INITIAL STUDY/MITIGATED NEGATIVE DECLARATION FOR THE BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT GEORGIANA SLOUGH EROSION CONTROL AND HABITAT ENHANCEMENT PROJECT

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June 2024

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LIST OF ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
AMM	Avoidance and minimization measures
APE	Area of Potential Effect
BAAQMD	Bay Area Air Quality Management District
BALMD	Brannan-Andrus Levee Maintenance District
BMP	Best Management Practices
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Cal-IPC	California Invasive Plant Council
CalEEMod	California Emissions Estimator Model
CALFIRE	California Department of Forestry and Fire Protection
CAPs	Criteria air pollutants
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CH_4	Methane
CHRIS	California Historical Resources Information System
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CRHR	California Register of Historical Resources
CLSC	California State Lands Commission
CVFPB	Central Valley Flood Protection Board
CWA	Clean Water Act
dB	Decibels
dBA	A-weighted sound pressure level
DPM	Diesel particulate matter
DSC	Delta Stewardship Council
DWR	Department of Water Resources
DWSE	Design Water Surface Elevation
EA	Environmental Assessment
EIR	Environmental Impact Report
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency

FHWA	Federal Highway Administration Guidelines
FHWG	Fisheries Hydroacoustic Working Group
FMMP	Farmland Mapping and Monitoring Program
GHGs	Greenhouse gases
HFCs	Hydrofluorocarbons
IS	Initial Study
L_{dn}/DNL	Day-Night Average Level
L_{eq}	Equivalent noise level
LF	Linear feet
LHMP	Local Hazard Mitigation Plan
MBTA	Migratory Bird Treaty Act
MHHW	Mean Higher High Water
MLD	Most likely descendant
MLLW	Mean lower low Water
MLW	Mean low water
MMRP	Mitigation Monitoring and Reporting Program
MND	Mitigated Negative Declaration
MT	Metric ton
NO_X	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NAVD88	North American Vertical Datum of 1988
NMFS	National Marine Fisheries Service
NPEDS	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OEHHA	Office of Environmental Health Hazard Assessment
OHWM	Ordinary High Water Mark
PFCs	Perfluorocarbons
PM	Particulate matter
PPV	Peak particle velocity
RCNM	Roadway Construction Noise Model
RMS	Root mean squared
ROG	Reactive organic gases
RSP	Rock slope protection
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SB	Senate Bill
SF_6	sulfur hexafluoride
SJVAPCD	San Joaquin Valley Air Quality Pollution Control District

SLF	Sacred Lands File
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_2	Sulfur dioxide
SR	State Route
SRA	Shaded riverine aquatic
SRA	State Responsibility Area
SWPPP	Stormwater Pollution Prevention Plan
TAC	toxic air contaminant
TSS	total suspended sediments
USACE	U.S. Army Corps of Engineers
ESDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMT	vehicle miles traveled
WEAP	Worker Environmental Awareness Program
YSAQMD	Yolo-Solano Air Quality Management District

Section 1 | Introduction

1.1 PROJECT OVERVIEW AND OBJECTIVES

The Brannan-Andrus Levee Maintenance District (BALMD) is proposing the Georgiana Slough Erosion Control and Habitat Enhancement Project (Proposed Project) to resolve upper slope erosion problems and a major lower slope undercutting issue along the right bank levee of Georgiana Slough, on Lower Andrus Island. The Georgiana Slough is subject to areas of levee erosion requiring repair and erosion control in order to maintain the levee and safety of the surrounding area. Maintenance of the Georgiana Slough is managed by BALMD. The Proposed Project is located along an approximately 1,500 linear-foot stretch of the levee along the Georgiana Slough (project site). This specific stretch is proposed for improvements due to the severity of erosion and the potential for establishing suitable habitat for fish.

The Proposed Project would involve construction of proven erosion control methods involving placement of quarry stone rip rap (or rock slope protection - RSP) at the toe of the levee, which functions as a foundational base for a habitat bench that will be constructed along the entire length of the project site. These methods are proposed as they allow and promote establishment of vegetation and habitat, which assists in regulation of water temperature, provision of shade relief and allochthonous inputs that are important food sources for aquatic species. The BALMD has implemented similar projects in the vicinity of the project site. Once completed, the project would provide suitable erosion control to the levee utilizing recognized and effective erosion control methodologies and support fish-friendly habitat through the creation of wetland and riparian shaded riverine aquatic (SRA) habitat on the channel margin. Specifically, the Proposed Project is expected to create 0.30 acres of riparian forest, 1,500 linear feet (LF) of SRA habitat, 1,473 LF/0.39 acres of freshwater marsh habitat, 1.12 acres of total riparian habitat (comprised of riparian forest, shrub scrub, and SRA habitat), and 0.75 acres of native grassland habitat.

The project objectives are to:

- Provide suitable levee erosion control on approximately 1,500 lineal feet of levee on the right bank of Georgiana Slough, corresponding to Stations 291+00 to 306+00 (Levee Mile 5.51 to 5.80).
- Provide fish-friendly habitat on Georgiana Slough channel margin.
- Minimize long-term maintenance and repair costs by repairing existing areas of erosion using stable and effective erosion control methodologies.

1.2 REGULATORY GUIDANCE

This document evaluates the potential environmental impacts of the Proposed Project in accordance with the California Environmental Quality Act (CEQA), Public Resources Code §21000 et seq., and the State CEQA *Guidelines*, Title 14 California Code of Regulations §15000 et seq. This Initial Study (IS) was prepared by the BALMD to determine if the Proposed Project could have significant impacts on the environment. In accordance with CEQA *Guidelines* §15064(a), an Environmental Impact Report (EIR) must be prepared if there is substantial evidence that a project may have significant impacts on the environment. If the lead agency for the CEQA process determines that there is no substantial evidence for such impacts, or if the potential impacts can be reduced through revisions to the project description or the addition of mitigation measures, a Negative Declaration or Mitigated Negative Declaration (MND) can be prepared (CEQA

Guidelines §15070). BALMD, as the CEQA lead agency for the Proposed Project, has determined that an IS/MND is the appropriate document for compliance with CEQA and the CEQA Guidelines.

1.3 PUBLIC REVIEW

In accordance with CEQA *Guidelines* §15073, this document will be circulated to local, State, and federal agencies and to interested organizations and individuals who may wish to review and comment on it. In reviewing this IS and proposed MND, affected public agencies and the interested public should focus on whether the document sufficiently identifies and analyzes the possible impacts on the environment.

Following the close of the public review period, the BALMD would review and evaluate the evidence contained in this IS and the public comments received on these documents. At a scheduled and noticed BALMD public meeting, BALMD would review a Statement of Findings prepared for the Proposed Project and would consider adoption of a MND and Mitigation Monitoring and Reporting Program (MMRP), and approval of the Proposed Project.

1.4 SUMMARY OF FINDINGS

Section 4 of this document contains the analysis and discussion of potential environmental impacts resulting from construction and implementation of the Proposed Project. Based on the resources evaluated, it was determined that the Proposed Project would have no impact on the following resources:

- Agriculture and Forestry Resources
- Land Use/Planning
- Mineral Resources
- Population/Housing
- Public Services

Impacts of the Proposed Project were determined to be less than significant for the following resources:

- Aesthetics
- Energy
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology/Water Quality
- Recreation
- Transportation
- Utilities/Service Systems
- Wildfire

Impacts of the Proposed Project to the following resources would be less than significant with the incorporation of mitigation measures:

- Air Quality
- Biological Resources
- Cultural Resources
- Geology/Soils
- Noise

- Tribal Cultural Resources

As required by CEQA, a MMRP would be prepared and adopted at the time of project approval. It would include those mitigation measures that would reduce potentially significant environmental impacts to less-than-significant levels.

1.5 DOCUMENT ORGANIZATION

This document is organized in the following manner:

- **Section 1 – Introduction.** This section provides a project overview and regulatory guidance, and describes the public review process and organization of this document.
- **Section 2 – Project Description.** This section describes the project location, history and background, purpose, and project components.
- **Section 3 – Determination.** This section identifies the environmental factors potentially affected based on the analyses contained in this IS and includes the Lead Agency's determination based upon those analyses
- **Section 4** – **Environmental Checklist.** This section provides an environmental setting for the Proposed Project and analyzes the potential environmental impacts of the Proposed Project. Resource topics appear in the order they appear in Appendix G (Environmental Checklist) of the CEQA *Guidelines*. Mitigation measures are incorporated and discussed, where appropriate, to reduce potentially significant impacts to less-than-significant levels. Mandatory Findings of Significance are also presented in this section.
- **Section 4 – List of Preparers.** This section contains a list of people that assisted in the preparation of this document.
- **Section 5 – References.** This section identifies the references used in the preparation of this document.

Section 2 | Project Description

2.1 PROJECT BACKGROUND

2.1.1 Project Title

Georgiana Slough Erosion Control and Habitat Enhancement Project

2.1.2 Lead Agency Name and Address

Brannan-Andrus Levee Maintenance District
P.O. Box 338
Walnut Grove, CA 95690

2.1.3 Contact Person and Phone Number

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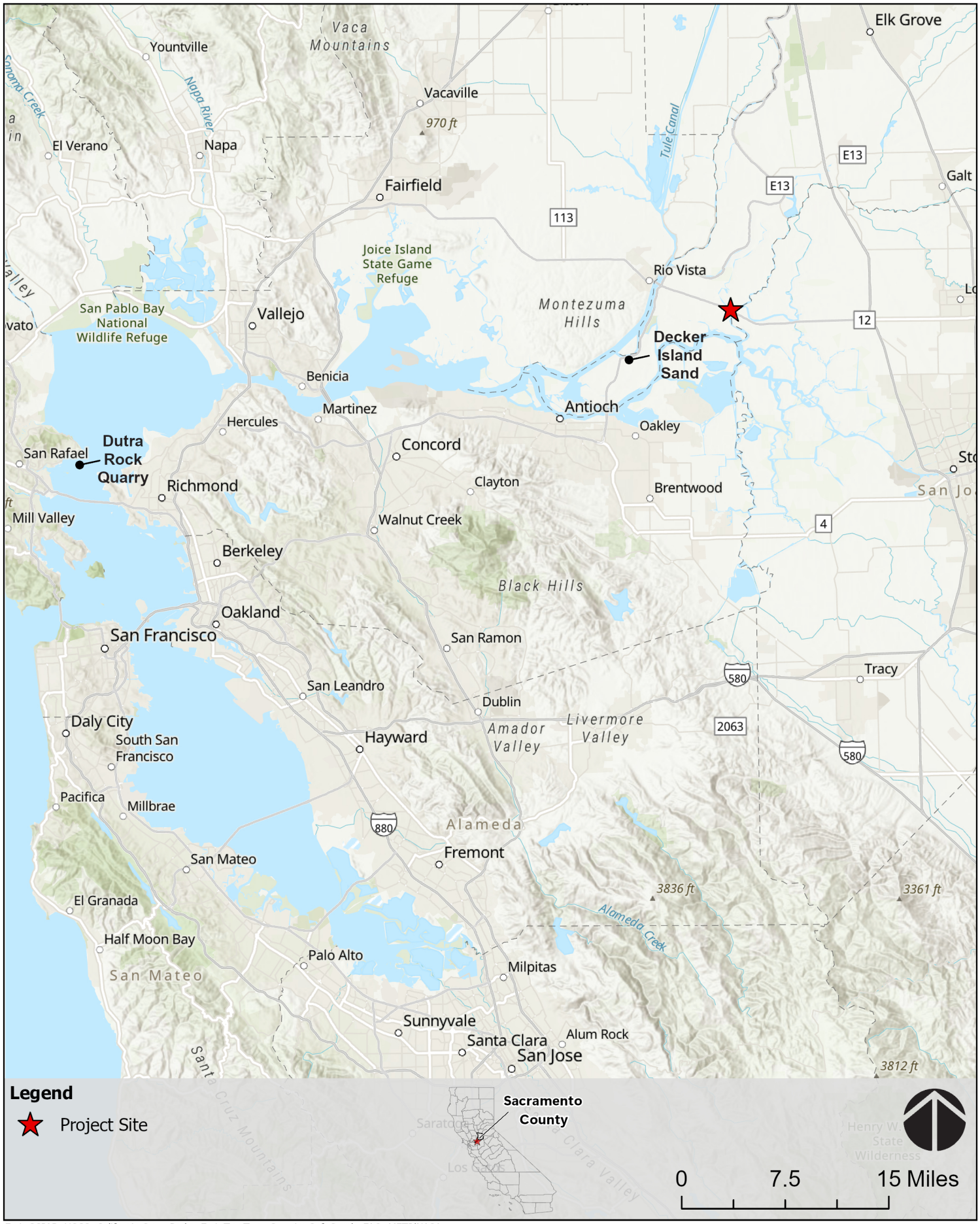
2.1.4 Project Location

The project is located in Sacramento County, in the primary zone of the Sacramento-San Joaquin Delta (**Figure 1**). Specifically, the project is located on the right (south) bank of Georgiana Slough on Lower Andrus Island, and is approximately 6.7 acres in size. The site extends over 1,500 LF from Levee Mile 5.51 (38.129721, -121.587691) to 5.80 (38.129592, -121.582281), approximately a quarter mile from the confluence of the Mokelumne River (**Figure 2**).

The project site also includes material source, storage, and staging areas (**Figures 1** and **2**). Quarried rock revetment material and 6 inch minus mineral filter would be sourced and transported to the project site via material barges from the established quarry at San Rafael. Clean soil for filling the wetland bench would also be transported via barge from Decker Island. One location has been selected for staging construction materials and equipment in an area on the landside of the levee, immediately adjacent to the proposed area of impact. Rock revetment, 6-inch minus, and fill will remain on the barge until final placement on the levee. Container plants required for the habitat features would be delivered periodically by pickup truck with trailer from a District approved nursery location within 75 miles of the project site.

2.1.5 General Plan Land Use and Zoning

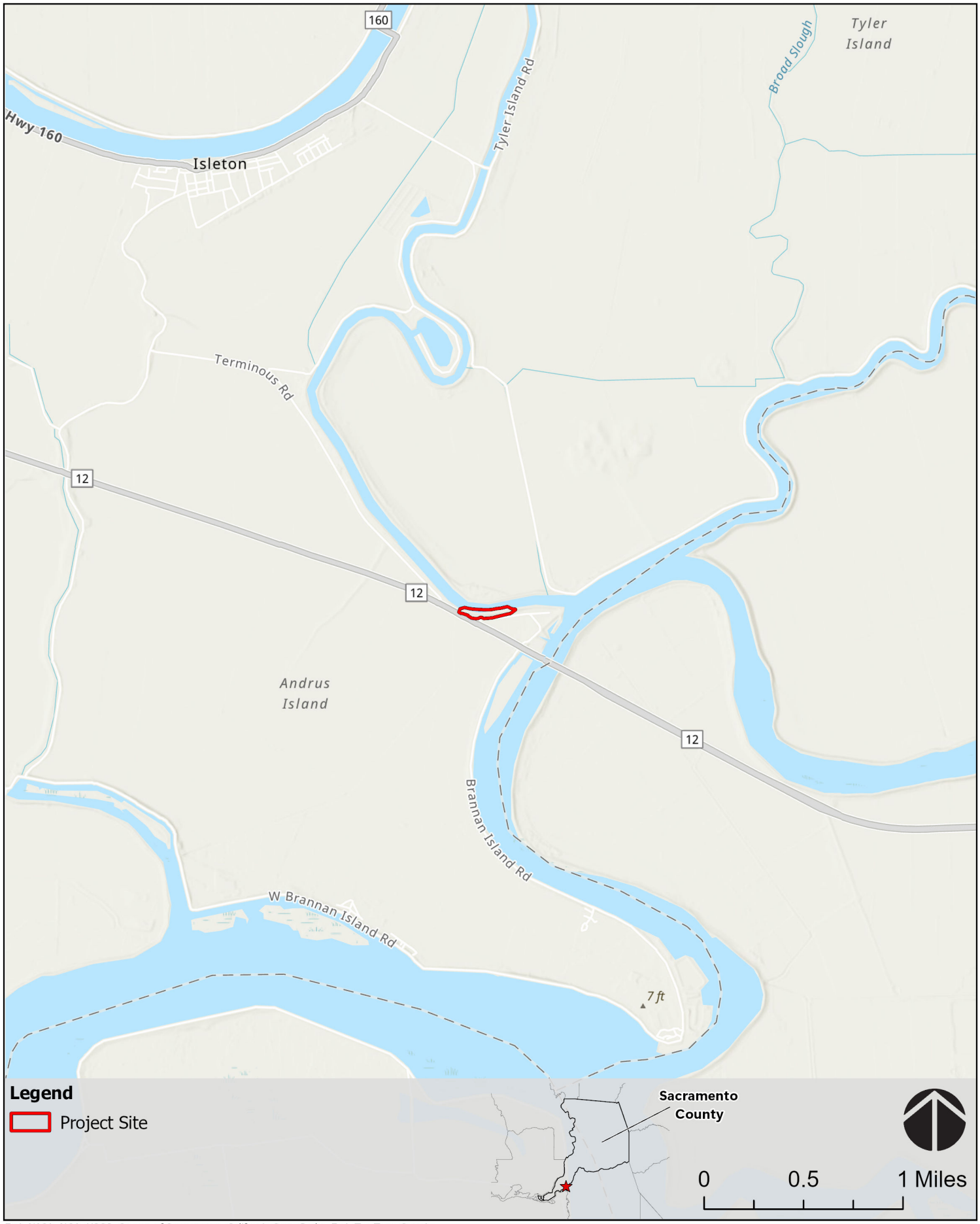
The General Plan land use designation for the project site is recreation and it is surrounded to the west and north by lands designated for agricultural cropland, as outlined in the Sacramento County General Plan Land Use Diagram (Sacramento County, 2013). The project site is zoned AR-2 (agricultural-residential-2 acres), DW-S (Delta waterways), and C-O (commercial recreation). No agricultural production occurs on the project site where construction activities would occur (Sacramento County, 2024).



Esri, CGIAR, USGS, California State Parks, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USFWS

FIGURE 1

REGIONAL LOCATION



Esri, NASA, NGA, USGS, County of Sacramento, California State Parks, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS,

FIGURE 2
SITE AND VICINITY

2.2 PROJECT COMPONENTS AND CONSTRUCTION PHASING

The Proposed Project would be implemented in the following phases:

1. Mobilization
2. Site Preparation
3. Levee Slope and Bench Construction
4. Removal/Relocation of Encroachments
5. Installation and Maintenance of Plants
6. Site Demobilization

Construction at the site would occur beginning upstream to downstream.

2.2.1 Construction Materials

Material necessary for project construction, with exception of the landside fill, would be imported from offsite locations and transported to the project site by barge and truck, including:

- Quarry stone/rock slope protection (RSP, angular rock ranging from 15 to 400 pounds) and 6-inch minus rock - obtained from a quarry in San Rafael and transported via material barge and tug, approximately 46 nautical miles to the project site.
- Soil for the wetland bench would be obtained from Decker Island, approximately 15 nautical miles from the project site.
- Container plants would be obtained from a nursery within 75 miles of the project site.

2.2.2 Mobilization

Project mobilization would include all preparatory work necessary for the contractor to initiate construction activities. This work would include moving equipment and rock/soil supplies to both the Project Area primarily by barge. A material barge, accompanied by tug boat, would be used to transport material from the quarry near San Rafael. A small tug (35-40 feet) would be used to move the crane barge between the Rio Vista staging and erosion repair site. Tugs used to maneuver the crane and material barges during site mobilization would be present on site periodically during the duration of construction activity (i.e. tugs may be moored or go to other non-related job sites if there is no need to move a barge for a period of time, and the material barge would be traveling back and forth from the quarry sites). A work boat would be used to transport laborers from the barge to the project site. Plants would be transported to the site via pickup truck and trailer.

Mobilization also would include setting up the staging area adjacent to the project site (**Figure 3**). Mobilization activities also would include any necessary pre-construction surveys and installation of erosion control and other Best Management Practices (BMP) measures as required.

2.2.3 Site Preparation (Clearing/Grubbing/Trimming)

Initial site preparation would include debris removal, mowing, tree trimming, limited grubbing, and clearing on the waterside and landside levee slope. As an initial step to preparing the levee slope for construction activities, any trash or other non-vegetated debris would be removed from the waterside

Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community, Yolo County, Maxar, Esri Community Maps Contributors, County of Sacramento,

FIGURE 3
AERIAL OVERVIEW

levee slope and hauled to an appropriate refuse disposal site (the Keller Canyon Landfill in Pittsburgh, CA is the closet site).

The Proposed Project may remove some mature trees as well as require some tree trimming to allow for construction activities to occur under the tree canopy (i.e., to ensure worker safety, the crane boom on the barge must be able to swing freely, without hitting trees). Consistent with BALMD's existing routine maintenance agreement with the California Department of Fish and Wildlife (CDFW), trees less than 2 inches in diameter at 48 inches above the ground and large shrubs would be cut with a flail mower. Grasses and small shrubs also may be cut with a flail mower and left in place. As needed, small tree trunks (i.e., less than 4 inches in diameter), branches of larger trees, and larger shrubs would be removed with a chainsaw and chipped onsite using a trailer-mounted chipper and transported and stockpiled on a BALMD property on lower Andrus Island. Grubbing would occur to remove any remnant stands of Himalayan blackberry and Arundo donax and would be completed using a small excavator (e.g., a Bobcat). Invasive vegetation would be trucked to a landfill or other appropriate disposal site. Since the site is isolated from active roadway traffic, no traffic control is anticipated or needed during all phases of construction.

2.2.4 Levee Slope and Bench Construction

Construction of the new levee slope would occur in three phases: 1.) First removing overburden and vegetation accumulated on the levee face. This borrowed overburden material would be then placed on the back/landside slope. 2.) Placing RSP and 6-inch minus backfill material on the waterside levee slope; and 3.) Placing soil planting fill to complete final grade on the wetland bench and the levee slope utilizing barges, work boats, tugs, a long-reach excavator, dozer, and excavator.

Quarry Stone/RSP and 6-inch Minus Backfill Placement

Work would begin by removing excess overburden on the levee face with a long-reach excavator. This borrowed overburden material would be then placed on the back/landside slope (at a 3:1 slope) of the levee to expand the levee and increase landward stability. The excavated waterside slope would then form the foundation for placement of launchable rip rap (12-18 inches) at the levee toe (between elevation -35.0 feet and -20.0 feet (NAVD 88)) where a key bench (6 feet deep by 8 feet wide minimum) would be placed to support the rock being placed on the lower slope. Rip rap between 12-18 inches would then be placed up to the bottom of the waterside bench, at elevation +2.3 feet (North American Vertical Datum of 1988 (NAVD88)) at Mean Lower Low Water (MLLW) at a 1.5:1 slope. A triangular prism of quarry stone will also be constructed from the MLLW to the Mean Higher High Water elevation (MHHW, elev. +5.6 NAVD88) to protect the wetland bench from wave wash. DWR RSP would then be keyed into a bench at that elevation 0.0 (NAVD88) and extend up to the Design Water Surface Elevation (DWSE) at +10.1 feet (NAVD88). A 6-inch layer of 6-inch minus material will be placed over the rip rap to act as a natural filter material between the rock and soil. A minimum of 12 inches of imported/borrow fill will be provided/mixed as a 'planting cap' over the quarry stone. Barges would transport material to the site directly from an established quarry in San Rafael, and material would be placed using a crane barge with a specialized clamshell attachment. Soil fill will be sourced at Decker Island and placed using a crane barge. Once offloaded by the crane barge, material can also be moved and compacted by a long-reach excavator and small front loader from the levee crown. The launchable rip rap would be used to support armoring of the re-sloped embankment and create a new foundation for the wetland habitat bench as well as a 2-foot veneer of erosion protection below the bench. RSP would be placed at a 2:1 slope, depending on the existing topography.

The wetland bench will be constructed following the construction of the rock prism, rip rap and filter placement. The bottom of the wetland bench will be placed at Mean Low Water (MLW) at elevation +2.7 feet (NAVD88). The width of the wetland benches would vary from approximately 16-ft to 17-ft wide with a 7:1 slope, sloping towards the water. **Figure 4** shows a typical wetland cross section and detail of the levee design (complete engineering plans are provided in **Appendix A**). Wetland plants would be installed into the soil filled bench with a modest band of scrub shrub and/or SRA habitat planted on and above the wetland bench from approximately elevation +5.2 to +10.0 (NAVD88) along the entire 1500-foot length of the site.

Crown Raising and Landside Slope Improvement

The excavated material from the water side slope will be used to increase the crown height to elevation +14.0 (NAVD88) to account for the impacts of climate change and increase freeboard above the DWSE. The material will be placed using a long-reach excavator and small front end loader. The existing levee crown width is approximately 15 to 20 feet wide, the proposed finished crown width will be 25-feet and with a 20-foot-wide gravel patrol road comprised of 6-inch deep Class II aggregate base. The excavated fill will also be placed on the landside slope utilizing a long-reach excavator and small front loader to both flatten the slope and increase the total width of the levee to capture the design levee section. The landside embankment off the crown will slope at a 3:1 slope to the existing grade.

Wetland Bench - Freshwater Marsh

The freshwater marsh/wetland bench (**Figure 4**) would be constructed above MLW at elevation +4.0 feet (NAVD88) to allow frequent inundation and development of aquatic and semi-aquatic habitat. The area immediately above the bench will be planted with native riparian species (e.g. willow spp.) to provide long term habitat benefit as well as increase channel roughness to reduce wave velocity. For wetland benches, materials would include the use of beneficial reuse soil that will come from the waterside re-slope. The bench will have 12-inches minimum of import fill with 0.5 feet of 6-inch minus to act as a filter between the soil and the 2-foot layer of quarry stone protection below. The bottom elevation of the wetland bench will be at MLW (+2.7 feet NAVD88). The top of the soil within the wetland bench will vary between elevation +4.0 to 6.0 feet NAVD88). Wetland bench width would also vary slightly, from approximately 16 feet to 17 feet wide, depending on the location along the levee. There would be a 7:1 slope maximum waterward within the bench to increase the variability of elevation (between +4.0 and +6.0 NAVD88) and encourage heterogeneity of species. The planted slope above the wetland benches would occur at a 2:1 slope. The project is anticipated to construct approximately 0.39 acres and 1,473 LF of freshwater marsh habitat. Species will be native hydrophytes grown/harvested locally where possible. Wetlands species, upon consult with CDFW, will include species that can be frequently inundated (CDFW Zone ‘B’) such as: plants (e.g., American bulrush, California tule, and some rush species).

The wetland bench to the DWSE will be faced with heavy coir fabric or another approved equivalent plantable erosion protection method to protect the lower slope from wave wash induced erosion until vegetation reaches full maturity and establishment.

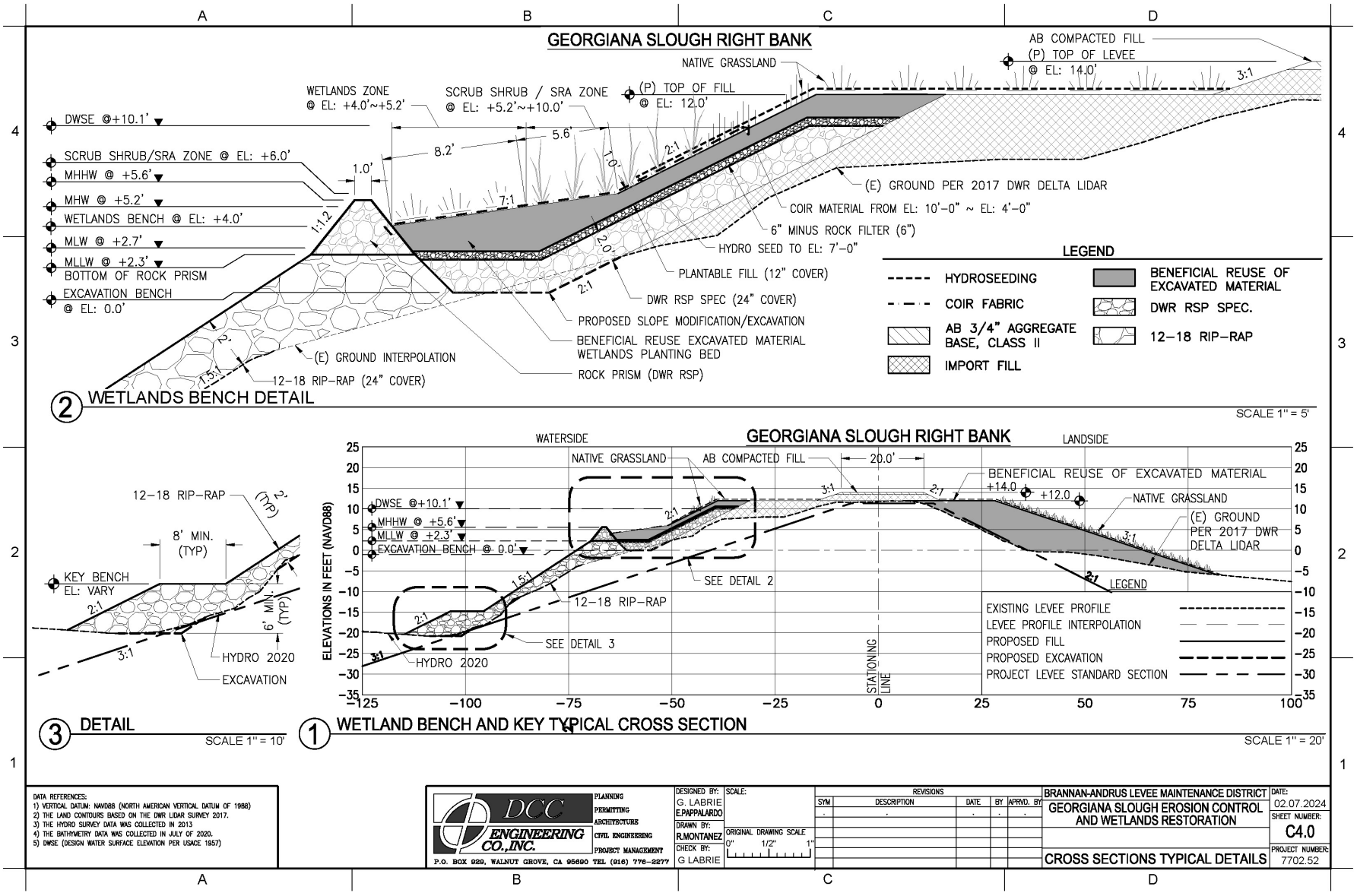


FIGURE 4

TYPICAL CROSS-SECTION

Waterside Riparian Habitat

Waterside riparian habitat (combination of riparian forest, shrub scrub, and SRA habitat) provides opportunities for terrestrial species and an important source for food inputs for aquatic species that utilize Georgiana Slough. A band of riparian habitat would be planted/established above the wetland benches on the waterside slope across the entire length of the proposed Georgiana Slough erosion repair. Ecologically suitable species that can be submerged in high water events (CDFW Zone 'C') such as: creeping wildrye, Santa Barbara sedge, rush spp., Goodding's black willow, arroyo willow, sandbar willow, button willow and pacific willow, would be planted using hand tools from approximately +4.0 to +10.0 feet (NAVD88) elevation up the slope across the site. Approximately 1.12 acres/1500 LF of riparian habitat (riparian forest, shrub scrub, and SRA) will be created.

Native Grassland

Native grassland habitat will be planted above the wetland benches at elevation +7.0 feet (NAVD88) and extend to the edge of the levee crown (approx. 14.0 ft NAVD88). The species include California fescue, small barley, creeping wildrye, salt grass, and one-sided bluegrass. In addition, the backside of the levee slope will be hydroseeded providing additional acreage of native grassland. A total of 0.75 acres of grasslands will be enhanced at the project site.

2.2.5 Site Demobilization

Site demobilization would include removal of all equipment and associated site BMP materials. The staging areas would require minimal demobilization activities since most materials would be removed from the staging areas as they are used up during project implementation. Palettes and residual plant materials would be cleaned and removed from the site as the work progresses, leaving nothing onsite at the conclusion of construction. Plant delivery palettes would be returned via truck to the source nursery at the conclusion of construction. Minor trash/debris would be removed from the site and disposed of at an approved facility. Barges, tugs and work boats would move on to the next unassociated job site or storage dock at the conclusion of construction.

2.3 CONSTRUCTION EQUIPMENT AND STAFFING

The types and number of pieces of equipment needed for each project phase and their anticipated duration of usage are shown in **Table 2.3-1**. Actual equipment use may vary, depending on contractor capabilities and preferences and equipment availability.

Table 2.3-1: Construction Equipment by Phase

Phase	Equipment Type	Number of Units	Estimated Duration of Use (number of work days)	Estimated Truck or Barge Trips (one-way)
Mobilization	Flatbed Truck (plant transport)	1	3	3
	Pickup Truck (trailer transport)	1	Duration of project	1
	Construction Trailer	1	Duration of project	n/a
	Portable Toilets	2	Duration of project	n/a
	Flail Mower	1	15	n/a

Phase	Equipment Type	Number of Units	Estimated Duration of Use (number of work days)	Estimated Truck or Barge Trips (one-way)
Site Preparation	Trailer-mounted Wood Chipper with Haul Truck	1	15	13
	Chainsaws	2	15	n/a
Levee Slope and Bench Construction	2,000 to 3,000 ton Material Barge (non-motorized)	1	66	36
	Crane Barge (non-motorized)	1	66	4
	Small Work Boat (40-ft max)	1	66	10
	Row Boat/12-ft Skiff (non-motorized crew transport)	1	66	n/a
	Long Reach Excavator	1	20	2
	Small Excavator (bobcat)	1	44	2
	Small Conveyor w/Generator (soil loading)	1	5	2
	Small Front-End Loader (conveyor loading)	1	5	2
	Tug Boat	1	22	36
Installation of Plants	Pickup Truck (trailer transport)	2	45	n/a
	Hydroseeding Truck	1	2	3
	1,000-gallon Water Truck	1	10	3
Site Demobilization	Pick-up Truck (trailer transport)	1	5	1

A maximum of up to approximately 30 construction personnel would work on the project, depending on the construction phase. Workers required for specific construction phases are anticipated to include:

- Two crew lead workers would be onsite, 8 hours per day, six days a week, for the duration of the project.
- Two 5-person crews of operator engineers would operate one crane barge and one small work boat during levee slope and bench construction.
- The tug boat would have a crew of 4 persons each and would be onsite periodically, as needed.
- One long-reach excavator operator would work 10 hours per day during levee slope construction.
- A front loader would work approximately 10 hours per day during levee slope construction.
- One foreman and one laborer would be present on the project site during all site work.
- One surveyor would be onsite, as needed.
- A planting crew of four to six workers.

2.4 CONSTRUCTION SCHEDULE

With favorable weather and tidal conditions, project construction is expected to be completed over approximately 120 days. In-water work would be conducted between August 1 and October 31 to avoid impacts to fish species. However, rock and rock soil mix placement above the Ordinary High Water Mark (OHWM) may take place at any time over the duration of project construction. Any tree trimming or vegetation removal would occur during the dormant period for nesting birds.

Work, including equipment operation, would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.). Equipment maintenance could occur before and after working hours and on Sunday.

2.5 PROJECT ENVIRONMENTAL COMMITMENTS

The following avoidance and minimization measures (AMM) have been incorporated into the Proposed Project to avoid or minimize the potential adverse effects fish and wildlife and their habitats and the physical environment. **Table 2.5-1** summarizes the general AMMs, with the complete discussion of each AMM provided below.

Table 2.5-1: Summary of Project AMMs

Number	Title	Summary
AMM 1	Timing of In-Water Work	Timing of in-water construction would occur between August 1 and October 31, which is the work window for Endangered Species Act (ESA) listed fishes. In addition, all in-water will occur during daylight hours and during low tides.
AMM 2	Worker Training	Construction personnel would undergo training and education on applicable environmental rules and regulations, and measures necessary to avoid or minimize effects to sensitive resources.
AMM 3	Construction BMPs and Monitoring	Standard practices and measures that would be implemented prior to, during, and after construction to avoid or minimize impacts to water quality, aquatic habitat, and listed species.
AMM 4	Protection of Landside Wetland Areas	The landside wetland areas within the project footprint would be protected by a buffer and clearly marked for avoidance.
AMM 5	Vegetation and Tree Removal and Associated Habitat Creation	Vegetation clearing would only occur within the project footprint. The project would impact 0.09 acres of riparian forest, 0.41 acres of scrub shrub, and 569 LF of SRA (**Figure 2**). However, the project would create a total of 1.12 acres of riparian habitat (0.30 acres of riparian forest, 0.82 acres of scrub shrub, and 1500 LF of SRA) making the project a net benefit for vegetative habitats.
AMM 6	Construction site clean-up	Includes revegetation plan and removal of all construction equipment.
AMM 7	Implementation of General Permit	Prepare a Stormwater Pollution Prevention Plan (SWPPP) in compliance with the National Pollutant Discharge Elimination System (NPDES) Construction General Permit and abide by all terms and BMPs within the SWPPP.

AMM 1: Timing of Work

AMM 1 consists of the following measures related to the timing of work.

- All in-water construction activity would be conducted between August 1 and October 31 to ensure protection of anadromous salmonids. This time period is the suggested work window for waterways located within the Delta.
- As much work below OHWM work as possible would be performed during low tide to reduce potential impacts to water quality.
- Work, including equipment operation, would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.).
- Equipment maintenance could occur before and after working hours and on Sunday.
- In-water construction activities would be limited to daylight hours, leaving a nighttime period for anadromous salmonids and Green Sturgeon to migrate past the Project area.

AMM 2: Worker Training

AMM 2 consists of the following worker training measure.

- All contractors and equipment operators would participate in a Worker Environmental Awareness Program (WEAP) training regarding potential environmental impacts to make them aware of the ecological value of the area, including the potential for special status species and their habitat to be present near the Proposed Project area.
- The WEAP training would cover, at a minimum, the special status species listed that have the potential to occur in the Proposed Project area during construction, including but not limited to anadromous fishes, a description of the regulatory status and general ecological characteristics of sensitive resources, and review of the limits of construction and avoidance measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form provided by the trainer documenting they have attended the WEAP training and understand the information presented to them.
- The WEAP training shall be conducted by a qualified biologist, to aid workers in recognizing special status resources that may occur in the project site and vicinity.
- Personnel involved in the Proposed Project would be trained in emergency response and spill containment techniques.

AMM 3: Construction BMPs and Monitoring

AMM 3 consists of the following construction BMPs:

- Staging, and both temporary and long-term material disposal areas would be located away from Waters of the United States.
- Equipment would be refueled, maintained, and serviced at designated staging areas away from the erosion repair site. All refueling, maintenance, and staging of equipment and vehicles shall occur at least 60 feet from bodies of water and in a location where a potential spill would not drain directly toward aquatic habitat (e.g., on a slope that drains away from the water source). Fuel transfer vehicles would have absorbent pads, pillows, socks, booms or other spill containment materials placed under the fueling operation.

- Petroleum products would be stored in non-leaking containers at impervious storage site from which runoff is not permitted to escape.
- Movement of heavy equipment to and from the Proposed Project area shall be restricted to established roadways and equipment shall be stored in established staging areas away from Georgiana Slough.
- All feasible AMM would be implemented to control erosion and runoff from areas associated with construction activities. Specifically, use of straw wattles, silt fences, or other erosion control measures would be used to ensure that constructed-related materials do not reach Georgiana Slough. All areas of temporary impacts and all other areas of temporary disturbance which could result in a discharge to Georgiana Slough would be restored.
- Soil disturbance activities shall cease if adverse weather conditions substantially increase the likelihood of transporting soil off site.
- Active water quality monitoring shall occur during the construction portion of the project. Should construction create conditions that exceed standard water quality thresholds, remedial actions shall be employed to reduce them back to threshold limits.
- A planting, monitoring, and adaptive management plan would be submitted to Resource Agencies.
- Wildlife observed within the project site shall be allowed to leave on their own unharmed.
- Fugitive dust would be minimized by watering or implementing other dust control measures. Fugitive dust would also be minimized by limiting construction vehicle speeds to 15 miles per hour or less, covering haul vehicles, installing wheel washers or other similar methods where vehicles exit the construction site onto paved roads.
- Construction activities would be limited to the designated work area, which would be clearly identified on the construction drawings and marked with fencing, stakes, and/or flags before ground-disturbing activities begin.
- All construction equipment would have sound-control devices no less effective than those provided on the original equipment; no equipment shall have an unmuffled exhaust system.
- No pets shall be allowed at the project site.
- All trash that may attract predators shall be properly contained in covered containers and removed from the work site on a regular basis.
- During construction, no litter or construction debris shall be placed within jurisdictional areas. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site. In addition, all project-generated debris, building materials, and rubbish shall be removed from jurisdictional areas and from areas where such materials could be washed into them.

AMM 4: Protection of Landside Wetland Areas

AMM 4 consists of the following measures to protect the non-jurisdictional wetlands identified on the landside of the levee in the Project area.

- Non-jurisdictional wetlands will be fenced off and no construction activities will occur within the fenced area.
- No construction equipment, staging materials, vehicles, spoil piles, etc., will be allowed within protected buffer areas.
- Wetland areas will remain fenced for the duration of the Project.

AMM 5: Vegetation Removal and Tree Protection

AMM 5 consists of riparian habitat creation intended to offset project impacts to vegetation.

- Vegetation clearing would only occur within the project footprint.
- The Proposed Project would impact a total of 569 lineal feet of SRA and 0.5 acres of riparian habitat (0.09 acres of riparian forest and 0.41 acres of scrub shrub); however, the project would create 0.30 acres of riparian forest; 0.82 acres of scrub shrub (1.12 acres of total riparian habitat); and 1,500 LF of SRA.

The project would result in a net benefit/enhancement for all vegetative habitat types.

AMM 6: Construction Site Clean-up

AMM 6 consists of the following construction site clean-up measures.

- All construction supplies, materials, and debris from the Proposed Project would be removed following completion of the Proposed Project.
- Plant delivery palettes would be returned via truck to the source nursery at the conclusion of construction.
- Minor trash/debris would be removed from the site and disposed of at an approved facility.

AMM 7: Implementation of General Permit (General Permit for Storm water Discharges Associated with Construction Activities)

All measures described in the State Water Resources Control Board National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit; Order No. 2022-0057-DWQNPDES Permit No. CAS000002) shall be implemented. A SWPPP shall be prepared that includes specific BMPs to avoid and minimize impacts on water quality during construction activities. The goals of the SWPPP would generally be to protect water quality; establish procedures to minimize accelerated soil erosion; and minimize non-storm water runoff. The SWPPP would define measures to prevent, control, and minimize impacts from a spill of hazardous, toxic, or petroleum substances during construction, as well as a description of potentially hazardous and non-hazardous materials that could be accidentally spilled, potential spill sources, potential spill causes, proper storage and transport methods, spill containment and recovery measures, agency notification, and responsible parties. Components of the SWPPP shall include measures that limit risk of release of contaminates to waterways. The SWPPP shall have the following primary objectives:

- Stabilization of the site as soon as possible.
- Controlling the perimeter of the project site.
- Protection of nearby receiving waters.
- Following all necessary pollution prevention measures.
- Minimization of the area and duration of exposed soils.

2.6 POST-CONSTRUCTION HABITAT MAINTENANCE AND MONITORING

Following completion of the proposed action, BALMD would conduct a minimum of five years of maintenance and monitoring of the new habitat features to ensure the vegetation is establishing properly. Site maintenance would occur on an as needed basis and focus on managing noxious weeds and ensuring plants receive adequate irrigation (years 1-3) in order to become established and meet success criteria. Most plant maintenance would include regular periodic watering and weed management so they become established. The tide would inundate portions of the levee slope twice per day, during portions of the months the tide would inundate partially up the slope and thus provide necessary moisture to wetland bench plants. It is anticipated that maintenance during the first two years would require bi-weekly to monthly site visits during the hot, active growing season (April through September) to ensure proper weed management and irrigation. Subsequent activities during the remaining year of the maintenance period would occur on a monthly basis.

Biological monitoring of the habitat features would occur on an annual basis and begin during the first year following construction. Initial monitoring during the first year would occur in summer - fall to assess the preliminary condition of the plants relative to meeting overall habitat establishment and survival goals. Subsequent monitoring for the remaining four years of the monitoring period would occur in late summer/early fall.

Plants would be recorded as dead if no viable above ground growth is visible. Dead plants and trees would be replaced as necessary during the first year and annually in subsequent years. Any re-planting would occur either in spring or late fall. Cumulative survival of all plants and trees at the conclusion of the five-year monitoring period would be at least 80 percent.

Invasive weed cover would be estimated visually during annual monitoring. Vegetative cover by invasive species would be less than ten (10) percent of all cover throughout the five-year monitoring period. In the event invasive species cover exceeds the cover criteria during any of the annual monitoring events, maintenance actions would be taken to reduce this cover to less than 10 percent.

2.7 SURROUNDING LAND USES AND SETTING

The project site includes both the land side and water side of an existing levee along the Georgiana Slough, a small portion of the Georgiana Slough channel, and a staging area located on the land side of the levee. The project site is located immediately adjacent to Brannan Island Road, north of the intersection with State Route (SR) 12. Land uses surrounding the project site include flood control structures, roads, rural residential, row-crop agriculture, river-based commerce and recreation, boat docks, and the Delta Boat Storage Yard. The confluence of the Georgiana Slough with the Mokelumne River is approximately one quarter mile downstream (east) of the project site, and a private recreational facility called ‘B+W Marina’ is located approximately 0.15 mile southeast of the project site and provides rental cottages, boat launch and dock space, and other recreational opportunities directly onto the Mokelumne River.

2.8 APPROVALS AND CONSULTATION

2.8.1 Other Agencies Whose Approval Is Required

BALMD has jurisdiction over review and approval of the Proposed Project and adoption of the MND. Other agencies whose approval may be required:

- Central Valley Flood Protection Board (CVFPB) – will authorize an Encroachment Permit
- U.S. Army Corps of Engineers (USACE) – will review and issue a Clean Water Act (CWA) Section 404 Permit and Section 408 Permit
- U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) – will be consulted regarding potential biological and fisheries resources impacts and issuance of a Biological Opinion
- Central Valley Regional Water Quality Control Board (RWQCB) – will issue a CWA Section 401 Water Quality Certification
- California Department of Fish and Wildlife (CDFW) – issuance of a Section 1600 Streambed Alteration Agreement (SAA)
- California State Lands Commission (CSLC) – responsible for lease authorization
- Delta Stewardship Council (DSC) – DSC may review the project for a consistency determination

2.8.2 Consultation with California Native American Tribes (Public Resources Code Section 21080.3.1)

On June 4, 2024 BALMD sent a consultation invitation letter via email to the following twelve tribes:

- Buena Vista Rancheria of Me-Wuk Indians
- Calaveras Band of Mi-Wuk Indians
- Ione Band of Miwok Indians
- Chicken Ranch Rancheria of Me-Wuk Indians
- Nashville Enterprise Miwok-Maidu-Nishinam Tribe
- Guidiville Rancheria of California
- Confederated Villages of Lisjan Nation
- California Valley Miwok Tribe
- Jackson Rancheria Band of Miwuk Indians
- Wilton Rancheria
- United Auburn Indian Community of the Auburn Rancheria
- Pakan'yani Maidu of Strawberry Valley Rancheria

No responses requesting formal consultation have been received as of the date of publication of this Initial Study.

Section 3 | Determination

3.1 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors, if checked below, would be potentially affected by the Proposed Project and would involve at least one impact that is a "potentially significant impact". Mitigation measures are recommended for each of the potentially significant impacts that would reduce the impact to less than significant.

Aesthetics	☐	Agricultural and 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	☐

The analyses of environmental impacts in **Section 4 Evaluation of Environmental Impacts** result in an impact statement, which shall have the following meanings.

Potentially Significant Impact. This category is applicable if there is substantial evidence that an effect may be significant, and no feasible mitigation measures can be identified to reduce impacts to a less than significant level. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

Less than Significant with Mitigation Incorporated. This category applies where the incorporation of mitigation measures would reduce an effect from a "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measure(s), and briefly explain how they would reduce the effect to a less than significant level (mitigation measures from earlier analyses may be cross-referenced).

Less Than Significant Impact. This category is identified when the proposed project would result in impacts below the threshold of significance, and no mitigation measures are required.

No Impact. This category applies when a project would not create an impact in the specific environmental issue area. "No Impact" answers do not require a detailed explanation if they are adequately supported by the information sources cited by the lead agency, which show that the impact does not apply to the specific project (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

3.2 DETERMINATION

On the basis of this initial evaluation (to be completed by the Lead Agency):

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will 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 will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have 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 or NEGATIVE DECLARATION 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.

Gilbert Labrie

Date:

Section 4 | Evaluation of Environmental Impacts

4.1 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?	☐	☐	☐	☒

4.1.1 Environmental Setting

The project site is located on the right bank of the Georgiana Slough on Lower Andrus Island. The site extends over 1,500 LF of the bank, on Levee Mile 5.51 to 5.80, approximately a quarter mile from the confluence of the Mokelumne River. The project site is located adjacent to Brannan Island Road, just north of SR 12. The work area includes an eroding portion of the levee adjacent to and along the Georgiana Slough itself. The project site DW-S (Delta waterways) zoning overlay indicates the area is denoted as a “Scenic Area” within the Delta Waterway. Scenic Areas are those waterways or portions of waterways that are of a lesser ecological or natural value than denoted "Natural Areas" or have the potential for enhancement of such values, but that can support a wider range of active recreational activities without adverse environmental impact.

The closest scenic highway that is officially designated by the California Department of Transportation is SR 160 which is located 2.56 miles to the north and 5.16 miles to the west of the project site (Caltrans, 2024). Views from SR 160 include the Sacramento River and adjacent agricultural and residential areas; the project site is not visible from SR 160.

Land uses surrounding the project site include flood control structures, roads, rural residential, row-crop agriculture, river-based commerce and recreation, boat docks, and the Delta Boat Storage Yard.

Light emitting sources in the vicinity of the project site include traffic along Brannan Island Road/Willow Tree Lane and SR 12, lighting from the Delta Boat Storage Yard, and security lighting associated with residential land uses.

4.1.2 Discussion

a,b) A scenic vista is generally considered a view of an area that has remarkable scenery or a natural resource from which the public can experience unique and exemplary high-quality views. Although the project site is publicly accessible from Rio Vista, Isleton, and SR 12, the visual character would not be considered as an expansive view of a highly valued landscape because the Georgiana Slough is highly utilized by recreational and commercial watercraft and lined with native and non-native vegetation. The project site does not include any scenic vistas that have been officially designated, and the Proposed Project would correct an erosion issue on the existing levee and provide native plantings but would not substantially change the visual characteristic of the site. As described above, the project site is publicly accessible from parts of Rio Vista, Isleton, and SR 12 but is not visible from the nearest designated scenic highway (SR 160). Although SR 160 is designated as a state scenic highway, construction activities at the project site would not be seen from this highway. There would be **no impact** to scenic vistas or scenic highways.

c) Both natural and artificial landscape features contribute to perceived visual images and the scenic attractiveness of a landscape. Scenic attractiveness is influenced by vegetation patterns, water characteristics, landforms, recreational features, and rural and urban features. Individuals respond differently to changes in the physical environment based on their experiences of the environment prior to changes, the extent and nature of those changes, and the proximity and duration of their views. The aesthetic value of an area is therefore a subjective measure of the visual character and scenic quality.

The Proposed Project is not located in an urbanized area, would not conflict with applicable zoning and other regulations governing scenic quality. The Proposed Project would require the removal of some mature trees as well as some tree trimming to allow for construction activities. However, implementation of habitat mitigation/enhancement features (wetland and riparian habitat/SRA) on the channel margin would include planting a variety of native tree, shrub, and grass species that, when mature, would result in a visual character of the erosion repair site similar to what currently exists. The visual character of the project site would be altered during construction and in the short term after construction is completed (i.e. until vegetation grows similarly to the pre-construction condition). In the long-term, the visual character of the project site would not be appreciably different from the visual character currently. Therefore, the Proposed Project would not substantially degrade the existing visual character or quality of the project site and surroundings. This impact would be **less than significant**.

d) Temporary construction activities would be limited to daylight hours to avoid nighttime lighted activities. The Proposed Project does not involve the installation of any new sources of light or glare. Therefore, there would be **no impact** from new sources of substantial light or glare which would adversely affect day or nighttime views in the area.

4.2 AGRICULTURE AND FORESTRY RESOURCES

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 (FMMP) 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?	☐	☐	☐	☒

4.2.1 Environmental Setting

The project site includes an erosion area that is along the Georgiana Slough where construction/repair activities would occur. The General Plan land use designation for the project site is recreation and it is surrounded to the west and north by lands designated for agricultural cropland, as outlined in the

Sacramento County General Plan Land Use Diagram (Sacramento County, 2013). The project site is zoned AR-2 (agricultural-residential-2 acres), DW-S (Delta waterways), and C-O (commercial recreation).

Agriculture

The project site is not identified as Farmland per the Farmland Mapping and Monitoring Program (FMMP). The FMMP identifies the project site as "Other Land," which signifies lands that are not included in any other mapping category and generally include low density rural developments, or timber, brush, wetland, and riparian areas not suitable for livestock grazing. While the project site zoning includes an agricultural overlay, the site consists of a levee and no agricultural production occurs on the project site. Surrounding land uses include agricultural production. South of the project site on the other side of SR 12, the land is considered Prime Farmland and is under a Williamson Act contract (California Dept. of Conservation, 2020). Across the Georgiana Slough to the north there is more Prime Farmland and also Farmland of Local Importance, but this land is not within the project site.

Forestry

Forest land is defined by Public Resources Code Section 12220(g) as land that can support 10 percent native tree cover or any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits. Timberland is defined by Public Resources Code Section 4526 as land, other than land owned by the federal government and land designated by the board as experimental forest land, which is available for, and capable of, growing a crop of trees of a commercial species used to produce lumber and other forest products, including Christmas trees. The project site does not meet the definition of "forest land" and "timberland" as defined above as there is minimal tree canopy on the site. The small size of the site and the location adjacent to the Georgiana Slough would make it unsuitable for forest resource management or timberland production.

4.2.2 Discussion

a) The FMMP identifies the project site as "Other Land," thus it is not mapped as farmland. The Proposed Project would involve temporary construction activities to implement erosion control and habitat mitigation/enhancement at the erosion repair site. Temporary construction activities would occur within 250 feet of existing agricultural land uses. However, no aspect of construction would adversely affect, or directly or indirectly cause or contribute to the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to other land uses. In the long-term, after Project construction, the stabilized levee would protect surrounding agricultural (and other) land uses from flooding. Therefore, there would be **no impact**.

b) As discussed above, no construction activities would occur on agricultural lands and would not cause agricultural lands to be converted to other land uses. There are no Williamson Act contracts that include the project site. Therefore, construction activities would not affect lands under the Williamson Act contract, or lands that could enter future Williamson Act contracts. Therefore, there would be **no impact**.

c) No forest land or timber land exists within or adjacent to the project site. Therefore, there would be no potential conflicts to existing zoning or cause rezoning of forest land. There would be **no impact**.

d) As discussed above, no forest land or timber land exists within or adjacent to the project site. As such, there would be no potential for loss of forest land or conversion of forest land to non-forest use. There would be **no impact** on forest land.

e) As discussed above, the project site is not located on any designated important farmland or forest land. While the Sacramento County zoning for the project site includes agricultural overlay, the project site is not farmed and the FMMP identifies the land as "other land." The Proposed Project would repair an erosional issue and would not change the existing land use of the site. There would be **no impact** on the conversion of farmland to non-agricultural use or of forest land to a non-forest use.

4.3 AIR QUALITY

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)?	☐	☐	☒	☐

4.3.1 Environmental Setting

The project site is located in Sacramento County, California, and lies within the Sacramento Valley Basin, which is under the jurisdiction of the Sacramento Metropolitan Air Quality Management District (SMAQMD). The Sacramento Valley Basin includes all of Butte, Colusa, Yolo, Sutter, Yuba, Sacramento, and Shasta counties, and the northeast portion of Solano County. As the local air quality management agency, SMAQMD is required to monitor air pollutant levels to ensure that State and federal air quality standards are met and, if they are not met, to develop strategies to meet the standards. Depending on whether or not the standards are met or exceeded, the Sacramento Valley Basin is classified as being in "attainment" or "nonattainment." The health effects associated with criteria air pollutants (CAPs) upon which attainment of State and federal air quality standards is measured are described in **Table 4.3-1**.

Table 4.3-1: Health Effects Associated with CAPs

Pollutant	Adverse Effects
Ozone	1) Short-term exposures: pulmonary function decrements and localized lung edema in humans and animals, risk to public health implied by alterations in pulmonary morphology and host defense in animals; (2) long-term exposures: risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (3) vegetation damage; and (4) property damage.
Carbon monoxide (CO)	Reduces oxygen delivery leading to: (1) Aggravation of chest pain (angina pectoris) and other aspects of coronary heart disease; (2) decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (3) impairment of central nervous system functions; and (4) possible increased risk to fetuses.
Nitrogen dioxide (NO_2)	1) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (2) risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; and (3) contribution to atmospheric discoloration.
Sulfur dioxide (SO_2)	(1) Bronchoconstriction accompanied by symptoms that may include wheezing, shortness of breath, and chest tightness during exercise or physical activity in persons with asthma.
Suspended particulate matter (PM_{10}, $PM_{2.5}$)	(1) Excess deaths from short-term and long-term exposures; (2) excess seasonal declines in pulmonary function, especially in children; (3) asthma exacerbation and possibly induction; (4) adverse birth outcomes including low birth weight; (5) increased infant mortality; (6) increased respiratory symptoms in children such as cough and bronchitis; and (7) increased hospitalization for both cardiovascular and respiratory disease (including asthma).

Source: SMAQMD, 2021a

The Sacramento Valley Air Basin is in a non-attainment area for federal standards for ozone and fine particulate matter (PM2.5), as well as the state standards for ozone and respirable particulate matter (PM_{10}). Because the Sacramento Valley Air Basin currently exceeds several state and federal ambient air quality standards, the SMAQMD is required to implement strategies to reduce pollutant levels to recognized acceptable standards (CARB, 2024; USEPA, 2024).

The tugboats that would deliver supplies to the project site would travel from San Rafael to the project site via the San Francisco Bay, San Joaquin River, and Mokelumne River, which would lead the tugboats through the Bay Area Air Quality Management District (BAAQMD), and along the boundaries of the Yolo-Solano Air Quality Management District (YSAQMD), the San Joaquin Valley Air Quality Pollution Control District (SJVAPCD) and the SMAQMD. Project construction would occur within the SMAQMD. Both the BAAQMD and the southwest portion of the YSAQMD are located in the San Francisco Bay Area Air Basin. The San Francisco Bay Area Air Basin is in a non-attainment area for State and national ozone standards, State $PM_{2.5}$ and PM_{10}, and national PM ambient air quality standards (CARB, 2024; USEPA, 2024). The SJVAPCD is located in the San Joaquin Valley Air Basin. The San Joaquin Valley Air Basin is in a non-attainment area for State and national ozone standards, State $PM_{2.5}$ and PM_{10}, and national $PM_{2.5}$ ambient air quality standards (CARB, 2024; USEPA, 2024).

CAP concentrations are measured at monitoring stations in the air districts. The Elk Grove-Bruceville Road monitoring station, located within the SMAQMD, is the closest station to the project site located approximately 15 miles northeast, and reports air quality data for ozone. The next nearest station that reports $PM_{2.5}$ and PM_{10} is the Sacramento T Street Station, located approximately 30 miles north of the project site (SMAQMD, 2017). There are no monitoring stations in Sacramento County that record CO emissions. The ambient air quality measurements from these stations are representative of the air quality near the project site. **Table 4.3-2** summarizes the air quality data for the three most recent calendar years for which data is available.

Table 4.3-2: Summary of Annual Data on Ambient Air Quality (2020-2022)

CAP	2020	2021	2022
Ozone			
Maximum concentration (1-hr \ 8-hr avg., ppm)	0.111 \ 0.082	0.105 \ 0.080	0.091 \ 0.074
Number of days state standard exceeded (1-hr \ 8-hr)	1 \ 2	2 \ 5	0 \ 1
Number of days national standard exceeded (1-hr \ 8-hr)	0 \ 1	0 \ 2	0 \ 0
Fine particulate matter ($PM_{2.5}$)			
Maximum concentration (24-hour µg/m^3)	111.0	89.1	33.1
Number of days national standard exceeded (24-hour measured [2])	6	4	0
Respirable Particulate Matter (PM_{10})			
Maximum concentration (24-hour µg/m3)	298.7	132.6	60.2
Number of days state standard exceeded (measured \ calculated [2])	59 \ 59.0	12 \ 13.3	6 \ 6.1
Number of days national standard exceeded (measured\ calculated [2])	4 \ 4.0	0 \ 0.0	0 \ 0.0

Notes:

1. Measurements from the Elk Grove-Bruceville Road Monitoring Station for ozone. Measurements of $PM_{2.5}$ and PM_{10} obtained from the Sacramento T Street air monitoring station.
2. Measured days are those days that an actual measurement was greater than the level of the state daily standard or the national daily standard. Measurements are typically collected every six days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

µg/m3=micrograms per cubic meter
ppm=parts per million
*= There was insufficient data to determine the value.
Source: CARB, 2022

Sensitive Receptors

Nearby sensitive receptors include single family residences, the closest of which is approximately 180 feet east of the project site. Additional sensitive receptors in the project vicinity include single family residences in City of Isleton and Isleton Elementary School located approximately 2.5 miles northwest of the project site.

Regulatory Framework

Air quality within the project site is regulated by agencies such as the U.S. Environmental Protection Agency (USEPA) and the California Air Resources Board (CARB) at the federal and State levels, respectively, and locally by the SMAQMD, BAAQMD, YSAQMD, and SJVAPCD. The air districts attain and maintain air quality conditions in their respective basins through a comprehensive program of planning, regulation,

enforcement, technical innovation, and promotion of the understanding of air quality issues. The air districts' clean air strategy includes the preparation of plans for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution.

Federal

The USEPA is responsible for enforcing the federal Clean Air Act (CAA). The USEPA is also responsible for establishing the National Ambient Air Quality Standards (NAAQS). The NAAQS are required under the 1977 CAA and subsequent amendments. The USEPA regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain types of locomotives. The agency has jurisdiction over emission sources outside state waters (e.g. beyond the outer continental shelf) and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by CARB.

State

CARB is responsible for meeting the State requirements of the federal CAA, administering the California CAA, and establishing the California Ambient Air Quality Standards (CAAQS). The California CAA, as amended in 1992, requires all air districts in the State to endeavor to achieve and maintain the CAAQS. The CAAQS are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride and visibility reducing particles. CARB regulates mobile air pollution sources, such as motor vehicles. The agency is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB established passenger vehicle fuel specifications, which became effective on March 1996. CARB oversees the functions of local air pollution control districts and air quality management districts, which in turn administer air quality activities at the regional and county level.

As described above, the Sacramento Valley Basin is classified as a non-attainment area for federal standards for ozone and $PM_{2.5}$, as well as the state standards for ozone and PM_{10}. Under the California CAA, areas not in compliance with the state standards must submit plans to reduce emissions and achieve attainment. SMAQMD developed a 2008 Ozone Standard Attainment Plan to reduce ozone in the region, which was updated in 2018 (CARB, 2018). Furthermore, SMAQMD developed an attainment plan for PM in 2021 (SMAQMD, 2021b). As described above, the San Francisco Bay Area Air Basin is in a nonattainment area for state and national ozone standards and national PM ambient air quality standards. The BAAQMD has developed the 2017 Clean Air Plan to reduce ozone and PM in the region. In addition, the YSAQMD has prepared the 2015 Triennial Assessment and Plan Update to reduce ozone in the region. The SJVAPCD has adopted a 2022 Ozone Plan and a 2018 $PM_{2.5}$ Plan, and 2007 PM_{10} maintenance plan.

Local

All projects are subject to SMAQMD's rules and regulations in effect at the time of construction. Specific rules applicable to the construction activities under the Proposed Project include, but are not limited to:

- Regulation 2, Rule 20, General Permit Requirements. Includes criteria for issuance or denial of permits, exemptions, appeals.
- Regulation 4, Rule 403, Fugitive dust. Limits fugitive dust by requiring watering during construction and demolition, or other means approved by the Air Pollution Control Officer.
- Regulation 4, Rule 404, PM. Limits PM in excess of 0.23 grams per dry standard cubic meter.

The only project emissions that would occur within the YSAQMD, BAAQMD, and SJAPCD would be from the tugboat transporting materials through the districts. Therefore, regulations in those districts regarding fugitive dust or other typical ground-disturbing or truck hauling construction activities would not apply to the Proposed Project.

CEQA Thresholds of Significance

SMAQMD adopted thresholds of significance for the purposes of CEQA assessments in the December 2009 Guide to Air Quality Assessment in Sacramento County, with the Thresholds of Significance Table most recently updated in April 2020 (SMAQMD, 2021a). The SMAQMD recommends the use of quantitative thresholds to determine the significance of temporary construction-related pollutant emissions and project operations. The YSAQMD has adopted guidelines for quantifying and determining the significance of air quality emissions in their Handbook for Assessing and Mitigating Air Quality Impacts (YSAQMD 2007); the BAAQMD has adopted guidelines for quantifying and determining the significance of air quality emissions in their CEQA Air Quality Guidelines (BAAQMD, 2022); and the SJVAPCD has adopted guidelines in their Air Quality Thresholds of Significance-Criteria Pollutants (SJVAPCD, 2015). These thresholds are shown in **Table 4.3-3**.

Table 4.3-3*:* Significance Thresholds of Affected Air Districts

Pollutant	Mass Daily Thresholds for Construction (lbs/day)			
	SMAQMD	YSAQMD[1]	BAAQMD	SJVAPCD
NO_X	85	167	54	167
ROG	--	167	54	167
PM_{10}	0 [2]	80	82 (exhaust only)	250
$PM_{2.5}$	0 [3]	N/A	54 (exhaust only)	250

Notes: [1]The SJVAPCD provides all their thresholds in tons per year, while the YSAQMD provides their thresholds for NO_X and ROG in tons per year. This was converted to pounds per day of construction by converting tons to pounds and dividing by 120 days, the length of the construction period. If tugboat emissions were to exceed the pounds per day threshold for all 120 construction days, the tons per year threshold would also be exceeded.
[2]If all feasible BACT (best available control technology)/BMPs are applied, then 80 pounds per day and 14.6 tons/year.
[3]If all feasible BACT/BMPs are applied, then 82 pounds per day and 15 tons/year
Sources: SMAQMD 2009; YSAQMD 2007; BAAQMD 2022; SJVAPCD 2015

Methodology

Construction emissions associated with development of the Proposed Project were calculated with the California Emissions Estimator Model (CalEEMod) 2022.1 (CAPCOA, 2022). Temporary emissions would result from three primary sources: operation of construction equipment and vehicles, ground disturbance during clearing and grubbing that create fugitive dust, and operation of boats.

The extent of daily emissions, particularly reactive organic gases (ROGs) and nitrogen oxide (NO_X) emissions, generated by construction equipment would depend on the quantity of equipment used and the hours of operation for project construction. The extent of fugitive dust ($PM_{2.5}$ and PM_{10}) emissions would depend upon the following factors: 1) the amount of disturbed soils; 2) the length of disturbance time; 3) whether excavation is involved; and 4) whether transporting excavated materials offsite is necessary. The amount of ROG emissions depends upon the type and amount of material utilized. Boat

emissions would depend on the type of vessel, the engine horsepower, the engine load factor, and the duration that the vessel would be used.

Construction would include mobilization, site preparation, waterside slope grading of overburden and landslide slope fill placement, waterside levee slope and bench construction, removal/relocation of encroachment, installation of plants, and site demobilization. Construction equipment, phases, and schedule were provided by the Project applicant and are described in detail in **Section 2.3**.

For analytical purposes, additional construction phases including barge mobilization, barge transport, and barge demobilization, were incorporated into the model to isolate emissions stemming from boat traffic. Further breakdown of emissions was conducted based on the specific routes taken by each boat during material transport. This isolation facilitates the division of emissions among the BAAQMD, YSAQMD, SJVAPCD, and SMAQMD air districts, through which the boats pass on their respective transport routes. For boat inputs into CalEEMod 2022.1, the following assumptions were used per information provided by the Project applicant:

- Levee slope and bench construction
    - One small work boat
        - 66 days of use
        - Engine-rated horsepower: 125
        - Engine load factor: 0.42
    - One tugboat or small work boat for the Crane Barge
        - 22 days of use
        - Engine-rated horsepower: 575
        - Engine load factor: 0.50
    - One tugboat for the Material Barge
        - 22 days of use
        - Engine-rated horsepower: 1,700
        - Engine load factor: 0.50

During levee slope and bench construction, boats will operate in four different air districts: the BAAQMD, the YSAQMD, the SJVAPCD, and the SMAQMD. For details on the route taken by each boat and the duration spent in each air district, please refer to the Boat Emission Area Assumptions in **Appendix B**. The material barge will be pulled by a tugboat, while a small work boat will be more likely to move the crane barge; however, to provide operational flexibility and a more conservative assessment of air quality impacts, **Appendix B** assumes that two tugboats are used for the Proposed Project. Barges and associated tugboats would travel through the BAAQMD, YSAQMD, SJVAPCD, and SMAQMD while in transport, and would conduct unloading operations within the SMAQMD.

Motorized boats would not be used in phases other than levee slope and bench construction. The emissions factors from the SMAQMD Harborcraft, Dredge and Barge Emission Factor Calculator were added into CalEEMod 2022.1 as non-default 'other construction equipment'. Assumptions were also made regarding average worker commute trips and default values were used for haul trip capacity. CalEEMod 2022.1 results are shown in **Appendix B**.

4.3.2 Discussion

a) The emission inventories used to develop a region's air quality attainment plans are based primarily on projected population growth and vehicle miles traveled (VMT) for the region, which are based, in part, on the planned growth identified in regional and community plans. Therefore, projects that would result in increases in population or employment growth beyond that projected in regional or community plans could result in increases in VMT above that planned in the attainment plan, further resulting in mobile source emissions that could conflict with a region's air quality planning efforts. The Proposed Project would involve erosion control and habitat modifications/enhancements within the Delta. The Proposed Project would not result in an increase in population, changes to land use, or an increase in VMT during project operation. In addition, the Proposed Project would not result in operational emissions. Therefore, implementation of the Proposed Project would not conflict with or obstruct implementation of any air quality planning efforts. Impacts would be **less than significant**.

b) CAP emissions typically occur during the construction phase and the operational phase of a project, and separate significance thresholds may be provided by air districts.

Temporary Construction-Related Regional CAP and Precursor Emissions

Project-related construction activities would generate temporary air pollutant emissions and fugitive dust emissions from construction equipment. Construction emissions would also occur from motor vehicles and boats transporting construction workers, equipment, materials, and construction debris to and from the project site. **Table 4.3-4** summarizes the estimated maximum daily emissions for each phase of construction within the SMAQMD, including construction emissions at the project site, and from vehicle and barge trips. Overlapping phases of construction have been combined to provide maximum day emissions.

As shown in **Table 4.3-4**, construction emissions from equipment operating at the project site and for the barge trips within the SMAQMD would not exceed the SMAQMD's adopted numerical thresholds. However, as discussed above, to apply the SMAQMD's PM_{10} and $PM_{2.5}$ construction emissions thresholds, the Proposed Project must implement all feasible BACT/BMPs or have zero PM emissions. Therefore, criteria pollutant emission impacts in the SMAQMD would be potentially significant. **Mitigation Measure AQ-1** would require implementation of SMAQMD's Basic Construction Emission Control Practices (Best Management Practices) (SMAQMD 2019). With implementation of **Mitigation Measure AQ-1**, impacts from construction related emissions within the SMAQMD would be reduced to a less than significant level.

Table 4.3-4: Estimated Construction Emissions by Phase within the SMAQMD

Phases	Pollutant					
	ROG	NOx	Total PM10	Total PM2.5	Exhaust PM 10	Exhaust PM2.5
Mobilization	0.26	0.38	0.64	0.15	0.00	0.00
Barge Mobilization	2.24	26.59	1.53	1.36	1.53	1.36
Phase Total	**2.50**	**26.97**	**2.17**	**1.51**	**1.53**	**1.36**
Site Preparation	0.38	2.21	0.79	0.23	0.05	0.05
Waterside slope grading of overburden and landside slope fill placement	1.32	10.35	7.60	3.92	0.44	0.41
Phase Total	**1.70**	**12.56**	**8.39**	**4.14**	**0.49**	**0.45**
Waterside Levee Slope and Bench Construction	1.87	21.12	8.63	4.33	0.66	0.61
Barge Transport	3.26	38.17	2.19	1.95	2.19	1.95
Removal/Relocation of Encroachments	0.13	0.09	0.30	0.07	0.00	0.00
Installation of Plants	1.04	6.07	0.62	0.29	0.20	0.18
Phase Total	**6.29**	**65.45**	**11.74**	**6.63**	**3.04**	**2.74**
Site Demobilization	0.23	0.23	0.61	0.14	0.00	0.00
Barge Demobilization	3.26	38.81	2.24	1.99	2.24	1.99
Phase Total	**3.49**	**39.04**	**2.85**	**2.13**	**2.24**	**1.99**
Maximum Day Emissions	**6.29**	**65.45**	**11.74**	**6.63**	**3.04**	**2.74**
SMAQMD Significance Threshold	-	85	80	82	-	-
Significant?	No	No	No	No	No	No

Notes: Only boat emissions assumed to occur in SMAQMD are included in this table. SMAQMD significance thresholds are based on implementation of BMPs (Mitigation Measure AQ-1).
Source: **Appendix B**

In addition to the emissions from construction on the project site and operation of boats within the SMAQMD, the operation of tugboats to import materials from outside of the air basin will result in emissions within adjacent air districts. In **Table 4.3-5**, construction-related air quality emissions in the three other air districts from tugboat and workboat emissions were compared with BAAQMD, YSAQMD, and SJVAPCD significance thresholds. As shown in **Table 4.3-5**, the maximum daily emissions would not exceed the BAAQMD, YSAQMD, or SJVAPCD thresholds of significance for construction emissions. Therefore, impacts from construction related emissions in adjacent air districts would be **less than significant**.

