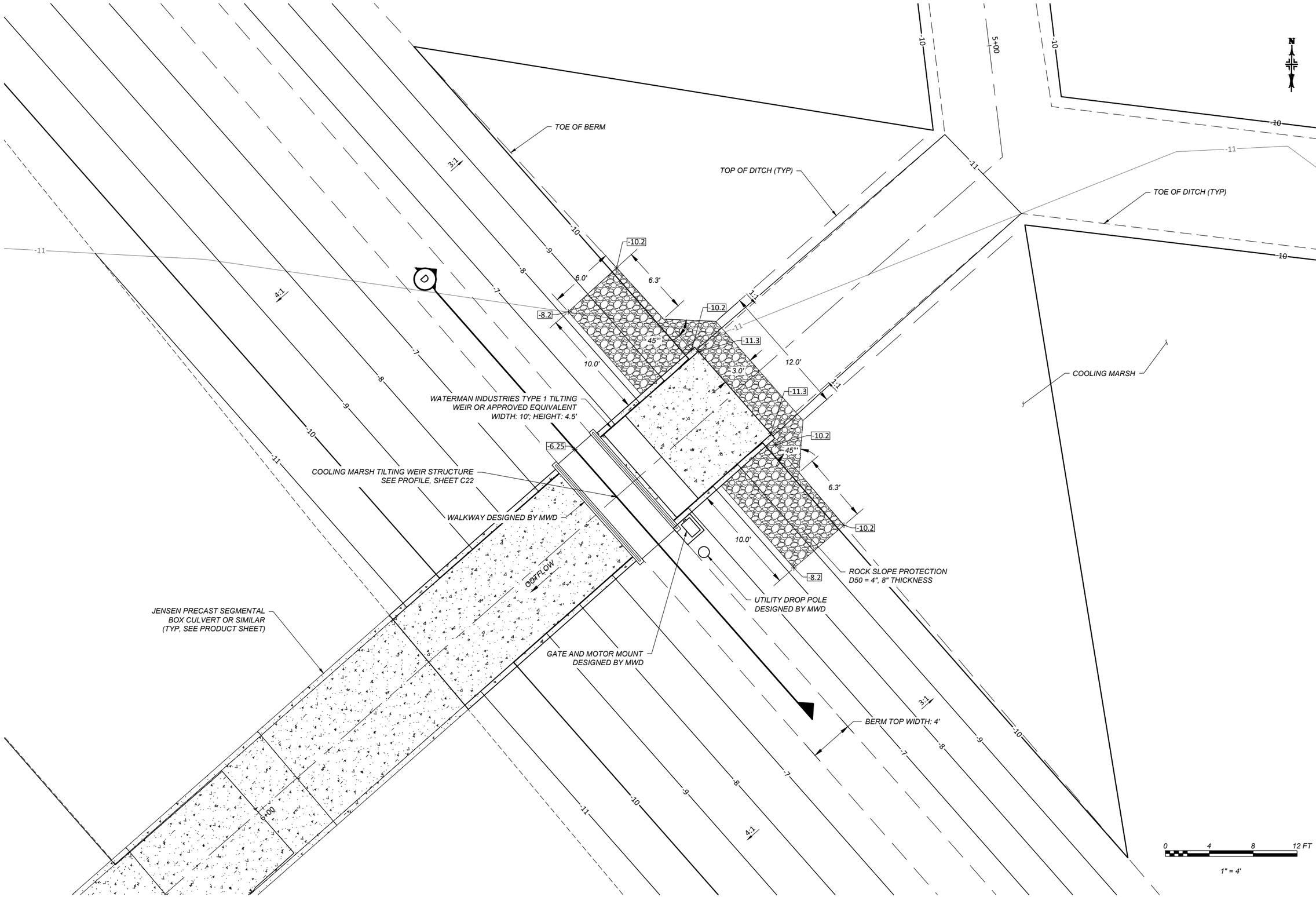

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CALIFORNIA

DELTA SMELT PROPAGATION RESEARCH PROJECT

TILTING WEIR PLAN DETAIL

JOB NUMBER	21-1016
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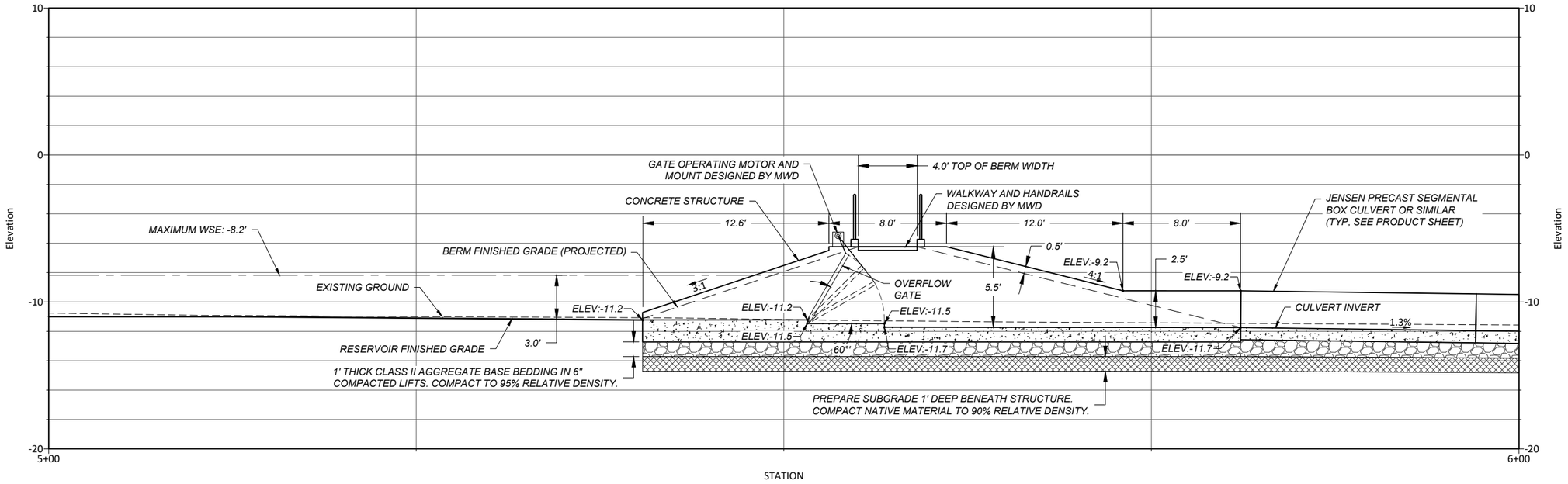
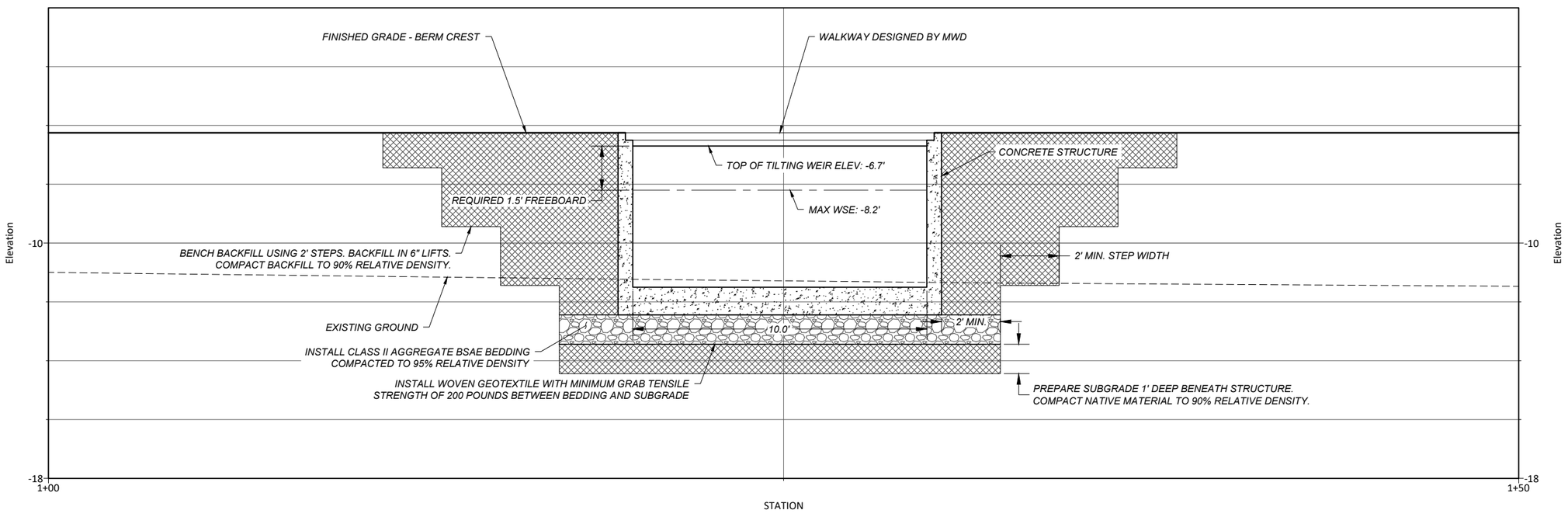
	21 OF 23



PROFILE: COOLING MARSH TILTING WEIR STRUCTURE

SCALE: 1" = 4' SHEET C21



D / C21 WATER CONTROL STRUCTURE SECTION

SCALE: 1" = 2'

DESIGNED LT JCI
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APPROVED SD

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CLIENT: METROPOLITAN WATER DISTRICT OF S. CALIFORNIA
700 NORTH ALAMEDA STREET
LOS ANGELES, CA 90012-2944
(213) 217-6000

CALIFORNIA
BOULDIN ISLAND
DELTA SMELT PROPAGATION RESEARCH PROJECT

TILTING WEIR PROFILE AND SECTION DETAILS

JOB NUMBER 21-1016
DOCUMENT RELEASE 100% DRAFT
DATE JUNE 2022
SHEET C22
22 OF 23

Road A ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L1	95.4		E: 6255697.46 N: 2234965.28	E: 6255676.14 N: 2235058.26
L2	176.6		E: 6255676.14 N: 2235058.26	E: 6255618.99 N: 2235225.32
L3	83.5		E: 6255618.99 N: 2235225.32	E: 6255595.42 N: 2235305.40
L4	316.9		E: 6255595.42 N: 2235305.40	E: 6255481.96 N: 2235601.30
L5	114.1		E: 6255481.96 N: 2235601.30	E: 6255436.47 N: 2235705.96
L6	74.5		E: 6255436.47 N: 2235705.96	E: 6255388.20 N: 2235762.70
L7	127.9		E: 6255388.20 N: 2235762.70	E: 6255294.06 N: 2235849.30
L8	97.3		E: 6255294.06 N: 2235849.30	E: 6255211.16 N: 2235900.28
L9	190.3		E: 6255211.16 N: 2235900.28	E: 6255027.51 N: 2235950.17
L10	198.5		E: 6255027.51 N: 2235950.17	E: 6254830.90 N: 2235977.11
L11	203.7		E: 6254830.90 N: 2235977.11	E: 6254627.17 N: 2235974.28
L12	239.1		E: 6254627.17 N: 2235974.28	E: 6254392.37 N: 2235929.00
L13	657.5		E: 6254392.37 N: 2235929.00	E: 6253775.76 N: 2235700.82
C1	32.2	37	E:6253775.76 N: 2235700.82	E: 6253744.68 N: 2235703.45
L14	25.1		E: 6253744.68 N: 2235703.45	E: 6253721.32 N: 2235712.74
C2	21.8	26	E:6253721.32 N: 2235712.74	E: 6253706.39 N: 2235727.81
C3	41.0	94	E:6253706.39 N: 2235727.81	E: 6253683.87 N: 2235761.68
L15	20.4		E: 6253683.87 N: 2235761.68	E: 6253666.26 N: 2235771.98
L16	13.5		E: 6253666.26 N: 2235771.98	E: 6253654.05 N: 2235777.83

Road B ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L17	37.0		E: 6255614.48 N: 2235240.62	E: 6255579.22 N: 2235229.35
L53	37.0		E: 6255614.48 N: 2235240.62	E: 6255579.22 N: 2235229.35
L18	574.9		E: 6255579.22 N: 2235229.35	E: 6255098.27 N: 2234914.31
L54	574.9		E: 6255579.22 N: 2235229.35	E: 6255098.27 N: 2234914.31
C4	47.3	30	E:6255098.27 N: 2234914.31	E: 6255056.64 N: 2234923.11
L57	99.8		E: 6255056.64 N: 2234923.11	E: 6255002.45 N: 2235006.86
C20	68.4	130	E:6255002.45 N: 2235006.86	E: 6254952.21 N: 2235052.15
C21	78.2	233	E:6254952.21 N: 2235052.15	E: 6254889.68 N: 2235098.54
C22	228.2	1256	E:6254889.68 N: 2235098.54	E: 6254747.43 N: 2235276.55
L55	350.7		E: 6254747.43 N: 2235276.55	E: 6254554.23 N: 2235569.27
C23	11.1	23	E:6254554.23 N: 2235569.27	E: 6254550.58 N: 2235579.66
L56	143.8		E: 6254550.58 N: 2235579.66	E: 6254537.34 N: 2235722.86

Road C ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L27	33.7		E: 6255546.42 N: 2235433.18	E: 6255514.93 N: 2235421.11
L28	277.5		E: 6255514.93 N: 2235421.11	E: 6255266.75 N: 2235296.96
C10	51.7	38	E:6255266.75 N: 2235296.96	E: 6255219.93 N: 2235306.89
L29	190.8		E: 6255219.93 N: 2235306.89	E: 6255099.88 N: 2235455.18
L30	173.4		E: 6255099.88 N: 2235455.18	E: 6254987.95 N: 2235587.64
C11	37.4	38	E:6254987.95 N: 2235587.64	E: 6254980.49 N: 2235622.79
L31	328.3		E: 6254980.49 N: 2235622.79	E: 6255071.60 N: 2235938.19

Road D ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L32	285.7		E: 6255266.75 N: 2235296.96	E: 6255012.46 N: 2235166.73
L33	138.8		E: 6255012.46 N: 2235166.73	E: 6254894.67 N: 2235093.24

Road E ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L34	225.5		E: 6254987.20 N: 2235588.55	E: 6254810.09 N: 2235448.97
C24	103.8	854	E:6254810.09 N: 2235448.97	E: 6254724.89 N: 2235389.85
L59	232.3		E: 6254724.89 N: 2235389.85	E: 6254526.32 N: 2235269.22
C25	45.6	183	E:6254526.32 N: 2235269.22	E: 6254490.69 N: 2235240.97
L60	52.1		E: 6254490.69 N: 2235240.97	E: 6254454.22 N: 2235203.79
C26	24.9	85	E:6254454.22 N: 2235203.79	E: 6254434.46 N: 2235188.83
L61	307.7		E: 6254434.46 N: 2235188.83	E: 6254164.69 N: 2235040.91
C27	47.4	30	E:6254164.69 N: 2235040.91	E: 6254123.82 N: 2235053.04
L62	321.2		E: 6254123.82 N: 2235053.04	E: 6253972.10 N: 2235336.11
L63	399.9		E: 6253972.10 N: 2235336.11	E: 6253767.86 N: 2235679.87
C28	33.4	69	E:6253767.86 N: 2235679.87	E: 6253744.68 N: 2235703.45

Road F ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L35	33.5		E: 6255000.88 N: 2235693.39	E: 6254968.68 N: 2235702.69
L36	163.6		E: 6254968.68 N: 2235702.69	E: 6254807.45 N: 2235730.22
L37	167.8		E: 6254807.45 N: 2235730.22	E: 6254639.61 N: 2235731.64
L38	178.6		E: 6254639.61 N: 2235731.64	E: 6254461.67 N: 2235716.36
C12	9.4	30	E:6254461.67 N: 2235716.36	E: 6254452.60 N: 2235714.13
L39	612.4		E: 6254452.60 N: 2235714.13	E: 6253888.09 N: 2235476.63

Road G ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L43	199.5		E: 6254386.45 N: 2235926.81	E: 6254437.71 N: 2235734.05
C14	37.0	149	E:6254437.71 N: 2235734.05	E: 6254451.56 N: 2235699.83
C15	37.0	149	E:6254451.56 N: 2235699.83	E: 6254465.40 N: 2235665.61
L44	41.0		E: 6254465.40 N: 2235665.61	E: 6254468.91 N: 2235624.72
C16	28.5	22	E:6254468.91 N: 2235624.72	E: 6254454.79 N: 2235602.27
L45	75.3		E: 6254454.79 N: 2235602.27	E: 6254384.38 N: 2235575.56
C17	13.3	22	E:6254384.38 N: 2235575.56	E: 6254371.31 N: 2235574.77
L46	162.3		E: 6254371.31 N: 2235574.77	E: 6254213.70 N: 2235613.62

Road H ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L47	124.5		E: 6254501.06 N: 2235250.75	E: 6254441.12 N: 2235359.90
C18	23.6	338	E:6254441.12 N: 2235359.90	E: 6254430.48 N: 2235380.98
L48	52.4		E: 6254430.48 N: 2235380.98	E: 6254404.42 N: 2235426.47
C19	71.6	90	E:6254404.42 N: 2235426.47	E: 6254349.07 N: 2235468.95
L49	271.4		E: 6254349.07 N: 2235468.95	E: 6254082.87 N: 2235521.60
C29	21.5	22	E:6254082.87 N: 2235521.60	E: 6254066.95 N: 2235534.68
L64	15.8		E: 6254066.95 N: 2235534.68	E: 6254060.91 N: 2235549.34

COOLING MARSH A CONVEYANCE CHANNEL ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L65	83.8		E: 6254130.28 N: 2235649.45	E: 6254161.54 N: 2235571.67
L66	10.8		E: 6254161.54 N: 2235571.67	E: 6254169.96 N: 2235564.83
L67	278.1		E: 6254169.96 N: 2235564.83	E: 6254442.81 N: 2235510.98

COOLING MARSH B CONVEYANCE CHANNEL ALIGNMENT GEOMETRY				
NUMBER	LENGTH	RADIUS	START POINT	END POINT
L68	174.9		E: 6255138.57 N: 2235516.72	E: 6255006.90 N: 2235401.58

DESIGNED LT JCI
DRAWN JP
REVIEWED GS, CB
APPROVED SD

STAMP

PREPARED BY: cbec eco engineering

CLIENT:

METROPOLITAN WATER DISTRICT OF S. CALIFORNIA
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BOULDIN ISLAND CALIFORNIA

DELTA SMELT PROPAGATION RESEARCH PROJECT ---- ALIGNMENT GEOMETRY

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23 OF 23

Appendix B

Construction Details and
Air Quality Emission Estimate Calculations

B-1 CalEEMod Output

Bouldin Smelt - San Joaquin Valley Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Bouldin Smelt

San Joaquin Valley Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	25.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Project specific information

Construction Phase - Project specific information

Off-road Equipment - Project specific info

Off-road Equipment - Project specific information

Off-road Equipment - Placeholder for dust calcs

Grading - Project info

Trips and VMT - Project specific information, trip for flatbed and fish transport trucks

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	35.00	47.00

Bouldin Smelt - San Joaquin Valley Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblConstructionPhase	NumDays	370.00	47.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblGrading	AcresOfGrading	11.75	117.00
tblLandUse	LotAcreage	0.00	25.00
tblOffRoadEquipment	HorsePower	367.00	231.00
tblOffRoadEquipment	HorsePower	402.00	362.00
tblOffRoadEquipment	HorsePower	158.00	1.00
tblOffRoadEquipment	HorsePower	97.00	200.00
tblOffRoadEquipment	HorsePower	97.00	450.00
tblOffRoadEquipment	HorsePower	247.00	265.00
tblOffRoadEquipment	HorsePower	221.00	570.00
tblOffRoadEquipment	HorsePower	8.00	249.00
tblOffRoadEquipment	HorsePower	187.00	180.00
tblOffRoadEquipment	HorsePower	158.00	200.00
tblOffRoadEquipment	HorsePower	187.00	1.00
tblOffRoadEquipment	HorsePower	247.00	1.00
tblOffRoadEquipment	HorsePower	16.00	375.00
tblOffRoadEquipment	HorsePower	367.00	1.00
tblOffRoadEquipment	HorsePower	172.00	100.00
tblOffRoadEquipment	HorsePower	97.00	1.00
tblOffRoadEquipment	LoadFactor	0.48	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.20
tblOffRoadEquipment	LoadFactor	0.37	0.74
tblOffRoadEquipment	LoadFactor	0.40	0.45
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	OffRoadEquipmentType	Cranes	Scrapers
tblOffRoadEquipment	OffRoadEquipmentType	Forklifts	Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType	Welders	Rubber Tired Dozers

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Dumpers/Tenders
tblOffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	7.00	2.40
tblOffRoadEquipment	UsageHours	7.00	2.40
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblOffRoadEquipment	UsageHours	8.00	1.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	0.00	2.00

2.0 Emissions Summary

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0249	0.2382	0.1742	5.1000e-004	0.0835	9.3100e-003	0.0929	0.0174	8.5700e-003	0.0260	0.0000	45.0756	45.0756	0.0136	1.0000e-004	45.4453
Maximum	**0.0249**	**0.2382**	**0.1742**	**5.1000e-004**	**0.0835**	**9.3100e-003**	**0.0929**	**0.0174**	**8.5700e-003**	**0.0260**	**0.0000**	**45.0756**	**45.0756**	**0.0136**	**1.0000e-004**	**45.4453**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0249	0.2382	0.1742	5.1000e-004	0.0835	9.3100e-003	0.0929	0.0174	8.5700e-003	0.0260	0.0000	45.0755	45.0755	0.0136	1.0000e-004	45.4453
Maximum	**0.0249**	**0.2382**	**0.1742**	**5.1000e-004**	**0.0835**	**9.3100e-003**	**0.0929**	**0.0174**	**8.5700e-003**	**0.0260**	**0.0000**	**45.0755**	**45.0755**	**0.0136**	**1.0000e-004**	**45.4453**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Bouldin Smelt - San Joaquin Valley Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	9-1-2022	9-30-2022	0.1440	0.1440
		Highest	0.1440	0.1440

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase I	Building Construction	9/1/2022	10/25/2022	6	47	
2	Grading for dust calc	Grading	9/1/2022	10/25/2022	6	47	

Bouldin Smelt - San Joaquin Valley Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 117

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase I	Scrapers	1	2.40	231	0.29
Phase I	Off-Highway Trucks	1	2.40	362	0.20
Grading for dust calc	Excavators	1	1.00	1	0.38
Phase I	Tractors/Loaders/Backhoes	1	2.40	200	0.74
Phase I	Tractors/Loaders/Backhoes	1	2.40	450	0.37
Phase I	Rubber Tired Dozers	1	2.40	265	0.45
Phase I	Bore/Drill Rigs	1	0.50	570	0.50
Phase I	Plate Compactors	1	2.40	249	0.43
Phase I	Graders	1	2.40	180	0.41
Phase I	Excavators	1	2.40	200	0.38
Grading for dust calc	Graders	1	1.00	1	0.41
Grading for dust calc	Rubber Tired Dozers	1	1.00	1	0.40
Phase I	Dumpers/Tenders	1	2.40	375	0.50
Grading for dust calc	Scrapers	1	1.00	1	0.48
Phase I	Other Construction Equipment	1	0.20	100	0.42
Grading for dust calc	Tractors/Loaders/Backhoes	1	1.00	1	0.37

Trips and VMT

Bouldin Smelt - San Joaquin Valley Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Phase I	11	0.00	0.00	2.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading for dust calc	5	13.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Phase I - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0235	0.2370	0.1622	4.8000e-004		9.2900e-003	9.2900e-003		8.5500e-003	8.5500e-003	0.0000	41.9086	41.9086	0.0136	0.0000	42.2475
Total	**0.0235**	**0.2370**	**0.1622**	**4.8000e-004**		**9.2900e-003**	**9.2900e-003**		**8.5500e-003**	**8.5500e-003**	**0.0000**	**41.9086**	**41.9086**	**0.0136**	**0.0000**	**42.2475**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Phase I - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	1.5000e-004	3.0000e-005	0.0000	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	1.0000e-005	0.0000	0.0587	0.0587	0.0000	1.0000e-005	0.0615
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**1.5000e-004**	**3.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0587**	**0.0587**	**0.0000**	**1.0000e-005**	**0.0615**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0235	0.2370	0.1622	4.8000e-004		9.2900e-003	9.2900e-003		8.5500e-003	8.5500e-003	0.0000	41.9086	41.9086	0.0136	0.0000	42.2474
Total	**0.0235**	**0.2370**	**0.1622**	**4.8000e-004**		**9.2900e-003**	**9.2900e-003**		**8.5500e-003**	**8.5500e-003**	**0.0000**	**41.9086**	**41.9086**	**0.0136**	**0.0000**	**42.2474**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Phase I - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	1.5000e-004	3.0000e-005	0.0000	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	1.0000e-005	0.0000	0.0587	0.0587	0.0000	1.0000e-005	0.0615
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**1.5000e-004**	**3.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0587**	**0.0587**	**0.0000**	**1.0000e-005**	**0.0615**