Table 4.3-5: Construction-Related Boat Emissions in Outside Air Districts

Tugboat Emissions	Pollutant			
	ROG	NO_X	PM_{10}	$PM_{2.5}$
Within BAAQMD				
Project Maximum lbs/day	3.4	40.0	2.3	2.1
BAAQMD Threshold lbs/day	54	54	54 (exhaust only)	54 (exhaust only)
Threshold Exceeded?	**No**	**No**	**No**	**No**
Within YSAQMD				
Project Maximum lbs/day	3.2	38.1	2.2	2
YSAQMD Threshold lbs/day	167	167	80	n/a
Threshold Exceeded?	**No**	**No**	**No**	**No**
Within SJVAPCD				
Project Maximum lbs/day	0.7	7.5	2.2	2
SJVAPCD Threshold lbs/day	184	184	276	276
Threshold Exceeded?	**No**	**No**	**No**	**No**

Notes: The BAAQMD recommends for construction projects that require less than 1 year to complete, lead agencies should annualize impacts over the scope of actual days that peak impacts would occur rather than over the full year. As such, emissions for tugboats have been totaled and annualized over the entire 66 days of the Waterside Levee Slope and Bench Construction (BAAQMD, 2022).
Source: **Appendix B**

With implementation of **Mitigation Measure AQ-1**, impacts due to temporary construction activities would be **less than significant**.

Long-Term Operational-Related Regional CAP and Precursor Emissions

As previously mentioned, no new local criteria pollutant emissions sources are anticipated under long-term project operation. The Proposed Project would have no operational air quality impacts since the Proposed Project would not change the existing use of the site. The Proposed Project would involve erosion control and habitat enhancement and would therefore not result in long-term emissions. There would be **no impact.**

c) The potential for the Proposed Project to result in the exposure of sensitive receptors to substantial pollutant concentrations was evaluated for construction-related activities. Project operation would not produce emissions.

Temporary Construction

CARB's Air Quality and Land Use Handbook: A Community Health Perspective (April 2005) provides recommendations for siting projects near sensitive land uses. These recommendations are intended to reduce the risk of potential health effects associated with diesel exhaust emitted from trucks. Diesel exhaust contain diesel particulate matter (DPM), a toxic air contaminant (TAC) associated with temporary health effects, including eye-watering, exacerbation of asthma, respiratory irritation, and more serious long-term effects, such as cancer and lung disease (CARB, 2005).

During construction, residences and other sensitive receptors may be affected by the temporary construction emissions from diesel-generated PM exhaust. As previously stated, nearby sensitive receptors include single family residences, the closest of which is approximately 158 feet east of the project site. Additional sensitive receptors in the project vicinity include single family residences in the City of Isleton and Isleton Elementary School located approximately 2.5 miles northwest of the project site. Construction of the Proposed Project would occur for approximately 120 working days over at least five months.

The dose to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for any exposed receptor. Thus, the risks estimated for an exposed individual are higher if a fixed exposure occurs over a longer period of time.

According to Office of Environmental Health Hazard Assessment (OEHHA), Health Risk Assessments to determine the exposure of sensitive receptors to TAC emissions should be based on a 30-year exposure period; however, such assessments should be limited to the period/duration of activities associated with a project (OEHHA, 2015). Consequently, it is important to consider that the use of off-road heavy-duty diesel equipment would be limited to the construction period, which would be approximately 120 days for the Proposed Project. Additionally, studies show that diesel PM is highly dispersive (e.g., decrease of 70 percent at 500 feet from the source) (Zhu et al. 2002).

As shown in **Table 4.3-4**, the Proposed Project would result in maximum emissions of approximately three lbs/day of PM_{10} and $PM_{2.5}$ exhaust in the SMAQMD. SMAQMD has not established a quantitative threshold of significance for construction-related TAC emissions but recommends taking into consideration specific construction-related characteristics of the project, which are described above. Therefore, considering the highly dispersive properties of DPM, the relatively low mass of DPM emissions that would be generated during Project construction, the distance of sensitive receptors, and the relatively short duration of construction activities (120 days) when compared to a 30-year exposure period, construction-related TAC emissions would not expose sensitive receptors to a substantial incremental increase in cancer risk. As a result, the Proposed Project would not conflict with SMAQMD guidance for risks and hazards to receptors associated with new emissions sources. Thus, the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations during construction. Impacts would be **less than significant**.

d) The occurrence and severity of odor impacts depend on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the presence of sensitive receptors. Although offensive odors rarely cause physical harm, they may still be very unpleasant, leading to considerable distress and often generating citizen complaints to local governments and regulatory agencies.

Construction associated with the Proposed Project would result in odors from exhaust emissions from onsite diesel equipment. Such emissions would be intermittent in nature and would dissipate rapidly with increasing distance from the source. In addition, SMAQMD Rule 402

prohibits any person or source from emitting air contaminants that cause detriment, nuisance, or annoyance to a considerable number of persons or the public.

Operation of the Proposed Project would involve new erosion control and habitat enhancements that would not generate new odors. Thus, operation of the Proposed Project would not expose the nearby existing receptors to objectionable odors or other emissions.

Implementation of the Proposed Project would not involve the construction or operation of major odor sources or other emissions. Thus, the Proposed Project would not result in the exposure of sensitive receptors to objectionable odors. Impacts would be **less than significant**.

4.3.3 Mitigation Measures

AQ-1: Best Available Construction Measures

Project contractors shall ensure that the relevant SMAQMD Basic Control Emission Control Practices (also known as BMPs) shall be implemented during project construction. BMPs include:

- Control of fugitive dust is required by District Rule 403 and enforced by District staff.
- Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads.
- Cover or maintain at least two feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways should be covered.
- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeping is prohibited.
- Limit vehicle speeds on unpaved roads to 15 miles per hour (mph).
- The following practices describe exhaust emission control from diesel powered fleets working at a construction site. California regulations limit idling from both on-road and off-road diesel-powered equipment. CARB enforces idling limitations and compliance with diesel fleet regulations.
    - Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site.
    - Provide current certificate(s) of compliance for CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation [California Code of Regulations, Title 13, sections 2449 and 2449.1].
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.

4.4 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 U.S. 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 U.S. 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?	☐	☐	☐	☒

4.4.1 Environmental Setting

The Proposed Project includes construction work on the levee adjacent to and within the Georgiana Slough. The terrestrial area includes adjacent land uses such as the urbanized areas along the slough and agricultural land area of the Delta.

Information related to terrestrial biological resources discussed below is based on the Biological Resources Assessment (BRA) for the Proposed Project completed by Acorn Environmental in April 2024 and included as **Appendix C**. Information related to aquatic biological resources discussed below is based on a Biological Assessment (BA) and Aquatic Resources Delineation (ARD) completed by Robertson-Bryan, Inc. and included as **Appendix D** and **E**, respectively.

Terrestrial Resources

Methods

Section 2 of **Appendix C** outlines the methodology utilized in preparation of the BRA. Queries of the USFWS Information for Planning and Consultation system (IPaC; Attachment B of **Appendix C**), CDFW California Natural Diversity Database (CNDDB) (Figure 5 of **Appendix C**), and the California Native Plant Society (CNPS) Online Inventory of Rare and Endangered Plants of California (Attachment B of **Appendix C**) were conducted to obtain comprehensive information regarding state and federally listed species as well as other special status species considered to have potential to occur within the Isleton, Rio Vista, Liberty Island, Courtland, Bruceville, Thornton, Terminous, Bouldin Island, and Jersey Island, California U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles. The results of these scientific database queries were compiled into a table that is presented as Attachment C of **Appendix C**.

In addition, the following resources were reviewed for information about the project site:

- Aerial photographs of the project site and vicinity;
- Isleton, Rio Vista, Liberty Island, Courtland, Bruceville, Thornton, Terminous, Bouldin Island, and Jersey Island, California USGS 7.5-minute topographic quadrangles;
- U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS, 2024);
- USFWS Critical Habitat Portal (USFWS, 2024a); and
- USFWS National Wetlands Inventory (Figure 6 of **Appendix C**).

Consulting biologist Dr. Geo Graening conducted a terrestrial biological field assessment on September 14, 2023, as discussed in Section 2 of **Appendix C**. Wildlife identification and nomenclature followed standard reference texts including Sibley Field Guide to Birds of Western North America (Sibley, 2003), Field Guide to Western Reptiles and Amphibians (Stebbins, 2003), and Mammals of North America (Bowers et al., 2004). The habitat requirements for each regionally occurring special status species were assessed and compared to the type and quality of the habitats observed within the project site during the field survey. Several sensitive species were eliminated from consideration as potential to occur on site due to lack of suitable habitat, lack of suitable soils/substrate, and/or known regional distribution.

Vegetation and Habitat Types

Terrestrial vegetative communities observed within the project site include ruderal/developed, riparian forest, and scrub shrub (Section 3.2 of **Appendix C**). These habitats are described below and shown on

Figure 5. The terrestrial habitat types below represent an approximately 5-acre portion of the Project Site. The remaining 1.7 acres are open water within the Georgiana Slough channel.

Ruderal / Developed (4.5 acres)

The terrestrial component of the project site consists mostly of ruderal and developed habitat. These areas consist of disturbed or converted natural habitat that is now either in ruderal state, or urbanized with gravel roads, structure, and utility placement. The banks of the levee are regularly mowed and trimmed for maintenance purposes. Vegetation within this habitat type consists primarily of nonnative European annual grasses (*Avena*, *Bromus*, *Hordeum*, and *Festuca* species) and weedy or invasive species lacking a consistent community structure. Landscape/ornamental species present are: blue gum eucalyptus (*Eucalyptus globulus*); cider gum (*Eucalyptus gunni*); black locust (*Robinia pseudoacacia*); and oleander (*Nerium* sp.) The disturbed and altered condition of these habitats greatly reduces their habitat value and ability to sustain rare plants or diverse wildlife assemblages. The CDFW Terrestrial Natural Communities alliances are: 11.300.00 Disturbed Habitat; and 12.000.00 Urban/Developed.

Riparian Forest (0.09 acres)

Patches of riparian forest exist along the waterside slope of the levee; the dominant tree species are Oregon ash (*Fraxinus latifolia*) and white alder (*Alnus rhombifolia*), with some narrow-leaf willow *(Salix exigua*) and red willow (*Salix laevigata*). The understory contains Himalayan blackberry and California wild grape. The CDFW Terrestrial Natural Communities alliances are: 61.207.00 Mixed Willow Riparian Forests and Woodland; and 61.420.00 White Alder Forest and Woodland.

Scrub Shrub (0.41 acres)

Patches of riparian scrub also exist along the waterside slope of the levee. The dominant community is willow thicket, and in the project site, this consists of narrow-leaf willow, red willow, sandbar willow (*Salix exigua*). Other willow species are present in the Delta: Goodding's black willow, arroyo willow, sandbar willow, button willow, and pacific willow. Other plant species in this riparian scrub habitat are Himalayan blackberry brambles, poison oak (*Toxicodendron diversilobum*), California mugwort (*Artemisia douglasiana*), giant reed (*Arundo donax*), and sedges (*Carex* spp.). The CDFW Terrestrial Natural Communities alliances are: 61.209.00 Narrow-leaf Willow Riparian Scrub; and 63.100.00 Scrub Willow [*Salix* spp.].

Wildlife

Wildlife observed during the field survey include fence lizard (*Sceloporus occidentalis*); minnow (*Cyprinidae*); orb weaver (*Argiope* sp.); ants (*Formicidae*); grasshoppers (*Orthoptera*); white skipper (*Heliopetes* sp.); swallow (*Petrochelidon pyrrhonota*); bushtit (*Psaltriparus minimus*); and American crow (*Corvus brachyrhynchos*). Wildlife activity was generally low during the field survey. Wildlife activity on the project site is likely to be depressed by ongoing disturbance from road and boat traffic and related noise, as well as activities from adjacent residences and boat docks.

Special-Status Terrestrial Species

The following special status plant species have the potential to occur in the project site (Section 4.1 and 5.1.1 of **Appendix C**):

- Suisun marsh aster (*Symphyotrichum lentum*), California Rare Plant Rank (CRPR) 1B.2.
- Mason's lilaeopsis (*Lilaeopsis masonii*); State Rare, CRPR 1B.1.

FIGURE 5

VEGETATION COMMUNITIES

- Bristly sedge (*Carex comosa*); CRPR 2B.1
- Bolander's water-hemlock (*Cicuta maculata var. bolanderi*); CRPR 2B.1
- Wooly rose-mallow (*Hibiscus lasiocarpos var. occidentalis*); CRPR 1B.2
- Delta tule pea (*Lathyrus jepsonii var. jepsonii*); CRPR 1B.2
- Delta mudwort (*Limosella australis*); CRPR 2B.1
- Eel-grass pondweed (*Potamogeton zosteriformis*); CRPR 2B.2
- Sanford's arrowhead (*Sagittaria sanfordii*); CRPR 1B.2
- Marsh skullcap (*Scutellaria galericulata*); CRPR 2B.2
- Side-flowering skullcap (*Scutellaria lateriflora*); CRPR 2B.2
- Watershield (*Brasenia schreberi*); CRPR 2B.3

Based on the database and literature review of records discussed in Section 4.1 of **Appendix C**, 26 terrestrial special status wildlife species are known to or have the potential to occur within the regional vicinity of the project site. Of the 26 species evaluated, 13 special status wildlife species have some potential to occur on the project site based on the presence of suitable habitat, known species ranges and distributions, recorded occurrence data, or observations made during the field survey. These species are:

- tricolored blackbird (*Agelaius tricolor*); CT
- great blue heron (*Ardea herodias*); SSC
- Swainson's hawk (*Buteo swainsoni*); CT
- white-tailed kite (*Elanus leucurus*); FP
- northwestern pond turtle (*Emys marmorata*); FP, SSC
- American peregrine falcon (*Falco peregrinus anatum*); FP
- western red bat (*Lasiurus blossevillii*); SSC
- hoary bat (*Lasiurus cinereus*); SSC
- California black rail (*Laterallus jamaicensis coturniculus*); CE
- song sparrow ("Modesto" population) (*Melospiza melodia*); SSC
- bank swallow (*Riparia riparia*); CT
- riparian brush rabbit (*Sylvilagus bachmani riparius*); FE, CE
- American badger (*Taxidea taxus*); SSC

Aquatic Resources

Methods

A literature review was completed to identify the native and special status fish species that have the potential to occur in Georgiana Slough, and more generally, in the vicinity of the project site, as discussed further in **Appendix D**. The list of special status fish species considered during impact analysis was compiled using the review of literature, a CNDDB (CDFW, 2024) search within a five-mile radius of the project site, a query of the USFWS IPaC (USFWS, 2024b), and other literature sources containing information on fishes of the Sacramento – San Joaquin Delta.

Fisheries Resources

The reach of Georgiana Slough in the vicinity of the Proposed Project supports 22 fish species/races (**Table 4.4-1**). These include a number of federally and state designated special status species that are described in further detail below.

Table 4.4-1: Native Fish Species Potentially Occurring in the Project Site

Family	Common Name	Scientific Name	Special status Designation [1]	
			ESA	CESA
Acipenseridae (Sturgeon)	Green Sturgeon	*Aciepenser medirostros*	FT	SSC
	White Sturgeon	*A. transmontanus*	--	SSC
Catostomidae (Suckers)	Sacramento Sucker	*Catostomus occidentalis*	--	--
Cottidae (Sculpins)	Prickly Sculpin	*C. asper*	--	--
Cyprinidae (Minnows)	Hardhead	*Mylopharodon conocephalus*	--	SSC
	Hitch	*Lavinia exilicauda*	--	--
	California Roach	*Hesperoleucus symmetricus*	--	--
	Sacramento Blackfish	*Orthodon microlepidotus*	--	--
	Sacramento Pikeminnow	*Pytchocheilus grandis*	--	--
	Sacramento Speckled Dace	*Rhinichthys osculus*	--	--
	Sacramento Splittail	*Pogonichthys macrolepidotus*	--	SSC
Embiotocidae (Surfperches)	Tule Perch	*Hysterocarpus traskii*	--	--
Gasterosteidae (Sticklebacks)	Threespine Stickleback	*Gasterosteus aculeatus*	--	--
Osmeridae (Smelts)	Delta Smelt	*Hypomesus transpacificus*	FT	SE
	Longfin Smelt	*Spirinchus thaleichthys*	--	ST
Petromyzontidae (Lampreys)	Pacific Lamprey	*Lampetra tridentata*	FSC	SSC
	River Lamprey	*L. ayresi*	--	SSC
Salmonidae (Salmon and Trout)	Chinook Salmon	*Onchorhynchus tshawytscha*		
	Winter-run		FE	SE
	Spring-run		FT	ST
	Fall-run		SC	SSC
	Late-fall run		SC	SSC
	Steelhead	*O. mykiss*	FT	--
	Rainbow Trout		--	--

[1] Special status designation abbreviations:
FE = Federally listed as endangered
FSC = Federal Species of Concern
FT = Federally listed as threatened
SE = Listed as endangered by the State of California
ST = Listed as threatened by the State of California
SSC = California Species of Special Concern
Sources: Moyle 2002, Moyle et al. 2015; CDFW, 2024; USFWS, 2024.

Special-Status Fish Species

Special status fish occurring in Georgiana Slough in the vicinity of the project site include Chinook salmon, steelhead, green sturgeon, white sturgeon, delta smelt, longfin smelt, Pacific lamprey, river lamprey, hardhead, and Sacramento splittail. The temporal occurrence of adult and juvenile special status fish

species that occur in Georgiana Slough are shown in **Figure 6**. Additional information on Endangered Species Act (ESA)-listed species is described within Section 4 of **Appendix D**. State-listed species are discussed below.

Central Valley Spring-run ESU Chinook Salmon

Central Valley ESU spring-run Chinook Salmon were listed as threatened under the ESA on September 16, 1999 (50 CFR 50394). Five-year status reviews in 2005 and 2011 reaffirmed their threatened status. A 5-year status review completed in 2016 also recommended that Central Valley Spring-run Chinook Salmon remain classified as threatened, even though the recent drought raised concerns that these populations could deteriorate into high extinction risk in the coming years (NMFS, 2016a).

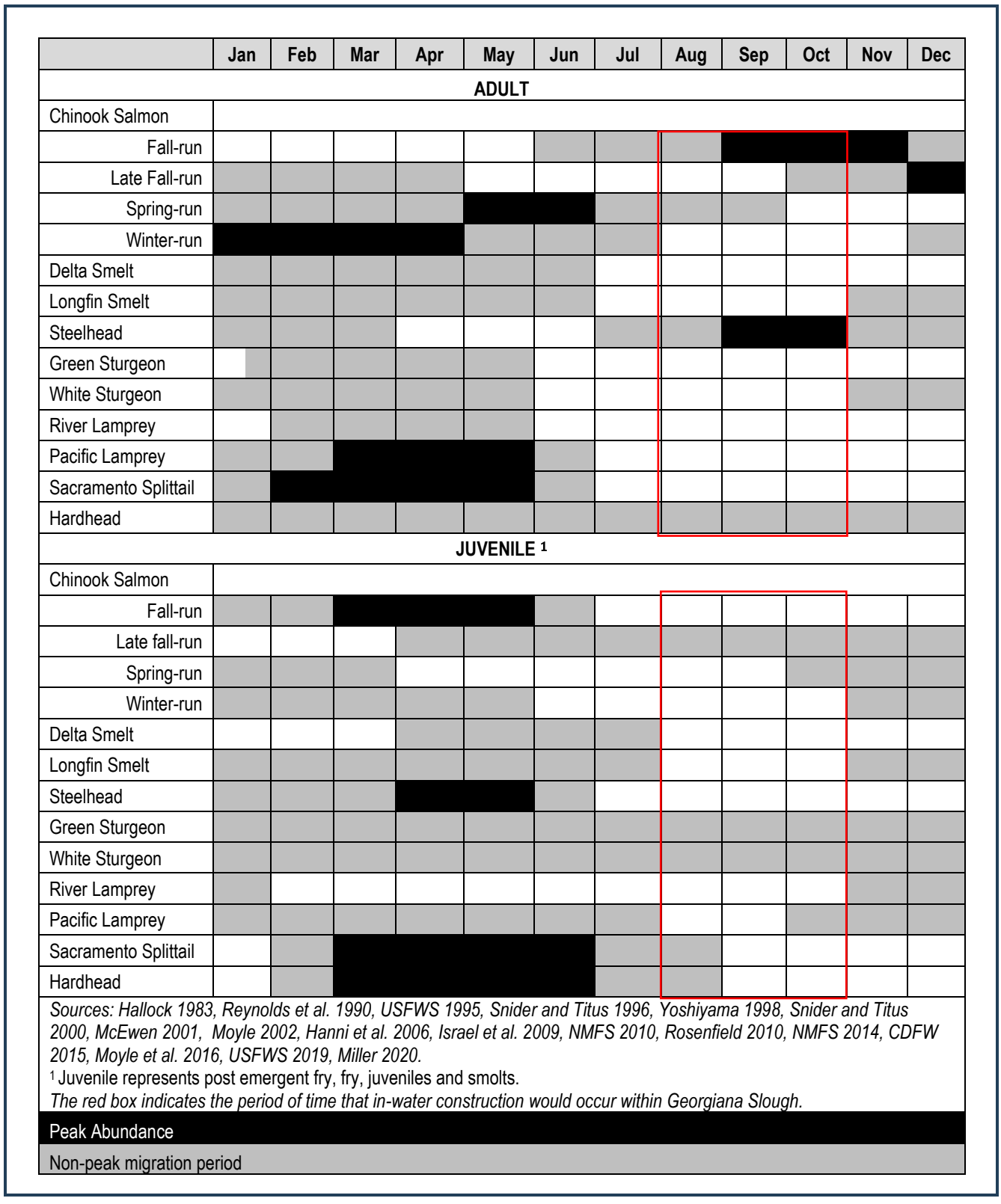
Historically, spring-run Chinook Salmon were abundant throughout the Sacramento and San Joaquin river systems, but were extirpated from the entire San Joaquin Basin by 1951 (Lufkin, 1991). Naturally spawning populations of spring-run Chinook Salmon are currently believed to be restricted to accessible reaches of the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Mill Creek, the Feather River, and the Yuba River (CDFG, 1998). The Central Valley ESU includes all spawning populations in the Sacramento River and its tributaries, including the Feather River, and one artificial propagation program, the Feather River Hatchery spring-run Chinook program.

Most life history traits for Central Valley spring-run Chinook ESU are based off characteristics from Sacramento River stocks where native populations still exist. Adult Central Valley spring-run Chinook Salmon begin upstream migration from the ocean in late January and early February (CDFG, 1998) and continue through September (NMFS, 2014). The fish enter rivers sexually immature and hold in deep, cold freshwater pools to mature for several months prior to spawning (Moyle, 2002) and generally enter their natal streams from mid-February through July (CDFG, 1998).

A majority of Central Valley spring-run Chinook Salmon enter the Sacramento River basin to spawn as three-year-olds (Fisher, 1994). Spawning typically occurs from mid-August to early October, peaking in September (Moyle, 2002). Juveniles generally reside in freshwater for 12–16 months and emigrate as yearlings from October through March with peak movement during November and December (NMFS, 2014). Length of residency within the Delta is unknown, but the fish are less likely to remain in the late spring months. Nevertheless, it is possible for juvenile spring-run Chinook Salmon to be present in the delta in all months of the year and adult spring-run Chinook Salmon to be present from January through September (NMFS, 2014). Both adult and juvenile spring-run Chinook Salmon could be present in Georgiana Slough in the vicinity of the project site during the in-water construction window (**Figure 6**).

Sacramento River Winter-run ESU Chinook Salmon

The Sacramento River winter-run ESU Chinook Salmon was listed as a threatened species under emergency provisions of the ESA in August 1989 (54 Federal Register [FR] 32085; August 4, 1989) and formally listed as threatened in November 1990 (55 FR 46515; November 5, 1990). In June 1992, NMFS proposed reclassifying the species as endangered (57 FR 27416; June 19, 1992) and winter-run ESU Chinook were formally listed as endangered January 4, 1994 (59 FR 440). NMFS developed a draft recovery plan in 1997 that was never finalized. However, the endangered designation status was reaffirmed on June 28, 2005 (70 FR 37160). NMFS completed another 5-Year Review of Sacramento winter-run ESU Chinook Salmon in December 2016, and again recommended maintaining the endangered classification (NMFS, 2016a) and again recommended maintaining the endangered classification (NMFS, 2016a). In July



Source: Robertson-Bryant, Inc. 2024

FIGURE 6

TEMPORAL OCCURRENCES OF SPECIAL-STATUS FISH IN GEORGIANA SLOUGH

2014, NMFS released a Recovery Plan for Sacramento River winter-run ESU Chinook Salmon (NMFS, 2014). The ESU includes all naturally spawned populations of winter-run ESU Chinook Salmon in the Sacramento River and its tributaries, as well as Chinook Salmon that are part of the conservation hatchery at the Livingston Stone National Fish Hatchery located at the foot of the Shasta Dam.

Escapement (the amount of fish that escape harvest and return to spawn) of Sacramento River winter-run ESU Chinook in the late 1960s was nearly 100,000 fish but declined to under 200 fish in the 1990s (Good et al., 2005). Since 1998 the Livingston Stone National Fish Hatchery salmon conservation program has produced and released winter-run ESU Chinook Salmon. This program has been a major factor in preventing species extinction through increasing population size from critical lows in the 1990s (NMFS, 2014). By 2006, returns to the hatchery were as high as 17,296 adults (CDFW, 2015). However, the run size decreased again in 2007 and has remained relatively low since then. In 2014 winter-run ESU Chinook escapement was 3,015 (CDFW, 2015). Although the ESU was saved from extinction much of the current population is made up of hatchery fish (NMFS, 2014).

Upstream spawning migrations through the Delta and into the lower Sacramento River occur from November through July, with peak immigration from January through April (USFWS, 1995; NMFS, 2014). Spawning occurs from May to August, peaking from May to July (NMFS, 2014). After rearing in streamside habitats for almost one-year, juvenile salmon migrate downstream. Although juveniles spend a substantial amount of time rearing in the Delta, the importance of the Delta to winter-run ESU Chinook's life history is not fully understood (NMFS ,2014). Juvenile winter-run Chinook Salmon may occur in Georgiana Slough from November through early May (NMFS, 2014). Neither adult nor juvenile winter-run Chinook Salmon would be present in Georgiana Slough in the vicinity of the project site during the in-water construction window (**Figure 6**).

Central Valley Fall/Late-Fall Run Chinook Salmon

The Central Valley fall-run and late fall-run Chinook salmon ESU were transferred from the federal candidate species list to the federal species of concern list in 2004 (64 FR 19975; April 15, 2004). Although Central Valley fall and late-fall runs are different life history forms, they are part of the same ESU. The Central Valley fall-run and late fall-run Chinook ESU includes all naturally spawned fall-run Chinook Salmon in the San Joaquin and Sacramento Basins, east of the Carquinez Strait. The fall-run of Chinook Salmon is currently the largest run of Chinook Salmon in the San Joaquin and Sacramento River watersheds. Fall-run Chinook Salmon continue to support commercial and recreational fisheries of significant economic importance.

In general, adult fall-run Chinook Salmon migrate into the Delta and upstream tributaries from June through December, with immigration peaking from September through November. Spawning generally occurs from October through December, with fry emergence typically beginning in late December and January. Fall-run Chinook Salmon emigrate as post-emergent fry, juveniles, and as smolts after rearing in their natal streams for up to six months. Fall-run emigrants may be present in Georgiana Slough from January through June, with peak emigration occurring between March and May. Emigrating juveniles remain in the Delta for variable lengths of time prior to entering the ocean. Adult and juvenile fall-run and late-fall run Chinook Salmon could be present in Georgiana Slough in the vicinity of the project site during the in-water construction window (**Figure 6**).

Delta Smelt

USFWS listed Delta Smelt (*Hypomesus transpacificus*) as a threatened species under the ESA in March 1993 (58 FR 12854). In early 2005, the USFWS reviewed the population status of this species and based

on 37 years of data, recommended that no change in its threatened status was warranted. The Delta Smelt also was listed as threatened under the California Endangered Species Act (CESA) in 1993, and re-designated by the state as endangered in 2008. On November 13, 2009, the Center for Biological Diversity filed separate lawsuits challenging the USFWS' failure to respond to a petition to change the Delta Smelt's federal status from threatened to endangered and the USFWS' denial of federal listing for the Longfin Smelt. On April 2, 2010, the USFWS issued a finding that re-listing Delta Smelt as endangered was warranted but precluded by the need to devote resources to higher-priority matters (75 FR 17667).

Delta Smelt are endemic to the Delta and were historically one of the most common fish found in the Delta with a range extending from Suisun Bay upstream to the City of Sacramento and below Mossdale on the San Joaquin River (USFWS, 1995). However, because of the recent declines in population, there have been substantial changes to the distribution and abundance of the species in its native geographic range (IEPMAS, 2015). The majority of the population is usually observed in the northern Delta and near to and west of the Sacramento-San Joaquin River confluence.

Delta Smelt are generally considered a diadromous (i.e., move between fresh and salt water) seasonal reproductive migrant (IEPMAS, 2015). The species reside in areas with low salinity most of the year. The 2019 state of scientific understanding indicates that most adult fish aggregate around Grizzly Island, Sherman Island, and in the Cache Slough Complex (USFWS, 2019). Although some smelt remain in freshwater year round (Sommer et al., 2011; Merz et al., 2011), Delta Smelt typically begin their freshwater migration to spawn in early winter. In the lower Sacramento River Delta Smelt spawning is known to occur in Cache Slough and Lindsey Slough (in the vicinity of Isleton) (Wang, 2007).

The spawning period is highly variable from year to year and may occur from late January through June (Moyle et al., 2016), with peak spawning activity typically occurring in April and May (USFWS, 2008; Moyle, 2002). The majority of Delta Smelt complete their entire life cycle in one year and the adults die after spawning. However, observations from laboratory studies indicate that, in aquaculture settings, a small proportion (<10 percent) of adults do not spawn until age-two and another small portion of adults survive spawning after age-one and live to spawn as age-two adults (Moyle, 2002). Delta Smelt larvae are transported downstream by river currents to zones of freshwater/saltwater mixing from late March through July (Wang, 1986).

Upstream spawning migration of Delta Smelt through the Delta occurs from January through June. Juvenile Delta Smelt migrate/drift downstream into the upper Delta from April through July. Neither adult nor juvenile Delta Smelt would be present in Georgiana Slough in the vicinity of the project site during the in-water construction window (**Figure 6**).

Longfin Smelt

Longfin Smelt was first petitioned for listing under CESA in August 2007 and was listed as threatened under CESA on March 5, 2009 because of apparent long-term declines in abundance. On April 2, 2012, the USFWS released their 12-month *Findings on a Petition to List the San Francisco Bay-Delta Population of the Longfin Smelt as Endangered or Threatened*. The USFWS determined the listing of Bay-Delta DPS of Longfin Smelt is warranted, however, the listing is precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. This finding means that the Longfin Smelt DPS was added to the list of candidates for ESA listing, where its status will be reviewed annually. Only the Bay-Delta population was advanced to candidate status.

The Delta supports the largest population of Longfin Smelt in California, but their range also extends into San Pablo Bay, San Francisco Bay, South San Francisco Bay, and the Gulf of the Farallones. Longfin Smelt are found in areas ranging in salinity from almost pure seawater (35 parts per thousand) upstream to areas of pure fresh water. Distribution of Longfin Smelt is centered in the west Delta, Suisun Bay, and San Pablo Bay. In wet years they may be distributed more toward San Pablo Bay, and in dry years more toward the west Delta.

The primary cause of decline of Longfin Smelt is reduction in outflows associated with water exports from state and federal pumping operations, especially during periods of drought (Moyle, 2002). Other factors cited as contributing to decline of Longfin Smelt include entrainment losses to diversions, extreme climatic variation, toxic substances (especially pesticides), predation, and competition from introduced species (Moyle, 2002).

Longfin Smelt are relatively short-lived, reaching maturity at age two. Most individuals live only two years, but some may live as long as three years. Adult Longfin Smelt move from estuarine areas into rivers to spawn. Spawning occurs in fresh water, over substrates composed of sand and/or gravel, rocks, and aquatic plants, and may occur from November into June, with peak spawning activity occurring from February through April (Emmett et al., 1991; Wang, 1986). Spawning occurs mainly downstream of about Rio Vista in the Sacramento River, and below Medford Island in the San Joaquin River, with a downstream boundary near Pittsburg and Montezuma Slough (Merz et al., 2013). Longfin Smelt have also been observed in their winter and spring spawning as far upstream as Isleton (USFWS, 2012). Once adult Longfin Smelt spawn, they die. Longfin Smelt larvae are most common in winter and early spring but are not found from August through October (Rosenfield, 2010). Within three months larvae develop into juveniles. Juveniles and sub-adults are distributed throughout the year in brackish and marine environments. Neither adult nor juvenile Longfin Smelt would be present in Georgiana Slough in the vicinity of the project site during the in-water construction window (**Figure 6**).

Central Valley DPS Steelhead

The Central Valley DPS steelhead (*Oncorhynchus mykiss*) was listed as threatened under the ESA on March 19, 1998 (63 FR 13347). Following 5-year status reviews in 2006 and 2011, the species was reaffirmed as threatened. On May 26, 2016, NMFS completed another 5-year status review and recommended the species remain classified as threatened (NMFS, 2016b).

The Central Valley DPS includes a mixture of hatchery and wild fish, and resident and anadromous steelhead from the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo bays and their tributaries (NMFS 2014, 63 FR 13347). Four artificial steelhead propagation programs are used to mitigate the loss of steelhead habitat: (1) Coleman National Fish Hatchery, (2) Feather River Hatchery, (3) Nimbus Hatchery and (4) Mokelumne Hatchery. The Coleman National, Feathery River, and Mokelumne River hatcheries are considered to be part of the DPS (NMFS, 2016b). The four hatcheries release approximately 600,000 yearling smolts annually and these fish now appear to constitute a major proportion of the total Central Valley steelhead population (NMFS, 2014).

Currently, Central Valley steelhead are considered “ocean maturing” or “winter” steelhead (McEwan and Jackson, 1996), although “stream maturing” or “summer” steelhead may have been present historically (Moyle, 2002). Adult steelhead, typically averaging 600 to 800 mm in length (Moyle, 2002), generally leave the ocean and begin upstream migration through the Delta to spawning reaches when river flows increase. Entry into the river system occurs to some degree every month except June (McEwan and

Jackson, 1996) although generally migration occurs from July through March, and peaks in September and October (NMFS, 2014).

Unlike salmon, steelhead are iteroparous (i.e., able to spawn repeatedly) and may spawn and return to the ocean for up to four consecutive years before dying; however, it is rare for steelhead to spawn more than twice, and the majority of repeat spawners are females (Busby et al., 1996). Spawning generally occurs from January through April (McEwan and Jackson, 1996), with adults migrating through the delta to and from spawning grounds throughout much of the year. Juvenile steelhead rear in their natal streams for 1 to 3 years prior to smoltification. Emigration of 1- to 3-year-old sub-adults primarily occurs from January through June (Snider and Titus, 1996). Length of residency within the Delta is unknown, but the fish are less likely to remain in the late spring months (NMFS, 2014). Only adult steelhead would be expected to be present in Georgiana Slough in the project site vicinity during the in-water construction window (**Figure 6**).

Southern DPS Green Sturgeon

On April 7, 2006, NMFS proposed the Southern DPS of Green Sturgeon, which includes all fish populations south of the Eel River, California, as threatened under the ESA (71 FR 17757). The Final Rule establishing take prohibitions for the Southern DPS was promulgated on June 2, 2010 (75 FR 30714). In August 2018, NMFS released a Recovery Plan for the southern DPS of North American Green Sturgeon (NMFS, 2018). A 5-year status review for the sDPS Green Sturgeon was completed in 2021 (NMFS, 2021). The review determined that since many of the threats cited in the original listing still existed, the Threatened status is still applicable.

Green Sturgeon are found in the lower reaches of large rivers from British Columbia south to the Delta. Green Sturgeon are anadromous and have diverse habitat needs that include freshwater streams, rivers, estuarine, and marine waters (NMFS, 2018). There are three general phases in Green Sturgeon life history: (1) freshwater stage (<3 years old), (2) coastal migrants (3–13 years old for females; 3–9 years old for males); and (3) adults (>13 years old for females, >9 years old for males) (EPIC et al., 2001). Although time spent in freshwater is thought to be minimal, freshwater access is an important component of the sturgeon's life history since it uses freshwater environments for spawning (Erickson et al., 2002; Emmett et al., 1991). It is thought that most adult fish, in preparation for spawning, follow a direct path to the Sacramento River when leaving the San Francisco Bay. However, a small percentage have been observed to move toward the eastern part of the Delta, following the San Joaquin River and subsequently enter the Sacramento River via the Mokelumne River and delta cross channel (NMFS, 2010; Gruber at al., 2012; Jackson and Van Eenennaam, 2012).

Adult Green Sturgeon move into the upper reaches of rivers in spring and early summer to feed and spawn. Based on angler and incidental catches of Green Sturgeon in the Sacramento River, spawning times are believed to be from April through July, peaking from mid-April to mid-June (USFWS, 1995; NMFS, 2018). Adult Green Sturgeon may be present in Georgiana Slough as they migrate upstream to spawning grounds, from February to July (Heublein et al. 2009, NMFS 2018). Adult emigration typically occurs from November through January and coincides with increased seasonal river flows (**Appendix F**). Thus, adult Green Sturgeon would not be present in the vicinity of the project site during construction activities (**Figure 6**).

Juvenile Green Sturgeon are believed to reside in freshwater habitats from one to four years, before emigrating to the Delta under winter high-flow events; however, the exact timing of emigration is unknown (EPIC et al., 2001). Juvenile Green Sturgeon may rear in the Delta throughout the year; thus, it

is possible for juvenile Green Sturgeon to be present in Georgiana Slough during all months of the year. Only juvenile Green Sturgeon would be expected to be present in Georgiana Slough in the project vicinity during the in-water construction window (**Figure 6**).

White Sturgeon

These fish are sometimes found in marine waters, but more typically they reside in large rivers and their associated estuaries such as the Delta. White sturgeon in the Sacramento-San Joaquin River system are the southernmost spawning population of the species. White sturgeon primarily spawn in the mainstem of the Sacramento River upstream of Knights Landing. Adults migrate from the estuary to spawning areas in the Sacramento River from February through June and then return to the Delta. Spawning, postspawning, and mature adult white sturgeon can occur in Georgiana Slough from November through May (Israel et al., 2009) thus adult white sturgeon would not be present in the project site vicinity during the in-water construction window. Juvenile white sturgeon could be present in Georgiana Slough during all months of the year (Israel et al., 2009).

Hardhead

Hardhead (*M. conocephalus*), a California Species of Special Concern, is a large warm water cyprinid (i.e., minnow) that occurs primarily in large, undisturbed low to mid-elevation rivers and streams (Moyle, 2002). Hardhead in large rivers, such as the Sacramento and San-Joaquin Rivers, typically migrate into smaller tributary streams to spawn, where habitat conditions are more suitable for spawning (Moyle, 2002). Hardhead mature in their third year and spawn primarily in April and May, although some data suggests that spawning may extend into August (Moyle, 2002). Although the early life history of juvenile hardhead is poorly understood, juvenile hardhead move into deeper habitats as they grow (Moyle, 2002). No hardhead spawning would occur in the vicinity of the project site, but juveniles and adults could be present in Georgiana Slough during all months of the year. Adult and juvenile hardhead could be present in Georgiana Slough in the vicinity of the project site during the in-water construction window.

Pacific Lamprey

The Pacific lamprey is a federal species of concern; however, no state designation has been made. Pacific Lamprey are still present throughout much of their historical range. However, some populations have been reduced or extirpated from streams that have been highly degraded or modified by humans. The Pacific Lamprey range includes Pacific coast drainages extending from Hokkaido Island, Japan to Alaska and south to Rio Santo Domingo, California and includes rivers and creeks of the Central Valley, California. Pacific Lamprey are anadromous and highly predaceous (Moyle, 2002). The predatory adult stage is spent in the ocean, although some scattered landlocked populations occur in some freshwater reservoirs.

The adults begin their upstream spawning migrations to freshwater rivers as early as January, with peak immigration occurring from early March through late June (Moyle 2002). Spawning occurs shortly after the adult lamprey reach suitable spawning areas, primarily during the spring and summer months. Following hatching, the ammocoetes reside in upstream waters for a period of five to seven years, where they burrow into the sediments and filter organic matter, before undergoing metamorphosis to the predatory and saltwater-tolerant adult phase and subsequent emigration from freshwater to the ocean. Emigration occurs under high flows during the winter and spring, possibly coincident with the upstream migration of adults (Moyle 2002). Based on the available information, adult Pacific Lamprey may be present in Georgiana Slough during their spawning migrations as early as January, but primarily between March and June, outside the in-water work window. Juvenile Pacific Lamprey could occur in the vicinity of the Proposed Project between October and July (Hanni et al. 2006), thus only juvenile Pacific Lamprey

could be present in Georgiana Slough in the vicinity of the proposed project during the in-water construction window (**Figure 6**).

River Lamprey

The river lamprey is relatively small (averaging 17 centimeters) and highly predaceous (Moyle, 2002). The river lamprey is distributed in streams and rivers along the eastern Pacific Ocean from Juneau, Alaska, to San Francisco Bay. Primary abundance in California is in the lower Sacramento River and San Joaquin River watersheds, especially the Stanislaus and Tuolumne Rivers.

A great deal of what is known about the River Lamprey is from information on populations in British Columbia. There, adults migrate from the Pacific Ocean into rivers and streams in the fall and spawn from February through May. Adults will excavate a saucer-shaped depression in sand or gravel riffles where the eggs are deposited. After spawning, the adults perish. Ammocoetes remain in backwaters for several years, where they feed on algae and microorganisms (Moyle et al., 1995). The metamorphosis from juvenile to adulthood begins in July and is complete by the following April. Following completion of metamorphosis, river lamprey congregate immediately upriver from salt water and emigrate into the ocean in late spring (Moyle, 2002).

Based on this life history, adult river lamprey may occur in Georgiana Slough from February through May, and juvenile river lamprey may occur between late November and January (Hanni et al., 2006). Neither adult nor juvenile river lamprey would be present in Georgiana Slough in the vicinity of the Proposed Project during the in-water construction window.

Sacramento Splittail

The Sacramento Splittail, a California Species of Special Concern, is an endemic cyprinid (i.e., minnow) that was once widely distributed in lakes and rivers throughout the Central Valley, including the Sacramento River upstream to Redding and in the American River as far east as Folsom (Moyle, 2002). Its present range includes Suisun Bay, the Napa and Petaluma rivers (Sommer et al., 1997), the Sacramento River as far north as the Red Bluff Diversion Dam, portions of the Delta, and the San Joaquin River upstream to the Tuolumne River near Modesto (Moyle, 2002).

Adult splittail generally migrate upstream from the San Francisco Estuary to spawn from November through February (CDFG, 2010). Spawning most frequently occurs on floodplains or edge habitats in March and April (Moyle, 2002; CDFG, 2010). Juvenile splittail inhabit shallow areas with abundant vegetation that are devoid of strong currents (Wang, 1986) as they travel downstream into the San Francisco Estuary from spawning grounds from April through August. Because all in-water work would be conducted between August 1 and October 31 it is possible that some juvenile splittail could be present in Georgiana Slough during in-water work. Only juvenile splittail could be present in Georgiana Slough in the vicinity of the project site during the in-water construction window.

Other Fish Species

The remaining non-special status species comprising Georgiana Slough's fish community include a diverse array of resident native and introduced fishes occupying multiple trophic levels and habitat types, and other recreationally important anadromous fishes (i.e., striped bass).

Native non-special status fish species include the resident form of Rainbow Trout, Sacramento Blackfish, and Threespine Stickleback. Introduced fish species within Georgiana Slough occupy multiple trophic levels and habitat types. Many centrarchids (e.g. black basses and sunfish) and ictalurids (i.e., catfish and

bullheads) may prey on eggs, juveniles, and small-bodied adult native and non-native fish. American Shad and Striped Bass, both introduced intentionally to provide a sport fishery, may also feed on juvenile fish, including natives. Western Mosquitofish, introduced as a mosquito-control agent, provide a forage base for native and non-native piscivores.

Critical Habitat

Critical habitat is the specific areas within a specific geographic area that contain the physical or biological features (PBFs) that are essential to the conservation of an endangered or threatened species.

Central Valley Spring-run ESU Chinook Salmon

Critical habitat for spring-run Chinook Salmon occurs in the vicinity of the project site. The PBFs for critical habitat in the vicinity of the Proposed Project for spring-run Chinook Salmon consist of:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development; and
- Freshwater rearing habitat with water quantity and quality, floodplain connectivity, forage, and natural cover supporting juvenile development, growth, mobility, and survival.

Sacramento River Winter-run ESU Chinook Salmon

Critical habitat for winter-run Chinook Salmon does overlap with the project site.

Delta Smelt

Critical habitat for Delta Smelt does not overlap with the project site.

Longfin Smelt

No critical habitat has been designated for Longfin Smelt.

Central Valley DPS Steelhead

Critical habitat for Central Valley Steelhead occurs in the vicinity of the project site. The PBFs for critical habitat in the vicinity of the Proposed Project for Central Valley Steelhead consist of:

- Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival; and
- Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These features are essential to conservation because, without them, juveniles cannot access and use the areas needed to forage, grow, and develop behaviors (e.g., predator avoidance, competition) that help ensure their survival.

Southern DPS Green Sturgeon

Critical habitat for Southern DPS (sDPS) Green Sturgeon occurs in the vicinity of the project site. The PBFs for critical habitat in the vicinity of the Proposed Project for the sDPS Green Sturgeon consist of:

- Food resources. Abundant prey items for larval, juvenile, subadult, and adult life stages. Benthic invertebrates and fish are critical for rearing, foraging, growth and development;
- Water flow. A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of change of freshwater discharge over time) necessary for normal behavior, growth, and survival of all life stages;
- Water quality. Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;
- Migratory corridor. A migratory pathway necessary for the safe and timely passage of sDPS fish within riverine habitats and between riverine and estuarine habitats (e.g., an unobstructed river or dammed river that still allows for safe and timely passage).
- Depth. Deep (i.e., ≥5 m) holding pools for both upstream and downstream holding of adult or subadult fish, with adequate water quality and flow to maintain the physiological needs of the holding adult or subadult fish; and
- Sediment quality. Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. This includes sediments free of contaminants that can negatively affect all life stages.

4.4.2 Discussion

a) The following discussion assesses potential impacts of the Proposed Project, both directly and through habitat modifications, on species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFW (formerly California Department of Fish and Game), USFWS, and/or NMFS occurring within the affected environment.

Terrestrial Resources

Construction activities and ground disturbance associated with the Proposed Project could potentially result in adverse effects to special status plants and wildlife. There would be no operational impacts to special status plants and wildlife because there are no operational activities associated with the project. Therefore, project-related effects discussed below are exclusively construction-related impacts.

As discussed in **Section 4.4.1** above and further within Section 4.1 and 5.1.1 of **Appendix C**, 12 special-status plant species have the potential to occur within the project site. The Proposed Project has potential to result in direct impacts to special status plant species if populations are present in the project site. Although implementation of the Proposed Project would not fully eliminate a special status species since there are other populations offsite, impacts to individuals would be potentially significant without mitigation due to the rarity of these plant species, if they were to occur within the project site. Implementation of **Measure BIO-1**, which includes pre-construction botanical surveys and the salvage and replanting of special-status plants, will reduce potential direct impacts to special status plant populations to a less than significant level. The Proposed Project is not expected to result in permanent loss of habitat due to both mitigation and enhancement/restoration of riparian forest, scrub shrub, SRA and freshwater marsh habitats. After implementation, the Proposed Project would create a net habitat benefit, as the proposed enhancement of riparian habitat and creation of wetland benches would increase habitat complexity and value for special status plants.

The Proposed Project has potential to result in indirect impacts to special status plant species by the spread of invasive, non-native species from construction equipment or imported fill materials. Invasive, non-native plant species can out-compete native species and/or alter habitat towards a state that is unsuitable for special status species. For example, the spread of certain weed species can reduce the biodiversity of native habitats through displacement of vital pollinators, potentially eliminating special status plant species. Impacts to special status plants species from invasive weeds are potentially significant because invasive weeds can spread to the extent that they affect rare plants at the local and/or regional population-level. By removal of invasive giant reed and Himalayan blackberry, the enhancement of riparian and native grassland habitat and the creation of freshwater marsh, the Proposed Project would create habitat complexity and increase the site's value for special status plants. To address the spread of invasive species, **Measure BIO-1** includes construction BMPs.

Project-Related Effects to Special Status Amphibians or Reptiles

Northwestern pond turtle (*Emys marmorata*; FP, SSC) has the potential to occur in the project site as further discussed in Section 4.1 and 5.1.2 of **Appendix C**. The project site has a small amount of suitable habitat, and project construction will disturb this habitat. If construction of the Proposed Project were to directly impact a northwestern pond turtle individual, this would be a potentially significant impact. Implementation of **Measure BIO-2** would avoid impacts to individuals from project activity and would reduce impacts to a **less than significant level**. Implementation of the Proposed Project would ultimately be beneficial for northwestern pond turtle through enhancement of riparian habitat and creation of freshwater marsh habitat.

Project-Related Effects to Special Status Mammals

The following special mammal species have the potential to occur in the project site (Section 4.1 and 5.1.2 of **Appendix C**):

- western red bat (*Lasiurus blossevillii*); SSC
- hoary bat (*Lasiurus cinereus*); SSC
- American badger (*Taxidea taxus*); SSC (dispersal only)

Bats, primarily Western red bat and hoary bat, could utilize the trees in the project site for roosting and could forage for insects over the open water. Bats could be directly impacted by vegetation trimming or grubbing and excavation activities, and indirectly impacted by construction-generated noise and vibration, which could cause roost abandonment. Implementation of the Proposed Project would ultimately be beneficial for bats through the creation and enhancement of riparian and freshwater marsh habitats. Implementation of **Measure BIO-3** described below would reduce potential impacts to bats to **less than significant**.

Dispersing American badgers are unlikely to occur within the project site, but it is possible transient individuals may cross the project site during construction activities. However, as already included under **AMM 3**, wildlife observed within the project site shall be allowed to exit the work area on their own without harm. Therefore, impacts to American badger would be **less than significant**.

Project-Related Effects to Nesting or Foraging Birds

The following special status birds have the potential to occur in the project site (Section 4.1 and 5.1.2 of **Appendix C**):

- tricolored blackbird (*Agelaius tricolor*); CT
- great blue heron (*Ardea herodias*); SSC
- Swainson's hawk (*Buteo swainsoni*); CT
- white-tailed kite (*Elanus leucurus*); FP

Swainson's hawk is State listed as Threatened. The larger trees within the vicinity of the project site provide suitable nesting habitat for the Swainson's hawk. The CNDDB contains four records of this species within five miles of the project site. This species has potential to be present (nesting) within or in the immediate vicinity of the project site during construction. Direct impacts to Swainson's hawk are unlikely to occur on the project site but could occur if the species is nesting within a half mile of the project site. The vegetation on the project site is likely too small to support Swainson's hawk nesting and therefore direct impacts resulting in injury to or mortality of individuals through destruction of active nests during tree removal or vegetation trimming is unlikely. However, direct impacts can also occur off-site through nest failure from noise and other disturbance in the vicinity of a nest. Any direct impacts to Swainson's hawk would be considered significant under CEQA. Implementation of the Proposed Project would ultimately be beneficial for Swainson's hawk through enhancement of riparian habitat (which can be used for nesting). The project site provides some suitable foraging habitat for Swainson's hawk, but project activity would not be expected to have indirect impacts to the species because there will be no net loss of foraging habitat. Implementation of **Mitigation Measure BIO-4** would avoid impacts to individuals from project activity and would reduce impacts to a **less than significant** level.

Suitable habitat occurs within the project site for the white-tailed kite, a State Fully Protected Species. This species could nest within the riparian habitat present on site. Potential impacts to this species, if nesting during project activity, include injury or mortality from nest destruction or nest abandonment. The species forages in undisturbed, open grasslands, meadows, farmlands and emergent wetland. The project site does not provide suitable foraging habitat for this species, and indirect impacts through loss of foraging habitat are not expected. Implementation of the Proposed Project would ultimately be beneficial for white-tailed kite through creation and enhancement of riparian habitat and creation of freshwater marsh habitat. Because of the current conservation status of this species, any impact to this species would be considered significant under CEQA. Implementation of **Mitigation Measure BIO-4** would reduce potential impacts to **less than significant**.

The project site and vicinity provide suitable nesting habitat for a wide variety of birds protected under the MBTA and/or California Fish and Game Code, as well as tricolored blackbird and great blue heron. Given the small size of the Proposed Project area and the abundance of similar nesting habitat in the area, it is unlikely that impacts to other protected bird species would be considered significant. Impacts to individual protected nesting birds may include injury or mortality as a result of nest destruction during vegetation clearing, tree removal or trimming, or nest abandonment from construction activity and noise. Therefore, there is the potential for direct impacts to bird species. Implementation of the Proposed Project would be beneficial for nesting birds through enhancement of riparian habitat and creation of marsh habitat. Implementation of **Mitigation**

Measure BIO-5 would avoid impacts to nesting birds and as such would reduce potential impacts to a **less than significant** level.

Aquatic Resources

The following section assesses the Proposed Project's potential to affect special status fish species in the vicinity of the Proposed Project area. An important factor in determining if any specific Proposed Project component would affect these species is the timing of occurrence of their life stages in Georgiana Slough near the project site, relative to the timing, magnitude, and duration of various Proposed Project components. In-river construction activities would be conducted between August 1 and October 31 to avoid impacts to fish species. Based on the timing of each species' life stage and habitat present in the Proposed Project area. **Table 4.4-2** shows the special status species and life stages that have the potential to be present while in-water construction is occurring.

Table 4.4-2: Special-Status Fish with Potential to Occur in the Project Site During Construction

Fish Species/Race	Juvenile	Adult
Fall-run Chinook Salmon	X	X
Late Fall-run Chinook Salmon	X	X
Spring-run Chinook Salmon	X	X
Winter-run Chinook Salmon	--	--
Delta Smelt	--	--
Longfin Smelt	--	--
Steelhead	--	X
Green Sturgeon	X	--
White Sturgeon	X	--
Hardhead	X	X
Pacific Lamprey	X	--
River Lamprey	--	--
Sacramento Splittail	X	--

X = Lifestage could be present during in-river construction work
-- = Lifestage would not be present during in-river construction work

The Proposed Project's potential to have a substantial effect on special status species and their habitats can be classified into two general categories: 1) temporary construction-related effects, which would occur only during active construction; and 2) permanent effects, which would result from creation of riparian and wetland benches.

Based on their life history, and the period of time that in-river construction work would occur winter-run Chinook Salmon, Delta Smelt, Longfin Smelt, and River Lamprey would not occur in the vicinity of the Proposed Project during any of the in-river construction areas. As such, these species are not discussed further in relation to temporary construction-related effects. However, these species are considered when assessing the permanent effects from creation of riparian and wetland benches.

Specific temporary construction-related impact mechanisms that potentially could affect special status species include:

- temporary effects to water quality, including increased turbidity and suspended solids as a result of construction activities
- temporary effects to water quality from contaminants that may wash off construction equipment;
- temporary effects from underwater noise as a result of operating tugboats and barges, and from operating construction equipment adjacent to and in the slough;
- direct effects, including disturbance, injury or mortality, as a result of in-water work activities listed above;
- direct effects from tugboat propeller strikes or entrainment of special status fishes and their food resources; and
- temporary effects to predator prey dynamics and increased predation of special status fish due to shading caused by temporary docking of one rock barge and one derrick barge.

Specific permanent impacts that could potentially affect special status fish species include:

- effects to habitat from creation of riparian and wetland benches

Temporary Effect to Water Quality: Increased Suspended Sediment and Turbidity

Site-preparation, levee slope and bench construction, and plant installation would have the potential to introduce suspended sediment into Georgiana Slough. Mobilization would include setting up staging and temporary material storage areas, pre-construction surveys, and installation of erosion control and other construction BMPs. All of this work would be done above the OHWM. Erosion control measures and timing this work to occur during the dry season would eliminate the potential for runoff, soil, and other construction debris to enter Georgiana Slough during this phase of the project (**Section 2.6** and **Section 4.10**).

Construction of the levee slope would require placement of backfill and planting fill to complete final grade. Some of the levee slope work would occur below the OHWM. Direct discharges of soil and suspended sediment to Georgiana Slough resulting in increases in total suspended sediments (TSS) and turbidity levels would be the main concern during the construction period, as much of project construction involves working on a levee slope on soils that are highly susceptible to erosion. The underwater levee slope has the greatest potential to generate elevated TSS and turbidity. At least a small portion of the levee slope construction work would occur under water. This would also disturb soils and cause localized turbidity plumes at the project site. Active water quality monitoring and implementation of remedial actions (**AMM 3**) will ensure turbidity remains below threshold limits.

Work is planned to occur in a single construction period during the seasonally dry period of the year when the risk of rainfall and related storm water runoff at the site would be minimal (i.e., between June and October). In-water work would be limited to August 1 to October 31 and most work would occur during low tide (**Section 2.6**). Elevated suspended sediment and turbidity levels would occur only during construction activity and would decrease back to existing conditions levels daily during the nighttime non-construction period. The implementation of appropriate erosion control and pollution prevention BMPs (**Section 2.6**), including active water quality monitoring and use of remedial actions, if necessary, would ensure construction-related erosion and TSS and turbidity generated from the construction activities does not affect water quality outside of the immediate vicinity of the work area.

Chronic increased concentrations of suspended solids and resulting increased turbidity are of concern to fish because they can cause species to avoid turbid waters during homing, reduce feeding and growth, displace juveniles, cause physiological stress and respiratory impairment, cause gill damage, reduce tolerance to disease and toxicants, reduce survival, and cause direct mortality (Sigler et al., 1983; Newcombe and Jensen, 1996; Bash et al., 2001; Madej, 2004). However, Bash et al. (2001) reported that the primary effect of increased turbidity on juvenile salmonids was irritation of the gills, and that direct lethality was unlikely.

Salmonids may alter their migratory behavior by moving laterally or downstream to avoid turbid areas (Sigler et al., 1984). Larger fish tend to be more tolerant of high concentrations of suspended sediment than smaller fish although migrating adult salmonids may cease migration or avoid areas with high silt loads (Bjorn and Resier, 1991). Any juvenile salmonids occurring in the area would be expected to swim to an unaffected portion of the river in response to elevated suspended sediment and turbidity and thus would not be expected to be affected by temporary daytime increases in suspended sediment and turbidity. If fish did remain in the construction zone, a sufficient portion of the channel (e.g., along the opposite bank and just upstream) would remain unaffected and provide suitable migration and rearing habitat.

There is little direct information available to assess turbidity effects on juvenile or adult sturgeon. However, elevated turbidity may alter the behavior of adult, subadult, and juvenile sturgeon. In a dredging field study, juvenile and adult Atlantic Sturgeon avoided water in the vicinity of a dredged material disposal site (Hatin et al., 2007). Therefore, increases in suspended sediment and turbidity related to construction activities could result in avoidance behavior by sturgeon present in the vicinity of the in-water construction work. Like salmonids, sturgeon would be expected to swim to an unaffected portion of the river in response to elevated suspended sediment and turbidity and thus would not be expected to be affected by temporary daytime increases in suspended sediment and turbidity. Like salmonids and sturgeon, other special status fish that could be residing in or moving through the construction area would seek to move away from working construction equipment because of underwater noise and elevated turbidity levels.

Additional potential indirect effects of in-river construction activities on special status fish species include localized losses of benthic macroinvertebrates and potential displacement of benthic macroinvertebrates resulting from sediment deposition. These effects would be expected to be short-lived due to the rapid re-colonization rates typically observed for benthic macroinvertebrates communities following temporary disturbances (Barbour et al., 1999). Moreover, the relative proportion of the benthic macroinvertebrate community affected within the project site would be negligible.

Incorporation of BMPs identified in **Section 2.6** would minimize suspended sediment levels and turbidity in Georgiana Slough during the construction period. Further, sediment and turbidity levels would be localized, and only elevated for a temporary period of time. Overall, any potential increases in turbidity and suspended sediment levels would be of sufficiently low magnitude and duration to not cause adverse effects to special status species within the Proposed Project area. Based on the levels of suspended sediment and turbidity anticipated to occur, the daily reduction in levels each night, and the overall short duration of exposure, the Proposed Project's potential to generate suspended sediment and turbidity would have a **less than significant impact** to special status fish species in Georgiana Slough.

Temporary Effect to Water Quality: Contaminants Entering the Georgiana Slough from Construction Equipment

Because all construction activities associated with the Proposed Project involve the use of heavy equipment, accidental chemical spills could occur. Since these construction activities would require heavy equipment to operate near the edge of and in the river channel, spills of fuels and other construction-related materials may enter Georgiana Slough. Accidental spills and leakage from construction equipment may include fuel, lubricants, hydraulic fluids and coolants. An accidental spill or inadvertent discharge of contaminants into Georgiana Slough associated with project activities could cause direct effects to special status fish. The potential magnitude of impacts to special status fish resulting from accidental or unintentional contaminant spills would depend on several factors, including the proximity to the water body, the type, amount, concentration, and solubility of the contaminant, and the timing and duration of the discharge. Contaminants entering Georgiana Slough in sufficient amounts could affect survival and growth rates of special status fish using the area, as well as other aquatic organisms including prey sources.

Petroleum products can cause oily films to form on the water surface that can reduce dissolved oxygen levels available to aquatic organisms. The severity of the effect depends on the concentration(s) of contaminant entering the river, species and life stage sensitivity, duration of exposure, condition or health of individuals (e.g., nutritional status), and physical or chemical properties of the water (e.g., temperature, dissolved oxygen). Potential effects can range from no effect to mortality. Thus, risks of such water quality-related effects to special status fish, and their prey organisms are directly proportional to the likelihood that petroleum contaminants would enter the river from the construction equipment, and the quantities expected to enter the river.

Construction activities would not occur at night, leaving a daily period of approximately 14 hours or more with no construction activity and no potential for inadvertent spills to occur. Additionally, the project description includes implementation of construction BMPs (AMM 3 in **Section 2.6**), and worker training (AMM 2 in **Section 2.6**) would avoid and minimize the potential for any discharge of contaminants into Georgiana Slough. These BMPs contain measures that are intended to reduce the probability for the release of toxic materials to Georgiana Slough and establish measures to contain any accidental spills quickly.

As such, the potential for contaminants to enter Georgiana Slough are considered to be a discountable effect (i.e., one that is not expected to occur) and thus would not adversely affect special status fish species. Based on the assessment provided above, the Proposed Project would have a **less than significant** impact to special status fish in regard to construction equipment-related contaminants entering Georgiana Slough at levels that would cause substantial adverse effects to their prey organisms and other aquatic life.

Temporary Effect: Effects from Underwater Noise

Construction equipment operating adjacent to and in Georgiana Slough during construction of the Proposed Project would result in temporary periods of elevated noise levels. Anthropogenic noise can induce startle and alarm responses in fish (Scholik and Yan, 2002), causing fish to flee an area (Boussard, 1981). Thus, increased noise can temporarily disrupt essential behavior patterns such as feeding and predator escapement. However, such transient startle responses are

unlikely to result in adverse impacts as fish are likely to quickly return to normal behaviors (Popper et al., 2019). Abiotic and biotic sounds are important to fish and many use acoustic signals to communicate. Noise emanating from construction activities can temporarily reduce auditory sensitivity of some fish species (Scholik and Yan, 2002) and interfere with signals that affect communication, behavior, and fitness (Popper and Hastings, 2009; Purser and Radford, 2011).

The type and severity of noise impacts would depend on several factors, including the intensity and characteristic of the sound, the distance of the fish from the source, and the frequency and duration of the noise-generating activities. The Fisheries Hydroacoustic Working Group (FHWG), which included representatives from CalTrans, the Federal Highways Administration, Washington State Department of Transportation, Oregon Department of Transportation, Regions 1 and 8 of the USFWS, and NMFS, developed an Agreement in Principal for Interim Criteria for Injury to Fish from Impact Pile Driving Activities. Although these interim criteria were designed to address sound exposure thresholds associated with pile driving activities, the criteria can also be applied to any anthropogenic, intense, and relatively long-duration sound such as that generated from heavy construction equipment (U.S. Department of the Interior and Bureau of Ocean Energy Management, 2012). The interim criteria used to determine the onset of physiological effects on fishes are presented in **Table 4.4-3**.

Table 4.4-3: Underwater Noise Criteria for Injury to Fish from Pile Driving Activities

Effect	Metric	Fish Mass	Threshold
Onset of physical injury	Peak pressure	N/A	206 dB (re: 1 µPa)
	Accumulated Sound Exposure Level	≥ 2 grams	187 dB (re: 1 µPa)
		< 2 grams	183 dB (re: 1 µPa)
Adverse behavioral effects	Root Mean Square Pressure	N/A	150 dB (re: 1 µPa)

Notes:
dB = decibels
µPa = micropascal
N/A = not applicable
Source: FHWG, 2008

While the criteria in **Table 4.4-3** are the accepted noise criteria for assessing noise impacts to fish, the information used to determine the criteria was based on very limited experimental data and incomplete studies of the effects of pile driving (Fisheries Hydroacoustic Working Group, 2008). More recent research shows that onset of physiological response to noise by salmonids does not occur until noise levels are substantially higher than the criteria in **Table 4.4-3** (U.S. Department of the Interior and Bureau of Ocean Energy Management, 2012).

Popper et al. (2019) suggest there are major issues with the threshold used for adverse behavioral affects described in **Table 4.4-3** since the origin for this threshold is unknown and no scientific basis for it has been documented. The authors suggest the sound pressures to which fish schools actually respond are closer to 163 dB (re: 1 µPa). However, further studies on wild fishes in their natural environment are necessary before a behavioral threshold can be developed (Popper et al., 2019).

Another issue with the thresholds described in **Table 4.4-3** is that most species of interest, including salmonids and sturgeon, are primarily detectors of particle motion, not sound pressure (Lovell et al., 2005; Meyer et al., 2012; Popper et al., 2019). Sturgeon, like other fish with swim bladders far removed from the ear, are unlikely to hear anthropogenic sounds unless they are very close to the sound source. It is unknown what level of particle motion would lead to behavioral effects of these species, but it is assumed that it would take a very high level of signal to prompt behavioral changes (Popper et al., 2019). It is likely that noise affects lamprey and Sacramento splittail similarly to salmonids as both have nothing within the structure of the ear or associated structures to suggest any specializations that make them more than a hearing generalist (Popper, 2005; CalTrans, 2015). It is unknown how Hardhead perceive sound (CalTrans, 2015).

Most of the temporary increase in noise associated with the Proposed Project would occur on land away from Georgiana Slough. BMPs in **Section 2.6** requires all combustion engine equipment be equipped with exhaust mufflers that are in good condition and appropriate for the machines. Based on inclusion of BMPs in **Section 2.6**, noise levels would be expected to be similar to traffic noise currently generated from the State highway located adjacent to the project site. Therefore, noise generated from the terrestrial portion of the Proposed Project would not be expected to be of a magnitude that would cause any behavioral or direct effects to special status fishes.

The special status fish that would potentially be present in the project site detect particle motion rather than sound pressure (Popper et al., 2019). At this time it is unknown what particle motion threshold would lead to behavioral changes in special status fishes. Regardless of how noise is measured, studies have shown that fishes exposed to pile driving sounds may show startle and alarm responses. Due to the lack of pile driving occurring in this project, and given that the project construction will generate lower levels of underwater noise than pile driving, it is expected that if a fish did come close enough to underwater noise generated by the work to experience a startle response from construction noise that it would be to be brief and unlikely to result in adverse effects to fish (Popper et al., 2019). Fish would be more likely to move away from the sound and utilize areas of the river that are not impacted by the temporary noise generated by construction.

Use of construction equipment adjacent to and in the river channel may result in temporary periods of elevated noise levels in Georgiana Slough. However, any increase in noise associated with these activities would be temporary and localized and would not reach levels that would cause substantial impacts. Any behavioral startle or avoidance responses that might occur would be brief and would not have biologically significant consequences; rather, it would aid fish in avoiding direct contact with the equipment. Georgiana Slough in the vicinity of the Proposed Project is wide (i.e., channel width of 200 feet) and there is ample room for fish to swim around and avoid the area in the river where the loudest noises would be generated. Consequently, the underwater noise associated with the Proposed Project would result in a **less than significant** impact to special status fish species.

Temporary Effect: Effects from Direct Contact with Construction Equipment

Construction activities that could result in direct effects include any activities using heavy equipment (i.e., small excavator, small conveyor with generator, and small front-end loader) in the water. In-water construction activities include construction of the levee slope and encroachment removal. Direct effects to special status fish from construction equipment

operating in the river channel could be in the form of harassment, harm, wounding, killing, trapping, capturing, or collecting the fish.

Underwater noise, turbidity, and flow pattern disruption (i.e., disruption of laminar flow vectors immediately adjacent to the equipment itself), would cause special status fish that could be present in the work area to likely avoid the equipment, thereby causing most fish to avoid direct effects. As discussed above, when salmonids and other special status fish detect sounds, they respond with startle and avoidance responses, which would be brief and biologically insignificant (Knudson et al., 1994; NMFS, 2013), but sufficient to avoid the equipment. Additionally, construction activities would not occur at night or on weekends, leaving a daily period of approximately 14 hours or more with no construction activity and thus no potential for direct effects from operation of construction equipment in the river channel to occur. Further, BMPs in **Section 2.6** would be implemented to reduce potential direct injuries to special status fish.

Based on these considerations, the timing of construction equipment working in the main channel, implementation of BMPs, the Proposed Project would have a **less than significant** impact to special status fish species.

Temporary Effect: Effects from Propeller Strikes and Entrainment

A rock barge, accompanied by tug boat, would be used to transport material from the quarry near San Rafael to the project site. A small work boat would be used to move the crane (derrick) barge to the project site. Work boats and tugs used to maneuver the barge during site mobilization would be present on site periodically during the duration of construction activity (i.e. tugs may be moored or go to other non-related job sites if there is no need to move a barge for a period of time, and the derrick barges would be traveling back and forth from the quarry and soil borrow sites). Work on the levee slope would occur using barges, work boats, and tugs.

Changes in pressure, shear forces, acceleration or deceleration and direct impacts have potential to cause injury to special status fishes if they come in contact with boat propellers. Barges have potential to entrain larvae, invertebrates, phytoplankton and zooplankton, and as a result have more potential to affect fishes via impacts to food resources than direct propeller strikes (Miranda and Killgore, 2013). However, entrainment from boat propellers is difficult to measure since organisms killed or injured in this manner show no visible scars.

Fish, such as salmonids that utilize surface waters, may be at higher risk of collision with a propeller than benthic dwelling fish such as sturgeon. Due to their small size, direct hits to juvenile salmonids are not expected. Adult salmonids and other special status fishes would have the ability to move out of the way of a boat or barge. Noise generated from the watercraft would cause adult fishes to move away from the boat or barge. Further, boats would be moving slowly when utilizing waters in the immediate vicinity of the project site, therefore, direct hits or entrainment of salmonids and other special status fishes are not expected to occur.

Sturgeon are benthic dwellers that prefer deep areas of the river so are not expected to be close enough to the surface to be directly affected by propellers or entrainment. Balazik et al. (2012) found direct strikes to Atlantic Sturgeon by small recreational powerboats in the Saint James River, Virginia were rare since fish spent a majority of time near the river bottom.

The Proposed Project would only result in minor increases in the number and frequency of barges and small boats operating in the Delta relative to existing conditions. Further, restriction of barge and tugboat operations to August 1 to October 31 will avoid the primary migration and rearing periods of juvenile anadromous salmonids. Adult special status species have the ability to move out of the way of barges and boats because of their greater swimming ability (Wolter and Arlinghaus, 2003).

Although there is potential for entrainment of phytoplankton and zooplankton (i.e., food supply to special status fishes) while barges and boats are operating in the river, the watercraft operational period will be outside of the main period when juvenile salmonids are present and feeding in the river. In general most plankton species have a fast regeneration period. For example, phytoplankton species typically have a regeneration period of two to four days (Rojo et al., 1994 as cited in Sarkar et al., 2019). As such, plankton populations would return to the same composition and population size as existing conditions within a few days of project-related barges and boats completing work. Finally, temporary losses of plankton from entrainment would be negligible relative to the total plankton production that occurs in Georgiana Slough.

For the reasons discussed above, temporary effects to special status fishes and their prey resources from propeller strikes and entrainment due to barges and boats operating in the vicinity of the Proposed Project would be **less than significant**.

Temporary Effect: Effects to Special-Status Fish due to Shading Caused by Temporary Presence of Barges

Barges would be present in Georgiana Slough near the project site intermittently during the 66-day in-water construction period. Based on the size of the derrick barge and rock barge, approximately 0.296 acre of the river will be shaded while the barges are present. Anthropogenic structures that cause shading in aquatic environments are of concern because they can decrease light levels that reduce primary production, promote predation by creating favorable conditions for ambush predators, and contribute to increased avoidance behavior during downstream juvenile salmonid migrations (Lange, 1999; Kemp 2005).

Information on the effects of shading from barges is limited. However, shade cast from over-water structures such as bridges can limit light available for photosynthesis affecting primary productivity that supports the food-web of special status fish species. Artificial shade can also alter the composition of invertebrate species by reducing abundance of larger species that salmonids and green sturgeon prefer (Duffy-Anderson and Able, 2001). Reduced light can affect the ability of fish to detect and consume prey (Munsch et al., 2015). Since juvenile salmonids are visual predators, poor quality habitats under manmade structures can inhibit feeding and may suppress growth of salmonids and demersal fish such as Green Sturgeon (Duffy-Anderson and Able 1999, 2001, Abel et al., 2005).

Information in the literature is conflicting on how artificial structures influence predator and prey aggregations (Lehman et al., 2019). It is thought that shaded areas can increase a predator's capture efficiency by creating a light/dark interface that allows ambush predators to remain in a darkened area and watch for prey to swim against a bright, highly visible background. Predators can see sunlit prey more than 2.5 times as far as a sunlit fish can see into a shaded area (Helfman, 1981). However, the potential for artificial structures to create predatory hotspots is dependent

on the predator community composition and habitat type (i.e., slope, aquatic vegetation present, etc.) (Lehman et al., 2019; Zeug et al., 2020).

The area of shade created by the barges will be temporary and intermittent since barges will continue to operate between the materials areas and project site during the 66-day period of in-water construction work. By nature of the construction process, barges will not be anchored in a stationary position. Construction of bank protection features will result in barges being constantly repositioned, therefore shading impacts during construction sequence on any given day will change.

Due to the small area of shade created by the barges, the relatively large area of river that will not be shaded, and the temporary nature of the construction work, it is unlikely that shading will have any effect on primary productivity. As such, it is not expected that the temporary stationing of barges in the vicinity of the Proposed Project area will affect prey production, or the ability of special status fish species to have access to food resources.

Although areas of artificial shade can create favorable conditions for ambush predators, there is no evidence in the Delta that these artificially shaded environments increase the predation rates of special status fishes (Lehman et al., 2019; Zeug et al., 2020). Although there is potential for barges to increase predatory fish habitat, the barge operational period will be outside of the main period when juvenile salmonids are present and feeding in the river. Juvenile Green Sturgeon within the Delta are typically large and not subject to significant piscivorous predation. Thus, temporary shading from barges is expected to have no impact on juvenile Green Sturgeon.

In conclusion, artificial shade created by construction barges would move throughout the course of each day that the barges are present so that no one area of the river is shaded for any substantial period of time. For the reasons described above, it is unlikely that the presence of construction barges would reduce primary productivity or create predatory hotspots. As such, the impacts to special status fish species due to the temporary and intermittent stationing of barges in the Proposed Project area will be **less than significant**.

Permanent Effect: Creation of Riparian and Wetland Benches

Prior to anthropogenic alterations, much of the Delta shorelines were comprised of shallow-water habitat that provided a diverse array of habitat for juvenile salmonids. Today, these shorelines are characterized primarily by steep-sloped levee embankments reinforced with riprap (Hellmair et al., 2018). Georgiana Slough within the vicinity of the project site is essentially an armored trapezoidal channel designed to convey water and protect adjacent lands from flooding which provides little suitable rearing and refugia habit for salmonid migrants, and instead promotes habitat preferred by black basses (*Micropterus* spp.) and other predatory fish species.

Riparian vegetation losses have also occurred in the Proposed Project area and there are large open areas along banks of Georgiana Slough that lack complex habitat in part due to the large amounts of riprap (Hellmair et al., 2018). In spite of the degraded condition of this habitat, the conservation value of the Proposed Project area is high because it is used by anadromous fish species for rearing and as a migration pathway.

The Proposed Project is located along a reach of Georgiana Slough that is leveed and has a channel width of 250 feet. River flow and tidal influence in the area is strong and shallow-water fish

friendly habitats are limited. An objective of the Proposed Project is to create vegetated habitat benches to enhance shaded riverine habitat and riparian and wetland benches to provide shallow-water high value seasonal rearing habitat for special status fish species (e.g. juvenile steelhead and Chinook Salmon).

The creation of the vegetated benches along the newly stabilized levee would restore previously lost ecosystem functions due to modifications of the river bank by providing refugia from predators, increasing foraging opportunities, and creating velocity refugia (McLain and Castillo, 2009; McNair, 2015; Hellmair et al., 2018; Dahm et al., 2019). This increased habitat availability, continuity and complexity would mimic characteristics of natural shorelines and floodplains used by native fish species including listed salmonids. Restoring habitat diversity and hydraulic complexity would support other ecological functions (e.g., vegetative success and invertebrate production) that are characteristic of natural shorelines and floodplains. Survival and emigration success is expected to increase from increased access to these complex habitats.

Wetland benches would be constructed at a relatively low elevation to allow frequent inundation and development of aquatic and semi-aquatic habitat. Wetland benches will be constructed approximately 1.5 feet above the MLLW (i.e., the average of the lower low water height of each tidal day). The depth would provide optimum short-term rearing and refugia habitat for juvenile salmonids during their winter-spring seaward emigration period, while minimizing the frequency of creating optimum spawning habitats for invasive fishes such as black basses, during their spring-summer spawning period.

Largemouth bass (*M. salmoides*), smallmouth bass (*M. dolomieu*), and spotted bass (*M. punctulatus*) dominate Delta waters and pose a predatory threat to emigrating juvenile salmonids (Moyle, 2002). Largemouth bass are one of the most common invasive fish species in the Delta (Nobriga and Feyrer, 2007; Young et al., 2018) and are thus used as a surrogate for all black basses in the following discussion. Largemouth bass typically spawn on nests created near aquatic vegetation and spawning may occur at depths ranging from 0.5–27 feet (Stuber et al., 1982), but most frequently spawn at depths of 3–4 feet (Johnke, 1995). Spawning is usually initiated in April, when water temperatures reach 59–61°F (which exceeds the optimal temperatures for juvenile salmonids reducing habitat overlap potential), and continues through June (Moyle, 2002). In rivers, spawning by black basses may extend into July (Moyle, 2002).

Survival and development of black bass embryos are dependent on relatively stable water levels, low velocities, and constant inundation (Stuber et al., 1982). Von Geldern and Mitchell (1975) reported that Largemouth Bass spawning was unsuccessful when Millerton Lake, CA, water levels fluctuated during the spawning season. Therefore, survival of embryos to the larval stage may be decreased or precluded by water level fluctuations, particularly if the water level fluctuations result in dewatering of the nests. Based on this information, optimal spawning habitats for largemouth bass are defined as stable water depths of 3–4 feet during the period April–July.

The wetland habitat benches would be at an elevation that would have frequent inundation, but there would be periods of time during most days when tides would cause the water to drop and dewater the benches. This dewatering would prevent successful nesting of largemouth bass. Outside of the spawning period, bass are typically associated with steeper bank slopes and greater water depths than that provided by the wetland benches (Zanjac et al., 2012). In contrast, migrating juvenile salmonids rely on nearshore riverine habitat that provides shallower depths

and slower velocity than the mainstem of Georgiana Slough during their outmigrations (Hellmair et al., 2018).

Creation of seasonal, shallow water habitat areas could lead to stranding of special status fishes due to fluctuating water levels on these newly created habitats. However, native fishes are adapted to the natural hydrologic regimes of floodplains and rivers and, as such, shallow water habitat emigration is likely to be triggered by environmental cues (e.g., increases in floodplain water temperatures as the water recedes, decreases in water surface elevations) (Moyle et al., 2007). Moyle et al. (2007) found native fish generally occur in floodplain habitats earlier (e.g., February through April) than nonnative fish and native fish emigrated from floodplain habitats rapidly (e.g., approximately one week or less) when daily maximum air temperatures rose from 68°F to 77°F. Further, no juvenile salmonids were found to be permanently stranded (i.e., isolated on the floodplain following the final disconnection of the year) during the four-year study (Moyle et al., 2007).

Wetland bench width would vary slightly, from approximately 16 feet to 17 feet wide, depending on the location along the levee. Due to the narrow width of the benches and response to environmental cues, juvenile salmonids are not expected to get stranded. Instead, juvenile salmonids are expected to utilize these nearshore habitat benches for a short period of time during their downstream migration (Hellmair et al., 2018). Delta smelt, longfin smelt, and sturgeon are also not expected to be stranded on the newly constructed wetland benches because these species are not expected to spend any significant amount of time utilizing the benches. If these fish did utilize the habitat benches, they would be expected to cue into environmental changes (e.g., increasing temperatures, lowering water surface elevations) and exit the area prior to incurring adverse effects.

Although the new benches would cause the Proposed Project area to become more complex and dynamic relative to existing conditions, it would also partially change the composition of the benthic environment from one dominated by soft soils to a mixture of soil types and rock slop protection. This RSP could reduce the amount of benthic foraging opportunities for green sturgeon.

Overall, the creation of wetland and riparian benches are expected to benefit most special status fish species. Newly planted trees will grow over time and add to the overhanging shade as planted trees mature (i.e., >15 years). Increased shade and creation of low velocity habitat would lead to increased foraging opportunities for migrating salmonids and other native fish species through increased macroinvertebrate production. However, loss of soft bank/bottom habitats (i.e., impacts to benthic environments) resulting from place of RSP in the water column could cause impacts that are potentially significant to Green Sturgeon. Therefore, implementation of **Measure BIO-6** would reduce impacts to green sturgeon to a **less than significant** level.

Summary

Project construction would cause temporary effects to water quality, create underwater noise, cause construction equipment to operate for a temporary period of time in the slough creating the potential for fish to come into direct contact with the equipment, and cause barges to operate for a temporary period of time in the water channel creating areas of shade within the water and the potential for direct impacts with the barges. All of these temporary construction-related

activities would have minimal effects to special status species and their habitats. In the long term, the creation of riparian habitat and wetland benches will improve the complexity within the river channel which will benefit special status species. The potentially significant impacts of project construction activities to special-status plants, reptiles, bats, and birds can be mitigated to less-than-significant levels.

b) The following discussion assesses potential impacts of the Proposed Project on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFW or USFWS.

Both the riparian forest (0.09 acres within the project site) and scrub shrub (0.41 acres within the project site) and SRA (569 LF within the project site) habitats are considered sensitive riparian habitats. Georgiana Slough is also considered sensitive with regards to aquatic species. Consistent with BALMD's existing routine maintenance agreement with the California Department of Fish and Wildlife (CDFW), trees less than 2 inches in diameter and large shrubs would be cut with a flail mower. Larger trees (> 4 inches DBH), to the extent they can be avoided and worked around, will be trimmed and left in place.

A main objective of the Proposed Project is to both mitigate and enhance riparian habitat in the Proposed Project footprint. Thus, after project completion there would be a net increase/enhancement in riparian habitat acreage and SRA at the project site compared to existing conditions. Although there would be some temporary effects to riparian habitats during the construction phase of the Proposed Project, following project implementation, there would be a total of 1.12 acres of riparian (0.30 acres of riparian forest; and 0.82 acres of scrub shrub) habitat and 1500 LF of SRA within the project site.

Additionally, the Georgiana Slough and adjacent riparian forest, scrub shrub and SRA habitats are under CDFW jurisdiction pursuant to Section 1600 *et seq.* of the CFGC and would be subject to permitting and compensatory mitigation requirements, which have been included as AMM 5. Direct impacts are expected to consist of vegetation removal, trimming, grubbing, excavation activities, and rip rap installation. However, these impacts are considered temporary and would be offset through implementation of the habitat mitigation and enhancement components of the Proposed Project and therefore, no further mitigation measures are recommended. Additionally, implementation of the Proposed Project would ultimately be beneficial for sensitive natural communities through the creation and enhancement/restoration of riparian, native grassland and the creation of 0.39 acres of new freshwater marsh habitat. Consequently, impacts to riparian and sensitive habitats are therefore **less than significant**.

c) The following discussion assesses potential impacts of the Proposed Project 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.

An Aquatic Resources Delineation (**Appendix E**) was conducted that identified the Georgiana Slough mainstem and two isolated wetlands on the land side of the levee. Georgiana Slough is a navigable waterway under federal jurisdiction. The two wetlands are isolated and do not have a continuous surface connection to Georgiana Slough, and therefore are not federally jurisdictional features under the 2023 Conforming Rule.

The Proposed Project would result in temporary impacts to aquatic resources that are protected under the CWA, the Porter Cologne Act, and other state regulations. Temporary impacts consist of the removal of riparian and riverine vegetation, excavation in a channel, and open water work which may cause siltation. The Proposed Project will require a CWA Section 404 Permit from the USACE. Likewise, a CWA Section 401 Water Quality Certification from the RWQCB and a Streambed Alteration Agreement (SAA) from the CDFW will also be required for work within and adjacent to Georgiana Slough. Although the isolated wetlands are not federally jurisdictional, they may be considered waters of the State. Pursuant to AMM 4, protective fencing will be installed around these wetlands and they will be avoided by project construction activities.

Impacts to jurisdictional areas are potentially significant without mitigation incorporated; however, because the project is designed as a riparian and aquatic habitat restoration and enhancement project, and no permanent impacts are anticipated, restoration of all temporary impacts to riparian and aquatic habitat and implementation of standard BMPs outlined in the project description (**Section 2.6**) are considered sufficient to ensure impacts are **less than significant**.

d) The following discussion assesses potential for the Proposed Project to 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 to impede the use of native wildlife nursery sites.

Terrestrial Wildlife

Wildlife movement corridors, or habitat linkages, are generally defined as connections between habitat patches that allow for physical and genetic exchange between otherwise isolated animal populations. Typically, habitat linkages are contiguous strips of natural areas, though dense landscape vegetation can be used by certain disturbance-tolerant species. For highly mobile or aerial species, habitat linkages may be discontinuous patches of suitable resources spaced sufficiently close together to permit travel along a route in a short period of time.

The project site functions as a part of a wildlife corridor because Georgiana Slough and the levee banks allow wildlife movement. Maritime and commercial structures, residences, and roads function as barriers. During construction, ground-disturbing activities and the presence of construction equipment will discourage terrestrial animal use and movement through the project site. However, this impact is temporary and the previously-prescribed mitigation measures will ensure that no wildlife is present in work areas and that the construction footprint remains as small as possible. Implementation of the Proposed Project will not create any new permanent barriers, such as the construction of docks, levees, buildings, or roads. Once completed, the Proposed Project would ultimately be beneficial for wildlife movement through the enhancement and creation of riparian, wetland, and native grassland habitats. Therefore, project-related impacts to wildlife movement are considered to be **less than significant**.

Aquatic Resources

Temporary Effect: Construction-Related Effects to Movement or Established Migratory Corridors of Special Status and Native Fish Species

Temporary effects from construction-related noise and disturbance associated with the Proposed Project have the potential to affect migrations and movements of special-status anadromous and resident fish near the active construction site. Presence of construction equipment could cause underwater noise, turbidity, and flow pattern disruption channel (i.e., disruption of laminar flow vectors immediately adjacent to the equipment itself) to occur during the short period of time the construction equipment may be present. This would likely cause any native species or special status fish that could be present in the work area to make slight changes to their movements to avoid the construction activities. However, most fish would move past the construction area unimpeded in a portion of the slough that is a sufficient distance from the area of disturbance.

The temporary areas of shade created by the barges are also not expected to delay migration of salmonids. In a study that assessed the impacts of shading from a large bridge in Washington State, only some migrating juvenile salmonids were delayed by the shade (Bloch et al., 2009). These fish were only delayed by an average of 10 minutes (Bloch et al., 2009). The areas of shade from the construction barges would be much smaller than that cast by large bridges and thus the artificial shade is expected to create minimal, if any delay in the downstream migration of juvenile salmonids.

Restriction of in-water work periods (August 1 to October 31) will avoid the primary migration periods of juvenile anadromous salmonids and all work would be limited to daylight hours during the week, leaving extensive periods of undisrupted passage for migrating fishes in the evenings, daily, and on weekends, when little to no construction would occur.

In summary, disturbance and noise associated with construction-related activities and creation of artificial shade due to presence of barges is not expected to adversely affect the migrations or movements of anadromous special status fishes. This is because most fish would move past the construction area unimpeded in a portion of the channel that is a sufficient distance from the active construction area. Because construction would be limited to daylight hours during the week, any delays in movement past or in the vicinity of the construction area would be short-term (i.e., several hours). Further, construction related activities would not interfere substantially with the movement of any native or resident special status fish species. Consequently, this impact would be **less than significant**.

Permanent Effect: Effects to Movement or Established Migratory Corridors of Special status and Native Fish Species

Creation of the vegetated benches along the newly stabilized levee would restore loss of ecosystem functions due to modifications along the slough and other waterbodies (by providing refugia from predators and creating velocity refugia) throughout the Delta. This increased habitat availability, continuity and complexity would mimic characteristics of natural shorelines and floodplains used by native fish species including special-status species and other native species. Ultimately, habitat enhancement and levee stabilization would provide a better migratory corridor than what is present under existing conditions.

Restoring habitat diversity and hydraulic complexity would support other ecological functions (e.g., vegetative success and invertebrate production) that are characteristic of natural shorelines and floodplains. Survival and emigration success is expected to increase from increased access to these complex habitats.

Although the seasonal, shallow water habitat areas could lead to stranding of special status fishes due to fluctuating water levels on these newly created habitats, native fishes are adapted to the natural hydrologic regimes of floodplains and rivers. As such, shallow water habitat emigration is likely to be triggered by environmental cues (e.g., increases in floodplain water temperatures as the water recedes, decreases in water surface elevations) (Moyle et al., 2007).

Based on the assessment provided above, the Proposed Project would have a **less-than-significant** impact on the movement of any native or migratory fish species or established native resident or migratory corridor, or on native fish nursery sites.

e) The following discussion assesses potential for the Proposed Project to conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The Proposed Project would not conflict with any local policies or ordinances protecting biological resources including the Sacramento County tree ordinance because the project will not remove any native oak trees or oak woodlands. Furthermore, the Sacramento County tree ordinance applies to private properties and projects but not to public infrastructure projects. The project is a multi-benefit flood protection project that includes both mitigation and enhancement/restoration of riparian forest, scrub shrub and freshwater marsh habitats included as part of the project description. There is **no impact**.

f) The following discussion assesses potential for the Proposed Project to conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The Proposed Project is not located within the plan areas for any adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan. As such, the project would not conflict with the provisions of any such plans and there would be **no impact**.

4.4.3 Mitigation Measures

BIO-1: Special Status Plant Avoidance, Minimization, and Mitigation Measures

During the appropriate bloom windows prior to construction, a qualified biologist or botanist shall survey all areas of suitable habitat for special status plant species with potential to occur on the project site. If any are detected, the location of all individual of special status plant species shall be mapped. Where feasible, individuals shall be fenced for avoidance during construction. Where avoidance is not feasible, losses shall be offset through inclusion of these species into the mitigation/restoration planting palette.

If detected in the project site and to the extent feasible, rhizomes of the Suisun Marsh aster and Mason's lilaeopsis shall be salvaged and stored in damp soil and cared for by a qualified biologist or nursery professional until the habitat restoration components of the project are implemented. Salvage of Mason's

lilaeopsis if found, may require additional authorizations from CDFW due to its status as a State rare species. Any agency consultations shall be completed prior to the start of construction, and the applicant shall submit written documentation of the results of such consultations. Mason's lilaeopsis and Suisun Marsh aster shall be included in the plant palette at a minimum 1.5 to 1 ratio of individuals planted to individuals removed.

All efforts should be made to avoid the spread or introduction of invasive weeds during implementation of the Proposed Project. Appropriate BMPs that are intended and designed to curtail the spread of invasive plant species should be implemented during construction. These include, but are not limited to, the following:

- During construction, the project shall make all reasonable efforts to ensure imported material is free of invasive plant species.
- Equipment and vehicles must be free of caked on mud and weed seeds/propagules before accessing and leaving the project site
- Landscaping materials shall not include invasive, non-native ornamentals as identified by the California Invasive Plant Council (Cal-IPC) Inventory.

BIO-2: Pre-construction Northwestern Pond Turtle Survey

- Because northwestern pond turtle could migrate into the project site between the time that the field survey was completed and the start of construction, a pre-construction survey for northwestern pond turtle shall be performed by a qualified biologist to ensure that northwestern pond turtle is not present. The survey shall be performed within 2 weeks of project initiation/ground disturbance. If northwestern pond turtle is detected, construction shall be delayed in that area, and the appropriate wildlife agency (CDFW and/or USFWS) shall be consulted and avoidance and minimization measures implemented.

BIO-3: Roosting Bats Avoidance and Minimization Measures

- Prior to construction activities that require removal of trees or large shrubs, a qualified biologist shall conduct a survey of potential bat roosts to determine if roosting bats are present. If a bat roost is found, further analysis shall be conducted sufficient to determine the species present and the type of roost (day, night, maternity, etc.). If the bats are not part of an active maternity colony, passive exclusion measures may be implemented in close coordination with CDFW prior to removal of the affected vegetation. These exclusion measures may include one-way valves that allow bats to exit the structure but are designed so that the bats may not re-enter if the roost is a cavity roost. For non-maternity tree roosts, the roost shall be checked daily until the bats have moved. Once movement has been confirmed, vegetation removal can proceed with a monitor present. Maternal bat colonies may not be disturbed while young are present and dependent on the roost.

BIO-4: Raptor Avoidance and Minimization Measures

- If feasible, all vegetation clearing, tree removal, and tree trimming shall occur outside of the nesting season (September 1 through February 14).
- If construction activity is scheduled during the nesting season (February 15 through August 31), a qualified biologist shall conduct a pre-construction survey for Swainson's hawk, white-tailed kite

and active Swainson's hawk and white-tailed kite nests. Surveys shall be conducted within two weeks of the start of construction activities that are scheduled to occur during the nesting/breeding season. The survey shall include the project site plus a 0.5 mile buffer. The pre-construction survey shall be conducted during the time of day when the birds are active and should be of sufficient duration to reliably conclude presence/absence of Swainson's hawk and white-tailed kite nests. A report of the survey results shall be submitted to the BALMD prior to issuance of any grading or building permits. As a fully protected species, there is no allowable "take" for white-tailed kite under any circumstances. As a State endangered species, there is no "take" of Swainson's hawk without "take" authorization from CDFW.

- If no active Swainson's hawk or white-tailed kite nests are detected, no additional action is required.
- If active Swainson's hawk nests are observed within 0.5 mile of the project, a minimum 0.25 mile avoidance buffer shall be established around each nest. If active white-tailed kite nests are identified within 0.5 mile of the project, a minimum avoidance buffer of 500 feet shall be established. Any variance for smaller avoidance buffers shall only be allowed with the approval of CDFW and the BALMD. Active nests shall be monitored by a qualified biologist during project-related activities. The avoidance buffer shall be maintained for the duration of the project, unless the biologist has determined that the young have fledged or are no longer dependent upon the nest and parental care.
- If a Swainson's hawk or white-tailed kite is observed perched or foraging in the project site, all project-related work shall cease and the individual will be allowed to leave the project site unimpeded and of its own accord before work may resume.
- Work activities shall be avoided within active raptor nest buffers until young birds have fledged and left the nest(s). Readily visible exclusion zones shall be established in areas where nests must be avoided.

BIO-5: Non-Raptor Nesting Bird Avoidance and Minimization Measures

- If feasible, removal and/or trimming of trees shall be scheduled to occur in the outside of the nesting season during non-breeding fall/winter months (September 1 through February 14), after fledging and before the initiation of the nesting season.
- If project activities occur between February 15 and August 31, a qualified biologist shall conduct pre-construction surveys for nesting birds no more than 14 days prior to construction. The survey shall include the entire project site and a 250-foot buffer. If active nests are found, the qualified biologist shall establish an appropriate species-specific avoidance buffer of sufficient size to prevent disturbance of the nest by project activity (typically a minimum of 50 feet). If no active nests are detected, no additional action is required.
- If applicable (i.e., nests are detected as a result of the pre-construction surveys), the qualified biologist shall perform at least two hours of pre-construction monitoring of the nest to characterize "typical" bird behavior. The qualified biologist shall monitor the nesting birds and shall increase the buffer if the qualified biologist determines the birds are showing signs of unusual or distressed behavior by project activities. Atypical nesting behaviors which may cause reproductive harm include, but are not limited to, defensive flights/vocalizations directed toward project personnel, standing up from a brooding position, and flying away from the nest.
- If applicable, the qualified biologist shall have authority to order the cessation of all project activities if the nesting birds exhibit atypical behavior which may cause reproductive failure (nest abandonment and loss of eggs and/or young) until an appropriate buffer is established. To prevent encroachment, the established buffer(s) shall be clearly marked by high visibility material.

The established buffer(s) shall remain in effect until the young have fledged or the nest has been abandoned as confirmed by the qualified biologist. Any sign of nest abandonment should be reported to CDFW within 48 hours.

BIO-6: Green Sturgeon Mitigation Acreage and Mitigation Credits

The following avoidance and minimization efforts shall be implemented for the Proposed Project:

- Permanent loss of 0.34 acres of soft bottom habitat due to the erosion repair impacts at the lowest waterside extent of the project, will require purchase of 0.34 acres of Green Sturgeon mitigation credit.
- Mitigation bank credits will be purchased from Fremont Landing Conservation Bank (operated by Wildlands) prior to project impacts.

4.5 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?	☐	☒	☐	☐

4.5.1 Environmental Setting

The following section summarizes information presented in **Appendix G**, which contains a comprehensive discussion of the cultural resources setting of the region and information regarding known and potential historical and archaeological resources in the project site, as well as regulatory framework. The Cultural Resources Assessment was prepared by Natural Investigations Company in March 2024.

Efforts to identify cultural resources in the project site consisted of records searches, a literature review, and an archaeological field inspection. A California Historical Resources Information System (CHRIS) record search was completed for the Area of Potential Effect (APE), which identified one previous cultural resource study within the APE and five previous studies within a 0.5-mile radius. These were conducted in 1993, 1997 (two), 2008, 2009, and 2012. The CHRIS records search did not identify any previously recorded cultural resources in the APE. There was a recent cultural study completed by Natural Investigations in the 0.5-mile radius of the APE for the BALMD Tree Removal Project in 2023, and recorded the Georgiana Slough Levee which is in the current APE.

The Native American Heritage Commission (NAHC) Sacred Lands File (SLF) search was conducted on February 8, 2024; the results received were negative for sensitive Native American cultural resources in the project site. Letters and maps were sent to recommended Native American contacts included on the NAHC list on February 19, 2024. Two responses were received from the inquiry. One email stated their Tribe (Confederated Villages of Lisjan Nation) did not have any information, and another email from Wilton Rancheria stated they were aware of sensitive Tribal resources near, but outside of the project site. A virtual meeting was set up to discuss the Proposed Project with the lead monitor of the Wilton Rancheria. There were no other responses to the inquiry.

A pedestrian survey of the project site was conducted by Natural Investigations archaeologist Olivia Bohmann on February 22, 2024. Ms. Bohmann surveyed the proposed work site along the levee and the adjacent staging area by walking transects spaced no greater than 5 meters apart. The rock sourcing area in San Rafael and the soils sourcing area on Decker Island did not warrant survey because they are previously permitted, i.e., the rock sourcing area is an established quarry, and Decker Island was established by dredging and is an active sourcing and disposal site.

The field survey identified site NIC-2023-BALMD-04, the Georgiana Slough Levee, in the APE that was recently recorded for the BALMD Tree Removal Project. The record for the site is adequate and was not updated as part of this project. The site appears to meet Criterion A for inclusion in the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR), but lacks integrity of workmanship, setting, feeling, materials, and association due to regular improvements, maintenance, and construction of paved roads along the crest of the levee. The soils within the project site are disturbed soils that were transported to this location to construct the levee and are not expected to contain intact prehistoric resources.

One historically significant shipwreck has been identified to have sunk within the Georgiana Slough, the waterbody adjacent to the project site (California State Lands Commission, 1988). No wrecks are known to exist directly within the project site.

4.5.2 Discussion

a) The records search identified one previously recorded cultural resource in the APE, the Georgiana Slough Levee where work is proposed to occur. The project site encompasses this levee, which appears to meet Criterion A for inclusion in the NRHP and CRHR, but lacks integrity of workmanship, setting, feeling, materials, and association due to the regular improvements, maintenance, and construction it receives. Furthermore, the soils within the project site are disturbed and are not expected to contain intact resources. The Proposed Project would only repair an erosional issue and add planting benches, while the alignment, location, and purpose of the levee would not be altered by the Proposed Project. Due to the continuous maintenance and repairs of the levee since its original construction, and the fact that the Proposed Project will repair and ensure long term stability of the levee, the Proposed Project would not impact the significance of the resource. Therefore, there would be **a less than significant impact** to historical resources.

b) Temporary construction activities for the Proposed Project would include ground disturbing activities including excavation prior to the placement of fill. The soils in the project site are disturbed soils that were transported to the area to construct the levee and are not expected to contain intact prehistoric resources. However, construction activities have the potential to encounter buried archaeological resources if excavation extends to native soils. Buried

archaeological resources may include, but are not limited to, deposits of stone, bone and shell artifacts, dark gray "midden" sediments, historic trash deposits, stone or adobe foundation, ship remains, and/or shipwreck artifacts. Therefore, the impact would be potentially significant. Implementation of **Mitigation Measure CULT-1** would reduce impacts to archaeological resources to a **less than significant** level.

c) No human remains were identified during the field studies, nor were any previously recorded burials included in the record search results. Encountering human remains is unlikely; however, it is always possible during ground disturbing activities. The Proposed Project would have a potentially significant impact on human remains in they were encountered during construction. The implementation of **Mitigation Measure CULT-2** would reduce the impact to **less than significant**.

4.5.3 Mitigation Measures

CULT-1: Unanticipated Discovery of Archaeological Resources

- If prehistoric or historic artifacts, or other indications of archaeological resources such as unusual deposits of stone, bone or shell, stone artifacts, or historic trash deposits or foundations are discovered once ground-disturbing activities are underway, the find(s) shall be immediately evaluated by a qualified archaeologist. If the find is determined to be a historical or unique archaeological resource, contingency funding and a time allotment to allow for implementation of avoidance measures or appropriate mitigation shall be made available, as provided in §15064.5 of the CEQA Guidelines. Such measures may include, but not be limited to, Phase II archaeological evaluation and Phase III data recovery excavation. Work may continue on other parts of the Proposed Project Area while historical or unique archaeological resource mitigation takes place on-site.

CULT-2: Discovery of Human Remains

- If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the county coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the county coroner must be notified immediately. If the human remains are determined to be prehistoric, the coroner shall notify the NAHC, which will determine and notify a most likely descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of being granted access and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials. If the landowner or authorized representative rejects the recommendation of the MLD, either the landowner or the MLD may request mediation by the NAHC, which would include the meaningful and timely discussion and careful consideration of the views of each party to come to an agreement. If the NAHC is unable to identify a MLD or the MLD fails to make a recommendation within 24 hours after notification by the NAHC, or the landowner or his authorized agent rejects the recommendation by MLD and mediation by the NAHC fails to provide a measure acceptable to the landowner, then the landowner or his authorized representative shall rebury the human remains and grave goods with appropriate dignity at a location on the property not subject to further disturbances.

4.6 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?	☐	☐	☐	☒

4.6.1 Environmental Setting

Public Resources Code Section 21100(b)(3) and CEQA Guidelines Appendices F and G require a description of the wasteful, inefficient, and unnecessary consumption of energy caused by a project. The production of electricity requires the conversion of energy stored in natural resources such as water, wind, oil, gas, coal, solar radiation, certain minerals (for nuclear power), and geothermal energy. Energy consumed in the vicinity of the project site is currently attributed to vehicles traveling on local roadways, the use of electricity and natural gas in nearby residences, and electricity used for other land uses such as the nearby boat docks and boat storage yard. Production of energy and energy use both result in pollution and depletion of these renewable and nonrenewable resources. There are no energy consuming materials, equipment, or land uses on the project site itself.

As described above in **Section 4.3** Air Quality, CARB regulates mobile air pollution sources such as those from motor vehicles. These regulations also ensure that wasteful, inefficient, or unnecessary consumption of energy resources does not occur by off-road diesel vehicles, such as construction equipment.

4.6.2 Discussion

a) Construction of the Proposed Project would result in energy consumption. Heavy equipment used to bring materials to and from the project site, workers commuting to the project site via car, truck, or boat, and tools used during construction would consume petroleum products. The use of this energy is necessary for construction of the Proposed Project and would be utilized only when needed for construction progress. Construction would be temporary in nature and limited in scale. Once the project is completed, there would be no utilization of energy resources. Compliance with federal, State, and local regulations (e.g. limit engine idling times) would reduce short-term energy demand and prevent the wasteful or inefficient use of energy during construction to the extent feasible, ensuring there would be **less than significant** impacts due to energy use.

b) As previously discussed, construction of the Proposed Project would be subject to compliance with applicable CARB Regulations. Once the project is completed, there would be no utilization of energy resources. The Proposed Project would not conflict with or obstruct a State or local plan for renewable energy and energy efficiency and there would be **no impact**.

4.7 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 ground shaking?	☐	☐	☒	☐
III. Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
IV. Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☒	☐

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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 of unique geologic feature?	☐	☒	☐	☐

4.7.1 Environmental Setting

There are 11 geomorphic provinces in California. These provinces are naturally defined geologic regions that have distinct landscapes and features based on geology, faults, topographic relief, and climate (California Geological Survey 2002). The Proposed Project occurs within the Great Valley geomorphic province. The Great Valley is an alluvial plain approximately 50 miles wide and 400 miles long (California Geological Survey 2002). The Great Valley is a trough in which sediments have been deposited continuously since the Jurassic period (i.e., approximately 160 million years ago).

Seismic Conditions

The project site is not located within an Alquist-Priolo Earthquake Fault Zone as mapped by the California Department of Conservation (DOC, 2024). The Midland Fault, a subsurface fault, is the closest Delta fault to the project site located approximately 11 miles west (DOC, 2024b), with the Rio Vista Fault only a few miles west beyond the Midland Fault.

Seismic hazards are those associated with faults, ground shaking, liquefaction, and seiches. Geological hazards include associations with expansive soils, subsidence, landslides, and erosion. Levees can be unstable under seismic loading and liquefaction can occur in levees due to the presence of sand and silt in levees. Potential seismic hazards in the project site vicinity include ground shaking or lurching resulting from seismic activity in faults within the region (Patton, 2018).

With the potential of the Midland Fault to be active, geologic hazards are more prevalent than seismic hazards in the area. These hazards include subsidence and levee erosion. The land forms within the project vicinity where construction activities would occur are generally level and therefore not prone to landslides.

Soil Types and Characteristics

Soils mapped by NRCS found within the project site include Valpac sandy loam, mucky substratum, partially drained, 0 to 2 percent slopes and Gazwell mucky clay, partially drained, 0 to 2 percent slopes (USDA, 2024).

The soils within the project site are disturbed soils that were likely dredged at this location to construct the levee. The soils in the region have undergone, and continue to undergo, varying degrees of subsidence (i.e., sinking or gradual downward settling) as a result of exposure (oxidation). As subsidence progresses in the soils behind the levee, it causes stresses on the levee making it less stable. The levee foundation soils are generally fine-grained consisting of sandy silt and organic clay (USACE 1993).

Soil Hazards

Hydrologic soil group is a classification based on the runoff potential of soils when thoroughly saturated by a long-duration storm. Soils are grouped into four classes ranging from A to D, with A being coarse-grained soils with high infiltration and low runoff potential, and D being mostly fine-grained clays with extremely slow infiltration and high runoff potential. The soils on the project site have hydrologic ratings of B and D, indicating that the majority of the soils have moderate to slow infiltration rates when thoroughly wetted (USDA, 2024).

Drainage class is a measure of the frequency and duration of wet periods under conditions similar to those in which the soil developed. The soils on the project site are a poorly drained to very poorly drained soil types (USDA, 2024).

Corrosivity pertains to a soil-induced electrochemical or chemical action that corrodes concrete or steel. The soils on the project site have a high risk of corrosion of steel and a moderate to high risk of corrosion to concrete (USDA, 2024).

Expansive soils are largely comprised of clays, which may increase in volume when water is absorbed and shrink when dried; this property is measured using linear extensibility. Expansive soils are of concern because they can cause foundations to rise during the rainy season and fall during the dry season, causing structural distortion. The soils within the project site have moderate linear extensibility ratings, and thus moderate-to-high shrink-swell potential (USDA, 2024).

Paleontological Resources

A search of the University of California Museum of Paleontology specimen records cited no listings for unique paleontological resources or geological features in the immediate project area. However, the database search listed 126 fossil specimens found in Sacramento County (UCMP, 2024).

4.7.2 Discussion

a) i. Fault ground ruptures would not occur in the Project area because there are no active faults mapped in the project site or vicinity by the California Geological Survey. The project site is not located in any Alquist-Priolo Earthquake Fault Zone. The nearest fault, the Midland Fault, is 11 miles from the project site and is not exposed to the ground surface; therefore the likelihood of ground rupture is low and if it were to occur would not be within the project site. Therefore, the Proposed Project would have a **less than significant** impact related to rupture of a known earthquake fault.

ii. There is potential for an earthquake to occur at the Midland Fault or along the San Andreas fault in the region, and strong seismic ground shaking could occur at the project site. There is potential that the levee will be exposed to strong seismic shaking in the future. The Proposed Project would not result in an operational land change that would alter the people or structures

exposed to strong seismic ground shaking. Instead, it would provide a more stable levee relative to its existing condition. As such, the Proposed Project would have a **less than significant** impact related to strong seismic ground shaking.

iii. The potential for seismic-related ground failure of the levee, including liquefaction, is unknown. However, the region is likely susceptible to seismically induced liquefaction that could cause failure of earthen levee integrity. The Proposed Project is specifically being constructed to further stabilize the levee along the Georgiana Slough by adding denser materials to the existing levee slope and removing the existing undercut slope. The Proposed Project would not result in an operational land use change that would alter the levee in such a way that would make it more susceptible to seismic-related ground failure, including liquefaction. As such, the Proposed Project would have **no impact** on ground failure or liquefaction.

iv. There have been no recorded landslide events on or in the vicinity of the project site as mapped by the USGS (USGS, 2024). Additionally, there are no geologic hazards or significantly unstable soil conditions known to exist on the project site which could contribute to landslides. The Proposed Project is located on a levee, which was designed with slopes that are not conducive to sliding. The surrounding topography is flat and not susceptible to landslides. The Proposed Project would further reinforce the slopes on the levee and would have **no impact** or increase the likelihood of landslides.

b) The temporary construction-related activities require some soil to be removed from the levee face to allow placement of RSP and the construction of the new wetland benches. Initial site preparation, including tree trimming, mowing, and limited grubbing, has the potential to result in localized and temporary soil erosion, in particular when exposed to rainfall and storm water runoff events during or immediately following construction.

One of the main objectives of the Proposed Project is to stabilize the levee and prevent further erosion. The Proposed Project includes erosion control seeding, in addition to restoration of riparian habitat, which would enhance long-term soil retention. Project environmental commitments and BMPs as stated in **Section 2.6** to reduce erosion, dust, and other soil disturbance activities would be followed. For example, soil disturbance activities would cease if adverse weather conditions increase the likelihood of transporting soil off site.

With the relatively quick construction schedule and immediate revegetation of the disturbed soils, the area would be stabilized and resistant to soil mobilization and transport within the first year after construction. Therefore, the Proposed Project would have a **less than significant** impact on soil erosion and loss of topsoil.

c) The project site contains relatively stable soils and no apparent unique or significant landforms, and it does not overlie potentially unstable geological units. The Proposed Project would not cause the area to become unstable. The levee is considered stable, and the Proposed Project would substantially improve its stability in the area of the project site. The project design, which involves adding material to the existing slope, would have a beneficial effect on any unstable soils. Therefore, any development on the soils is unlikely to become unstable and result in geologic hazards. As a result, the Proposed Project would have **no impact**.

d) Because the existing levee was constructed above soils deposited over time by the Mokelumne and Sacramento River systems, the potential exists for expansive soils to occur beneath the existing levee. The soils within the project site have moderate-to-high shrink swell potential (USDA, 2024). The Proposed Project has been designed to address the potential for expansive soils. By improving the stability of the levee, the Proposed Project would reduce risks to life and property from expansive soils. Therefore, the Proposed Project would result in a **less than significant** impact.

e) The Proposed Project would not involve the construction of septic tanks or alternative wastewater disposal systems. Therefore, the Proposed Project would have **no impact** on soils utilized for septic tanks or alternative wastewater disposal systems.

f) There are no recorded listings for unique paleontological resources or geological features on the project site or in the immediate vicinity. However, it is possible that unknown buried paleontological materials could be found during ground disturbing activities at the project site. This is considered potentially significant. To address unanticipated and accidental discoveries, implementation of **Mitigation Measure GEO-1** would reduce the impact to a less than significant level.

4.7.3 Mitigation Measures

GEO-1: Accidental Discovery of Paleontological Resources

If vertebrae fossils (e.g., teeth, bones etc.) are unearthed by the construction crew anywhere on the project site, the finds should be set aside and all excavation activity shall cease at the specific place of discovery until a paleontologist has assessed the find and, if deemed significant, salvaged the find in a timely manner. The decision to conduct paleontological salvage operations will be determined by the paleontologist in consultation with District staff. Work may proceed on other parts of the project while assessment and/or salvage by the paleontologist is underway. Finds determined significant by the paleontologist shall be deposited with a recognized repository such as the University of California Museum of Paleontology.

4.8 GREENHOUSE GAS EMISSIONS

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

4.8.1 Environmental Setting

Gases that absorb and re-emit infrared radiation in the atmosphere are called GHGs. The GHGs that are widely seen as the principal contributors to human-induced climate change include carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), fluorinated gases such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Water vapor is excluded from the list of GHGs because it is short-lived in the atmosphere and its atmospheric concentrations are primarily determined by natural processes, such as oceanic evaporation.

GHGs are emitted by both natural processes and human activities. Of these gases, CO_2, CH_4, and N_2O are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing are associated with agricultural practices and landfills. N_2O is produced by microbial processes in soil and water, including those reactions that occur in fertilizers that contain nitrogen, fossil fuel combustion, and other chemical processes. In addition to natural sources, human activities are exerting a substantial and growing influence on climate by changing the composition of the atmosphere and the ocean, and by modifying the land surface through deforestation and urbanization that reduces carbon capture and decreases albedo (Intergovernmental Panel on Climate Change, 2014). GHGs are typically quantified in terms of "carbon dioxide equivalent" (CO_2e), a common measure used to compare the emissions of various GHGs based on their global warming potential. This measure is usually presented in metric tons (MT) and is expressed as $MTCO_2e$.

Regulatory Framework

California's major initiative for reducing GHG emissions is outlined in Assembly Bill 32 (AB 32), the "California Global Warming Solutions Act of 2006," signed into law in 2006. AB 32 codifies the statewide goal of reducing GHG emissions to 1990 levels by 2020, and requires CARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires CARB to adopt regulations to require reporting and verification of statewide GHG emissions. Based on this guidance, CARB approved a 1990 statewide GHG level and 2020 limit of 427 MMT CO_2e. The Scoping Plan was approved by CARB on December 11, 2008, and included measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted since approval of the Scoping Plan.

In May 2014, CARB approved the first update to the AB 32 Scoping Plan. The 2013 Scoping Plan update defined CARB's climate change priorities for the next five years and set the groundwork to reach post-2020 statewide goals. Senate Bill 32 (SB 32) was signed by the governor on September 8, 2016 to extend AB 32 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). To ensure consistency with SB 32 CARB adopted another update the Scoping Plan in December 2017. The 2017 Scoping Plan update highlights California's progress toward meeting the "near-term" 2030 GHG emission reduction goals defined in the original Scoping Plan. The strategy includes extending the Cap-and-Trade program post-2020, implementation of the Short-Lived Climate Pollutant Plan and Mobile Source Strategy and increasing renewable energy generation and improving energy efficiency. In 2016, the Legislature passed SB 32. This established a benchmark for California to reduce GHG emissions to 40 percent below 1990 levels by 2030. Under the 2022 Scoping Plan, seven key areas were identified: transportation sustainability, clean electricity grid, sustainable

manufacturing and buildings, carbon dioxide removal and capture, short-lived climate pollutants (non-combustion gases), and natural and working lands.

SMAQMD Thresholds

The majority of individual projects do not generate sufficient GHG emissions to directly influence climate change. However, physical changes caused by a project can contribute incrementally to cumulative effects that are significant, even if individual changes resulting from a project are limited. The issue of climate change typically involves an analysis of whether a project's contribution towards an impact would be cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15064[h][1]).

According to the SMAQMD CEQA Guide, the SMAQMD "recognizes that although there is no known level of emissions that determines if a single project will substantially impact the environment, a threshold must be set to trigger review and to assess the need for mitigation. Lead agencies shall compare the project's estimated GHG emissions to the District's recommended thresholds of significance: construction phase of all project types - 1,100 MT of CO_2e per year" (SMAQMD, 2021a). Therefore, if construction of the project exceeds the 1,100 MT of CO_2e per year threshold of significance, the project emissions may have a cumulatively considerable contribution to a significant cumulative environmental impact.

Methods

Construction emissions associated with development of the Project were calculated with CalEEMod 2022.1 (CAPCOA, 2022) and the SMAQMD Harborcraft, Dredge and Barge Emission Factor Calculator, Version 1.0 as recommended by SMAQMD for levee projects; model inputs and outputs are shown in **Appendix B**. Please refer to the discussion under **Section 4.3** above for a full explanation of the emissions calculations methods and assumptions.

4.8.2 Discussion

a) Construction of the Proposed Project would generate GHG emissions from construction equipment, truck hauling, construction worker trips, and operation of the tugboats and work boats. Similar to the analysis of CAP emissions provided in **Section 4.3**, emissions of GHG resulting from construction of the Proposed Project would occur in multiple air districts due to the tug boat routes from San Rafael and Decker Island to the project site. Climate change is a global issue and the effects are not localized like they are for CAPs, and therefore it is more appropriate and more conservative to assess the total project emissions against the SMAQMD significance thresholds.

- Construction activity is estimated to occur over a period of approximately 120 days. As shown in **Table 4.8-1**, construction activity for the Proposed Project would generate an estimated 695 MT of CO_2. The Proposed Project would involve erosion control and habitat enhancement and thus would not include operational emissions. Project generated annual GHG emissions would not exceed the 1,100 MT CO_2e threshold and impacts would be **less than significant**.

Table 4.8-1: Estimated Construction Emissions of GHGs

Construction Year	Annual Emissions (CO_2 MT/year)
2025	695

Notes: Modeled values represent total emissions that would occur over the duration of the construction period. See **Appendix B** for detail on model inputs, assumptions, and project specific modeling parameters.

b) The Proposed Project would be consistent with applicable regulations or plans addressing GHG reductions. As discussed in (a) above, the Proposed Project is in compliance with SMAQMD thresholds for GHG emissions. SMAQMD's recommended thresholds and mitigation measures were developed to show consistency with AB 32, SB 32, and the Scoping Plan. Therefore, the Proposed Project would not conflict with or obstruct implementation of CARB's Scoping Plan for achieving GHG reductions consistent with AB 32 and SB 32 and would achieve reductions consistent with SMAQMD's guidance. This impact would be **less than significant**.

4.9 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	☐	☐	☐	☒

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	☐	☒

4.9.1 Environmental Setting

Hazardous materials and wastes are regulated by federal and state laws and are required to be recycled or properly disposed. Hazardous wastes include waste listed on one of the four Resource Conservation and Recovery Act hazardous wastes lists: the F-list (non-specific source wastes), K-list (source-specific wastes), P-list and U-list (both lists consist of discarded commercial waste products), or that exhibits one of the four characteristics of a hazardous waste, which include ignitability, corrosivity, reactivity, or toxicity. No hazardous waste sites are listed on the California Department of Toxic Substances Control EnviroStor database (i.e., identifies sites with known contamination or suspected of contamination) as occurring near the project site or vicinity (DTSC, 2024).

In 2021, Sacramento County partnered with cities within the County to update its multijurisdictional Local Hazard Mitigation Plan (LHMP). The LHMP assesses natural hazards of concern and evaluates risks to safety, public health and property, and the environment. It also evaluates mitigation measures to reduce these risks and vulnerabilities (Sacramento County, 2021). Hazards identified in the LHMP were related to severe weather, floods, climate change, and subsidence. No contamination sites or other areas with hazardous materials were identified as an issue (Sacramento County, 2021).

The nearest airport to the project site, Spezia Airport (9CL9), is a private airstrip located approximately 6.2 miles north. The airport is located on 13 acres of land and has a single 2,500-foot long, 100-foot wide primary runway. The second nearest airport is Rio Vista Municipal Airport, located approximately 7.8 miles northwest of the project site.

The nearest school, Isleton Elementary School, is located approximately 2.5 miles from the site.

The project site is not located in a designated Fire Hazard Severity Zone (CALFIRE, 2024) or a designated California Department of Forestry and Fire Protection (CALFIRE) State Responsibility Area (SRA). Further, the LHMP identified the project area as having a low potential for a significant wildfire (Sacramento County, 2021).

4.9.2 Discussion

a,b) Construction of the Proposed Project requires the use of small quantities of hazardous materials, typically in the form of oil, fuel, and lubricants for construction equipment; however, these materials are not acutely hazardous. The potential severity of a hazardous material incident related to these materials depends on the type, location, and quantity of the material released. The greatest potential for risk of public exposure to fuel, oil, lubricant, or waste spills from the Proposed Project would occur during transport given some residences are close to transportation corridors that would be used to deliver materials to the project site. All materials would be used in accordance with applicable federal, state, and local laws, including Cal-OSHA requirements and manufacturer's instructions. Cal-OSHA has adopted regulations for safe workplaces and practices, including the handling and transporting of hazardous materials required for construction activities. Further, much of the access to the project site would occur from boats and barges on the Georgiana Slough. Therefore, the Proposed Project would have a **less than significant** impact on the creation of a significant hazard to the public or the environment through the routine transport of disposal materials.

c) The nearest school, Isleton Elementary School, is located approximately 2.5 miles from the project site. No schools are within one-quarter mile of the site. Therefore, no hazardous emissions would occur, or hazardous materials, substances, or waste would be handled within one-quarter mile of an existing or proposed school. Therefore, there would be **no impact**.

d) Based on a search of the EnviroStor database, the project site and vicinity are not located on or near any federal-, state-, or local-designated hazardous wastes site (DTSC, 2024). Therefore, the Proposed Project would have **no impact** on the related safety of people residing or working in the Project area.

e) The project site is not located within the vicinity of a private airstrip or an airport land use plan (City of Rio Vista, 2018). The nearest airstrip, Spezia Airport (9CL9), is located 6.2 miles north of the project site, and the nearest airport, Rio Vista Municipal Airport, is located approximately 7.8 miles northwest of the project site across the Sacramento River. The project would be located far enough from these airports that it would not create a safety hazard or excessive noise for people residing or working within the project site. As such, the impacts would be **no impact**.

f) Access to the project site would predominantly occur via work boats on the Georgiana Slough. During planting activities, after completion of the RSP and wetland benches, access to the Proposed Project would occur from vehicles on SR 12. Additionally, some staging activities would occur and a construction trailer would be parked on the site during some project-related trips which would be temporary, and not substantially hinder the passage of emergency vehicles. Further, the Proposed Project does not include any actions that would impair or physically interfere with the Sacramento County Emergency Operations Plan (Sacramento County, 2022) or the implementation of any evacuation plan along SR 12. Therefore, there would be **no impact**.

g) The project site is not located in a wildland fire hazard area or a designated CALFIRE SRA. Therefore, there would be **no impact**.

4.10 HYDROLOGY AND WATER QUALITY

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Violate any 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 off-site;	☐	☐	☒	☐
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; or	☐	☐	☒	☐
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?	☐	☐	☐	☒

4.10.1 Environmental Setting

Surface Water and Stormwater

The project site is in the Sacramento-San Joaquin Delta straddling two watersheds, with the levee marking the boundary between the Threemile Slough-Sacramento River watershed (HUC 180201630703) and the South Mokelumne River-Mokelumne River watershed (HUC 180400121106). The Threemile Slough-Sacramento River watershed is the southern portion of the project site on the land side of the levee and drains southwest away from Georgiana Slough, while the South Mokelumne River-Mokelumne River watershed is the water side of the levee draining into the Georgiana Slough (USEPA, 2024b). The Threemile Slough-Sacramento River watershed is approximately 61,655 acres, while the South Mokelumne River-Mokelumne River watershed is approximately 26,799 acres.

The Sacramento River, located approximately 2.57 miles northwest of the project site, is California's largest river and provides 31 percent of the State's surface water. It provides water for several beneficial uses including municipal and domestic supply, irrigation, stock watering, process, service supply, contact recreation, other non-contact recreation, warm and cold freshwater habitat, warm and cold migration habitat, warm spawning habitat, wildlife habitat, and navigation. The Georgiana Slough is a natural channel that allows water and fish to move into the interior Delta. It links the Sacramento River and the San Joaquin River above their confluence in the Delta, at the head of the Suisun Bay, through its connection with the Mokelumne River approximately a quarter mile from the project site. The Mokelumne River is a source of irrigation water for agriculture and provides recreation opportunities in the region.

The Georgiana Slough and Mokelumne River are both located within the Delta Waterways, central portion. While neither are classified as impaired or listed in the CWA Section 303 (d) list by the State Water Resources Control Board (State Water Resources Control Board, 2018), Delta waterways (central portion) are generally classified as impaired for metals (mercury), pesticides (Ddt [Dichlorodiphenyltrichloroethane] and chlorpyrifos), and non-native aquatic plants (USEPA, 2024c).

Flooding

The areas where the Proposed Project would occur are designated "AE" by the Federal Emergency Management Agency (FEMA) as shown on FEMA Map Panel Number 06067C0565H, effective August 16, 2012 (FEMA, 2024). The designation AE indicates areas at high risk for flooding with an approximately 1 percent chance of annual flooding.

Levee failure and subsequent flooding can occur as a result of sustained high flows or flows that are higher than normal water years. The most dangerous is high velocity flooding of properties adjacent to and downstream of a levee breach. Levee failures can also occur due to animal activity and anomalies within the levee section. Historically, as indicated by the Sacramento County LHMP, the Brannan Andrus Levee Maintenance District (Reclamation Districts 317, 407, 2067) was concerned of levee failure due to a high-water event in 1997, when a section of the landslide slope sloughed into a toe ditch along the Georgiana Slough levee (Sacramento County, 2021). The duration of a levee failure risk time can last hours to weeks, depending on the river flows and precipitation. However, it is possible for a catastrophic levee collapse to occur with little to no warning. This would likely occur when the levee is saturated and the high hydrostatic water pressure or flow on the river side combined with levee erosion from high water flows or some type

of levee defect cause an almost instant collapse of the levee (Sacramento County, 2021). Areas located near the break would suffer immediate and extensive damage.

Groundwater

The Proposed Project is located within the Solano Subbasin, which lies within the Sacramento Valley Basin (SWRCB, 2024). The Solano Subbasin boundaries are defined by Putah Creek to the north, the Sacramento River on the east (from Sacramento to Walnut Grove), the North Mokelumne River on the southeast (from Walnut Grove to the San Joaquin River), and the San Joaquin River on the south (from the North Mokelumne River to the Sacramento River). The western border is defined by the hydrologic divide that separates lands draining to the San Francisco Bay from those draining to the Sacramento-San Joaquin River Delta, or approximately the English Hills and Montezuma Hills (CGB, 2004).

As stated in California Groundwater Bulletin 118, "The primary water-bearing formations comprising the Solano subbasin are sedimentary continental deposits of Late Tertiary (Pliocene) to Quaternary (Recent) age. Fresh water-bearing units include younger alluvium, older alluvium, and the Tehama Formation. The units pinch out near the Coast Range on the west and thicken to a section of nearly 3000 feet near the eastern margin of the basin. Saline water-bearing sedimentary units underlie the Tehama formation and are generally considered the saline water boundary" (CGB, 2004).

Groundwater within the Solano Subbasin is considered to generally be good quality, and useable for both domestic and agricultural purposes. The shallow aquifer, or the alluvium aquifer, is used primarily for private wells, agriculture pumps, and small community water systems. The deep aquifer, or the Tehama Formation, is used primarily for municipal water supply and some agricultural wells (CDWR, 2021).

The California Department of Water Resources (DWR) has designated the Solano Subbasin as medium priority in accordance with the Sustainable Groundwater Management Act. Because of its medium priority designation, the Solano Subbasin must be managed by a locally-developed groundwater sustainability plan developed by a local groundwater sustainability agency (NDGSA, 2020). On January 18, 2024, DWR approved the Solano Subbasin Groundwater Sustainability Plan.

4.10.2 Discussion

a) Levee construction and grading activities associated with the Proposed Project have the potential to impact water quality in the Georgiana Slough and downstream receiving waters. Site preparation would include vegetation removal and staging area setup, while construction would include excavation of the eroded levee slope, levee replacement backfill, rock placement, and restoration of vegetation. Work is planned to occur over a 120-day period, with the in water work limited to a 90-day period (August 1 to October 31) during the seasonally dry period when the risk of rainfall and related storm water runoff at the site would be minimal. Most work would occur during low tides, but some construction would occur under the water. Additionally, the use of construction materials such as fuels and solvents may present a risk to surface water quality. Storage of construction material and equipment in work areas or staging areas could create the potential for a release of hazardous materials, trash, or sediment. These construction activities have the potential to result in temporary water quality effects to the following physical or chemical constituents within the Georgiana Slough and Mokelumne River: TSS, turbidity, oil and grease, petroleum, hydrocarbons, and trash. Construction related eroded soil may contain organic matter, plant nutrients, and other contaminants such as trace metals or pesticides.

TSS and Turbidity

Direct discharges of soil and suspended sediment to the Georgiana Slough and Mokelumne River resulting in increases in TSS and turbidity levels would be the main concern during the construction period because the majority of the project construction involves working on a levee slope on soils that are susceptible to erosion. Vegetation removal, backfill placement, rock placement, and plant installation may all cause temporary increases in TSS and turbidity levels as a result of the temporary disturbance of soils. The levee slope work has the greatest potential to generate elevated TSS and turbidity because some of the work will occur under water. Therefore, the in-river portion of construction would occur over a 90-day period (August 1 to October 31) during the dry season. As stated above, construction activities would be conducted during the seasonally dry months when storm water runoff would be low or nonexistent. The potential for increased TSS and turbidity levels would occur only during construction activity and would decrease back to existing condition levels daily during the nighttime non-construction period. The implementation of appropriate erosion control and pollution prevention BMPs listed in **Section 2.6** would avoid and minimize construction-related erosion and potential for TSS and turbidity from the construction work to enter into the water. AMM 3 includes active water quality monitoring and implementation of remedial actions if TSS and turbidity reach levels that would exceed established thresholds.

Construction activities would also be conducted in conformance with applicable federal and State regulations pertaining to erosion control, and contaminant spill control and response measures. In particular, the construction work would be subject to authorization under the State Water Resources Control Board NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit; Order No. 2022-0057-DWQ/NPDES Permit No. CAS000002). Therefore, BALMD and/or its construction contractor would be required to develop a SWPPP and implement appropriate construction BMPs for all activities that may result in the discharge of construction-related contaminants from disturbed construction areas. Implementation of appropriate erosion control and pollution prevention BMPs would avoid and minimize construction-related erosion and contaminant discharges. In addition to the BMPs, the SWPPP would include BMP inspection and monitoring activities, and identify responsibilities of all parties, contingency measures, agency contacts, and training requirements and documentation for those personnel responsible for installation, inspection, maintenance, and repair of BMPs.

Project design and compliance with relevant laws, including preparation and adherence to a project-specific SWPPP, will ensure the potential for erosion and TSS impacts due to construction remains at **less than significant** levels.

Following construction, during what would be considered the ‘operational’ phase, the return of seasonal rains can result in “first flush” runoff events with elevated levels of TSS and turbidity. However, the levee slope would be seeded for erosion control with native grasses, and plants installed for successful habitat vegetation establishment prior to the rainy season. This would make the levee slope stabilized and more resistant to mobilization and transport of soils prior to the onset of the rainy season.

The purpose of the Proposed Project is to repair an area of levee erosion. By installing stable and effective erosion control methodologies there would be lower potential for TSS and turbidity to enter Georgiana Slough relative to existing conditions. Thus, the Proposed Project would not contribute to long-term elevated TSS and turbidity levels in Georgiana Slough or immediately

downstream in the Mokelumne River. Instead, the Proposed Project would lead to long-term improvements (i.e., decreases) in TSS and turbidity due to decreasing erosion on the levee slope in the vicinity of the Proposed Project.

Petroleum Hydrocarbons and Other Construction-Related Contaminants

The use of motorized equipment on shore and in the river and storage and handling of fuels, equipment lubricants, and fluids may result in petroleum product discharges that could be harmful to water quality if they directly enter the Georgiana Slough or Mokelumne River or are spilled on the ground where they may enter the groundwater or be mobilized and transported in stormwater runoff following construction. Other potential construction related contaminants associated with the equipment used or inadvertently discharged by construction workers may include trash, cleaners, solvents, and human sanitary wastes. The staging area where equipment and chemicals will be stored has been intentionally sited on the land side of the levee to minimize the potential for accidental releases, should they occur, to enter receiving waters.

Some construction related-contaminants, such as polycyclic aromatic hydrocarbons (PAHs) that are found in some fuel and oil petroleum byproducts, can bioaccumulate in aquatic and terrestrial organisms. Construction activities may also disturb areas where bioaccumulative constituents included on the state's CWA Section 303(d) list are present in the soil (e.g., mercury and pesticides). Bioaccumulation of constituents in the aquatic food chain arises as a result of long-term loading of a constituent or a pervasive and widespread source of constituent discharge. However, as a result of the generally localized disturbances, and intermittent and temporary nature of construction-related activities, construction would not result in contaminant discharges of a substantial magnitude or duration to contribute to long-term bioaccumulation processes or cause measurable long-term degradation such that any Section 303(d) impairments would be made discernibly worse.

The potential for direct discharge of equipment- or worker-related contaminants to the Georgiana Slough or Mokelumne River from vegetation removal, backfill placement, rock placement, and installation of plants is anticipated to be minimal with implementation of construction BMPs (AMM 3), other project environmental commitments, and compliance with the NPDES General Construction Permit (AMM 7).

Summary

In summary, the risk of direct discharges of construction-related contaminants to water would be very low, site disturbances would be of short duration during a single dry-weather construction season with limited exposure to rainfall and stormwater runoff, and implementation of construction BMPs and project environmental commitments would further avoid and minimize potential adverse construction-related effects. Additionally, because construction-related disturbances and potential constituent discharges would be temporary, construction activities would not be expected to cause any substantial increase in levels of any bioaccumulative pollutants that would result in measurably higher body burdens of a pollutant in aquatic organisms or wildlife, nor contribute to long-term water quality degradation by measurable levels such that any CWA Section 303(d) impairments would be made discernibly worse. Furthermore, the Proposed Project would not be expected to cause constituent discharges of sufficient frequency and magnitude to result in a substantial increase of exceedances of water quality objectives/criteria, nor substantially degrade water quality with respect to constituents of concern, and thus would not adversely affect any beneficial uses in the waterways. Potential

impacts associated with water quality standards or degradation of surface or groundwater quality would be **less than significant**.

b) The Proposed Project would not involve extraction of groundwater or a change in impervious surface area that would impede groundwater recharge. Therefore, the Proposed Project would have **no impact** on groundwater supplies or recharge, or the sustainable groundwater management of the underlying basin.

c) The Proposed Project involves rehabilitation of an existing levee and could improve the drainage of the site by preventing further erosion of the levee. The Proposed Project would not add any impervious surfaces to the area.

i. As discussed above, the purpose of the Proposed Project is to repair areas of levee erosion located on the right bank of the Georgiana Slough. Construction would occur during the dry season so soil erosion would be unlikely to occur from rainfall or storm water runoff events during construction. Project environmental commitments and construction BMPs would be in place to prevent construction-generated loose soils from entering the Georgiana Slough. Thus, substantial erosion or siltation of the area would not occur.

   Following completion of construction, the levee would be more stable and the potential for the levee to erode would be much lower than existing conditions. Thus, in the long-term the potential for substantial erosion or siltation to occur would be lower than existing conditions. With the implementation of project environmental commitments, BMPs, and adherence to regulatory requirements, potential impacts from stormwater runoff, including erosion and siltation, would be **less than significant**.

ii. As discussed above in (a), the Proposed Project would not result in substantial surface runoff and would not result in on- or offsite flooding. Instead, the Proposed Project would enhance stability of the existing levee structure relative to its existing condition and decrease or prevent potential for continued erosion and subsequent levee failure. The runoff from the site would be unchanged as a result of the Proposed Project. The Proposed Project would therefore have a **less than significant** impact on the amount of surface runoff from the Proposed Site therefore less likelihood of flooding on- or offsite.

iii. As discussed above in (a), the Proposed Project would not result in substantial contributions of pollutants to adjacent waters. There are no municipal or other stormwater drainage facilities in the area, and stormwater runs off the project site as sheet flow and would continue to do so after construction is complete. The Proposed Project would have a **less than significant impact** on the capacity of existing or planned storm water drainage systems or additional sources of polluted runoff.

iv. The Proposed Project would neither impede or redirect flood flows. The Proposed Project would stabilize the existing levee and reduce the potential for levee failure in the future. This would reduce potential flood risks in the localized area. The Proposed Project would have a **less than significant** impact on flood flows.

d) The Proposed Project is not located in a region subject to a seiche or tsunami and therefore the Proposed Project would have no impact on pollutant release due to inundation by seiche or

tsunami. The in-water work portion of the construction would occur during the dry season. As described in **Section 4.10.1**, the greatest potential for flooding to occur in the area is during prolonged rainfall, and timing construction during the dry season would minimize potential risk of flooding. Post construction, the rehabilitation of the existing levee would increase flood protection by minimizing the risk of levee failure through prevention of future erosion. This rehabilitation would lessen the potential hazards associated with floods compared to existing conditions, resulting in a lower risk of inundation. The Proposed Project would have **no impact** on pollutant release due to a flood hazard.

e) The Proposed Project would be obtaining coverage under the NPDES General Permit for Storm Water Discharges associated with construction and land disturbance activities (General Permit; Order No. 2022-0057-DWQ/NPDES Permit No. CAS000002). This NPDES permit implements federal and state water quality standards, including provision of state water quality control plans. To obtain a Section 404 permit from the Army Corps of Engineers, the state RWQCB would have to issue a Section 401 Water Quality Certification that states the Proposed Project complies with water quality standards. Therefore, the Proposed Project would not conflict with a water quality control plan.

As discussed above in (b) and in **Section 4.10.1**, the Proposed Project would not result in depletion of groundwater or impede groundwater recharge. The Proposed Project would not conflict with the Solano Subbasin Groundwater Sustainability Plan.

4.11 LAND USE AND 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?	☐	☐	☐	☒

4.11.1 Environmental Setting

The General Plan land use designation for the project site is recreation and it is surrounded to the west and north by lands designated for agricultural cropland, as outlined in the Sacramento County General Plan Land Use Diagram (Sacramento County, 2013). The project site is zoned AR-2 (agricultural-residential-2 acres), DW-S (Delta waterways), and C-O (commercial recreation). No agricultural production occurs on the project site where construction activities would occur.

The Proposed Project is located within an area covered by the California State Delta Plan, a comprehensive, long-term management plan for the Delta required by the 2009 Delta Reform Act. The

Delta Reform Act also included the creation of the DSC, the State agency responsible for developing and implementing the Delta Plan. The Delta Plan was unanimously adopted by the DSC on May 16, 2013. It was amended in 2016 and then again in 2019. The Delta Plan includes a comprehensive, and legally enforceable, sustainable management plan to achieve the coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. To achieve these coequal goals, the Delta Plan states that it is necessary to protect and enhance the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place (DSC, 2019). The Delta Plan contains a set of regulatory policies under California Water Code section 85057.5(b)(5). Actions subject to these policies are called “covered actions.”

The Proposed Project is located in the Primary Zone of the Delta and within the planning area of the Delta Protection Commission. The Delta Protection Act required the Delta Protection Commission to prepare, adopt, and thereafter review and maintain a comprehensive long-term Resource Management Plan for land uses within the Primary Delta. The goals of the Resource Management Plan are to “protect, maintain, and where possible enhance and restore the overall quality of the Delta environment, including but not limited to agriculture, wildlife habitat, and recreational activities; assure orderly, balanced conservation and development of Delta land resources and improve flood protection by structural and nonstructural means to ensure an increased level of public health and safety." The Proposed Project was also developed to be consistent with the Delta Protection Commission’s Land Use and Resource Management Plan (Delta Protection Commission, 2010).

4.11.2 Discussion

a) The Proposed Project consists of temporary construction activities over the course of approximately 120 days. The Proposed Project would not change the land use, it would only improve the current levee that is currently in place. The levee would be reinforced and revegetated but no new structures are proposed. As such, no local communities would be divided as a result of the Proposed Project. Therefore, the Proposed Project would have **no impact** on an established community.

b) The Proposed Project would not conflict with any goals or policies in the Sacramento County General Plan (Sacramento County, 2017). The Proposed Project is classified as a “covered action” under the Delta Plan and was developed to be consistent with the Delta Plan. Therefore, the Proposed Project would not conflict with the Delta Plan or the Delta Protection Commission’s Land Use and Resource Management Plan. The Proposed Project is located within land zoned for agricultural cropland, Delta waterways, and commercial recreation. No land use designation changes are proposed and the Proposed Project would remediate an ongoing erosional issue to protect the existing onsite and surrounding land uses. Therefore, the Proposed Project would have **no impact** due to a conflict with any applicable land use plans, policies, or regulations adopted for the purpose of avoiding or mitigation environmental effects.

4.12 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?	☐	☐	☐	☒

4.12.1 Environmental Setting

No significant mineral resources are found in much of the Delta. The Sacramento County General Plan – Conservation Element indicates no known mineral resources within the project site (Sacramento County, 2017).

4.12.2 Discussion

a,b) There are no known mineral resources in the project site and therefore construction activities would not result in the removal of any mineral resources. Therefore, the Proposed Project would have **no impact** on the availability of mineral resources.

4.13 NOISE

Would the project result in:	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 ground borne vibration or ground borne noise levels?	☐	☐	☒	☐

Would the project result in:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	☐	☒

4.13.1 Environmental Setting

Sound Fundamentals

Sound is a vibratory disturbance created by a moving or vibrating source, capable of being detected by hearing organs such as the human ear. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds (Caltrans, 2013). Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to actual sound pressure levels so they are consistent with the human hearing response. Decibels are measured on a logarithmic scale where a doubling of a noise energy source, such as doubling traffic volumes, would increase the noise level by 3 dB; similarly, dividing the energy in half would result in a decrease of 3 dB (Caltrans, 2013).

Sound changes in both level and frequency spectrum as it travels from source to receiver. The most obvious change is the decrease in sound level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line), the path sound travels, site conditions, and obstructions. Noise levels from a point source, such as construction, industrial machinery, typically attenuate or drop off at a rate of 6 dBA per doubling of distance. Noise from a line source, e.g., roadway, pipeline, railroad typically attenuates at about 3 dBA per doubling of distance (Caltrans, 2013). Noise levels may also be reduced by intervening structures; the amount of attenuation provided by this "shielding" depends on object size and the frequencies of the noise levels. Natural terrain features, such as hills and dense woods, and man-made features, such as buildings and walls, can significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (FHWA, 2011). The Federal Highway Administration (FHWA) guidelines indicate that modern building construction generally provides an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows.

The impact of noise is not a function of sound level alone. The time of day when noise occurs and the duration of the noise are also important. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. One of the most frequently used noise metrics is the equivalent noise level (L_{eq}); it considers both duration and sound power level. L_{eq} is defined as the single steady A-weighted level equivalent to the same amount of energy

as that contained in the actual fluctuating levels over a period of time. Typically, L_{eq} is summed over a one-hour period. L_{max} is the highest root mean squared (RMS) sound pressure level within the sampling period.

Noise occurring at night tends to be more disturbing than that occurring during the day. Community noise is usually measured using Day-Night Average Level (L_{dn} or DNL), which is the 24-hour average noise level with a +10 dBA penalty for noise occurring during nighttime hours (10:00 p.m. to 7:00 a.m.). Community noise can also be measured using Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a +5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. (Caltrans, 2013). Noise levels described by L_{dn} and CNEL usually differ by about 1 dBA. Quiet suburban areas typically have CNEL noise levels in the range of 40 to 50 dBA, while areas near arterial streets are in the 50 to 60+ dBA CNEL range.

Vibration

Groundborne vibration refers to the mechanical oscillations transmitted through the ground due to various sources, such as transportation systems, construction activities, or industrial processes. These vibrations can impact nearby structures, human comfort, and the environment. While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as groundborne noise. Groundborne noise may result in adverse effects, such as building damage, when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz). The primary concern from vibration is that it can be intrusive and annoying to building occupants and vibration-sensitive land uses.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or RMS vibration velocity. Particle velocity is the velocity at which the ground moves. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the greatest magnitude of particle velocity associated with a vibration event.

Regulatory Setting

Chapter 6.68 of the Sacramento County Code exempts construction noise associated with the repair, remodeling, demolition, paving or grading of any property between the hours of 6:00 a.m. and 8:00 p.m. on weekdays and between 7:00 a.m. and 8:00 p.m. on Saturday and Sunday. Construction noise occurring outside of these hours would be noncompliant with Chapter 6.68 of the Sacramento County Code, therefore resulting in a significant impact. The County does not have standards for vibration. Caltrans has published applicable guidelines for vibration annoyance caused by transient and intermittent sources, shown in **Table 4.13-1**.

Table 4.13-1: Caltrans Criteria for Vibration Annoyance

Human Response	Maximum PPV (in/sec), Transient Sources[1]	Maximum PPV (in/sec), Continuous/Frequent Intermittent Sources[1]
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

[1] Caltrans defines transient sources as those that create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources can include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans, 2020

In addition, Caltrans has published its own guidelines for structural damage from vibration, as shown in **Table 4.13-2**.