3.3 Grading for dust calc - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0797	0.0000	0.0797	0.0164	0.0000	0.0164	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.0797**	**0.0000**	**0.0797**	**0.0164**	**0.0000**	**0.0164**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Grading for dust calc - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3700e-003	1.0500e-003	0.0120	3.0000e-005	3.8000e-003	2.0000e-005	3.8200e-003	1.0100e-003	2.0000e-005	1.0300e-003	0.0000	3.1083	3.1083	8.0000e-005	9.0000e-005	3.1364
Total	**1.3700e-003**	**1.0500e-003**	**0.0120**	**3.0000e-005**	**3.8000e-003**	**2.0000e-005**	**3.8200e-003**	**1.0100e-003**	**2.0000e-005**	**1.0300e-003**	**0.0000**	**3.1083**	**3.1083**	**8.0000e-005**	**9.0000e-005**	**3.1364**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0797	0.0000	0.0797	0.0164	0.0000	0.0164	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.0797**	**0.0000**	**0.0797**	**0.0164**	**0.0000**	**0.0164**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Bouldin Smelt - San Joaquin Valley Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Grading for dust calc - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3700e-003	1.0500e-003	0.0120	3.0000e-005	3.8000e-003	2.0000e-005	3.8200e-003	1.0100e-003	2.0000e-005	1.0300e-003	0.0000	3.1083	3.1083	8.0000e-005	9.0000e-005	3.1364
Total	**1.3700e-003**	**1.0500e-003**	**0.0120**	**3.0000e-005**	**3.8000e-003**	**2.0000e-005**	**3.8200e-003**	**1.0100e-003**	**2.0000e-005**	**1.0300e-003**	**0.0000**	**3.1083**	**3.1083**	**8.0000e-005**	**9.0000e-005**	**3.1364**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.505022	0.051937	0.170337	0.165963	0.030143	0.007880	0.013096	0.025463	0.000664	0.000317	0.023954	0.001505	0.003719

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

Bouldin Smelt - San Joaquin Valley Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

B-2 EMFAC Output

Source: EMFAC2017 (v1.0.3) Emission Rates
Region Type: Air District
Region: San Joaquin Valley Unified APCD
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX, RESTLOSS and DIURN

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Trips	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	PM10_RUNEX
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDA	Aggregate	Aggregate	Gasoline	1661148.167	64658321.37	7803211.342	0.043284634	0	0.265155809	0.001199407	0	0.001952554	0.002000001	0.002562831	0.001304465
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDA	Aggregate	Aggregate	Diesel	14264.95498	589120.3636	67883.18562	0.226664724	0	0	0.017600996	0	0	0.002000001	0.002627942	0.018396835
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDT1	Aggregate	Aggregate	Gasoline	176038.9696	6110101.244	793270.5784	0.125423483	0	0.398245816	0.001721538	0	0.002735029	0.002000001	0.003135613	0.001872301
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDT1	Aggregate	Aggregate	Diesel	136.7096324	2398.669101	456.7800866	1.630771493	0	0	0.239514193	0	0	0.002000001	0.003697181	0.250343962
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDT2	Aggregate	Aggregate	Gasoline	574010.1744	20743582.97	2646431.26	0.065397601	0	0.332795078	0.001240111	0	0.001961236	0.002000001	0.003009773	0.001348733
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDT2	Aggregate	Aggregate	Diesel	2918.123683	125207.1376	14281.74698	0.046595085	0	0	0.005015774	0	0	0.002000001	0.003029454	0.005242565

SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDA	Aggregate	Aggregate	Gasoline	1661148.167	64658321.37	7803211.342
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDA	Aggregate	Aggregate	Diesel	14264.95498	589120.3636	67883.18562
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDT1	Aggregate	Aggregate	Gasoline	176038.9696	6110101.244	793270.5784
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDT1	Aggregate	Aggregate	Diesel	136.7096324	2398.669101	456.7800866
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDT2	Aggregate	Aggregate	Gasoline	574010.1744	20743582.97	2646431.26
SAN JOAQUIN VALLEY UNIFIED APCD	2022	LDT2	Aggregate	Aggregate	Diesel	2918.123683	125207.1376	14281.74698

Source: EMFAC2017 (v1.0.3) Emission Rates
Region Type: Air District
Region: San Joaquin Valley Unified APCD
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX, RESTLOSS and DIURN

GWP
N20 298
CH4 25

Region	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	CO2_RUNEX	CO2_IDLEX	CO2_STREX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	N2O_RUNEX	N2O_IDLEX	N2O_STREX	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK
SAN JOAQUIN VALLEY UNIFIED APCD	0	0.002123581	0.008000002	0.007322374	277.2970776	0	70.47021729	0.002379009	0	0.073795306	0.00472715	0	0.033531307	0.009157725	0	0.341211899	0.094269277
SAN JOAQUIN VALLEY UNIFIED APCD	0	0	0.008000002	0.007508406	237.5206877	0	0	0.001352907	0	0	0.037421481	0	0	0.029127284	0	0	0
SAN JOAQUIN VALLEY UNIFIED APCD	0	0.002974529	0.008000002	0.008958894	329.4377608	0	87.20086303	0.006025977	0	0.1095182	0.009291582	0	0.039592558	0.026698346	0	0.566767342	0.172338095
SAN JOAQUIN VALLEY UNIFIED APCD	0	0	0.008000002	0.010563373	420.6566494	0	0	0.014144852	0	0	0.066274626	0	0	0.304530336	0	0	0
SAN JOAQUIN VALLEY UNIFIED APCD	0	0.002133019	0.008000002	0.00859935	340.9798583	0	87.12353711	0.002752676	0	0.083090134	0.005760212	0	0.037309505	0.010699157	0	0.384386245	0.080750375
SAN JOAQUIN VALLEY UNIFIED APCD	0	0	0.008000002	0.008655584	314.9866554	0	0	0.000637114	0	0	0.049626276	0	0	0.013716696	0	0	0

	CO2e_RUNEX	CO2e_IDLEX	CO2e_STREX
SAN JOAQUIN VALLEY UNIFIED APCD	278.7652434	0	82.30742957
SAN JOAQUIN VALLEY UNIFIED APCD	248.7061117	0	0
SAN JOAQUIN VALLEY UNIFIED APCD	332.3573017	0	101.7374002
SAN JOAQUIN VALLEY UNIFIED APCD	440.7601093	0	0
SAN JOAQUIN VALLEY UNIFIED APCD	342.7652182	0	100.3190229
SAN JOAQUIN VALLEY UNIFIED APCD	329.7912134	0	0

Source: EMFAC2017 (v1.0.3) Emission Rates
Region Type: Air District
Region: San Joaquin Valley Unified APCD
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX, RESTLOSS and DIURN

Region	ROG_RUNLOSS	ROG_DIURN	TOG_RUNEX	TOG_IDLEX	TOG_STREX	TOG_HOTSOAK	TOG_RUNLOSS	TOG_RESTLOSS	TOG_DIURN	CO_RUNEX	CO_IDLEX	CO_STREX	SOx_RUNEX	SOx_IDLEX	SOx_STREX
SAN JOAQUIN VALLEY UNIFIED APCD	0.242861844	1.463803414	0.013362931	0	0.37358408	0.094269277	0.242861844	1.463803414	0.034744349	0.724398196	0	3.355647743	0.002741364	0	0.00069667
SAN JOAQUIN VALLEY UNIFIED APCD	0	0	0.033159476	0	0	0	0	0	0.0031	0.349589455	0	0	0.002250629	0	0
SAN JOAQUIN VALLEY UNIFIED APCD	0.497312475	2.745407653	0.038954398	0	0.620538374	0.172338095	0.497312475	2.745407653	0.035934282	1.357871019	0	5.517556387	0.003256828	0	0.000862069
SAN JOAQUIN VALLEY UNIFIED APCD	0	0	0.346687541	0	0	0	0	0	0.0031	1.694602598	0	0	0.003985936	0	0
SAN JOAQUIN VALLEY UNIFIED APCD	0.21429534	1.325386307	0.015611903	0	0.420854514	0.080750375	0.21429534	1.325386307	0.036406635	0.797763172	0	3.708245642	0.003370933	0	0.000861305
SAN JOAQUIN VALLEY UNIFIED APCD	0	0	0.015615547	0	0	0	0	0	0.0031	0.13810128	0	0	0.002984659	0	0

SAN JOAQUIN VALLEY UNIFIED APCD
SAN JOAQUIN VALLEY UNIFIED APCD
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SAN JOAQUIN VALLEY UNIFIED APCD

B-3 On Road Emissions

Bouldin Smelt - Final Emissions Calculations

TPY		ROG	NOx	PM10	PM2.5	CO2e
Offsite Emissions	Exhaust (Trucks and passenger vehicles)	1.91E-04	1.39E-04	3.08E-05	1.09E-05	5.40E-01
	Fugitive Dust (Trucks and passenger vehicles)	x	x	0.000502	0.000123	x
Total		0.00	0.00	0.00	0.00	0.54

PPD		ROG	NOx	PM10	PM2.5	CO2e
Offsite Emissions	Exhaust (Trucks and passenger vehicles)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fugitive Dust (Trucks and passenger vehicles)	x	x	0.002753	0.000676	x
Total		0.00	0.00	0.00	0.00	0.00

Bouldin Smelt - EMFAC2021 Emissions Calculations for *Off-Site Exhaust Emissions*

Accounts for trucks and passenger vehicles driving to and from the site

Background Information

Conversions

Tons	Pounds	Grams
1	2000	907185

Mile	Feet
1	5280

Trip Info

Employee Trips	
Annual One-Way Trips	128
Trip Length	16.8
Truck Trips	
Annual One-Way Trips	16
Trip Length	39

Fleet Mix

Employee Trips - Same as Worker (above)		
LDA	Gas	0.5
LDT1	Gas	0.125
LDT1	Diesel	0.125
LDT2	Gas	0.125
LDT2	Diesel	0.125

Vehicle Mix

The user can select the type of vehicle mix. The EMFAC mix is the total mix of all vehicles provided by EMFAC. The program can also assume that the workers' personal vehicles consist of 50% light-duty auto (or passenger car), 25% light-duty truck type 1 (LDT1), and 25% light-duty truck type 2 (LDT2). The equivalent test weight (ETW) from EMFAC2017 for each type of vehicle is presented below[12]:

Gross Vehicle Weights

Vehicle Type	ETW (lb)
LDA	All
LDT1	<= 3,750
LDT2	3,751 - 5,750

EMFAC2022 Output - Aggregate Speed

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Trips	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	CO2e_RUNEX	CO2e_IDLEX	CO2e_STREX	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK	ROG_RUNLOSS	ROG_DIURN
SAN JOAQUIN	2022	LDA	Aggregate	Aggregate	Gasoline	1661148.167	64658321.37	7803211.342	0.043284634	0	0.265155809	0.001304465	0	0.002123581	0.008000002	0.007322374	0.001199407	0	0.001952554	0.002000001	0.002562831	278.765243	0	82.30742957	0.00915773	0	0.341211899	0.094269277	0.242861844	1.463803414
SAN JOAQUIN	2022	LDA	Aggregate	Aggregate	Diesel	14264.95498	589120.3636	67883.18562	0.226664724	0	0	0.018396835	0	0	0.008000002	0.007508406	0.017600996	0	0	0.002000001	0.002627942	248.706112	0	0	0.02912728	0	0	0	0	0
SAN JOAQUIN	2022	LDT1	Aggregate	Aggregate	Gasoline	176038.9696	6110101.244	793270.5784	0.125423483	0	0.398245816	0.001872301	0	0.002974529	0.008000002	0.008958894	0.001721538	0	0.002735029	0.002000001	0.003135613	332.357302	0	101.7374002	0.02669835	0	0.566767342	0.172338095	0.497312475	2.745407653
SAN JOAQUIN	2022	LDT1	Aggregate	Aggregate	Diesel	136.7096324	2398.669101	456.7800866	1.630771493	0	0	0.250343962	0	0	0.008000002	0.010563373	0.239514193	0	0	0.002000001	0.003697181	440.760109	0	0	0.30453034	0	0	0	0	0
SAN JOAQUIN	2022	LDT2	Aggregate	Aggregate	Gasoline	574010.1744	20743582.97	2646431.26	0.065397601	0	0.332795078	0.001348733	0	0.002133019	0.008000002	0.00859935	0.001240111	0	0.001961236	0.002000001	0.003009773	342.765218	0	100.3190229	0.01069916	0	0.384386245	0.080750375	0.21429534	1.325386307
SAN JOAQUIN	2022	LDT2	Aggregate	Aggregate	Diesel	2918.123683	125207.1376	14281.74698	0.046595085	0	0	0.005242565	0	0	0.008000002	0.008655584	0.005015774	0	0	0.002000001	0.003029454	329.791213	0	0	0.0137167	0	0	0	0	0

Emissions Calcs

TPY	g/ton	907185					ROG	ROG	ROG	ROG	ROG	ROG	NOx	NOx	NOx	PM10	PM10	PM10	PM10	PM10	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	CO2e	CO2e	CO2e
			g/mi	g/trip	g/vehicle/day		g/mi	g/vehicle/day	g/trip	g/trip	g/trip	g/vehicle/day	g/mi	g/vehicle/day	g/trip	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/mi	g/vehicle/day	g/trip
		One-Way Trips	mi	tot mi	tot trip	tot veh	ROG_RUNEX	ROG_IDLEX	ROG_STREX	OG_HOTSOAR	OG_RUNLOSS	ROG_DIURN	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	CO2_RUNEX	CO2_IDLEX	CO2_STREX
3	LDA	64	16.8	1075.2	64	32	1.09E-05	0.00E+00	2.41E-05	6.65E-06	1.71E-05	5.16E-05	5.13E-05	0.00E+00	1.87E-05	1.55E-06	0.00E+00	1.50E-07	9.48E-06	8.68E-06	1.42E-06	0.00E+00	1.38E-07	2.37E-06	3.04E-06	3.30E-01	0.00E+00	5.81E-03
4	LDA	64	16.8	1075.2	64	32	3.45E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.69E-04	0.00E+00	0.00E+00	2.18E-05	0.00E+00	0.00E+00	9.48E-06	8.90E-06	2.09E-05	0.00E+00	0.00E+00	2.37E-06	3.11E-06	2.95E-01	0.00E+00	0.00E+00
5	LDT1	16	16.8	268.8	16	8	7.91E-06	0.00E+00	1.00E-05	3.04E-06	8.77E-06	2.42E-05	3.72E-05	0.00E+00	7.02E-06	5.55E-07	0.00E+00	5.25E-08	2.37E-06	2.65E-06	5.10E-07	0.00E+00	4.82E-08	5.93E-07	9.29E-07	9.85E-02	0.00E+00	1.79E-03
6	LDT1	16	16.8	268.8	16	8	9.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-04	0.00E+00	0.00E+00	7.42E-05	0.00E+00	0.00E+00	2.37E-06	3.13E-06	7.10E-05	0.00E+00	0.00E+00	5.93E-07	1.10E-06	1.31E-01	0.00E+00	0.00E+00
7	LDT2	16	16.8	268.8	16	8	3.17E-06	0.00E+00	6.78E-06	1.42E-06	3.78E-06	1.17E-05	1.94E-05	0.00E+00	5.87E-06	4.00E-07	0.00E+00	3.76E-08	2.37E-06	2.55E-06	3.67E-07	0.00E+00	3.46E-08	5.93E-07	8.92E-07	1.02E-01	0.00E+00	1.77E-03
8	LDT2	16	16.8	268.8	16	8	4.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-05	0.00E+00	0.00E+00	1.55E-06	0.00E+00	0.00E+00	2.37E-06	2.56E-06	1.49E-06	0.00E+00	0.00E+00	5.93E-07	8.98E-07	9.77E-02	0.00E+00	0.00E+00

Off-Site Exhaust Emissions (includes brakeware + tireware)

TPY	ROG	NOx	PM10	PM2.5	CO2e
LDA	1.10E-04	7.00E-05	1.99E-05	6.97E-06	3.36E-01
LDT1	5.39E-05	4.42E-05	5.63E-06	2.08E-06	1.00E-01
LDT2	2.68E-05	2.52E-05	5.36E-06	1.89E-06	1.03E-01
Total	1.91E-04	1.39E-04	3.08E-05	1.09E-05	5.40E-01

Bouldin Smelt - AP42 Emissions Calculations for *Off-Site Fugitive Dust Emissions*

Accounts for trucks and passenger vehicles driving to and from the site

Background Information

Conversions

Tons	Pounds	Grams
1	2000	907185

Mile	Feet
1	5280

Year	Day
1	365

Vehicle Weight

4800	pounds
2.4	tons

NOTE: average vehicle weight, California statewide

Roadway Travel Fractions and VMT Estimates

County	San Joaquin
Freeway	0.46
Major	0.35
Collector	0.117
Local	0.02

SOURCE: Table 6

Silt Loading Content

County	San Joaquin
Freeway	0.015
Major	0.032
Collector	0.032
Local	1.6

SOURCE: Table 7

Composite Silt Load

0.053844

Operational Trips

	Annual One-Way Trips	Trip Length (mi)	VMT/Year
Trucks	16	39	624
Passenger	128	16.8	2150.4
Total			**2774.4**

AP42 Paved Roads - Re-entrained PAVED Road Dust and Emission Factors

Calculation Methodology: USEPA AP-42, Paved Roads, Section 13.2.1, Revised January 2011 http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf

Road Dust Equation	E [lb/VMT] = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

Variables		
	PM10	PM2.5
k (lb/VMT)	0.0022	0.00054
sL	0.053844	0.053844
W	2.4	2.4
P	55	55
N	365	365

Where:

E = the particulate emission factor in units of pounds of particulate matter per VMT

k = the U.S. EPA AP-42 particle size multiplier (PM10 = 0.0022 lb/VMT),[1]

sL = the roadway-specific silt loading in grams/square meter (g/m2),[2,3,4,5]

W = the average weight of vehicles traveling the road (California statewide default = 2.4 tons),[5]

P = number of “wet” days, when at least one site per county received at least 0.01 inch of precipitation during the annual averaging period,[9] and

N = the number of days in the annual averaging period (default = 365)

Source: California Air Resources Board (CARB), Miscellaneous Process Methodology 7.9 — Entrained Road Travel, Paved Road Dust. Revised and updated March

Source:

calculation

Table 13.2.1-1 Particle Size Multipliers for Paved Road Equation of

Calculated above (silt loading factor)

Table 7 of CARB, 2018.

Table 8 of CARB, 2018.

annual days (365)

Emission Factor	PM10	PM2.5	
	0.000362	8.8893E-05	lbs/mi

Off-Site Fugitive Dust Emissions

lb/year	PM10	PM2.5
	1.004768	0.24662479

PPD	PM10	PM2.5
	0.002753	0.000675684

TPY	PM10	PM2.5
	0.000502	0.000123312

Background Information

Table 6
2008 Roadway Travel Fractions and VMT (1) Estimates for California Entrained Paved Road Dust

Air Basin	County	Air District	2012 VMT (million VMT per year)	2008 HPMS Travel Fractions (2)				
				Freeway	Major	Collector	Local, Local Urban (3)	Local Rural
GB	Alpine	GBU	67	0.000	0.775	0.118	0.107	
GB	Inyo	GBU	555	0.002	0.743	0.156	0.099	
GB	Mono	GBU	314	0.000	0.776	0.085	0.139	
LC	Lake	LAK	510	0.000	0.610	0.278	0.113	
LT	El Dorado	ED	387	0.174	0.572	0.130	0.124	
LT	Placer	PLA	312	0.408	0.381	0.113	0.097	
MC	Amador	AMA	443	0.000	0.763	0.139	0.098	
MC	Calaveras	CAL	369	0.000	0.688	0.186	0.126	
MC	El Dorado	ED	1,384	0.174	0.572	0.130	0.124	
MC	Mariposa	MPA	177	0.000	0.488	0.075	0.437	
MC	Nevada	NSI	1,050	0.437	0.261	0.167	0.135	
MC	Placer	PLA	556	0.408	0.381	0.113	0.097	
MC	Plumas	NSI	259	0.000	0.519	0.273	0.209	
MC	Sierra	NSI	90	0.140	0.435	0.153	0.272	
MC	Tuolumne	TUO	387	0.000	0.583	0.246	0.171	
MD	Kern	KER	1,666	0.268	0.562	0.082	0.089	
MD	Los Angeles	AV	3,466	0.453	0.442	0.054	0.051	
MD	Riverside	MOJ	392	0.478	0.333	0.126	0.063	
MD	Riverside	SC	425	0.478	0.333	0.126	0.063	
MD	San Bernardino	MOJ	8,814	0.524	0.340	0.069	0.067	
NC	Del Norte	NCU	224	0.000	0.657	0.227	0.116	
NC	Humboldt	NCU	1,111	0.222	0.497	0.175	0.106	
NC	Mendocino	MEN	1,020	0.062	0.599	0.221	0.118	
NC	Sonoma	NS	716	0.258	0.470	0.185	0.087	
NC	Trinity	NCU	200	0.000	0.712	0.082	0.206	
NCC	Monterey	MBU	3,620	0.164	0.572	0.164	0.101	
NCC	San Benito	MBU	686	0.000	0.853	0.082	0.064	
NCC	Santa Cruz	MBU	1,523	0.271	0.476	0.187	0.066	
NEP	Lassen	LAS	374	0.000	0.587	0.256	0.157	
NEP	Modoc	MOD	134	0.000	0.453	0.224	0.323	
NEP	Siskiyou	SIS	1,000	0.453	0.224	0.121	0.201	
SC	Los Angeles	SC	78,066	0.453	0.442	0.054	0.051	
SC	Orange	SC	27,160	0.483	0.431	0.027	0.059	
SC	Riverside	SC	18,207	0.478	0.333	0.126	0.063	
SC	San Bernardino	SC	14,487	0.524	0.340	0.069	0.067	
SCC	San Luis Obispo	SLO	2,761	0.211	0.611	0.086	0.092	
SCC	Santa Barbara	SB	3,304	0.299	0.505	0.127	0.069	
SCC	Ventura	VEN	7,191	0.370	0.469	0.082	0.079	
SD	San Diego	SD	30,297	0.553	0.319	0.080	0.048	
SF	Alameda	BA	13,732	0.566	0.317	0.064	0.053	
SF	Contra Costa	BA	7,985	0.517	0.334	0.066	0.082	
SF	Marin	BA	2,258	0.497	0.290	0.146	0.067	
SF	Napa	BA	1,101	0.180	0.524	0.204	0.092	
SF	San Francisco	BA	3,159	0.360	0.520	0.068	0.053	
SF	San Mateo	BA	5,595	0.563	0.319	0.063	0.055	
SF	Santa Clara	BA	14,041	0.434	0.449	0.054	0.064	
SF	Solano	BA	2,891	0.627	0.251	0.061	0.062	
SF	Sonoma	BA	3,047	0.258	0.470	0.185	0.087	

Table 6
2008 Roadway Travel Fractions and VMT (1) Estimates for California Entrained Paved Road Dust

Air Basin	County	Air District	2012 VMT (million VMT per year)	2008 HPMS Travel Fractions (2)				
				Freeway	Major	Collector	Local, Local Urban (3)	Local Rural
SJV	Fresno	SJU	8,641	0.293	0.427	0.126	0.085	0.022
SJV	Kern	SJU	6,872	0.268	0.562	0.082	0.066	0.026
SJV	Kings	SJU	1,408	0.264	0.503	0.144	0.063	0.070
SJV	Madera	SJU	1,854	0.139	0.650	0.100	0.041	0.052
SJV	Merced	SJU	2,575	0.244	0.527	0.125	0.052	0.018
SJV	San Joaquin	SJU	6,485	0.456	0.351	0.117	0.058	0.020
SJV	Stanislaus	SJU	3,769	0.300	0.375	0.229	0.075	0.071
SJV	Tulare	SJU	3,777	0.152	0.545	0.172	0.059	0.022
SS	Imperial	IMP	2,400	0.273	0.453	0.168	0.106	
SS	Riverside	SC	4,714	0.478	0.333	0.126	0.063	
SV	Butte	BUT	1,693	0.080	0.557	0.240	0.124	
SV	Colusa	COL	696	0.609	0.167	0.077	0.147	
SV	Glenn	GLE	527	0.541	0.209	0.121	0.129	
SV	Placer	PLA	3,110	0.408	0.381	0.113	0.097	
SV	Sacramento (4)	SAC	13,027	0.469	0.389	0.075	0.067	
SV	Shasta	SHA	1,923	0.419	0.401	0.090	0.090	
SV	Solano	YS	1,660	0.627	0.251	0.061	0.062	
SV	Sutter	FR	798	0.088	0.628	0.129	0.155	
SV	Tehama	TEH	1,065	0.492	0.264	0.148	0.095	
SV	Yolo	YS	2,167	0.561	0.252	0.086	0.101	
SV	Yuba	FR	658	0.165	0.503	0.220	0.111	
Statewide Total			**337,332**					

Table 7
2008 Silt Loadings and PM_{10} Emission Factors for California
Entrained Paved Road Dust Estimates