Table 4.13-2: Caltrans Criteria for Vibration Damage

Structure and Condition	Maximum PPV (in/sec), Transient Sources[1]	Maximum PPV (in/sec), Continuous/Frequent Intermittent Sources[1]
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Caltrans, 2020

Sensitive Receptors

Typically, noise sensitive land uses include single family residential, multiple family residential, churches, hospitals and similar health care institutions, convalescent homes, libraries, and school classroom areas. The closest noise sensitive receptors to the project site are single family residences approximately 180 feet east of the project site.

4.13.2 Discussion

a) The Proposed Project would generate temporary construction noise that would exceed existing ambient noise levels in the project vicinity. Noise impacts associated with construction activity are a function of the noise generated by construction equipment, the location and sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Project construction is anticipated to be completed over 120 days, anytime between June 15 and December 30, 2025. Work would generally occur Monday through Saturday from 7:00 a.m. to 7:00 p.m. and limited to daylight hours. All construction equipment would have sound-control devices no less effective than those provided on the original equipment and no equipment shall have an unmuffled exhaust system. The nearest noise sensitive receptors, single family homes, are located approximately 180 feet east of the project site. The staging area would be approximately 190 feet from the nearest sensitive receptors.

Construction noise was estimated using the FHWA Roadway Construction Noise Model (RCNM) results from the 2020 Final Environmental Assessment (EA) for the BALMD Sacramento River Erosion Control and Habitat Enhancement Project (Robertson-Bryan Inc, 2020). This 2020 Final EA assessed the impacts from erosion control measures similar to the Proposed Project. The erosion control sites analyzed in the 2020 Final EA were located approximately 5.4 miles northwest of the project site, and the nearest sensitive receptors were also approximately 180 feet from the

nearest construction activities. The 2020 Final EA predicted construction noise levels for a variety of construction operations based on empirical data and the application of acoustical propagation formulas. The 2020 Final EA provided reference noise levels for standard construction equipment with an attenuation of 6 dBA per doubling of distance for stationary equipment and 3 dBA per doubling of distance for mobile equipment. The modeling did not take into consideration the topographic variation of the area; as such, it provided more conservative results that are applicable to the conditions of the current project site. Noise was modeled based on the type of equipment to be used in each phase of construction, which would be similar to the phases of construction associated with the Proposed Project. **Table 4.13-3** is a replication of the noise level results from the 2020 Final EA, including the anticipated noise levels at 180 feet from the construction source. The table displays the estimated noise levels from the combined construction equipment anticipated to be used concurrently at the different levels of construction. The construction equipment assumed in the 2020 Final EA is similar to the Proposed Project, but the Proposed Project would utilize fewer pieces of equipment, as noted in the notes below **Table 4.13-3**.

As shown in **Table 4.13-3**, construction noise could reach as high as 109 dBA L_{eq} at 85 feet, which is about half the distance to the nearest sensitive receptor. Therefore, the sensitive receptor could experience noise levels that exceeds the County of Sacramento daytime and nighttime exterior noise standards in residential areas of 55 dBA L_{eq} and 50 dBA L_{eq} respectively. However, construction would occur from 7:00 a.m. to 7:00 p.m. Monday through Saturday and would therefore be compliant with Chapter 6.68 of the Sacramento County Code that exempts construction noise between the hours of 6:00 AM and 8:00 PM on weekdays and between 7:00 AM and 8:00 PM on Saturday and Sunday. In addition, all construction equipment would be equipped with sound control devices and no equipment would have unmuffled exhaust systems. Despite these measures, construction noise during site preparation, specifically from the woodchipper, could disturb nearby residents, resulting in a temporary potentially significant impact. With implementation of **Mitigation Measure NZ-1**, this impact will be **less than significant**.

Table 4.13-3 Construction Noise Levels by Phase (2020 Final EA Model Results)

Construction Phase	Equipment[1]	Construction Noise Level (dBA L_{eq}) at 85 feet
Mobilization	Pickup Truck, Flatbed Truck	69
Site Preparation	Flail Mower, Wood Chipper, Haul Truck, Chainsaw (2)	109
Levee Slope, Bench Construction and Encroachment	2,000 ton barge (non-motorized) (2)[6], crane barge (non-motorized) (2)[2], work boat (2)[5], excavator, conveyor with generator, front-end loader, tug boat (2), vibratory pile driver[3]	90
Installation of Plants	Work boat[4], hydroseeding truck, water truck	73
Site Demobilization	Pickup Truck	66

[1]Only equipment that would result in temporary construction noise is shown. The equipment listed in this table represents the assumptions utilized in the 2020 EA, which are in some cases greater than what is anticipated under the Proposed Project.

[2]The Proposed Project would use one crane barge, one less than what was analyzed in the 2020 EA.

[3]The Proposed Project does not include a vibratory pile driver, and therefore noise levels would be reduced.

[4]The Proposed Project would not include a work boat at this phase but instead two pickup trucks, which would create additional noise.

[5]The Proposed Project would only use one work boat, one less than what was analyzed in the 2020 EA.

[6]The Proposed Project would only use one 2,000 ton barge, one less than what was analyzed in the 2020 EA. Source: Robertson-Bryan Inc, 2020

The Proposed Project involves erosion control and habitat enhancements along the Georgiana Slough levee. The Proposed Project would not change the use of the project site as a levee and would provide more stability and flood protection. The Proposed Project would not increase vehicle traffic on surrounding roadways during operation and would not create new sources of noise that would be audible to noise sensitive receivers. There would be **no impact** due to operational noise.

b) The use of heavy construction equipment can generate substantial vibration near the source. Construction activity associated with the Proposed Project would be a temporary source of groundborne vibration in the project vicinity. Similar to construction noise, vibration levels would be variable depending on the type of construction project and related equipment use. Typical project construction activities may also generate substantial vibration in the immediate vicinity, typically within 25 feet of the equipment.

Construction equipment used during Project construction that produce vibrations would include loaded trucks, excavators, and woodchipper. Typically the types of construction equipment that produce the most significant vibrations include vibratory pile drivers and compactors, but neither of these are proposed to be used for construction of the Proposed Project. Loaded trucks have a vibration level of 0.076 PPV at 25 feet (FTA, 2018). A woodchipper is anticipated to have vibration levels similar to a small bulldozer that has a vibration level of 0.003 PPV at 25 feet. For the equipment that has the greatest vibration generation potential, the loaded trucks, the vibration level that would be perceivable at the nearest sensitive receptor would be approximately 0.012 PPV. This level would not exceed the distinctly perceptible threshold for humans (0.04 PPV) or the threshold for damage to extremely fragile buildings (0.25 PPV) (Caltrans, 2020). Furthermore, there are no fragile buildings within 180 feet of the project site (Caltrans, 2020). Vibration from other construction equipment, including the woodchipper and excavator, would be even smaller than the loaded trucks and therefore unperceivable. The Proposed Project would not involve long-term use of any equipment or processes that would result in potentially substantial levels of ground vibration. Furthermore, project construction would occur during daytime hours of 7:00 a.m. to 7:00 p.m., compliant with Chapter 6.68 of the Sacramento County Code. Therefore, building damage and human disturbance from construction would be **less than significant**.

c) The nearest airport to the project site, Spezia Airport (9CL9), is located approximately 6.2 miles north. The construction area for the Proposed Project is not located in the airport's noise contours and the Project would not subject people to excessive noise level. Therefore, there would be **no impact**.

4.13.3 Mitigation Measures

NZ-1: Minimize Wood Chipper-Related Noise

To reduce wood chipper noise-related impacts to occupants of nearby noise sensitive land uses, the wood chipper used during the site preparation phase shall include one or more of the following noise reduction measures by design:

- Selection of low noise components, e.g. engine;

- Optimization of the knife mounting configuration to reduce noise;
- Selection of a low noise exhaust system; and/or
- Use of low-noise operating mode.

4.14 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?	☐	☐	☐	☒

4.14.1 Environmental Setting

The General Plan land use designation for the project site is recreation and it is surrounded to the west and north by lands designated for agricultural cropland, as outlined in the Sacramento County General Plan Land Use Diagram (Sacramento County, 2013). The project site is zoned AR-2 (agricultural-residential-2 acres), DW-S (Delta waterways), and C-O (commercial recreation). No agricultural production occurs on the project site where construction activities would occur.

4.14.2 Discussion

a, b) The Proposed Project would not include the construction of new housing or commercial businesses. Construction would be short-term and would not result in construction employees relocating to the project vicinity. No additional permanent staff would be needed for project operation. The Proposed Project would not remove any homes or result in displacement of people. Therefore, the Proposed Project would have **no impact** on population growth, displacement of existing housing, or displacement of people.

4.15 PUBLIC SERVICES

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) 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:				
I. Fire protection?	☐	☐	☐	☒
II. Police protection?	☐	☐	☐	☒
III. Schools?	☐	☐	☐	☒
IV. Parks?	☐	☐	☐	☒
V. Other public facilities?	☐	☐	☐	☒

4.15.1 Environmental Setting

The project site is located in the jurisdiction of the River Delta Fire District. The River Delta Fire District maintains mutual aid agreements with Sacramento County Fire Agencies as well as Montezuma Fire District and Woodbridge Fire District (River Delta Fire District, 2013). The Isleton Fire Department also serves the area and has mutual aid agreements with the River Delta Fire District. The nearest fire station is approximately 2.5 miles from the project site.

Law enforcement services for the Project area are provided by the Sacramento County Sheriff's Department. The nearest school is the Isleton Elementary School located approximately 2.5 miles from the project site. The nearest park is in the city of Isleton located approximately 2.6 miles from the project site.

4.15.2 Discussion

a) The Proposed Project involves temporary construction activity on a relatively small area to resolve erosion problems along the right bank levee of Georgiana Slough on Lower Andrus Island. These activities would not directly or indirectly affect existing public services, nor require alteration or provision of additional public services. Since the site is isolated from active roadway traffic and

many materials and workers will be delivered to the site via barge or boat, no traffic control is anticipated or needed during all phases of construction including during clearing and grubbing activities.

Emergency vehicle response time will not be affected when traveling on SR 12. Therefore, the Proposed Project would have **no impact** on fire and police protection services. The Proposed Project is not in the vicinity of a school or park, and there will be **no impact** on schools, parks, or other public facilities.

4.16 RECREATION

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

4.16.1 Environmental Setting

The Proposed Project area is located on a levee that does not typically receive much, if any, public access. Residences near the project site have private docks on the Georgiana Slough. A private recreational facility called 'B+W Marina' is located approximately 0.15 mile southeast of the project site and provides rental cottages, boat launch and dock space, and other recreational opportunities directly onto the Mokelumne River (B&W Resort Marina, 2013). Adjacent to the levee work within the Georgiana Slough, pleasure boating, fishing, watersports and additional residential access to the river occur.

4.16.2 Discussion

a,b) The Proposed Project involves temporary construction on a relatively small area. During construction, recreational activities may be temporarily affected near the construction site due to the presence of barges on the Georgiana Slough. Construction machinery may interfere with fishing opportunities by generating noise and their general presence in the river. The construction area is relatively small, and there would be sufficient fishing areas nearby within Georgiana Slough or the Mokelumne River that could continue to be utilized for fishing during the temporary construction period. This potential temporary impact on recreational activities from construction would not necessitate the construction or expansion of recreational facilities.

The private B+W Marina facility located on the Mokelumne River would not be directly impacted by construction. The Proposed Project would have a **less than significant** impact on the physical deterioration of existing neighborhoods or regional parks or other recreational facilities, or the need for the construction or expansion of recreational facilities.

4.17 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) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

4.17.1 Environmental Setting

The Sacramento County General Plan Circulation Element provides the framework for Sacramento County decisions relating to the transportation system and the transportation vision for the County. The Circulation Element includes goals, policies, and implementation programs to guide transportation in the County.

SR 12 is adjacent to and just south of the project site and is the main access point to the project site. SR 12 is a two-lane road in the vicinity of the project site that runs in a generally east-west direction, connecting the cities of Lodi and Fairfield.

4.17.2 Discussion

a) The Proposed Project would not result in changes to the transportation system infrastructure within or adjacent to the project site or result in additional traffic from long-term operation. The Proposed Project would not cause measurable changes in long-term traffic volumes or circulation patterns in the project vicinity. Therefore, the Proposed Project would not conflict with a transportation plan or policy or affect transit, bicycle, or pedestrian facilities. There would be **no impact**.

b) The Proposed Project would not result in an increase in operational vehicle trips; therefore, there would be no increase in VMT from project operation. The Proposed Project would result in very minor, temporary increases in construction-related traffic on SR 12 for construction of the erosion control measures and hauling material to the project site. Construction staging and stockpiling of all materials for the Proposed Project would occur at one staging area on the project site to reduce construction VMT. Project construction vehicle trips are estimated to result in at most 36 daily round trips during any given time. Construction VMT is temporary and would occur over approximately 120 days. Therefore, construction would not constitute a significant increase in VMT. The Proposed Project would be consistent with CEQA Guidelines Section 15064.3 and impacts would be **less than significant**.

c-d) The Proposed Project would not result in changes to the transportation system infrastructure within the Proposed Project area. The Proposed Project would not result in additional traffic from long-term operation or physical changes to area roadways. Therefore, the Project would not cause hazards due to a design feature or measurable changes to circulation patterns.

Worker parking during project construction would occur on the project site at the staging area as shown in **Figure 2**. No one-way traffic control would be needed because construction traffic or work would not inhibit SR 12 or local roadway traffic, such as Willow Tree Lane. Therefore, project parking during construction would not result in safety, emergency access, or other traffic issues. The Proposed Project would not result in inadequate emergency access or increase hazards due to a design feature. Impacts would be **less than significant**.

4.18 TRIBAL 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 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 CRHR, or in the local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	☐	☒	☐	☐

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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 Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

4.18.1 Environmental Setting

Background research related to tribal cultural resources included a SLF search conducted by the NAHC, and completion of a Cultural Resources Assessment summarizing the findings, which is described throughout this analysis and attached as **Appendix G**. As described in **Appendix G**, the SLF search for the project site yielded negative results for the presence of sensitive Native American resources in the area.

AB 52 provides for consultation between lead agencies and Native American tribal organizations during the CEQA process. On February 19, 2024, based on the list of tribes provided by the NAHC, Natural Investigations Inc. sent consultation letters requesting information regarding sensitive Native American cultural resources in or near the Project APE. If no response was received, follow-up phone calls were made on March 4, 2024. The Confederated Villages of Lisjan Nation responded by email and did not have any information, and the Wilton Rancheria stated they were aware of sensitive Tribal resources near the Project site. A virtual meeting was set up to discuss the Project with the lead monitor of the Wilton Rancheria. No other comments or requests were received.

4.18.2 Discussion

a) i,ii. The Proposed Project contains identified site NIC-2023-BALMD-04, the Georgiana Slough Levee, in the APE that was recently recorded for the BALMD Tree Removal Project. The site appears to meet Criterion A for inclusion in the NRHP and CRHR, but lacks integrity of workmanship, setting, feeling, materials, and association due to regular improvements, maintenance, and construction of paved roads along the crest of the levee. Construction activities have the potential to encounter buried archaeological resources that could be considered tribal cultural resources if they are of Native American origin. Buried tribal cultural resources may include but are not limited to deposits of stone, bone and shell artifacts, dark gray “midden” sediments, or cemeteries. Therefore, the impact is considered potentially significant. With the implementation of **Mitigation Measure TRIB-1**, the impacts would be reduced to **less than significant**.

4.18.3 Mitigation Measures

TRIB-1: Accidental Discovery of Tribal Cultural Resources

If any resources of Native American origin are discovered once ground-disturbing activities are underway, the BALMD shall contact local Native Americans to consult on the find. If the find is determined to be a tribal cultural resource, contingency funding and a time allotment to allow for implementation of avoidance measures or appropriate mitigation determined in consultation with local Native Americans shall be made available. Work may continue on other parts of the project site while tribal cultural resources mitigation takes place on-site.

4.19 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 storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation 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?	☐	☐	☐	☒
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?	☐	☐	☒	☐

4.19.1 Environmental Setting

The Proposed Project would not generate wastewater or require the use of any wastewater treatment facility or storm water drainage facility. The nearest solid waste disposal transfer station is the Keller Canyon Landfill in Pittsburgh, approximately 30 miles southwest of the project site. Clean soil for filling the wetland bench would be transported via barge from Decker Island.

4.19.2 Discussion

a) The Proposed Project does not involve any changes to wastewater, storm water drainage, electrical power, natural gas, or telecommunication services in the project site, or involve any changes in wastewater disposal activities. Two portable toilets would be onsite for the duration of construction activities and the Proposed Project would not generate wastewater that would require a wastewater treatment facility or involve any changes in wastewater disposal activities. Therefore, the Proposed Project would have **no impact** on the need for new or expanded water or wastewater treatment plant, storm water drainage, electrical power, natural gas, or telecommunication facilities.

b) The Proposed Project would not create the need for an increased water supply. Therefore, the Proposed Project would have **no impact** on the need for new or expanded water supplies to serve the project.

c) The Proposed Project does not require wastewater service, thus the project would not involve any changes to wastewater services in the Proposed Project area. Therefore, there would be **no impact** on wastewater treatment plant capacity.

d,e) As an initial step to preparing the levee slope for construction activities, any trash would be removed from the waterside levee slope and hauled to an appropriate refuse disposal site; the Keller Canyon Landfill in Pittsburgh is the closest site. Invasive vegetation that is removed for site preparation would also be trucked to the Keller Canyon Landfill or other appropriate disposal site. Some waste would also be generated during the placement of planting medium. To ensure a clean source of soil, the first six inches of soil material that contains unwanted seed material would be stripped and stockpiled for disposal on Decker Island, as needed. In addition to any trash or refuse produced by construction personnel, the disposal of any solid waste would comply with applicable federal, state, or local regulations for solid waste disposal. The Proposed Project would not impair the attainment of solid waste reduction goals. Therefore, this impact would be **less than significant** on compliance with statutes and regulations related to solid waste.

4.20 WILDFIRE

If located in or near SRA 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 uncontrollable spread of 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?	☐	☐	☐	☒

4.20.1 Environmental Setting

In California, wildfire protection jurisdictions are separated and overseen by local, state, or federal governments. The majority of Sacramento County is considered to be Local Responsibility Areas. CALFIRE is the state agency responsible for providing fire protection on all SRA lands. The SRA closest to the project site is in the eastern part of the County in the Sierra Nevada foothills and is categorized as moderate for fire hazard severity (CALFIRE, 2023). This area is more than 20 miles from the project site. In 2007 - 2011 CALFIRE provided hazard severity zones for Local Responsibility Areas recommending areas for “Very High Severity.” There are no “Very High Fire Hazard Severity Zones” in or near the project site (CALFIRE, 2011). As described above in **Section 4.9**, the project site is not located in a Fire Hazard Severity Zone (CALFIRE, 2024) or a designated CALFIRE SRA. Further, the LHMP identified the project area as having a low potential for a significant wildfire (Sacramento County, 2021).

4.20.2 Discussion

a) As described above in **Section 4.17**, the temporary construction-related trips for the Proposed Project would not substantially affect the capacity or congestion patterns on affected roads because most material and worker trips would arrive via barge or boat. Emergency access would continue to be provided via SR 12 throughout the entire duration of the construction period. There are no additional trips associated with the operation of the Proposed Project. As such the Proposed Project would not interfere with any emergency response or emergency evacuation plan. Therefore, there would be **no impact** on an adopted emergency response plan or emergency evacuation plan.

b) There are some tall grasses and shrubs within some of the project site and machinery and vehicles working in these areas have potential to generate sparks that temporarily increase fire risk. Construction vehicles would be equipped with fire extinguishers to address any possibility of a small fire that could be ignited by construction activities and the site is largely developed, graveled, or surrounded by water that would minimize or prevent the risk of wildfire. The Proposed Project will stabilize the existing slope of the levee in the long-term which would not pose any increased wildfire risk. Thus, there would be a **less than significant** impact associated with the exacerbation of wildfire risks and the Proposed Project would not expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.

c) The purpose of the Proposed Project is to stabilize the existing levee to prevent erosion and future levee failure. This would reduce the potential for future maintenance activities. The Proposed Project does not require the installation or maintenance of associated infrastructure such as roads, fuel breaks, emergency water sources, etc. As such, there would be **no impact** on exacerbating wildfire risk or resulting in temporary or ongoing impacts to the environment.

d) The Proposed Project would improve the existing stability of the site by stabilizing the levee and reducing erosion of the levee slope. Thus, the Proposed Project would have **no impact** on risks to people or structures as a result of runoff, post-fire slope instability, or drainage changes.

4.21 CEQA MANDATORY FINDINGS OF SIGNIFICANCE

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) 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?	☐	☒	☐	☐
b) 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) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

a) With respect to temporary construction-related impacts, the Proposed Project has the potential to result in temporary disturbances to terrestrial and aquatic wildlife, if present at the time of construction, and sensitive riparian habitat. Additionally, there are potential water quality and erosion impacts during construction. As with many projects, there is also the potential to disturb buried or previously unknown cultural resources or tribal cultural resources. All of these temporary construction-related impacts are reduced to less-than-significant levels with the implementation of mitigation measures identified throughout this IS.

Permanent effects of the Proposed Project include levee stabilization to prevent future erosion, and aquatic and riparian habitat creation. This would benefit terrestrial and aquatic biological resources compared to existing conditions. Furthermore, the Proposed Project would repair an

existing erosional issue which would improve water quality compared to existing conditions, and stabilize a portion of the levee that would protect offsite property and the environment. Consequently, with the implementation of mitigation measures identified herein, the Proposed Project would not 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, reduce the number of 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. Therefore, this impact is **less than significant**.

b) Cumulative environmental effects are multiple individual effects that, when considered together, would be considerable or compound or increase other environmental impacts. Individual effects may result from a single project or a number of separate projects and may occur at the same place and point in time or at different locations and over extended periods of time. The Proposed Project would result in stabilization of the levee bank along the Georgiana Slough and enhance habitat in the highly channelized waterbody.

Potential impacts associated with construction of the Proposed Project would be less than significant, short-term, and localized, and would not combine in such a way that a significant cumulative effect could occur. In addition, as described in **Section 2**, the Proposed Project includes avoidance and minimization measures that would avoid or minimize potential contribution to cumulative environmental impacts. Further, levee stabilization and habitat restoration and enhancement would cause the Proposed Project area to mimic a more natural habitat relative to existing conditions. This permanent effect would improve natural ecological functions in the Proposed Project area. As such, the Proposed Project does not have impacts that are individually limited, but cumulatively considerable and this impact would be **less than significant**.

Based on the nature and scope of the Proposed Project and the analysis herein, the Proposed Project would not result in any direct or indirect substantial adverse effects on human beings. The Proposed Project would result in temporary impacts to human health during project implementation, including changes to air quality as a result of CAP emissions (discussed in **Section 4.3**, Air Quality) and exposure of persons to noise impacts from construction equipment (discussed in **Section 4.12**, Noise). All the identified potential impacts to human beings would be temporary and have a low potential for occurring. Each of the impacts that may cause adverse effects on human beings have been evaluated and found to be less than significant with the inclusion of mitigation measures. No substantial adverse effects on human beings would occur; the impact would be **less than significant**.

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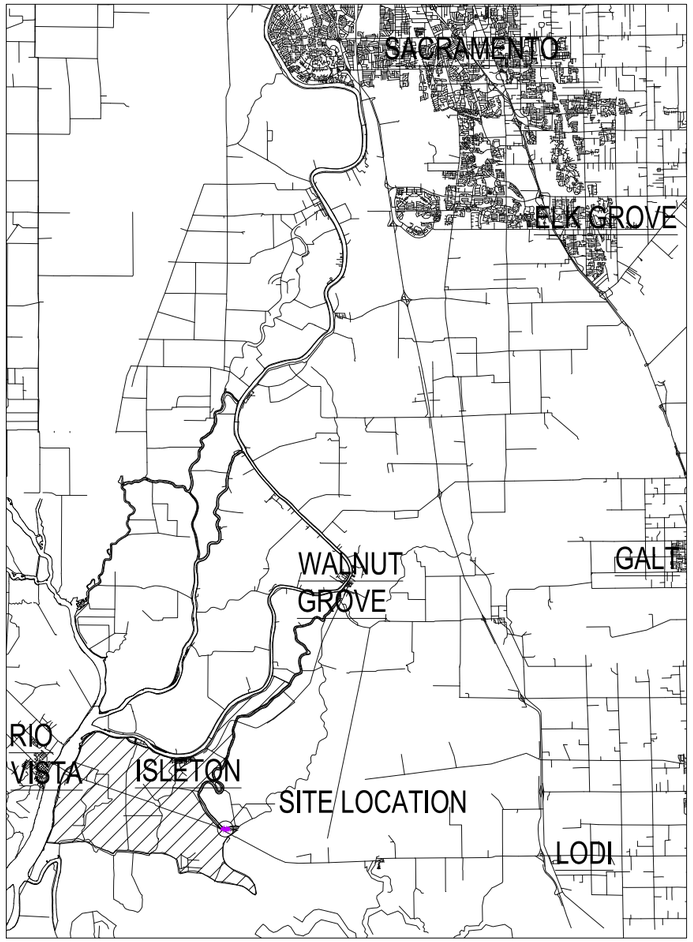
Appendix A

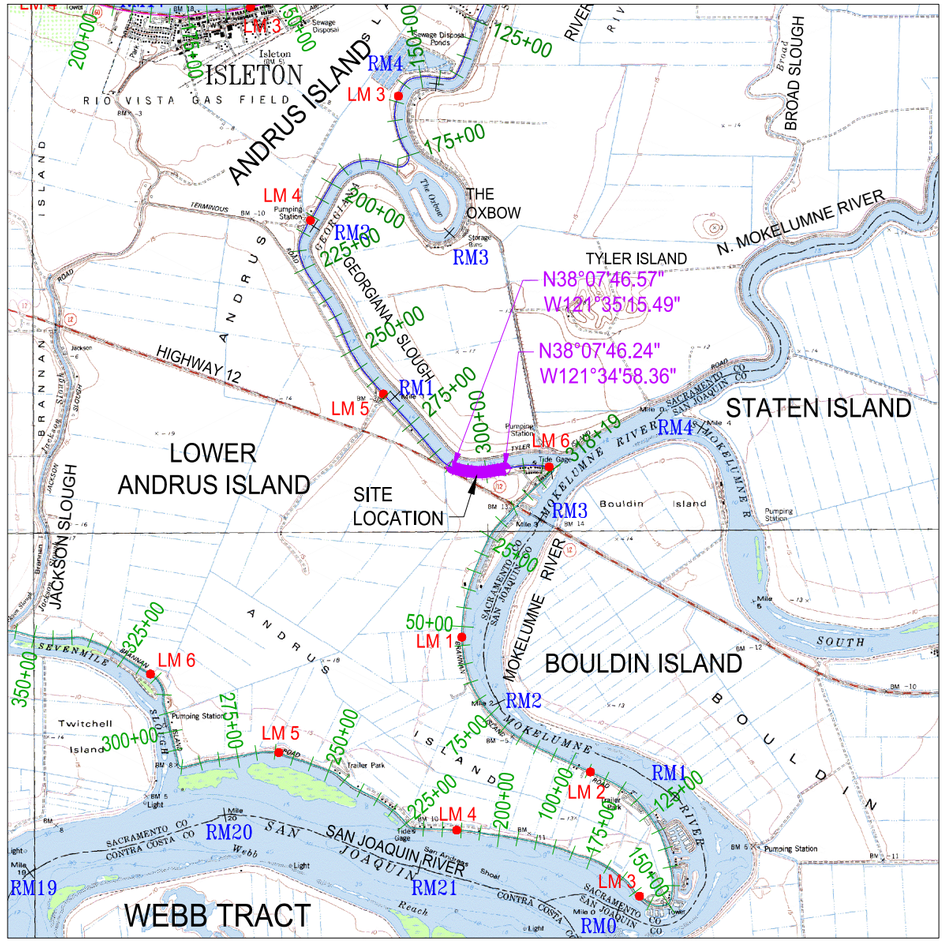
75% Design Plans

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT

EROSION CONTROL AND RIPARIAN BENCH RESTORATION
GEORGIANA SLOUGH RIGHT BANK
STA 291+00 TO STA 305+00 [RM.25-RM.55]



VICINITY MAP



LOCATION MAP

DRAWING INDEX

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
VICINITY MAP AND SITE LOCATIONS
DRAWING INDEX

DATE: 01.26.2024
SHEET NUMBER: C1.0
PROJECT NUMBER: 7702.52

GENERAL NOTES

1. GENERAL NOTES AREA APPLICABLE TO ALL WORK, UNLESS OTHERWISE ON OTHER SHEETS.
2. REFERENCE LINE IS INTENDED TO FACILITATE SITE RELATED COMMUNICATION BETWEEN THE CONTRACTOR AND THE ENGINEER.

SURVEY NOTES

1. COORDINATES REFER TO THE CALIFORNIA STATE PLANE COORDINATE SYSTEM ZONE 2, NAD 83, FEET.
2. ELEVATIONS ARE REFERENCE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.
3. LEVEE CENTERLINE PROFILE ELEVATIONS PER DWR LIDAR SURVEY 2017
4. BATHYMETRY DATA WAS OBTAINED FROM A HYDRO BY ENVIRONMENTAL DATA SOLUTIONS DONE IN JUNE OF 2013, AND FROM A HYDRO FROM GAHAGANA & BRYANT ASSOCIATES, INC. JULY 2020
5. THE CONTOURS SHOWN ON THESE PLANS ARE PER THE DWR LIDAR SURVEY OF 2017.
6. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONFIRM FIELD CONDITIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL NOTIFY THE ENGINEER IF A DISCREPANCY IS FOUND THAT WILL AFFECT CONSTRUCTION.

CONSTRUCTION NOTES

1. THE LIMITS OF CONSTRUCTION WORK SHALL BE STAKED BY DCC ENGINEERING.
2. THE DIMENSIONS AND QUANTITIES SHOWN ON THESE PLANS ARE APPROXIMATE AND ONLY INDICATE THE SCOPE OF EACH REPAIR.
3. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL UTILITIES WITHIN THE CONSTRUCTION ZONE, ALONG THE CONSTRUCTION ACCESS ROUTE AND IN STAGING AREAS BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.
4. LEVEE SLOPES SHALL NOT BE CUT IN ORDER TO PROVIDE CONSTRUCTION RAMPS, IF REQUIRED. TEMPORARY CONSTRUCTION ACCESS RAMPS MAY BE CONSTRUCTED DOWN THE WATERSIDE FACE OF THE LEVEE BY PLACING EARTH MATERIALS. UPON COMPLETION OF THE JOB ALL TEMPORARY RAMPS SHALL BE REMOVED AND THE MATERIALS DISPOSED OF BY THE CONTRACTOR. ANY TEMPORARY EARTHWORK ASSOCIATED WITH CONSTRUCTION MUST BE APPROVED BY THE CONTRACTING OFFICER.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE CAUSED BY THE CONTRACTOR TO THE STAGING AREAS, PAVEMENT, ROADS, FENCES, FLOOD CONTROL STRUCTURES, INCLUDING LEVEES, LEVEE RAMPS, AND EXISTING BANK PROTECTION IMPROVEMENTS, VEGETATION, AND ALL OTHER UTILITIES AND IMPROVEMENTS NOT DESIGNATED FOR REMOVAL.
6. EXISTING ROADWAYS SHALL BE KEPT CLEAR OF MUD AND DEBRIES AT ALL TIMES. AT THE STAGING SITE.
7. CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES TO REMAIN WITHIN PROJECT LIMITS, AND WILL BE RESPONSIBLE FOR ANY DAMAGE TO THESE UTILITIES BY CONTRACTOR WORK.
8. EXCAVATION OF WATER SIDE SLOPE; CONSTRUCTION EQUIPMENT ON THE LEVEE SHALL BE APPROVED BY THE DISTRICT ENGINEER PRIOR TO MOBILIZATION TO THE CONSTRUCTION SITE. A PLAN SHALL BE SUBMITTED TO THE DISTRICT ENGINEER ON EQUIPMENT BEING PLACED ON THE LEVEE CROWN OR BENCH. THE AREA ABOVE MLLW +2.3' ELEVATION NAVD 88 MAY BE EXCAVATED FROM THE LEVEE BY AN EXCAVATOR OR LONG REACH EXCAVATOR. THE SLOPE BELOW MLLW +2.3' SHALL BE EXCAVATED BY MARINE EQUIPMENT. THE CUT CAN BE STEPPED AS SHOW ON THE CROSS SECTION PLAN.

LEGEND:

FLAT–SLOPE — BENEFICIAL REUSE OF EXCAVATED MATERIAL

FLAT–SLOPE — IMPORT FILL

AB 3/4" AGGREGATE BASE, CLASS II

DWR RSP SPEC.

12-18 RIP RAP (LIGHT CLASS ROCK)

WETLANDS BENCH @ EL. +4.0'~+5.2' NAVD88

(E) LEVEE PROFILE
(P) FILL
(P) EXCAVATION
PROJECT LEVEE STANDARD SECTION
(P) HYDROSEEDING
(P) COIR FABRIC
(P) FILTER FABRIC

FLOW — DIRECTION OF WATER FLOW

TOP OF SLOPE / TOE OF SLOPE — SLOPE

-10 — CONTOUR ELEVATION

SURVEY CONTROL POINT

1 / C–1 — INDICATES SECTION NUMBER; INDICATES DRAWING SHEET ON WHICH SECTION IS SHOWN

[20+00] — OLD STATIONING

300+00 — CURRENT STATIONING

DWR RSP SPEC	
WEIGHT (LB.)	% SMALLER BY WEIGHT MIN – MAX
400	. 100
300	85 100
70	15 50
15	0 5
LIGHT CLASS ROCK	
ROCK WEIGHT	% LARGER THAN
1/4 TON	0–5
200 LB.	50–100
25 LB.	95–100

ABBREVIATIONS:

	APPROXIMATE
CL	CENTER LINE
COE	CORPS OF ENGINEERING
DFE	DESIGN FLOOD ELEVATIONS
DWG	DRAWING
DWR	DEPARTMENT OF WATER RESOURCES
ELEV., EL.	ELEVATION
EP	EDGE OF PAVEMENT
(E), EX., EXIST.	EXISTING
FT	FEET
L	LENGTH
MIN.	MINIMUM
NTS	NOT TO SCALE
O.C.	ON CENTER
P	PROPOSED
PNT	POINT
RSP	ROCK SLOPE PROTECTION
SPEC	SPECIFICATIONS
STA	STATION
USACE	US ARMY CORPS OF ENGINEERS

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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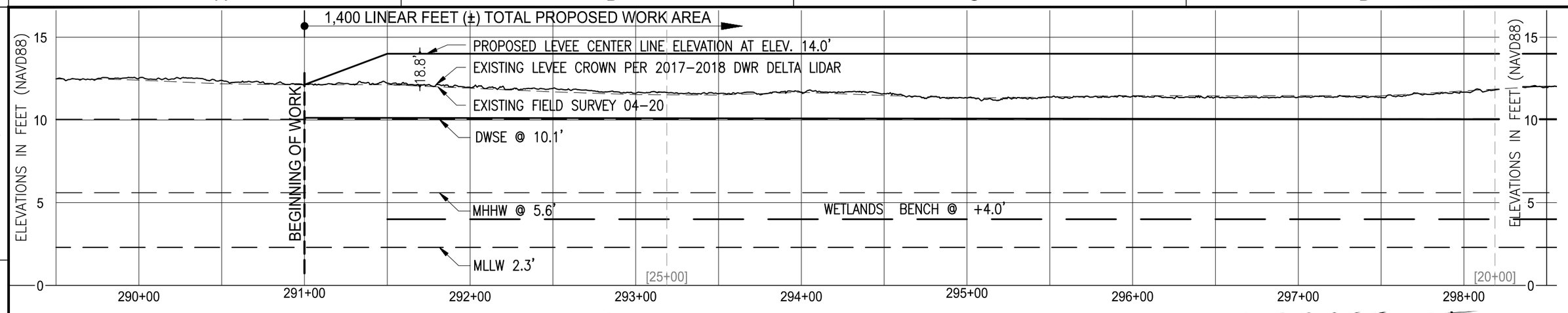
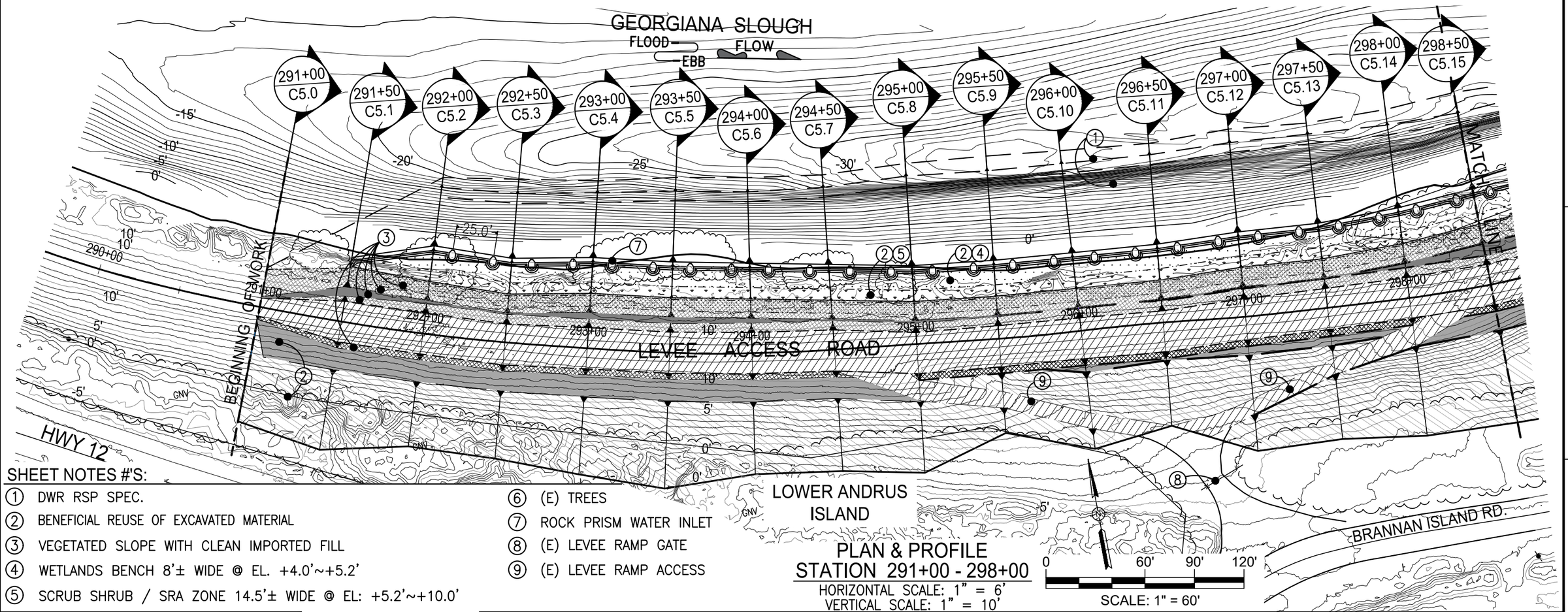
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
GENERAL NOTES
SPECIFICATIONS

DATE: 01.26.2024
SHEET NUMBER: C2.0
PROJECT NUMBER: 7702.52





SHEET NOTES #'S:

1. DWR RSP SPEC.
2. BENEFICIAL REUSE OF EXCAVATED MATERIAL
3. VEGETATED SLOPE WITH CLEAN IMPORTED FILL
4. WETLANDS BENCH 8'± WIDE @ EL. +4.0'~+5.2'
5. SCRUB SHRUB / SRA ZONE 14.5'± WIDE @ EL: +5.2'~+10.0'
6. (E) TREES
7. ROCK PRISM WATER INLET
8. (E) LEVEE RAMP GATE
9. (E) LEVEE RAMP ACCESS

PLAN & PROFILE
STATION 291+00 - 298+00

HORIZONTAL SCALE: 1" = 6'
VERTICAL SCALE: 1" = 10'

0 60' 90' 120'
SCALE: 1" = 60'

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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SCALE:
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REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
PLAN & PROFILE STA 291+00 TO 298+00

DATE: 01.26.2024
SHEET NUMBER: C3.0
PROJECT NUMBER: 7702.52

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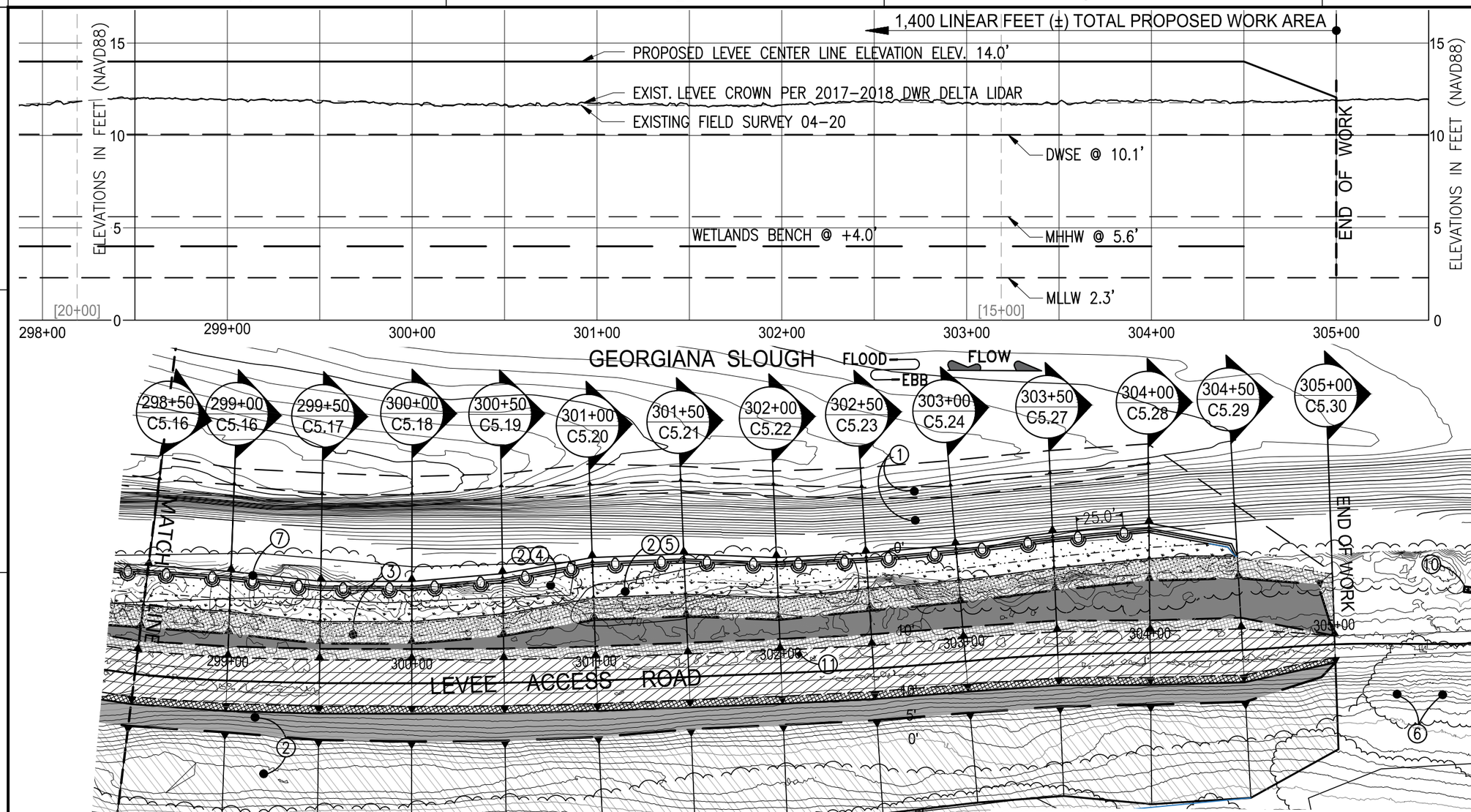

PLAN & PROFILE
STATION 298+00 - 305+00

HORIZONTAL SCALE: 1" = 6'
VERTICAL SCALE: 1" = 10'

SHEET NOTES #'S:

1. DWR RSP SPEC.
2. BENEFICIAL REUSE OF EXCAVATED MATERIAL
3. VEGETATED SLOPE WITH CLEAN IMPORTED FILL
4. WETLANDS BENCH 8.2'± WIDE @ EL. +4.0'~+5.2'
5. SCRUB SHRUB / SRA ZONE 14.5'± WIDE @ EL: +5.2'~+10.0'
6. (E) TREES
7. ROCK PRISM WATER INLET
8. (E) LEVEE RAMP GATE
9. (E) LEVEE RAMP ACCESS
10. (E) WATER GAUGE STATION SOLAR PANEL (DO NOT DISTURB)
11. (E) BENCH MARK (DO NOT DISTURB) PLACE 6"ø PIPE OVER BM FOR PROTECTION

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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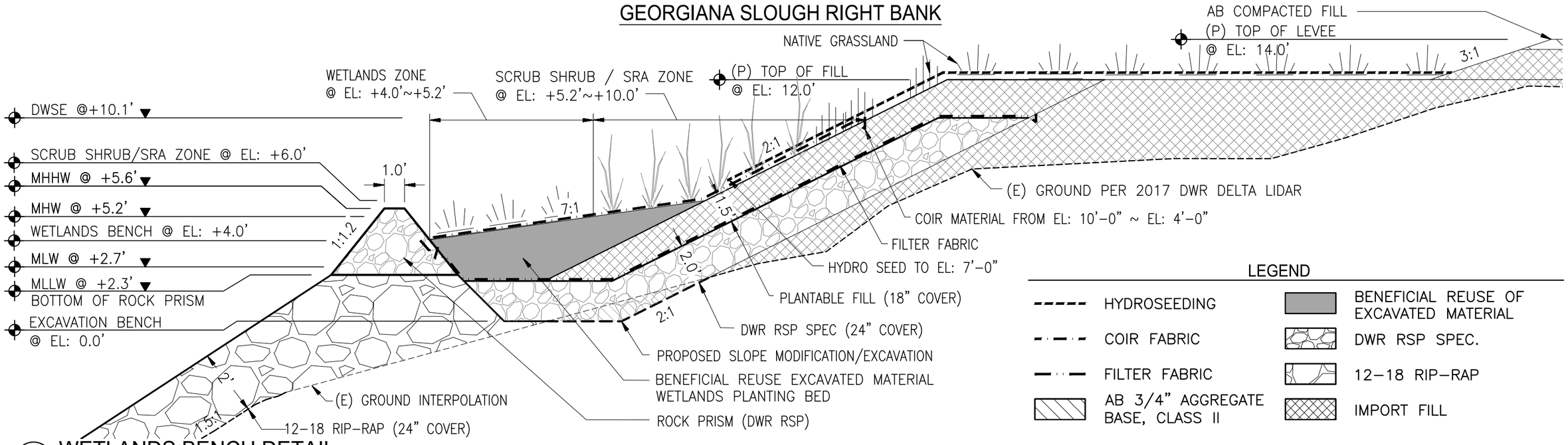
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
PLAN & PROFILE STA 298+00 TO 305+00

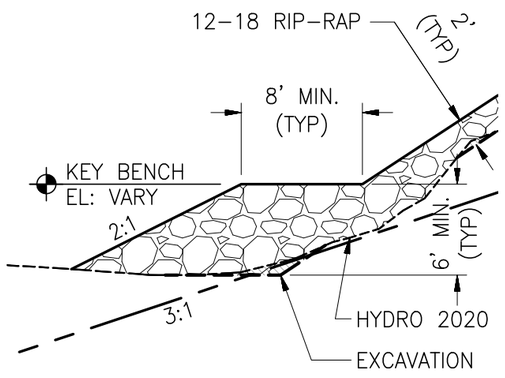
DATE: 01.26.2024
SHEET NUMBER: C3.1
PROJECT NUMBER: 7702.52

GEORGIANA SLOUGH RIGHT BANK



2 WETLANDS BENCH DETAIL

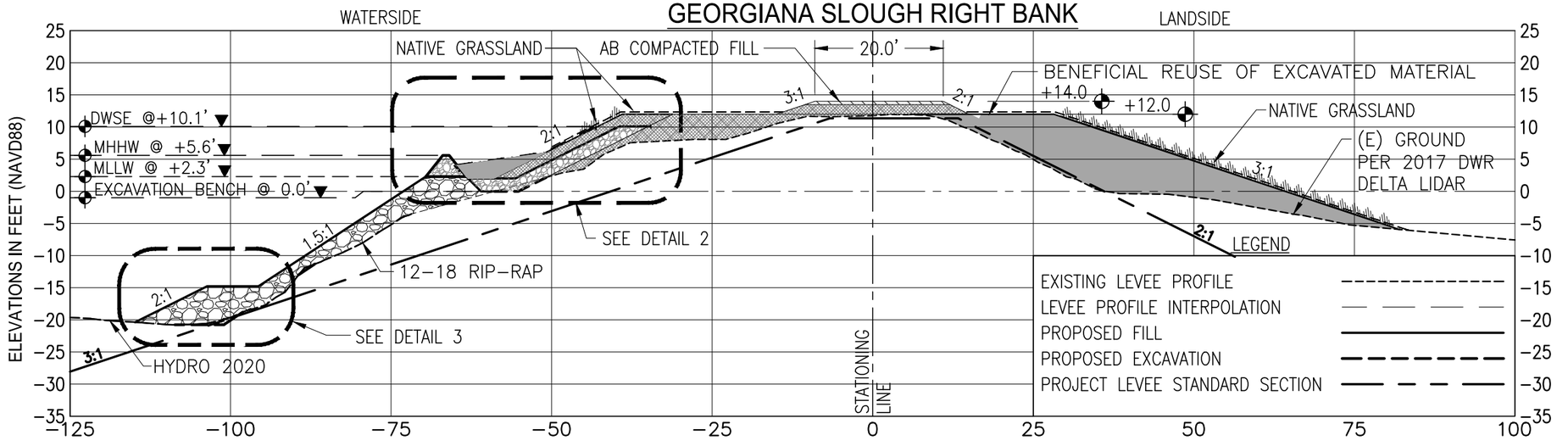
SCALE 1" = 5'



3 DETAIL

SCALE 1" = 10'

GEORGIANA SLOUGH RIGHT BANK



1 WETLAND BENCH AND KEY TYPICAL CROSS SECTION

SCALE 1" = 20'

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
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SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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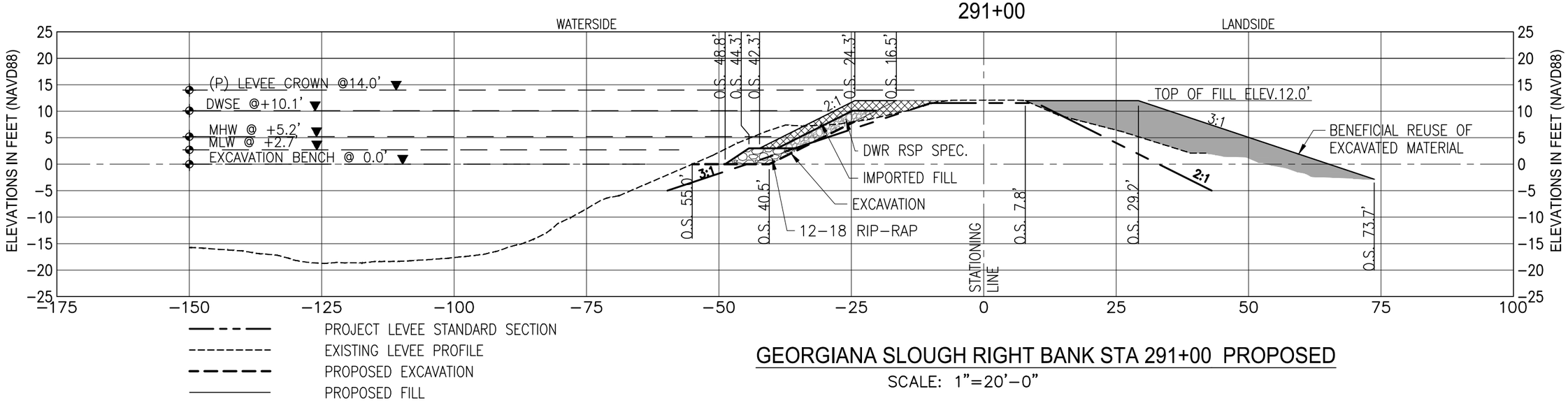
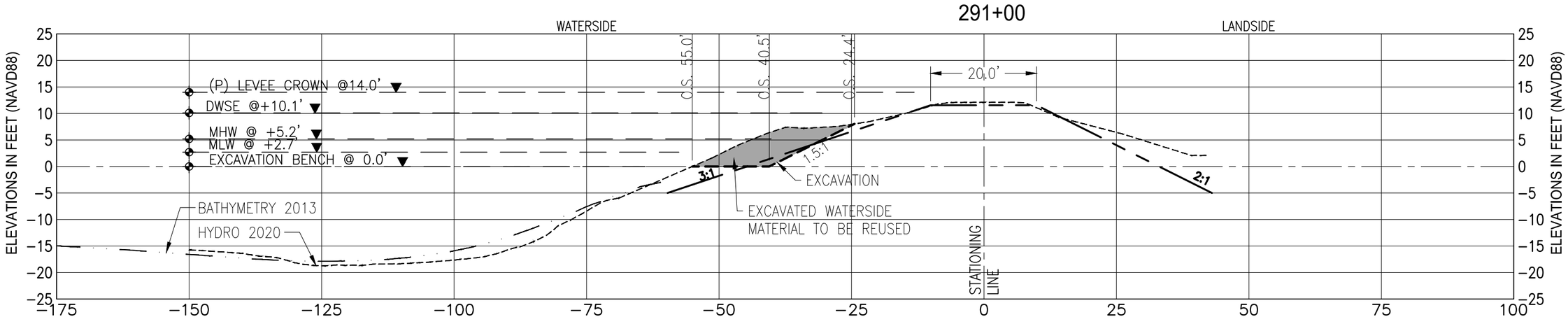
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
CROSS SECTIONS TYPICAL DETAILS

DATE: 01.26.2024
SHEET NUMBER: C4.0
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 291+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 291+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
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REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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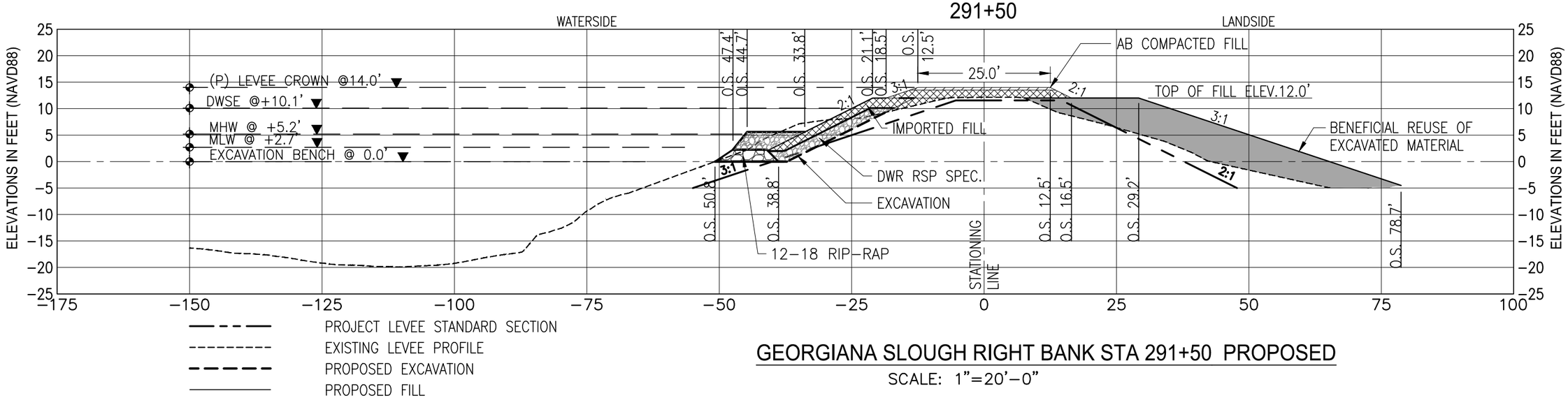
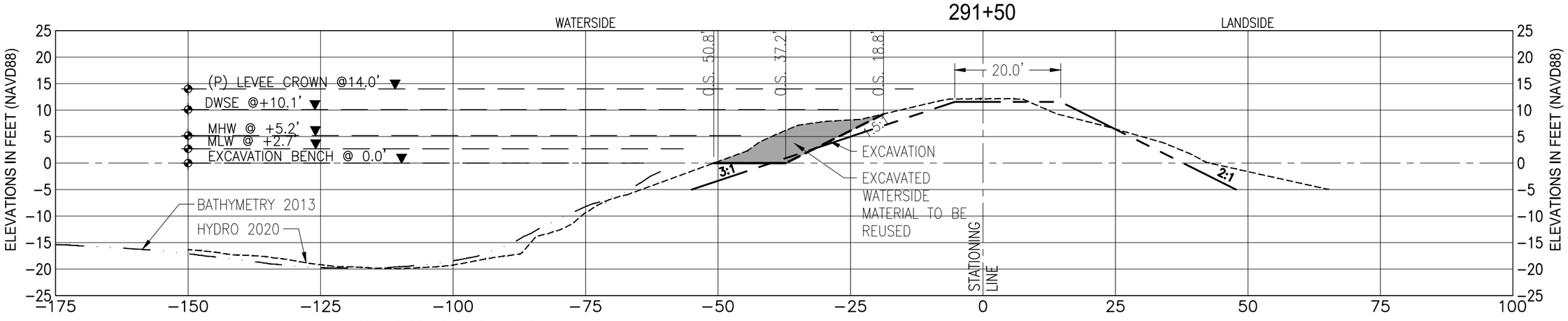
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 291+00

DATE: 01.26.2024
SHEET NUMBER: C5.0
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 291+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 291+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
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ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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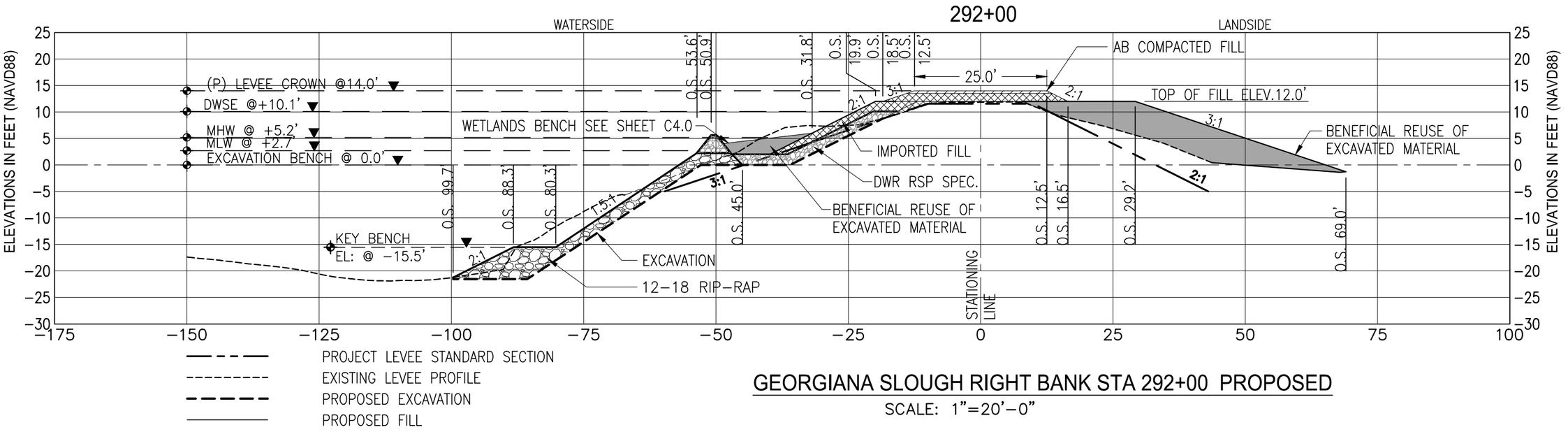
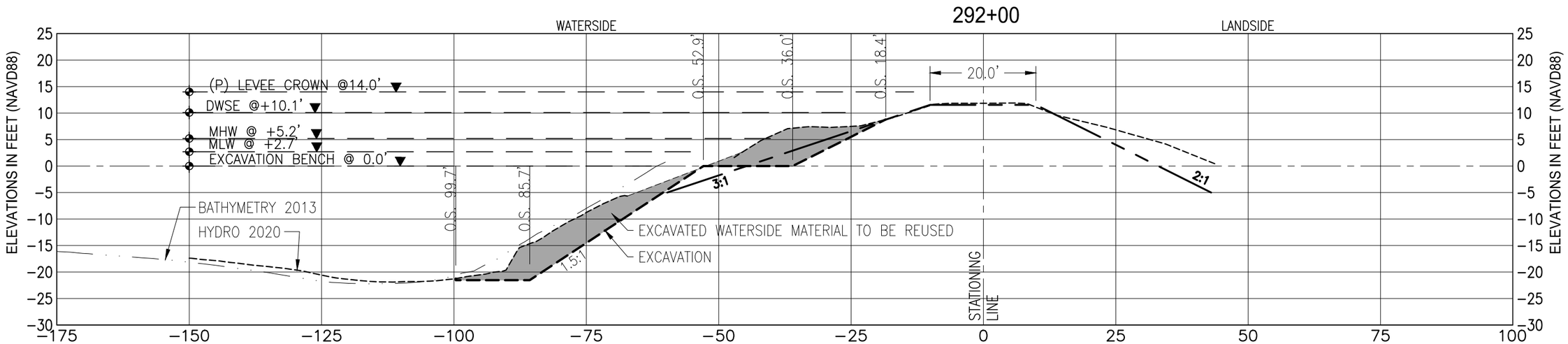
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 291+50

DATE: 01.26.2024
SHEET NUMBER: C5.1
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 292+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 292+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
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SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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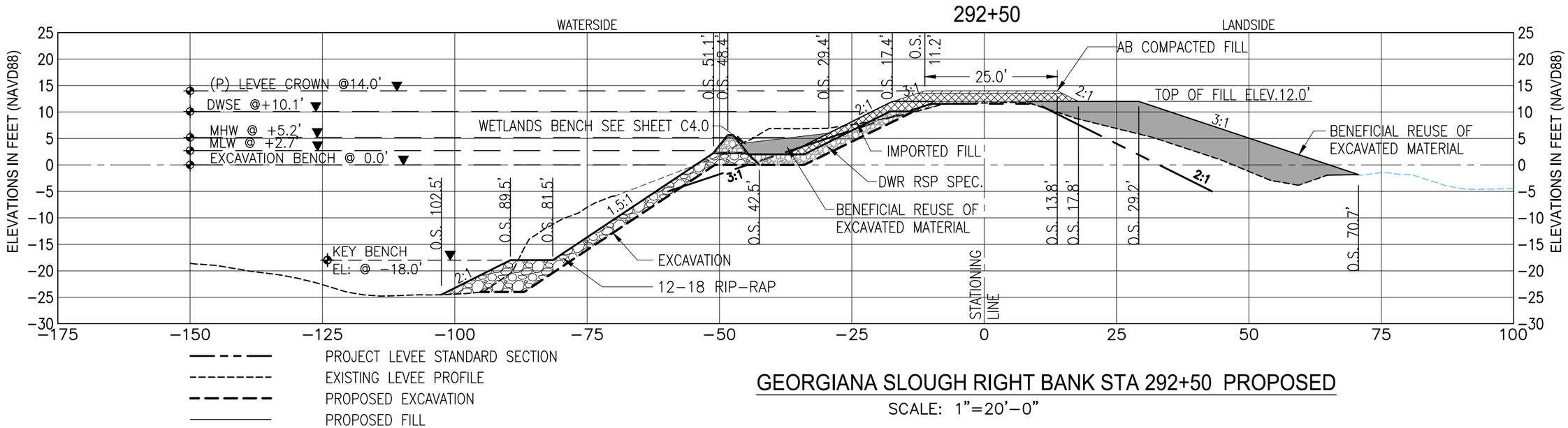
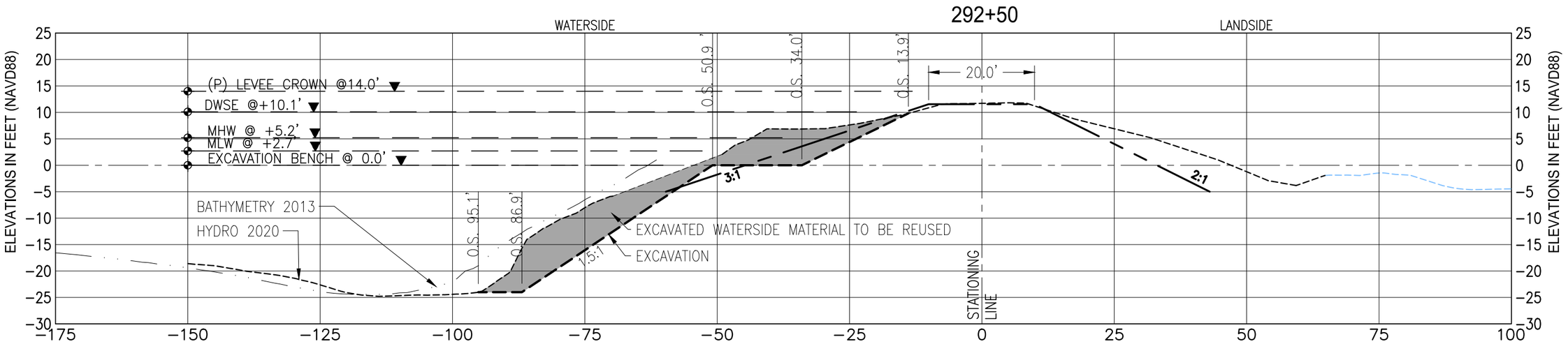
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 292+00

DATE: 01.26.2024
SHEET NUMBER: C5.2
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 292+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 292+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
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SYM	DESCRIPTION	DATE	BY	APRVD. BY
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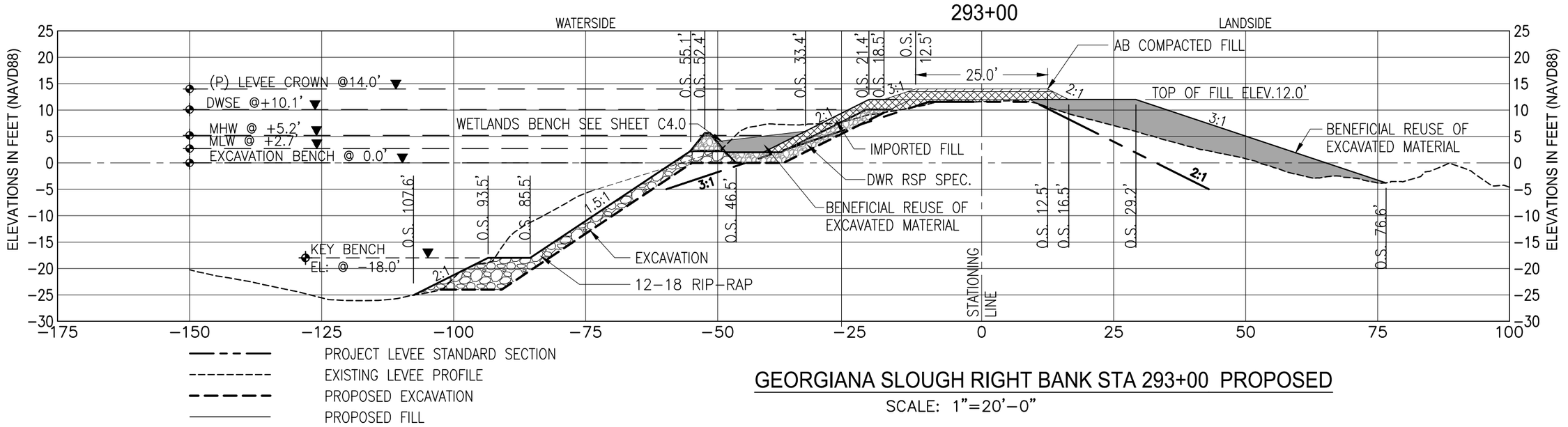
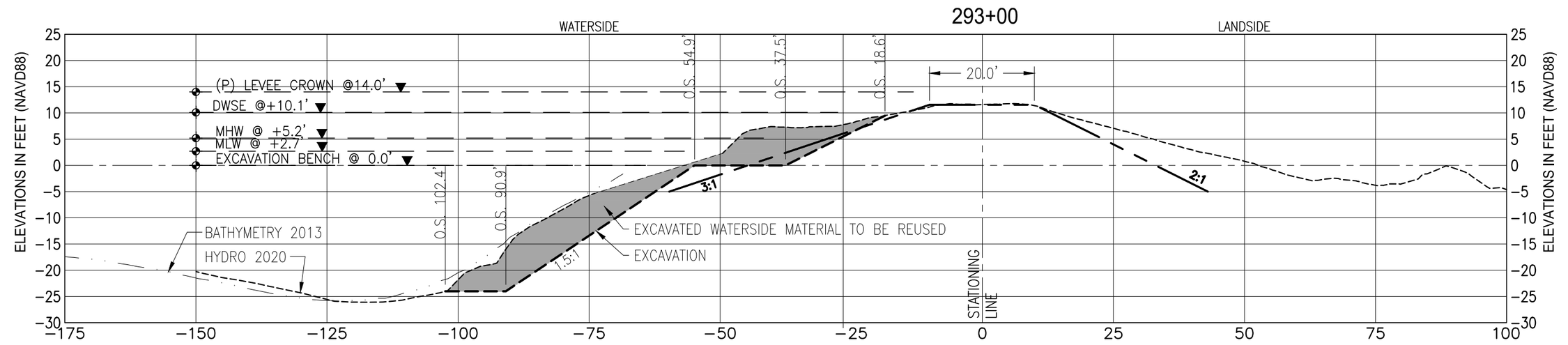
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 292+50

DATE: 01.26.2024
SHEET NUMBER: C5.3
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 293+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 293+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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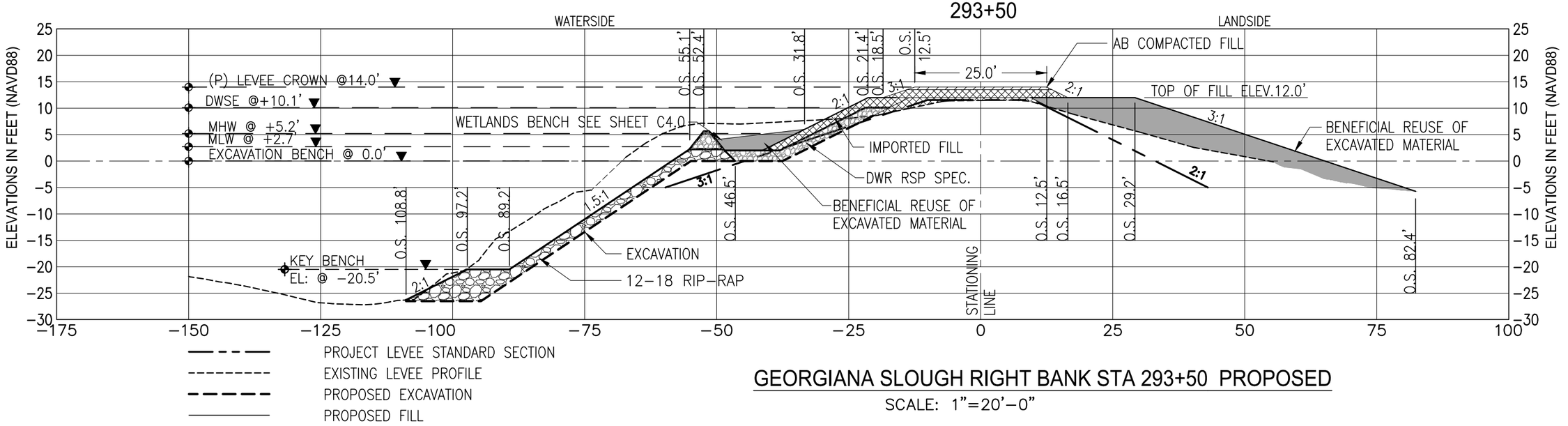
PROJECT MANAGEMENT
P.O. BOX 929, WALNUT GROVE, CA 95690 TEL (916) 776-2277 FAX (916) 776-2282

DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

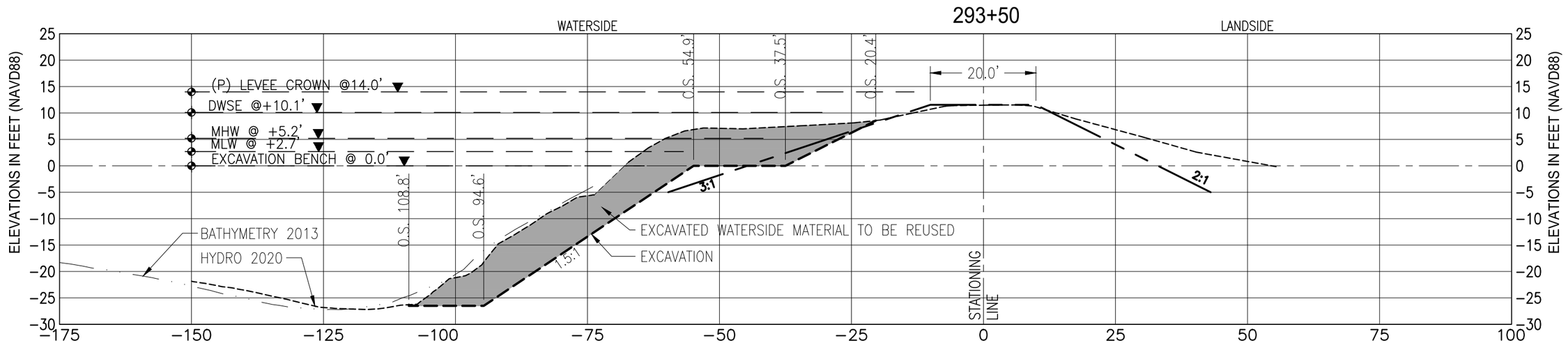
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 293+00

DATE: 01.26.2024
SHEET NUMBER: C5.4
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 293+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 293+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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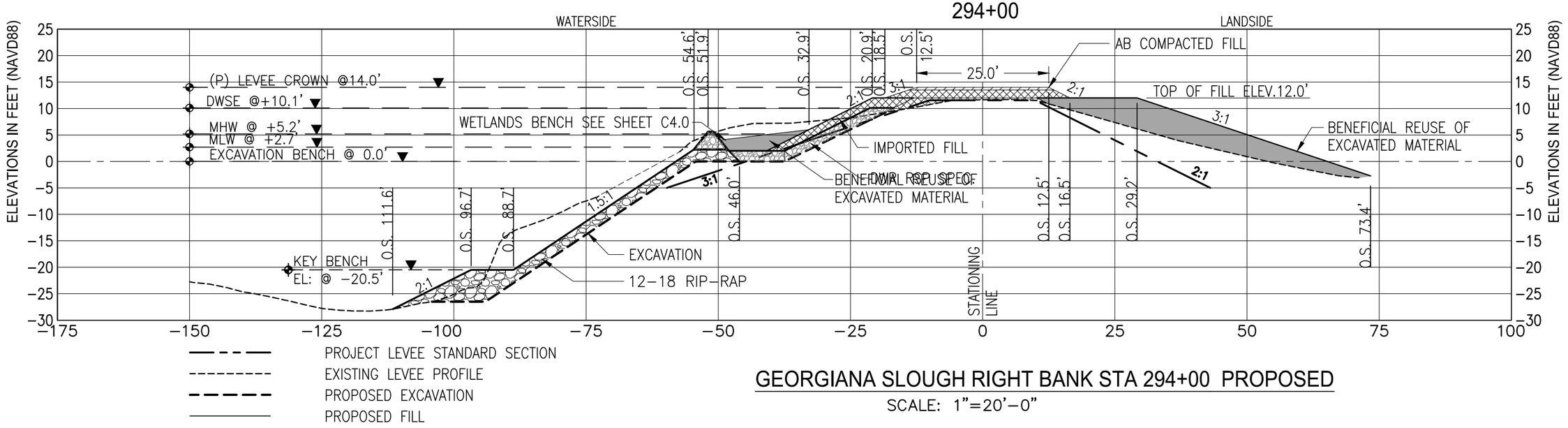
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

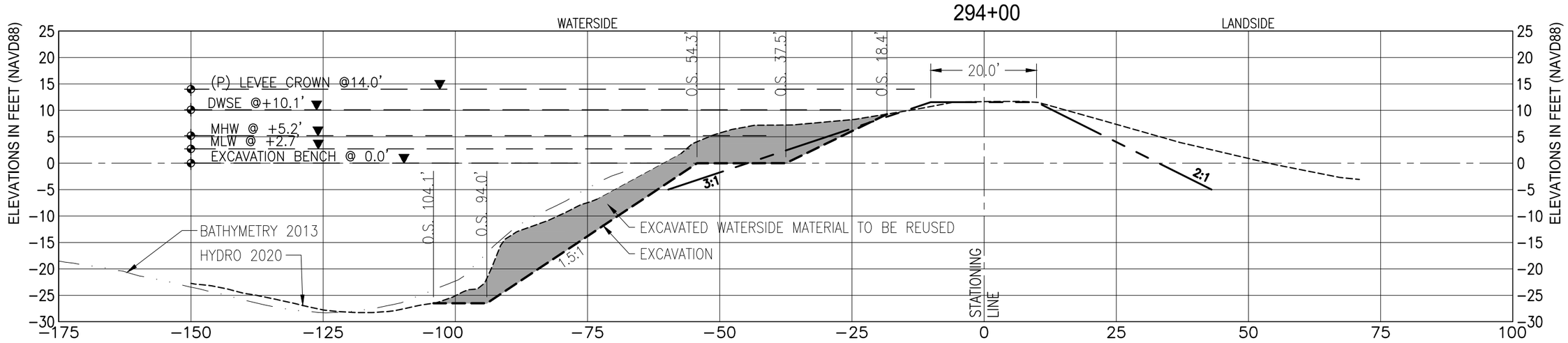
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 293+50

DATE: 01.26.2024
SHEET NUMBER: C5.5
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 294+00 PROPOSED

SCALE: 1"=20'−0"



GEORGIANA SLOUGH RIGHT BANK STA 294+00 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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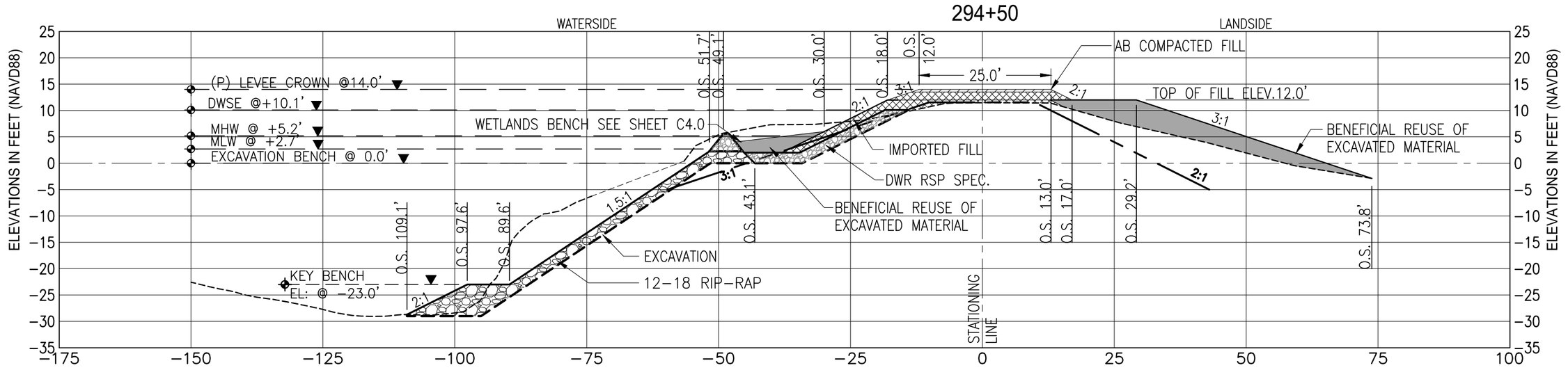
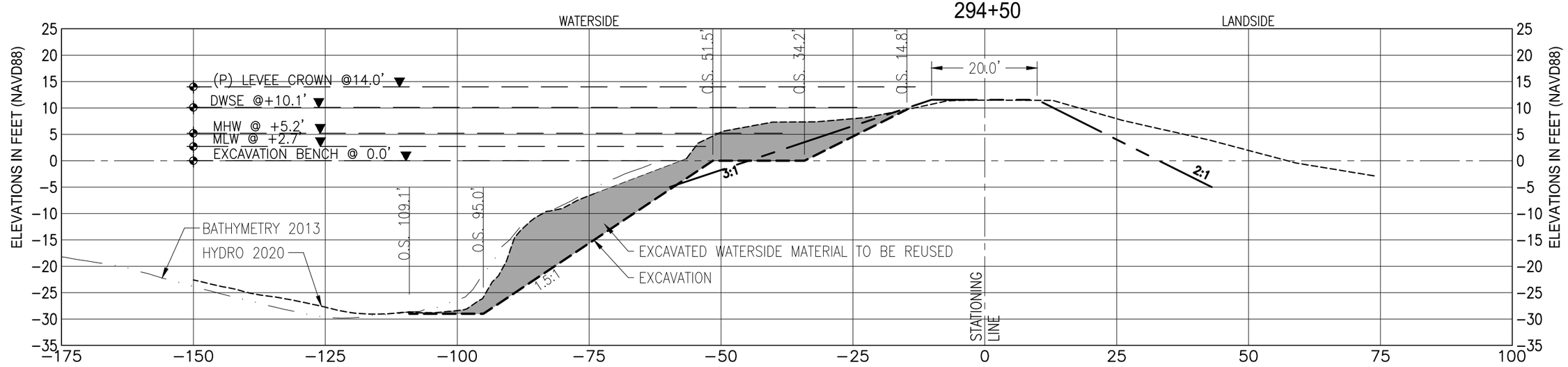
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 294+00

DATE: 01.26.2024
SHEET NUMBER: C5.6
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 294+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 294+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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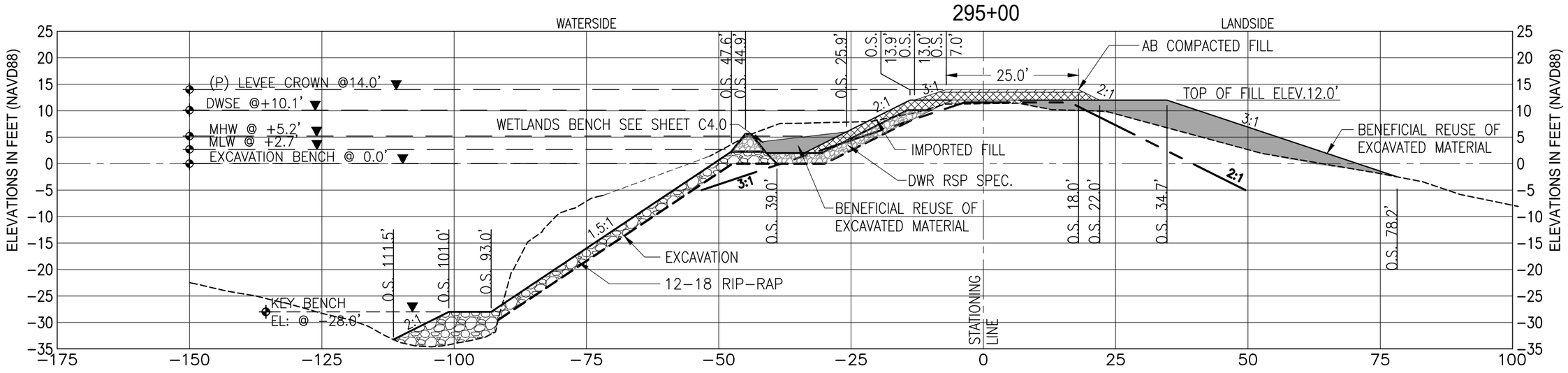
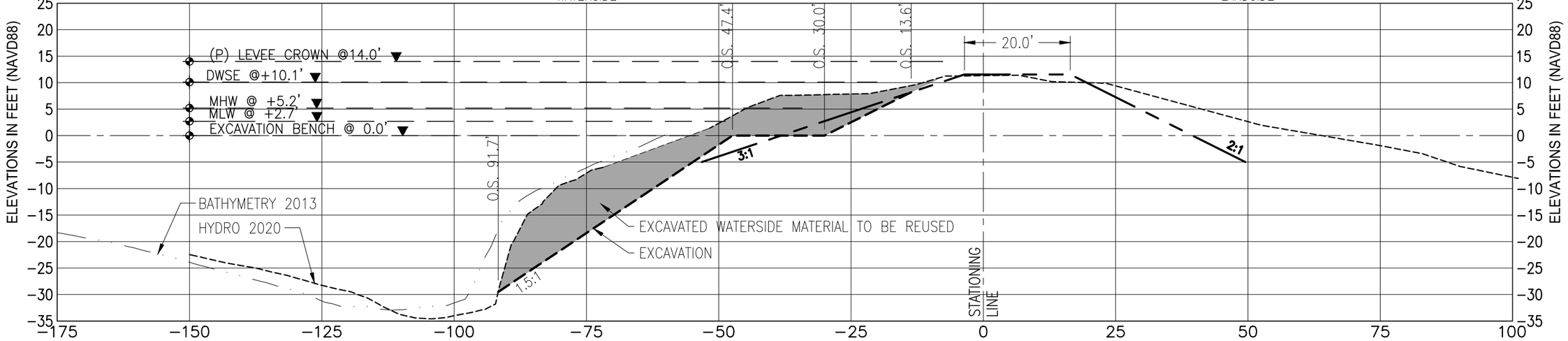
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 294+50

DATE: 01.26.2024
SHEET NUMBER: C5.7
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 295+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 295+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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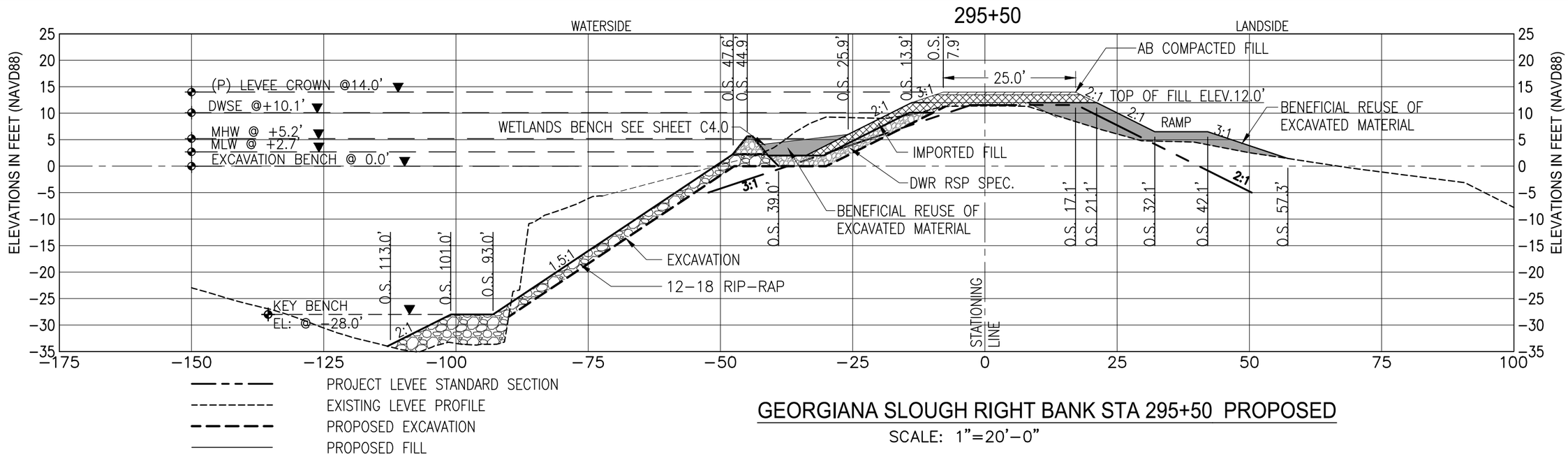
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

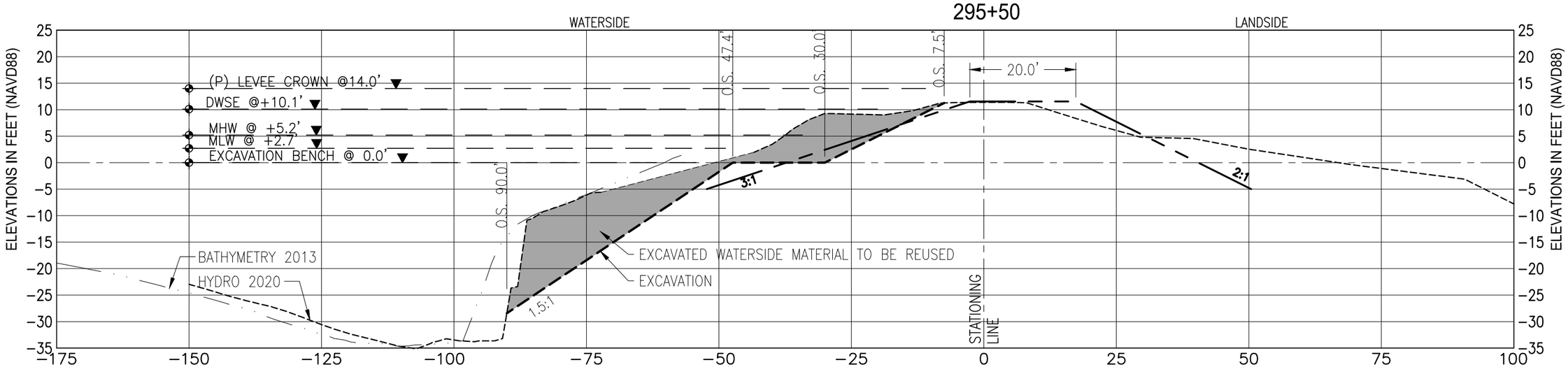
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 295+00

DATE: 01.26.2024
SHEET NUMBER: C5.8
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 295+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 295+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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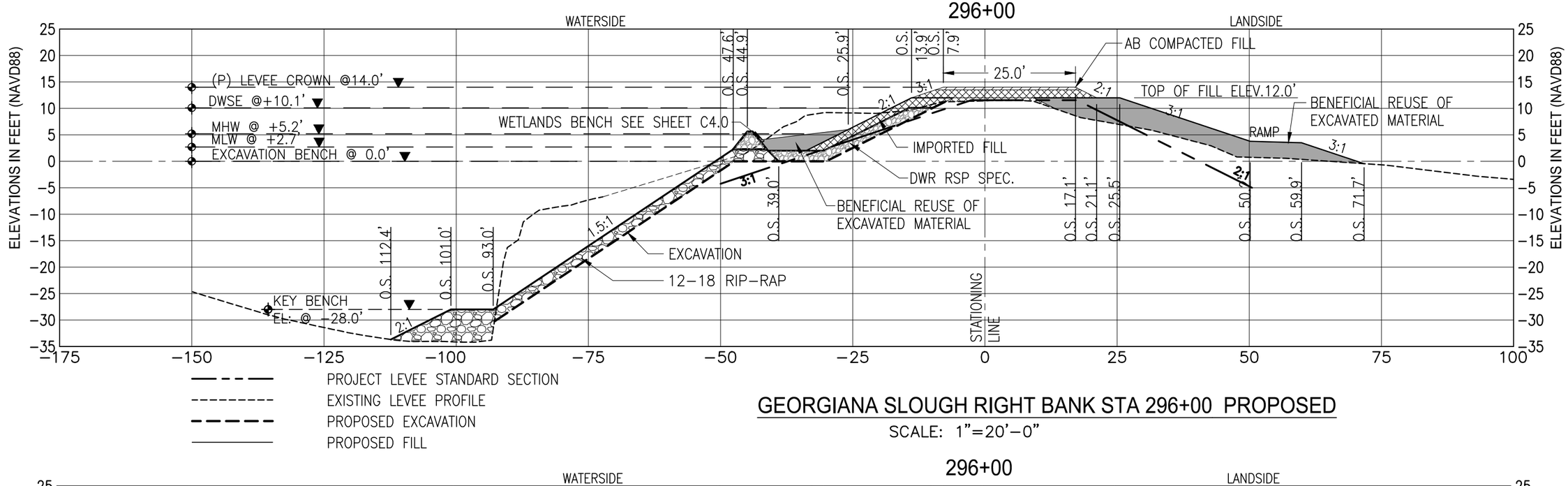
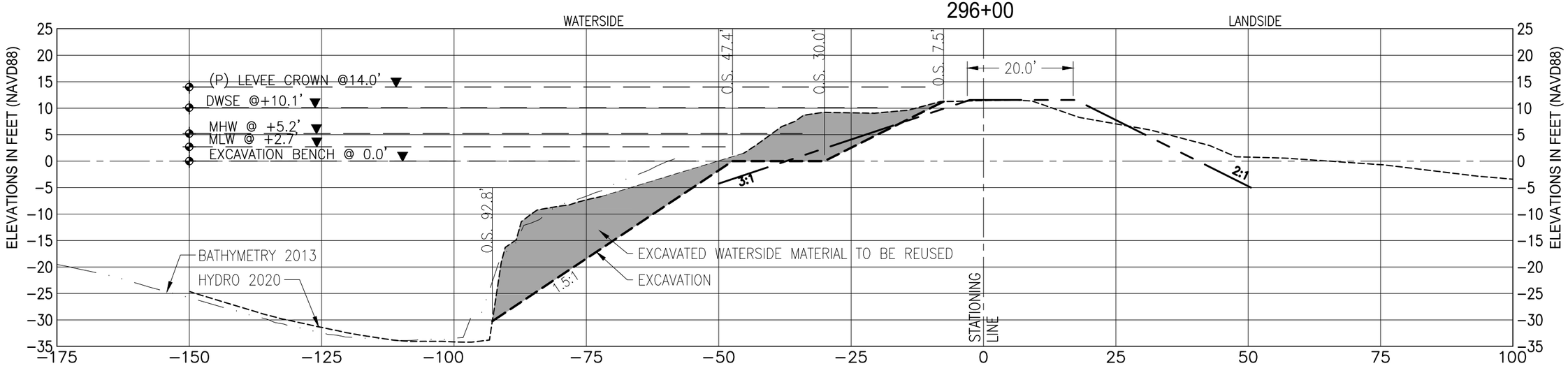
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 295+50

DATE: 01.26.2024
SHEET NUMBER: C5.9
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 296+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 296+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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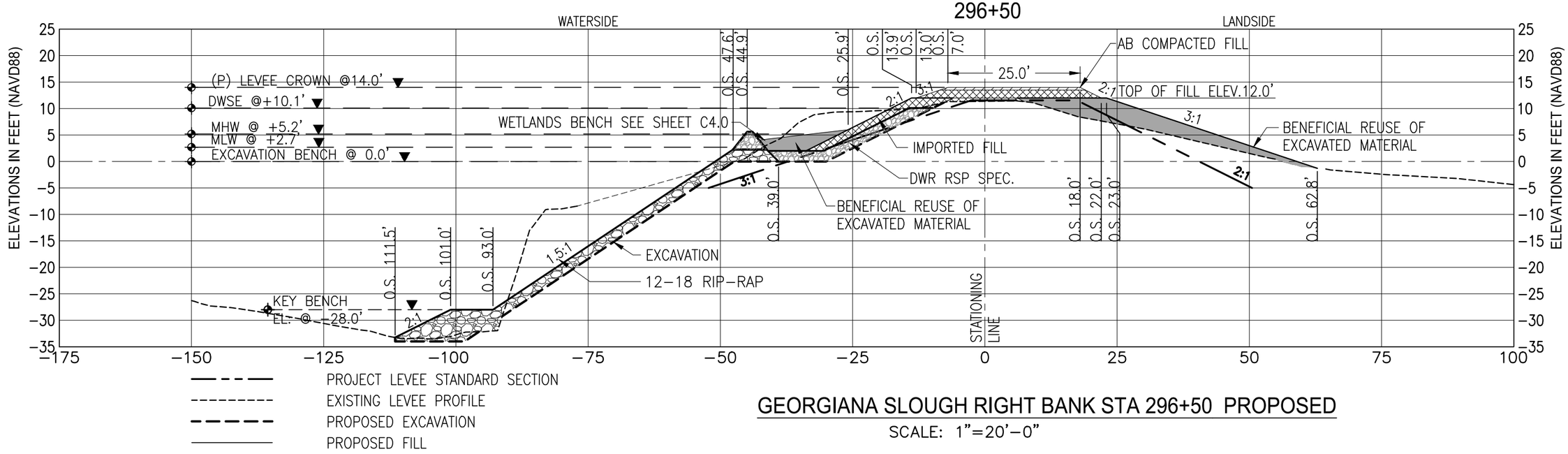
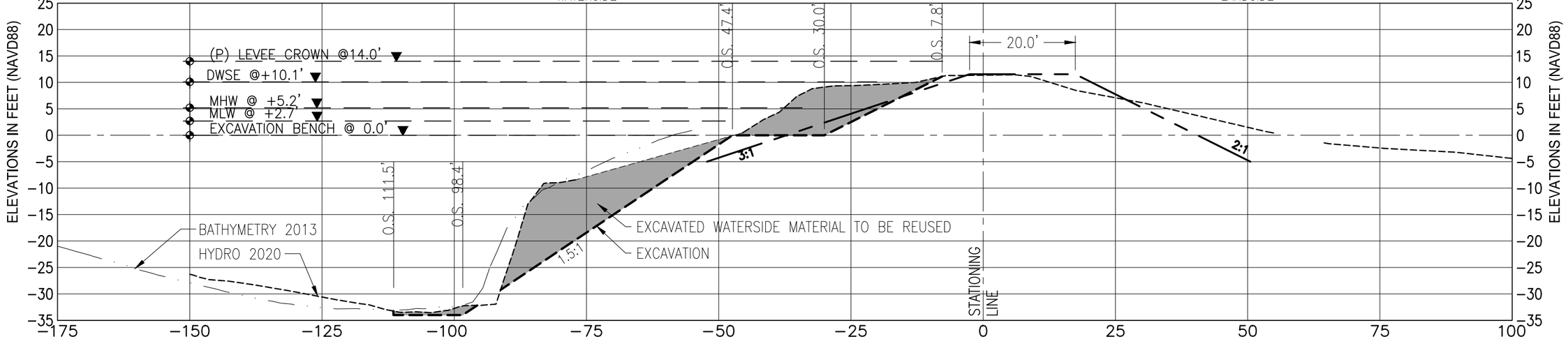
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 296+00

DATE: 01.26.2024
SHEET NUMBER: C5.10
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 296+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 296+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
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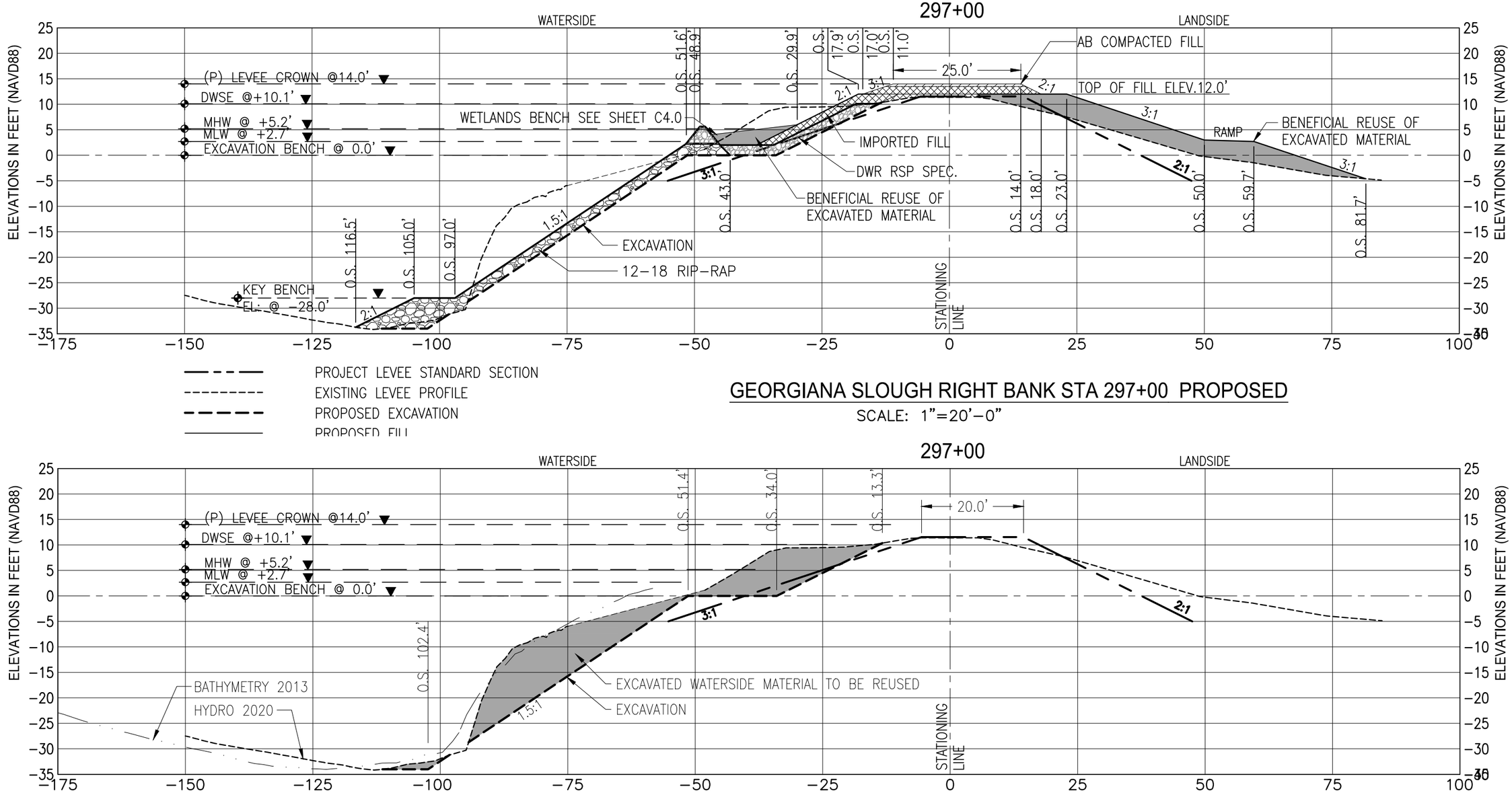
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 296+50

DATE: 01.26.2024
SHEET NUMBER: C5.11
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 297+00 PROPOSED

SCALE: 1"=20'-0"

GEORGIANA SLOUGH RIGHT BANK STA 297+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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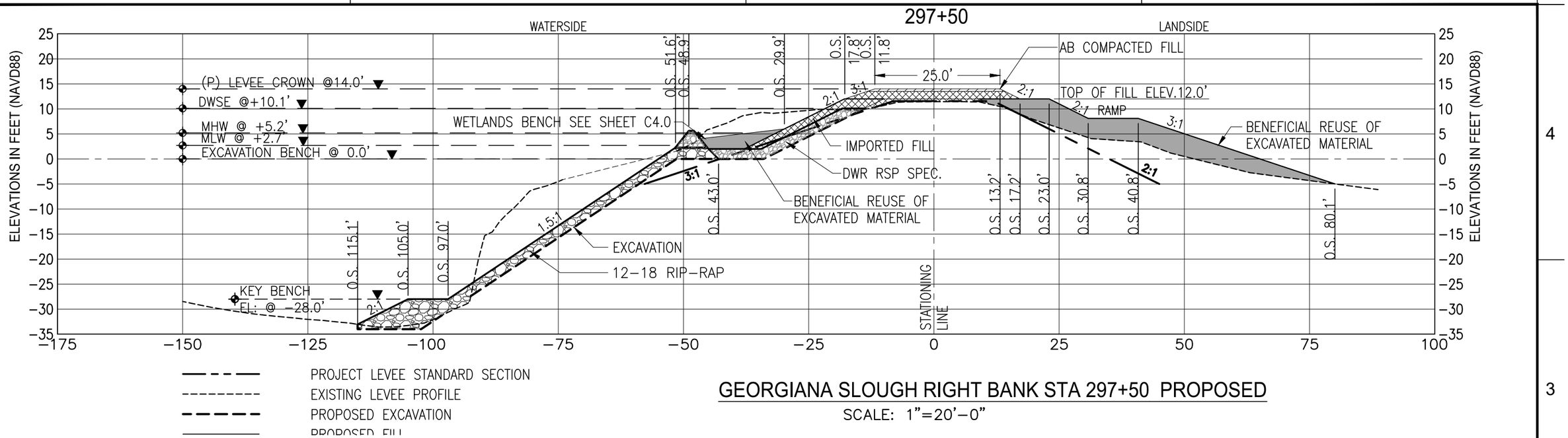
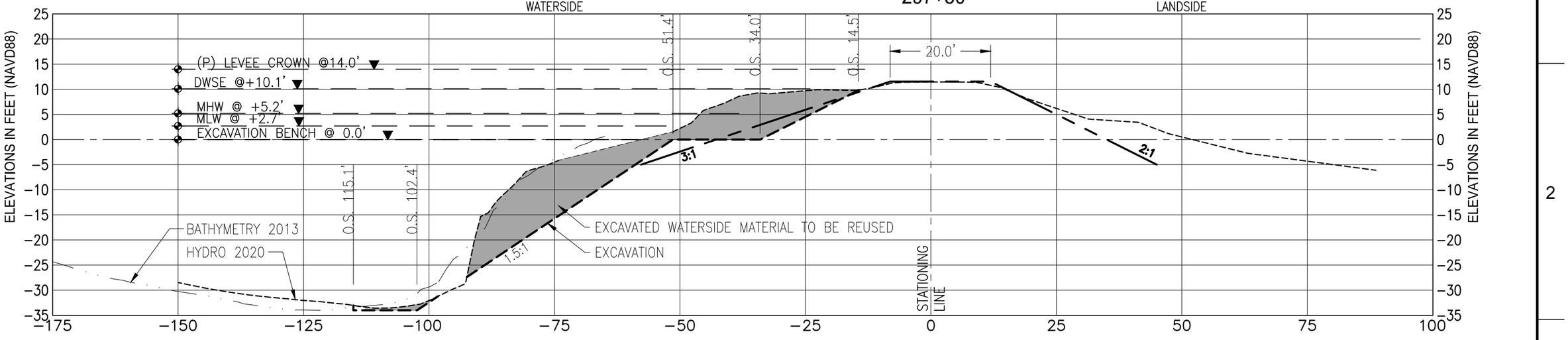
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 297+00

DATE: 01.26.2024
SHEET NUMBER: C5.12
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 297+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 297+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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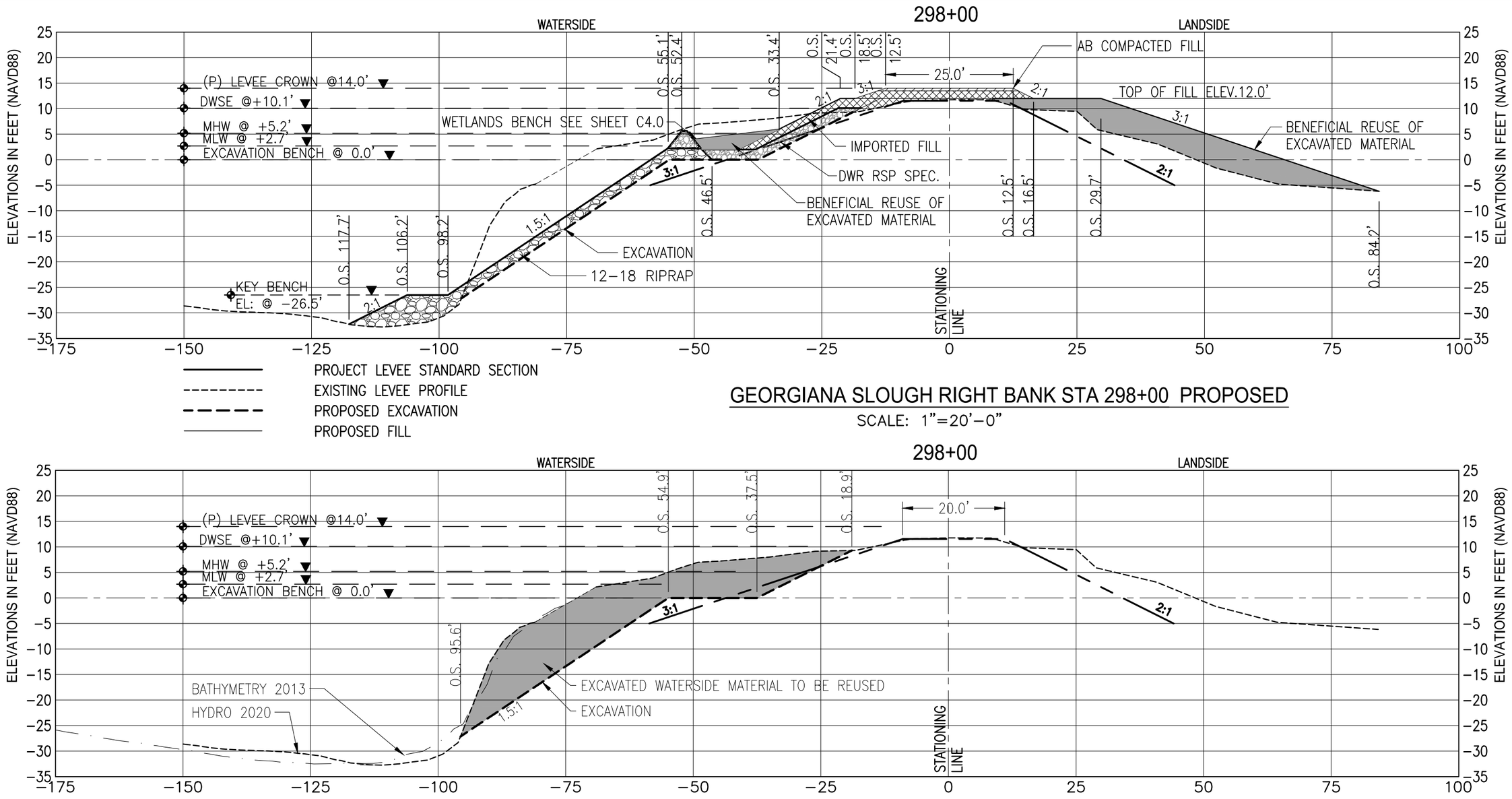
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 297+50

DATE: 01.26.2024
SHEET NUMBER: C5.13
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 298+00 PROPOSED

SCALE: 1"=20'−0"

GEORGIANA SLOUGH RIGHT BANK STA 298+00 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
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DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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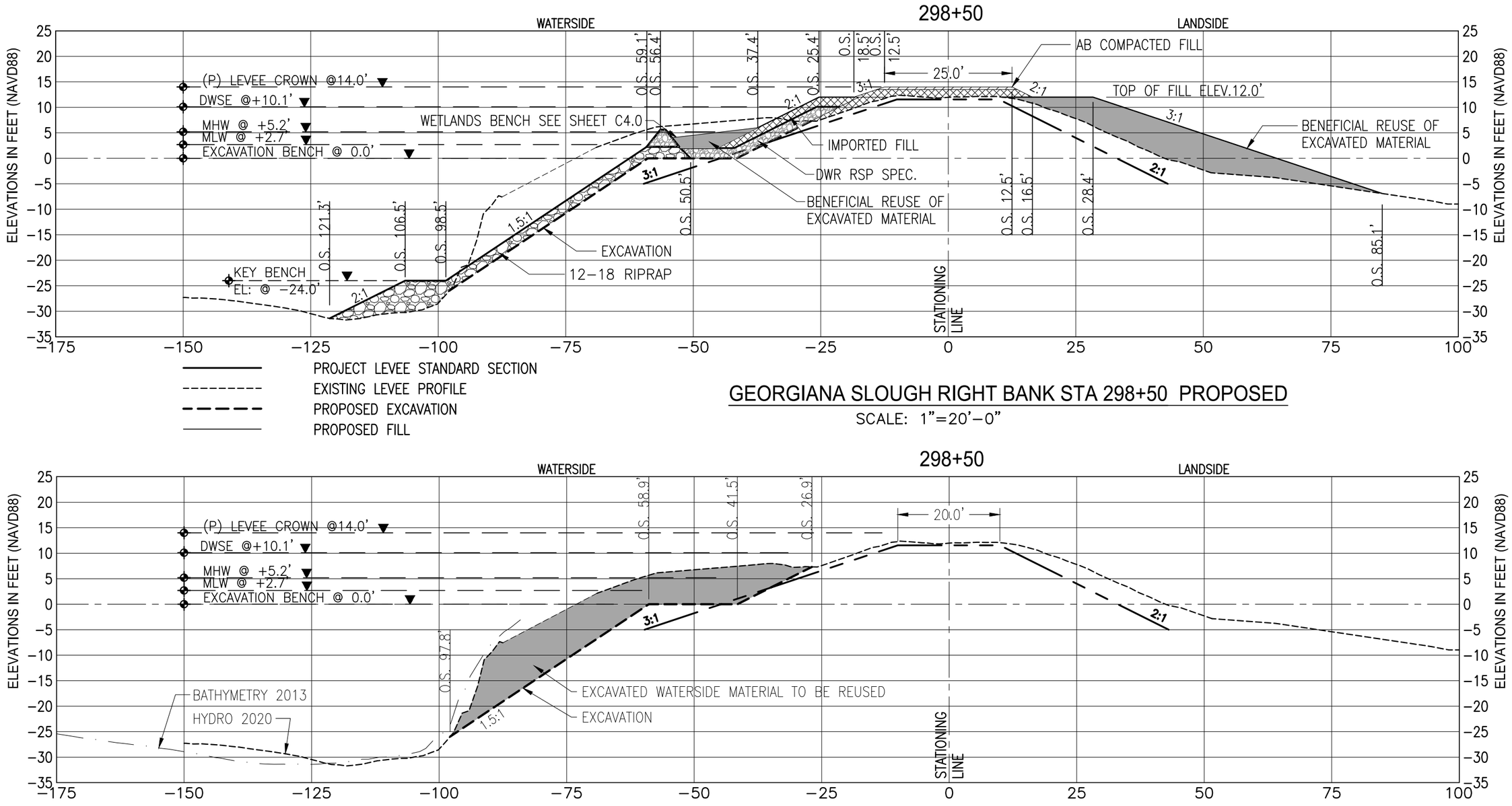
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 298+00

DATE: 01.26.2024
SHEET NUMBER: C5.14
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 298+50 PROPOSED

SCALE: 1"=20'−0"

GEORGIANA SLOUGH RIGHT BANK STA 298+50 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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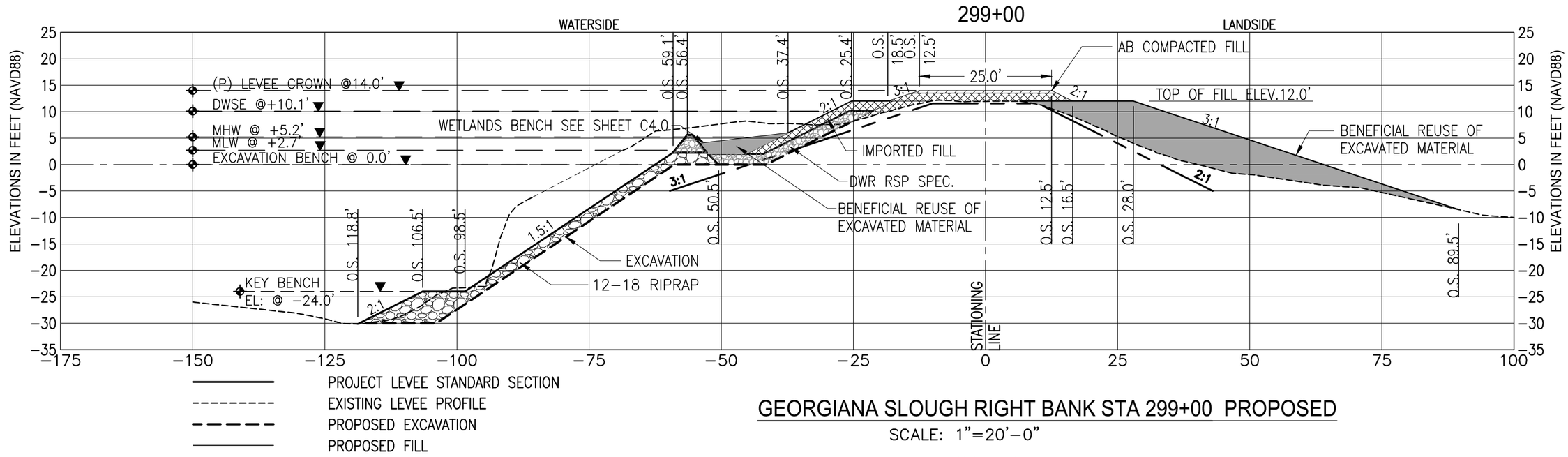
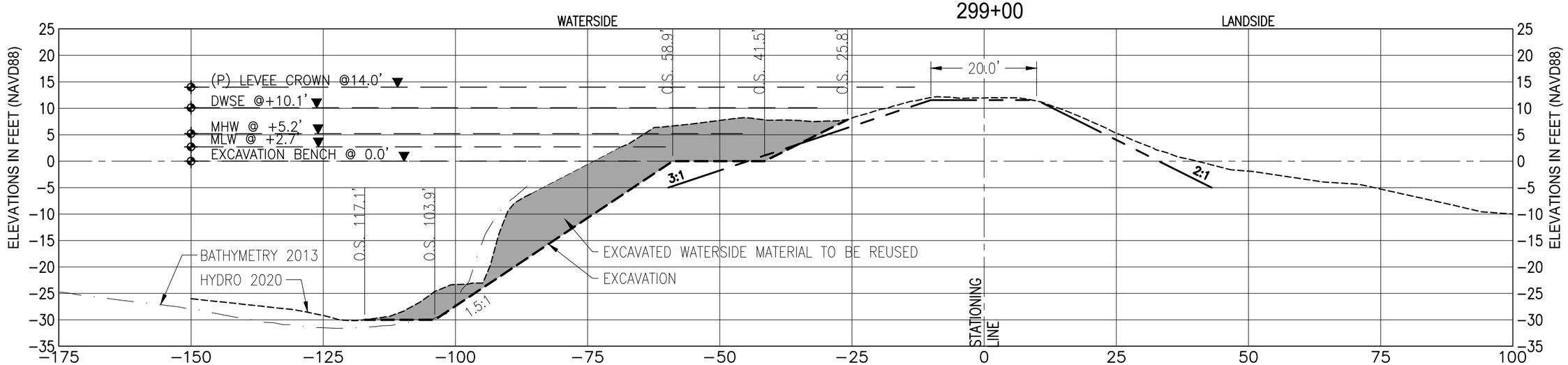
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 298+50

DATE: 01.26.2024
SHEET NUMBER: C5.15
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 299+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 299+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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P.O. BOX 929, WALNUT GROVE, CA 95690 TEL (916) 776-2277 FAX (916) 776-2282

DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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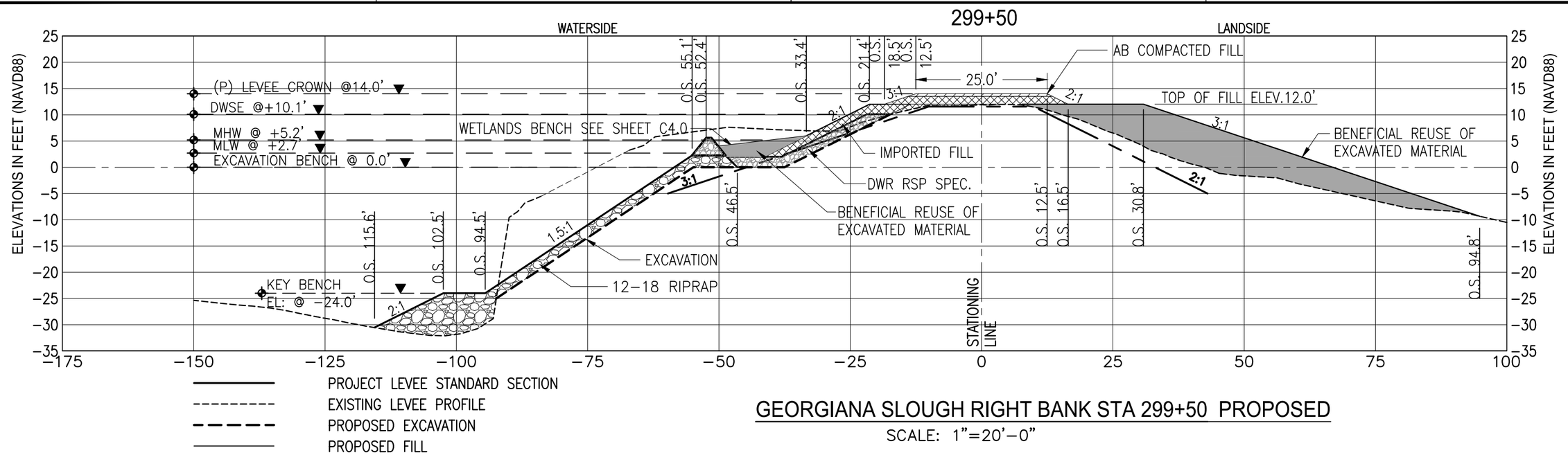
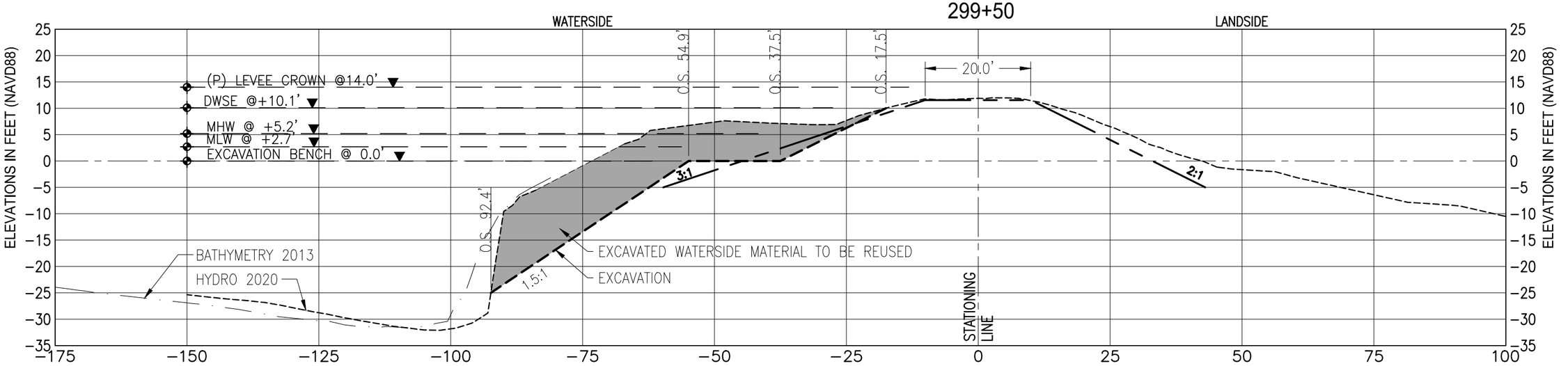
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 299+00

DATE: 01.26.2024
SHEET NUMBER: C5.16
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 299+50 PROPOSED

SCALE: 1"=20'−0"



GEORGIANA SLOUGH RIGHT BANK STA 299+50 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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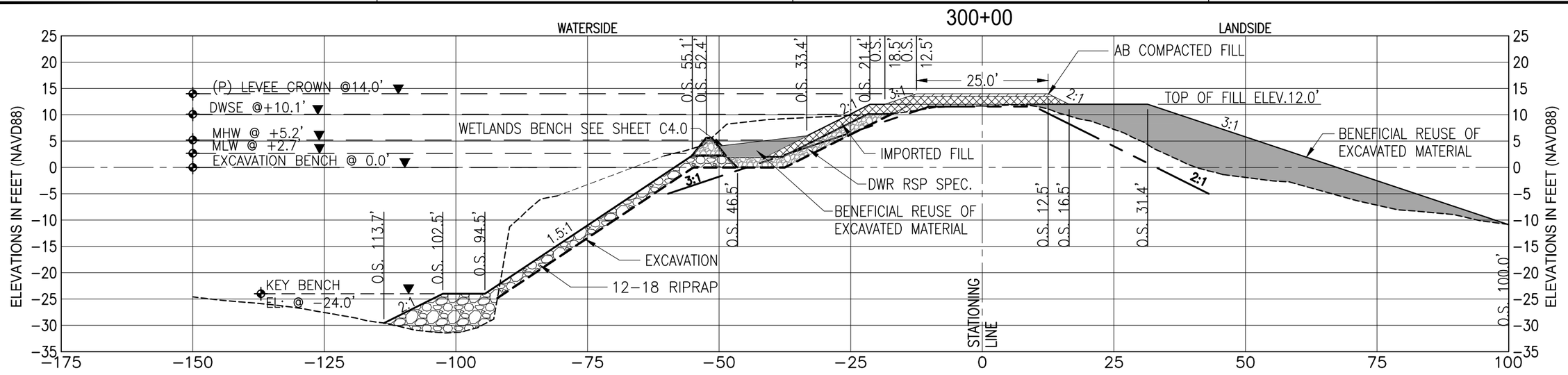
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

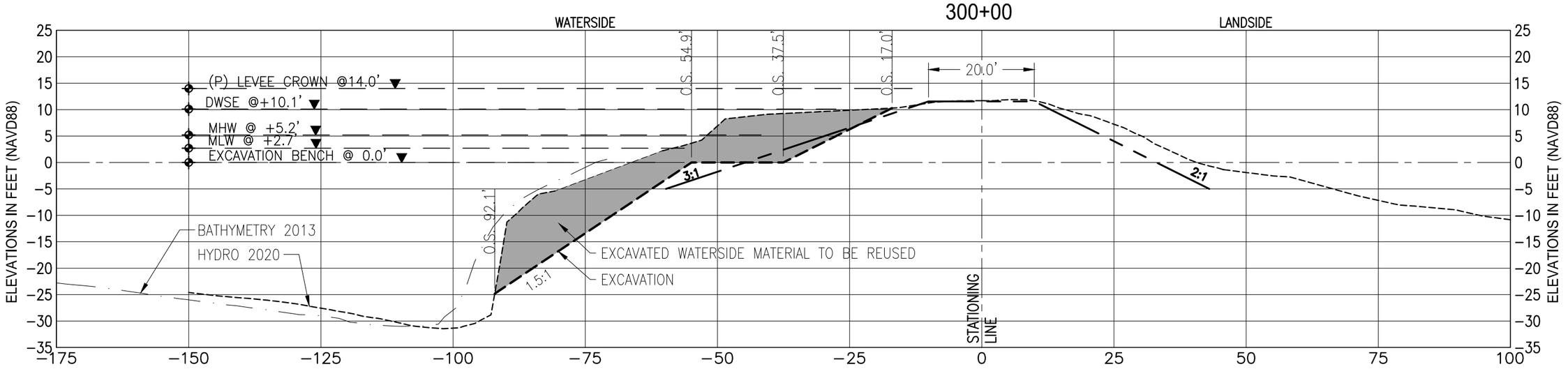
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 299+50

DATE: 01.26.2024
SHEET NUMBER: C5.17
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 300+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 300+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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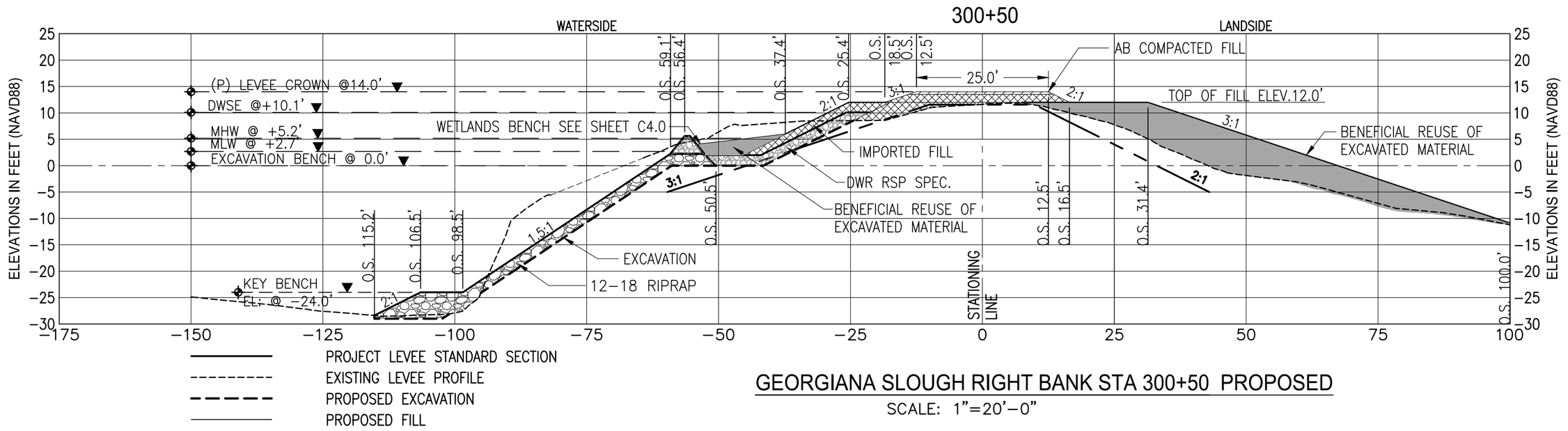
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

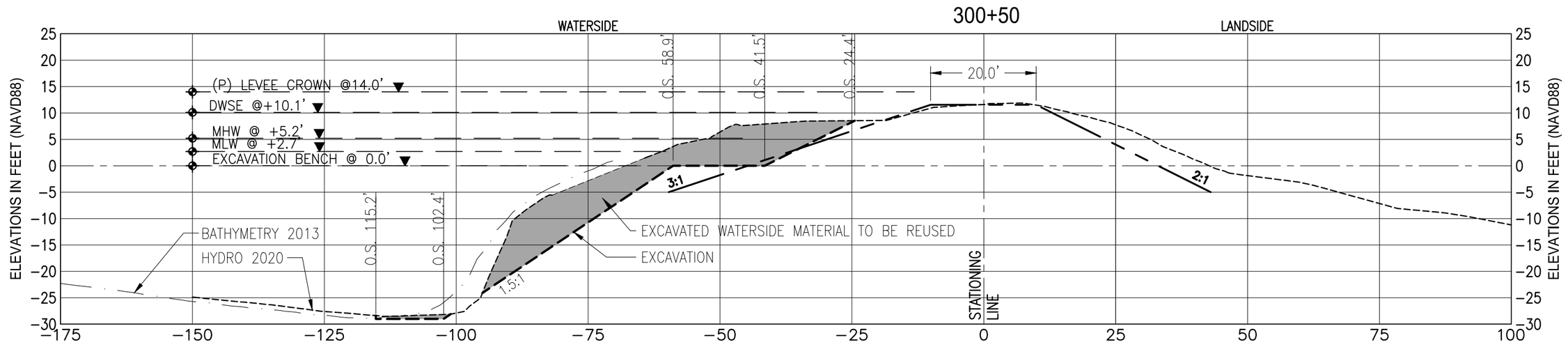
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 300+00

DATE: 01.26.2024
SHEET NUMBER: C5.18
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 300+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 300+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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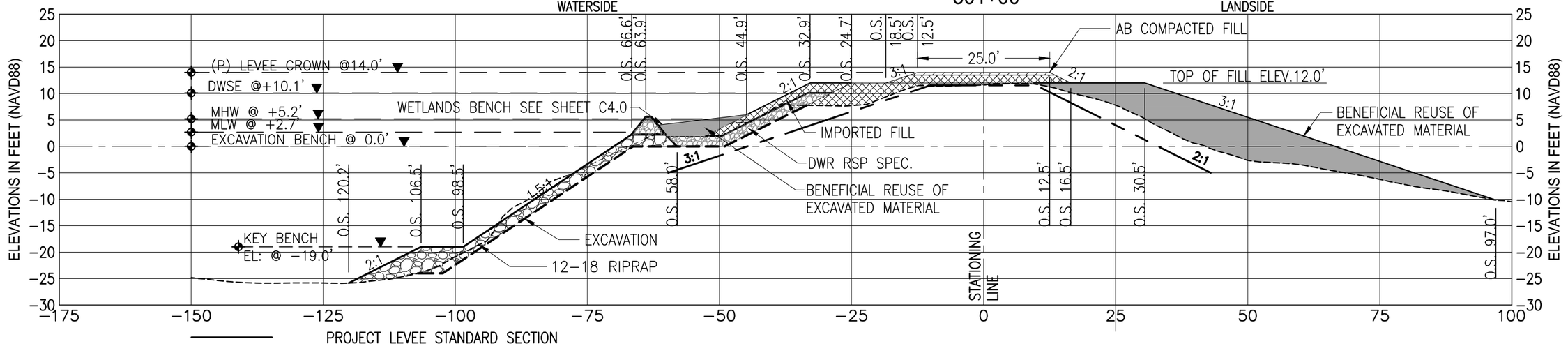
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

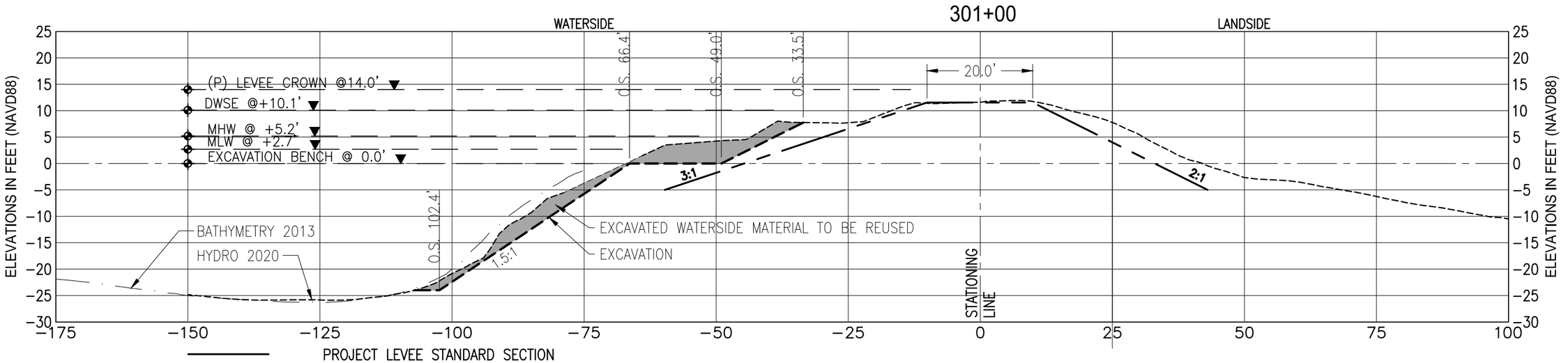
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 300+50

DATE: 01.26.2024
SHEET NUMBER: C5.19
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 301+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 301+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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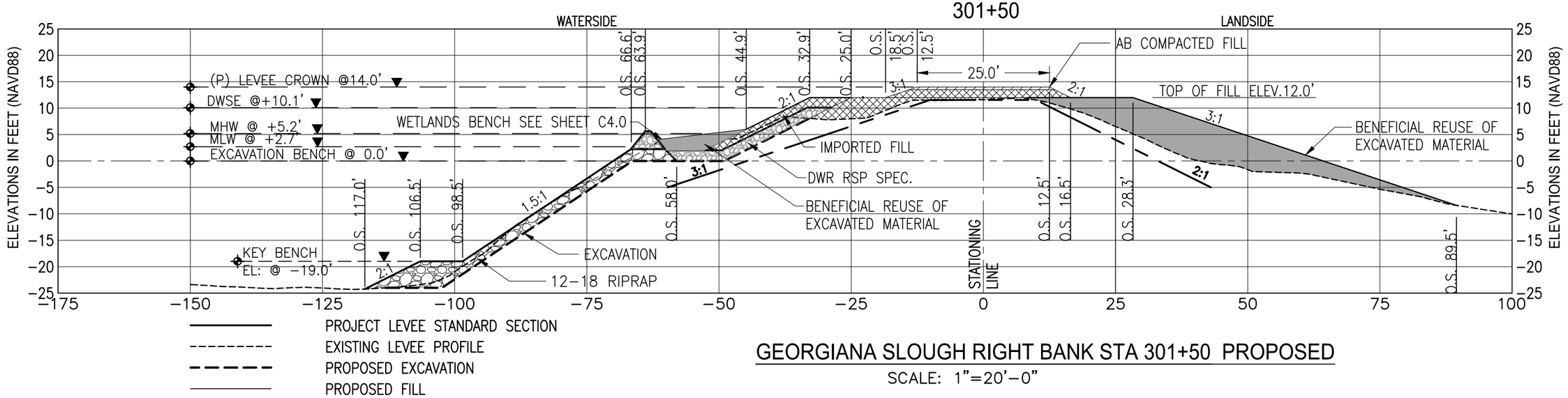
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

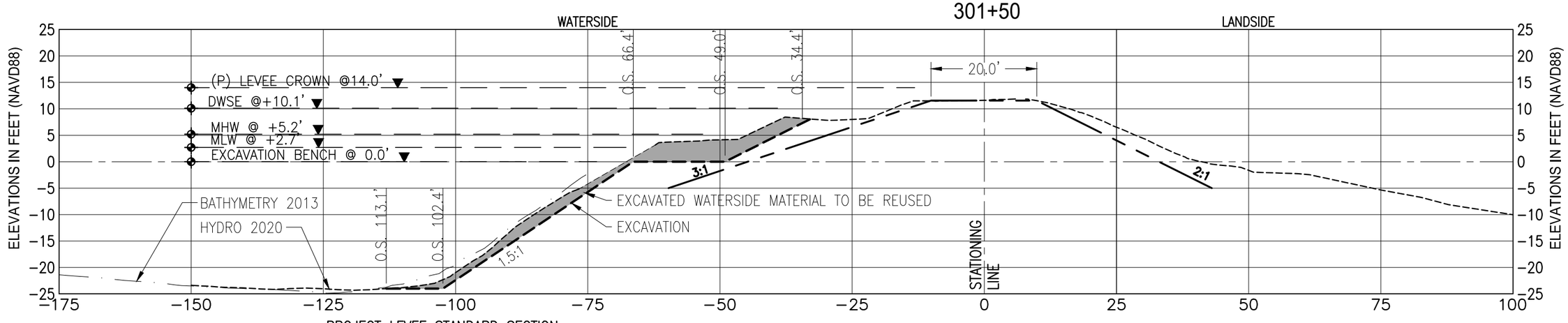
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 301+00

DATE: 01.26.2024
SHEET NUMBER: C5.20
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 301+50 PROPOSED

SCALE: 1"=20'−0"



GEORGIANA SLOUGH RIGHT BANK STA 301+50 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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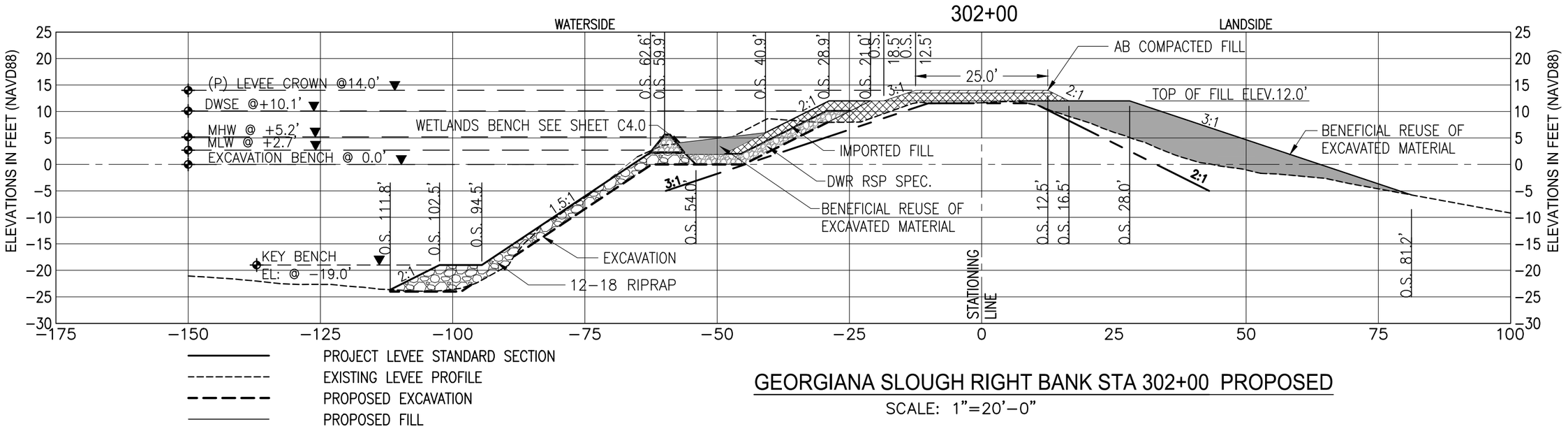
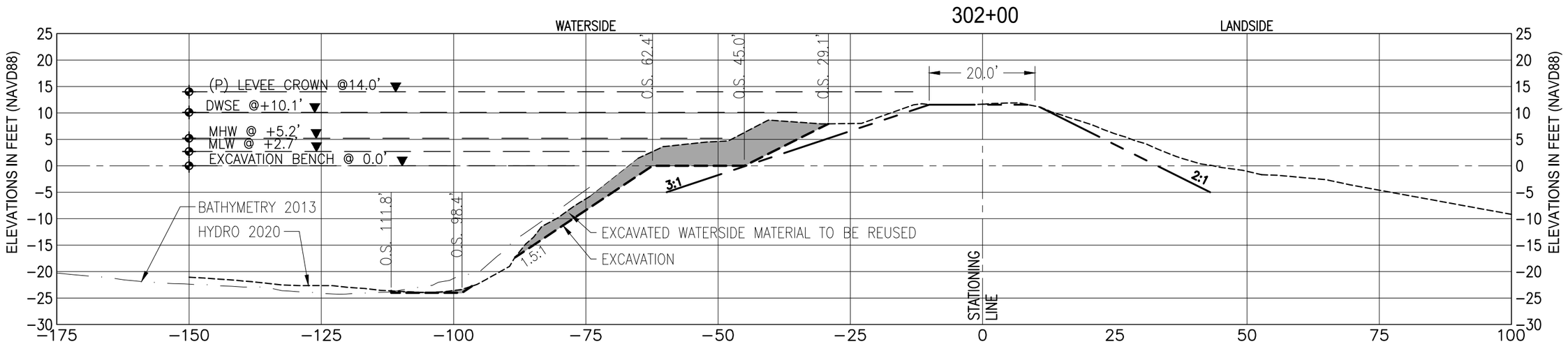
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 301+50

DATE: 01.26.2024
SHEET NUMBER: C5.21
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 302+00 PROPOSED

SCALE: 1"=20'−0"



GEORGIANA SLOUGH RIGHT BANK STA 302+00 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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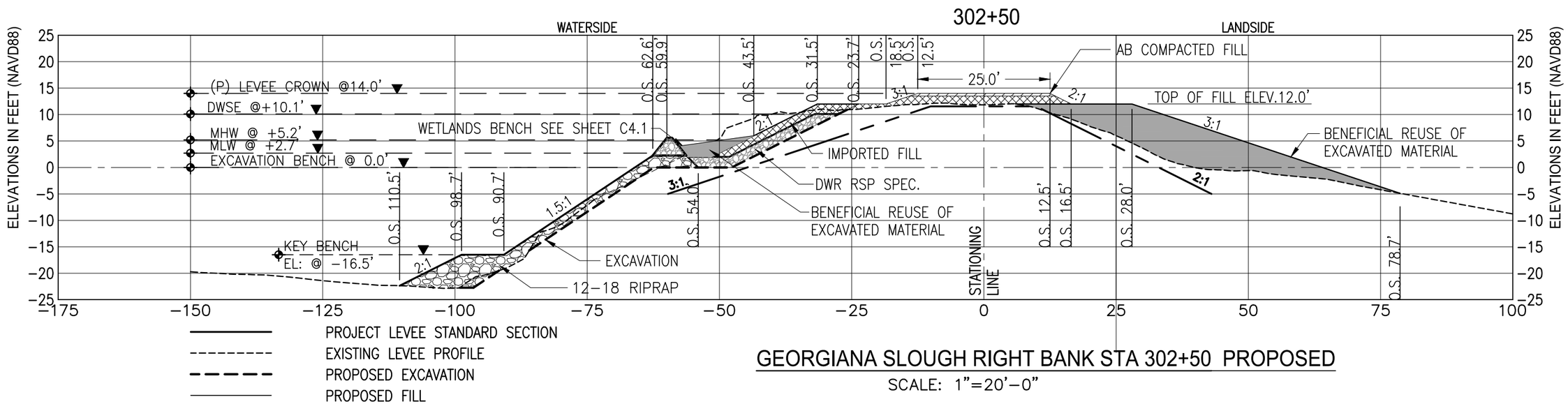
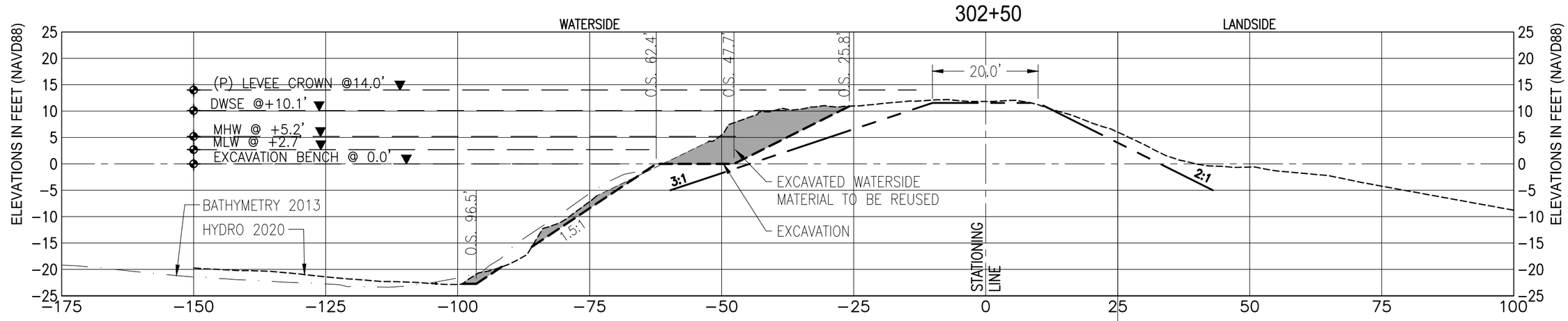
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 302+00

DATE: 01.26.2024
SHEET NUMBER: C5.22
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 302+50 PROPOSED

SCALE: 1"=20'−0"