Air Basin	County	Air District	Silt Loadings (SL, g/m²) and PM_{10} Emission Factors (EF; lbs $PM_{10}/10^6$ VMT)										Avg. Vehicle Weight (tons)
			Freeway		Major (1)		Collector (1)		Local, Local Urban (1,2)		Local Rural (2) Sand/Gravel Proc. (3)		
			SL	EF	SL	EF	SL	EF	SL	EF	SL	EF	
GB	Alpine	GBU	0.015	111.8	0.032	222.8	0.032	222.8	0.32	1,811.2			2.4
GB	Inyo	GBU	0.015	115.4	0.032	229.9	0.032	229.9	0.32	1,868.6			2.4
GB	Mono	GBU	0.015	114.5	0.032	228.1	0.032	228.1	0.32	1,854.2			2.4
LC	Lake	LAK	0.015	112.1	0.032	223.5	0.032	223.5	0.32	1,816.4			2.4
LT	El Dorado	ED	0.015	112.1	0.032	223.5	0.032	223.5	0.32	1,816.4			2.4
LT	Placer	PLA	0.015	111.4	0.032	222.0	0.032	222.0	0.32	1,804.7			2.4
MC	Amador	AMA	0.015	112.5	0.032	224.1	0.032	224.1	0.32	1,821.6			2.4
MC	Calaveras	CAL	0.015	111.8	0.032	222.8	0.032	222.8	0.32	1,811.2			2.4
MC	El Dorado	ED	0.015	112.3	0.032	223.8	0.032	223.8	0.32	1,819.0			2.4
MC	Mariposa	MPA	0.015	112.1	0.032	223.3	0.032	223.3	0.32	1,815.1			2.4
MC	Nevada	NSI	0.015	110.9	0.032	221.1	0.032	221.1	0.32	1,796.8			2.4
MC	Placer	PLA	0.015	111.7	0.032	222.7	0.032	222.7	0.32	1,809.9			2.4
MC	Plumas	NSI	0.015	111.6	0.032	222.3	0.032	222.3	0.32	1,807.3			2.4
MC	Sierra	NSI	0.015	111.3	0.032	221.7	0.032	221.7	0.32	1,802.0			2.4
MC	Tuolumne	TUO	0.015	112.4	0.032	223.9	0.032	223.9	0.32	1,820.3			2.4
MD	Kern	KER	0.015	115.7	0.032	230.5	0.032	230.5	0.32	1,873.8			2.4
MD	Los Angeles	AV	0.015	115.7	0.032	230.5	0.032	230.5	0.32	1,873.8			2.4
MD	Riverside	MOJ	0.015	116.3	0.08	533.3	0.08	533.3	0.84	4,531.5			2.4
MD	Riverside	SC	0.015	116.3	0.08	533.3	0.08	533.3	0.84	4,531.5			2.4
MD	San Bernardino	MOJ	0.015	115.8	0.08	531.1	0.08	531.1	0.84	4,512.7			2.4
NC	Del Norte	NCU	0.015	108.7	0.032	216.6	0.032	216.6	0.32	1,760.3			2.4
NC	Humboldt	NCU	0.015	107.9	0.032	215.0	0.032	215.0	0.32	1,747.2			2.4
NC	Mendocino	MEN	0.015	108.4	0.032	215.9	0.032	215.9	0.32	1,755.1			2.4
NC	Sonoma	NS	0.015	111.6	0.032	222.3	0.032	222.3	0.32	1,807.3			2.4
NC	Trinity	NCU	0.015	110.9	0.032	220.9	0.032	220.9	0.32	1,795.5			2.4
NCC	Monterey	MBU	0.015	113.2	0.032	225.6	0.032	225.6	0.32	1,833.4			2.4
NCC	San Benito	MBU	0.015	113.5	0.032	226.2	0.032	226.2	0.32	1,838.6			2.4
NCC	Santa Cruz	MBU	0.015	112.4	0.032	223.9	0.032	223.9	0.32	1,820.3			2.4
NEP	Lassen	LAS	0.015	112.9	0.032	224.9	0.032	224.9	0.32	1,828.1			2.4
NEP	Modoc	MOD	0.015	111.5	0.032	222.2	0.032	222.2	0.32	1,806.0			2.4
NEP	Siskiyou	SIS	0.015	109.9	0.032	219.0	0.032	219.0	0.32	1,779.9			2.4
SC	Los Angeles	SC	0.015	114.9	0.013	100.9	0.013	100.9	0.135	848.4			2.4
SC	Orange	SC	0.015	115.0	0.013	100.9	0.013	100.9	0.135	849.0			2.4
SC	Riverside	SC	0.015	114.9	0.08	527.0	0.08	527.0	0.84	4,478.2			2.4
SC	San Bernardino	SC	0.015	114.3	0.08	524.4	0.08	524.4	0.84	4,456.2			2.4
SCC	San Luis Obispo	SLO	0.015	114.2	0.032	227.6	0.032	227.6	0.32	1,850.3			2.4
SCC	Santa Barbara	SB	0.015	113.9	0.032	227.0	0.032	227.0	0.32	1,845.1			2.4
SCC	Ventura	VEN	0.015	115.1	0.032	229.4	0.032	229.4	0.32	1,864.7			2.4
SD	San Diego	SD	0.015	114.2	0.032	227.6	0.032	227.6	0.32	1,850.3			2.4

Table 7
2008 Silt Loadings and PM_{10} Emission Factors for California
Entrained Paved Road Dust Estimates

Air Basin	County	Air District	Silt Loadings (SL, g/m²) and PM_{10} Emission Factors (EF; lbs $PM_{10}/10^6$ VMT)										Avg. Vehicle Weight (tons)
			Freeway		Major (1)		Collector (1)		Local, Local Urban (1,2)		Local Rural (2) Sand/Gravel Proc. (3)		
			SL	EF	SL	EF	SL	EF	SL	EF	SL	EF	
SF	Alameda	BA	0.015	112.7	0.032	224.6	0.032	224.6	0.32	1,825.5			2.4
SF	Contra Costa	BA	0.015	112.8	0.032	224.8	0.032	224.8	0.32	1,826.8			2.4
SF	Marin	BA	0.015	112.3	0.032	223.8	0.032	223.8	0.32	1,819.0			2.4
SF	Napa	BA	0.015	112.1	0.032	223.5	0.032	223.5	0.32	1,816.4			2.4
SF	San Francisco	BA	0.015	112.2	0.032	223.6	0.032	223.6	0.32	1,817.7			2.4
SF	San Mateo	BA	0.015	112.8	0.032	224.8	0.032	224.8	0.32	1,826.8			2.4
SF	Santa Clara	BA	0.015	112.5	0.032	224.1	0.032	224.1	0.32	1,821.6			2.4
SF	Solano	BA	0.015	113.3	0.032	225.7	0.032	225.7	0.32	1,834.7			2.4
SF	Sonoma	BA	0.015	112.1	0.032	223.3	0.032	223.3	0.32	1,815.1			2.4
SJV	Fresno	SJU	0.015	114.0	0.032	227.2	0.032	227.2	0.32	1846.4	1.6	7987.1	2.4
SJV	Kern	SJU	0.015	114.6	0.032	228.4	0.032	228.4	0.32	1856.8	1.6	8032.3	2.4
SJV	Kings	SJU	0.015	114.6	0.032	228.3	0.032	228.3	0.32	1855.5	1.6	8026.6	2.4
SJV	Madera	SJU	0.015	114.1	0.032	227.3	0.032	227.3	0.32	1847.7	1.6	7992.8	2.4
SJV	Merced	SJU	0.015	113.5	0.032	226.2	0.032	226.2	0.32	1838.6	1.6	7953.3	2.4
SJV	San Joaquin	SJU	0.015	113.2	0.032	225.6	0.032	225.6	0.32	1833.4	1.6	7930.7	2.4
SJV	Stanislaus	SJU	0.015	113.4	0.032	226.0	0.032	226.0	0.32	1837.3	1.6	7947.6	2.4
SJV	Tulare	SJU	0.015	114.4	0.032	228.0	0.032	228.0	0.32	1852.9	1.6	8015.4	2.4
SS	Imperial	IMP	0.015	116.7	0.032	232.6	0.032	232.6	0.32	1890.8			2.4
SS	Riverside	SC	0.015	116.3	0.08	533.3	0.08	533.3	0.84	4,531.5			2.4
SV	Butte	BUT	0.015	112.5	0.032	224.3	0.032	224.3	0.32	1,822.9			2.4
SV	Colusa	COL	0.015	113.1	0.032	225.4	0.032	225.4	0.32	1,832.1			2.4
SV	Glenn	GLE	0.015	112.5	0.032	224.3	0.032	224.3	0.32	1,822.9			2.4
SV	Placer	PLA	0.015	112.3	0.032	223.8	0.032	223.8	0.32	1,819.0			2.4
SV	Sacramento (4)	SAC	0.015	113.0	0.032	225.2	0.032	225.2	0.32	1,830.8			2.4
SV	Shasta	SHA	0.015	111.0	0.032	221.2	0.032	221.2	0.32	1,798.1			2.4
SV	Solano	YS	0.015	112.9	0.032	225.1	0.032	225.1	0.32	1,829.4			2.4
SV	Sutter	FR	0.015	111.6	0.032	222.3	0.032	222.3	0.32	1,807.3			2.4
SV	Tehama	TEH	0.015	111.9	0.032	223.0	0.032	223.0	0.32	1,812.5			2.4
SV	Yolo	YS	0.015	112.9	0.032	225.1	0.032	225.1	0.32	1,829.4			2.4
SV	Yuba	FR	0.015	112.5	0.032	224.3	0.032	224.3	0.32	1,822.9			2.4

Table 8
Annual Rainfall Days: Average Days per Year that California Counties Receive 0.01 Inch or Greater Precipitation Over Years of Record (1)

Air Basin	County	Air District	Annual Rainfall Days (1)
GBV	Alpine	GBU	72
GBV	Inyo	GBU	28
GBV	Mono	GBU	39
LC	Lake	LAK	68
LT	El Dorado	ED	68
LT	Placer	PLA	77
MC	Amador	AMA	64
MC	Calaveras	CAL	72
MC	El Dorado	ED	66
MC	Mariposa	MPA	69
MC	Nevada	NSI	83
MC	Placer	PLA	73
MC	Plumas	NSI	75
MC	Sierra	NSI	79
MC	Tuolumne	TUO	65
MD	Kern	KER	24
MD	Los Angeles	AV	24
MD	Riverside	MOJ	17
MD	Riverside	SC	17
MD	San Bernardino	MOJ	23
NC	Del Norte	NCU	111
NC	Humboldt	NCU	121
NC	Mendocino	MEN	115
NC	Sonoma	NS	75
NC	Trinity	NCU	84
NCC	Monterey	MBU	55
NCC	San Benito	MBU	51
NCC	Santa Cruz	MBU	65
NEP	Lassen	LAS	59
NEP	Modoc	MOD	76
NEP	Siskiyou	SIS	96
SC	Los Angeles	SC	34
SC	Orange	SC	33
SC	Riverside	SC	34
SC	San Bernardino	SC	41
SCC	San Luis Obispo	SLO	42
SCC	Santa Barbara	SB	46
SCC	Ventura	VEN	31
SD	San Diego	SD	42
SF	Alameda	BA	61
SF	Contra Costa	BA	60
SF	Marin	BA	66
SF	Napa	BA	68
SF	San Francisco	BA	67
SF	San Mateo	BA	60
SF	Santa Clara	BA	64
SF	Solano	BA	54
SF	Sonoma	BA	69
SJV	Fresno	SJU	45
SJV	Kern	SJU	37
SJV	Kings	SJU	38
SJV	Madera	SJU	44
SJV	Merced	SJU	51
SJV	San Joaquin	SJU	55
SJV	Stanislaus	SJU	52
SJV	Tulare	SJU	40
SS	Imperial	IMP	11
SS	Riverside	SC	17
SV	Butte	BUT	63
SV	Colusa	COL	56
SV	Glenn	GLE	63
SV	Placer	PLA	66
SV	Sacramento	SAC	57
SV	Shasta	SHA	82
SV	Solano	YS	58
SV	Sutter	FR	75
SV	Tehama	TEH	71
SV	Yolo	YS	58
SV	Yuba	FR	63

Table 13.2.1-1. PARTICLE SIZE MULTIPLIERS FOR PAVED ROAD EQUATION

Size range[a]	Particle Size Multiplier k[b]		
	g/VKT	g/VMT	lb/VMT
PM-2.5[c]	0.15	0.25	0.00054
PM-10	0.62	1.00	0.0022
PM-15	0.77	1.23	0.0027
PM-30[d]	3.23	5.24	0.011

[a] Refers to airborne particulate matter (PM-x) with an aerodynamic diameter equal to or less than x micrometers.

[b] Units shown are grams per vehicle kilometer traveled (g/VKT), grams per vehicle mile traveled (g/VMT), and pounds per vehicle mile traveled (lb/VMT). The multiplier k includes unit conversions to produce emission factors in the units shown for the indicated size range from the mixed units required in Equation 1.

[c] The k-factors for $PM_{2.5}$ were based on the average $PM_{2.5}$:PM_{10} ratio of test runs in Reference 30.

[d] PM-30 is sometimes termed "suspendable particulate" (SP) and is often used as a surrogate for TSP.

SOURCE: CARB, 2018.

Appendix C

Biological Resources Technical Report

Final

DELTA SMELT AND NATIVE SPECIES PRESERVATION PROJECT

Biological Resource Assessment Report

Prepared for
Metropolitan Water District of
Southern California

October 2022

Final

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DELTA SMELT AND NATIVE SPECIES PRESERVATION PROJECT

Biological Resource Assessment

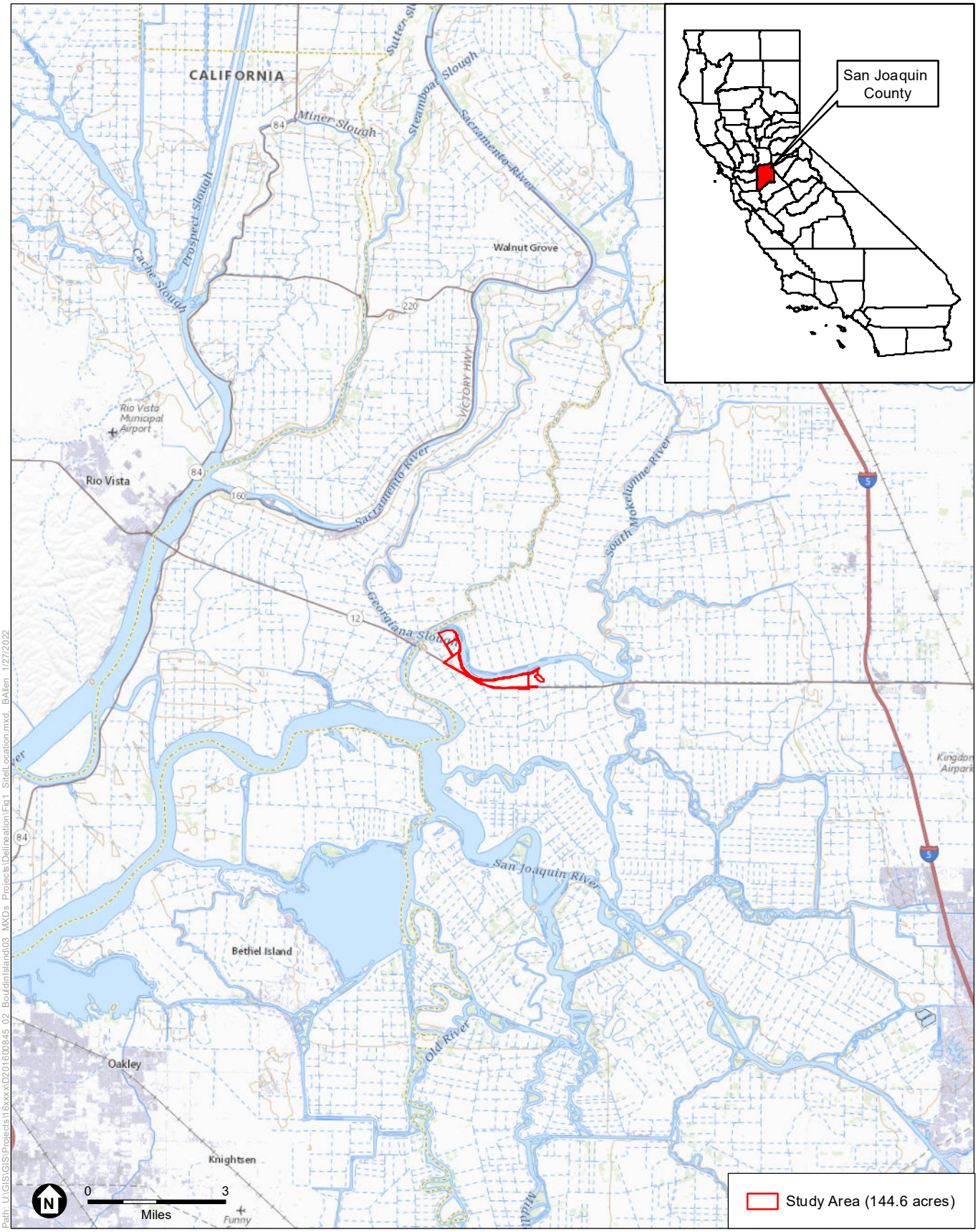
1. Introduction

The purpose of this report is to document the results of the reconnaissance level surveys conducted within the Delta Smelt Preservation Project (Project) survey area. The proposed Project will include the establishment of native fish propagation ponds, cooling marshes, and food production marshes (also referred to as a marsh-pond complex) on the northwest side of Bouldin Island and a tule harvest pond on the northeast portion of Bouldin Island. The location of the proposed Project survey area is shown in **Figures 1 and 2**. For this report, the survey area encompasses the Project area and is larger in some portions to allow for flexibility in Project placement and to avoid sensitive areas when feasible. The marsh-pond complex defines the area where the ponds will be constructed and the tule harvest area refers to the area where the tules will be harvested; these areas are connected by existing haul routes.

The proposed Project area is owned by Metropolitan Water District of Southern California (Metropolitan) and located adjacent to the confluence of the North Mokelumne River and the South Mokelumne River. The Mokelumne River borders Bouldin Island on the north and east sides and is separated from the Proposed Project by a man-made levee system. The south and west sides of the marsh-pond complex are bound by agricultural ditches and active farm fields that are typically planted in corn. The portion of the Proposed Project site where the marsh-pond complexes will be constructed is currently a fallow wheat field that has most recently been dryland farmed. The tule harvest area is located approximately 2.5 miles, by levee road, to the east of the marsh-pond complex. It consists of a tule marsh tule, cattails, and willows. Haul routes to both the marsh complexes and tule harvest area are regularly maintained gravel roads that include the levee road around the exterior of the island and internal access roads that are accessible from Highway 12.

Bouldin Island has been farmed continuously for over 140 years. Due to on-going subsidence of peat soils, land surface elevations are now between 5 and 25 feet below sea level. Land surface elevations where the marshes and ponds will be located range from 5 to 16 feet below mean sea level (NGVD 29 datum). A toe-drain is located at the landside base of the levee and is periodically overgrown with blackberry shrubs.[1] The agricultural ditches to the south and west are regularly maintained and have only sparse vegetation. A club is located approximately 0.5 mile from the

[1] The toe-drains are regularly maintained by the local reclamation districts and the agricultural ditches are maintained as part of regular farming operations. The conditions described were based on surveys from December 2021.



SOURCE: USGS, 2022; ESA, 2022

Delta Smelt Preservation Project

Figure 1
Project Site Location

ESA

SOURCE: MAXAR, 2021; ESA, 2022

Delta Smelt Preservation Project

Figure 1-2
Project Study Area

ESA

center of the proposed marsh-pond complexes on the opposite side of the levee and a single-family residence is situated just a little further than a 0.5 mile from the center. Power and phone lines follow the levee system. Highway 12 lies approximately 0.5 mile south of the proposed marsh-pond complex (Figures 1 and 2).

2. Regulatory Setting

The proposed Project is subject to several federal, state and regional regulations (Table 1). This section discusses those regulations that are applicable to the Proposed Project Area.

Federal

Federal Endangered Species Act

Pursuant to the Endangered Species Act (ESA), as amended (16 USC 1531 et seq.), USFWS and National Oceanic and Atmospheric Administration (NOAA) Fisheries (previously known as the National Marine Fisheries Service (NMFS) have regulatory authority over Federally listed species. Under the ESA, a permit to take a listed species is required for any Federal action that may harm an individual of that species. "Take" is defined under ESA Section 9 as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Under Federal regulation, take is further defined to include habitat modification or degradation where it would be expected to result in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. ESA Section 7 outlines procedures for Federal interagency cooperation to conserve Federally listed species and designated critical habitat. Section 7(a)(2) requires Federal agencies to consult with USFWS and NMFS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1936, as amended (16 USC 703 et seq.), implements domestically a series of international treaties that provide for migratory bird protection. The MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds; the act provides that it is unlawful, except as permitted by regulations, "to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird …" (16 USC 703). This prohibition includes both direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds. Permits for take of nongame migratory birds can be issued only for specific activities, such as scientific collecting, rehabilitation, propagation, education, taxidermy, and protection of human health and safety and personal property.

TABLE 1
PERMITS AND APPROVALS WHICH MAY BE REQUIRED

Agency/Department	Permit/Approval	Description
Federal		
USACE	Clean Water Act Section 404 Permit	Section 404 of the CWA regulates "the discharge of dredged or fill material into all waters of the United States, including wetlands.
US Fish and Wildlife Service (USFWS) & National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service	Section 7 of the Federal Endangered Species Act Consultation/Biological Opinions	Federal agencies must consult with the USFWS if any project or action they authorize may affect a listed species or designated critical habitat.
State of California		
State Historic Preservation Office (SHPO)	Section 106 of the National Historic Preservation Act	Section 106 of the NHPA requires that all federal agencies to take into account the effects of their undertakings on historic properties. Federal agencies are required to consult with the SHPO during the identification and evaluations process.
CDFW	Streambed Alteration Agreement	Regulates activities that would 'substantially divert or obstruct the natural flow, 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 into a river, stream, or lake.
CDFW	California Endangered Species Act	Prohibits the take of any species of wildlife designated as endangered, threatened, or candidate species. CDFW may authorize the take of any such species if certain conditions are met.
Central Valley Regional Water Quality Control Board (CVRWQCB)	401 Water Quality Certification (required for 404 Permit), NPDES General Permit for Stormwater Discharge Associated with Construction, Porter-Cologne Waste Discharge Requirements (WDR)	Project proponents are required to submit a Notice of Intent to the RWQCB for coverage under the General Construction Permit for projects with disturbance over one acre. Section 401 Water Quality Certification is necessary when Section 404 permits are required. WDRs are issued for discharges of dredged or fill material to waters of the State.

Notes: N/A (not applicable), NPDES (National Pollutant Discharge Elimination System).

The Pacific Coast FMP designates EFH for Pacific salmon, which includes Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley fall-/late fall–run Chinook salmon. The Pacific Coast Groundfish FMP designates EFH for species of flatfish, rockfish, roundfish, sharks and rays, which extends from the Pacific Ocean landward into bays and estuaries up to the mean higher high-water level.

Clean Water Act

The United States Army Corps of Engineers administers Section 404 of the Clean Water Act. Section 404 regulates activities in "waters of the United States." This term is defined in Code of Federal Regulations (CFR) title 33, section 328.3 (33 CFR 328.3). As of early September 2021, USACE and the U.S. Environmental Protection Agency (EPA) are interpreting "waters of the

United States" consistent with the pre-2015 regulatory regime until further notice. Therefore, *waters of the U.S.* shall include:

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(2) All interstate waters including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters:

  (a) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

  (b) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

  (c) Which are used or could be used for industrial purpose by industries in interstate commerce;

(4) All impoundments of waters otherwise defined as waters of the United States under the definition;

(5) Tributaries of the above waters;

(6) The territorial seas;

(7) Wetlands adjacent to the above waters (other than waters that are themselves wetlands). Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

(8) Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with EPA.

State

California Endangered Species Act

Under the CESA, CDFW has the responsibility for maintaining a list of threatened and endangered species (California Fish and Game Code Section 2070). CDFW also maintains a list of candidate species, which are those formally under review for addition to either the list of endangered species or the list of threatened species. CESA prohibits the take of plant and animal species that the California Fish and Game Commission has designated as either threatened or endangered in California. "Take" in the context of CESA means to hunt, pursue, catch, capture, or kill or attempt to hunt, pursue, catch, capture, or kill a State-listed species (California Fish and Game Code Section 86). The take prohibitions also apply to candidates for listing under CESA. However, Section 2081 of CESA allows CDFW to authorize exceptions to the State's take prohibition for educational, scientific, or management purposes.

In accordance with the requirements of CESA, an agency reviewing a project within its jurisdiction must determine if any State-listed endangered or threatened species could be present in the project area and if the proposed project would potentially result in "take" of such a species. If the applicant determines that the project may result in the incidental take of a State-listed species, they may apply for, and CDFW may issue, an incidental take permit under Section 2081 of the California Fish and Game Code. For species that are listed under both CESA and FESA, where an applicant has received incidental take authorization under FESA, the Director of CDFW may make a Consistency Determination under Section 2080.1 of the California Fish and Game Code declaring that the federal authorization also applies to compliance with CESA.

California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (CNPPA) (California Fish and Game Code Sections 1900–1913), which directed CDFW to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this state." The CNPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. CESA expanded on the original CNPPA and enhanced legal protection for plants. The CESA established threatened and endangered species categories and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, three listing categories for plants are employed in California: rare, threatened, and endangered.

Special-Status Natural Communities

CDFW's Natural Heritage Division identifies special-status natural communities, which are those that are naturally rare and those whose extent has been greatly diminished through changes in land use. The California Natural Diversity Database tracks natural communities in the same way that it tracks occurrences of special-status species: Information is maintained on each site for the natural community's location, extent, habitat quality, level of disturbance, and current protection measures. CDFW is mandated to seek the long-term perpetuation of the areas in which these communities occur. While there is no statewide law that requires protection of all special-status natural communities, CEQA requires consideration of the potential impacts of a project on biological resources of statewide or regional significance.

California Fish and Game Code

In addition to CESA, the following California Fish and Game Code sections provide protection to biological resources.

Fully Protected Species

Certain species are considered *fully protected*, meaning that the Code explicitly prohibits all take of individuals of these species except for take permitted for scientific research. Section 5050 lists fully protected amphibians and reptiles, Section 5515 lists fully protected fish, Section 3511 lists fully protected birds, and Section 4700 lists fully protected mammals.

It is possible for a species to be protected under the California Fish and Game Code, but not fully protected. For instance, mountain lion (*Puma concolor*) is protected under Section 4800 et seq. but is not a fully protected species.