GEORGIANA SLOUGH RIGHT BANK STA 302+50 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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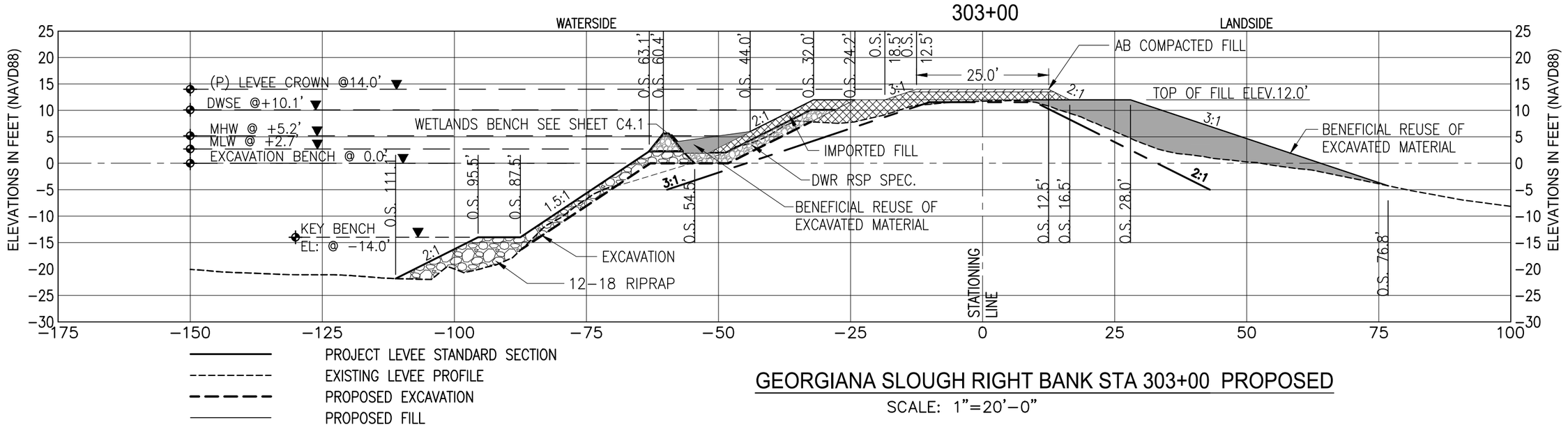
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

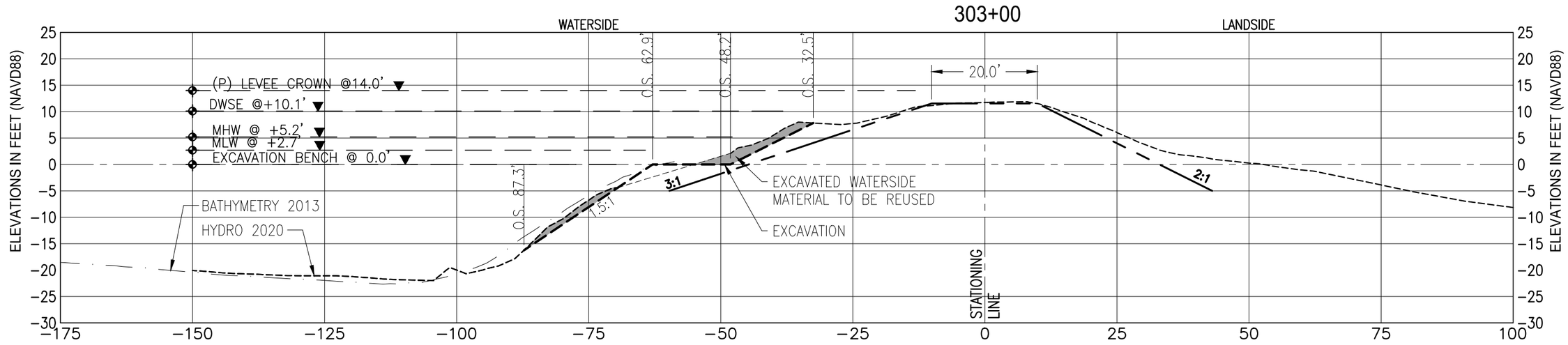
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 302+50

DATE: 01.26.2024
SHEET NUMBER: C5.23
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 303+00 PROPOSED

SCALE: 1"=20'−0"



GEORGIANA SLOUGH RIGHT BANK STA 303+00 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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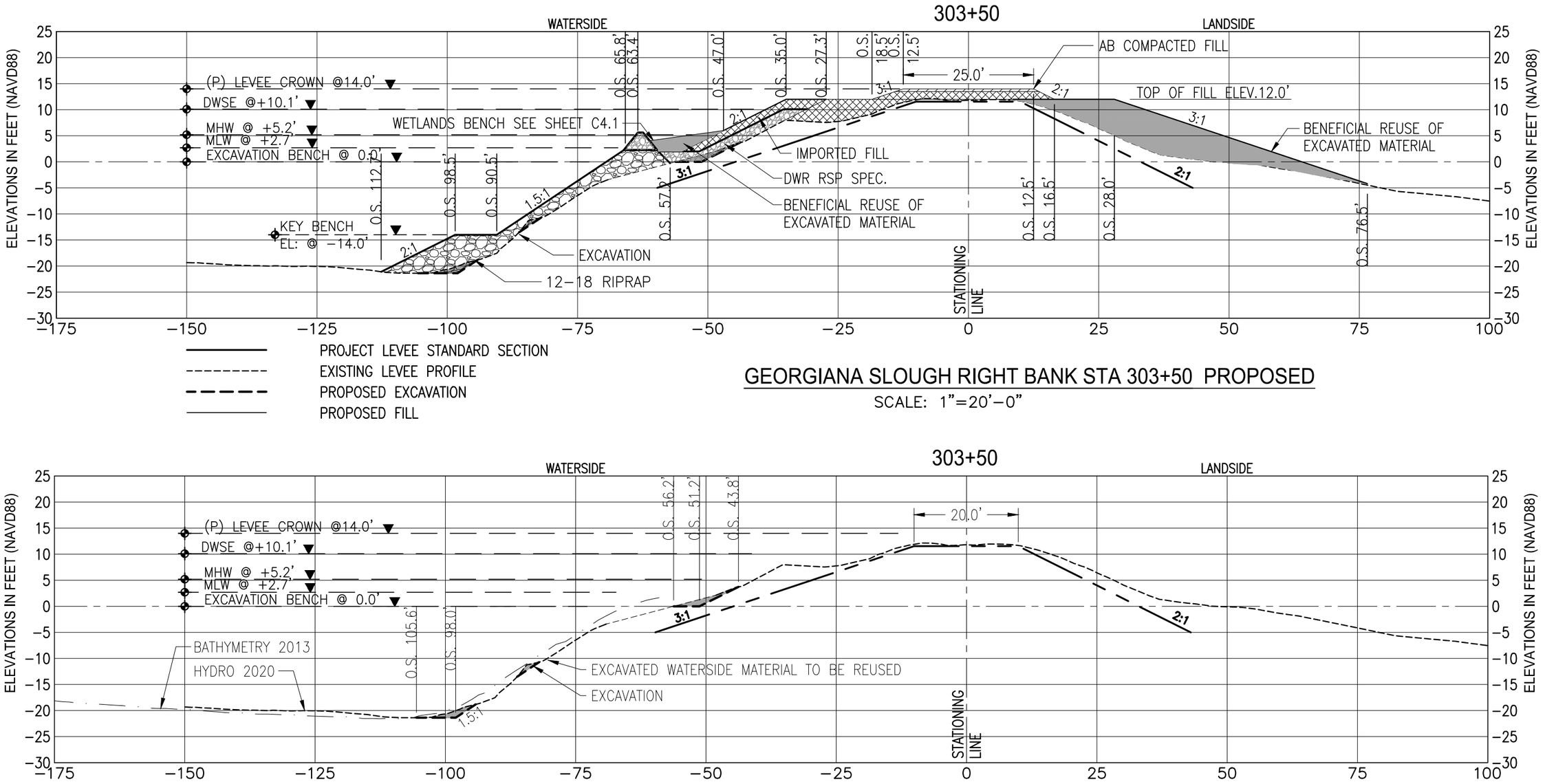
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 303+00

DATE: 01.26.2024
SHEET NUMBER: C5.24
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 303+50 PROPOSED

SCALE: 1"=20'−0"

GEORGIANA SLOUGH RIGHT BANK STA 303+50 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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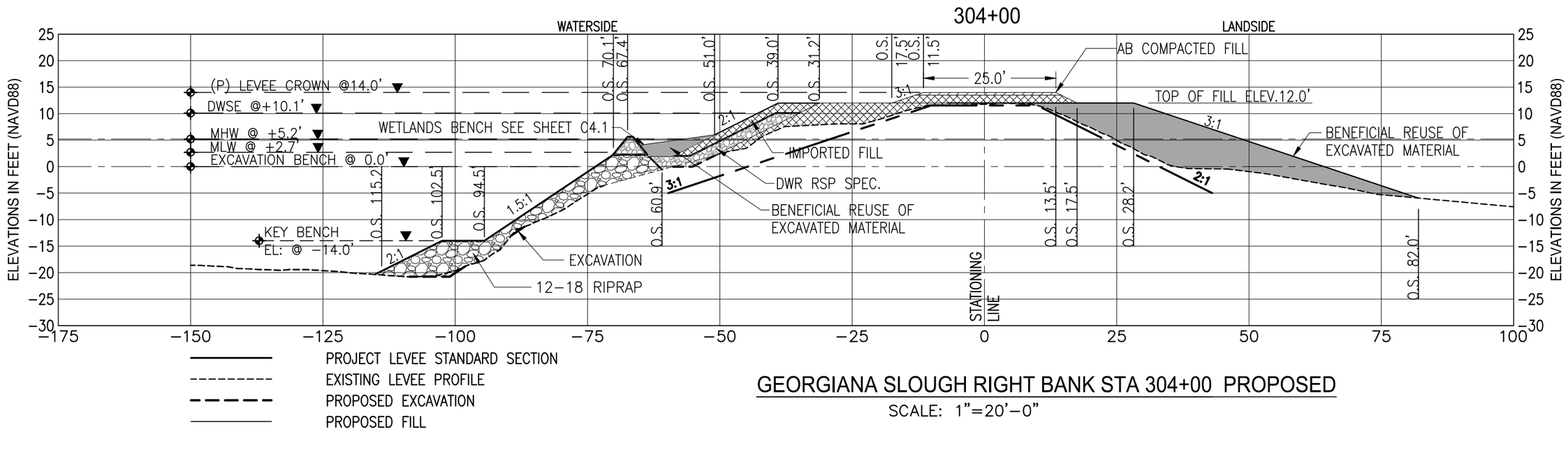
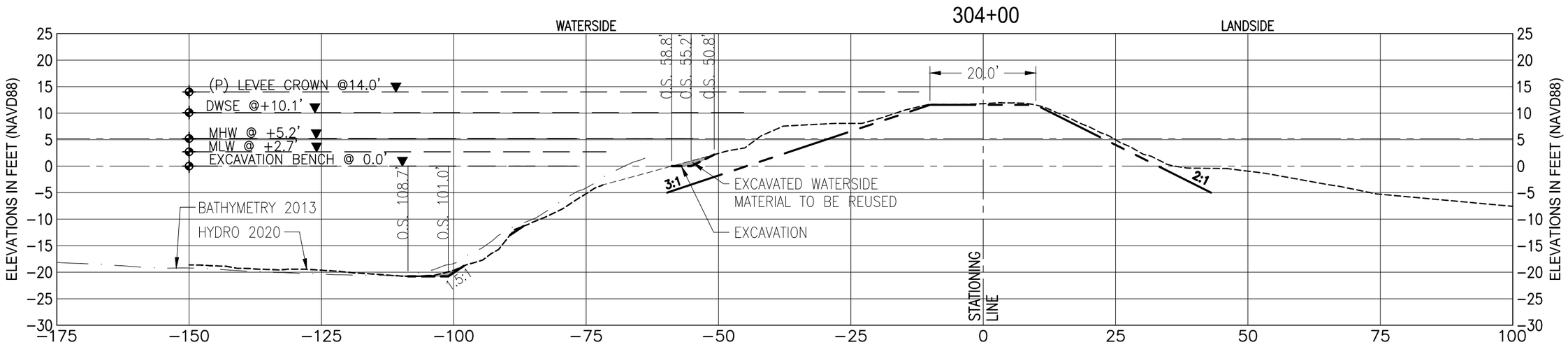
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 303+50

DATE: 01.26.2024
SHEET NUMBER: C5.25
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 304+00 PROPOSED

SCALE: 1"=20'−0"



GEORGIANA SLOUGH RIGHT BANK STA 304+00 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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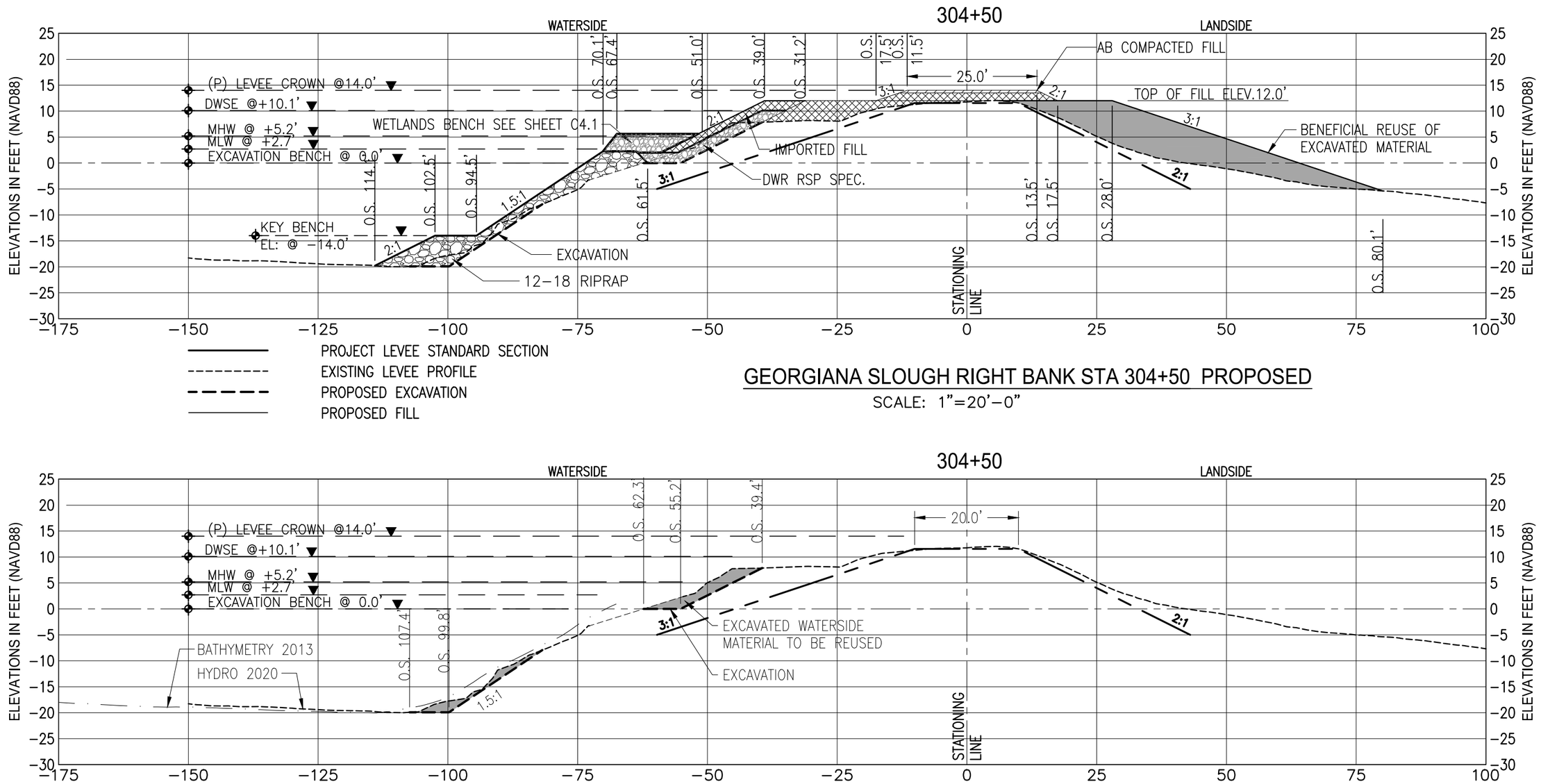
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 304+00

DATE: 01.26.2024
SHEET NUMBER: C5.26
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 304+50 PROPOSED

SCALE: 1"=20'−0"

GEORGIANA SLOUGH RIGHT BANK STA 304+50 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

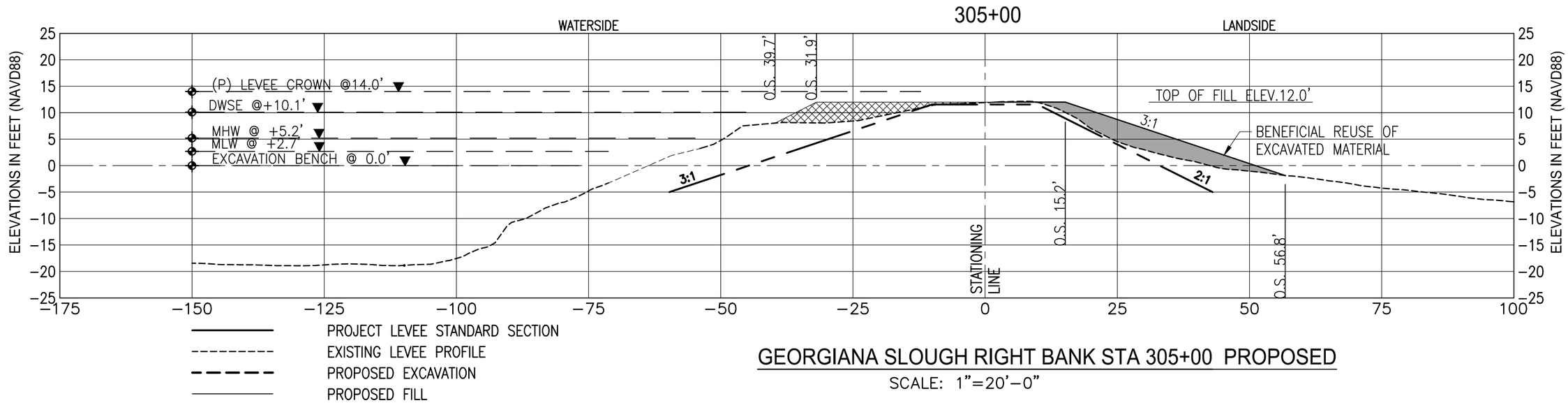
DCC ENGINEERING CO.,INC.
PLANNING
PERMITTING
ARCHITECTURE
CIVIL ENGINEERING
PROJECT MANAGEMENT
P.O. BOX 929, WALNUT GROVE, CA 95690 TEL (916) 776-2277 FAX (916) 776-2282

DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

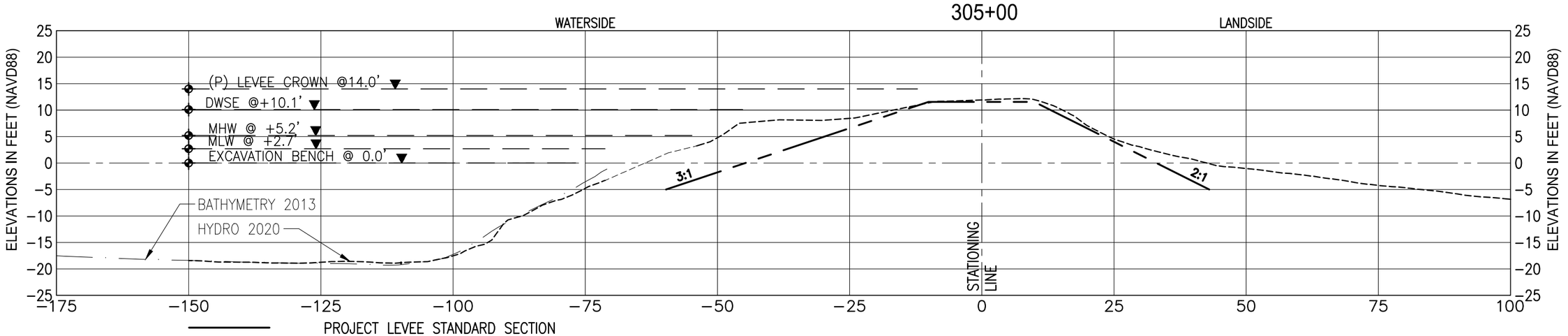
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 304+50

DATE: 01.26.2024
SHEET NUMBER: C5.27
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 305+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 305+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 305+00

DATE: 01.26.2024
SHEET NUMBER: C5.28
PROJECT NUMBER: 7702.52

T:\7702.52 - balmd - georgiana slough sta 290+00 - 306+00\001_ENGINEERING\20231120 - SOW DESIGN\7702.52 C5.14_B-SECTIONS 01.26.2024.dwg, 1/26/2024 3:39:53 PM, RMontanez

Appendix B

Air Quality Modeling

Georgiana Slough Custom Report

Table of Contents

5.3. Construction Vehicles

5.3.1. Unmitigated

5.3.2. Mitigated

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Georgiana Slough
Construction Start Date	6/15/2025
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	5.70
Precipitation (days)	20.6
Location	38.12934530180215, -121.5838252659411
County	Sacramento
City	Unincorporated
Air District	Sacramento Metropolitan AQMD
Air Basin	Sacramento Valley
TAZ	715
EDFZ	4
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.22

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
User Defined Linear	0.28	Mile	5.80	0.00	—	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-10-A	Water Exposed Surfaces
Construction	C-10-C	Water Unpaved Construction Roads
Construction	C-11	Limit Vehicle Speeds on Unpaved Roads
Construction	C-12	Sweep Paved Roads

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Unmit.	16.4	187	10.0	8.40	18.4	8.95	3.82	12.8	22,747
Mit.	16.4	187	10.0	4.30	14.3	8.95	1.75	10.7	22,747
% Reduced	—	—	—	49%	22%	—	54%	16%	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Unmit.	16.6	188	10.0	9.00	19.0	8.95	3.96	12.9	23,271
Mit.	16.6	188	10.0	4.91	14.9	8.95	1.90	10.8	23,271
% Reduced	—	—	—	45%	22%	—	52%	16%	—
Average Daily (Max)	—	—	—	—	—	—	—	—	—
Unmit.	3.03	34.4	1.83	2.25	4.08	1.63	1.04	2.68	4,200
Mit.	3.03	34.4	1.83	1.12	2.95	1.63	0.47	2.10	4,200
% Reduced	—	—	—	50%	28%	—	55%	22%	—
Annual (Max)	—	—	—	—	—	—	—	—	—

Unmit.	0.55	6.28	0.33	0.41	0.75	0.30	0.19	0.49	695
Mit.	0.55	6.28	0.33	0.20	0.54	0.30	0.09	0.38	695
% Reduced	—	—	—	50%	28%	—	55%	22%	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—
2025	16.4	187	10.0	8.40	18.4	8.95	3.82	12.8	22,747
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—
2025	16.6	188	10.0	9.00	19.0	8.95	3.96	12.9	23,271
Average Daily	—	—	—	—	—	—	—	—	—
2025	3.03	34.4	1.83	2.25	4.08	1.63	1.04	2.68	4,200
Annual	—	—	—	—	—	—	—	—	—
2025	0.55	6.28	0.33	0.41	0.75	0.30	0.19	0.49	695

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—
2025	16.4	187	10.0	4.30	14.3	8.95	1.75	10.7	22,747
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—
2025	16.6	188	10.0	4.91	14.9	8.95	1.90	10.8	23,271
Average Daily	—	—	—	—	—	—	—	—	—

2025	3.03	34.4	1.83	1.12	2.95	1.63	0.47	2.10	4,200
Annual	—	—	—	—	—	—	—	—	—
2025	0.55	6.28	0.33	0.20	0.54	0.30	0.09	0.38	695

3. Construction Emissions Details

3.1. Site Preparation (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.10	0.04	—	0.04	0.04	—	0.04	291
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.05	< 0.005	—	< 0.005	< 0.005	—	< 0.005	12.0
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.98
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.25	0.17	0.00	0.61	0.61	0.00	0.14	0.14	691
Vendor	< 0.005	0.14	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	70.6
Hauling	0.01	0.80	0.01	0.11	0.12	0.01	0.03	0.04	468
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.00	0.02	0.02	0.00	0.01	0.01	25.9
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.90
Hauling	< 0.005	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	19.2
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	4.28
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.48
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.18

3.2. Site Preparation (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.10	0.04	—	0.04	0.04	—	0.04	291
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	0.05	< 0.005	—	< 0.005	< 0.005	—	< 0.005	12.0
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.98
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.25	0.17	0.00	0.61	0.61	0.00	0.14	0.14	691
Vendor	< 0.005	0.14	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	70.6
Hauling	0.01	0.80	0.01	0.11	0.12	0.01	0.03	0.04	468
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.00	0.02	0.02	0.00	0.01	0.01	25.9
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.90
Hauling	< 0.005	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	19.2
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	4.28
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.48
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.18

3.3. Installation of Plants (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.89	5.47	0.19	—	0.19	0.18	—	0.18	2,673
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.89	5.47	0.19	—	0.19	0.18	—	0.18	2,673
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.67	0.02	—	0.02	0.02	—	0.02	330
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.12	< 0.005	—	< 0.005	< 0.005	—	< 0.005	54.6
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.13	0.09	0.00	0.30	0.30	0.00	0.07	0.07	346

Vendor	0.01	0.51	< 0.005	0.12	0.12	< 0.005	0.03	0.03	421
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.11	0.11	0.00	0.30	0.30	0.00	0.07	0.07	306
Vendor	0.01	0.55	< 0.005	0.12	0.12	< 0.005	0.03	0.03	420
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.00	0.04	0.04	0.00	0.01	0.01	38.8
Vendor	< 0.005	0.07	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	51.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	8.59
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.4. Installation of Plants (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.89	5.47	0.19	—	0.19	0.18	—	0.18	2,673
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.89	5.47	0.19	—	0.19	0.18	—	0.18	2,673

Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.67	0.02	—	0.02	0.02	—	0.02	330
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.12	< 0.005	—	< 0.005	< 0.005	—	< 0.005	54.6
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.13	0.09	0.00	0.30	0.30	0.00	0.07	0.07	346
Vendor	0.01	0.51	< 0.005	0.12	0.12	< 0.005	0.03	0.03	421
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.11	0.11	0.00	0.30	0.30	0.00	0.07	0.07	306
Vendor	0.01	0.55	< 0.005	0.12	0.12	< 0.005	0.03	0.03	420
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.00	0.04	0.04	0.00	0.01	0.01	38.8
Vendor	< 0.005	0.07	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	51.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.42
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	8.59
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Mobilization (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.25	0.17	0.00	0.61	0.61	0.00	0.14	0.14	691
Vendor	0.01	0.21	< 0.005	0.03	0.03	< 0.005	0.01	0.01	121
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	5.17
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.86
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.16
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.6. Mobilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.25	0.17	0.00	0.61	0.61	0.00	0.14	0.14	691
Vendor	0.01	0.21	< 0.005	0.03	0.03	< 0.005	0.01	0.01	121
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	5.17
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.86
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.16
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Waterside slope grading of overburden and landside slope fill placement (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	10.2	0.44	—	0.44	0.41	—	0.41	1,674
Dust From Material Movement	—	—	—	6.55	6.55	—	3.37	3.37	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.11	1.00	0.04	—	0.04	0.04	—	0.04	165
Dust From Material Movement	—	—	—	0.65	0.65	—	0.33	0.33	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.18	0.01	—	0.01	0.01	—	0.01	27.3
Dust From Material Movement	—	—	—	0.12	0.12	—	0.06	0.06	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.25	0.17	0.00	0.61	0.61	0.00	0.14	0.14	691
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.00	0.06	0.06	0.00	0.01	0.01	62.1
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	10.3
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.8. Waterside slope grading of overburden and landside slope fill placement (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.07	10.2	0.44	—	0.44	0.41	—	0.41	1,674
Dust From Material Movement	—	—	—	2.56	2.56	—	1.31	1.31	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.00	0.04	—	0.04	0.04	—	0.04	165
Dust From Material Movement	—	—	—	0.25	0.25	—	0.13	0.13	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.18	0.01	—	0.01	0.01	—	0.01	27.3
Dust From Material Movement	—	—	—	0.05	0.05	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.25	0.17	0.00	0.61	0.61	0.00	0.14	0.14	691
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—

Worker	0.02	0.02	0.00	0.06	0.06	0.00	0.01	0.01	62.1
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	10.3
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Site Demobilization (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.23	0.22	0.00	0.61	0.61	0.00	0.14	0.14	612
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.43
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.10. Site Demobilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—

Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.23	0.22	0.00	0.61	0.61	0.00	0.14	0.14	612
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.43
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.12. Barge Traffic Mobilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	12.3	147	8.43	—	8.43	7.51	—	7.51	10,379
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.40	0.02	—	0.02	0.02	—	0.02	28.4
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	< 0.005	—	< 0.005	< 0.005	—	< 0.005	4.71
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.14. Barge Traffic Transport (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	13.5	160	9.16	—	9.16	8.16	—	8.16	11,406
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	13.5	160	9.16	—	9.16	8.16	—	8.16	11,406
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.37	28.0	1.61	—	1.61	1.43	—	1.43	2,000
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.43	5.12	0.29	—	0.29	0.26	—	0.26	331
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.16. Barge Traffic Demobilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.30	63.1	3.63	—	3.63	3.23	—	3.23	4,462
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.17	0.01	—	0.01	0.01	—	0.01	12.2
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	< 0.005	—	< 0.005	< 0.005	—	< 0.005	2.02
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.17. Removal/Relocation of Encroachments (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.13	0.09	0.00	0.30	0.30	0.00	0.07	0.07	346
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	15.5
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.57
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.18. Removal/Relocation of Encroachments (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.13	0.09	0.00	0.30	0.30	0.00	0.07	0.07	346
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	15.5
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.57
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.19. Waterside Levee Slope and Bench Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.64	14.3	0.59	—	0.59	0.54	—	0.54	3,606
Dust From Material Movement	—	—	—	6.71	6.71	—	3.39	3.39	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.64	14.3	0.59	—	0.59	0.54	—	0.54	3,606
Dust From Material Movement	—	—	—	6.71	6.71	—	3.39	3.39	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.30	2.58	0.11	—	0.11	0.10	—	0.10	652
Dust From Material Movement	—	—	—	1.21	1.21	—	0.61	0.61	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.47	0.02	—	0.02	0.02	—	0.02	108
Dust From Material Movement	—	—	—	0.22	0.22	—	0.11	0.11	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.13	0.09	0.00	0.30	0.30	0.00	0.07	0.07	346
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.10	6.77	0.07	0.96	1.03	0.07	0.26	0.33	3,949
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.11	0.11	0.00	0.30	0.30	0.00	0.07	0.07	306
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.09	7.27	0.07	0.96	1.03	0.07	0.26	0.33	3,941
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.00	0.05	0.05	0.00	0.01	0.01	56.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.29	0.01	0.17	0.18	0.01	0.05	0.06	713
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	9.42
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.24	< 0.005	0.03	0.03	< 0.005	0.01	0.01	118

3.20. Waterside Levee Slope and Bench Construction (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.64	14.3	0.59	—	0.59	0.54	—	0.54	3,606
Dust From Material Movement	—	—	—	2.62	2.62	—	1.32	1.32	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.64	14.3	0.59	—	0.59	0.54	—	0.54	3,606
Dust From Material Movement	—	—	—	2.62	2.62	—	1.32	1.32	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.30	2.58	0.11	—	0.11	0.10	—	0.10	652
Dust From Material Movement	—	—	—	0.47	0.47	—	0.24	0.24	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.47	0.02	—	0.02	0.02	—	0.02	108
Dust From Material Movement	—	—	—	0.09	0.09	—	0.04	0.04	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.13	0.09	0.00	0.30	0.30	0.00	0.07	0.07	346
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.10	6.77	0.07	0.96	1.03	0.07	0.26	0.33	3,949
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.11	0.11	0.00	0.30	0.30	0.00	0.07	0.07	306
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.09	7.27	0.07	0.96	1.03	0.07	0.26	0.33	3,941
Average Daily	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.00	0.05	0.05	0.00	0.01	0.01	56.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.29	0.01	0.17	0.18	0.01	0.05	0.06	713
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	9.42
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.24	< 0.005	0.03	0.03	< 0.005	0.01	0.01	118

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Linear, Grubbing & Land Clearing	6/19/2025	7/5/2025	6.00	15.0	—
Installation of Plants	Linear, Grubbing & Land Clearing	9/7/2025	10/29/2025	6.00	45.0	—
Mobilization	Linear, Grading & Excavation	6/15/2025	6/18/2025	6.00	3.00	—

Waterside slope grading of overburden and landside slope fill placement	Linear, Grading & Excavation	7/6/2025	8/16/2025	6.00	36.0	—
Site Demobilization	Linear, Grading & Excavation	10/28/2025	11/1/2025	6.00	5.00	—
Barge Traffic Mobilization	Linear, Grading & Excavation	8/18/2025	8/18/2025	6.00	1.00	Start from Rio Vista
Barge Traffic Transport	Linear, Grading & Excavation	8/19/2025	10/31/2025	6.00	64.0	Back and forth
Barge Traffic Demobilization	Linear, Grading & Excavation	11/1/2025	11/1/2025	6.00	1.00	End in Rio Vista
Removal/Relocation of Encroachments	Linear, Drainage, Utilities, & Sub-Grade	8/18/2025	9/6/2025	6.00	18.0	—
Waterside Levee Slope and Bench Construction	Linear, Drainage, Utilities, & Sub-Grade	8/18/2025	11/1/2025	6.00	66.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Installation of Plants	Off-Highway Trucks	Diesel	Average	2.00	8.00	376	0.38
Waterside slope grading of overburden and landside slope fill placement	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Waterside slope grading of overburden and landside slope fill placement	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Barge Traffic Mobilization	Other Construction Equipment	Diesel	Average	1.00	9.00	1,700	0.50

Barge Traffic Mobilization	Other Construction Equipment	Diesel	Average	1.00	1.00	575	0.50
Barge Traffic Transport	Other Construction Equipment	Diesel	Average	1.00	3.00	575	0.50
Barge Traffic Transport	Other Construction Equipment	Diesel	Average	1.00	9.00	1,700	0.50
Barge Traffic Transport	Other Construction Equipment	Diesel	Average	1.00	4.00	125	0.42
Barge Traffic Demobilization	Other Construction Equipment	Diesel	Average	1.00	3.00	1,700	0.50
Barge Traffic Demobilization	Other Construction Equipment	Diesel	Average	1.00	3.00	575	0.50
Waterside Levee Slope and Bench Construction	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Waterside Levee Slope and Bench Construction	Excavators	Diesel	Average	1.00	10.0	364	0.38
Waterside Levee Slope and Bench Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	84.0	0.37
Waterside Levee Slope and Bench Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Waterside Levee Slope and Bench Construction	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Installation of Plants	Off-Highway Trucks	Diesel	Average	2.00	8.00	376	0.38
Waterside slope grading of overburden and landside slope fill placement	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40

Waterside slope grading of overburden and landside slope fill placement	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Barge Traffic Mobilization	Other Construction Equipment	Diesel	Average	1.00	9.00	1,700	0.50
Barge Traffic Mobilization	Other Construction Equipment	Diesel	Average	1.00	1.00	575	0.50
Barge Traffic Transport	Other Construction Equipment	Diesel	Average	1.00	3.00	575	0.50
Barge Traffic Transport	Other Construction Equipment	Diesel	Average	1.00	9.00	1,700	0.50
Barge Traffic Transport	Other Construction Equipment	Diesel	Average	1.00	4.00	125	0.42
Barge Traffic Demobilization	Other Construction Equipment	Diesel	Average	1.00	3.00	1,700	0.50
Barge Traffic Demobilization	Other Construction Equipment	Diesel	Average	1.00	3.00	575	0.50
Waterside Levee Slope and Bench Construction	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Waterside Levee Slope and Bench Construction	Excavators	Diesel	Average	1.00	10.0	364	0.38
Waterside Levee Slope and Bench Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	10.0	84.0	0.37
Waterside Levee Slope and Bench Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Waterside Levee Slope and Bench Construction	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix

Mobilization	—	—	—	—
Mobilization	Worker	60.0	14.3	LDA,LDT1,LDT2
Mobilization	Vendor	4.00	8.80	HHDT,MHDT
Mobilization	Hauling	0.00	20.0	HHDT
Mobilization	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	60.0	14.3	LDA,LDT1,LDT2
Site Preparation	Vendor	2.00	8.80	HHDT
Site Preparation	Hauling	6.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Waterside slope grading of overburden and landside slope fill placement	—	—	—	—
Waterside slope grading of overburden and landside slope fill placement	Worker	60.0	14.3	LDA,LDT1,LDT2
Waterside slope grading of overburden and landside slope fill placement	Vendor	0.00	8.80	HHDT,MHDT
Waterside slope grading of overburden and landside slope fill placement	Hauling	0.00	20.0	HHDT
Waterside slope grading of overburden and landside slope fill placement	Onsite truck	—	—	HHDT
Removal/Relocation of Encroachments	—	—	—	—
Removal/Relocation of Encroachments	Worker	30.0	14.3	LDA,LDT1,LDT2
Removal/Relocation of Encroachments	Vendor	0.00	8.80	HHDT,MHDT
Removal/Relocation of Encroachments	Hauling	0.00	20.0	HHDT
Removal/Relocation of Encroachments	Onsite truck	—	—	HHDT
Installation of Plants	—	—	—	—
Installation of Plants	Worker	30.0	14.3	LDA,LDT1,LDT2
Installation of Plants	Vendor	2.00	75.0	MHDT
Installation of Plants	Hauling	0.00	20.0	HHDT

Installation of Plants	Onsite truck	—	—	HHDT
Site Demobilization	—	—	—	—
Site Demobilization	Worker	60.0	14.3	LDA,LDT1,LDT2
Site Demobilization	Vendor	0.00	8.80	HHDT,MHDT
Site Demobilization	Hauling	0.00	20.0	HHDT
Site Demobilization	Onsite truck	—	—	HHDT
Waterside Levee Slope and Bench Construction	—	—	—	—
Waterside Levee Slope and Bench Construction	Worker	30.0	14.3	LDA,LDT1,LDT2
Waterside Levee Slope and Bench Construction	Vendor	0.00	8.80	HHDT,MHDT
Waterside Levee Slope and Bench Construction	Hauling	50.7	20.0	HHDT
Waterside Levee Slope and Bench Construction	Onsite truck	—	—	HHDT
Barge Traffic Mobilization	—	—	—	—
Barge Traffic Mobilization	Worker	0.00	14.3	LDA,LDT1,LDT2
Barge Traffic Mobilization	Vendor	0.00	8.80	HHDT,MHDT
Barge Traffic Mobilization	Hauling	0.00	20.0	HHDT
Barge Traffic Mobilization	Onsite truck	—	—	HHDT
Barge Traffic Transport	—	—	—	—
Barge Traffic Transport	Worker	0.00	14.3	LDA,LDT1,LDT2
Barge Traffic Transport	Vendor	0.00	8.80	HHDT,MHDT
Barge Traffic Transport	Hauling	0.00	20.0	HHDT
Barge Traffic Transport	Onsite truck	—	—	HHDT
Barge Traffic Demobilization	—	—	—	—
Barge Traffic Demobilization	Worker	0.00	14.3	LDA,LDT1,LDT2
Barge Traffic Demobilization	Vendor	0.00	8.80	HHDT,MHDT

Barge Traffic Demobilization	Hauling	0.00	20.0	HHDT
Barge Traffic Demobilization	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Mobilization	—	—	—	—
Mobilization	Worker	60.0	14.3	LDA,LDT1,LDT2
Mobilization	Vendor	4.00	8.80	HHDT,MHDT
Mobilization	Hauling	0.00	20.0	HHDT
Mobilization	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	60.0	14.3	LDA,LDT1,LDT2
Site Preparation	Vendor	2.00	8.80	HHDT
Site Preparation	Hauling	6.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Waterside slope grading of overburden and landside slope fill placement	—	—	—	—
Waterside slope grading of overburden and landside slope fill placement	Worker	60.0	14.3	LDA,LDT1,LDT2
Waterside slope grading of overburden and landside slope fill placement	Vendor	0.00	8.80	HHDT,MHDT
Waterside slope grading of overburden and landside slope fill placement	Hauling	0.00	20.0	HHDT
Waterside slope grading of overburden and landside slope fill placement	Onsite truck	—	—	HHDT
Removal/Relocation of Encroachments	—	—	—	—
Removal/Relocation of Encroachments	Worker	30.0	14.3	LDA,LDT1,LDT2
Removal/Relocation of Encroachments	Vendor	0.00	8.80	HHDT,MHDT
Removal/Relocation of Encroachments	Hauling	0.00	20.0	HHDT

Removal/Relocation of Encroachments	Onsite truck	—	—	HHDT
Installation of Plants	—	—	—	—
Installation of Plants	Worker	30.0	14.3	LDA,LDT1,LDT2
Installation of Plants	Vendor	2.00	75.0	MHDT
Installation of Plants	Hauling	0.00	20.0	HHDT
Installation of Plants	Onsite truck	—	—	HHDT
Site Demobilization	—	—	—	—
Site Demobilization	Worker	60.0	14.3	LDA,LDT1,LDT2
Site Demobilization	Vendor	0.00	8.80	HHDT,MHDT
Site Demobilization	Hauling	0.00	20.0	HHDT
Site Demobilization	Onsite truck	—	—	HHDT
Waterside Levee Slope and Bench Construction	—	—	—	—
Waterside Levee Slope and Bench Construction	Worker	30.0	14.3	LDA,LDT1,LDT2
Waterside Levee Slope and Bench Construction	Vendor	0.00	8.80	HHDT,MHDT
Waterside Levee Slope and Bench Construction	Hauling	50.7	20.0	HHDT
Waterside Levee Slope and Bench Construction	Onsite truck	—	—	HHDT
Barge Traffic Mobilization	—	—	—	—
Barge Traffic Mobilization	Worker	0.00	14.3	LDA,LDT1,LDT2
Barge Traffic Mobilization	Vendor	0.00	8.80	HHDT,MHDT
Barge Traffic Mobilization	Hauling	0.00	20.0	HHDT
Barge Traffic Mobilization	Onsite truck	—	—	HHDT
Barge Traffic Transport	—	—	—	—
Barge Traffic Transport	Worker	0.00	14.3	LDA,LDT1,LDT2
Barge Traffic Transport	Vendor	0.00	8.80	HHDT,MHDT

Barge Traffic Transport	Hauling	0.00	20.0	HHDT
Barge Traffic Transport	Onsite truck	—	—	HHDT
Barge Traffic Demobilization	—	—	—	—
Barge Traffic Demobilization	Worker	0.00	14.3	LDA,LDT1,LDT2
Barge Traffic Demobilization	Vendor	0.00	8.80	HHDT,MHDT
Barge Traffic Demobilization	Hauling	0.00	20.0	HHDT
Barge Traffic Demobilization	Onsite truck	—	—	HHDT

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3.12. Barge Traffic Mobilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.45	5.31	0.31	—	0.31	0.27	—	0.27
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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3.12. Barge Traffic Mobilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	11.9	141	8.13	—	8.13	7.24	—	7.24
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.39	0.02	—	0.02	0.02	—	0.02
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	< 0.005	—	< 0.005	< 0.005	—	< 0.005
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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3.14. Barge Traffic Transport (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.34	15.9	0.92	—	0.92	0.82	—	0.82
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.34	15.9	0.92	—	0.92	0.82	—	0.82
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.24	2.80	0.16	—	0.16	0.14	—	0.14
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.51	0.03	—	0.03	0.03	—	0.03
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—

Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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3.14. Barge Traffic Transport (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	11.9	141	8.13	—	8.13	7.24	—	7.24
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	11.9	141	8.13	—	8.13	7.24	—	7.24
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	2.08	24.8	1.43	—	1.43	1.27	—	1.27
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.38	4.53	0.26	—	0.26	0.23	—	0.23
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—

Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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3.14. Barge Traffic Transport (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	2.55	0.12	—	0.12	0.11	—	0.11
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.29	2.55	0.12	—	0.12	0.11	—	0.11
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.45	0.02	—	0.02	0.02	—	0.02
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	< 0.005	—	< 0.005	< 0.005	—	< 0.005
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—

Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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3.16. Barge Traffic Demobilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.34	15.9	0.92	—	0.92	0.82	—	0.82
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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3.16. Barge Traffic Demobilization (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	3.96	47.1	2.71	—	2.71	2.41	—	2.41
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.13	0.01	—	0.01	0.01	—	0.01
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	< 0.005	—	< 0.005	< 0.005	—	< 0.005
Dust From Material Movement	—	—	—	0.00	0.00	—	0.00	0.00
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phases	ROG	NOx	Total PM10	Total PM2.5	Exhaust PM 10	Exhaust PM2.5
Mobilization	0.26	0.38	0.64	0.15	0.00	0.00
Barge Mobilization	2.24	26.59	1.53	1.36	1.53	1.36
Phase Total	**2.50**	**26.97**	**2.17**	**1.51**	**1.53**	**1.36**
Site Preparation	0.38	2.21	0.79	0.23	0.05	0.05
Waterside slope grading of overburden and landside slope fill placement	1.32	10.35	7.60	3.92	0.44	0.41
Phase Total	**1.70**	**12.56**	**8.39**	**4.14**	**0.49**	**0.45**
Waterside Levee Slope and Bench Construction	1.87	21.12	8.63	4.33	0.66	0.61
Barge Transport	3.26	38.17	2.19	1.95	2.19	1.95
Removal/Relocation of Encroachments	0.13	0.09	0.30	0.07	0.00	0.00
Installation of Plants	1.04	6.07	0.62	0.29	0.20	0.18
Phase Total	**6.29**	**65.45**	**11.74**	**6.63**	**3.04**	**2.74**
Site Demobilization	0.23	0.23	0.61	0.14	0.00	0.00
Barge Demobilization	3.26	38.81	2.24	1.99	2.24	1.99
Phase Total	**3.49**	**39.04**	**2.85**	**2.13**	**2.24**	**1.99**
Maximum Day Emissions	**6.29**	**65.45**	**11.74**	**6.63**		
SMAQMD Significance Threshold	-	85	80	82		
Significant?	No	No	No	No		

Note: Only boat emissions assumed to occur in SMAQMD are included.

Trip Type	Trip Code
Site – Decker Island (fill)	A
Site – SRRQ (rock)	B
Site – Rio Vista	C
Rio Vista – SRRQ	D
Rio Vista - Decker I	E
Site - Korths	F

Miles in each air district				
BAAQMD	YSAQMD	SMAQMD	SJAQMD	Total miles
3.3	1.25	9.82	1.9	16.27
35	10.7	11.32	1.9	58.92
3.45	2.3	12.27	1.9	19.92
30.9	13.2	9.3		53.4
	3.7	2.3		6
		2.1	1.5	3.6

Percentages in each air district				
BAAQMD	YSAQMD	SMAQMD	SJAQMD	Total
0.20	0.08	0.60	0.12	1.00
0.59	0.18	0.19	0.03	1.00
0.17	0.12	0.62	0.10	1.00
0.58	0.25	0.17	0.00	1.00
0.00	0.62	0.38	0.00	1.00
0.00	0.00	0.58	0.42	1.00

		Total Trip Emissions				Emissions in each air district (Maximum lbs/day)				
		NOx	ROG	PM10	PM2.5	BAAQMD	YSAQMD	SMAQMD	SJAQMD	Total
	Barge Mobilization									
D	Material Barge	141	11.9	8.13	7.24	81.6	34.9	24.6	0.0	141.00
E	Crane Barge	5.31	0.45	0.31	0.27	0.0	3.3	2.0	0.0	5.31
						Total NOx	**81.59**	**38.1**	**26.59**	**0.00**
						6.9	2.9	2.1	0.0	11.90
						0.0	0.3	0.2	0.0	0.45
						Total ROG	**6.9**	**3.2**	**2.24**	**0.0**
						4.7	2.0	1.4	0.0	8.13
						0.0	0.2	0.1	0.0	0.31
						Total PM10	**4.7**	**2.2**	**1.53**	**0.0**
						4.2	1.8	1.3	0.0	7.24
						0.0	0.2	0.1	0.0	0.27
						Total PM2.5	**4.2**	**2.0**	**1.36**	**0.0**
	Barge Transport									
B	Material Barge	141	11.9	8.13	7.24	83.8	25.6	27.1	4.5	141.00
A	Crane Barge	15.9	1.34	0.92	0.82	3.2	1.2	9.6	1.9	15.90
F	Workboat	2.55	0.29	0.12	0.11	0.0	0.0	1.5	1.1	2.55
						Total NOx	**87.0**	**26.8**	**38.17**	**7.5**
						7.1	2.2	2.3	0.4	11.90
						0.3	0.1	0.8	0.2	1.34
						0.0	0.0	0.2	0.1	0.29
						Total ROG	**7.3**	**2.3**	**3.26**	**0.7**
						4.8	1.5	1.6	0.3	8.13
						0.2	0.1	0.6	0.1	0.92
						0.0	0.0	0.1	0.1	0.12
						Total PM10	**5.0**	**1.5**	**2.19**	**0.4**
						4.3	1.3	1.4	0.2	7.24
						0.2	0.1	0.5	0.1	0.82
						0.0	0.0	0.1	0.0	0.11
						Total PM2.5	**4.5**	**1.4**	**2.0**	**0.4**
	Barge Demobilization									
C	Material Barge	47.1	3.96	2.71	2.41	8.2	5.4	29.0	4.5	47.10
C	Crane Barge	15.9	1.34	0.92	0.82	2.8	1.8	9.8	1.5	15.90
						Total NOx	**10.9**	**7.3**	**38.81**	**6.0**
						0.7	0.5	2.4	0.4	3.96
						0.2	0.2	0.8	0.1	1.34
						Total ROG	**0.9**	**0.6**	**3.26**	**0.5**
						0.5	0.3	1.7	0.3	2.71
						0.2	0.1	0.6	0.1	0.92
						Total PM10	**0.6**	**0.4**	**2.24**	**0.3**
						0.4	0.3	1.5	0.2	2.41
						0.1	0.1	0.5	0.1	0.82
						Total PM2.5	**0.6**	**0.4**	**1.99**	**0.3**

BAAQMD Annualized Emissions (lbs/day)

# of Trips	Total Emissions
1	81.58989
1	6.885955
1	4.704438
1	4.189438
# of Trips	
30	2512.729
10	32.24954
0	0
	2544.979
30	212.0672
10	2.717886
0	0
	214.7851
30	144.8829
10	1.866011
0	0
	146.7489
30	129.0224
10	1.663184
0	0
	130.6856
# of Trips	
1	10.91114
1	0.917922
1	0.62869
1	0.559413

Total		**Days**	**Avg.**
NOx	2637.48	66	**40.0**
ROG	222.589	66	**3.4**
PM10	152.082	66	**2.3**
PM2.5	135.4344	66	**2.1**

SMAQMD Harborcraft, Dredge and Barge Emission Factor Calculator - Input Data Page

INSTRUCTIONS:
1. Enter inputs into tables A1, A2, A3, and A4 below. Required inputs must be entered to estimate emission rates, optional inputs should be entered if available.
2. After entering inputs, review status and error messages (cell E14); make changes as necessary until this cell is green indicating that inputs are ready.
3. Results may be reviewed in "MainEngineEmissRates" and "AuxEngineEmissRates" tabs, both colored yellow.

Inputs and Status

Inputs color legend	Required Input
	Optional Input
Status and error messages	OK. Default values will be applied to blank model year and HP

A1. Inventory Calendar year

Inventory Calendar Year	2025

A4. Project Information

Inputs	
Date (mm/dd/yyyy):	4/25/2024
Project Name:	Georgiana Slough Erosion Control and Habitat Enhancement
Project Location:	Georgiana Slough
Contact Person:	
Company Name:	
Mailing Address:	
Phone Number:	
Email Address:	

A2. Main Engine Inputs

Required Inputs			Optional Inputs			
Vessel Name	**Vessel Type**	**No. of Engines**	**Engine Model Year**	**Engine Rated Power (hp)**	**Vessel Number**	**Home Port**
Crane Barge Tu g	Tug Boats	1		575		
Material Barge Tugboat	Tug Boats	1		1700		
Work Boat	Work Boats	1		125		

A3. Auxiliary Engine Inputs

Required Inputs			Optional Inputs	
Vessel Name	**Auxiliary Engine Type**	**No. of Engines**	**Engine Model Year**	**Engine Rated Power (hp)**

SMAQMD Harborcraft, Dredge and Barge Emission Factor Calculator - Main Engine Emission Rates

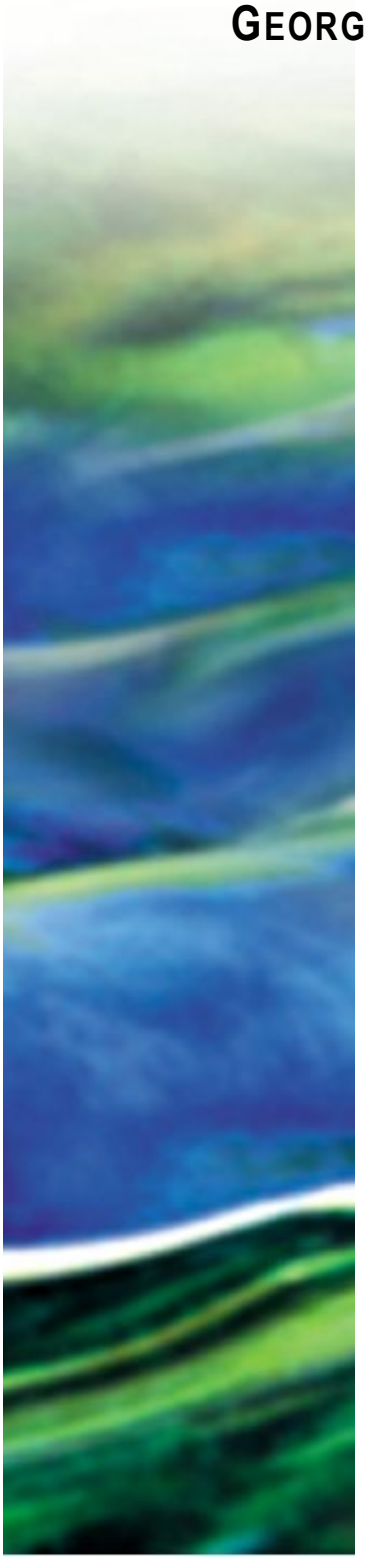
Calendar Year: 2025 **Number of Entries:** 3

Vessel/Engine Information								Emission Rates (lb/hr; estimates for each row are totals over the number of engines listed in column J for that row)										Emission Rates for a Single Engine (g/bhp-hr)									
Vessel Name	Vessel Number	Home Port	Vessel Type	Engine Model Year	Engine Rated Power (hp)	Engine Load Factor	Number of engines	PM_{10}	$PM_{2.5}$	NOx	ROG	CO	SO_2	CO_2	CH_4	N_2O	CO_2e	PM_{10}	$PM_{2.5}$	NOx	ROG	CO	SO_2	CO_2	CH_4	N_2O	CO_2e
Crane Barge Tu			Tug Boats	2004	575	0.50	1	0.306	0.272	5.315	0.447	1.562	0.004	374.621	0.015	0.003	375.907	0.482	0.429	8.385	0.705	2.464	0.006	591.045	0.024	0.005	593.1
Material Barge			Tug Boats	2004	1700	0.50	1	0.904	0.805	15.713	1.321	4.617	0.010	1107.577	0.045	0.009	1111.377	0.482	0.429	8.385	0.705	2.464	0.006	591.045	0.024	0.005	593.1
Work Boat			Work Boats	2008	125	0.45	1	0.031	0.028	0.684	0.078	0.537	0.001	73.296	0.003	0.001	73.547	0.253	0.227	5.513	0.627	4.327	0.006	591.045	0.024	0.005	593.1

Appendix C

Aquatic Species Biological Assessment

BIOLOGICAL ASSESSMENT AND ESSENTIAL FISH HABITAT ASSESSMENT FOR THE BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT GEORGIANA SLOUGH EROSION CONTROL AND HABITAT ENHANCEMENT PROJECT



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Prepared by:

ROBERTSON - BRYAN, INC.
Solutions for Progress

April 2024

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APPENDICES

1 INTRODUCTION

The purpose of this biological assessment (BA) is to review the proposed Brannan-Andrus Levee Maintenance District (BALMD) Georgiana Slough Erosion Control and Habitat Enhancement Project (Project) in sufficient detail to determine to what extent the proposed action may affect any of the threatened, endangered, or proposed species and designated or proposed critical habitats listed below. In addition, the following information is provided to comply with statutory requirements to use the best scientific and commercial information available when assessing the risks posed to listed and designated and critical habitat by proposed federal actions. This BA is prepared in accordance with legal requirements set forth under regulations implementing Section 7 of the Endangered Species Act (ESA; 50 CFR 402; 16 U.S.C. 1536 (c)). This BA addresses species that fall under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS).

Pursuant to Section 14 of the Rivers and Harbors Act of 1899, 33 U.S.C. 408 (Section 408), the Brannan-Andrus Levee Maintenance District has requested permission through the Central Valley Flood Protection Board (CVFPB) from the US Army Corps of Engineers (Corps) to alter the Sacramento River Flood Control Project, an existing federal flood risk management project, authorized by the Flood Control Act of 1917. The BALMD is also seeking Corps authorization under Section 404 of the Clean Water Act for the discharge of dredged or fill material associated with the construction of the Project, including construction of habitat benches. Finally, BALMD is also seeking Corps authorization under Section 10 of the River and Harbors Act.

The following federally listed species (**Table 1**) were considered in this BA.

Table 1. Species under NMFS and USFWS Jurisdiction Evaluated for the Georgiana Slough Erosion Control and Habitat Enhancement Project.

Species[1]	Federal Status	Critical Habitat
Species under NMFS Jurisdiction		
Green Sturgeon Southern DPS *Acipenser medirostris*	Threatened	The action addressed in this document falls within designated critical habitat. (70 Federal Register 52300-52351, October 9, 2009)
Central Valley steelhead DPS *Oncorhynchus mykiss*	Threatened	The action addressed in this document falls within designated critical habitat. (70 *Federal Register* 52488–52536, September 2, 2005)
Central Valley spring-run Chinook Salmon ESU *Oncorhynchus tshawytscha*	Threatened	The action addressed in this document falls within designated critical habitat. (70 *Federal Register* 52488–52627, September 2, 2005).
Sacramento River winter-run Chinook Salmon ESU *Oncorhynchus tshawytscha*	Endangered	Designated critical habitat does not occur within the action area.
Species under USFWS Jurisdiction		
Delta Smelt *Hypomesus transpacificus*	Threatened	The action addressed in this document falls within designated critical habitat. (59 *Federal Register 65256,* December 19, 1994).
Longfin Smelt *Spirinchus thaleichthys*	Proposed Endangered	No critical habitat has been designated for this species
[1]The term "species" under the ESA includes species, subspecies, and, for vertebrates only, "distinct population segments (DPSs)." Pacific salmon are listed as "evolutionary significant units (ESU's)," which are essentially equivalent to DPSs under ESA.		

The 1996 Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended (16 U.S.C. 1801), includes requirements to identify, describe and protect EFH. EFH is the habitat necessary for managed fish to complete their life cycle, thus contributing to a sustainable fishery and a healthy ecosystem. EFH is defined as "…those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." Central Valley spring-run Chinook ESU salmon, Sacramento River winter-run ESU Chinook Salmon and Central Valley fall-/late fall-run Chinook salmon are all species managed under the MSA. The action area is located within and adjacent to Georgiana Slough, which is in the Sacramento River Delta hydrologic unit, which is designated as EFH. Therefore, this document also addresses the potential effects of the Project on EFH.

2 CONSULTATION TO DATE

There has been no consultation regarding the Project with NMFS or USFWS to date.

3 DESCRIPTION OF THE PROPOSED ACTION

3.1 PURPOSE AND OBJECTIVES

The purpose of the Project is to repair areas of levee erosion located on the right bank of Georgiana Slough, along Lower Andrus Island, near the confluence of Georgiana Slough and the Mokelumne River. Specifically, the Project is needed to resolve upper slope erosion problems and major lower slope undercutting issues, increase levee stability and improve the level of flood protection for Lower Andrus Island by repairing areas of levee erosion. The proposed erosion control project will also implement/incorporate methods that provide enhanced fisheries and riparian habitat in this reach of the Sacramento-San Joaquin Delta that currently provides limited fish habitat. Once completed, the project would provide suitable erosion control to the levee utilizing recognized and effective erosion control methodologies, and fish-friendly habitat through the creation of wetland and riparian shaded riverine aquatic (SRA) habitat on the channel margin.

The project objectives are to:

- Provide suitable levee erosion control on approximately 1,500 lineal feet of levee on the right bank of Georgiana Slough, corresponding to Stations 291+00 to 306+00 (Levee Mile 5.51 to 5.80).

- Provide fish-friendly habitat on Georgiana Slough channel margin through the creation of wetland and riparian benches with shaded riverine aquatic (SRA) habitat on the channel margins.

- Minimize long-term maintenance and repair costs by repairing existing areas of erosion using stable and effective erosion control methodologies.

3.2 LOCATION

The project is located in Sacramento County, in the primary zone of the Sacramento-San Joaquin Delta (**Figure 1**). Specifically, the project is located on the right bank of Georgiana Slough, on

Lower Andrus Island. The sites extend over 1,500 lineal feet (LF) of bank, from Levee Mile 5.51 to 5.80, approximately a quarter mile upstream from the confluence of the Mokelumne River (**Figure 2**).

Proposed construction would occur on approximately 1,500 LF of waterside levee and channel margin located on the right bank of Georgiana Slough, adjacent to Lower Andrus Island. Quarried rock material would be sourced and transported to the project site via rock barge from San Rafael. Clean soil for filling the wetland bench would be obtained and transported via barge from Decker Island. The staging of construction materials would be located in an area on the landside of the levee, immediately adjacent to the proposed project site, accessible from Brannan Island Road, near the intersection of Brannan Island Road and Highway 12, west of the Mokelumne River Bridge. Container plants required for the habitat features would be delivered periodically by pickup truck with trailer from a District approved nursery location within 75 miles of the project area. Additionally, a boat launch at B&W Resort and Marina, located 1,000 feet downstream from the confluence of Georgiana Slough and the Mokelumne River, and approximately 0.25 miles downstream from the Project location, would be used for launching the work boat that would be used for tasks around the project site, as needed.

3.3 ACTION AREA

The action area for an ESA Section 7 consultation is defined as all areas that may be affected directly or indirectly by the federal action, and not just the immediate area involved in the action. For the purposes of this BA, the action area includes the approximately 1,500 LF portion of Georgiana Slough, including the bed and bank, where active levee construction will occur between Levee Mile 5.51 and 5.80. The action area also includes approximately 500 LF of Georgiana Slough upstream and downstream of the active construction area due to possible effects of construction on the water quality of the river (e.g., increased turbidity).

In summary the action area includes approximately 1,500 LF of Georgiana Slough, including the river bank (e.g., levee), levee crown, and staging area on the landside of the levee, along with 500 LF of Georgiana Slough upstream and downstream of the active construction area, as shown in Figure 2.

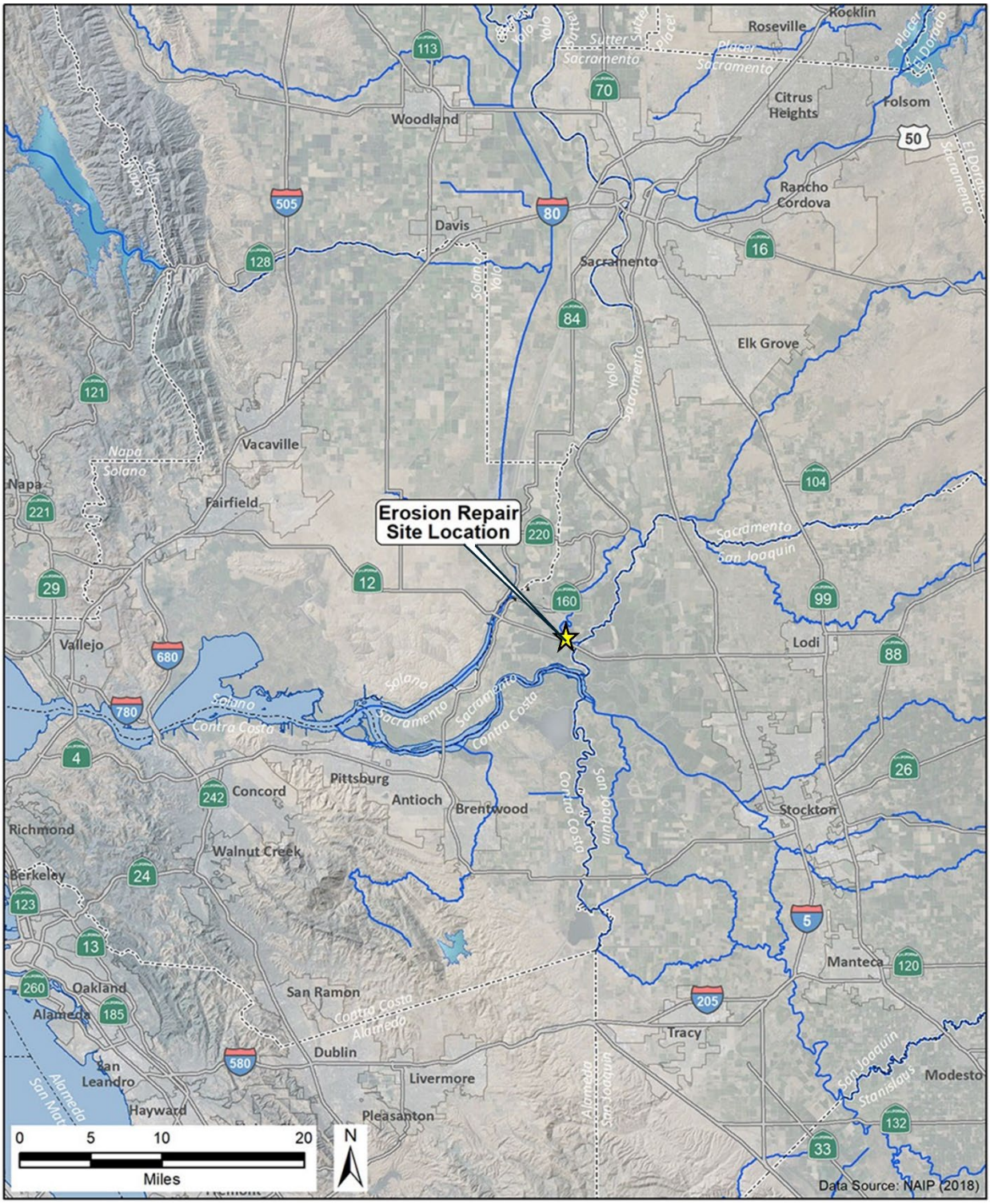

Figure 1. Project Location.

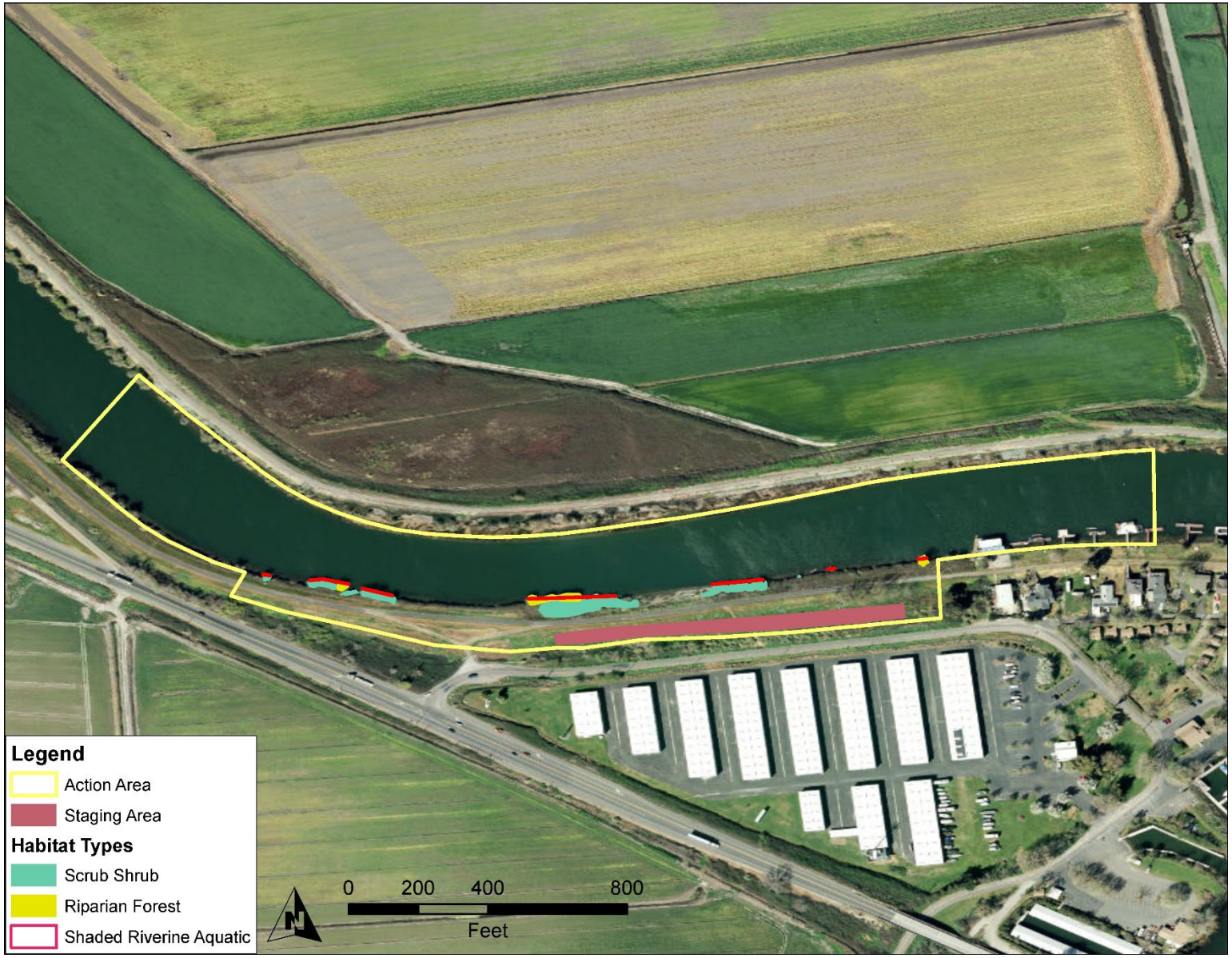

Figure 2. Proposed Project, including the Action Area, Staging Area, and Existing Habitat Types.

3.4 PROJECT COMPONENTS AND CONSTRUCTION PHASING

The Project would be implemented in the following seven phases:

1. Mobilization
2. Site Preparation
3. Waterside Slope Grading of Overburden and Landside Slope Fill Placement
4. Waterside Levee Slope and Bench Construction
5. Removal/Relocation of Encroachments
6. Installation and maintenance of Plants
7. Site Demobilization

Construction at the site would occur beginning upstream to downstream.

75% construction drawings of the Project are located in Appendix A.

3.4.1 Construction Materials

Material necessary for Project construction, with the exception of landside fill, would be imported from offsite locations and transported to the project site by barge and truck, including:

- Rock slope protection (RSP) quarry stone (angular rock ranging from 15 to 400 pounds) and 6-inch minus rock obtained from a quarry in San Rafael and transported via material barge and tug, approximately 50 miles to the project site.
- Soil for the wetland bench would be obtained from Decker Island (15 nautical miles from the Action Area).
- Container plants would be obtained from a nursery within 75 miles of the project site.

3.4.2 Mobilization

Project mobilization would include all preparatory work necessary for the contractor to initiate construction activities. This work would include moving equipment and rock/soil supplies to the action area primarily by barge. A material barge, accompanied by tugboat, would be used to transport rock material from the quarry near San Rafael and soil from Decker Island. A small tugboat (35–40 feet) would be used to move the crane barges to and from the Project site. Tugs used to maneuver the crane and material barges during site mobilization would be present on site periodically during the duration of construction activity (i.e. tugs may be moored or go to other non-related job sites if there is no need to move a barge for a period of time, and the material barges would be traveling back and forth from the quarry and soil sites). A work boat would be used to transport laborers from the barge to the project site. Plants would be transported to the site via pickup truck and trailer.

Mobilization also would include setting up a staging area (Figure 2). Mobilization activities also would include any necessary pre-construction surveys and installation of erosion control and other Best Management Practices (BMP) measures.

3.4.3 Site Preparation (Clearing/Grubbing/Trimming)

Initial site preparation would include debris removal, mowing, tree trimming, limited grubbing, and clearing on the waterside and landside levee slope. As an initial step to preparing the levee slope for construction activities, any trash or other non-vegetated debris would be removed from the waterside and landside levee slope and hauled to an appropriate refuse disposal site (i.e. Keller Canyon Landfill in Pittsburgh, CA).

The Proposed Project may remove some trees that act as shaded riverine habitat as well as require some tree trimming to allow for construction activities to occur under the tree canopy (i.e., to ensure worker safety, the crane boom on the barge must be able to swing freely, without hitting trees). Consistent with BALMD's existing routine maintenance agreement with the California Department of Fish and Wildlife (CDFW), trees less than 2 inches in diameter at 48-inches above the ground and large shrubs would be cut with a flail mower. Grasses and small shrubs also may be cut with a flail mower and left in place. The District will avoid cutting trees larger than 2-inches in diameter as much as practicable. As needed, Small tree trunks (i.e., less than 4 inches in diameter), branches of larger trees, and larger shrubs would be removed with a chainsaw and chipped onsite using a trailer-mounted chipper and transported and stockpiled on a BALMD property on southern Brannan Island. Grubbing would occur to remove any remnant stands of Himalayan blackberry and *Arundo donax* and would be completed using a small excavator (e.g., a Bobcat). Invasive vegetation would be trucked to a landfill or other appropriate disposal site. Since the site is isolated from active roadway traffic no traffic control is anticipated or needed during all phases of construction.

3.4.4 Levee Slope and Bench Construction

Construction of the new levee slope would occur in three phases: 1) removing overburden and vegetation accumulated on the levee face. This borrowed overburden material would be then placed on the back/landside slope; 2) Placing RSP and 6-inch minus backfill material on the waterside levee slope; and 3) placing soil planting fill to complete final grade on the wetland bench and the levee slope utilizing barges, work boats, tugboats, a long-reach excavator, dozer, and excavator.

3.4.4.1 Quarry Stone/Rock Slope Protection and 6-inch Minus Backfill Placement

Work would begin by removing excess overburden and vegetation accumulated on the levee face with a long-reach excavator. This borrowed overburden material would be then placed on the back/landside slope (at a 3:1 slope) of the levee to increase landward stability. The excavated waterside slope would then form the foundation for placement of launchable rip rap (12-18-in) at the levee toe (between elevation -35.0 feet and -20.0 feet (NAVD 88)) where a key bench (6-ft deep by 8-ft wide min.) would be placed to support rock being placed on the lower slope. 12-18" rip rap would then be placed up to the bottom of the waterside bench, at elevation +2.3 feet (NAVD88) at Mean Lower Low Water (MLLW) at a 1.5:1 slope. A triangular prism of quarry stone will also be constructed from MLLW to the Mean Higher High-Water elevation (MHHW, elev. +5.6 NAVD88) to protect the wetland bench from wave wash.

DWR RSP would then be keyed into a bench at that elevation 0.0 (NAVD88) and extend up to the Design Water Surface Elevation (DWSE) at +10.1 feet. (NAVD88). A 6-in layer of 6-inch minus material will be placed over the rip rap to act as a natural filter material between the rock

and soil. A minimum of 12 inches of imported/borrow fill will be provided/mixed as a "planting cap" over the quarry stone. Barges would transport material to the site directly from an established quarry in San Rafael, and material would be placed using a crane barge with a specialized clamshell attachment. Soil fill will be sourced at Decker Island and placed using a crane barge. Once offloaded by the crane barge, material can also be moved and compacted by a long-reach excavator and small front loader from the levee crown. The launchable rip rap would be used to support armoring of the re-sloped embankment and create a new foundation for the wetland habitat bench as well as a 2-foot veneer of erosion protection below the bench. RSP would be placed at a 2:1 slope, depending on the existing topography.

The wetland bench will be constructed following the construction of the rock prism, rip rap and filter placement. The bottom of the wetland bench will be placed at Mean Low Water (MLW) at elevation +2.7-feet (NAVD88). The width of the wetland benches would vary from approximately 16-ft to 17-ft wide with a 7:1 slope, sloping towards the water. The top of the wetland bench will range from elevation +4.0-feet to +6.0-feet depending on topography. **Figure 4** shows a typical wetland cross section and detail of the levee design. Wetland plants would be installed into the soil filled bench with a modest band of scrub shrub and/or shaded riverine aquatic (SRA) habitat planted on and above the wetland bench from approximately elevation +5.2 to +10.0 (NAVD88) along the entire 1500-foot length of the site.

3.4.4.1.1 Crown Raising and Landside Slope Improvement

The excavated material from the water side slope will be used to increase the crown height to elevation +14.0 (NAVD88) to account for the impacts of climate change and increase freeboard above the DWSE. The material will be placed using a long-reach excavator and small front-end loader. The existing levee crown width is approximately 15 to 20 feet wide, the proposed finished crown width will be 25-feet and with a 20-foot-wide gravel patrol road comprised of 6-inch deep Class II aggregate base. The excavated fill will also be placed on the landside slope utilizing a long-reach excavator and small front loader to both flatten the slope and increase the total width of the levee to capture the design levee section. The landside embankment off the crown will slope at a 3:1 to the existing grade.

3.4.4.1.2 Wetland Bench - Freshwater Marsh

The Freshwater marsh/wetland bench (Figure 3) would be constructed above Mean Lower Low Water (MLLW) at elevation +4.0 feet (NAVD88) to allow frequent inundation and development of aquatic and semi-aquatic habitat. The area immediately above the bench will be planted with scrub shrub willows to provide long term habitat benefit as well as increase channel roughness to reduce wave velocity. For wetland benches, materials would include the use of beneficial reuse soil that will come from the waterside re-slope. The bench will have twelve-inches minimum of import fill with 0.5 feet of 6-inch minus to act as a filter between the soil and the 2-foot layer of quarry stone protection below. The bottom elevation of the wetland bench will be at MLW (+2.7-feet NAVD88). The top of the soil within the wetland bench will vary between elevation +4.0 to 6.0 feet NAVD88). Wetland bench width would also vary slightly, from approximately 16 feet to 17 feet wide, depending on the location along the levee. There would be a 7:1 slope maximum waterward within the bench to increase the variability of elevation (between +4.0 and +6.0 NAVD88) and encourage heterogeneity of species. The planted slope above the wetland benches would occur at a 2:1 slope. The project is anticipated to construct approximately 0.39 acres and 1,473 LF of freshwater marsh habitat.

Species will be native hydrophytes grown/harvested locally where possible. Wetlands species, upon consult with CDFW, will include species that can be frequently inundated (CDFW Zone 'B') such as: plants (e.g., American bulrush, California tule, and rush species).

The wetland bench to the DWSE will be faced with heavy coir fabric or another approved equivalent plantable erosion protection method to protect the lower slope from wave wash induced erosion until vegetation reaches full maturity and establishment.

3.4.4.1.3 Waterside Riparian Habitat

Waterside riparian habitat (Figure 3) (combined of riparian forest, shrub scrub and shaded riverine aquatic (SRA) habitat) provides an important source of food inputs for aquatic species that utilize Georgiana Slough. A band of riparian habitat would be planted/established above the wetland benches on the waterside slope across the entire length of the Project. Ecologically suitable species that can be submerged in high water events (CDFW Zone 'C') such as: creeping wildrye, Santa Barbara sedge, rush species, Goodding's black willow, arroyo willow, sandbar willow, button willow and pacific willow, would be planted using hand tools from approximately +4.0 to +10.0 feet (NAVD88) elevation up the slope across the site. Approximately 1.12 acres/1500 LF of riparian habitat (riparian forest, shrub scrub and SRA) habitat will be created.

3.4.4.1.4 Native Grassland

Native grassland habitat will be planted above the wetland benches at elevation +7.0 feet (NAVD88) and extend to the edge of the levee crown (approx. 14.0 ft NAVD88). The species include California fescue, small barley, creeping wildrye, salt grass, and one-sided bluegrass. In addition, the backside of the levee slope will be hydroseeded providing additional acreage of native grassland. A total of 0.75 acres of grasslands will be enhanced at the project site.

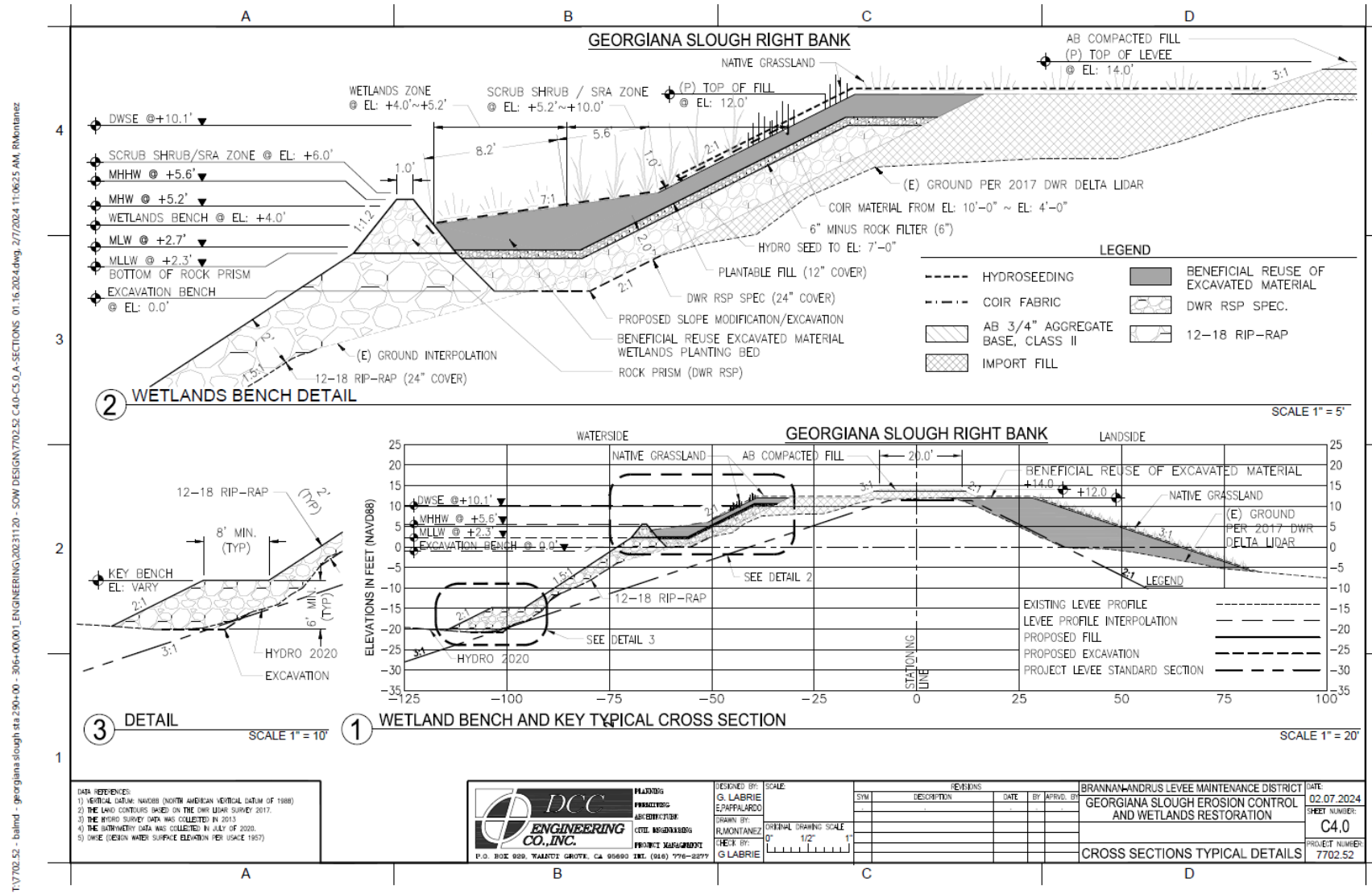

Figure 3. Typical wetland bench cross section.

3.4.5 Installation of Plants

Following construction of the new levee slope and habitat benches, an ecologically suitable mix of plants would be delivered to the site via flatbed truck. The benches would be planted using hand tools with wetland plant species that can be frequently inundated (CDFW Zone 'B') such as American bulrush, California tule, and rush species. From approximately +4.0 to +10.0 feet (NAVD88) elevation up the slope across the site, ecologically suitable species that can be submerged in high water events (CDFW Zone 'C') would be planted using hand tools (e.g. creeping wildrye, Santa Barbara sedge, rush species, Goodding's black willow, arroyo willow, sandbar willow, button willow and pacific willow).

The levee slope above the benches would be hydroseeded with native grasses and planted with California fescue, small barley, creeping wildrye, salt grass, and one-sided bluegrass, and the backside of the levee slope would also be hydroseeded with native grasses. A temporary irrigation system will be installed to water plants during a 3-5 year establishment period. A screened volume pump drawing water from Georgiana Slough will be operated temporarily.

3.4.6 Site Demobilization

Site demobilization would include removal of all equipment and associated site BMPs. The staging area would require minimal demobilization activities since most materials would be removed from the staging area as they are used up during project implementation. Palettes and residual plant materials would be cleaned and removed from the site as the work progresses, leaving nothing onsite at the conclusion of construction. Plant delivery palettes would be returned via truck to the source nursery at the conclusion of construction. Minor trash/debris would be removed from the site and disposed of at an approved facility. Barges, tugs, and work boats would move on to the next unassociated job site or storage dock at the conclusion of construction.

3.4.7 Construction Schedule

With favorable weather and tidal conditions, project construction is expected to be completed over approximately 120 days, anytime between June 15, 2025, and December 30, 2025, following a biological survey to locate any potential raptor nests or ground nesting birds. Note: in-water work would be conducted between August 1 and October 31 to avoid impacts to fish species. However, work above the OHWM may take place at any time over the duration of project construction.

Work, including equipment operation, would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.). Equipment maintenance could occur before and after working hours and on Sunday.

3.4.8 Post-Construction Habitat Maintenance and Monitoring

Following completion of the proposed action, BALMD would conduct a minimum of five years of maintenance and monitoring of the new habitat features to ensure the vegetation is establishing properly. Site maintenance would occur on an as needed basis and focus on managing noxious weeds and ensuring plants receive adequate irrigation (years 1-3) to ensure

that they become established and meet success criteria. Most plant maintenance would include regular periodic watering and weed management until they become established. The tide would inundate portions of the levee slope twice per day; and during portions of the month the tide would inundate partially up the slope and thus provide necessary moisture to wetland bench plants. It is anticipated that maintenance during the first two years would require bi-weekly to monthly site visits during the hot, active growing season (April through September) to ensure proper weed management and irrigation. Subsequent activities during the remaining three years of the maintenance period would occur monthly.

Biological monitoring of the habitat features would occur on an annual basis and begin during the first year following construction. Initial monitoring during the first year would occur in both spring and fall to assess the preliminary condition of the plants relative to meeting overall habitat establishment and survival goals. Subsequent monitoring for the remaining two years of the monitoring period would occur in late summer/early fall.

Plants would be recorded as dead if no viable above ground growth is visible. Dead plants and trees would be replaced as necessary during the first year and annually in subsequent years. Any re-planting would occur either in spring or late fall. Cumulative survival of all plants and trees at the conclusion of the three-year monitoring period would be at least 80 percent.

Invasive weed cover would be estimated visually during annual monitoring. Vegetative cover by invasive species would be less than ten (10) percent of all cover throughout the three-year monitoring period. In the event invasive species cover exceeds the cover criteria during any of the annual monitoring events, maintenance actions would be taken to reduce this cover to less than 10%.

3.4.9 Construction Equipment and Estimated Duration of Use by Project Component

Table 2 shows the equipment type, number of units, estimated duration of use, and estimated truck or barge trips for each phase of the Project.

Table 2. Typical Equipment that may be Used for Construction of the Project

Phase	Equipment Type	Number of Units	Estimated Duration of Use (number of work days)	Estimated Truck or Barge Trips (one-way)
Mobilization	Flatbed Truck (plant transport)	1	3	3
	Pickup Truck (trailer transport)	1	Duration of project	1
	Construction Trailer	1	Duration of project	n/a
	Portable Toilets	2	Duration of project	n/a
Site Preparation	Flail Mower	1	15	n/a
	Trailer-mounted Wood Chipper with Haul Truck	1	15	13
	Chainsaws	2	15	n/a
Levee Slope and Bench Construction	2,000-3,000 ton Material Barge (non-motorized)	1	66	36
	Crane Barge (non-motorized)	1	66	4
	Small Work Boat (40-ft max)	1	66	10
	Row Boat/12-ft Skiff (non-motorized crew transport)	1	66	n/a
	Long Reach Excavator	1	20	2
	Small Excavator (bobcat)	1	44	2
	Small Conveyor w/Generator (soil loading)	1	5	2
	Small Front-End Loader (conveyor loading)	1	5	2
	Tug Boat	1	22	36
Installation of Plants	Pickup Truck (trailer transport)	2	45	n/a
	Hydroseeding Truck	1	2	3
	1,000-gallon Water Truck	1	10	3
Site Demobilization	Pick-up Truck (trailer transport)	1	5	1

3.5 CONSERVATION MEASURES

To avoid and minimize impacts on ESA-listed species, the following measures would be implemented:

The following Conservation Measures (CM) would be incorporated into the Project to assist in mitigating the potential environmental effects during construction. **Table 3** summarizes the general CMs.

Table 3. Summary of Conservation Measures.

Number	Title	Summary
CM 1	Timing of In-Water Work	Timing of construction would occur between August 1 and October 31, which is the work window for ESA listed fishes. Additionally, all in-water will occur during daylight hours and during low tides.
CM 2	Worker Training	Construction personnel would undergo training and education on applicable environmental rules and regulations, and measures necessary to avoid or minimize effects to sensitive resources.
CM 3	Construction Best Management Practices (BMPs) and Monitoring	Standard practices and measures that would be implemented prior to, during, and after construction to avoid or minimize impacts to water quality, aquatic habitat, and listed species.
CM 4	Protection of Landside Wetland Areas	The landside wetland areas within the project footprint would be protected by a buffer and clearly marked for avoidance.
CM 5	Vegetation and Tree Removal and Associated Habitat Creation	Vegetation clearing would only occur within the project footprint. The project would impact 0.09 acres of riparian forest, 0.41 acres of scrub shrub, and 569 LF of Shaded Riverine Aquatic (SRA)(Figure 2). However, the project would create a total of 1.12 acres of riparian habitat (0.30 acres of riparian forest, 0.82 acres of scrub shrub, and 1500 LF of SRA) making the project a net benefit for vegetative habitats.
CM 6	Construction site clean-up	Includes revegetation plan and removal of all construction equipment.
CM 7	Mitigation Acreage and Mitigation Credits for Loss of Soft Bottom Habitat	Includes purchasing mitigation credits to mitigate loss of soft bottom habitat due to the Project.

3.5.1 CM 1: Timing of Work

CM 1 consists of the following measures related to the timing of work.

- All in-water construction activity would be conducted between August 1 and October 31 to ensure protection of anadromous salmonids, Green Sturgeon, Delta Smelt, and Longfin Smelt. This time period is the suggested work window for waterways located within the central zone of the Delta.

- As much work below OHWM work as possible would be performed during low tide to reduce potential impacts to water quality.

- Work, including equipment operation, would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.).

- Equipment maintenance could occur before and after working hours and on Sunday.

- In-water construction activities would be limited to daylight hours, leaving a nighttime period for anadromous salmonids and Green Sturgeon to migrate past the action area.

3.5.2 CM 2: Worker Training

CM 2 consists of the following worker training measure.

- All contractors and equipment operators would participate in a Worker Environmental Awareness Program (WEAP) training regarding potential environmental impacts to make

them aware of the ecological value of the area, including the potential for ESA-listed species and their habitat to be present within the action area.

- The WEAP training would cover, at a minimum, the ESA-listed species listed that have the potential to occur in the action area during construction, a description of the regulatory status and general ecological characteristics of sensitive resources, and review of the limits of construction and avoidance measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form provided by the trainer documenting they have attended the WEAP and understand the information presented to them.

- The WEAP training shall be conducted by a qualified biologist, to aid workers in recognizing ESA-listed species that may occur in the action area.

- Personnel involved in the Project would be trained in emergency response and spill containment techniques.

3.5.3 CM 3: Construction Best Management Practices (BMPs) and Monitoring

CM 3 consists of the following construction BMPs.

- Staging, and both temporary and long-term material disposal areas would be located away from Waters of the United States.

- Equipment would be refueled, maintained, and serviced at designated staging areas away from the erosion repair sites. All refueling, maintenance, and staging of equipment and vehicles shall occur at least 60 feet from bodies of water and in a location where a potential spill would not drain directly toward aquatic habitat (e.g., on a slope that drains away from the water source). Fuel transfer vehicles would have absorbent pads, pillows, socks, booms or other spill containment materials placed under the fueling operation.

- Petroleum products would be stored in non-leaking containers at impervious storage sites from which runoff is not permitted to escape.

- Movement of heavy equipment to and from the Project sites shall be restricted to established roadways and equipment shall be stored in established staging areas away from Georgiana Slough.

- All feasible avoidance and minimization measures would be implemented to control erosion and runoff from areas associated with construction activities. Specifically, use of straw waddles, silt fences, or other erosion control measures would be used to ensure that constructed-related materials do not reach Georgiana Slough. All areas of temporary impacts and all other areas of temporary disturbance which could result in a discharge to Georgiana Slough would be restored.

- Soil disturbance activities would cease if adverse weather conditions substantially increase the likelihood of transporting soil off site.

- A planting and monitoring plan would be submitted to Resource Agencies.

- Active water quality monitoring would occur during the construction portion of the project. Should construction create conditions that exceed standard water quality thresholds, remedial actions will be employed to reduce them back to threshold limits.

- Fugitive dust would be minimized by watering or implementing other dust control measures. Fugitive dust would also be minimized by limiting construction vehicle speeds to 15 miles per hour or less, covering haul vehicles, installing wheel washers or other similar methods where vehicles exit the construction sites onto paved roads.

- Construction activities would be limited to the designated work area, which would be clearly identified on the construction drawings and marked with fencing, stakes, and/or flags before ground-disturbing activities begin.

- All construction equipment would have sound-control devices no less effective than those provided on the original equipment; no equipment shall have an unmuffled exhaust system.

- No pets shall be allowed at the project site.

- All trash that may attract predators shall be properly contained in covered containers and removed from the work site on a regular basis.

- During construction, no litter or construction debris shall be placed within jurisdictional areas. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site. In addition, all project-generated debris, building materials, and rubbish shall be removed from jurisdictional areas and from areas where such materials could be washed into them.

3.5.4 CM 4: Protection of Landside Wetland Areas

CM 4 consists of the following measures to protect the non-jurisdictional wetlands identified on the landside of the levee in the Project area.

- Non-jurisdictional wetlands will be fenced off and no construction activities will occur within the fenced area.
- No construction equipment, staging materials, vehicles, spoil piles, etc., will be allowed within protected buffer areas.
- Wetland areas will remain fenced for the duration of the Project.

3.5.5 CM 5: Vegetation and Tree Removal and Associated Habitat Creation

CM 5 consists of riparian habitat creation intended to offset project impacts to vegetation.

- Vegetation clearing would only occur within the project footprint.

- The Proposed Project would impact a total of 569 lineal feet of SRA and 0.5 acres of riparian habitat (0.09 acres of riparian forest, and 0.41 acres of scrub shrub); however, the project would create 0.30 acres of riparian forest; 0.82 acres of scrub shrub (1.12 acres of total riparian habitat); and 1,500 LF of SRA. (Figure 2).

The project would be a net benefit for all vegetative habitat types.

3.5.6 CM 6: Construction Site Clean-up

CM 6 consists of the following construction site clean-up measures.

- All construction supplies, materials, and debris from the Project would be removed following completion of the Project.

- Plant delivery palettes would be returned via truck to the source nursery at the conclusion of construction.

- Minor trash/debris would be removed from the site and disposed of at an approved facility.

3.5.7 CM: 7 Mitigation Acreage and Mitigation Credits for Loss of Soft Bottom Habitat

CM 7 is designed to mitigate the loss of soft bottomed riverine habitat associated with the proposed action. Green sturgeon utilize soft-bottom habitat to feed. Loss of soft bottom habitats could impact green sturgeon, therefore, the project would mitigate any losses.

The existing levee slope contains existing riprap down to elevation -20.0 NAVD88. However, in order to construct the key, riprap would need to be placed on soft bottom habitat that does not currently have riprap on it, an area that is 10 ft wide along the entire length of the project site (i.e., 1,500 ft). Total permanent impacts to soft bottom habitat would be 1,500 LF by 10 ft width for a total impact area of 0.34 acres.

BALMD will advance mitigate with the purchase of 0.34 acres of Green Sturgeon mitigation credit. Mitigation bank credits will be purchased from Fremont Landing Conservation Bank (operated by Wildlands) prior to project impacts.

4 STATUS OF ESA-LISTED SPECIES AND CRITICAL HABITAT IN THE ACTION AREA

The list of ESA-listed species that could occur within the action area, shown in **Table 4**, was compiled using IpaC, the NMFS website and past consultation processes with USFWS and NMFS involving projects located in the vicinity of the Project. Table 4 also contains each species' federal listing status, critical habitat status, habitat description, and determination of effects.

Table 4. Federally listed species potentially occurring within the action area of the Project.

Common Name; Scientific Name	Federal Listing Status	Critical Habitat Status	Habitat Description	Determination of Effects
Species under NMFS Jurisdiction				
Green Sturgeon Southern DPS *Acipenser medirostris*	Threatened	Final designated October 9, 2009. Critical habitat within action area.	Adult Green Sturgeon are known to spawn in the upper mainstem of the Sacramento River. Subadult and adult Green Sturgeon spend the majority of their life in the coastal marine environment.	Suitable habitat for Green Sturgeon is present within the action area. **May affect, not likely to adversely affect.**
Central Valley steelhead DPS *Oncorhynchus mykiss*	Threatened	Final designated September 2, 2005. Critical habitat within action area.	Drainages of Sacramento and San Joaquin rivers San Francisco, San Pablo, and Suisun bays eastward to Chipps Island.	Suitable habitat for steelhead is present within the action area. **May affect, not likely to adversely affect.**
Central Valley spring-run Chinook Salmon ESU *Oncorhynchus tshawytscha*	Threatened	Final designated September 2, 2005. Critical habitat within action area.	Drainages of Sacramento and San Joaquin rivers. San Francisco, San Pablo, and Suisun bays eastward to Chipps Island.	Suitable habitat for spring-run Chinook Salmon is present within the action area. **May affect, not likely to adversely affect.**
Sacramento River winter-run Chinook Salmon ESU *Oncorhynchus tshawytscha*	Endangered	Final designated June 16, 1992. None within action area.	Drainages of Sacramento river. San Francisco, San Pablo, and Suisun bays eastward to Chipps Island.	Suitable habitat for winter-run Chinook Salmon is present within the action area, however, they are not expected to occur in the action area during in-water work. **May affect, not likely to adversely affect.**
Species under USFWS Jurisdiction[2]				
Delta Smelt *Hypomesus transpacificus*	Threatened	Final designated December 19, 1994. Critical habitat within action area.	Delta Smelt are tolerant of a wide salinity range. They have been collected from estuarine waters up to 14 ppt (parts per thousand) salinity. For a large part of their one-year life span, Delta Smelt live along the freshwater edge of the mixing zone (saltwater-freshwater interface), where the salinity is approximately 2 ppt. Shortly before spawning, adults migrate upstream from the brackish-water habitat associated with the mixing zone and	Suitable habitat for delta smelt is present within the action area, however, they are not expected to occur in the action area during in-water work. **No effects**

Common Name; Scientific Name	Federal Listing Status	Critical Habitat Status	Habitat Description	Determination of Effects
			disperse into river channels and tidally-influenced backwater sloughs. They spawn in shallow, fresh or slightly brackish water upstream of the mixing zone. Most spawning happens in tidally-influenced backwater sloughs and channel edgewaters. Although spawning has not been observed in the wild, the eggs are thought to attach to substrates such as cattails, tules, tree roots and submerged branches. Delta Smelt are found only from the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties (USFWS 1995).	
Longfin Smelt *Spirinchus thaleichthys*	Proposed Endangered	No critical habitat has been designated for this species.	Longfin Smelt are found in areas ranging in salinity from almost pure seawater (35 parts per thousand) upstream to areas of pure fresh water. Distribution of Longfin Smelt is centered in the west Delta, Suisun Bay, and San Pablo Bay. In wet years they may be distributed more toward San Pablo Bay, and in dry years more toward the west Delta. Spawning occurs mainly downstream of about Rio Vista in the Sacramento River, and below Medford Island in the San Joaquin River, with a downstream boundary near Pittsburg and Montezuma Slough.	Suitable habitat for longfin smelt is present within the action area, however, they are not expected to occur in the action area during in-water work. **No effect**s
[1]The term "species" under the ESA includes species, subspecies, and, for vertebrates only, "distinct population segments (DPSs)." Pacific salmon are listed as "evolutionary significant units (ESU's)," which are essentially equivalent to DPSs under ESA. [2] The list of Species under USFWS jurisdiction was developed using IPaC.				

Based on the potential for effects, as described in Table 4, the following ESA-listed species have the potential to be affected by Project:

- Southern DPS Green Sturgeon
- Central Valley DPS Steelhead
- Central Valley Spring-run ESU Chinook Salmon
- Sacramento River Winter-run ESU Chinook Salmon
- Delta Smelt; and
- Longfin Smelt

The following sections provide information on the basic biology, habitat requirements, and life history of the above named ESA-listed species that may be affected by the proposed action.

The temporal occurrence of adult and juvenile Green Sturgeon, steelhead, spring-run Chinook Salmon, winter-run Chinook Salmon, Delta Smelt and Longfin Smelt in or near the action area are shown in **Figure 4.** As described above, all in-water would be conducted during the work window of August 1 through October 31. It is important to note that the NMFS in-water work window for the Central Delta is July 1 to October 31 while the USFWS in-water work window is from August 1 to November 30. Since this project will occur in a location with ESA listed species under both NMFS and USFWS jurisdictions a work window that meets both Services in-water work windows was chosen for the Proposed Action (i.e., August 1 to October 31).

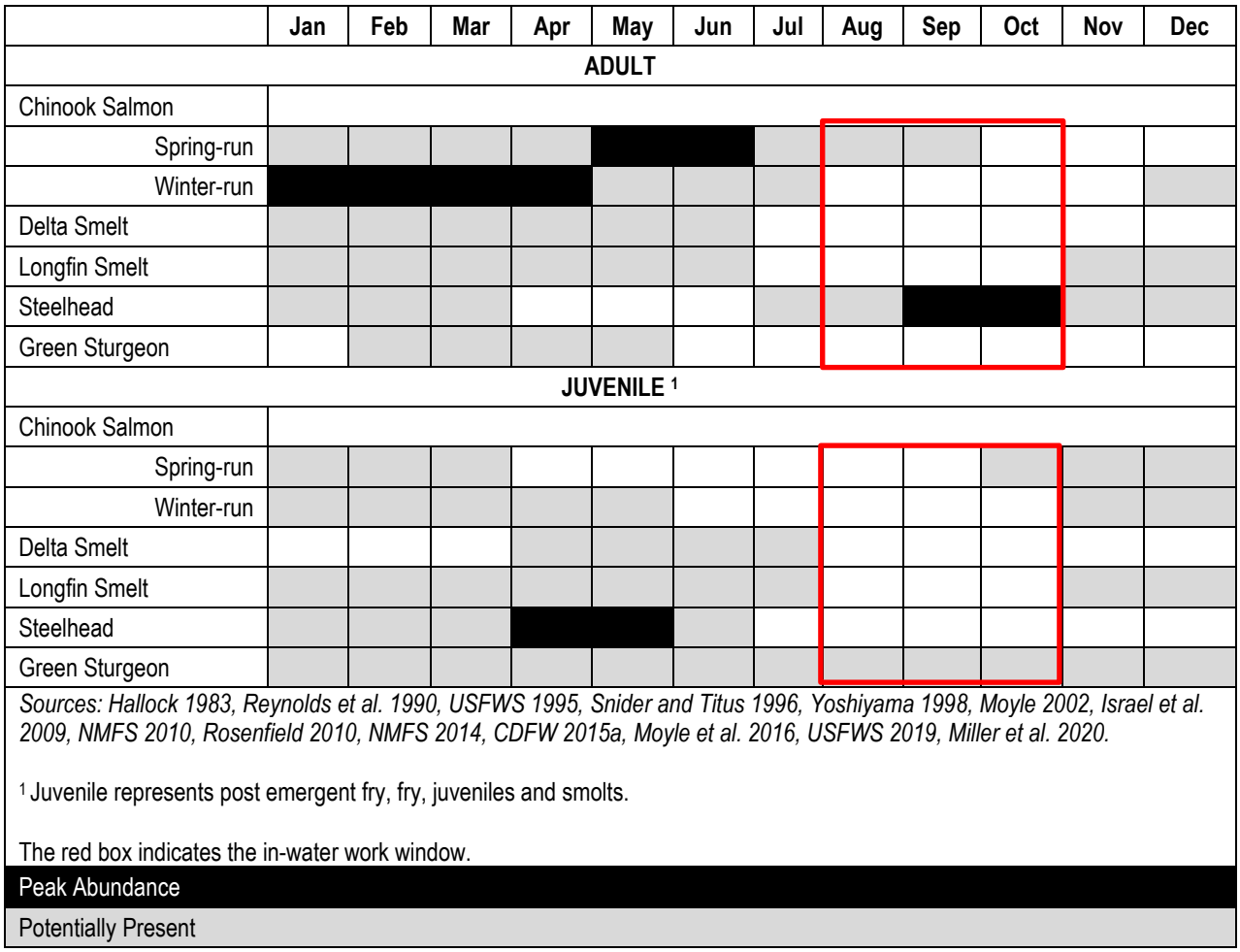

Figure 4. Temporal Occurrences of Adult and Juvenile Green Sturgeon, Steelhead, Spring-run Chinook Salmon, Winter-run Chinook Salmon, Delta Smelt, and Longfin Smelt in Georgiana Slough.

4.1 SOUTHERN DPS GREEN STURGEON

4.1.1 Status

On April 7, 2006, NMFS proposed the Southern DPS (sDPS) of North American Green Sturgeon (*Acipenser medirostris*), which includes all fish populations south of the Eel River, California, as threatened under the ESA (71 FR 17757). The Final Rule establishing take prohibitions for the sDPS was promulgated on June 2, 2010 (75 FR 30714). The designation was based on information that sDPS Green Sturgeon were likely to become endangered in the near future throughout its entire range (NMFS 2015). In August 2018, NMFS released a Recovery Plan for the southern DPS of North American Green Sturgeon (NMFS 2018). A 5-year status review for the sDPS Green Sturgeon was completed in 2021 (NMFS 2021). The review determined that since many of the threats cited in the original listing still existed, the Threatened status is still applicable.

There are 25 living species of sturgeon found worldwide (Bemis and Kynard 1997) and the least is known about North American Green Sturgeon (Erickson et al. 2002). Green Sturgeon are anadromous and have diverse habitat needs that include freshwater streams, rivers, estuarine, and marine waters (COSEWIC 2004, NMFS 2018). Little is known about Green Sturgeons spawning, rearing, migration or feeding behaviors although time spent in freshwater is thought to be minimal (Erickson et al. 2002, Emmett et al. 1991). However, freshwater access is an important component of the sturgeon's life history since it uses freshwater environments for spawning.

Until recently the only confirmed spawning site in the Central Valley was a short stretch of the upper mainstem Sacramento River, below Keswick Dam (NMFS 2010). In 2011 sDPS Green Sturgeon were found spawning in the Feather River, a major tributary to the Sacramento River (Seesholtz et al. 2014, NMFS 2015). This new information suggests other areas within the Central Valley may also be used for spawning. Adequate spawning conditions may have historically been present in the San Joaquin Basin although it is unknown if sDPS Green Sturgeon used these areas or if the fish were absent, rare, common or abundant prior to development (Beamesderfer et al. 2004, Mora, et al. 2009, NMFS 2015).

Published estimates of abundance between 1954 and 2001 ranged from 175 fish to more than 8,000, however there are a number of biases and errors associated with this data so the estimates are considered unreliable (CDFG 2002). Based on surveys of aggregating sites in the upper Sacramento River and estimates of mean spawning periodicity, the total number of adult sDPS Green Sturgeon is 1,348 ± 524 (pers comm. With Ethan Mora, UC Davis, May 6, 2015, as cited in NMFS 2015).

Although information regarding sturgeon habitat use is inadequate, it is thought that most adult fish, in preparation for spawning, follow a direct path to the Sacramento River when leaving the San Francisco Bay. However, a small percentage have been observed to move toward the eastern part of the Delta, following the San Joaquin River and subsequently enter the Sacramento River via the Mokelumne River and delta cross channel (NMFS 2010, Gruber at al. 2012, Jackson and Van Eenennaam 2012).

Reduction in spawning habitat was cited as the principal threat to the sDPS Green Sturgeon population at the time of its listing and was confirmed in the 2015 status review (NMFS 2015). Habitat in the Sacramento River and Sacramento-San Joaquin Delta/Estuary has been greatly modified since the mid-1800s and it functions differently today than it did historically (NMFS 2010). Examples of specific types of habitat alteration listed in the draft recovery plan include: 1) Hydraulic gold mining resulting in removal of gravel and deposition of mercury-laced fine sediment 2) Agricultural practices that have converted tidal and seasonal marshlands to fields 3) Levees that have removed riparian vegetation and channel complexity 4) Alterations to river flow and temperature 5) In water diversions altering flow rates and possibly entraining larval/juvenile sturgeon 6) Introduced and invasive species that have modified trophic relationships.

4.1.2 Critical Habitat

The action area is located within critical habitat for the sDPS Green Sturgeon.

NMFS regulations require the agency to focus on the physical and biological features (PBFs) that are essential for conservation of listed species. The seven PBFs of critical habitat for the southern DPS Green Sturgeon are as follows (NMFS 2018).

- Food resources. Abundant prey items for larval, juvenile, subadult, and adult life stages.
- Substrate type/size (i.e., structural features of substrates). Substrates suitable for egg deposition and development (e.g., bedrock sills and shelves, cobble and gravel, or hard clean sand, with interstices or irregular surfaces to "collect" eggs and provide protection from predators, and free of excessive silt and debris that could smother eggs during incubation), larval development (e.g., substrates with interstices or voids providing refuge from predators and from high flow conditions), and feeding of juveniles, subadults, and adults (e.g., sand/mud substrates).
- Water flow. A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) necessary for normal behavior, growth, and survival of all life stages.
- Water quality. Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages.
- Migratory corridor. A migratory pathway necessary for the safe and timely passage of all life stages within riverine habitats and between riverine and estuarine habitats (e.g., an unobstructed river or dammed river that still allows for safe and timely passage).
- Depth. Deep (i.e., ≥5 meters) holding pools for both upstream and downstream holding of adult or subadult fish, with adequate water quality and flow to maintain the physiological needs of the holding adult or subadult fish.
- Sediment quality. Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages.

4.1.3 Life History

There are three general phases in Green Sturgeon life history: (1) freshwater stage (<3 years old), (2) coastal migrants (3–13 years old for females; 3–9 years old for males); and (3) adults (>13 years old for females, >9 years old for males) (EPIC et al. 2001). Green Sturgeon are long lived (up to 60–70 years) and reach sexual maturity at 16–20 years of age in females and as early as 14 years of age in males (Van Eenennaam et al. 2006). Sturgeon may spawn every three to five years throughout their lives (Moyle 2002, Miller et al. 2020).

Adult Green Sturgeon move into estuaries and lower reaches of rivers between mid-February and early-May to feed (NMFS 2010). Adults captured in the Delta feed off benthic invertebrates including shrimp, mollusks, amphipods, and small fish (Moyle et al. 1992 as cited by NOAA 2015). Tagging studies indicate migration of adults to upstream spawning reaches and

downstream emigrations is rapid, typically occurring over the course of a few weeks (Heublein et al. 2009, Miller et al. 2020). Spawning occurs from April through early July in relatively deep (>3 m), cool (50–63.7° F, Van Eenennaam et al. 2008, Poytress et al. 2010, 2011), turbulent rivers over substrates often dominated by cobbles (Moyle 2002); however, substrates may range from clean sand to bedrock (Emmet et al. 1991).

Females produce 60,000–140,000 eggs (Moyle 2002) that are broadcast and fertilized externally. Adhesive eggs settle to the river bottom and attach to substrates although excessive silt can prevent eggs from attaching to each other and/or substrates, likely resulting in decreased egg survival. Eggs likely hatch within approximately 200 hours at 55°F, based on their presumed similarity to white sturgeon (*A. transmontanus*) (Emmett et al. 1991, Moyle 2002). Green Sturgeon grow quickly and have a relatively short residence time in a river (Van Eenennaam 2006) before migrating downstream toward the Sacramento-San Joaquin Delta/Estuary where they rear for one to four years prior to migrating as subadults to the ocean (NMFS 2010). Juveniles in the Delta feed on opossum shrimp, *Neomysis mercedis*, and *Corophium* amphipods (Radtke 1966 as cited in Beamesderfer 2004).

Post spawn adults hold for several months in deep pools or near spawning sites and migrate downstream to overwintering and rearing habitats when flows increase in fall (NMFS 2010) and temperature decrease to less than 50° F. Green Sturgeon re-enter the ocean from summer through December (Miller et al. 2020).

4.2 CENTRAL VALLEY DPS STEELHEAD

4.2.1 Status

The Central Valley DPS steelhead (*Oncorhynchus mykiss*) was listed as threatened under the ESA on March 19, 1998 (63 FR 13347). Following 5-year status reviews in 2006 and 2011, the species was reaffirmed as threatened. On May 26, 2016 NMFS completed another 5-year status review and recommended the species remain classified as threatened (NMFS 2016a). The Central Valley DPS includes a mixture of hatchery and wild fish, and resident and anadromous steelhead from the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo bays and their tributaries (NMFS 2014, 63 FR 13347). Four artificial steelhead propagation programs are used to mitigate for loss of steelhead habitat: (1) Coleman National Fish Hatchery, (2) Feather River Hatchery, (3) Nimbus Hatchery and (4) Mokelumne Hatchery. The Coleman National, Feathery River, and Mokelumne River hatcheries are considered to be part of the DPS (NMFS 2016a). The four hatcheries release approximately 600,000 yearling smolts annually and these fish now appear to constitute a major proportion of the total Central Valley steelhead population (NMFS 2014).

4.2.2 Critical Habitat

The action area is located within critical habitat for Central Valley steelhead.

The PBFs for critical habitat for Central Valley steelhead consist of:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

- Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. These features are essential to conservation because, without them, juveniles cannot access and use the areas needed to forage, grow, and develop behaviors (e.g., predator avoidance, competition) that help ensure their survival;

- Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival; and

- Estuarine areas free of obstruction and excessive predation.

4.2.3 Life History

Currently, Central Valley steelhead are considered "ocean maturing" or "winter" steelhead (McEwan and Jackson 1996), although "stream maturing" or "summer" steelhead may have been present historically (Moyle 2002). Adult steelhead, typically averaging 600 to 800 mm in length (Moyle 2002), generally leave the ocean and begin upstream migration through the Delta to spawning reaches in the upper San Joaquin tributaries when river flows increase. Entry into the river system occurs to some degree every month except June (McEwan and Jackson 1996) although generally migration occurs from July through March, and peaks in November and December (NMFS 2014).

Unlike salmon, steelhead are iteroparous (i.e., able to spawn repeatedly) and may spawn and return to the ocean for up to four consecutive years before dying; however, it is rare for steelhead to spawn more than twice and the majority of repeat spawners are females (Busby et al. 1996). Although one-time spawners comprise the majority of the population, Shapolov and Taft (1954) reported that historically repeat spawners were relatively numerous (i.e., 17.2%) in California streams. Spawning generally occurs from January through April (McEwan and Jackson 1996) when water temperatures are between 30–52°F. Redds (i.e., "nests" in spawning gravels) are typically dug by female fish in water depths of 10 to 150 cm where water velocities range from 20 to 155 cm/sec (Moyle 2002). Eggs hatch within three to four weeks and fry emerge from the gravel four to six weeks later (Shapovalov and Taft 1954).

Juvenile steelhead rear in their natal streams for 1 to 3 years prior to smoltification. Fish are found in cool flowing water or pools where there is ample cover provided by riparian vegetation (Moyle 2002). Emigration of 1- to 3-year old sub-adults primarily occurs from January through June (Snider and Titus 1996).

Juvenile central valley steelhead can be found in water with summer temperature ranging from 32–81°F (NMFS 2014), however juvenile steelhead in northern California experience various stresses in waters warmer than 71.6°F (Nielsen et al. 1994). Sublethal temperature effects include reduced growth and/or maturation rates, increased vulnerability to predation, and increased risk

of disease. Wurtsbaugh and Davis (1977) found juvenile steelhead growth rates were greatest at 61.5°F, depending on food ration; growth rates declined rapidly above 61.5°F, yet were still positive at 72.5°F, the highest experimental temperature used in their study. Steelhead, like most salmonids, will actively try to avoid unsuitable temperatures through behavioral thermoregulation (i.e., physically moving away from warmer waters) (Keefer et al. 2009).

4.3 CENTRAL VALLEY SPRING-RUN ESU CHINOOK SALMON

4.3.1 Status

Central Valley ESU spring-run Chinook Salmon were listed as threatened under the ESA on September 16, 1999 (50 CFR 50394). 5-year status reviews in 2005 and 2011 reaffirmed their threatened status. A 5-year status review completed in 2016 also recommended that Central Valley Spring-run Chinook Salmon remain classified as threatened, even though the recent drought raised concerns that Central Valley Spring-run Chinook Salmon populations could deteriorate into high extinction risk in the coming years (NMFS 2016b).

Historically, spring-run Chinook Salmon were abundant throughout the Sacramento and San Joaquin River systems, but were extirpated from the entire San Joaquin Basin by 1951 (Lufkin 1991). Naturally-spawning populations of spring-run Chinook Salmon are currently believed to be restricted to accessible reaches of the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Mill Creek, the Feather River, and the Yuba River (CDFG 1998). The Central Valley ESU includes all spawning populations in the Sacramento River and its tributaries, including the Feather River, and one artificial propagation program, the Feather River Hatchery spring-run Chinook program.

To achieve recovery of Central Valley spring-run Chinook ESU two basic strategies have been identified 1) protect and enhance existing populations and 2) reintroduce stocks in historic habitat. Unoccupied former habitat has been prioritized as primary, candidate, or non-candidate areas (NMFS 2014). Primary areas identified for reintroduction of the species include habitat where there is a high likelihood of success based on species-specific life history needs, and available habitat quality and quantity (NMFS 2014). The San Joaquin River from Friant Dam to the Merced River confluence is prioritized as a primary focus for recovery of spring-run Chinook Salmon (NMFS 2014). Currently, a nonessential experimental population is being introduced to this reach of the San Joaquin River.

Habitat degradation is considered the primary reason why Central Valley spring-run ESU are in need of ESA protection. Dam construction has eliminated nearly all historic spawning habitat. Much of the habitat where summer water temperatures are suitable for Chinook Salmon is above 150-500 m elevations, yet most of that high elevation habitat is now upstream of impassible dams (NMFS 2005). Other threats to the ESU include (1) operation of antiquated fish screens, fish ladders, and diversion dams (2) levee construction and maintenance projects that have simplified riverine habitat and have disconnected rivers from floodplain; and (3) water delivery and hydroelectric operation. Threats to the genetic integrity of spring-run Chinook, including hybridization with fall-run Chinook, are also identified as a serious concern.

4.3.2 Critical Habitat

The action area is located within critical habitat for spring-run Chinook Salmon.

The PBFs for critical habitat for spring-run Chinook Salmon consist of:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
- Freshwater rearing habitat with water quantity and quality, floodplain connectivity, forage, and natural cover supporting juvenile development, growth, mobility, and survival;
- Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover, such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival; and
- Estuarine areas free of obstruction and excessive predation supporting mobility and survival, with water quantity, water quality, and salinity conditions supporting juvenile and adult physiological transitions between fresh and saltwater, and natural cover and forage supporting growth, maturation and survival.

4.3.3 Life History

Most life history traits for Central Valley spring-run Chinook ESU are based off characteristics from Sacramento River stocks where native populations still exist. Adult Central Valley spring-run Chinook ESU begin upstream migration from the ocean in late January and early February (CDFW 1998) and continue through September (NMFS 2014). The fish enter rivers sexually immature and hold in deep, cold freshwater pools to mature for several months prior to spawning (Moyle 2002) and generally enter their natal streams from mid-February through July (CDFW 1998). A majority of Central Valley spring-run Chinook ESU enter the Sacramento River basin to spawn as three year olds (Fisher 1994). Spawning typically occurs from mid-August to early October, peaking in September (Moyle 2002).

Water temperature impacts length of time required for embryo incubation. Temperatures between 41–55.4°F and waters with high oxygen saturation are necessary for embryo survival (Moyle 2002). Embryos hatch in 40–60 days then remain in gravel as alevins for 4–6 weeks before emerging as fry (average size 44 mm) in November through March (Moyle 2002). Juveniles from the Sacramento River generally reside in freshwater for 12–16 months and emigrate as yearlings from October through March with peak movement during November and December (NMFS 2014). Length of residency within the Delta is unknown, but the fish are less likely to remain in the late spring months.

4.4 SACRAMENTO RIVER WINTER-RUN ESU CHINOOK SALMON

4.4.1 Status

The Sacramento River winter-run ESU Chinook Salmon was listed as a threatened species under emergency provisions of the federal Endangered Species Act (ESA) in August 1989 (54 Federal Register [FR] 32085; August 4, 1989) and formally listed as threatened in November 1990 (55 FR 46515; November 5, 1990). In June 1992, NMFS proposed reclassifying the species as endangered (57 FR 27416; June 19, 1992) and winter-run ESU Chinook were formally listed as endangered January 4, 1994 (59 FR 440). NMFS developed a draft recovery plan in 1997 that was never finalized. However, the endangered designation status was reaffirmed on June 28, 2005 (70 FR 37160). NMFS completed another 5-Year Review of Sacramento winter-run ESU Chinook Salmon in August 2011 and in December 2016, and again recommended maintaining the endangered classification (NMFS 2011, NMFS 2016c). In July 2014, NMFS released a Recovery Plan for Sacramento River winter-run ESU Chinook Salmon (NMFS 2014). The ESU includes all naturally spawned populations of winter-run ESU Chinook Salmon in the Sacramento River and its tributaries, as well as Chinook Salmon that are part of the conservation hatchery at the Livingston Stone National Fish Hatchery (LSNFH) located at the foot of the Shasta Dam.

Escapement (the amount of fish that escape harvest and return to spawn) of Sacramento River winter-run ESU Chinook in the late 1960s was nearly 100,000 fish but declined to under 200 fish in the 1990s (Good et al. 2005). Since 1998 the LSNFH salmon conservation program has produced and released winter-run ESU Chinook Salmon. This program has been a major factor in preventing species extinction through increasing population size from critical lows in the 1990s (NMFS 2014). By 2006, returns to the hatchery were as high as 17,296 adults (CDFW 2015b). However, the run size decreased again in 2007 and has remained relatively low since then. In 2014 winter-run ESU Chinook escapement was 3,015 (CDFW 2015b). Although the ESU was saved from extinction much of the current population is made up of hatchery fish (NMFS 2014).

Winter-run ESU Chinook historically spawned in the upper Sacramento River system and in Battle Creek (Yoshiyama et al. 1996) as four independent populations (Lindley et al. 2007). However, watershed development has eliminated a substantial portion of historical spawning habitat and current spawning habitat is limited to a reach of the Sacramento River primarily between Keswick Dam downstream to the Red Bluff Diversion Dam (NMFS 2014).

Winter-run ESU Chinook were first listed in 1989 because of blockage of historical habitat by Shasta and Keswick dams, warm water releases, water exports in the southern Delta, loss of rearing habitat, heavy metal contamination from Iron Mountain Mine and entrainment in a large number of unscreened or poorly screen water diversions (NMFS 1997). When winter-run ESU Chinook were initially being evaluated for listing in the late 1980s harvest was not considered to impact the population. However, in the years following the ESA ruling it was determined that ocean fisheries jeopardize winter-run ESU Chinook Salmon and restrictions on harvest have since been adopted (NMFS 2014). Predation on emigrating salmon in the lower Sacramento River and Delta by non-native (striped bass, smallmouth bass and largemouth bass) and native

species (pikeminnow) is an ongoing threat to the ESU (NMFS 2014). Manmade structures in freshwater habitat have provided habitat for predatory fish and led to increased predation levels.

The greatest threat to the population is that the ESU is comprised of a single population with limited spawning and rearing habitats (NMFS 2014). With no other population to buffer the remaining stock from natural fluctuations, the nearly singular age at maturity, low fecundity rates and little contribution by older-year classes a single catastrophe could result in extinction of the ESU (NMFS 2014). Adult Sacramento River winter-run ESU Chinook Salmon spawn only within the Sacramento River basin.

4.4.2 Critical Habitat

Georgiana Slough is not located within critical habitat designated for winter-run Chinook salmon.

4.4.3 Life History

Sacramento River winter-run ESU Chinook depend on cool water temperatures during spawning, embryo incubation and the juvenile rearing period. Upstream spawning migrations through the Delta and into the lower Sacramento River occur from December through July, with peak immigration from January through April (USFWS 1995). The fish enter freshwater sexually immature and must hold for several months in suitable habitat prior to spawning (NMFS 2014). Spawning occurs from mid-April to mid-August, peaking in June and July. For successful spawning, winter-run ESU Chinook require the clear, spring-fed rivers of the upper Sacramento Basin with summer water temperatures from 50°F–59°F and loose gravel (NMFS 1997). In ideal conditions, eggs hatch in 40–60 days and alevins (newly spawned fish still carrying the egg's yolk) remain in the gravel for 4–6 weeks (NMFS 1997). Fry (juvenile fish once the yolk has been absorbed) emerge from the gravel in mid-June through mid-October (NMFS 1997). Fry then disperse to shallow waters with slow currents, fine sediments and bank cover.

After rearing in streamside habitats for almost one year, juvenile salmon migrate downstream during twilight from mid-July with migration peaking in September and occur in the lower Sacramento River primarily from November through early May (NMFS 2014). Fry generally rear in the freshwater upper Delta for the first two months (Kjelson et al. 1981). As juveniles begin smoltification (making physiological changes to survive in salt water), they move further downstream to more saline waters where they forage for zooplankton, copepods, invertebrates and arachnids in shallow areas with protective cover (Kjelson et al. 1981, MacFarlane and Norton 2002, Sommer et al. 2001). Juveniles remain in the Delta until they reach a fork length (length from the tip of the snout to the middle of the tail fin fork) of approximately 118 mm then emigrate to the ocean (Fisher 1994, Myers et al. 1998). Although the fish spend a substantial amount of time rearing in the Delta, the importance of the Delta to winter-run ESU Chinook's life history is not fully understood (NMFS 2014).

4.5 DELTA SMELT

4.5.1 Status

Delta Smelt (*Hypomesus transpacificus*) was listed as a threatened species under the ESA in March 1993 (58 FR 12854). In early 2005, the USFWS reviewed the population status and, based on 37 years of data, recommended that no change in its threatened status was warranted. In April 2010, upon completion of a 12-month finding on a petition to reclassify Delta Smelt as endangered under the ESA, the Service announced that reclassifying the status of the species from threatened to endangered was warranted, but precluded by other higher priority listing actions (75 FR 17667).

Delta Smelt were historically one of the most common fish found in the Sacramento-San Joaquin delta and when the species was listed as threatened in 2005 recovery potential was fairly high. However, in the years since the listing, Delta Smelt numbers have rapidly declined and the imperiled wild population is currently facing extinction. In 2015, with the state facing extreme drought conditions, only six Delta Smelt were captured in the annual spring Kodiak trawl survey which CDFW uses to monitor smelt as they aggregate to spawn (Moyle 2015). Although this survey only represents a sampling of the actual population, low numbers show a decline in the annual abundance of the species over the last decade.

A reduction in suitable habitat has significantly affected the long-term decline of Delta Smelt. Suitable habitat has decreased from 28–78% depending on specific habitat conditions (Feyrer et al. 2007). A majority of the habitat loss has occurred along the periphery of the species range, constraining the distribution of the species to a core region near the confluence of the Sacramento and San Joaquin Rivers (Feyrer et al. 2007). The declining habitat combined with a suppressed pelagic food web has led to a significant decline in the Delta Smelt population (Bennett 2005, Feyrer et al. 2007). As Delta Smelt numbers continue to decline the population can no longer replace themselves and the species is now believed to be facing extinction.

4.5.2 Critical Habitat

The action area is located within critical habitat for Delta Smelt.

PBFs for critical habitat for Delta Smelt consist of:

- Physical habitat – structural components of habitat, including spawning substrate and, possibly, water depth for Delta Smelt;
- Water – suitable water quality conditions (e.g., temperature, turbidity, food availability, entrainment risk, contaminants) to support the various Delta Smelt life stages;
- River flow – transport flows to facilitate migrations to and from spawning habitats; and,
- Salinity – low-salinity zone (freshwater-brackish interface) used as nursery habitat.

4.5.3 Life History

Delta Smelt are endemic to the upper Sacramento-San Joaquin estuary and historically were found below Isleton on the Sacramento River, below Mossdale on the San Joaquin River, and in Suisun Bay (USFWS 1995). However, because of the recent declines in population, there have been substantial changes to the distribution and abundance of the species in its native geographic range (IEPMAS 2015). The majority of the population is usually observed in the northern Delta and near to and west of the Sacramento-San Joaquin River confluence. The 2019 state of scientific understanding indicates that most adult fish aggregate around Grizzly Island, Sherman Island, and in the Cache Slough Complex (USFWS 2019).

Delta Smelt are generally considered a diadromous (i.e., move between fresh and salt water) seasonal reproductive migrant (IEPMAS 2015). A moderately euryhaline (i.e., tolerant of a wide range of salinities) and pelagic (live in open waters near the surface) fish species, Delta Smelt are endemic to the Delta. The species reside in areas with low salinity most of the year, which in most years includes the western Delta and Suisun Bay. However, in early winter, Delta Smelt begin their freshwater migration to spawn. However some smelt remain year round in fresh water (Sommer et al. 2011, Merz et al. 2011).

The spawning period is highly variable from year to year, and may occur from and may occur from late January through June (Moyle et al. 2016), with peak spawning activity typically occurring in April and May (USFWS 2008, Moyle 2002). Spawning occurs near the channel bottom over sandy substrates in shallow areas (Bennett 2005). Delta Smelt spawning has not been observed in the wild. However, based on laboratory studies, spawning typically occurs at night, under a new moon or full moon, and under low tide conditions (Moyle 2002). Spawning success is believed to be associated with lunar periods and occurs within the temperature range of approximately 59–68°F (Bennett 2005). The female broadcasts between 1,200 and 2,600 eggs into the water column, which are fertilized by a dominant male that swims alongside the female releasing milt. Eggs sink to the bottom and adhere to the substrate. Delta Smelt eggs incubate for 9–13 days at temperatures of approximately 59–62°F (Moyle 2002).

The majority of Delta Smelt complete their entire life cycle in one year and the adults die after spawning. However, observations from laboratory studies indicate that, in aquaculture settings, a small proportion (<10 percent) of adults do not spawn until age-two and another small portion of adults survive spawning after age-one and live to spawn as age-two adults (Moyle 2002). Second-year spawners are larger than first-year spawners and thus second-year females may have a much higher fecundity and contribute a higher number of eggs per female relative to first-year spawners (Moyle 2002).

Upon hatching, larval Delta Smelt have a large oil globule, which is semi-buoyant and allows them to stay suspended in the water column just above the river bottom. Delta Smelt larvae begin feeding 4–5 days after hatching. Because they maintain a position near the channel bottom, they are usually not swept downstream by high flows until they are several weeks old and their swim bladder has developed (Moyle 2002). At this stage, the larvae are able to fill the swim bladder with gas, which makes them more buoyant and allows them to move higher in the water column, where higher velocities carry them downstream to the low salinity mixing zone in the Delta

(Moyle 2002). Delta Smelt larvae are transported downstream by river currents to zones of freshwater/saltwater mixing from late March through July (Wang 1986).

Based on their life history, larval Delta Smelt are transported downstream by river flows to the tidal low salinity zone of the Delta, where they rear as juveniles (Bennett 2005; Moyle 2002). According to Bennett (2005), juvenile fish range from 20 to 40 mm in length, while adult fish range from 50 to 80 mm. Moyle (2002) states that adult Delta Smelt range from 55 to 70 mm in length.

Delta Smelt are a thermally sensitive species requiring relatively cold water for survival and reproduction. While their temperature tolerances in the wild are not well understood, Bennett (2005) reports that, based on monitoring studies conducted in the wild, Delta Smelt are most abundant when temperatures are less than 72°F, with greater than 90% of Delta Smelt catches occurring at temperatures less than 68°F. Spawning success is limited to temperatures between 59 and 68°F in laboratory studies (Bennett 2005).

4.6 LONGFIN SMELT

4.6.1 Status

Longfin Smelt (*Spirinchus thaleichthys*) was first petitioned for listing under CESA in August 2007 and was listed as threatened under CESA on March 5, 2009, because of apparent long-term declines in abundance. On April 2, 2012, the USFWS released their 12-month *Findings on a Petition to List the San Francisco Bay-Delta Population of the Longfin Smelt as Endangered or Threatened*. The USFWS determined the listing of Bay-Delta DPS of Longfin Smelt is warranted, however, the listing is precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. This finding means that the Longfin Smelt DPS was added to the list of candidates for ESA listing, where its status will be reviewed annually. Only the Bay-Delta population was advanced to candidate status.

The Delta supports the largest population of Longfin Smelt in California, but their range also extends into San Pablo Bay, San Francisco Bay, South San Francisco Bay, and the Gulf of the Farallones. Longfin Smelt are found in areas ranging in salinity from almost pure seawater (35 parts per thousand) upstream to areas of pure fresh water. Distribution of Longfin Smelt is centered in the west Delta, Suisun Bay, and San Pablo Bay. In wet years they may be distributed more toward San Pablo Bay, and in dry years more toward the west Delta. The primary cause of decline of Longfin Smelt is reduction in outflows associated with water exports from state and federal pumping operations, especially during periods of drought (Moyle 2002). Other factors cited as contributing to decline of Longfin Smelt include entrainment losses to diversions, extreme climatic variation, toxic substances (especially pesticides), predation, and competition from introduced species (Moyle 2002).

4.6.2 Critical Habitat

No Critical Habitat has been designated for this species.

4.6.3 Life History

Longfin Smelt are relatively short-lived, reaching maturity at age two. Most individuals live only two years, but some may live as long as three years. Adult Longfin Smelt move from estuarine areas into rivers to spawn. Spawning occurs in fresh water, over substrates composed of sand and/or gravel, rocks, and aquatic plants, and may occur from November into June, with peak spawning activity occurring from February through April (Emmett et al. 1991, Wang 1986). Each female can lay between 5,000 and 24,000 adhesive eggs. Spawning occurs mainly downstream of about Rio Vista in the Sacramento River, and below Medford Island in the San Joaquin River, with a downstream boundary near Pittsburg and Montezuma Slough (Merz et al. 2013). Longfin Smelt have also been observed in their winter and spring spawning as far upstream as Isleton (USFWS 2012). Once adult Longfin Smelt spawn they die. Longfin Smelt larvae are most common in winter and early spring, but are not found from August through October (Rosenfield 2010). Larvae move up and down in the water column to maintain position within the mixing zone of the Estuary where foraging on small shrimp-like crustaceans occurs. Within three months larvae develop into juveniles. Juveniles and sub-adults are distributed throughout the year in brackish and marine environments.

5 ENVIRONMENTAL BASELINE AND CUMULATIVE EFFECTS

For the proposed action, the environmental baseline is described as "the past and present impacts of all Federal, state, or private actions and other human activities in an action area, the anticipated impacts of all proposed Federal projects in an action area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process" (50 CFR §402.02).

5.1 REGIONAL SETTING

As described above, the erosion control and habitat enhancement site extends over approximately 1,500 LF on the right (south) bank of Georgiana Slough, near the confluence with the Mokelumne River.

The action area is located within the primary zone of the legal boundary of the Sacramento-San Joaquin Delta. The Delta Protection Act of 1992 (SB 1866) established primary and secondary zones of the Delta. These zones were established to protect the agriculture, wildlife habitat, and recreation land uses in the primary zone from potential urban and suburban encroachment. A comprehensive resource management plan for land uses within the primary zone of the Delta was prepared in compliance with the Act (Delta Protection Commission 1995).

The Delta is a complex network of more than 700 miles of tidally influenced channels and sloughs (Simi and Ruhl 2005). The Delta area includes tidally influenced areas from the Sacramento River at the confluence with the American River and the San Joaquin River at Vernalis downstream to Chipps Island (CALFED Bay-Delta Program 2000). The bulk of the total freshwater inflow to the Delta originates from the Sacramento River to the north, and most of the total inflow occurs during winter and early spring (CALFED Bay-Delta Program 2000). From the southeast side of the Delta, the San Joaquin River contributes a high percentage of

inflowing nutrients and food resources (CALFED Bay-Delta Program 2000). Numerous distributaries flow through the low-lying tidal area of the Delta.

The action area is situated in the southern portion of the Sacramento Valley, which lies between the Coast Ranges to the west and Sierra Nevada to the east. The valley floor is nearly level with elevations ranging from near sea level to a few hundred feet above sea level.

The Sacramento Valley is characterized by a semi-arid climate. Summers are hot and dry while winters are cool and moist. The site is influenced by marine breezes. These westerly winds flow through the Carquinez Strait and follow the Sacramento River upstream. Easterly winds, which are cool, and northerly winds, which are warm or hot, also run through the site and affect the seasonal climate of the action area.

5.2 LOCAL SETTING

The action area is located on the right bank of Georgiana Slough, on Lower Andrus Island. The erosion control and habitat enhancement site extend over approximately 1,500 LF of bank, near the confluence of Georgiana Slough and the Mokelumne River. The action area is considered as being in a rural setting. The action area includes both terrestrial and aquatic portions.

The aquatic portion of the action area includes approximately 1,500 LF (0.27 nautical miles [NM]) of Georgiana Slough between RM 0.29 and 0.56 and just upstream and downstream of those locations. This area of the river is tidally influenced. The riverbed is natural-bottomed with rock slope protection along its banks that extend into the river. Shaded aquatic riverine habitat is present along approximately 569 LF of the right bank. SRA habitat is distributed across the action area and consists primarily of white alder (*Alnus rhombifolia*), willow species (*Salix spp*.), and Oregon Ash (*Fraxinus latifolia*).

5.3 STATUS OF ESA-LISTED SPECIES AND CRITICAL HABITAT WITHIN THE ACTION AREA

As discussed in Section 3.4.7, all construction work in the aquatic portion of the action area would be completed during the suggested work window of August 1 through October 31. Therefore, potential construction-related effects on ESA-listed fish species would be limited to those that could occur in the action area during this time period. Based on their potential for use of the action area, southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt may be affected by the Project in the long-term.

5.3.1 Southern DPS Green Sturgeon

Adult Green Sturgeon could use the action area as a migration corridor to and from upstream spawning grounds. Juvenile Green Sturgeon could also use the action area for rearing. Based on adult and juvenile Green Sturgeon temporal occurrences (Figure 4) only juvenile Green Sturgeon could occur in the action area during time periods when construction actions could affect Georgiana Slough.

Critical habitat for Green Sturgeon is present in the action area. PBFs for Green Sturgeon that occur in the action area include water flow, water quality, migratory corridor, depth, and sediment quality.

5.3.2 Central Valley DPS Steelhead

Adult steelhead could use the action area as a migration corridor to and from upstream spawning grounds. Juvenile steelhead could also use the action area for juvenile rearing. Based on adult and juvenile steelhead temporal occurrences (Figure 4) only adult steelhead could occur in the action area during time periods when construction actions could affect Georgiana Slough.

Critical habitat for Central Valley steelhead is present in the action area. PBFs for central valley steelhead that occur in the action area include freshwater migration corridors and freshwater rearing sites.

5.3.3 Central Valley Spring-Run ESU Chinook Salmon

Adult spring-run Chinook Salmon could use the action area as a migration corridor to upstream spawning grounds. Juvenile spring-run Chinook Salmon use the action area for rearing and out-migration. Based on adult and juvenile spring-run Chinook Salmon temporal occurrences (Figure 4) adult and juvenile spring-run Chinook Salmon could occur in the action area during time periods when construction actions could affect Georgiana Slough.

Critical habitat for spring-run Chinook Salmon is present in the action area. The PBF for spring-run Chinook Salmon that occurs in the action area include freshwater migration corridors and freshwater rearing sites.

5.3.4 Sacramento River Winter-Run Chinook Salmon

Adult winter-run Chinook Salmon could use the action area as a migration corridor to upstream spawning grounds. Juvenile winter-run Chinook Salmon use the action area for rearing and out-migration. Based on adult and juvenile winter-run Chinook Salmon temporal occurrences (Figure 4) winter-run Chinook Salmon are not expected to occur in the action area during time periods when construction actions could affect Georgiana Slough.

Georgiana Slough is not critical habitat for winter-run Chinook salmon.

5.3.5 Delta Smelt

As described above (Figure 4), upstream spawning migrations through the Delta and into the lower Sacramento River by Delta Smelt occur from January through June. Juvenile Delta Smelt migrate/drift downstream into the upper Delta from April through July. Therefore, Delta Smelt are not expected to occur in the action area during time periods when Georgiana Slough could be affected by construction activities.

Critical habitat for Delta Smelt is present in the action area. PBFs for Delta Smelt that occur in the action area include physical habitat, water, and river flow.

5.3.6 Longfin Smelt

As described above (Figure 4), peak Longfin Smelt spawning activity in the Delta occurs from February through April downstream of about Rio Vista in the Sacramento River, and below Medford Island in the San Joaquin River. Longfin Smelt larvae are most common in winter and early spring but are not found from August through October. Therefore, Longfin Smelt are not expected to occur in the action area during time periods when Georgiana Slough could be affected by construction activities.

There is no designated critical habitat for Longfin Smelt.

5.4 FACTORS AFFECTING ESA-LISTED SPECIES AND CRITICAL HABITAT IN WITHIN THE ACTION AREA

The action area is primarily used by ESA-listed fishes as a migration corridor and rearing habitat for juvenile fishes. Factors affecting ESA-listed fishes and critical habitat in the action area include the following:

- river channelization, bank stabilization actions (placement of rip-rap) and establishment of levees causing loss of channel complexity, including the elimination of critical floodplain habitat,
- land use changes in the watershed, including dam construction (outside the action area), urban development, and agricultural development,
- introduction of non-native aquatic species (e.g., Largemouth Bass and Striped Bass) , some of which increase predation pressure on indigenous species, including ESA-listed species, and modified trophic relationships,
- manmade structures (bridges and diversion structures) have provided habitat for predatory fish which has led to increased predation levels on native juvenile fishes, including ESA-listed juvenile fishes,
- state and federal fish stocking programs,
- elevated levels of recreational and subsistence fishing, and on-river recreational (boating) activities, and
- Invasive submerged aquatic vegetation provided habitat for predatory fish and led to increased predation levels.

6 EFFECTS OF THE PROPOSED ACTION ON ESA-LISTED SPECIES AND CRITICAL HABITAT DESIGNATIONS

6.1 EFFECTS ASSESSMENT APPROACH

The following section assesses the potential effects of the Proposed Action on spring-run Chinook Salmon, winter-run Chinook Salmon, steelhead, Green Sturgeon, Delta Smelt, Longfin Smelt, and critical habitat for the species in which critical habitat occurs within the action area.

The degree to which these species and their critical habitat designations may be adversely affected by the Proposed Action is a function of:

- Environmental Baseline,
- species and life-stage specific timing in the action area,
- type and degree of use of the action area,
- the Proposed Action's direct effects on each species and life-stage specific timing during and after construction,
- the Proposed Action's indirect effects on each species and life-stage specific timing during and after construction,
- all interrelated and independent activities associated with the Proposed Action, and
- any cumulative effects.

Adult and juvenile Southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt all have the potential to occur in Georgiana Slough during land-based construction activities (June 15 - December 30, 2025). However, because in-water construction activities would only occur during the work window (i.e., August 1 through October 31) adult and juvenile winter-run Chinook Salmon, adult and juvenile Delta Smelt, and adult and juvenile Longfin Smelt would not be present in the action area during in-water construction activities. As such, winter-run Chinook Salmon, Delta Smelt, and Longfin Smelt are not discussed further in relation to temporary construction-related effects. However, these species are considered when assessing the permanent effects from creation of riparian and wetland benches and for potential effects to their critical habitat.

Potential effects of the Proposed Action would be minimized through implementation of the conservation measures (Section 3), as well as through the construction timing and design of the Proposed Action. The proposed period for all terrestrial construction activities is the dry season, from June 15 through December 30. The proposed period for all aquatic-related construction activities is August 1 through October 31.

6.2 POTENTIAL EFFECTS TO ESA-LISTED FISHES

The potential for the Proposed Action to adversely affect ESA-listed fish species and their critical habitat that have the potential to be affected by the Proposed Action can be classified into two general categories: 1) construction-related effects, which typically are temporary in nature, and 2) long-term effects, which typically result from the long-term "operation" of the Proposed Action and can be either temporary or permanent in nature.

Potential construction related effects of the Proposed Action include:

- temporary effects to water quality, including increased turbidity and suspended solids as a result of construction activities that include; site preparation, levee slope and bench construction, and plant installation.

- temporary effects to water quality from contaminants that may wash off construction equipment working in or near the river;

- temporary effects from underwater noise as a result of operating a barge in Georgiana Slough, and from operating construction equipment adjacent to and in the river channel;

- direct effects, including disturbance, injury or mortality, as a result of in-river work activities listed above;

- direct effects from direct strikes or entrainment of fishes and their food resources (i.e., invertebrates, phytoplankton, and zooplankton) from barge trips; and

- temporary effects to predator prey dynamics and increased predation of ESA-listed fish due to shading caused by temporary docking of one barge.

Potential long-term effects of the Proposed Action that could affect ESA-listed fishes or critical habitat designations include:

- effects to habitat from creation of wetland benches in Georgiana Slough.

6.2.1 Temporary Effects

6.2.1.1 Temporary Effects to Water Quality: Increased Suspended Sediment and Turbidity

Site-preparation, levee slope and bench construction, and plant installation would have the potential to introduce suspended sediment into Georgiana Slough.

Site-preparation and construction mobilization would include moving equipment and rock/soil supplies to both the action area and a barge landing/staging area in Rio Vista, primarily by barge. Mobilization would include setting up staging and temporary material storage areas, pre-construction surveys, and installation of erosion control and other construction BMPs (see CM 3). All of this work would be done above the OHWM. Erosion control measures (CM 3) and timing this work to occur during the dry season (CM 1) would eliminate the potential for runoff, soil, and other construction debris to enter Georgiana Slough during this phase of the project.

Construction of the levee slopes would require placement of backfill and planting fill to complete final grade. Some of the levee slope work would occur below the OHWM.