Protection of Birds and Their Nests

Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this Code or any regulation made pursuant thereto. Section 3503.5 of the Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs. Migratory non-game birds are protected under Section 3800, while other specified birds are protected under Section 3505.

Stream and Lake Protection

CDFW has jurisdictional authority over streams and lakes and the wetland resources associated with these aquatic systems under California Fish and Game Code Sections 1600 et seq. through administration of Lake or Streambed Alteration Agreements. The agreements are treated as permits once both parties have signed. California Fish and Game Code Sections 1600–1616 authorize CDFW 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 lake or stream." Because CDFW asserts its jurisdiction over streamside habitats that may not qualify as waters or wetlands under the federal Clean Water Act definition (see Section 3.4.2.1), CDFW's asserted jurisdiction may be broader than USACE's jurisdiction, and may include the outermost extent of riparian habitat or floodplain.

When CDFW enters into a Streambed Alteration Agreement with the project applicant, CDFW can impose reasonable measures necessary to protect the resource. A project applicant must submit a notification of lake or streambed alteration to CDFW and, if necessary, obtain an agreement before implementing the project. CDFW can also enter into special types of agreements for recurring operation and maintenance activities or large scale long-range planned projects, referred to as Routine Maintenance Agreements or Master Streambed Alteration Agreements.

California Species of Special Concern

CDFW maintains a list of "species of special concern," which serves as a watch list. While this designation does not afford protection under CESA, species of special concern should be included in the analysis of project impacts according to CEQA Guidelines Section 15380 if the species of special concern meets the sensitivity criteria outlined in Section 15380. The criteria address species not included on an official list but that are at risk of becoming threatened or endangered throughout all or a portion of their range.

State Water Resources Control Board and Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs) (together "Boards") are the principal State agencies with primary

responsibility for the coordination and control of water quality. In the Porter-Cologne Act, the California Legislature declared that the "state must be prepared to exercise its full power and jurisdiction to protect the quality of the waters in the state from degradation..." (California Water Code Section 13000). Porter-Cologne grants the Boards the authority to implement and enforce the water quality laws, regulations, policies, and plans to protect the groundwater and surface waters of the State. Impacts to waters of the State determined to be jurisdictional would require a project proponent to obtain a waste discharge permit (for non-federally jurisdictional waters) and/or a Clean Water Act Section 401 certification (for federally jurisdictional waters, when a USACE Section 404 permit is obtained). The enforcement of the State's water quality requirements is not solely the purview of the Boards and their staff. Other agencies (e.g., CDFW) can enforce certain water quality provisions in State law.

3. Methodology

Environmental Science Associates (ESA) biologists Joe Sanders and Christy Dawson conducted reconnaissance-level surveys of the Project survey area on October 8, 2021. The surveys were conducted to document vegetation communities that could provide habitat for sensitive species and other wildlife observed in and adjacent to the Project area.

4. Vegetative Communities

Vegetative communities within the proposed marsh-pond complex include annual grassland, cropland, disturbed/developed area and small patches of riparian habitat associated with the agricultural ditches (**Figure 3**). The tule harvest area was comprised of tule marsh and riparian habitat (**Figure 4**).

Annual Grassland

Annual grassland is comprised of non-native grasses and forbs. Common non-native grass species observed in this community include Bermuda grass (*Cynodon dactylon*), oat (*Avena sp.*), bromes (*Bromus spp.*), Johnson grass (*Sorghum halepense*), and Pacific bentgrass (*Agrostis avenacea*). Common forbs observed were milk thistle (*Silybum marianum*), filaree (*Erodium* sp.) and cheeseweed (*Malva* sp.).

Annual grassland provides little cover for most wildlife, yet numerous species forage and several species breed in this habitat type. Grasslands attract bumble bees and other insects that rely on flowering grassland species. They also attract reptiles and amphibians such as western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), gopher snake (*Pituophis melanoleucus*), and Pacific chorusfrog (*Pseudacris regilla*); and birds such as California quail (*Callipepla californica*), western bluebird (*Sialia mexicana*), and lesser goldfinch (*Carduelis psaltria*).Common small mammals expected to occur in grasslands include western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Mus musculus*), California vole (*Microtus californicus*), black-tailed jackrabbit (*Lepus californicus*), black-tailed deer (*Odocoileus hemionus*), coyote (*Canis latrans*), and Botta's pocket gopher (*Thomomys bottae*). Small rodents, reptiles, and invertebrates attract raptors (birds of prey) including red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Accipiter striatus*), and American kestrel (*Falco sparverius*), and special-status

birds such as white-tailed kite (*Elanus leucurus*), burrowing owl (*Athene cunicularia*), and Swainson's hawk (*Buteo swainsoni*).

Non-native grasslands are important foraging grounds for aerial and ground-foraging insect eaters such as Myotis (*Myotis* sp.) bat species and pallid bats (*Antrozous pallidus*).

Disturbed/Developed

The levee system has substantially altered the habitat of the proposed Project area. In addition to the levee system, existing facilities in the survey area include a club house, gravel access roads, and farm fields. Disturbed portions of the survey area include bare ground, non-native vegetation, or farmed areas that are subject to continued disturbance.

Wetlands and Other Waters

A delineation conducted by the California Department of Water Resources in April of 2020 and verified by the US Army Corps of Engineers (USACE) on June 18, 2020 (SPK-2019-00899) was prepared for a separate project also occurring in part on Bouldin Island. This delineation identified approximately 14.65 acres of potential waters of the United States and State within the survey area. This includes 1.38 acres of agricultural ditch that was comprised mostly of blackberry shrubs, 0.20 acres of forested wetland, which includes riparian scrub and woodland species, 2.58 acres of seasonally flooded scrub shrub, which is comprised primarily of riparian scrub with no overstory, and 10.48 acres of fresh emergent wetland that was comprised of various aquatic plants such as tules. An additional field visit was conducted on October 8, 2021, to confirm that the delineation was still accurate and a supporting memo was prepared (**Appendix A**).

Wetland and other waters habitat for the survey area are described below.

Riparian Scrub (Scrub-shrub)

Riparian scrub habitat consists of shrub-dominated areas that are subject to hydrologic influence from toe drain and agricultural ditches (agricultural ditches). Scrub habitat consists of areas dominated by non-native Himalayan blackberry (*Rubus armeniacus*) shrubs and vines that have no tree cover. Some of the agricultural ditches had remnant Himalayan blackberry canes and looked to have been recently cleared of vegetation.

Riparian scrub supports large numbers of insects and attracts passerine birds, including several species of flycatchers, warblers, and hummingbirds.

Riparian Woodland (Forested Wetland)

Riparian woodlands in the survey area are tree-dominated areas that are fed by agricultural water that is either siphoned from the river or pulled from wells. These areas are dominated by Goodding's willow (*Salix gooddingii*) and Fremont cottonwood (*Populus fremontii*) with an understory of dense Himalayan blackberry.

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SOURCE: MAXAR, 2021; DWR, 2021; ESA, 2022

Delta Smelt Preservation Project

Figure 3
Vegetative Communities of the
Project Marsh-Pond Complex

ESA

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SOURCE: MAXAR, 2021; DWR, 2021; ESA, 2022

Delta Smelt Preservation Project

ESA

Figure 4
Vegetative Communities of the
Project Marsh-Pond Complex

Many wildlife species depend on riparian woodlands for water, food, and cover. Several raptor species—red-shouldered hawk, Cooper's hawk, great horned owl, and the State-listed Swainson's hawk—build their nests in the crowns of cottonwood, valley oak, and other large trees that grow on the landside and waterside of the levees. Natural cavities and woodpecker holes provide nesting sites for cavity-nesting species, including wood duck (*Aix sponsa*), American kestrel, tree swallow (*Tachycineta bicolor*), western bluebird, and western screech owl (*Megascops kennicottii*).

Emergent Wetland (Fresh Emergent Wetland)

Emergent wetland is dominated by aquatic emergent vegetation and occurs in the tule harvest area. Vegetation is dominated by willows (*Salix gooddingii*, *S. lasiolepis,* and *S. exigua*), as well as catails (*Typha* sp.), and tule (*Schoenoplectus* sp.).

Fresh emergent wetland provides food, cover, and water for numerous birds, amphibians, reptiles, and mammals and is one of the most productive wildlife habitats in California. Common bird species that feed in fresh emergent wetlands include various ducks, geese, and wading birds including mallards, Canada geese, herons and egrets, forage in the water and along the shallow edges. Many flycatchers, such as black phoebes (*Sayornis nigricans*), swallows, and other insectivores also utilize fresh emergent wetlands to forage on insects attracted to the water. Several birds, such as the red-winged blackbird (*Agelaius phoeniceus*), make use of the tall aquatic vegetation to hide their nests over the water, which protects them from ground predators. Larger emergent wetlands provide safety for resting waterfowl.

In addition to birds, amphibians, such as the Pacific chorus frog and reptiles like the northwestern pond turtle (*Actinemys marmorata*), a species of special concern, live within and around the margins of wetlands, which provide moist habitat, food, and cover. Deer, coyote, and various smaller mammals access emergent wetlands for a year-round water source.

5. Federally Listed and State-Listed Wildlife Species

Several wildlife species known to occur in or in the vicinity of the survey area are protected under Federal and/or State Endangered Species Acts or have been designated as species of special concern by CDFW. In addition, Section 15380(b) of the State CEQA Guidelines provides a definition of rare, endangered, or threatened species that are not included in any listing. Species recognized under these terms are referred to collectively as "special-status species."

A list of special-status plant and wildlife species with potential to occur in or in the vicinity of the survey area was compiled from a search of the California Natural Diversity Database (CNDDB) (CDFW 2021), the California Native Plant Society (CNPS) rare plant inventory, a search of the USFWS Information for Planning and Consultation endangered species database (USFWS 2021), and biological literature of the region. The search encompassed the Isleton and Bouldin Island 7.5-minute U.S. Geological Survey topographic quadrangles.

Each species on the list was assessed individually based on its habitat requirements and distribution relative to the location and vegetation communities that occur in and around the survey area. **Tables 2 and 3** provide a comprehensive list of special-status wildlife species that have potential

to occur within the survey area. Those species with a moderate or high potential to occur in the survey area are described below in greater detail. If habitat was not present or the survey area is outside of the known range of the species, the species with no potential was assumed absent and excluded from the list. A complete list of the downloaded special-status species lists are included in **Appendix B**.

The "Potential to Occur" categories are defined as follows:

- **Low:** The survey area provides only limited and low-quality habitat for a particular species. In addition, the known range for a particular species may be outside of the survey area.
- **Moderate**: The survey area and/or immediate vicinity provides suitable habitat for a particular species.
- **High**: The survey area and/or immediate vicinity provide ideal habitat conditions for a particular species and/or known populations occur in the survey areas or within its immediate vicinity.
- **Present:** The species was observed during the biological surveys within the survey area.

Northwestern Pond Turtle

The northwestern pond turtle is a California species of special concern. This moderate-sized aquatic turtle is commonly found in ponds, lakes, marshes, rivers, streams, and agricultural ditches with rocky or muddy substrates. Northwestern pond turtle habitat often includes shoreline basking areas that may or may not be bordered by aquatic vegetation. Aquatic sites are often within woodlands, grasslands, and open forests, between sea level and 6,000 feet in elevation. Northwestern pond turtles bask on logs or other objects when water temperatures are lower than air temperatures. Their nests are created in upland areas with friable soils, often up to 0.25 miles from an aquatic site (Jennings and Hayes 1994; Stebbins, 2003; Zeiner et al. 1988).

Northwestern pond turtles are discontinuously distributed throughout California west of the Cascade-Sierran crest (Jennings and Hayes 1994). There is a CNDDB documented occurrence on Bouldin Island in an agricultural plunge pool in 2001, approximately halfway between the pond and harvest areas near the haul route, just north of Hwy 12.

Giant Garter Snake

Giant garter snake is State and Federally listed as threatened by CDFW and the USFWS respectively. Giant garter snakes inhabit agricultural wetlands including agricultural ditches, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands in the Central Valley. Giant garter snakes are often found within these aquatic features especially when emergent vegetation including cattails and bulrushes are present. Because most of its natural habitat has been lost, the giant garter snake also lives in rice fields (USFWS 2017). Rice fields provide surface water during the summer when the snakes are active and marsh-like conditions provide the cover, habitat, and prey required for giant garter snake to survive (Halstead et al. 2010). The active season extends from April 1 to October 1. Giant garter snakes inhabit small mammal burrows and other soil crevices above flood elevations during this inactive period (USFWS 2017).

TABLE 2
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE PROPOSED PROJECT AREA

Common Name Scientific Name	Status (Federal/ State/CNPS	Habitat Requirements	Identification/ Survey Period	Potential to Occur
Plants				
Woolly rose-mallow *Hibiscus lasiocarpus*	--/--/1B	Margins of freshwater marshes, wet riverbanks, and on low, peat islands in sloughs of the Delta; 0 to 400 feet elevation;	Blooming period: June–September	Moderate potential to occur in agricultural ditches that are not inundated with blackberries. Known to occur along edge of waterways adjacent to Bouldin Island (CNDDB 2021).
Sanford's arrowhead *Sagittaria sanfordii*	--/--/1B	Wetland. Marshes and swamps. In standing or slow-moving freshwater ponds, marshes, and ditches. 0 to 2133 feet in elevation.	Blooming period: May–October	Moderate potential to occur in agricultural ditches that are not inundated with blackberries. A population was recorded in CNDDB in 1994 approximately 2.5 miles to the north (CNDDB 2021).
Marsh skullcap *Scutellaria galericulata*	--/--/2	Freshwater marshes and swamps, meadows and seeps; 0 to 7,000 feet elevation.	Blooming period: June–September	Moderate potential to occur in agricultural ditches that are not inundated with blackberries. Known occurrence from 1994 on small island between Bouldin and Staten Islands, just east of the marsh-pond complex and west of the harvest area (CNDDB 2021).
Side-flowering skullcap *Scutellaria lateriflora*	--/--/2	Freshwater marshes and swamps, meadows and seeps; 0 to 7,000 feet elevation.	Blooming period: June–September	Moderate potential to occur in agricultural ditches that are not overgrown by blackberries. Historic occurrence from 1892 documented on Bouldin Island. More recent documented occurrence approximately 7 miles to the north (CNDDB 2021)

TABLE 3
SPECIAL-STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE PROPOSED PROJECT AREA

Common Name *Scientific Name*	Status (Federal/ State)	Habitat Requirements	Potential to Occur
Invertebrates			
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	**FT/--**	**Mature elderberry shrubs.**	*None. Elderberry plants are not present in the survey area.*
Reptiles			
Northwestern pond turtle *Actinemys marmorata*	--/CSC	Agricultural wetlands and other wetlands such as agricultural and drainage canals, low gradient streams, marshes, ponds, sloughs, small lakes, and their associated uplands.	Moderate potential to occur. Marginal aquatic habitat is present in the agricultural canals and in the harvest area when inundated. The survey area also contains a limited amount of potentially suitable upland egg-laying habitat within grasslands. There is a documented occurrence on Bouldin Island in an agricultural plunge pool in 2001 approximately 1 mile from the pond and harvest areas, just north of Hwy 12 (CNDDB 2021).
Giant garter snake *Thamnophis gigas*	FT/CT	Marsh and swamp, riparian scrub, wetland. Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and agricultural ditches. This is the most aquatic of the garter snakes in California.	Moderate potential to occur. Suitable aquatic habitat is present in the agricultural ditches. The toe drain is not currently suitable habitat due to inundation by blackberry. The closest CNDDB occurrence records of giant garter snake occur approximately 4.5 miles to the south in 2010.
Birds			
Burrowing owl *Athene cunicularia* (burrow sites)	--/CSC	Coastal prairie, coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran Desert scrub, and valley and foothill grassland. Open, dry annual or perennial grasslands, deserts and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Moderate potential to occur in the Delta, but suitable grassland habitat is present. The closest CNDDB occurrence is approximately 6 miles to the west (CNDDB 2021).
Swainson's hawk *Buteo swainsoni*	--/CT	Great Basin grassland, riparian forest, riparian woodland, valley and foothill grassland. Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	High potential to occur. Known to occur within a five-mile radius of the survey area. Suitable nest trees are present in the riparian area adjacent to the pond and the harvest area and there is suitable foraging habitat within grasslands and irrigated pasture in and adjacent to the survey area.

TABLE 3
SPECIAL-STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE PROPOSED PROJECT AREA

Common Name ***Scientific Name***	**Status (Federal/ State)**	**Habitat Requirements**	**Potential to Occur**
Northern harrier *Circus cyaneus* (nesting)	--/CSC	Coastal scrub, Great Basin grassland, marsh and swamp, riparian scrub, valley and foothill grassland, and wetlands. Coastal salt and fresh-water marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	High potential to occur. Potentially suitable grassland nesting and foraging habitat for this species is present. While there are no known nesting occurrences of northern harrier within the quad search area, northern harrier has been documented within other portions of Bouldin Island by ESA biologists. This species is underreported in the CNDDB.
White-tailed kite *Elanus leucurus* (nesting)	--/CFP	Cismontane woodland, marsh and swamp, riparian woodland, valley and foothill grassland, and wetlands. Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	High potential to occur. Suitable nest trees are present and there is suitable foraging habitat within grasslands, croplands, and marsh habitat in and adjacent to the pond and harvest areas. While there are no known nesting occurrences of white-tailed kites within the quad search area, there is a potential for them to occur. This species is underreported in the CNDDB.
Short-eared owl *Asio flammeus* (wintering)	--/CSC	Utilizes densely vegetated grasslands and emergent wetlands with abundant prey (e.g., voles, other small mammals, birds, reptiles, amphibians, and arthropods) in the Delta as wintering grounds. It has been known to occasionally nest in Northern California.	Present. Observed in the harvest area during surveys, which provides suitable wintering habitat and the surrounding crop lands provides ideal foraging habitat.
Lesser sandhill crane *Grus canadensis* (wintering)	--/CSC	Annual and perennial grassland habitats, pastures, moist croplands with rice or corn stubble, and open, emergent wetlands.	High potential to occur. Sandhill cranes vocalizations heard on the adjacent Staten Island to the north. They were not identified to subspecies. Suitable winter foraging habitat could be present on Bouldin Island. This species is known to winter, but does not breed in the Delta, wintering only.
Greater sandhill crane *Grus canadensis tabida* (wintering)	--/CT,CFP	Annual and perennial grassland habitats, pastures, moist croplands with rice or corn stubble, and open, emergent wetlands. Typically nests in mounds of wetland plants or hummocks in remote portions of extensive wetlands. Sometimes nests in grass-lined depressions on dry sites.	High potential to occur. Sandhill cranes vocalizations heard on the adjacent Staten Island to the north. They were not identified to subspecies. Suitable winter foraging habitat could be present on Bouldin Island. This species is known to winter, but does not breed in the Delta, wintering only.
California black rail *Laterallus jamaicensis coturniculus* (year round)	--/CT,CFP	Brackish marsh, freshwater marsh, marsh and swamp, salt marsh, wetland. Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	Low potential to occur. Submarginal habitat is present in the harvest area, which does not maintain consistent water. The nearest known occurrence of this species is approximately 5 miles to the southeast (CNDDB 2021).

TABLE 3
SPECIAL-STATUS WILDLIFE SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE PROPOSED PROJECT AREA

Common Name *Scientific Name*	Status (Federal/ State)	Habitat Requirements	Potential to Occur
Loggerhead shrike *Lanius ludovicianus* (nesting)	--/CSC	Forages and nests in grasslands, shrublands, and open woodlands. Nests in trees and shrubs.	Moderate potential to occur. Suitable nesting habitat is present and there is suitable foraging habitat within grasslands, croplands, and marsh habitat in and adjacent to the pond and harvest areas. While there is only one known nesting occurrence within the quad search area. This species is underreported in the CNDDB.
Song sparrow – "Modesto" population *Melospiza melodia* (year-round)	--/CSC	Nests and forages primarily in emergent marsh, riparian scrub, and early successional riparian forest habitats in the north-central portion of the Central Valley; infrequently in mature riparian forest and sparsely vegetated ditches and levees. Forages primarily on exposed ground or in leaf litter.	Moderate potential to occur. Suitable habitat is present in marsh and riparian habitat in and adjacent to the pond and harvest areas. There are multiple occurrences on the east side of Bouldin Island along the various sloughs (CNDDB 2021).
Mammals			
Western red bat *Lasiurus blossevillii*	--/CSC	Cismontane woodland, lower montane coniferous forest, riparian forest, riparian woodland. Roosts primarily in trees, 2-40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	Moderate potential to occur. Suitable roost habitat is present in riparian trees and western red bat may forage within the survey area. There is an older occurrence from 1999 approximately 4 miles to the west.

STATUS CODES:

Federally Listed Species
FE = federal endangered
FT = federal threatened
FC = candidate
PT = proposed threatened
FPD = proposed for delisting
FD = delisted

California State Ranked Species
CE = California state endangered
CT = California state threatened
CR = California state rare
CSC = California species of special Concern
CCT = California state threatened candidate
CFP = California fully protected

CNPS Rank Categories
1A = plants presumed extinct in California
1B = plants rare, threatened, or endangered in California and elsewhere
2 = plants rare, threatened, or endangered in California, but common elsewhere
3 = plants about which we need more information
4 = plants of limited distribution

There are two giant garter snake CNDDB occurrences documented within 5 miles of the survey area. One occurrence is from 2016 and is approximately five miles west of the survey area. This occurrence states that the record was mapped on the south side of Twitchell Island on the San Joaquin River. The other occurrence is from 2010 and is approximately 4.5 miles south of the survey area just northeast of Venice Island. This occurrence states that three individuals were found dead on the road and one live snake was basking on the shoulder of the road and then retreated into the riprap.

The agricultural ditch could provide suitable habitat for giant garter snake if they contain water during the active season. However, based on the lack of remnant aquatic vegetation, the agricultural ditches are either regularly maintained or don't pond water for a significant period of time to support aquatic vegetation. The toe drains were completely covered by dense blackberry

shrubs and are not considered giant garter snake habitat. The small mammal burrows present on the sides of the agricultural ditches within the survey area and on the graded levee provide suitable upland habitat.

Western Burrowing Owl

The western burrowing owl is listed by CDFW as a California species of special concern. They inhabit grassland, desert, and open shrub habitats throughout the state from sea level to approximately 5,300 feet (CDFW 1999). Unlike many sensitive species, burrowing owls persist and even thrive in some landscapes that are highly altered by human activity. The characteristics of suitable habitat are burrows for roosting and nesting, and relatively short vegetation with only sparse shrubs and taller vegetation. Individuals in agricultural environments nest along roadsides and water conveyance structures. Breeding occurs February through August (CDFW 2012).

Although burrowing owls are not common in the Delta, there is habitat available and potential for burrowing owl to be present in the survey area. Suitable habitat is present along the levees and in agricultural fields. Ground squirrel burrows were observed adjacent to the survey area, but no burrowing owls or signs were observed.

Swainson's Hawk

Swainson's hawk is State listed as threatened. It once occupied large grassland and shrub steppe habitats, as well as canyons, foothills, and smaller interior valleys in otherwise mountainous regions. Currently, the species is most common in the Central Valley and Great Basin. Nesting habitat for Swainson's hawk includes mature trees with relatively dense canopies such as oaks or cottonwoods in or near riparian habitat, agricultural fields, or suburban neighborhoods near suitable foraging habitat. They forage in grasslands, irrigated pastures, and grain fields. In California, Swainson's hawks begin nesting in late March, and the young usually leave the nest (fledge) by August.

There are numerous documented CNDDB occurrences within five miles of the survey area. The large trees within the riparian corridor and adjacent areas could provide nesting sites and the agricultural fields provide suitable foraging habitat.

Northern Harrier

Northern harrier is listed by CDFW as a California species of special concern. This raptor breeds widely but locally in North America from northern Alaska and Canada south to midlatitudes and lower latitudes of the United States and northern Baja, California; it is found year-round in much of its breeding range in the contiguous United States and locally in southwestern and southeastern Canada. Northern harriers breed and forage in a variety of open habitats that provide adequate vegetative cover, an abundance of suitable prey, and scattered hunting perches, such as shrubs or fence posts. In California, such habitats include freshwater marshes, brackish and saltwater marshes, wet meadows, weedy borders of lakes, rivers and streams, annual and perennial grasslands (including those with vernal pools), ungrazed or lightly grazed pastures, some croplands, sagebrush flats, and desert sinks. The species occurs more broadly and in much greater numbers during

migration and winter than during the breeding season. Northern harriers nest on the ground from March through August mostly in patches of dense, often tall shrubby/scrubby vegetation in undisturbed areas (Davis and Niemela 2008). Northern harriers require approximately 4 to 6 weeks to fledge young (Smith et al. 2011), and undisturbed nesting habitat must be available to avoid nest depredation and destruction (Cripe 2000).

The potential for northern harriers to occur in the survey area is high. Open habitats on levees and in the survey area provide foraging habitat and potentially suitable nesting habitat for this species occurs in the harvest area as well as in adjacent agricultural lands.

White-Tailed Kite

The white-tailed kite is a fully protected species under the California Fish and Game Code. This species nests primarily in riparian and lowland habitats often associated with agricultural areas throughout cismontane California. White-tailed kites typically nest in dense vegetation at the tops of oaks, willows, or other native trees. They prey primarily on voles and other diurnal mammals (CDFW 2005). Their numbers and range have increased in the past few decades (CDFW 2005).

There are no documented occurrences in the vicinity of the survey area, and they were not observed during the survey; however, white-tailed kites are underreported in CNDDB and they could use the survey area for foraging.

Short-eared Owl

Short-eared owl is listed by CDFW as a California species of special concern. While small resident populations of short-eared owls remain in the Great Basin region and locally in the Sacramento–San Joaquin River Delta, most recent breeding from coastal central California and the San Joaquin Valley has been episodic. The breeding range retracts dramatically in drought conditions and during prey reductions.

Nesting short-eared owls require open grassland that supports concentrations of microtine rodents and herbaceous cover sufficient to conceal their ground nests from predators (Holt and Leasure 1993). Suitable habitats may include salt- and freshwater marshes, irrigated alfalfa or grain fields, and ungrazed grasslands and old pastures. Tule marsh or tall grasslands with cover 30–50 cm in height can support nesting pairs (Holt and Leasure 1993). Productive habitat for resident owls is now almost entirely limited to wildlife refuges and management areas (Roberson 2008). Management of refuges and restoration areas for herbaceous cover has been successful in maintaining resident owls, even when prey dwindle.

A short-eared owl was flushed during surveys of the harvest area. The owl is likely a winter migrant, which is common in the Central Valley.

Lesser and Greater Sandhill Crane

Lesser and greater sandhill cranes are winter residents and migrants in the Delta, arriving during early September and reaching maximum densities during December and January and

departing during early March. Sandhill cranes vocalizations were heard on the adjacent Staten Island, which occurs approximately 1500 feet to the north of the survey area.

Lesser sandhill crane is a California species of special concern. Lesser sandhill crane is a large gray, heavy-bodied bird with a long neck, long legs, and red plumage on top of the head. The subspecies range includes much of North America; the population that occurs in the proposed Project area breeds in southwestern and south-central Alaska and migrates to the Central Valley of California to overwinter (Shuford and Gardali 2008).

Greater sandhill crane is State listed as threatened is and Fully Protected under California Fish and Game Code. Greater sandhill crane is the largest sandhill crane subspecies, with gray plumage, heavy body, long neck and legs, and red plumage on top of the head. The subspecies range includes much of North America; the population that occurs in the proposed Project area breeds in small numbers in northeastern California, with larger populations coming from Washington, Oregon, and western Canada, and migrates to the Central Valley of California to overwinter (CDFW 1994).

Foraging habitat between the two subspecies is similar (although there are some individual crop preferences) and consists mainly of harvested corn fields, winter wheat, irrigated pastures, alfalfa fields, and fallow fields. Mid-day loafing typically occurs in wetlands and flooded fields and they occasionally forage and will opportunistically consume small rodents, birds, and invertebrates along agricultural field borders, levees, rice checks, and ditches, and in alfalfa fields or pastures. Night roosting is in shallowly flooded open fields and open wetlands interspersed with uplands and tends to congregate in small to large flocks. Greater and lesser sandhill cranes use similar roost sites and are both sensitive to human disturbance (Littlefield and Ivey 2000).

Staten Island, just to the north of Bouldin Island, is a known sandhill crane refuge, where a significant portion of the Delta populations reside in the winter. They have also been documented on Bouldin Island (Littlefield and Ivey 2000). Vocalizations from Staten Island were heard during the field visit.

Loggerhead Shrike

The loggerhead shrike is listed by CDFW as a California species of special concern, and is a year-round resident, distributed throughout much of California, except in higher-elevation and heavily forested mountainous regions (Humple 2008). Shrikes nest earlier than most other passerines. The breeding season for the species may begin as early as late February and lasts through July (Yosef 1996). Loggerhead shrikes establish breeding territories in open habitats with relatively short vegetation that allows for visibility of prey such as arthropods, small reptiles, amphibians, rodents, and birds. They can be found in grasslands, scrub habitats, riparian areas, other open woodlands, ruderal habitats, and developed areas, including golf courses and agricultural fields (Yosef 1996). Loggerhead shrikes require the presence of structures for impaling their prey. These structures most often take the form of thorny or sharp-stemmed shrubs or barbed wire (Humple 2008). Ideal breeding habitat for loggerhead shrikes is short grass habitat with many perches, shrubs, or trees for nesting and sharp branches or barbed wire fences for impaling prey.

Loggerhead shrikes are known to occur throughout the Central Valley, and suitable habitat, such as the riparian areas, blackberry shrubs, and areas with adjacent foraging sites, such as fallow fields and agricultural crops, are present in the survey area; therefore, there is a moderate potential for the loggerhead shrike to be present in the survey area.

Song Sparrow ("Modesto" population)

The song sparrow (*Melospiza melodia*) has the greatest number of genetically distinct populations of any bird in North America, including seven subspecies that breed in California, six of which are endemic to the State. The "Modesto" population was once considered to be a distinct subspecies (*M. m. mailliardi*), but it has recently been classified as a race and merged with the *heermanni* subspecies (Patten and Pruett 2009). Because it is debatable that the Modesto population is genetically distinct, it is considered a California species of special concern (Gardali 2008) until further genetic studies are conclusive.

Song sparrows are year-round residents that breed from mid-March through early August in the Sacramento Valley, Delta, and northern San Joaquin Valley, with centers of abundance in the Delta and Butte Sink areas (Gardali 2008). They generally breed in freshwater and saline emergent wetlands and riparian willow thickets. However, breeding has been documented in sparsely vegetated agricultural ditches, and levees, especially in areas adjacent to the Butte Sink, in the northernmost limit of Little Butte Creek, and in roadside agricultural ditches east of the Sacramento River above the Tisdale Bypass (Gardali 2008).

The Modesto song sparrow is known to occur in the sloughs around Bouldin Island. Because suitable habitat is present adjacent to the survey area and marginal habitat occurs in the survey area the Modesto song sparrow has a moderate to high potential to be present in the survey area.

Other Breeding and Migratory Birds

The Federal Migratory Bird Treaty Act and Section 3513 of the California Fish and Game Code protect raptors, most native migratory birds, and breeding birds that could be present in the survey area. The survey area provides high-quality foraging and nesting opportunities for a variety of resident and migratory birds. Common raptor species that may nest in the mature trees in the survey area could include red-tailed hawk, red-shouldered hawk, and great horned owl (observed near survey area). Wading birds such as the great egret and the great blue heron are known to nest on the nearby Venice and Decker Islands and could use the agricultural ditches for foraging.

Western Red Bat

The western red bat is listed by CDFW as a California species of special concern. This is a riparian obligate species (i.e., dependent on riparian habitat) that is ubiquitous throughout California except the northern Great Basin region. Western red bats roost individually in dense clumps of tree foliage in riparian areas, orchards, and suburban areas. They are primarily moth specialists but will forage for a variety of other insects. Individuals have been observed foraging around streetlamps and floodlights in suburban areas (WBWG 2005).

Based on its tendency to roost within tree foliage, this species may be intermittently present in the riparian areas; the closest and most recent CNDDB occurrence within 5 miles was from 1999 and was located 4 miles to the west.

Critical Habitat for Listed Wildlife Species

USFWS defines the term "critical habitat" in the Federal Endangered Species Act as a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. The survey area is not within designated critical habitat for any listed terrestrial wildlife species. While delta smelt critical habitat does overlap Bouldin Island and Central Valley steelhead critical habitat is designated in the waters around Bouldin Island, there is currently no habitat to support delta smelt or Central Valley steelhead in the Project area.

Essential Fish Habitat

No EFH occurs in the proposed Project area. Pacific Coast Salmon EFH for Chinook salmon is designated in the waters around Bouldin Island. Pacific Coast Groundfish EFH extends to the mean higher high-water level (MHHW) or the upriver extent of saltwater intrusion (upstream area and landward where waters have salinities less than 0.5 ppt); however, Pacific Groundfish species occur primarily in higher salinity areas, principally further west in San Pablo Bay, Suisun Bay and Central San Francisco Bay.

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Appendix A

Aquatic Resources Delineation Memorandum

180 Grand Avenue
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Oakland, CA 94612
510.839.5066 phone
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esassoc.com

memorandum

date	December 21, 2021
to	Dee Bradshaw, Metropolitan Water District of Southern California
cc	Christy Dawson, Environmental Science Associates (ESA)
from	Joe Sanders, Environmental Science Associates (ESA)
subject	Bouldin Island Delta Smelt Preservation Project – Aquatic Resources Delineation Memorandum

Introduction

Environmental Science Associates (ESA) conducted a delineation of aquatic resources on behalf of the Metropolitan Water District of Southern California. The study area, which encompasses an area approximately 144.61 acres, is located adjacent to the confluence of the North Mokelumne River and the South Mokelumne River in northwestern San Joaquin County, CA (**Attachment 1**). The Mokelumne River borders the Proposed Project on north and east sides and is separated from the Proposed Project by a levee system. The south and west sides of the project are bound by irrigation ditches and adjacent farm fields.

The purpose of this memo is to identify aquatic resources, if present, within the study area. It is important to note that this work builds upon a previous Preliminary Jurisdictional Determination (PJD) of aquatic resources by the California Department of Water Resources (DWR) which encompasses this study area (SPK-2019-00899) and is provided in **Attachment 3**. This assessment is based on the best professional judgment of ESA investigators. All conclusions presented should be considered preliminary and subject to change pending agency review.

Setting

The study area is located adjacent to the confluence of the North Mokelumne River and the South Mokelumne River. The Mokelumne River borders the study area on north and east sides and is separated from the study area by a levee system. The south and west sides of the project are bound by irrigation ditches and adjacent farm fields, that were recently planted in corn. The study area currently consists of a fallow wheat field that has most recently been dryland farmed, a depressional area that is used as levee sourcing material, and farm roads. Bouldin Island was reclaimed around 1922, farmed continuously, and due to on-going land subsidence, is now between 5 and 25 feet below sea level and the adjacent river water surface elevations. A toe-drain is located at the base of the levee and is overgrown with blackberries.

Survey Methods

ESA Wetland Ecologist Joe Sanders verified previously mapped aquatic resources in the field based on their spatial extents on November 8, 2021. The study area was walked such that visual coverage was 100 percent. All features, including the aquatic resources mapping performed by DWR in 2020 and study area boundaries, were analyzed in the field with a GPS unit (EOS Arrow 100) with real-time differential correction and an instrument-rated mapping accuracy of less than one meter.

Survey Results

The boundaries of previously mapped aquatic resources within the study area by DWR in 2020 were determined to encompass all aquatic resources present within the study area (**Attachment 2**). Aquatic features present within the study area include Agricultural Ditches, Forested Wetlands, Freshwater Emergent Wetlands, and Scrub Shrub Wetlands. The aquatic features that occur within the study area are outlined below in **Table 1**.

TABLE 1
AQUATIC RESOURCES SUMMARY

Feature Type	Cowardin Classification	Area	
		Acres	Square Feet
Wetlands			
Agricultural Ditch	*Palustrine - Emergent - farmed*	1.38	60,262
Forested Wetland	*Palustrine - Forested*	0.20	8,523
Freshwater Emergent Wetland	*Palustrine - Emergent Persistent*	10.48	456,593
Scrub Shrub Wetland	*Palustrine - Scrub-Shrub*	2.58	112,597
Total Area of Aquatic Features:		**14.65**	**637,975**

All mapped features likely have a significant nexus with the Mokelumne River, a Traditional Navigable Water (TNW), and are therefore likely jurisdictional under Sections 401 and 404 of the Clean Water Act (CWA). These results received a Preliminary Jurisdictional Determination by the USACE in 2020 (SPK-2019-00899) and are subject to further change pending agency review.

Attachments

Attachment 1 – Regional Location Map

Attachment 2 – Aquatic Resources Delineation Map

Attachment 3 – Delta Conveyance Project – Aquatic Resources Delineation Report

Appendix B
Special-Status Species Lists

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

San Joaquin County, California

Local office

San Francisco Bay-Delta Fish And Wildlife

(916) 930-5603

(916) 930-5654

650 Capitol Mall
Suite 8-300
Sacramento, CA 95814

http://kim_squires@fws.gov

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
California Clapper Rail Rallus longirostris obsoletus Wherever found No critical habitat has been designated for this species. http://ecos.fws.gov/ecp/species/4240	Endangered

Reptiles

NAME	STATUS
Giant Garter Snake Thamnophis gigas Wherever found No critical habitat has been designated for this species. http://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. http://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander Ambystoma californiense There is **final** critical habitat for this species. The location of the critical habitat is not available. http://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS

Delta Smelt Hypomesus transpacificus — Threatened

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

http://ecos.fws.gov/ecp/species/321

Insects

NAME	STATUS

Delta Green Ground Beetle Elaphrus viridis — Threatened

Wherever found

There is **final** critical habitat for this species. The location of the critical habitat is not available.

http://ecos.fws.gov/ecp/species/2319

Monarch Butterfly Danaus plexippus — Candidate

Wherever found

No critical habitat has been designated for this species.

http://ecos.fws.gov/ecp/species/9743

Valley Elderberry Longhorn Beetle Desmocerus californicus dimorphus — Threatened

Wherever found

There is **final** critical habitat for this species. The location of the critical habitat is not available.

http://ecos.fws.gov/ecp/species/7850

Crustaceans

NAME	STATUS

Conservancy Fairy Shrimp Branchinecta conservatio — Endangered

Wherever found

There is **final** critical habitat for this species. The location of the critical habitat is not available.

http://ecos.fws.gov/ecp/species/8246

Vernal Pool Fairy Shrimp Branchinecta lynchi — Threatened
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
http://ecos.fws.gov/ecp/species/498

Vernal Pool Tadpole Shrimp Lepidurus packardi — Endangered
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
http://ecos.fws.gov/ecp/species/2246

Flowering Plants

NAME	STATUS
Large-flowered Fiddleneck Amsinckia grandiflora Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. http://ecos.fws.gov/ecp/species/5558	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Delta Smelt Hypomesus transpacificus http://ecos.fws.gov/ecp/species/321#crithab	Final

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus — Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
http://ecos.fws.gov/ecp/species/1626

Clark's Grebe Aechmophorus clarkii — Breeds Jun 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
http://ecos.fws.gov/ecp/species/2084

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
http://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
http://ecos.fws.gov/ecp/species/9656

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
http://ecos.fws.gov/ecp/species/3910

Wrentit Chamaea fasciata — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Yellow-billed Magpie Pica nuttalli

Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
http://ecos.fws.gov/ecp/species/9726

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

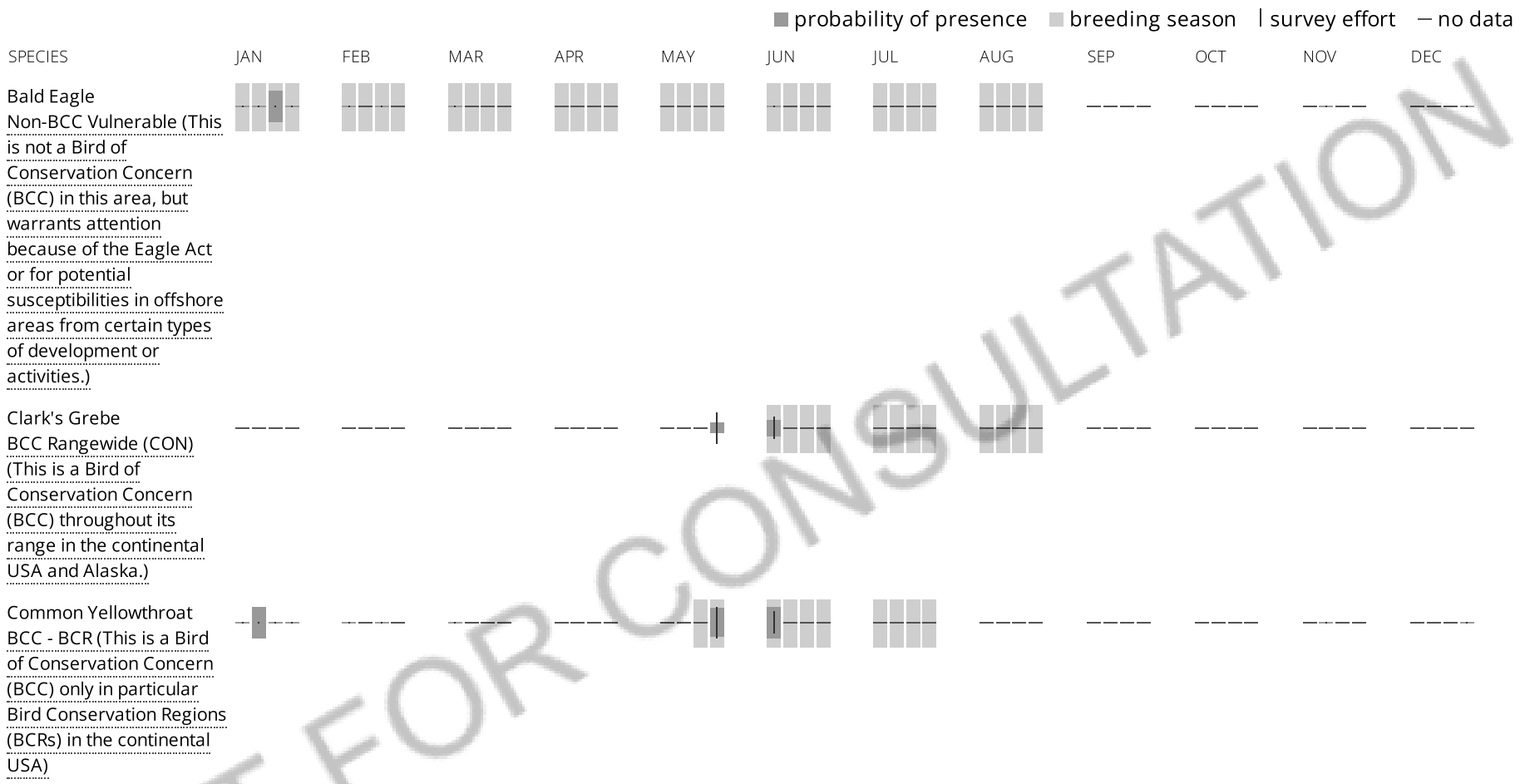
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Nuttall's Woodpecker BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)	____	____	____	____	____	____	____	____	____	____	____	____
Oak Titmouse BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)	____	____	____	____	____	____	____	____	____	____	____	____
Tricolored Blackbird BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)	____	____	____	____	____	____	____	____	____	____	____	____
Wrentit BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)	____	____	____	____	____	____	____	____	____	____	____	____
Yellow-billed Magpie BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)	____	____	____	____	____	____	____	____	____	____	____	____

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

Wildlife refuges and fish hatcheries

REFUGE AND FISH HATCHERY INFORMATION IS NOT AVAILABLE AT THIS TIME

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

OTHER

Pf

RIVERINE

R1UBV

R2ABHx

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Rio Vista (3812126) OR Isleton (3812125) OR Thornton (3812124) OR Jersey Island (3812116) OR Bouldin Island (3812115) OR Terminous (3812114) OR Woodward Island (3712185) OR Holt (3712184) OR Brentwood (3712186))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Alkali Meadow *Alkali Meadow*	CTT45310CA	None	None	G3	S2.1	
alkali milk-vetch *Astragalus tener var. tener*	PDFAB0F8R1	None	None	G2T1	S1	1B.2
Alkali Seep *Alkali Seep*	CTT45320CA	None	None	G3	S2.1	
American peregrine falcon *Falco peregrinus anatum*	ABNKD06071	Delisted	Delisted	G4T4	S3S4	FP
Antioch andrenid bee *Perdita scitula antiochensis*	IIHYM01031	None	None	G1T1	S1	
Antioch Dunes anthicid beetle *Anthicus antiochensis*	IICOL49020	None	None	G1	S1	
Antioch Dunes evening-primrose *Oenothera deltoides ssp. howellii*	PDONA0C0B4	Endangered	Endangered	G5T1	S1	1B.1
bank swallow *Riparia riparia*	ABPAU08010	None	Threatened	G5	S2	
big tarplant *Blepharizonia plumosa*	PDAST1C011	None	None	G1G2	S1S2	1B.1
Bolander's water-hemlock *Cicuta maculata var. bolanderi*	PDAPI0M051	None	None	G5T4T5	S2?	2B.1
Brewer's western flax *Hesperolinon breweri*	PDLIN01030	None	None	G2	S2	1B.2
bristly sedge *Carex comosa*	PMCYP032Y0	None	None	G5	S2	2B.1
burrowing owl *Athene cunicularia*	ABNSB10010	None	None	G4	S3	SSC
California black rail *Laterallus jamaicensis coturniculus*	ABNME03041	None	Threatened	G3G4T1	S1	FP
California linderiella *Linderiella occidentalis*	ICBRA06010	None	None	G2G3	S2S3	
California tiger salamander - central California DPS *Ambystoma californiense pop. 1*	AAAAA01181	Threatened	Threatened	G2G3	S3	WL
caper-fruited tropidocarpum *Tropidocarpum capparideum*	PDBRA2R010	None	None	G1	S1	1B.1
Cismontane Alkali Marsh *Cismontane Alkali Marsh*	CTT52310CA	None	None	G1	S1.1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Coastal and Valley Freshwater Marsh *Coastal and Valley Freshwater Marsh*	CTT52410CA	None	None	G3	S2.1	
Congdon's tarplant *Centromadia parryi ssp. congdonii*	PDAST4R0P1	None	None	G3T1T2	S1S2	1B.1
curved-foot hygrotus diving beetle *Hygrotus curvipes*	IICOL38030	None	None	G1	S1	
Delta button-celery *Eryngium racemosum*	PDAPI0Z0S0	None	Endangered	G1	S1	1B.1
Delta mudwort *Limosella australis*	PDSCR10030	None	None	G4G5	S2	2B.1
Delta smelt *Hypomesus transpacificus*	AFCHB01040	Threatened	Endangered	G1	S1	
Delta tule pea *Lathyrus jepsonii var. jepsonii*	PDFAB250D2	None	None	G5T2	S2	1B.2
eel-grass pondweed *Potamogeton zosteriformis*	PMPOT03160	None	None	G5	S3	2B.2
giant gartersnake *Thamnophis gigas*	ARADB36150	Threatened	Threatened	G2	S2	
great blue heron *Ardea herodias*	ABNGA04010	None	None	G5	S4	
Great Valley Valley Oak Riparian Forest *Great Valley Valley Oak Riparian Forest*	CTT61430CA	None	None	G1	S1.1	
hoary bat *Lasiurus cinereus*	AMACC05030	None	None	G3G4	S4	
loggerhead shrike *Lanius ludovicianus*	ABPBR01030	None	None	G4	S4	SSC
longfin smelt *Spirinchus thaleichthys*	AFCHB03010	Candidate	Threatened	G5	S1	
marsh skullcap *Scutellaria galericulata*	PDLAM1U0J0	None	None	G5	S2	2B.2
Mason's lilaeopsis *Lilaeopsis masonii*	PDAPI19030	None	Rare	G2	S2	1B.1
midvalley fairy shrimp *Branchinecta mesovallensis*	ICBRA03150	None	None	G2	S2S3	
molestan blister beetle *Lytta molesta*	IICOL4C030	None	None	G2	S2	
Northern California legless lizard *Anniella pulchra*	ARACC01020	None	None	G3	S3	SSC
redheaded sphecid wasp *Eucerceris ruficeps*	IIHYM18010	None	None	G1G3	S1S2	
riparian brush rabbit *Sylvilagus bachmani riparius*	AMAEB01021	Endangered	Endangered	G5T1	S1	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Sacramento anthicid beetle *Anthicus sacramento*	IICOL49010	None	None	G1	S1	
San Joaquin kit fox *Vulpes macrotis mutica*	AMAJA03041	Endangered	Threatened	G4T2	S2	
San Joaquin pocket mouse *Perognathus inornatus*	AMAFD01060	None	None	G2G3	S2S3	
San Joaquin spearscale *Extriplex joaquinana*	PDCHE041F3	None	None	G2	S2	1B.2
Sanford's arrowhead *Sagittaria sanfordii*	PMALI040Q0	None	None	G3	S3	1B.2
side-flowering skullcap *Scutellaria lateriflora*	PDLAM1U0Q0	None	None	G5	S2	2B.2
soft salty bird's-beak *Chloropyron molle ssp. molle*	PDSCR0J0D2	Endangered	Rare	G2T1	S1	1B.2
song sparrow ("Modesto" population) *Melospiza melodia*	ABPBXA3010	None	None	G5	S3?	SSC
steelhead - Central Valley DPS *Oncorhynchus mykiss irideus pop. 11*	AFCHA0209K	Threatened	None	G5T2Q	S2	
stinkbells *Fritillaria agrestis*	PMLIL0V010	None	None	G3	S3	4.2
Suisun Marsh aster *Symphyotrichum lentum*	PDASTE8470	None	None	G2	S2	1B.2
Swainson's hawk *Buteo swainsoni*	ABNKC19070	None	Threatened	G5	S3	
tricolored blackbird *Agelaius tricolor*	ABPBXB0020	None	Threatened	G1G2	S1S2	SSC
valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	IICOL48011	Threatened	None	G3T2	S3	
vernal pool fairy shrimp *Branchinecta lynchi*	ICBRA03030	Threatened	None	G3	S3	
watershield *Brasenia schreberi*	PDCAB01010	None	None	G5	S3	2B.3
western bumble bee *Bombus occidentalis*	IIHYM24250	None	None	G2G3	S1	
western pond turtle *Emys marmorata*	ARAAD02030	None	None	G3G4	S3	SSC
western red bat *Lasiurus blossevillii*	AMACC05060	None	None	G4	S3	SSC
western ridged mussel *Gonidea angulata*	IMBIV19010	None	None	G3	S1S2	
western spadefoot *Spea hammondii*	AAABF02020	None	None	G2G3	S3	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
Elanus leucurus						
woolly rose-mallow	PDMAL0H0R3	None	None	G5T3	S3	1B.2
Hibiscus lasiocarpos var. occidentalis						

Record Count: 62

Search Results

12 matches found. Click on scientific name for details

Search Criteria: Quad is one of [**3812125:3812115**]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	PHOTO
Brasenia schreberi	watershield	Cabombaceae	perennial rhizomatous herb (aquatic)	Jun-Sep	None	None	G5	S3	2B.3	 ©2014 Kirsten Bovee
Carex comosa	bristly sedge	Cyperaceae	perennial rhizomatous herb	May-Sep	None	None	G5	S2	2B.1	 Dean Wm. Taylor 1997
Cicuta maculata var. *bolanderi*	Bolander's water-hemlock	Apiaceae	perennial herb	Jul-Sep	None	None	G5T4T5	S2?	2B.1	No Photo Available
Hibiscus lasiocarpos var. *occidentalis*	woolly rose-mallow	Malvaceae	perennial rhizomatous herb (emergent)	Jun-Sep	None	None	G5T3	S3	1B.2	 © 2020 Steven Perry
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	Fabaceae	perennial herb	May-Jul(Aug-Sep)	None	None	G5T2	S2	1B.2	 © 2003 Mark Fogiel
Lilaeopsis masonii	Mason's lilaeopsis	Apiaceae	perennial rhizomatous herb	Apr-Nov	None	CR	G2	S2	1B.1	No Photo Available
Limosella australis	Delta mudwort	Scrophulariaceae	perennial stoloniferous herb	May-Aug	None	None	G4G5	S2	2B.1	 © 2020 Richard Sage
Potamogeton zosteriformis	eel-grass pondweed	Potamogetonaceae	annual herb (aquatic)	Jun-Jul	None	None	G5	S3	2B.2	No Photo Available
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	None	None	G3	S3	1B.2	No Photo Available
Scutellaria galericulata	marsh skullcap	Lamiaceae	perennial rhizomatous herb	Jun-Sep	None	None	G5	S2	2B.2	 © 2021

			herb							Scot Loring
Scutellaria lateriflora	side-flowering skullcap	Lamiaceae	perennial rhizomatous herb	Jul-Sep	None	None	G5	S2	2B.2	No Photo Available
Symphyotrichum lentum	Suisun Marsh aster	Asteraceae	perennial rhizomatous herb	(Apr)May-Nov	None	None	G2	S2	1B.2	No Photo Available

Showing 1 to 12 of 12 entries

Suggested Citation:

California Native Plant Society, Rare Plant Program. 2022. Inventory of Rare and Endangered Plants of California (online edition, v9-01 1.0). Website https://www.rareplants.cnps.org [accessed 22 January 2022].

Appendix D

Aquatic Resources Delineation Memo

180 Grand Avenue
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Oakland, CA 94612
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esassoc.com

memorandum

date	December 21, 2021
to	Dee Bradshaw, Metropolitan Water District of Southern California
cc	Christy Dawson, Environmental Science Associates (ESA)
from	Joe Sanders, Environmental Science Associates (ESA)
subject	Bouldin Island Delta Smelt Preservation Project – Aquatic Resources Delineation Memorandum

Introduction

Environmental Science Associates (ESA) conducted a delineation of aquatic resources on behalf of the Metropolitan Water District of Southern California. The study area, which encompasses an area approximately 144.61 acres, is located adjacent to the confluence of the North Mokelumne River and the South Mokelumne River in northwestern San Joaquin County, CA (**Attachment 1**). The Mokelumne River borders the Proposed Project on north and east sides and is separated from the Proposed Project by a levee system. The south and west sides of the project are bound by irrigation ditches and adjacent farm fields.

The purpose of this memo is to identify aquatic resources, if present, within the study area. It is important to note that this work builds upon a previous Preliminary Jurisdictional Determination (PJD) of aquatic resources by the California Department of Water Resources (DWR) which encompasses this study area (SPK-2019-00899) and is provided in **Attachment 2**. This assessment is based on the best professional judgment of ESA investigators. All conclusions presented should be considered preliminary and subject to change pending agency review.

Setting

The study area is located adjacent to the confluence of the North Mokelumne River and the South Mokelumne River. The Mokelumne River borders the study area on north and east sides and is separated from the study area by a levee system. The south and west sides of the project are bound by irrigation ditches and adjacent farm fields, that were recently planted in corn. The study area currently consists of a fallow wheat field that has most recently been dryland farmed, a depressional area that is used as levee sourcing material, and farm roads. Bouldin Island was reclaimed around 1922, farmed continuously, and due to on-going land subsidence, is now between 5 and 25 feet below sea level and the adjacent river water surface elevations. A toe-drain is located at the base of the levee and is overgrown with blackberries.

Survey Methods

ESA Wetland Ecologist Joe Sanders verified previously mapped aquatic resources in the field based on their spatial extents on November 8, 2021. The study area was walked such that visual coverage was 100 percent. All features, including the aquatic resources mapping performed by DWR in 2020 and study area boundaries, were analyzed in the field with a GPS unit (EOS Arrow 100) with real-time differential correction and an instrument-rated mapping accuracy of less than one meter.

Survey Results

The boundaries of previously mapped aquatic resources within the study area by DWR in 2020 were determined to encompass all aquatic resources present within the study area (**Attachment 3**). Aquatic features present within the study area include Agricultural Ditches, Forested Wetlands, Freshwater Emergent Wetlands, and Scrub Shrub Wetlands. The aquatic features that occur within the study area are outlined below in **Table 1**.

TABLE 1
AQUATIC RESOURCES SUMMARY

Feature Type	Cowardin Classification	Area	
		Acres	Square Feet
Wetlands			
Agricultural Ditch	*Palustrine - Emergent - farmed*	1.38	60,262
Forested Wetland	*Palustrine - Forested*	0.20	8,523
Freshwater Emergent Wetland	*Palustrine - Emergent Persistent*	10.48	456,593
Scrub Shrub Wetland	*Palustrine - Scrub-Shrub*	2.58	112,597
Total Area of Aquatic Features:		**14.65**	**637,975**

All mapped features likely have a significant nexus with the Mokelumne River, a Traditional Navigable Water (TNW), and are therefore likely jurisdictional under Sections 401 and 404 of the Clean Water Act (CWA). These results received a Preliminary Jurisdictional Determination by the USACE in 2020 (SPK-2019-00899) and are subject to further change pending agency review.

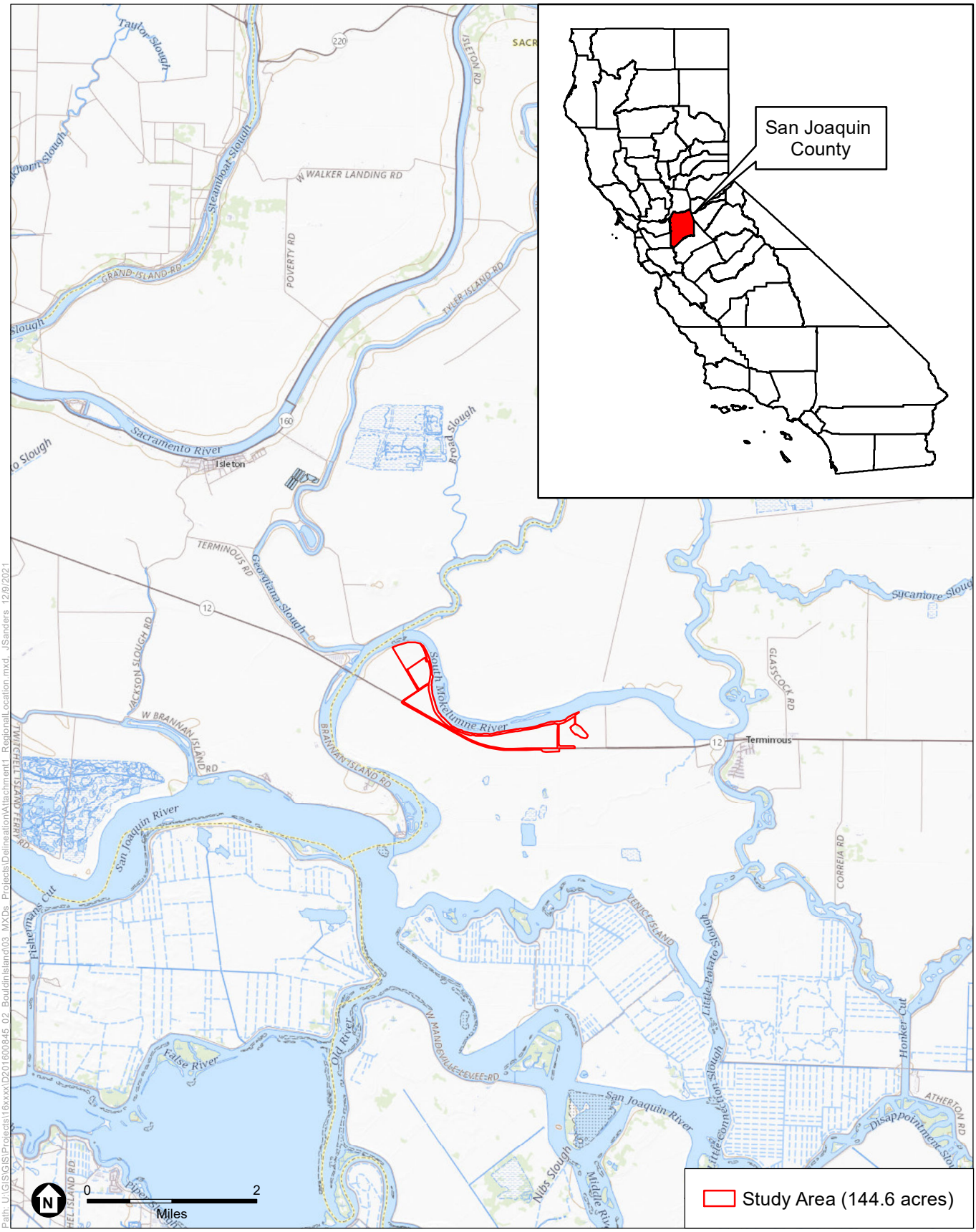
Attachments

Attachment 1 – Regional Location Map

Attachment 2 – Delta Conveyance Project – Aquatic Resources Delineation Report

Attachment 3 – Aquatic Resources Delineation Map

Attachment 1
Regional Location Map



SOURCE: USGS, 20221; ESA, 2021

Delta Smelt Preservation Project

Attachment 1
Regional Location

ESA

Attachment 2

Delta Conveyance Project - Aquatic Resources Delineation Report

Aquatic Resources Delineation Report

Delta Conveyance Project

April 27, 2020

Submitted to:

US Army Corps of Engineers, Sacramento District
1325 J Street – Room 1513
Sacramento, CA 95814

Prepared by:

California Department of Water Resources
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EXECUTIVE SUMMARY

The California Department of Water Resources is proposing to construct a water conveyance facility in the Sacramento–San Joaquin Delta, known as the Delta Conveyance Project. The following report presents the results of a delineation of potential waters of the United States, including wetlands, within the 135,639-acre study area. Two alignments (Central and East) are being considered for further development at this time, and a preferred alignment and project footprint will be identified in the pending Department of the Army permit application at a later date. The study area encompasses both alignments that are currently being considered.

The following report and mapping have been prepared for the Sacramento District of the U. S. Army Corps of Engineers (USACE) to request a verification of aquatic resources utilizing the Preliminary Jurisdictional Determination process. Aquatic features that are identified as potential waters of the United States may be subject to USACE regulation under Section 404 of the Clean Water Act up to the ordinary high-water mark for non-tidal channels and to the mean higher high water elevation (e.g., high tide line) in water bodies subject to tidal influence. Navigable waters, including waters subject to tidal influence, up to the mean high water level, are also subject to USACE regulation under Section 10 of the Rivers and Harbors Act of 1899.

Within the 135,639-acre study area for this project, 16,680.85 acres of wetlands and other waters were delineated.

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ACRONYMS AND ABBREVIATIONS

CVP	Central Valley Project
CWA	Clean Water Act
Delta	Sacramento–San Joaquin Delta
DEM	Digital Elevation Model
DWR	California Department of Water Resources
CDFW	California Department of Fish and Wildlife
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
GIS	Geographic Information System
HUC	Hydrologic Unit Code
LiDAR	Light Detection and Ranging
MHW	Mean High Water
MHHW	Mean Higher High Water
MLRA	Major Land Resource Area
NAIP	National Agriculture Imagery Program
NAVD 88	North American Vertical Datum of 1988
NRCS	Natural Resources Conservation Service
OBL	Obligate
OHWM	Ordinary High-Water Mark
PJD	Preliminary Jurisdictional Determination
SWP	State Water Project
RGL	Regulatory Guidance Letter
RPW	Relatively Permanent Water
TNW	Traditional Navigable Water
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey

1.0 INTRODUCTION

The California Department of Water Resources (DWR) is proposing to construct a water conveyance facility (Delta Conveyance Project; proposed project) in the Sacramento–San Joaquin Delta (Delta).

The existing State Water Project (SWP) water conveyance facilities, which include Clifton Court Forebay and the Banks Pumping Plant in the south Delta, currently enable DWR to divert water and lift it into the California Aqueduct. The proposed project would construct and operate new conveyance facilities in the Delta that would add to the existing SWP infrastructure. New intake facilities are proposed as part of the Delta Conveyance Project as points of diversion that would be located in the north Delta along the Sacramento River between Freeport and the confluence with Sutter Slough. The new conveyance facilities would include a tunnel to convey water from the new intakes to the existing Banks Pumping Plant and potentially the federal Jones Pumping Plant in the south Delta. The new facilities would provide an alternate location for diversion of water from the Delta and would be operated in coordination with the existing south Delta pumping facilities, resulting in a system also known as "dual conveyance" because there would be two complementary methods to divert and convey water. New facilities proposed for the Delta Conveyance Project include, but are not limited to, the following:

- Two intake facilities on the Sacramento River
- Tunnel reaches and tunnel shafts
- Forebays
- Pumping plant
- South Delta Conveyance Facilities

Other ancillary facilities may be constructed to support construction of the conveyance facilities including, but not limited to, access roads, barge unloading facilities, concrete batch plants, fuel stations, mitigation areas, and power transmission and/or distribution lines. Under the proposed project, the new north Delta facilities would be sized to convey up to 6,000 cubic feet per second (cfs) of water from the Sacramento River to the SWP facilities in the south Delta.

The 135,639-acre study area for this project is located within the legal Delta (Figure 1. *Study Area for the Delta Conveyance Project;* DWR 2020). The study area includes two alignments (Central and East) that are currently being considered for further development, and a preferred alignment and project footprint will be identified at a later date. Because of the large size of the study area and the lack of access to private land[1], aquatic resources were mapped via interpretation of aerial imagery, topographical maps,

[1] Through environmental review of previous Delta conveyance projects, the Bay Delta Conservation Plan and the California WaterFix, private landowners throughout the Delta have objected to DWR's requests to access land in private ownership to perform soil studies leading to a series of court cases culminating in the California State Supreme Court decision, Property Reserve, Inc. v. Superior Court (2016) 1 Cal.5th 151.

LiDAR imagery, and vegetation maps in a Geographical Information System (GIS). No pedestrian field surveys were completed as part of the current mapping effort discussed in this report.

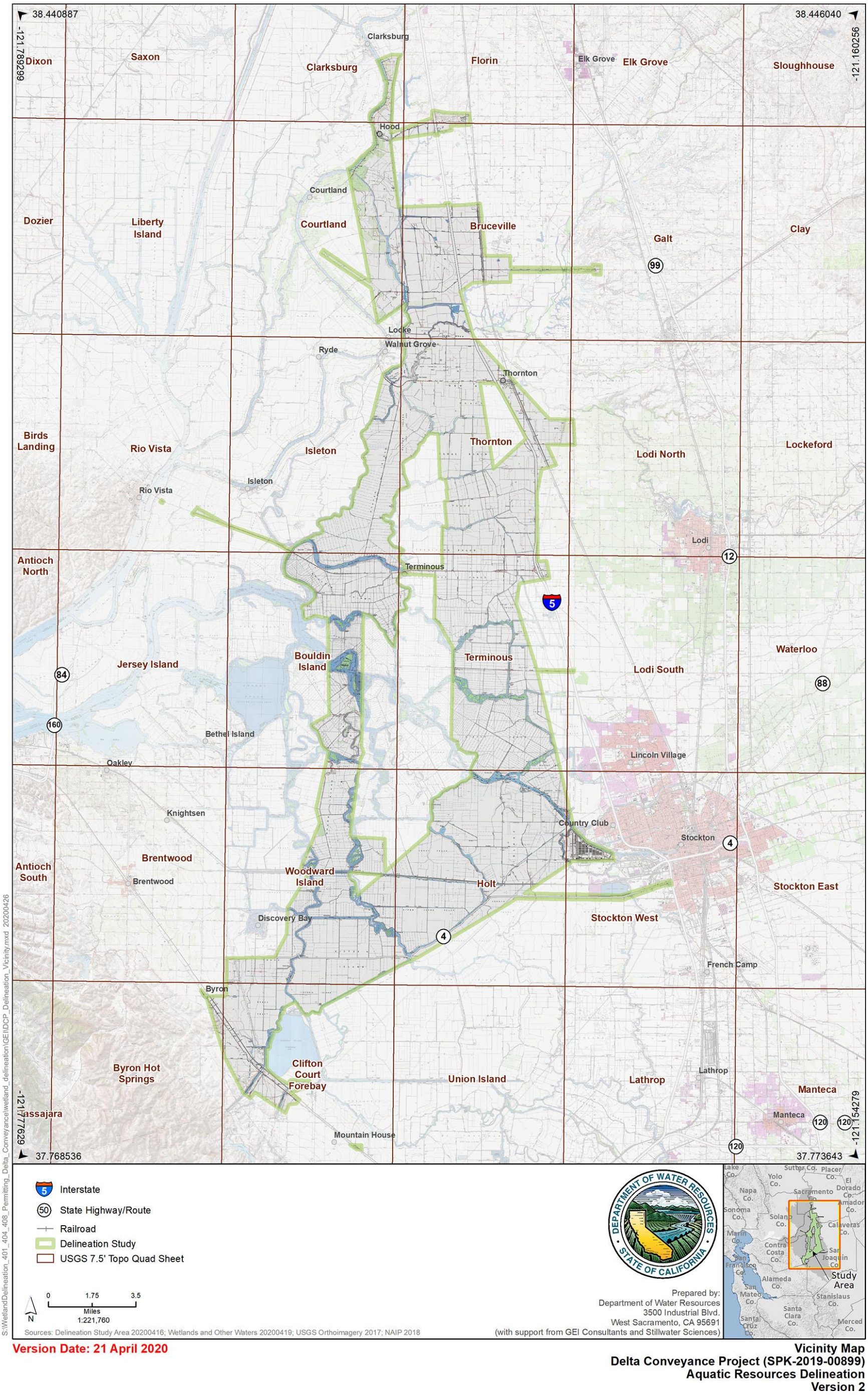

Figure 1. Study Area for the Proposed Delta Conveyance Project

This report presents the results of a delineation of potential waters of the U.S., including wetlands, in the study area. Waters of the U.S. are subject to U.S. Army Corps of Engineers (USACE) regulation under Section 404 of the Clean Water Act (CWA) to the Ordinary High Water Mark (OHWM) for non-tidal channels and to the Mean Higher High Water (MHHW) elevation (e.g., high tide line) in water bodies subject to tidal influence. Navigable waters, including waters subject to tidal influence to the Mean High Water (MHW) level, are also subject to USACE regulation under Section 10 of the Rivers and Harbors Act of 1899.

DWR hereby requests verification of this delineation, utilizing the Preliminary Jurisdictional Determination (PJD) process from the Sacramento District of the USACE.

2.0 METHODS

The Delta Conveyance Project study area encompasses approximately 135,639 acres. At the time of this delineation, only a limited portion of the study area was accessible to conduct field delineation due to lack of access to properties under private ownership; therefore, the decision was made to conduct the entire delineation via aerial imagery interpretation in order to maintain consistency across the study area. During project kick-off efforts, DWR met with USACE and State Water Resources Control Board staff to obtain agreement on a methodology that relied exclusively upon aerial photo interpretation and digitizing aquatic resources using GIS. Similar methods have been employed and accepted for other large-scale projects in the region in the recent past.

The Core Wetland Mapping Team was composed of wetland delineators, GIS analysts, and wetland ecologists from DWR's Division of Environmental Services, GEI Consultants, Inc., and Stillwater Sciences, working under the direction of DWR's Delta Conveyance Office. The Core Wetland Mapping Team used aerial imagery interpretation in GIS to identify and delineate aquatic features in the study area by identifying signatures typically associated with, and indicative of wetlands, including areas of inundation or saturation on wet season imagery, hydrophytic vegetation signatures that persisted over multiple years, and soil map unit properties as obtained from the Natural Resource Conservation Service (NRCS) Soil Survey. Other imagery signatures that were evaluated included variation in soil color and areas of active agriculture where cropped lands showed reduced growth and/or vigor. LiDAR imagery was routinely used to identify minor variations in topography to correlate potential wetland signatures on aerial imagery to topographic depressions and to delineate wetland polygons.

To ensure a systematic approach for evaluating the entirety of the study area, a grid of 509 tiles was overlaid on the study area. Each tile covered approximately 371 acres, with a perimeter of approximately 3.1 miles. Blocks of tiles were assigned to each of the five GIS analysts on the Core Wetland Mapping Team, and each tile was recorded as it was completed. A quality assurance review of the consultant-produced portions of the data was conducted by DWR prior to submission of the mapping to USACE.

2.1 Data Sources

The Core Wetland Mapping Team primarily used the following as data sources to identify aquatic features within the study area:

- 1-foot resolution true-color digital orthorectified aerial imagery flown on December 14-20, 2017 (USGS 2017)
- 2017 Sacramento-San Joaquin Delta LiDAR, Digital Elevation Model (DEM) data from flights conducted on December 9, 2017 through January 21, 2018 (USGS 2017)
- 1-meter pixel resolution true-color digital aerial imagery from the National Agriculture Imagery Program captured in 2018 (NAIP 2018)
- Soil data from the NRCS Web Soil Survey database (NRCS 2019)

Additional sources of information included historical aerial imagery available on Google Earth, United States Geological Survey (USGS) topographic maps, earlier NAIP imagery, the United States Fish and Wildlife Service's (USFWS) National Wetland Inventory (USFWS 2020), and the 2011 Delta Vegetation and Land Use Data (CDFW 2020). Wetland mapping products that were developed by DWR for the Bay Delta Conservation Plan and California Water Fix were also consulted. Information on wetland vegetation, soils, and hydrology which was used to identify aquatic features is described below.

2.2 Delineation of Aquatic Resources

Over the majority of the study area, aquatic resources were initially identified using the 2017 USGS orthoimagery, which was the most recent high-resolution imagery collected during the wet season that was available during the mapping process. If a presumed aquatic resource was identified based on the 2017 USGS orthoimagery, the 2017 DEM and aerial imagery from other years were also viewed to confirm the presence of the feature. This was done to reduce aerial photo interpretation error, and to ensure that only persistent aquatic resources were mapped and not anomalies that were present in only one year (e.g. temporary agricultural ditches). Some of the easternmost portions of the study area were not included in the 2017 imagery collection, and in those cases, the 2018 NAIP was used as the primary source. Aquatic resources were digitized at a 1:1000 or greater (e.g. 1:500) map scale. All aquatic features that were identified at this scale were mapped. Ditches and other narrow, linear features were digitized as lines that were buffered based on their observed width.

Wetland features within the study area were identified based on the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008) technical guidance documents that describe and define the characteristics of wetlands. In these guidance documents, wetlands are defined as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Although wetland polygons were delineated based exclusively on aerial interpretation, consideration of USACE's three-parameter approach, which relies on presence of

hydrophytic vegetation assemblage, hydric soils, and wetland hydrology, was applied to identify and delineate boundaries of aquatic features.

Aquatic features were categorized as perennial or seasonal, based on persistence of hydrology as evidenced by sustained inundation or saturation visible on aerial imagery. Perennial wetlands were further classified into emergent wetlands, scrub-shrub wetlands, or forested wetlands based primarily on vegetative life form (i.e., herbaceous, shrub dominated, or tree dominated). Seasonal wetlands were further classified as alkaline wetland or vernal pool as these habitats have unique soil and distinctive vegetation assemblages. The seasonal wetland category also includes a third class generalized as "seasonal wetland" to capture the diversity of non-specialized vegetation assemblages that are associated with a range of soil types and are subject to temporal inundation of a duration that supports a hydrophytic vegetation assemblage.

Linear features and open water habitats that may qualify as other waters of the U.S. were categorized based on tidal influence as non-tidal or tidal. Non-tidal waters include natural channels, lakes, depressions, and agricultural ditches. Tidal classifications include tidal channel, which includes major waterways, and conveyance channel which was used for conveyance features associated with the SWP and Central Valley Project (CVP). Specific characteristics of each aquatic type are discussed below in Section 3.2 Aquatic Resources.

The aerial interpretation mapping methods utilized for this effort are robust, repeatable, and incorporate a number of data sources; however, conducting a wetland delineation in GIS may affect the accuracy of the results based on the following: 1) aerial imagery is necessarily distorted in order to construct a two-dimensional representation of a three-dimensional surface. For instance, NAIP aerial imagery is acquired with a minimum horizontal accuracy of 6 meters from photo-identifiable ground points (USDA 2020) and 2017 USGS imagery was produced with a minimum accuracy target of 1.52 meters (USGS 2017); and, 2) delineation based on aerial imagery is limited to evaluation of surface features such as transitions in vegetation types and inundation or saturation signatures that do not necessarily exhibit abrupt boundaries. In these cases, the delineator must use best professional judgement in delineating a wetland boundary. Because of these factors, an exact margin of precision for this delineation is difficult to quantify.

2.3 Vegetation Interpretation

Identification and quantification of many individual plant species is not possible using the methods outlined in this mapping effort; however, the vegetation assemblages that are generally associated with the wetland classes that were used are dominated by hydrophytic vegetation. The National Wetland Plant List (Lichvar et al. 2016) was referenced to obtain the wetland indicator status for each species likely to be dominant within each wetland class within the study area. A species is considered dominant when that species accounts for 20 percent or more of the total absolute cover in a vegetation stratum (USACE 1987, 2008). Based on the GIS approach employed, dominant plant species that typify a wetland class assisted in the determination of class. Botanical nomenclature follows *The Jepson Manual: Vascular Plants of California, Second Edition* (Baldwin et al. 2012).

Ratings of obligate (OBL), facultative wetland (FACW), or facultative (FAC) correspond to hydrophytic species, and the plant's frequency of occurrence in wetlands. These plant indicator categories are defined as:

- OBL—greater than 99 percent occurrence in wetlands
- FACW—between 67 percent and 99 percent occurrence in wetlands
- FAC—between 34 percent and 66 percent occurrence in wetlands

Plants ranked as facultative upland (FACU) and upland (UPL) may also occur in wetlands but are not part of the dominant plant community. Dominant plant species that are likely to be encountered in each class of wetland are described in Section 3.2 Aquatic Resources.

2.4 Soil Survey

The Core Wetland Mapping Team consulted NRCS soil maps of Alameda, Contra Costa, Sacramento, and San Joaquin counties (NRCS 2019). Although most soil map units within the study area were identified as hydric, hydric soil map units may also include portions that are non-hydric, and therefore, should not be taken as a sole indicator of wetland conditions. The hydric soil criteria are as follows (NRCS 2012):

1. All Histels except Folistels and Histosols except Folists; or
2. Map unit components in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, or Andic, Cumulic, Pachic, or Vitrandic subgroups that:
    a. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    b. Show evidence that the soil meets the definition of a hydric soil;
3. Map unit components that are frequently ponded for long duration or very long duration during the growing season that:
    a. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    b. Show evidence that the soil meets the definition of a hydric soil; or
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
    a. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    b. Show evidence that the soils meet the definition of a hydric soil.

2.5 Hydrology

The Core Wetland Mapping Team evaluated wetland hydrology by analyzing inundation or saturation signatures on aerial images and landscape form and position in the LiDAR DEM. Features such as depressions and toe slopes, combined with the photographic signatures indicative of seasonal or persistent inundation or saturation were used to infer wetland hydrology. The primary aerial image sources relied upon for this mapping effort were the 2017 USGS Orthoimagery and the 2018 NAIP imagery.

Prior to the initiation of this mapping effort, the USACE was consulted to determine whether conditions observed in the 2017 USGS Orthoimagery would be accepted as representative of normal rainfall conditions for the area. The USACE conducted an analysis of antecedent rainfall conditions using the dates of the imagery flight and found scores over the study area ranging from 7 to 11, indicating that wet season conditions at the time were normal to drier than normal. In some cases, the 2017 USGS imagery captured areas that were flood irrigated or artificially managed for waterfowl. In those cases, analysts could not exclusively rely on inundation as a reliable wetland hydrology indicator. This issue was addressed by utilizing LiDAR to identify topographic depressions and multiple aerial images to identify persistent farmed wetlands.

The 2017 LiDAR DEM and USGS 7.5-Minute 1:24,000 scale Topographic Quadrangles were used to identify topographic depressions, major water bodies, drainage channels, and ditches. Additionally, photographic signatures of hydrology were assessed under different precipitation conditions by comparing aerial photographs from multiple years. NAIP aerial imagery from 2010, 2012, and 2016, as well as aerial images in Google Earth were routinely referenced in areas subject to high degrees of anthropogenic disturbance, such as agricultural fields on Delta islands, to distinguish persistent aquatic features from more temporary features.

3.0 RESULTS

3.1 Environmental Setting

The Sacramento-San Joaquin Delta is formed at the western edge of California's Central Valley by the confluence of the Sacramento and San Joaquin Rivers. The study area is located within portions of Sacramento, San Joaquin, Contra Costa, and Alameda Counties. The study area encompasses portions of 18 USGS topographic 7.5-minute quadrangles (quads) stretching from Township 7 North on the Clarksburg quad to Township 1 South on the Clifton Court Forebay quad and spans from Range 6 East at the western study area boundary to Range 3 East along the eastern boundary. The study area overlaps with the following USGS quads: Clarksburg, Florin, Courtland, Bruceville, Galt, Rio Vista, Isleton, Thornton, Lodi North, Bouldin Island, Terminous, Lodi South, Brentwood, Woodward Island, Holt, Stockton West, Byron Hot Springs, and Clifton Court Forebay (Figure 1). The topography of the study area is generally flat and ranges in elevation from about 36 feet above sea level (NAVD 88) at the northern study area boundary to sea level near Clifton Court Forebay at the south end of the study area. The lowest elevations within the study area are located on Delta islands, with 16.44 feet below sea level (NAVD 88) documented as the lowest elevation point (USGS 2017). The highest elevation within the study area is 129.3 feet above mean sea level (NAVD 88). The Delta islands within the study area are surrounded by levees, and on-island pumps and ditches maintain water levels within the island interiors.

Cultivated land constitutes the majority of the land cover in the study area. Major crops include corn, alfalfa, tomatoes, wheat, and wine grapes. A large number of other crops are also grown in the study area, including orchard crops like almonds and pears, and many annual crops like pumpkins and safflower. Other agricultural land uses include pasture, hay, and turf grasses.

Tidal channels include open water river channels and sloughs that are subject to the ebb and flow of the tides, including portions of the Sacramento and San Joaquin Rivers, several tributaries, and associated sloughs. Tidal freshwater emergent wetland occurs as a transition between the tidal channels and adjacent riparian or upland plant communities. The lower elevation emergent wetland areas are more frequently inundated and are dominated by tules (*Schoenoplectus* spp.) and cattails (*Typha* spp.).

Non-tidal perennial aquatic communities include small ponds, lakes, and river channels without tidal influence. This community is characterized by open water; however, floating and/or submerged vegetation may be present. Common plant species include water primrose (*Ludwigia* spp.), water hyacinth (*Eichhornea crassipes*), and Brazilian waterweed (*Egeria densa*). Tules and cattails may also grow at the water margins.

The valley/foothill riparian natural community is often the transition between aquatic and upland habitats. In the Delta, this community is most often confined to long linear patches along waterways. Larger areas can be found on instream islands and restoration areas. Riparian forest supports broadleaved riparian trees with canopy cover ranging from open to dense. Riparian forest often has an understory layer of riparian scrub species. The tree species that dominate the Delta's riparian forests include willows (*Salix* spp.), Fremont's cottonwood (*Populus fremontii*), boxelder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), and California sycamore (*Platanus racemosa*).

Alkaline seasonal wetland and vernal pool complex also occur in areas where shallow depressions are underlain by hardpan or dense clay layers. The vegetation of these communities is characterized by a high percentage of native and special status species such as different species of goldfields (*Lasthenia* spp). These habitat types are found primarily at the northern and southern ends of the study area, near North Stone Lake and Clifton Court Forebay, respectively.

Seasonal wetlands occur in areas that are seasonally ponded or saturated either through water management or natural water table levels. Plant species composition within these generalized wetlands depends on the hydrologic regime. Common species range from cattails and tules to annual species that are tolerant of disturbance. In some farm fields on subsided islands, there are areas that remain too wet for crops to grow or thrive. These areas often form seasonal wetlands with weedy vegetation.

Undeveloped upland areas are generally dominated by a grassland community that consists of introduced or native annual and perennial grasses and forbs. In the study area, this community can be found on levee banks, in undeveloped fields, or interspersed with vernal pool and alkaline seasonal wetland communities. Common species include wild oats (*Avena* spp.), bromes (*Bromus* spp.), barley (*Hordeum* spp.), wild radish (*Raphanus raphanistrum*), and mustards (*Brassica* spp.).

3.1.1 Landscape and Local Hydrology

The study area crosses four watersheds, including the Lower Sacramento watershed (Hydrologic Unit Code [HUC] 18020163), the San Joaquin Delta watershed (HUC 18040003), the Upper Cosumnes watershed (HUC 18040012), and the Upper Mokelumne watershed (HUC 18040012).

The study area is located primarily within Major Land Resource Area (MLRA) 16 (California Delta) in Land Resource Region C (California Subtropical Fruit, Truck, and Specialty Crop) (NRCS 2006). This MLRA, located at the confluence of the Sacramento and San Joaquin Rivers, was floodplain prior to European settlement and anthropogenic modification. The historic Delta formed as a result of fluvial sedimentation due to reduced flow rates and low gradient stream deposition. As the Delta formed, so did the many streams that divided the then-nearly topographically level Delta into "islands." Levee building commenced in the late 1800's to facilitate large-scale agricultural development in the Delta, disconnecting the interior of Delta islands from seasonal flooding. Presently, groundwater management in the form of pumping and ditching which provide drainage to prevent islands from internal flooding is required as a result of land subsidence.

Delta channels and sloughs are influenced by ocean tides and water levels vary during each tidal cycle; the range of tidal fluctuation is from less than one foot in the east Delta to more than 5 feet near Carquinez Strait (DWR 2013). Flows in the Delta are also influenced by human activities such as the CVP and SWP operations, other water exports, channel widening, channel connections, barriers, and agricultural diversions.

The C.W. Bill Jones and Harvey O. Banks pumping plants, elements of the Federal CVP and California SWP respectively, are located in the south Delta near Tracy. These pumping plants lift water from the Delta into the Delta-Mendota Canal and California Aqueduct to deliver water to farms located in the southern Central Valley and Tulare Lake Basins, and cities in southern California. During periods of low flow, operation of the pumping plants can create a flow reversal, allowing brackish waters from San Pablo Bay to move into the Delta (NRCS 2006).

3.1.2 Soils

The NRCS soil map units that occur within the study area are shown in Figure 2 *Soil Map Units in the Study Area*. Many of the soil map units in the study area are listed as hydric, or contain minor components that meet the definition of hydric soil. Within the Delta, much of the soil genesis occurred under anaerobic conditions as a result of regular and prolonged saturation, flooding, and ponding under historic conditions. Therefore, the preponderance of hydric map units within the study area is primarily a relic of Delta conditions prior to land reclamation in the late 1800's. In many instances, hydric soil indictors remain despite the presence of levees and measures to control groundwater levels.

The soil orders that are prevalent in this MLRA are Entisols, Histosols, and Mollisols (NRCS 2006). The soils have a thermic temperature regime, aquatic soil moisture regime, and mixed minerology as a result of sediment transport from fluvic processes. The soils are generally very deep, poorly drained or very poorly drained, and have a high clay content.

According to NRCS (2006), soil great groups common to the study area generally formed as follows. Fluvaquents (Valdez series) formed in alluvium on floodplains and deltas. Haplosaprists formed in organic material in freshwater marshes (Kingile and Rindge series). Endoaquolls (Egbert, Gazwell, Peltier, and Ryde series) formed in alluvium in basins, marshes, sloughs, and on deltas.

Table 1. Soil Units Within the Study Area

Soil Unit Symbol	Soil Unit Name	Contains Hydric Components?
101	Acampo sandy loam, 0 to 2 percent slopes	No
Bb	Brentwood clay loam	No
Bc	Brentwood clay loam, wet	No
111	Bruella sandy loam, 0 to 2 percent slopes	No
CaA	Capay clay, 0 to 2 percent slopes	No
CbA	Capay clay, wet, 0 to 2 percent slopes	No
115	Clear Lake clay, hardpan substratum, drained, 0 to 1 percent slopes	Yes
114	Clear Lake clay, partially drained, 0 to 2 percent slopes, frequently flooded	Yes
130	Columbia fine sandy loam, drained, 0 to 2 percent slopes	Yes
121	Columbia sandy loam, clayey substratum, drained, 0 to 2 percent slopes, occasionally flooded	Yes
119	Columbia sandy loam, clayey substratum, partially drained, 0 to 2 percent slopes	Yes
116	Columbia sandy loam, partially drained, 0 to 2 percent slopes	Yes
123	Columbia silt loam, drained, 2 to 5 percent slopes	Yes
128	Cosumnes silt loam, drained, 0 to 2 percent slopes	Yes
129	Cosumnes silt loam, drained, 0 to 2 percent slopes, occasionally flooded	Yes
127	Cosumnes silt loam, partially drained, 0 to 2 percent slopes	Yes
138	Cosumnes silty clay loam, drained, 0 to 2 percent slopes	Yes
148	Dello clay loam, drained, 0 to 2 percent slopes, overwashed	Yes
145	Dello loamy sand, drained, 0 to 2 percent slopes	Yes
146	Dello loamy sand, partially drained, 0 to 2 percent slopes	Yes
149	Devries sandy loam, drained, 0 to 2 percent slopes, MLRA 16	Yes
135	Dierssen clay loam, deep, drained, 0 to 2 percent slopes	Yes
134	Dierssen sandy clay loam, drained, 0 to 2 percent slopes	Yes
133	Dierssen sandy loam, drained, 0 to 2 percent slopes	Yes
150	Dumps	No
137	Durixeralfs, 0 to 1 percent slopes	No
155	Egbert-Urban land complex, partially drained, 0 to 2 percent slopes	Yes
141	Egbert clay, partially drained, 0 to 2 percent slopes	Yes
Ea	Egbert mucky clay loam	Yes
152	Egbert mucky clay loam, partially drained, 0 to 2 percent slopes	Yes

Table 1. Soil Units Within the Study Area

Soil Unit Symbol	Soil Unit Name	Contains Hydric Components?
153	Egbert silty clay loam, partially drained, 0 to 2 percent slopes	Yes
154	Egbert silty clay loam, sandy substratum, partially drained, 0 to 2 percent slopes	Yes
155	Egbert-Urban land complex, partially drained, 0 to 2 percent slopes	Yes
Fc	Fluvaquents	Yes
150	Fluvaquents, 0 to 2 percent slopes, frequently flooded	Yes
159	Fluvaquents, 0 to 2 percent slopes, frequently flooded	Yes
152	Galt clay, 0 to 1 percent slopes, MLRA 17	Yes
153	Galt clay, 0 to 4 percent slopes, MLRA 17	Yes
151	Galt clay, leveled, 0 to 1 percent slopes	Yes
155	Gazwell mucky clay, partially drained, 0 to 2 percent slopes	Yes
166	Grangeville fine sandy loam, partially drained, 0 to 2 percent slopes	No
168	Guard clay loam, 0 to 2 percent slopes	Yes
169	Guard clay loam, drained, 0 to 2 percent slopes	Yes
173	Hollenbeck silty clay, 0 to 2 percent slopes	No
179	Itano silty clay loam, partially drained, 0 to 2 percent slopes	Yes
181	Jacktone-Urban land complex, 0 to 2 percent slopes	Yes
189	Kingdon fine sandy loam, 0 to 2 percent slopes	No
191	Kingile-Ryde complex, partially drained, 0 to 2 percent slopes	Yes
Kb	Kingile muck	Yes
190	Kingile muck, partially drained, 0 to 2 percent slopes	Yes
167	Lang fine sandy loam, drained, 0 to 2 percent slopes	Yes
Lb	Lang sandy loam, deep	No
169	Laugenour loam, partially drained, 0 to 2 percent slopes	Yes
LaC	Linne clay loam, 3 to 15 percent slopes	No
LbD	Linne clay loam, 5 to 15 percent slopes	No
Mb	Marcuse clay	Yes
Mbcc	Marcuse clay	Yes
Mb	Marcuse clay	Yes
Mc	Marcuse clay, strongly alkali	Yes
Md	Merritt loam	Yes
197	Merritt silty clay loam, partially drained, 0 to 2 percent slopes	Yes
205	Peltier mucky clay loam, organic substratum, partially drained, 0 to 2 percent slopes	Yes

Table 1. Soil Units Within the Study Area		
Soil Unit Symbol	**Soil Unit Name**	**Contains Hydric Components?**
204	Peltier mucky clay loam, partially drained, 0 to 2 percent slopes, MLRA 16	Yes
213	Piper sandy loam, partially drained, 0 to 2 percent slopes	Yes
190	Pits	No
222	Reiff fine sandy loam, 0 to 2 percent slopes, occasionally flooded	No
RbA	Rincon clay loam, 0 to 2 percent slopes, MLRA 14	No
RdA	Rincon clay loam, 0 to 3 percent slopes	No
Rd	Rindge muck, 0 to 2 percent slopes, partially drained, MLRA 16	Yes
225	Rindge muck, 0 to 2 percent slopes, partially drained, MLRA 16	Yes
201	Rindge mucky silt loam, partially drained, 0 to 2 percent slopes, MLRA 16	Yes
224	Rindge mucky silt loam, partially drained, 0 to 2 percent slopes, overwashed	Yes
226	Rioblancho clay loam, drained, 0 to 2 percent slopes	Yes
230	Ryde clay loam, partially drained, 0 to 2 percent slopes, MLRA 16	Yes
232	Ryde clay loam, sandy substratum, partially drained, 0 to 2 percent slopes	Yes
231	Ryde silty clay loam, organic substratum, partially drained, 0 to 2 percent slopes	Yes
233	Ryde-Peltier complex, partially drained, 0 to 2 percent slopes, MLRA 16	Yes
Sa	Sacramento clay, 0 to 2 percent slopes, MLRA 16	Yes
Sb	Sacramento clay, alkali	Yes
234	Sailboat silt loam, drained, 0 to 2 percent slopes	Yes
206	Sailboat silt loam, partially drained, 0 to 2 percent slopes	Yes
214	San Joaquin silt loam, 0 to 3 percent slopes	No
213	San Joaquin silt loam, leveled, 0 to 1 percent slopes	No
216	San Joaquin-Durixeralfs complex, 0 to 1 percent slopes	No
218	San Joaquin-Galt complex, 0 to 3 percent slopes	No
217	San Joaquin-Galt complex, leveled, 0 to 1 percent slopes	No
219	San Joaquin-Urban land complex, 0 to 2 percent slopes	No
Sc	San Ysidro loam, 0 to 5 percent slopes, dry, MLRA 17	No
Sccc	San Ysidro loam, 0 to 5 percent slopes, dry, MLRA 17	No
222	Scribner clay loam, partially drained, 0 to 2 percent slopes	Yes
243	Scribner clay loam, partially drained, 0 to 2 percent slopes	Yes

Table 1. Soil Units Within the Study Area		
Soil Unit Symbol	**Soil Unit Name**	**Contains Hydric Components?**
244	Scribner clay loam, sandy substratum, partially drained, 0 to 2 percent slopes	Yes
246	Shima muck, partially drained, 0 to 2 percent slopes	Yes
247	Shinkee muck, partially drained, 0 to 2 percent slopes	Yes
Sh	Solano loam	Yes
Sk	Solano loam, strongly alkali	Yes
252	Stomar clay loam, 0 to 2 percent slopes	No
So	Sycamore silt loam	Yes
Ss	Sycamore silty clay loam	Yes
225	Tinnin loamy sand, 0 to 2 percent slopes	No
256	Tokay fine sandy loam, 0 to 2 percent slopes	No
259	Tujunga loamy sand, 0 to 2 percent slopes	No
Ub	Urban land	No
260	Urban land	No
261	Valdez silt loam, organic substratum, partially drained, 0 to 2 percent slopes, MLRA 16	Yes
230	Valpac loam, partially drained, 0 to 2 percent slopes	Yes
232	Valpac variant sandy loam, partially drained, 0 to 2 percent slopes	Yes
264	Venice muck, partially drained, 0 to 2 percent slopes	Yes
263	Venice mucky silt loam, partially drained, 0 to 2 percent slopes, overwashed	Yes
265	Veritas sandy loam, partially drained, 0 to 2 percent slopes	No
Wa	Webile muck	Yes
273	Webile muck, partially drained, 0 to 2 percent slopes	Yes
238	Xerarents-San Joaquin complex, 0 to 1 percent slopes	No
280	Yellowlark gravelly loam, 2 to 5 percent slopes	No
Source: NRCS 2019		

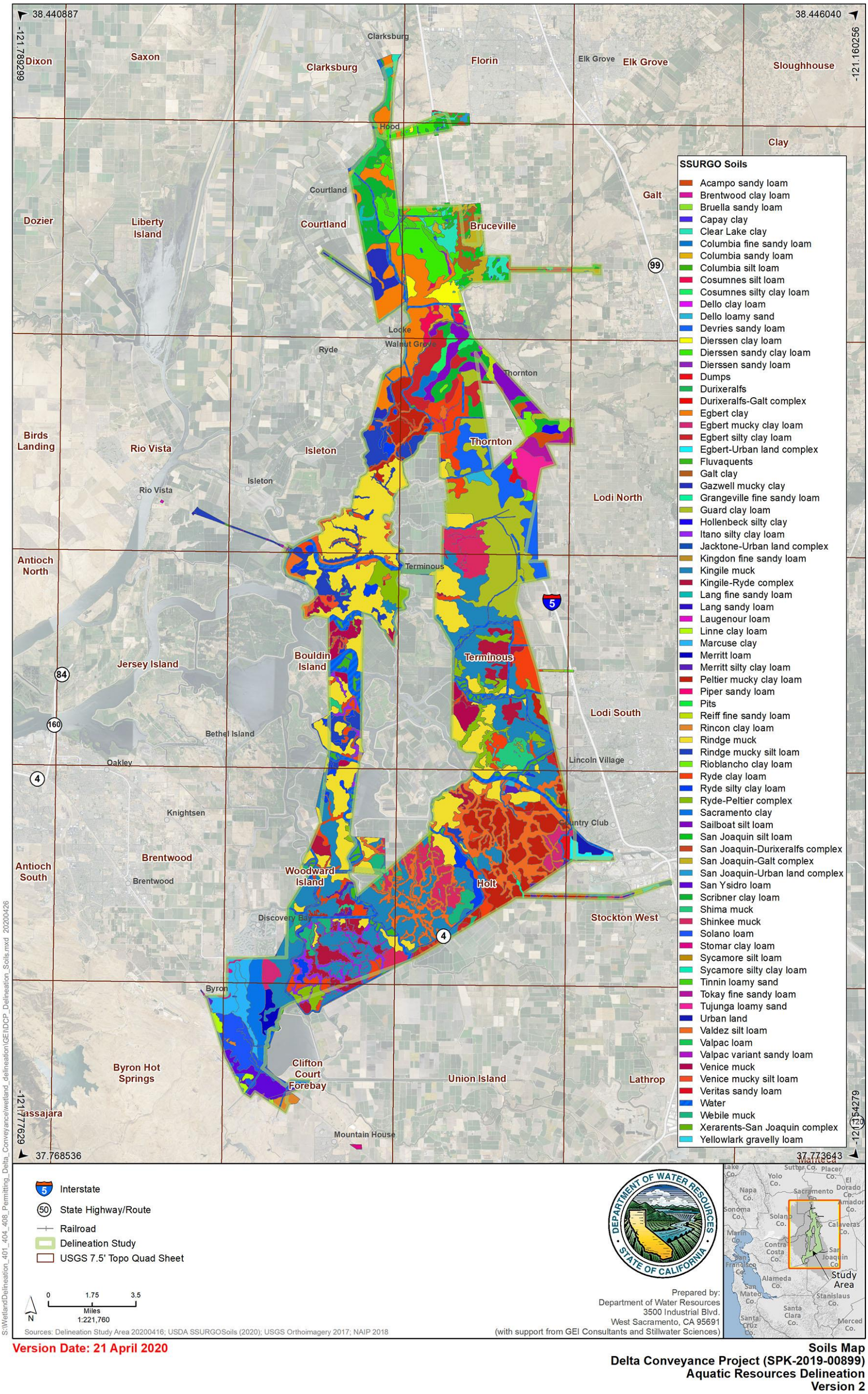

Figure 2. Soil Map Units in the Study Area

3.1.3 Climate

The Mediterranean climate of the study area is defined by hot, dry summers and cool, wet winters. The temperatures of the Sacramento–San Joaquin Delta tend to be lower than the surrounding areas during the summer because of periodic and diurnal cooling that is a result of its proximity to the Pacific Ocean and the San Francisco Bay.

Precipitation in the study area occurs mostly between November and April in the form of rain. Rainfall totals are variable based on local weather patterns, but typically 12 to 21 inches are received in the study area (NRCS 2006).

3.1.4 Normal Circumstances

The extensive marshes, channels, and natural levees that existed in the Delta prior to European settlement have been altered by human use. Dams on the Sacramento and San Joaquin Rivers manipulate flows and reduce sediment loads. Channels have been leveed, deepened, and straightened. Cities, industry, and agriculture extract and discharge water into the waterways of the Delta. Today the vegetation, soils, and hydrology of most of the Delta islands are highly altered and manipulated to facilitate intensive agriculture. Because of the historic modifications within the Delta, the permanence of the modifications, and their effect on Delta hydrology, the current conditions are considered the normal circumstance of the Delta.

USACE Regulatory Guidance Letter 86-09[1] (USACE 1986) states that "normal circumstances" are determined on the basis of an area's characteristics and use, at present and in the recent past. The Courts[2] have upheld the view that such historically manipulated areas are the baseline for "normal

[1] Regulatory Guidance Letter (RGL) 86-09: "it is our intent under Section 404 to regulate discharges of dredged or fill material into the aquatic system as it exists and not as it may have existed over a record period of time…We do not intend to assert jurisdiction over those areas that once were wetlands and part of an aquatic system, but which, in the past, have been transformed into dry land for various purposes." … "Many areas of wetlands converted in the past to other uses would, if left unattended for a sufficient period of time, revert to wetlands solely through the devices of nature. However, such natural circumstances are not what is meant by "normal circumstances…" "Normal circumstances" are determined on the basis of an area's characteristics and use, at present and in the recent past. Thus, if a former wetland has been converted to another use…and that use alters its wetland characteristics to such an extent that it is no longer a "water of the United States", that area will no longer come under the Corps regulatory jurisdiction for purposes of Section 404. However, if the area is abandoned and over time regains wetland characteristics such that it meets the definition of "wetlands", then the Corps 404 jurisdiction has been restored."

[2] See e.g., *New Hope Power Co. v. U.S. Army Corps of Engineers*, 746 Fed. Supp. 2d 1272 (S.D. Fla. 2010)(historic ground water pumping is the "normal circumstance" for the purposed of making wetland determinations); *Golden Gate Audubon Society, Inc. v. United States Army Corps of Engineers*, 717 F.Supp. 1417, 1421–1422 (N.D. Cal. 1988) ("*Audubon I*") (if wetlands site was transformed into dry land by 1975, Corps could find the dry land was its normal circumstance because regulatory definition does not retroactively extend jurisdiction over areas that have been transformed into dry land); *Leslie Salt Co. v. United States*, 896 F.2d 354, 358 (9th Cir. 1990) (whether wetlands are artificially or naturally created is irrelevant to determine whether, "under normal circumstances," an area supports wetland vegetation); *Golden Gate Audubon Society, Inc. v. United States Army Corps of Engineers*, 796 F.Supp. 1306, 1313 (N.D. Cal. 1992) ("*Audubon II*") ("if a site has been legally converted to dry land, so that it no longer meets the regulatory definition of 'wetlands,' that site will not come under Corps jurisdiction"; conversely, "it is impossible to state that the 'normal circumstances' of an area which contains wetlands is anything other than "wetlands");

Harris v. United States, 820 F.Supp. 1026, (N.D. Miss. 1993) (agency's failure to consider what characteristics the land would possess without the presence of water control structures is not grounds for concluding delineation was arbitrary).

circumstances" for wetland determinations. Thus, it is appropriate to map and identify wetlands based on current conditions, which include anthropogenic modification of vegetation and natural hydrology conditions, as they have existed since prior to the establishment of the Clean Water Act.

3.2 Aquatic Resources

A total of 135,650 acres were evaluated in GIS for the presence of aquatic features that may be subject to USACE jurisdiction under CWA Section 404 and Section 10 of Rivers and Harbors Act. Potentially jurisdictional aquatic features are depicted on the Aquatic Resources Delineation Mapbook provided in **Appendix A**. A detailed table of aquatic features is provided in **Appendix B**. A summary of the types of aquatic resources that were identified in the study area and the corresponding Cowardin classification types (Cowardin et al. 1979) are provided in **Table 2**. Potentially jurisdictional aquatic features are described below.

Table 2. Summary of Aquatic Features Within the Study Area

	Feature ID	Cowardin Code	Acres
Wetlands			**6,627.16**
Perennial			*3,059.54*
	EM (Emergent Wetland)	PEM Palustrine-emergent	1,468.60
	SS (Scrub-Shrub Wetland)	PSS Palustrine-scrub shrub	906.80
	FO (Forested Wetland)	PFO Palustrine-forested	684.14
Seasonal			*3,567.62*
	SW (Seasonal Wetland)	PEM Palustrine-emergent nonpersistent	3,115.30
	AW (Alkaline Wetland)	PSS Palustrine-scrub shrub	319.00
	VP (Vernal Pool)	PEM1 Palustrine-emergent nonpersistent	133.32
Other Waters of the U.S.			**9,186.27**
Non-Tidal			*2,864.62*
	AD (Agricultural Ditch)	R4 Riverine-intermittent	2,341.37
	CH (Natural Channel)	R4 Riverine-intermittent	21.66
	DE (Depression)	PUB Palustrine-unconsolidated bottom	304.76
	LA (Lake)	L1UB Lacustrine-unconsolidated bottom	196.83
Tidal			*7,189.07*
	TC (Tidal Channel)	R1UB Riverine-Tidal-unconsolidated bottom	7,096.16
	CO (Conveyance Channel)	N/A, Rock-lined Conveyance Channel	92.91
Total Acreage of Aquatic Features			**16,680.84**
version April 21, 2020 Source: DWR 2020			

3.2.1 Wetlands

While ground truthing was not feasible as a result of restricted land access at the time of mapping and report preparation, areas depicted as wetlands in **Appendix A** are assumed to meet USACE's three wetland parameters as these locations have evidence of inundation or saturation on aerial imagery from multiple years, are dominated by hydrophytic vegetation as interpreted from aerial imagery, and have

hydric soils based on NRCS soil maps and hydric soil ratings, or soils are assumed to be hydric based on the presence of wetland hydrology and hydrophytic plant assemblages. Delineated wetlands were categorized as perennial or seasonal based on evidence of persistent or temporary saturation or inundation respectively. The following section describes likely conditions within each of the aquatic feature types.

Perennial Wetlands

Perennial wetlands are dominated by persistent wetland hydrology and perennial hydrophytic vegetation. Three types of perennial wetlands were mapped in the study area and were differentiated based on the growth form of the vegetation.

Emergent Wetland

Emergent wetlands within the study area are dominated by herbaceous emergent plants such as California tule (*Schoenoplectus californicus*; OBL), hard-stem tule (*S. acutus*; OBL), narrow-leaf cattail (*Typha angustifolia*; OBL), broad-leaf cattail (*T. latifolia*; OBL), and floating water primrose (*Ludwigia peploides*; OBL). The vegetation assemblages typically associated with this wetland type are almost exclusively dominated by species rated as obligate on the National Wetland Plant List (Lichvar et al. 2016). These areas have a persistent vegetative aerial signature and evidence of inundation or saturation is present on most aerial images evaluated.

This wetland class typically occurs at the edges of ponds or lakes, along the margins of tidal channels, on in-channel islands of major tidal channels within the Delta, and where seepage occurs on the landside of levees. Average water depth in this type of feature is estimated to be around 3 feet.

Scrub-Shrub Wetland

Scrub-shrub wetlands within the study area are dominated by woody vegetation less than 20 feet tall and include shrubs typically associated with riparian areas such as sandbar willow (*Salix exigua*; FACW), Himalayan blackberry (*Rubus armeniacus*; FAC), red twig dogwood (*Cornus sericea* [syn. *C. alba*]; FACW) buttonwillow (*Cephalanthus occidentalis*; OBL), and California wild rose (*Rosa californica*; FAC). Fremont's cottonwood (*Populus fremontii* [syn. *P. deltoides*]; FAC) seedlings or saplings may also be present. The vegetation assemblages typically associated with this wetland type include species rated as obligate, facultative wetland, and facultative on the National Wetland Plant List (Lichvar et al. 2016). Herbaceous species are generally lacking or are a minor component of the vegetation assemblage as the canopy cover in scrub-shrub wetlands is high and low-growing herbaceous species do not receive sufficient light for survival. Evidence of saturation or inundation is more variable as compared to the emergent wetland class; however, the vegetation community is persistent due to the dominance of perennial shrubs.

The scrub-shrub wetland class typically occurs at the periphery of depressions, ponds, and lakes; along the margins of tidal and non-tidal channels; and on in-channel islands in the Delta. Average water depth in this type of feature is estimated to be around 2 feet.

Forested Wetland

Forested wetlands are defined by woody vegetation that is 20 feet tall or taller with a tree canopy cover equal to or greater than 25 percent. Riparian trees common in the study area include Goodding's black willow (*Salix gooddingii*; FACW), red willow (*S. laevigata*; FACW), box elder (*Acer negundo*; FACW), Oregon ash (*Fraxinus latifolia*; FACW), Fremont's cottonwood, white alder (*Alnus rhombifolia*; FACW), black walnut (*Juglans hindsii*; FAC), and valley oak (*Quercus lobata*; FACU). Forested wetlands generally have a shrub component, typically in canopy openings and along the forested edge. The presence of an herbaceous layer is variable. The vegetation assemblages typically associated with forested wetlands include species rated as facultative wetland and facultative on the National Wetland Plant List (Lichvar et al. 2016). Species with obligate or facultative upland ratings are occasional in forested wetlands, and generally not the dominant species represented in the habitat.

Forested wetlands within the study area are located along the edges of tidal and non-tidal channels, and on in-channel islands located within tidally influenced waterways. Evidence of saturation or inundation is variable on aerial images as compared to the emergent wetland class; however, the vegetation community is persistent due to the dominance of perennial tree species. Average water depth in this type of feature is estimated to be around 2 feet.

Seasonal Wetlands

Three classes of seasonal wetlands were mapped in the study area. Seasonal wetlands experience temporary inundation or saturation, typically in the winter or spring months of water years that receive at or above normal precipitation. Inundation and saturation are most evident on aerial images captured during wet months. Due to the seasonality of saturated or inundated conditions, hydrophytic vegetation is transitory and these areas are prone to colonization by annual upland grasses and forbs late in the growing season as the soils dry. Aerial image evaluation beyond the primary image source years of 2017 and 2018 was often necessary to aid in the determination of seasonal wetlands.

Vernal Pool

Vernal pool wetlands are topographic depressions that are usually found within annual grassland habitats. There is a water-restricting soil horizon, often high in clay content and indurated, located near the soil surface that prevents water from infiltrating deep into the soil horizons and away from the root zone. These depressions fill with rainwater and may remain inundated through spring or early summer. Vernal pools often occur in complexes of many small pools that are hydrologically interconnected via overland surface flow through swales when pools are full. Water may also move below the soil surface as water infiltrates and travels above the hardpan or claypan layer into adjacent pools. Vernal pools support distinct herbaceous

vegetation assemblages and many of the plant species that occur in this wetland type are endemic to California. Vernal pool wetlands can support a variety of floristic diversity, ranging from common to rare. Commonly encountered species typical of vernal pool habitats within the study area include popcorn flower (*Plagiobothrys* spp.; OBL to FACW), Fremont's tidy tips (*Layia fremontii*; OBL), goldfields (*Lasthenia* spp.; OBL to FACU), coyote thistle (*Eryngium* spp.; OBL to FACW), calicoflower (*Downingia* spp.; OBL), and pale spike rush (*Eleocharis macrostachya*; OBL). The wet phase of vernal pools is dominated by plants rated as obligate or facultative wetland on the National Wetland Plant List (Lichvar et al. 2016). As the vernal pools draw down as a result of evaporation and increased evapotranspiration in late spring and early summer, annual upland grasses sometimes colonize and become dominant in these seasonal wetland habitats.

Vernal pool wetlands within the study area are located primarily in areas that are relatively undeveloped without substantial land alteration. This wetland type occurs on lands with hummocky surfaces, primarily at the northernmost portion of the study area south of North Stone Lake, and along the western side of the San Joaquin Valley near Clifton Court Forebay. Average water depth in this type of feature is estimated to be around 1 foot.

Alkaline Wetland

Alkaline wetland is a type of seasonal wetland influenced by strongly alkaline or saline soils. Alkaline wetlands often support alkaline or saline tolerant shrubs such as iodine bush (*Allenrolfea occidentalis*; FACW), alkali heath (*Frankenia salina*; FACW), bush seepweed (*Suaeda nigra*; OBL), and saltbush (*Atriplex* spp.; FACW to FAC). The shrub layer may be co-dominate with salt-tolerant grasses including salt grass (*Distichlis spicata*; FAC) and alkali sacaton (*Sporobolus airoides*; FAC). This wetland type may have large unvegetated areas as a result of salt accumulations at or near the soil surface. Alkaline wetland habitats are dominated by an assemblage of plants with facultative wetland or facultative ratings on the National Wetland Plant List (Lichvar et al. 2016).

Evidence of seasonal saturation or inundation may be present on wet season aerial imagery, and salt crust presents bright white signatures during dry season imagery. Alkaline wetlands are primarily located in the southern portion of the study area on lands without substantial land alteration, or in small patches at the periphery of agricultural fields or along canals. Average water depth in this type of feature is estimated to be around 1 foot.

Seasonal Wetland

Seasonal wetlands are the most broad and diverse of the wetland types identified in this report. These wetlands are primarily colonized by herbaceous species that are common throughout the Central Valley and Delta. The vegetation assemblages typically associated with seasonal wetlands primarily include species rated as facultative wetland and facultative on the National Wetland Plant List (Lichvar et al. 2016), and often include ruderal species such as tall flatsedge (*Cyperus eragrostis*; FACW), Santa Barbara sedge (*Carex barbarae*; FAC), soft rush (*Juncus*

effusus; FACW), fiddle dock (*Rumex pulcher*; FAC), curly dock (*R. crispus*; FAC), and perennial rye grass (*Festuca perennis* [syn. *Lolium perenne];* FAC). Species with obligate or facultative upland ratings typically comprise a lesser percentage of the plant community. The vegetation composition is influenced primarily by landscape position, influence of ground water, soil texture, and runoff and drainage properties, as well as anthropogenic and natural disturbances.

Seasonal wetlands are the most prevalent and widespread of all wetland classes mapped within the study area. Evidence of saturation or inundation is variable on aerial images, especially in areas with a high degree of anthropogenic modification and which may be subject to regular disturbance such as agriculture or winter flooding for migratory bird and waterfowl management. Numerous seasonal wetlands were mapped in active agricultural fields in the Delta. While the size and shape of seasonal wetlands in farmed fields is subject to a degree of annual variation which may result from on-going farming practices, some evidence of wet season inundation or saturation is visible in a typical year. Although ground water levels are controlled on Delta islands using a system of pumps and drainage ditches to maintain water levels on the subsided islands, a high water table persists in some areas. Upland crops planted in these areas may be subject to failure or may be impossible to harvest; therefore, aerial signatures indicating reduced growth and/or vigor in crops such as corn or areas within cropped fields that were seldom planted were interpreted as indications of wetland conditions and these areas were categorized as seasonal wetland. Average water depth in this type of feature is estimated to be around 1 foot.

3.2.2 Other Waters

Areas identified on aerial images as other waters were categorized into non-tidal and tidal features. On some tidal features, man-made structures such as gates or culverts may restrict tidal influence to varying degrees, but the waterways are still subject to twice-daily tidal fluctuations.

Non-Tidal Waters

Five types of non-tidal waters were mapped in the study area. Non-tidal features include naturally occurring features and anthropogenic features on the landscape that are the result of ditching or excavation. Non-tidal waters are subject to Section 404 of the CWA up to the OHWM.

Agricultural Ditch

Agricultural land cover is common throughout the study area, most notably on Delta islands. Agricultural ditches are used for irrigation and drainage purposes. Agricultural ditches range in size from 1 to 75 feet in width. These features are generally unvegetated with unconsolidated mud bottoms as a result of regular maintenance activities conducted to maintain capacity for drainage and water delivery. Tule and cattail species may colonize ditch side-slopes if there is a lapse in the vegetation maintenance cycle. Water in agricultural ditches may be pumped off of agricultural lands and/or Delta islands and have a connection to Traditional Navigable Waters

(TNW) or Relatively Permanent Waters (RPW). Average water depth in this type of feature is estimated to be around 3 feet.

Natural Channel

Non-tidal natural channels are present primarily along the northeast and southwest portions of the study area. Natural channels include large perennial rivers that qualify as TNW, intermittent streams that qualify as RPW, and ephemeral channels that qualify as non-RPW. All features mapped to this class are assumed to have an OHWM as indicated by a change in vegetative character or break in bank slope, as evidenced on aerial imagery or DEM. The substrate in natural channels may be mud, sand, gravel, and/or cobble depending on geographic location. Natural channels within the study area include waterways such as drainages to Stone Lake and tributaries to the Cosumnes River and Italian Slough. Average water depth in this type of feature is estimated to be around 3 feet.

Depression

Depressions are open-water ponds that are permanently or seasonally inundated, with little to no rooted vegetation on an unconsolidated or mud bottom. These features may be artificially filled as a result of agricultural or stormwater detention, or may result from a high water table. Depressions are less than 20 acres in size and generally have a water depth of less than 6 feet. These water bodies are often created by excavation, and are diked or otherwise artificially impounded.

Depressions may be colonized by floating plant species such as common duckweed (*Lemna minor*; OBL), mosquito fern (*Azolla* spp.; OBL), or water hyacinth (*Eichhornia crassipes*; OBL), but generally lack rooted vegetation except on depression margins. Average water depth in this type of feature is estimated to be around 6 feet.

Lake

Lakes are open-water features that are permanently inundated with little to no rooted vegetation on an unconsolidated or mud bottom and are greater than 20 acres in size. Lakes may have a wave-formed shoreline.

Lakes may also exhibit floating vegetation such as common duckweed, mosquito fern, or water hyacinth. Average water depth in this type of feature is estimated to be around 6 feet.

Tidal Waters

Tidal waters are the open water portions of linear aquatic features that are influenced by the rise and fall of the tides. Man-made structures such as gates or culverts may restrict tidal influence to varying degrees. Tidal waters are subject to regulation under Section 404 of the CWA up to the MHHW elevation (e.g., high tide line), and are subject to Section 10 of the Rivers and Harbors Act of 1899 up to the MHW level.

Tidal Channel

Tidal channels are natural perennial riverine waterways, though most within the study area have been modified with leveed banks that are reinforced with rock revetment. In-channel water velocity and depth fluctuate under tidal influence, and the channel bottom is generally composed of mud or unconsolidated sediments with varying amounts of sand, silt, and clay.

Emergent wetlands that occur along the margins of tidal channels and in-channel islands that are also commonly encountered in the study area, notably along Old River and Middle River, were mapped separately from the tidal channel aquatic type.

Conveyance Channel

Conveyance channels include rock or cement-lined linear channels. These are constructed water features which are associated with the SWP or CVP. These features are generally straight as a result of excavation and are diked or have reinforced banks. Vegetation is generally absent due to water depth or a lack of rooting substrate. Control structures are present that periodically affect tidal influence, but conveyance channels experience tidal fluctuation when water is brought into the system, generally on a flood tide.

4.0 CLEAN WATER ACT GUIDANCE ON POTENTIAL JURISDICTIONAL FEATURES

This aquatic resource delineation has been prepared in order to provide the USACE with necessary information for the issuance of a PJD. A significant nexus evaluation is not necessary to obtain a PJD; however, the following information summarizes the Clean Water Act jurisdictional guidance in effect as of the submission of this report.

On October 22, 2019 the U.S. Environmental Protection Agency (USEPA) and USACE returned to the definition of "waters of the United States" promulgated in 1986/1988, repealing the 2015 Clean Water Rule.

Under this ruling, the following types of water bodies are subject to CWA jurisdiction, as codified in 33 Code of Federal Regulations 328.3 (1986):

1. All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide
2. All interstate waters, including interstate wetlands
3. The territorial seas
4. All impoundments of waters otherwise identified as waters of the United States
5. All tributaries of waters 1–3 above

6. All waters adjacent to a water identified in 1–5, including wetlands, ponds, oxbows, impoundments, and similar waters

7. On a case-specific basis, other waters, including wetlands, provided that those waters alone, or in combination with other similarly situated waters, including wetlands, located in the same region, have a significant nexus to a traditional navigable water, interstate water, or the territorial seas.

The results of this report and the identification of potentially jurisdictional features is consistent with the guidance documents presently in effect. The Aquatic Resources Delineation Mapbook (**Appendix A**) was prepared in accordance with the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program (USACE 2016).

5.0 CONCLUSION

The 135,639-acre study area contains 16,680.84 acres of wetlands and other waters that may be jurisdictional under Section 404 of the CWA and/or Section 10 of the Rivers and Harbors Act of 1899. The locations of potentially jurisdictional features are depicted in **Appendix A**.

This delineation is draft until a preliminary jurisdictional determination is issued by the Sacramento District of USACE.

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LIST OF APPENDICES

NOTE - these appendices are not available in this Attachment 3 of the "Bouldin Island Delta Smelt Preservation Project - Aquatic Resources Delineation Memorandum" (December 21, 2021)

APPENDIX A

Aquatic Resources Delineation Mapbook (provided as three separate pdf files)

NOTE - these appendices are not available in this Attachment 3 of the "Bouldin Island Delta Smelt Preservation Project - Aquatic Resources Delineation Memorandum" (December 21, 2021)

APPENDIX B

ORM Upload Sheet (provided as a separate Excel file)

NOTE - these appendices are not available in this Attachment 3 of the "Bouldin Island Delta Smelt Preservation Project - Aquatic Resources Delineation Memorandum" (December 21, 2021)

APPENDIX C

Aquatic Resources Delineation GIS Data (provided as a separate geodatabase file)

NOTE - these appendices are not available in this Attachment 3 of the "Bouldin Island Delta Smelt Preservation Project - Aquatic Resources Delineation Memorandum" (December 21, 2021)

Attachment 3
Aquatic Resources Delineation Map

SOURCE: NAIP Imagery; DWR, 2019; ESA, 2021

Delta Smelt Preservation

Study Area (144.6 acres)

Aquatic Resources Within Study Area

- Agricultural Ditch
- Forested Wetland
- Scrub Shrub Wetland

ESA

Attachment 2a
Delineation of Aquatic Resources

(1 of 3)
Delineated by: DWR

Path: U:\GIS\GIS\Projects\16xxxx\D2016008\845_02_BouldinIsland\03_MXDs_Projects\Delineation\Attachment2_AquaticResource\s2of3.mxd_JSanders_12/20/2021

0 400
Feet
1 inch = 400 feet

SOURCE: NAIP Imagery; DWR, 2019; ESA, 2021

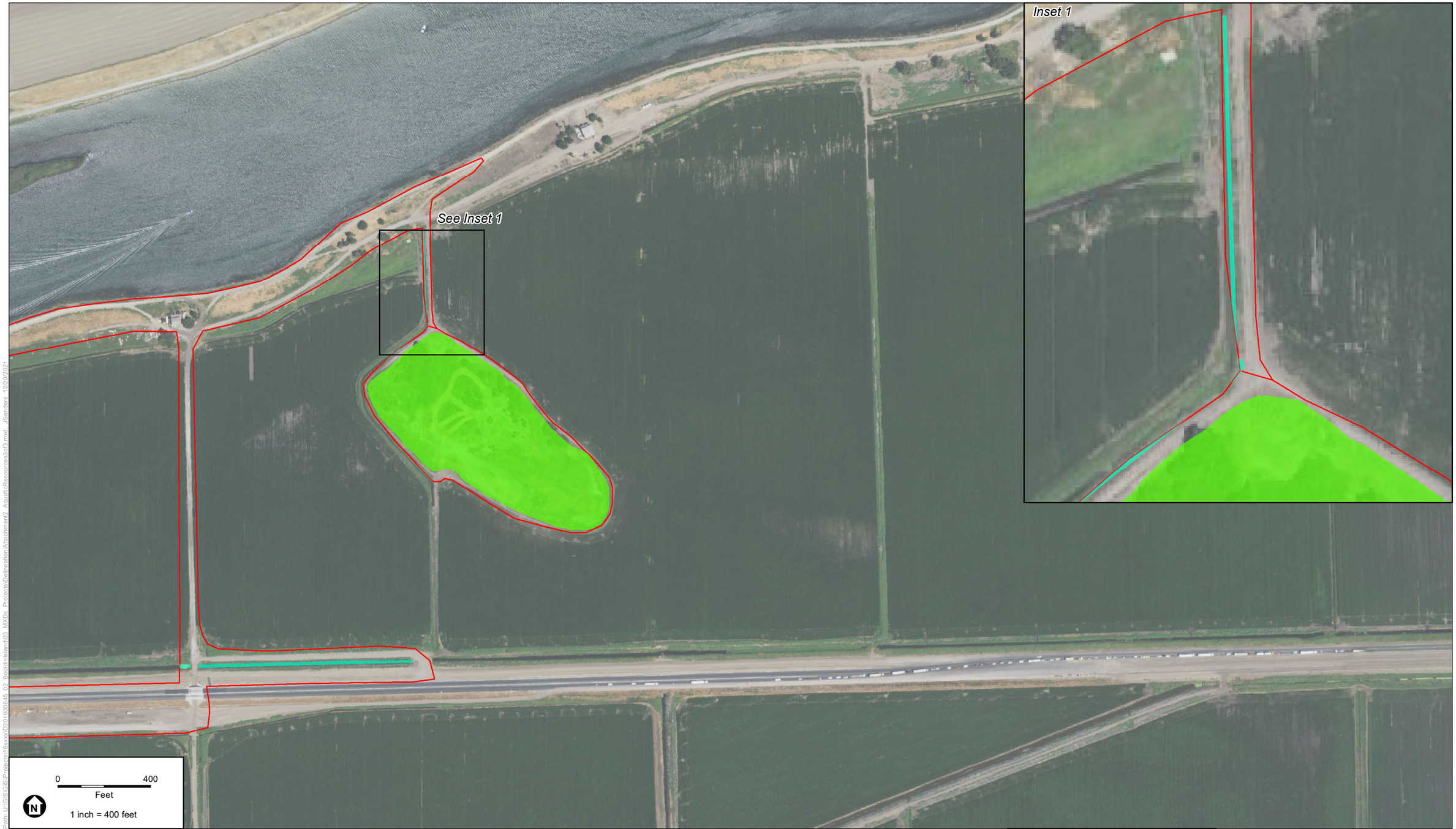
Study Area (144.6 acres)

Grizzly King Tidal Restoration Project

Attachement 2b
Delineation of Aquatic Resources
(page 2 of 3)

Delineated by: DWR

ESA



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SOURCE: NAIP Imagery; DWR, 2019; ESA, 2021

Study Area (144.6 acres)

Aquatic Resources Within Study Area

- Agricultural Ditch
- Freshwater Emergent Wetland

Delta Smelt Preservation

Attachment 2c
Delineation of Aquatic Resources
(3 of 3)

Delineated by: DWR

ESA