These activities could disturb river sediments and cause construction material, including soil and other particulates and debris to enter into Georgiana Slough, which could increase suspended sediment and turbidity in the action area. At least a small portion of the levee slope construction work would occur below the OHWM. This would also disturb soils and cause localized turbidity plumes at the site.

6.2.1.1.1 Potential Exposure and Effects to ESA-listed Fishes

Temporary water quality impairment could affect ESA-listed fishes if the magnitude and duration of impairment results in direct or indirect effects to fish or their habitat.

Salmonids may alter their migratory behavior by moving laterally or downstream to avoid turbid areas (Sigler et al. 1984). Larger fish tend to be more tolerant of high concentrations of suspended sediment than smaller fish although migrating adult salmonids may cease migration or avoid areas with high silt loads (Bjorn and Resier 1991). Any juvenile salmonids occurring in the area would be expected to swim to an unaffected portion of the river in response to elevated suspended sediment and turbidity and thus would not be expected to be affected by temporary increases in suspended sediment and turbidity. If fish did remain in the construction zone, a sufficient portion of the channel (e.g., along the opposite bank and just upstream) would remain unaffected and provide suitable migration and rearing habitat.

There is little direct information available to assess turbidity effects on juvenile or adult Green Sturgeon. However, elevated turbidity may alter the behavior of adult, subadult and juvenile Green Sturgeon. In a dredging field study, juvenile and adult Atlantic sturgeon avoided water in the vicinity of a dredged material disposal site (Hatin et al. 2007). Therefore, increases in suspended sediment and turbidity related to construction activities could result in avoidance behavior by Green Sturgeon. Turbidity may have the greatest effect on spawning activity of Green Sturgeon (Van Eenennaam et al. 2008). However, because no adult Green Sturgeon are expected to occur in the action area during construction, this component of the Proposed Action would have no effect on Green Sturgeon spawning or egg incubation.

As described above, work is planned to occur in a single construction period between June and December. In-water work would be limited to August 1 to October 31 and most work would occur during low tide (CM 1). Elevated suspended sediment and turbidity levels would occur only during construction activity and would decrease back to baseline levels daily during the nighttime non-construction period. The implementation of appropriate erosion control and pollution prevention BMPs (CM 3), including active water quality monitoring and use of remedial actions if necessary, would ensure construction-related erosion and TSS and turbidity generated from the construction activities does not affect water quality outside of the immediate vicinity of the work area.

Incorporation of CM 1 (Timing of In-water Work) and CM 3 (Construction BMPs that include turbidity monitoring) would minimize suspended sediment levels and turbidity in Georgiana Slough during the construction period. Further, sediment and turbidity levels would be localized, and only elevated for a temporary period of time. Overall, any potential increases in turbidity and suspended sediment levels would be of sufficiently low magnitude and duration to not cause adverse effects to ESA-listed species within the action area.

Based on the levels of suspended sediment and turbidity anticipated to occur, the daily reduction in levels each night, and the overall short duration of exposure, temporary suspended sediment and turbidity generated by the Proposed Action is considered insignificant and it is concluded that relative to water quality, the proposed action may affect but is not likely to adversely affect juvenile Southern DPS Green Sturgeon, adult Central Valley DPS steelhead, and adult and

juvenile Central Valley spring-run ESU Chinook Salmon. Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt are not expected to occur in the action area during in-water work and, therefore, would not be affected by potential changes in water quality.

6.2.1.1.2 Potential Effects to Critical Habitat

The proposed action could cause temporary and localized increases in suspended sediment and turbidity. However, because these would be temporary in nature and not cause any long-term effects to the habitat value, the potential effects are considered insignificant and thus the Proposed Action may affect but is not likely to adversely affect Southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, or Delta Smelt critical habitat.

6.2.1.2 Temporary Effects to Water Quality: Contaminants

Potential sources of contaminant discharges would be from heavy equipment operating near the edge of and in the river channel, and the operation of barges within the river. An accidental spill or inadvertent discharge of contaminants into the action area associated with project activities (e.g., barge operations) could affect water quality.

The use of motorized equipment, and storage and handling of fuels and equipment lubricants and fluids may result in petroleum product discharges that could be harmful to water quality if they directly enter the river or are spilled on the ground where they may be mobilized and transported in stormwater runoff into surface waters following construction. Other potential construction related contaminants associated with the equipment used, contained in products used to construct project facilities, or inadvertently discharged by construction workers may include trash, cleaners, solvents, and human sanitary wastes.

6.2.1.2.1 Potential Exposure and Effects to ESA-Listed Fishes

The magnitude of effects to ESA-listed fishes and their prey organisms resulting from accidental or unintentional contaminant spills would depend on several factors related to the spill, including the proximity to the water body, the type, amount, concentration, and solubility of the contaminant, and the timing and duration of the discharge. The severity of the effect also depends on species and life stage sensitivity, duration of exposure, condition or health of individuals (e.g., nutritional status), and physical or chemical properties of the water (e.g., temperature, dissolved oxygen). Potential effects can range from no effects to mortality of aquatic organisms.

Contaminants entering the action area in sufficient amounts could affect survival and growth rates of ESA-listed fish using the waterbody and other aquatic organisms including prey sources. Petroleum products can cause oily films to form on the water surface that can reduce DO levels available to aquatic organisms. The severity of the effect depends on species and life stage sensitivity, duration and frequency of exposure, condition or health of individuals (e.g., nutritional status), and physical or chemical properties of the water (e.g., temperature, DO).

Potential effects can range from avoidance behavior to mortality, which could result from exposure to acutely lethal concentrations of contaminants or exposure to sub-lethal levels that

cause physiological stress and increase susceptibility to other sources of mortality (e.g., predation, disease).

Construction activities would not occur at night or on weekends (CM 1: Timing of In-water Work), leaving a daily period of approximately 14 hours or more with no construction activity and no potential for inadvertent spills to occur. Additionally, the project description includes implementation of construction BMPs (CM 3) and worker training (CM 2) would avoid and minimize the potential for any discharge of contaminants into Georgiana Slough. These CMs contain measures that are intended to reduce the probability for the release of toxic materials to Georgiana Slough and establish measures to contain any accidental spills quickly.

As such, the potential for contaminants to enter Georgiana Slough are considered to be a discountable effect (i.e., one that is not expected to occur) and thus would not adversely affect ESA-listed fish species. Based on the assessment provided above, the Proposed Action may affect but is not likely to adversely affect juvenile Southern DPS Green Sturgeon, adult Central Valley DPS steelhead, and adult and juvenile Central Valley spring-run ESU Chinook Salmon. Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt are not expected to occur in the action area during in-water work and, therefore, would not be affected by potential accidental spills.

6.2.1.2.2 Potential Effects to Critical Habitat

Utilization of conservation measures, as described above, would aide in preventing contaminants from entering Georgiana Slough in the unlikely event a spill occurred. Because the potential for a spill, and thus the potential for effects from a spill is considered discountable, the Proposed Action may affect, but is not likely to adversely affect Southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, or Delta Smelt critical habitat.

6.2.1.3 Temporary Effects from Underwater Noise

Construction equipment operating adjacent to and in Georgiana Slough during construction would result in temporary periods of elevated noise levels. Anthropogenic noise can induce startle and alarm responses in fish. (Scholik and Yan 2002) causing fish to flee an area (Boussard 1981). Thus, increased noise can temporarily disrupt essential behavior patterns such as feeding and predator escapement. However, such transient startle responses are unlikely to result in adverse impacts as fish are likely to quickly respond to normal behaviors (Popper et al. 2019). Abiotic and biotic sounds are important to fish and many use acoustic signals to communicate. Noise emanating from construction activities can temporarily reduce auditory sensitivity of some fish species (Scholik and Yan 2002) and interfere with signals that affect communication, behavior and fitness (Popper and Hastings 2009, Purser and Radford 2011).

The type and severity of noise impacts would depend on several factors, including the intensity and characteristic of the sound, the distance of the fish from the source, and the frequency and duration of the noise-generating activities. The Fisheries Hydroacoustic Working Group (FHWG), which included representatives from CalTrans, the Federal Highways Administration, Washington State Department of Transportation, Oregon Department of Transportation, Regions 1 and 8 of the USFWS, and NMFS, developed an Agreement in Principal for Interim Criteria for Injury to Fish from Impact Pile Driving Activities. Although these interim criteria were designed

to address sound exposure thresholds associated with pile driving activities the criteria can also be applied to any anthropogenic, intense, and relatively long-duration sound such as that generated from heavy construction equipment (U.S. Department of the Interior and Bureau of Ocean Energy Management 2012). The interim criteria used to determine the onset of physiological effects on fishes are presented in **Table 5**.

Table 5. Fisheries Hydroacoustic Working Group underwater noise criteria for injury to fish from pile driving activities.

Effect	Metric	Fish Mass	Threshold
Onset of physical injury	Peak pressure	N/A	206 dB (re: 1 µPa)
	Accumulated Sound Exposure Level	≥ 2 grams	187 dB (re: 1 µPa)
		< 2 grams	183 dB (re: 1 µPa)
Adverse behavioral effects	Root Mean Square Pressure	N/A	150 dB (re: 1 µPa)

Notes:
dB = decibels
µPa = micropascal
N/A = not applicable
Source: Fisheries Hydroacoustic Working Group 2008

While the criteria in Table 5 are the accepted noise criteria for assessing noise impacts to fish, the information used to determine the criteria was based on very limited experimental data and incomplete studies of the effects of pile driving (U.S. Department of the Interior and Bureau of Ocean Energy Management 2012). More recent research shows that onset of physiological response to noise by salmonids does not occur until noise levels are substantially higher than the criteria in Table 5 (U.S. Department of the Interior and Bureau of Ocean Energy Management 2012).

Popper et al. (2019) suggest there are major issues with threshold used for adverse behavioral affects described in Table 5 since the origin for this threshold is unknown and no scientific basis for it has been documented. The authors suggest the sound pressures to which fish schools actually respond are closer 163dB (re: 1 µPa). However, further studies on wild fishes in their natural environment are necessary before a behavioral threshold can be developed (Popper et al. 2019).

Another issue with the thresholds described in Table 5 is that most species of interest, including salmonids and sturgeon, are primarily detectors of particle motion, not sound pressure (Lovell et al. 2005, Meyer et al. 2012, Popper et al. 2019). Sturgeon, like other fish with swim bladders far removed from the ear, are unlikely to hear anthropogenic sounds unless they are very close to the sound source. It is unknown what level of particle motion would lead to behavioral effects of these species, but it is assumed that it would take a very high level of signal to prompt behavioral changes (Popper et al. 2019).

6.2.1.3.1 Potential Exposure and Effects to ESA-Listed Fishes

Most of the temporary increase in noise associated with the project activities would occur on land away from Georgiana Slough. CM 3 requires all combustion engine equipment be equipped with exhaust mufflers that are in good condition and appropriate for the machines. Based on

inclusion of CM 3, noise levels would be expected to be similar to traffic noise currently generated from the road and bridge located adjacent to the action area. Therefore, noise generated from the terrestrial portion of the Proposed Action would not be expected to be of a magnitude that would cause any behavioral or direct effects to ESA-listed fishes.

Construction noise generated by project activities does not involve pile driving or vibratory installation of material and is therefore expected to be far below the onset of physical injury threshold identified in Table 5. Further, ESA-listed fish that would potentially be present in the action area detect particle motion rather than sound pressure (Popper et al. 2019). It is currently unknown what particle motion threshold would lead to behavioral changes in ESA-listed fishes. Fish would be more likely to move away from the sound and utilize areas of the river that are not impacted by the temporary noise generated by pile driving.

Use of construction equipment adjacent to and in the river channel and pile driving may result in temporary periods of elevated noise levels in Georgiana Slough. However, any increase in noise associated with these activities would be temporary and localized and would not reach levels that would cause substantial impacts. Any behavioral startle or avoidance responses that might occur would be brief and would not have biologically significant consequences; rather, it would aid fish in avoiding direct contact with the equipment.

Georgiana Slough in the action area has a channel width of over 50 meters and there is ample room for fish to swim around and avoid the area in the river where the loudest noises would be generated. Therefore, these effects are considered insignificant and it is concluded that relative to noise, the proposed action may affect but is not likely to adversely affect adult and juvenile Southern DPS Green Sturgeon, adult and juvenile Central Valley DPS steelhead, and adult and juvenile Central Valley spring-run ESU Chinook Salmon. Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt are not expected to occur in the action area during in-water work and, therefore, would not be affected by potential increases in underwater noise.

6.2.1.3.2 Potential Effects to Critical Habitat

The proposed action would cause temporary and localized increases in land based and underwater noise. However, because these increases would be temporary in nature and not cause any long-term effects to the habitat value, the potential effects are considered insignificant and thus the Proposed Action may affect but is not likely to adversely affect Southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, or Delta Smelt critical habitat.

6.2.1.4 Potential Effects from Direct Contact with Construction Equipment

Construction activities that could result in direct effects include any activities using heavy equipment (i.e., small excavator, small conveyor with generator, small front-end loader) in the water. In-water construction activities include construction of the levee slope and wetland benches.

6.2.1.4.1 Potential Exposure and Effects to ESA-Listed Fishes

Underwater noise, turbidity, and flow pattern disruption (i.e., disruption of laminar flow vectors immediately adjacent to the equipment itself), would cause ESA-listed fish that could be present in the work area to likely avoid the equipment, thereby causing most fish to avoid direct contact with the equipment.

As discussed above in 6.2.1.3 potential effects from noise, when salmonids and Green Sturgeon detect sounds they respond with startle and avoidance responses, which would be brief and biologically insignificant (Knudson et al. 1994, NMFS 2013), but sufficient to avoid the equipment. Additionally, construction activities would not occur at night or on weekends (CM 1: Timing of In-water Work), leaving a daily period of approximately 14 hours or more with no construction activity and thus no potential for direct effects from operation of construction equipment in the river channel to occur. Further, CM 3 (Construction BMPs) would be implemented to reduce potential direct injuries to ESA-listed fish.

Based on these considerations, the timing of construction equipment working in the main channel, implementation of CM 1 and 3, effects from potential direct contact with construction equipment are considered insignificant and it is concluded that the proposed action may affect but is not likely to adversely affect adult and juvenile southern DPS Green Sturgeon, adult and juvenile Central Valley DPS steelhead, and adult and juvenile Central Valley spring-run ESU Chinook Salmon. Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt are not expected to occur in the action area during in-water work and, therefore, would not be affected by direct contract with construction equipment.

6.2.1.4.2 Potential Effects to Critical Habitat

The proposed action would cause temporary and localized increases in construction equipment operating in Georgiana Slough. However, because these increases in presence of construction equipment would be temporary in nature and not cause any long-term effects to the habitat value, the potential effects are considered insignificant and thus the Proposed Action may affect but is not likely to adversely affect Southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, or Delta Smelt critical habitat.

6.2.1.5 Potential Effects from Propeller Strikes and Entrainment

A rock barge, accompanied by tug boat, would be used to transport material from a quarry near San Rafael to the action area. A small work boat may be used move crew, and the crane barges between the staging and erosion repair site. Work boats and tugs used to maneuver the barges during site mobilization would be present on site periodically during the duration of construction activity (i.e. tugs may be moored or go to other non-related job sites if there is no need to move a barge for a period of time, and the crane barges would be traveling back and forth from the quarry and soil borrow sites). Work on the levee slope would occur using barges, work boats, and tugs.

Changes in pressure, shear forces, acceleration or deceleration and direct impacts have potential to cause injury to ESA-listed fishes if they come in contact with boat propellers. Barges have potential to entrain larvae, invertebrates, phytoplankton and zooplankton, and as a result have

more potential to affect fishes via impacts to food resources than direct propeller strikes (Miranda and Killgore 2013). However, entrainment from boat propellers is difficult to measure since organisms killed or injured in this manner show no visible scars.

6.2.1.5.1 Potential Exposure and Effects to ESA-Listed Fishes

Fish, such as salmonids that utilize surface waters may be at higher risk of collision with a propeller than benthic dwelling fish such as sturgeon. Due to their small size, direct hits to juvenile salmonids are not expected. Adult salmonids and Green Sturgeon would have the ability to move out of the way of a boat or barge. Noise generated from the watercraft would cause adult fishes to move away from the boat or barge. Further, boats would be moving slowly when utilizing waters in the immediate vicinity of the action area, therefore, direct hits or entrainment of salmonids are not expected to occur.

Sturgeon are benthic dwellers that prefer deep areas of the river so are not expected to be close enough to the surface to be directly affected by propellers or entrainment. Balazik et al. (2012) found direct strikes to Atlantic Sturgeon by small recreational powerboats in the Saint James River, Virginia were rare since fish spent a majority of time near the river bottom.

The Project would only result in minor increases in the number and frequency of barges and small boats operating in the Delta relative to baseline conditions. Further, restriction of barge and tugboat operations from August 1 to October 31 will avoid the primary migration and rearing periods of juvenile anadromous salmonids. Adult salmonids and Green Sturgeon have the ability to move out of the way of barges and boats because of their greater swimming ability (Wolter and Arlinghaus 2003).

Although there is potential for entrainment of phytoplankton and zooplankton (i.e., food supply to ESA-listed fishes) while barges and boats are operating in the river, the watercraft operational period will be outside of the main period when juvenile salmonids are present and feeding in the river. In general most plankton species have a fast regeneration period. For example, phytoplankton species typically have a regeneration period of two to four days (Rojo et al. 1994 as cited in Sarkar et al. 2019). As such, plankton populations would return to the same composition and population size as baseline conditions within a few days of project-related barges and boats completing work. Finally, temporary losses of plankton from entrainment would be negligible relative to the total plankton production that occurs in Georgiana Slough.

For the reasons discussed above, temporary effects to ESA-listed fishes and their prey resources from propeller strikes and entrainment is considered insignificant. It is concluded that the proposed action may affect but is not likely to adversely affect adult and juvenile southern DPS Green Sturgeon, adult and juvenile Central Valley DPS steelhead, and adult and juvenile Central Valley spring-run ESU Chinook Salmon. Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt are not expected to occur in the action area during in-water work and, therefore, would not be affected by propeller strikes and entrainment.

6.2.1.5.2 Potential Effects to Critical Habitat

The proposed action would cause temporary and localized increases in construction equipment (i.e., barges and powerboats with propellers) operating in Georgiana Slough. However, because

these increases in presence of construction equipment would be temporary in nature and not cause any long-term effects to the habitat value, the potential effects are considered insignificant and thus the Proposed Action may affect but is not likely to adversely affect southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, or Delta Smelt critical habitat.

6.2.1.6 Temporary Effects from Shading Caused by Temporary Presence of Barges

Barges would be present in Georgiana Slough, within the action area, intermittently during the in-water construction period. This will cause areas of Georgiana Slough to be artificially shaded during the construction period. Based on the size of the barges, approximately 0.296 acres of the river will be shaded while the barges are present.

The area of shade created by the barges will be temporary, and intermittent since barges will continue to operate between the staging sites and the Project during the 66-day period of in-water construction work. By nature of the construction process, barges will not be anchored in a stationary position. Construction of bank protection features will result in barges being constantly repositioned, therefore shading impacts during construction sequence in any given day will change.

6.2.1.6.1 Potential Exposure and Effects to ESA-Listed Fishes

Anthropogenic structures that cause shading in aquatic environments are of concern because they can decrease light levels that reduce primary production, promote predation by creating favorable conditions for ambush predators, and contribute to increased avoidance behavior during downstream juvenile salmonid migrations (Lange 1999, Kemp 2005).

The effects of shading from temporarily docked or stationed barges is poorly studied. However, shade cast from over-water structures such as bridges can limit light available for photosynthesis affecting primary productivity that supports the food-web of ESA-listed fish species. Artificial shade can also alter the composition of invertebrate species by reducing abundance of larger species that salmonids and Green Sturgeon prefer (Duffy-Anderson and Able 2001). Reduced light can affect the ability of fish to detect and consume prey (Munsch et al. 2014). Since juvenile salmonids are visual predators poor quality habitats under manmade structures can inhibit feeding and may suppress growth of salmonids and demersal fish such as Green Sturgeon (Duffy-Anderson and Able 1999, 2001, Abel et al. 2005).

Information in the literature is conflicting on how artificial structures influence predator and prey aggregations (Lehman et al. 2019). It is thought that shaded areas can increase a predator's capture efficiency by creating a light/dark interface that allows ambush predators to remain in a darkened area and watch for prey to swim against a bright, highly visible background. Predators can see sunlit prey more than 2.5 times as far as a sunlit fish can see into a shaded area (Helfman 1981). However, the potential for artificial structures to create predatory hotspots is dependent on the predator community composition and habitat type (i.e., slope, aquatic vegetation present, etc.) (Lehman et al. 2019, Zeug et al. 2020).

Due to the small area of shade created by the barges, the relatively large area of river that will not be shaded, and the temporary nature of the construction work, it is unlikely that shading will

have any effect on primary productivity. As such, it is not expected that the temporary stationing of barges in the vicinity of the action area will affect prey production, or the ability of ESA-listed fish species to have access to food resources.

The temporary areas of shade created by the barges are also not expected to delay migration of salmonids. In a study that assessed the impacts of shading from a large bridge in Washington State, only some migrating juvenile salmonids were delayed by the shade (Bloch et al. 2009). These fish were only delayed by an average of 10 minutes (Bloch et al. 2009). The areas of shade from the construction barges would be much smaller than that cast by large bridges and thus the artificial shade is expected to create minimal, if any delay in the downstream migration of juvenile salmonids.

Although areas of artificial shade can create favorable conditions for ambush predators, there is no evidence in the Delta that these artificially shaded environments increase the predation rates of ESA-listed fishes (Lehman et al. 2019, Zeug et al. 2020). Although there is potential for barges to increase predatory fish habitat, the barge operational period will be outside of the main period when juvenile salmonids are present and feeding in the river. Juvenile Green Sturgeon within the Delta are typically large and not subject to significant piscivorous predation. Thus, temporary shading from barges is expected to have no impact on juvenile Green Sturgeon.

In conclusion, artificial shade created by construction barges would move throughout the course of each day that the barges are present so that no one area of the river is shaded for any substantial period of time. For the reasons described above, it is unlikely that the presence of construction barges would reduce primary productivity, delay or interfere with migrations, or create predatory hotspots. As such, the impacts to ESA-listed fish species due to the temporary and intermittent stationing of barges in the action area is considered insignificant. It is concluded that the proposed action may affect but is not likely to adversely affect juvenile southern DPS Green Sturgeon, adult Central Valley DPS steelhead, and adult and juvenile Central Valley spring-run ESU Chinook Salmon. Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt are not expected to occur in the action area during in-water work and, therefore, would not be affected by shading created by barges.

6.2.1.6.2 Potential Effects to Critical Habitat

The proposed action could cause temporary and localized increases in areas of artificial shade due to the presence of barges. However, because the artificial shade would be temporary in nature and not cause any long-term effects to the habitat value, the potential effects are considered insignificant and thus the Proposed Action may affect but is not likely to adversely affect Southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, or Delta Smelt critical habitat.

6.2.2 Long-term Effects

6.2.2.1 Creation of Riparian and Wetland Benches in Georgiana Slough

Prior to anthropogenic alterations much of the Delta shorelines were comprised of shallow-water habitat that provided a diverse array of habitat for juvenile salmonids. Today, these shorelines, are characterized primarily by steep-sloped levee embankments reinforced with riprap (Hellmair

et al. 2018). Georgiana Slough within the action area is essentially an armored trapezoidal channel designed to convey water and protect adjacent lands from flooding which provides little suitable rearing and refugia habit for salmonid migrants, and instead, promotes habitat preferred by black basses (*Micropterus* spp.) and other predatory fish species.

Riparian vegetation losses have also occurred in the action area and there are large open areas along banks of Georgiana Slough that lack complex habitat in part due to the large amounts of riprap (Hellmair et al. 2018). In spite of the degraded condition of this habitat, the conservation value of the action area is high because it is used by anadromous fish species for rearing and as a migration pathway.

The Project is located along a reach of Georgiana Slough that is fully leveed and has a channel width of approximately 200 feet. River flow in the area is tidally influenced and shallow-water fish friendly habitats are limited. An objective of the Project is to create vegetated habitat benches to enhance shaded riverine habitat and riparian and wetland benches to provide shallow-water high value seasonal rearing habitat for ESA-listed fish species (e.g. juvenile steelhead and Chinook Salmon).

6.2.2.1.1 Potential Exposure and Effects to ESA-Listed Fishes

The creation of the vegetated benches along the newly stabilized levee would restore loss of ecosystem functions due to modifications of the river bank by providing refugia from predators, increasing foraging opportunities, and creating velocity refugia (McLain and Castillo 2009, McNair 2015, Hellmair et al. 2018, Dahm et al. 2019). This increased habitat availability, continuity and complexity would mimic characteristics of natural shorelines and floodplains used by native fish species including listed salmonids. Restoring habitat diversity and hydraulic complexity would support other ecological functions (e.g., vegetative success and invertebrate production) that are characteristic of natural shorelines and floodplains. Survival and emigration success is expected to increase from increased access to these complex habitats.

Wetland benches would be constructed at a relatively low elevation to allow relatively frequent inundation and development of aquatic and semi-aquatic habitat. Wetland benches will be constructed approximately 1.7 feet above the MLLW (i.e., the average of the lower low water height of each tidal day). The depth would provide optimum short-term rearing and refugia habitat for juvenile salmonids during their winter-spring seaward emigration period, while minimizing the frequency of creating optimum spawning habitats for invasive fishes such as black basses, during their spring-summer spawning period.

Largemouth Bass (*M. salmoides*), Smallmouth Bass (*M. dolomieu*), and Spotted Bass (*M. punctulatus*) dominate Delta waters and pose a predatory threat to emigrating juvenile salmonids (Moyle 2002). Largemouth Bass are one of the most common invasive fish species in the Delta (Nobriga and Feyrer 2007, Young et al. 2018) and are thus used as a surrogate for all black basses in the following discussion. Largemouth Bass typically spawn on nests created near aquatic vegetation and spawning may occur at depths ranging from 0.5–27 feet (Stuber et al. 1982), but most frequently spawn at depths of 3–4 feet (Johnke 1995). Spawning is usually initiated in April, when water temperatures reach 59–61°F (which exceeds the optimal

temperatures for juvenile salmonids reducing habitat overlap potential), and continues through June (Moyle 2002). In rivers, spawning by black basses may extend into July (Moyle 2002).

Survival and development of black bass embryos are dependent on relatively stable water levels, low velocities, and constant inundation (Stuber et al. 1982). Von Geldern and Mitchell (1975) reported that Largemouth Bass spawning was unsuccessful when Millerton Lake, CA, water levels fluctuated during the spawning season. Therefore, survival of embryos to the larval stage may be decreased or precluded by water level fluctuations, particularly if the water level fluctuations results in dewatering of the nests. Based on this information, optimal spawning habitats for Largemouth Bass are defined as stable water depths of 3–4 feet during the period April–July.

The wetland habitat benches would be at an elevation that would have frequent inundation, but there would be periods of time during most days when tides would cause the water to drop and dewater the benches. This dewatering would prevent successful nesting of Largemouth Bass. Outside of the spawning period, bass are typically associated with steeper bank slopes and greater water depths than that provided by the wetland benches (Zanjac et al. 2012). In contrast, migrating juvenile salmonids rely on nearshore riverine habitat that provides shallower depths and slower velocity than the mainstem of the Sacramento River during their outmigrations (Hellmair et al. 2018).

Creation of seasonal, shallow water habitat areas could lead to stranding of ESA-listed fishes due to fluctuating water levels on these newly created habitats. However, native fishes are adapted to the natural hydrologic regimes of floodplains and rivers and, as such, shallow water habitat emigration is likely to be triggered by environmental cues (e.g., increases in floodplain water temperatures as the water recedes, decreases in water surface elevations) (Moyle et al. 2007). Moyle et al. 2007 found native fish generally occur in floodplain habitats earlier (e.g., February through April) than nonnative fish and native fish emigrated from floodplain habitats rapidly (e.g., approximately one week or less) when daily maximum air temperatures rose from 68°F to 77°F. Further, no juvenile salmonids were found to be permanently stranded (i.e., isolated on the floodplain following the final disconnection of the year) during the four-year study (Moyle et al. 2007).

Wetland bench width would vary slightly, from approximately 16 feet to 17 feet wide, depending on the location along the levee. Due to the narrow width of the benches and response to environmental cues, juvenile salmonids are not expected to get stranded. Instead, juvenile salmonids are expected to utilize these nearshore habitat benches for a short period of time during their downstream migration (Hellmair et al. 2018). Delta Smelt, Longfin Smelt, and sturgeon are also not expected to be stranded on the newly constructed wetland benches because these species are not expected to spend any significant amount of time utilizing the benches. If these fish did utilize the habitat benches, they would be expected to cue in on environmental changes (e.g., increasing temperatures, lowering water surface elevations) and exit the area prior to incurring adverse effects.

Although the new benches would cause the action area to become more complex and dynamic relative to baseline conditions it would also partially change the composition of the benthic

environment in the lower slope from one dominated by soft soils to a mixture of soil types and rock slop protection. This rock slope protection could reduce the amount of benthic foraging opportunities for Green Sturgeon. This loss of habitat would be mitigated by CM 7.

Overall, the creation of wetland benches and associated habitat types (shaded aquatic riverine, shrub scrub, freshwater marsh, and riparian forest) are expected to benefit ESA-listed fish species relative to baseline conditions. Newly planted trees will grow over time and add to the overhanging shade as planted trees mature. Increased shade and creation of low velocity habitat would lead to an increase foraging opportunities for migrating salmonids and other native fish species through increased macroinvertebrate production. CM 7 (mitigation acreage) will ensure the project does not negatively impact Green Sturgeon feeding due to loss of soft bottom habitat. Thus, the proposed action may affect but is not likely to adversely affect spring and winter-run Chinook Salmon, steelhead, Delta Smelt, Longfin Smelt, and Green Sturgeon.

6.2.2.1.2 Potential Effects to Critical Habitat

The Project was designed to improve fish habitat for ESA-listed fish in the action area. Nevertheless, the permanent loss of 0.34 acres of soft bottom habitat would occur, which would be mitigated by CM 7. Therefore, the identified habitat effects of the Project would not appreciably diminish the conservation function of PBFs or the capability of designated critical habitat to satisfy essential requirements for the ESA-listed species use of the action area or eliminate access to or otherwise diminish the conservation function of PBFs for critical habitat outside the action area. The construction of habitat benches would increase the conservation function of designated critical habitat for Chinook Salmon, steelhead, and Delta Smelt, while implementation of CM 7 would mitigate for impacts to Green Sturgeon habitat for Green. Thus, the Project would have insignificant effects to designated critical habitat for Chinook Salmon, steelhead, Delta Smelt, and Green Sturgeon.

6.2.3 Summary of the Effects of the Project

All effects assessed for the Project to the listed fish species were found to be discountable or insignificant. No substantial adverse effects to the listed species were identified by the above assessments. Likewise, no significant, adverse effects were identified that will reduce the quantity or quality and thus value of any of the PBFs designated for southern DPS Green Sturgeon, Central Valley DPS steelhead, spring-run Chinook Salmon, or Delta Smelt.

6.3 INTERRELATED AND INTERDEPENDENT EFFECTS

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. There are no anticipated interrelated or interdependent effects associated with the proposed action.

6.4 CUMULATIVE EFFECTS

Cumulative effects are defined by federal regulations as "…those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the

action area of the Federal action subject to consultation" (50 CFR 402.02). Cumulative effects must be considered in the analysis of the effects of the proposed action. This definition of "cumulative effects" does not include "…future Federal actions requiring separate consultation (unrelated to the proposed action)…" (USFWS and NMFS 1998).

There are no known future state, tribal, local, or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the federal action subject to this consultation. In addition, the effects of the Project were found to be discountable, insignificant, or beneficial to listed fish species or their critical habitat designations. Therefore, because there are no adverse effects to cumulate with other effects or stressors to these species within the action area nor are there any known future activities that could cumulate with effects of the Project, there are no anticipated cumulative effects associated with the Proposed Action.

7 CONCLUSIONS

7.1 ESA-LISTED FISH SPECIES

Based on the assessments presented above, all effects to the listed species assessed were found to be beneficial, insignificant, or discountable. Because no significant effects were determined to occur at the individual or population levels due to the Project, the Project will not adversely affect the continued existence or recovery of these species. Based on these findings, the proposed action **may affect, but is not likely to adversely affect** southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, Sacramento River winter-run ESU Chinook Salmon, Delta Smelt, and Longfin Smelt.

7.2 CRITICAL HABITAT

Based upon the project design, the minimal short-term impacts associated with the construction – related components of the Project, and the improvement of critical habitat through construction of the habitat benches the Project will not reduce the quantity or quality or value of any PBFs that exist within the action area. Thus, it is concluded that the Project will **not result in destruction or adverse modification of designated critical habitat** for Southern DPS Green Sturgeon, Central Valley DPS steelhead, Central Valley spring-run ESU Chinook Salmon, or Delta Smelt critical habitat.

8 ESSENTIAL FISH HABITAT

8.1 BACKGROUND

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires Federal agencies to consult with NMFS on activities that may adversely affect Essential Fish Habitat (EFH).

The objective of this EFH assessment is to determine whether or not the proposed action(s) "may adversely affect" designated EFH for relevant commercially, federally managed fisheries species within the proposed action area. It also describes conservation measures proposed to avoid,

minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

A MSA regulation provides that federal fishery management plans should identify specific types or areas of habitat within EFH as "habitat areas of particular concern" (HAPC) based on one or more of the following considerations: 1) the importance of the ecological function provided by the habitat; 2) the extent to which the habitat is sensitive to human-induced environmental degradation; 3) whether, and to what extent, development activities are, or will be, stressing the habitat type; and 4) the rarity of the habitat type (50 C.F.R. § 600.815(a)(8)). The intended goal of identifying such habitats as HAPCs is to provide additional focus for conservation efforts. While the HAPC designation does not add any specific regulatory process, it highlights certain habitat types that are of high ecological importance.

Amendment 18 formally designated five HAPCs for Pacific Salmon: 1) complex channels and floodplain habitats; 2) thermal refugia; 3) spawning habitat; 4) estuaries; and 5) marine and estuarine SAV.

8.2 DESCRIPTION OF THE PROJECT

The Project would repair an area of levee erosion on the right bank of Georgiana Slough, on Lower Andrus Island from River Mile 0.29 to 0.56, approximately one-half mile upstream from the confluence of Georgiana Slough and the Mokelumne River. The Project would increase levee stability and improve the level of flood protection for Lower Andrus Island by repairing an area of levee erosion. Erosion control would be implemented using methods that would also provide enhanced riparian and wetland habitat (i.e., habitat benches) in this reach of Georgiana Slough that currently provides limited fish habitat. Vegetated benches would provide instream cover, create important rearing habitat for fish and reduce water temperatures in the shallow aquatic areas along the bank of Georgiana Slough.

For a complete project description, see Section 3 of this document.

Central Valley spring-run Chinook ESU salmon, Sacramento River winter-run ESU Chinook Salmon and Central Valley fall-/late fall-run Chinook Salmon are all species managed under the Pacific Coast Salmon federal fishery management plans.

During construction, adult and juvenile life stages of late fall-run and spring-run Chinook Salmon, and adult fall-run Chinook Salmon, have the potential to occur in the action area. After construction, when the habitat benches are fully functioning, adult and juvenile life stages of late fall-run, fall-run, winter-run, and spring-run Chinook Salmon have the potential to occur in the action area.

There are no HAPCs located within the action area.

8.3 ASSESSMENT OF EFFECTS

8.3.1 Temporary Construction-related Effects to EFH

As discussed in Section 6.2, during construction activities the Project could cause temporary and localized increases in suspended sediment, turbidity, contaminants, noise, and potential for direct effects from presence of construction equipment in river channel, tugboat propeller strikes or entrainment, and temporary effects from artificial shading. Based upon the Project design and inclusion of conservation measures effects to EFH will be insignificant. It is concluded that the temporary construction-related effects of the Project will have no significant adverse effects on the quality or quantity of EFH.

8.3.2 Long-Term Effects to EFH

An objective of the Project is to create vegetated habitat benches to enhance shaded riverine habitat and riparian and wetland benches to provide shallow-water high value seasonal rearing habitat for ESA-listed fish species (e.g. Chinook Salmon). Newly planted trees will grow over time and add to the overhanging shade as planted trees mature (i.e., >15 years). Increased shade and creation of low velocity habitat would lead to increase foraging opportunities for migrating salmonids through increased macroinvertebrate production. Thus, the long-term effects of the Project to EFH will be beneficial and will have no significant adverse effects on the quality or quantity of EFH.

8.4 CONSERVATION MEASURES

The conservation measures previously described in Section 3.5 of this BA will be implemented to minimize the potential adverse effects to designated EFH described above.

8.5 EFH CONCLUSION

Based upon the project design, conservation measures, the short-term construction related-impacts associated with the Project, the overall habitat benefits that would be created by the habitat benches and because none of the five HAPCs occur within the action area, it is concluded that there will be **no adverse effects** to EFH.

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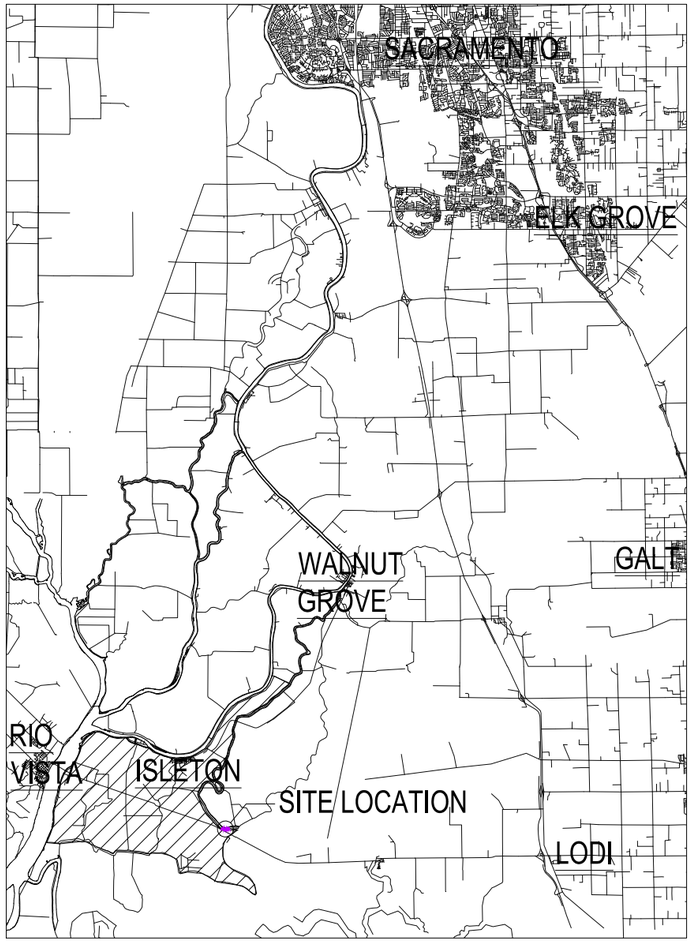
Appendix A

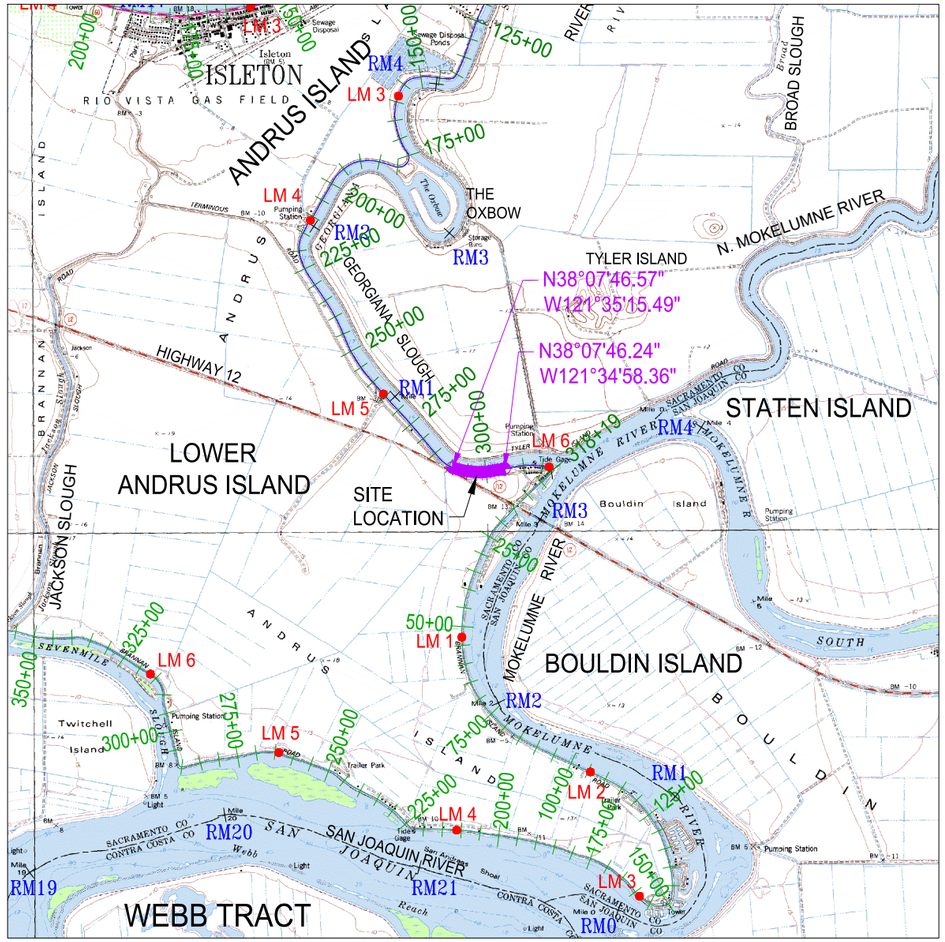
75% Design Construction Drawings

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT

EROSION CONTROL AND RIPARIAN BENCH RESTORATION
GEORGIANA SLOUGH RIGHT BANK
STA 291+00 TO STA 305+00 [RM.25-RM.55]



VICINITY MAP



LOCATION MAP

DRAWING INDEX

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS

SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
VICINITY MAP AND SITE LOCATIONS
DRAWING INDEX

DATE: 12.21.2023
SHEET NUMBER: C1.0
PROJECT NUMBER: 7702.52

GENERAL NOTES

1. GENERAL NOTES AREA APPLICABLE TO ALL WORK, UNLESS OTHERWISE ON OTHER SHEETS.
2. REFERENCE LINE IS INTENDED TO FACILITATE SITE RELATED COMMUNICATION BETWEEN THE CONTRACTOR AND THE ENGINEER.

SURVEY NOTES

1. COORDINATES REFER TO THE CALIFORNIA STATE PLANE COORDINATE SYSTEM ZONE 2, NAD 83, FEET.
2. ELEVATIONS ARE REFERENCE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.
3. LEVEE CENTERLINE PROFILE ELEVATIONS PER DWR LIDAR SURVEY 2017
4. BATHYMETRY DATA WAS OBTAINED FROM A HYDRO BY ENVIRONMENTAL DATA SOLUTIONS DONE IN JUNE OF 2013, AND FROM A HYDRO FROM GAHAGANA & BRYANT ASSOCIATES, INC. JULY 2020
5. THE CONTOURS SHOWN ON THESE PLANS ARE PER THE DWR LIDAR SURVEY OF 2017.
6. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONFIRM FIELD CONDITIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL NOTIFY THE ENGINEER IF A DISCREPANCY IS FOUND THAT WILL AFFECT CONSTRUCTION.

CONSTRUCTION NOTES

1. THE LIMITS OF CONSTRUCTION WORK SHALL BE STAKED BY DCC ENGINEERING.
2. THE DIMENSIONS AND QUANTITIES SHOWN ON THESE PLANS ARE APPROXIMATE AND ONLY INDICATE THE SCOPE OF EACH REPAIR.
3. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL UTILITIES WITHIN THE CONSTRUCTION ZONE, ALONG THE CONSTRUCTION ACCESS ROUTE AND IN STAGING AREAS BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.
4. LEVEE SLOPES SHALL NOT BE CUT IN ORDER TO PROVIDE CONSTRUCTION RAMPS, IF REQUIRED. TEMPORARY CONSTRUCTION ACCESS RAMPS MAY BE CONSTRUCTED DOWN THE WATERSIDE FACE OF THE LEVEE BY PLACING EARTH MATERIALS. UPON COMPLETION OF THE JOB ALL TEMPORARY RAMPS SHALL BE REMOVED AND THE MATERIALS DISPOSED OF BY THE CONTRACTOR. ANY TEMPORARY EARTHWORK ASSOCIATED WITH CONSTRUCTION MUST BE APPROVED BY THE CONTRACTING OFFICER.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE CAUSED BY THE CONTRACTOR TO THE STAGING AREAS, PAVEMENT, ROADS, FENCES, FLOOD CONTROL STRUCTURES, INCLUDING LEVEES, LEVEE RAMPS, AND EXISTING BANK PROTECTION IMPROVEMENTS, VEGETATION, AND ALL OTHER UTILITIES AND IMPROVEMENTS NOT DESIGNATED FOR REMOVAL.
6. EXISTING ROADWAYS SHALL BE KEPT CLEAR OF MUD AND DEBRIES AT ALL TIMES. AT THE STAGING SITE.
7. CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES TO REMAIN WITHIN PROJECT LIMITS, AND WILL BE RESPONSIBLE FOR ANY DAMAGE TO THESE UTILITIES BY CONTRACTOR WORK.
8. EXCAVATION OF WATER SIDE SLOPE; CONSTRUCTION EQUIPMENT ON THE LEVEE SHALL BE APPROVED BY THE DISTRICT ENGINEER PRIOR TO MOBILIZATION TO THE CONSTRUCTION SITE. A PLAN SHALL BE SUBMITTED TO THE DISTRICT ENGINEER ON EQUIPMENT BEING PLACED ON THE LEVEE CROWN OR BENCH. THE AREA ABOVE MLLW +2.3' ELEVATION NAVD 88 MAY BE EXCAVATED FROM THE LEVEE BY AN EXCAVATOR OR LONG REACH EXCAVATOR. THE SLOPE BELOW MLLW +2.3' SHALL BE EXCAVATED BY MARINE EQUIPMENT. THE CUT CAN BE STEPPED AS SHOW ON THE CROSS SECTION PLAN.

LEGEND:

- BENEFICIAL REUSE OF EXCAVATED MATERIAL
- AB COMPACTED FILL
- 70-30 SOIL & 6" MINUS
- 50-50 SOIL & 6" MINUS
- DWR RSP SPEC.
- 12-18 RIP RAP
- RIPARIAN BENCH @ +7.0' ELEV. NAVD88
- WETLAND BENCH @ +3.0' ELEV. NAVD88
- PLANTED TERRAWALL W/GRIPPER LOCK SYSTEM

- (E) LEVEE PROFILE
- (P) FILL
- (P) EXCAVATION
- PROJECT LEVEE STANDARD SECTION
- (P) HYDROSEEDING
- (P) COIR FABRIC
- FLOW — DIRECTION OF WATER FLOW
- TOP OF SLOPE / TOE OF SLOPE — SLOPE
- -10 — CONTOUR ELEVATION
- SURVEY CONTROL POINT
- 1 / C-1 — INDICATES SECTION NUMBER; INDICATES DRAWING SHEET ON WHICH SECTION IS SHOWN
- [20+00] — OLD STATIONING
- 300+00 — CURRENT STATIONING

USACE ROCK SPEC	
STONE WEIGHT POUNDS	CUMULATIVE % FINER BY WEIGHT
400	100
250	70–100
100	50–80
30	32–58
5	2–20
1	0–10
LESS THAN 1/2" MAX. DIMENSION	

NOTE: 5% OF THE MATERIAL CAN WEIGH MORE THAN 400 POUNDS. HOWEVER NO PIECE SHALL WEIGH MORE THAN 500 POUNDS

DWR RSP SPEC		
WEIGHT (LB.)	% SMALLER BY WEIGHT MIN	MAX
400	.	100
300	85	100
70	15	50
15	0	5

LIGHT CLASS ROCK	
ROCK WEIGHT	% LARGER THAN
1/4 TON	0–5
200 LB.	50–100
25 LB.	95–100

ABBREVIATIONS:

APPROX.	APPROXIMATE
CL	CENTER LINE
COE	CORPS OF ENGINEERING
DFE	DESIGN FLOOD ELEVATIONS
DSC	DELTA STEWARDSHIP COUNCIL
DWG	DRAWING
DWR	DEPARTMENT OF WATER RESOURCES
ELEV., EL.	ELEVATION
EP	EDGE OF PAVEMENT
(E), EX., EXIST.	EXISTING
FFLH	FISH FRIENDLY LEVEE HABITAT
FT	FEET
L	LENGTH
MIN.	MINIMUM
NTS	NOT TO SCALE
O.C.	ON CENTER
P	PROPOSED
PNT	POINT
RSP	ROCK SLOPE PROTECTION
SPEC	SPECIFICATIONS
STA	STATION
USACE	US ARMY CORPS OF ENGINEERS

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

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SYM	DESCRIPTION	DATE	BY	APRVD. BY
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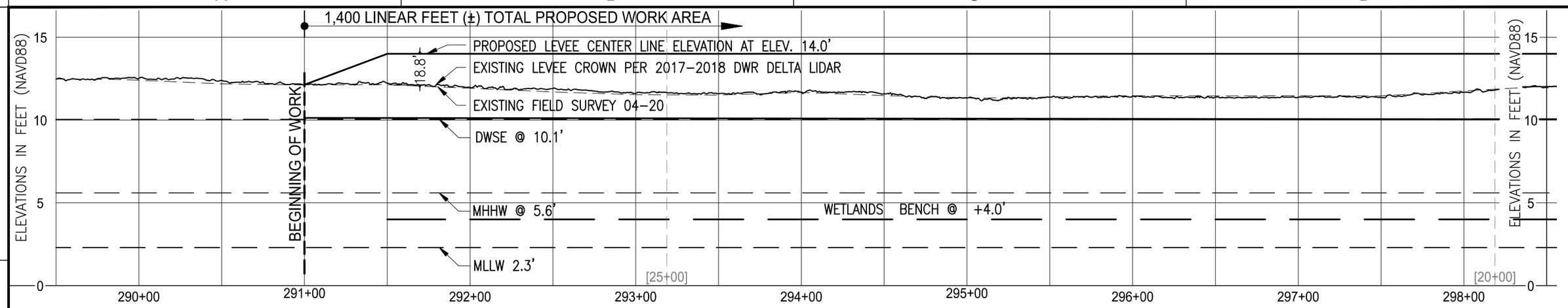
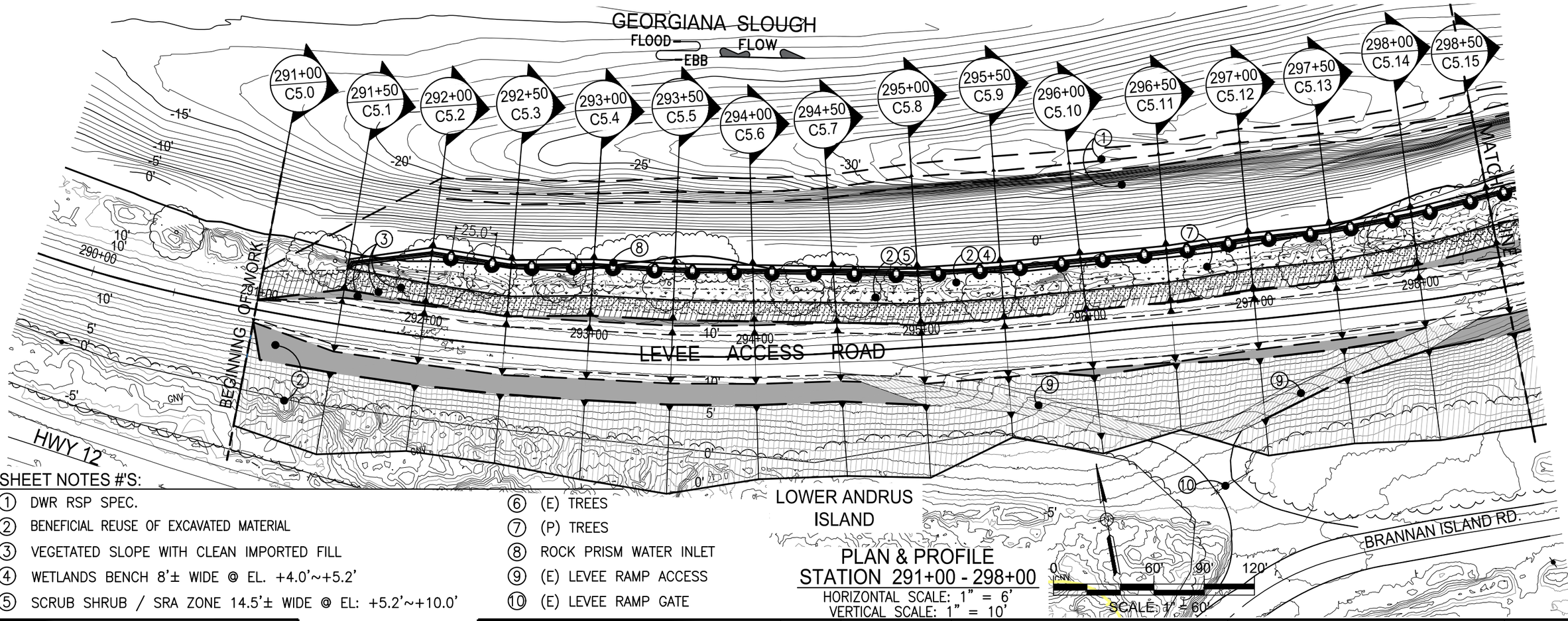
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
GENERAL NOTES
SPECIFICATIONS

DATE: 12.21.2023
SHEET NUMBER: C2.0
PROJECT NUMBER: 7702.52





SHEET NOTES #'S:

① DWR RSP SPEC.
② BENEFICIAL REUSE OF EXCAVATED MATERIAL
③ VEGETATED SLOPE WITH CLEAN IMPORTED FILL
④ WETLANDS BENCH 8'± WIDE @ EL. +4.0'~+5.2'
⑤ SCRUB SHRUB / SRA ZONE 14.5'± WIDE @ EL: +5.2'~+10.0'
⑥ (E) TREES
⑦ (P) TREES
⑧ ROCK PRISM WATER INLET
⑨ (E) LEVEE RAMP ACCESS
⑩ (E) LEVEE RAMP GATE

PLAN & PROFILE
STATION 291+00 - 298+00

HORIZONTAL SCALE: 1" = 6'
VERTICAL SCALE: 1" = 10'

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
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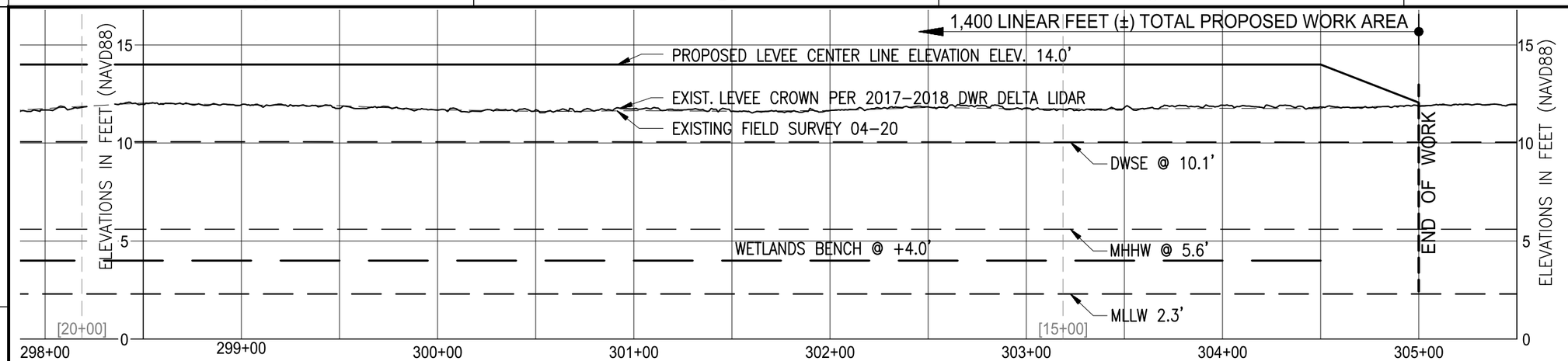
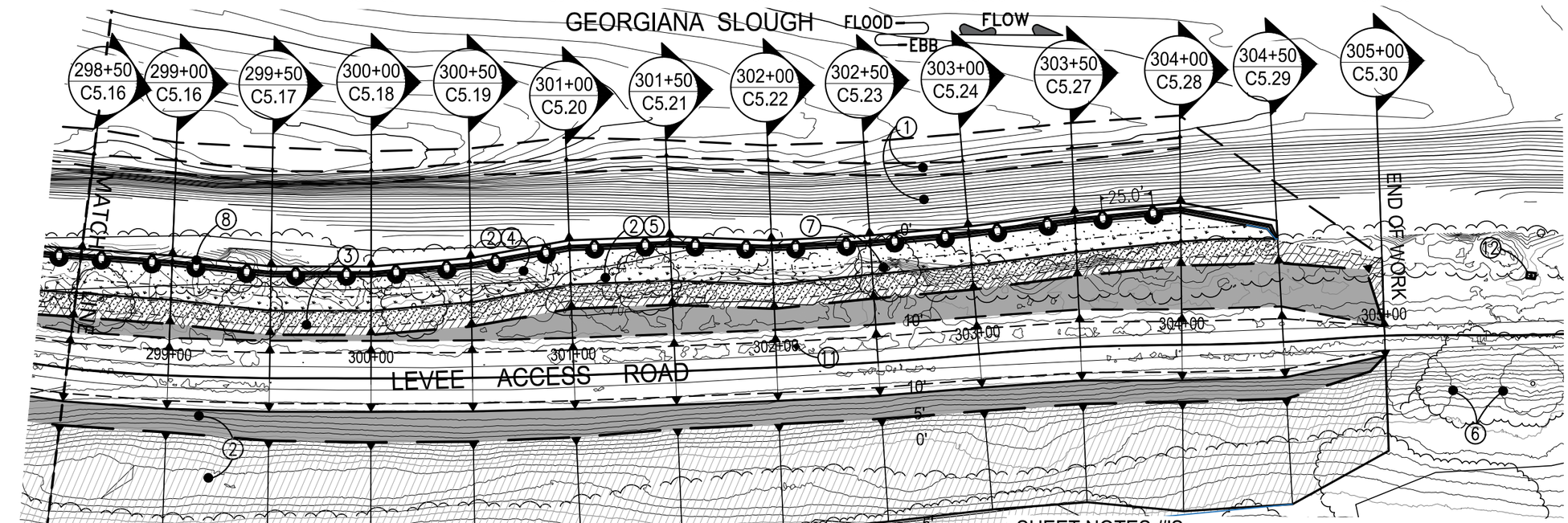
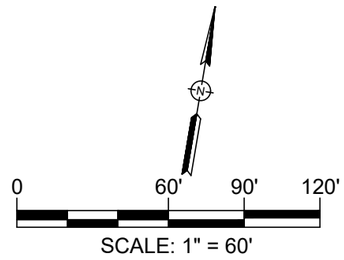
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
PLAN & PROFILE STA 291+00 TO 298+00

DATE: 12.21.2023
SHEET NUMBER: C3.0
PROJECT NUMBER: 7702.52







PLAN & PROFILE
STATION 298+00 - 305+00

HORIZONTAL SCALE: 1" = 6'
VERTICAL SCALE: 1" = 10'

SHEET NOTES #'S:

1. DWR RSP SPEC.
2. BENEFICIAL REUSE OF EXCAVATED MATERIAL
3. VEGETATED SLOPE WITH CLEAN IMPORTED FILL
4. WETLANDS BENCH 8.2'± WIDE @ EL. +4.0'~+5.2'
5. SCRUB SHRUB / SRA ZONE 14.5'± WIDE @ EL: +5.2'~+10.0'
6. (E) TREES
7. (P) TREES
8. ROCK PRISM WATER INLET
9. (E) LEVEE RAMP ACCESS
10. (E) LEVEE RAMP GATE
11. (E) BENCH MARK (DO NOT DISTURB) PLACE 6"ø PIPE OVER BM FOR PROTECTION
12. (E) WATER GAUGE STATION SOLAR PANEL (DO NOT DISTURB)

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
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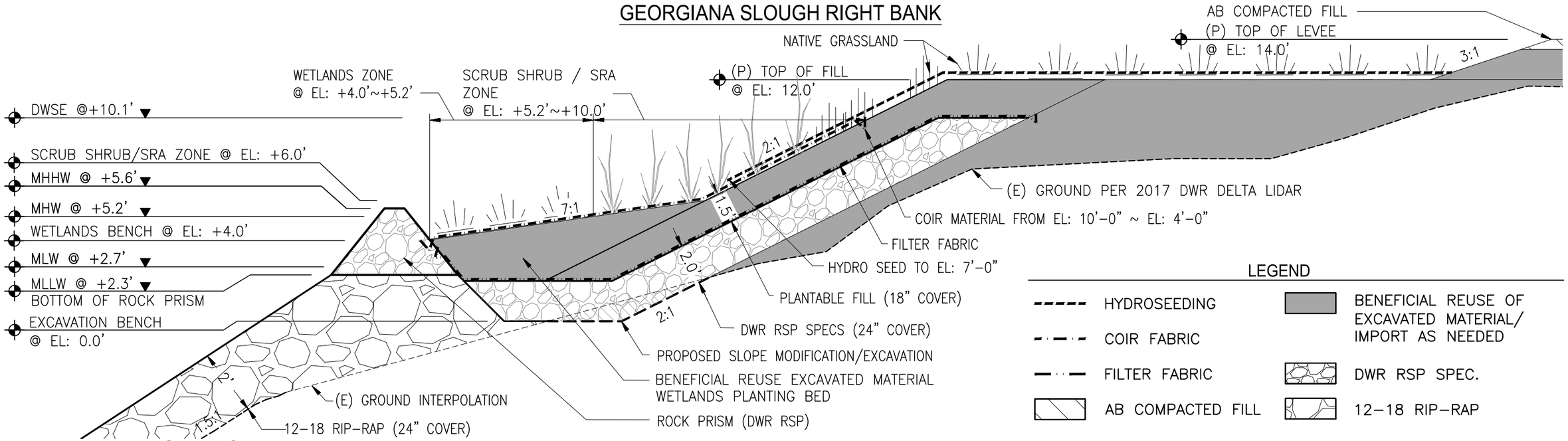
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
PLAN & PROFILE STA 298+00 TO 305+00

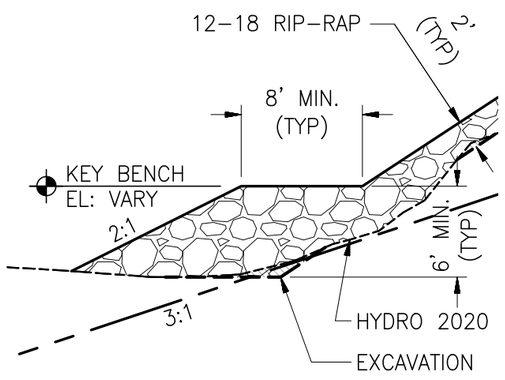
DATE: 12.21.2023
SHEET NUMBER: C3.1
PROJECT NUMBER: 7702.52

GEORGIANA SLOUGH RIGHT BANK



2 WETLANDS BENCH DETAIL

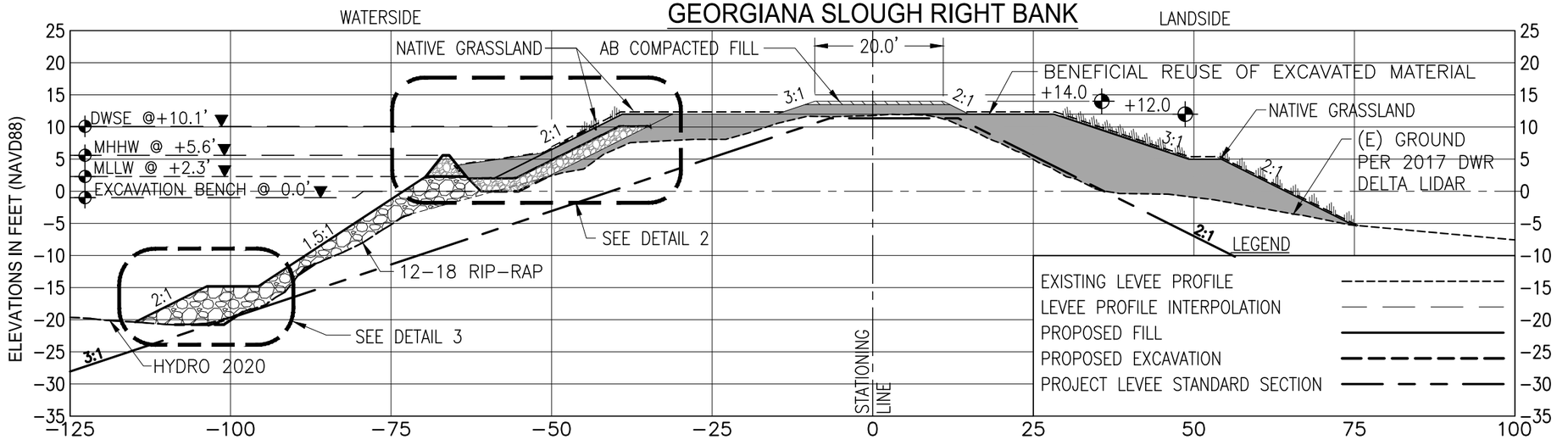
SCALE 1" = 5'



3 DETAIL

SCALE 1" = 10'

GEORGIANA SLOUGH RIGHT BANK



1 WETLAND BENCH AND KEY TYPICAL CROSS SECTION

SCALE 1" = 20'

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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P.O. BOX 929, WALNUT GROVE, CA 95690 TEL (916) 776-2277 FAX (916) 776-2282

DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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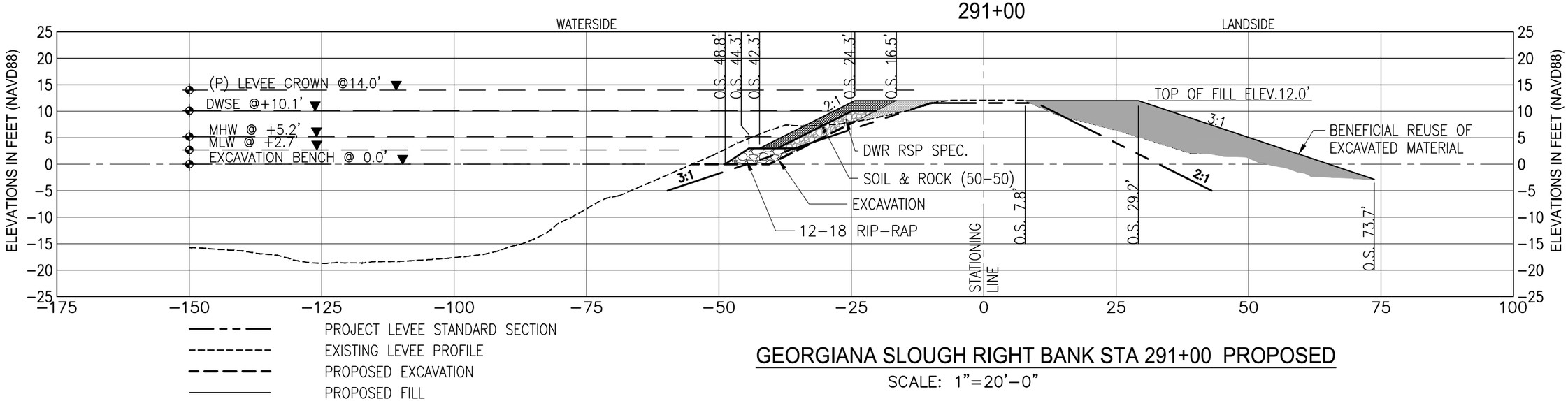
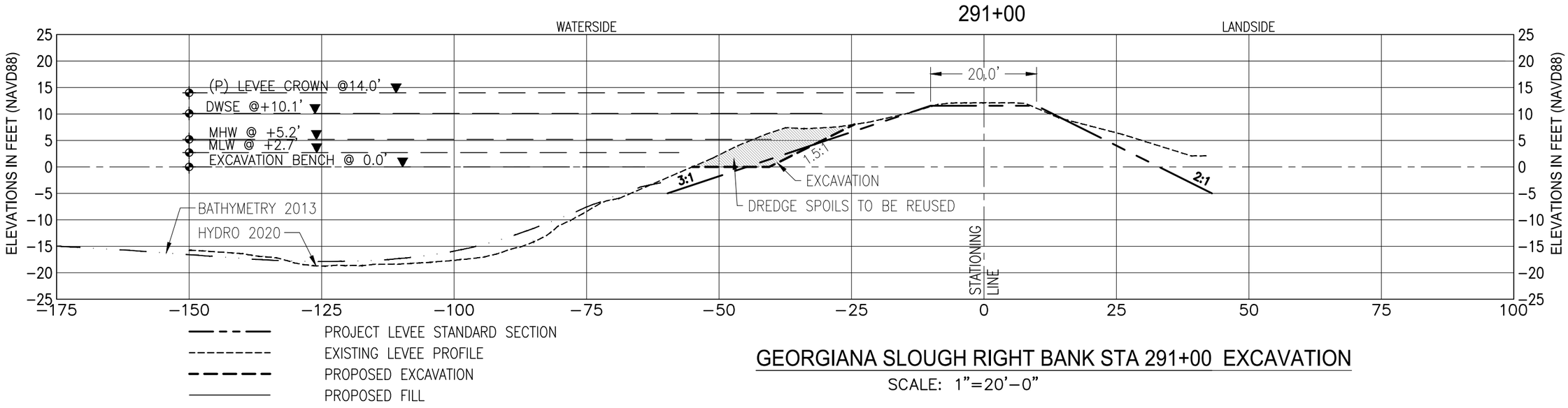
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
CROSS SECTIONS TYPICAL DETAILS

DATE: 12.21.2023
SHEET NUMBER: C4.0
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 291+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 291+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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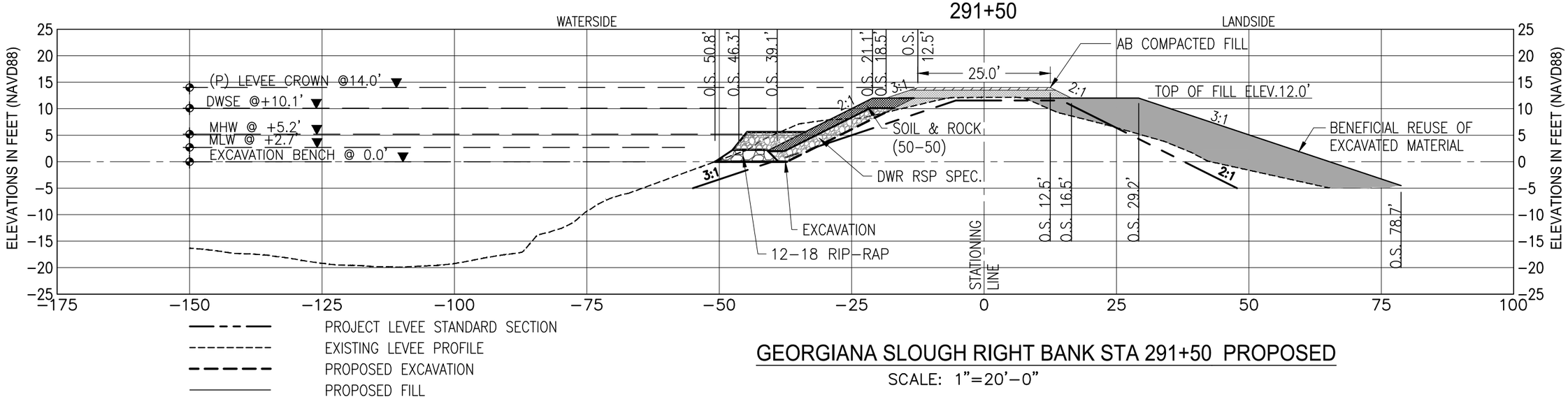
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

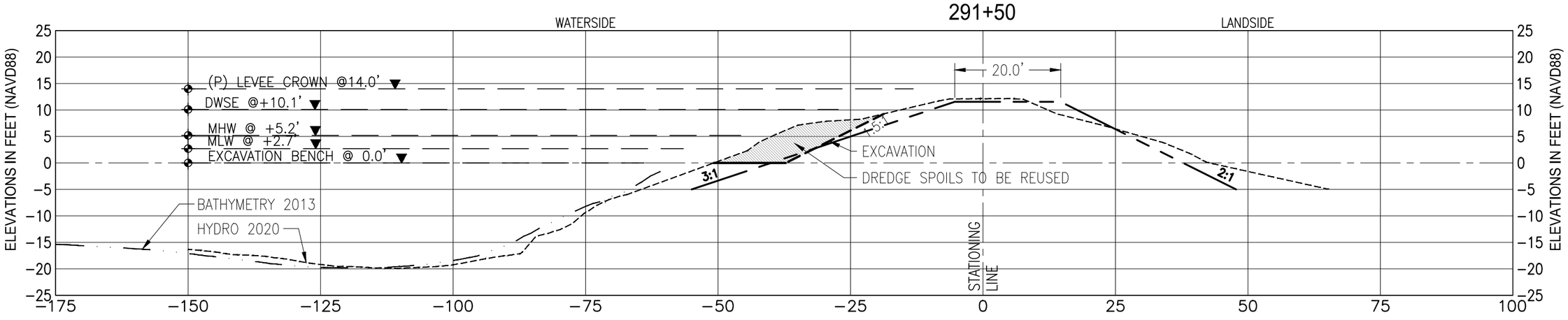
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 291+00

DATE: 12.21.2023
SHEET NUMBER: C5.0
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 291+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 291+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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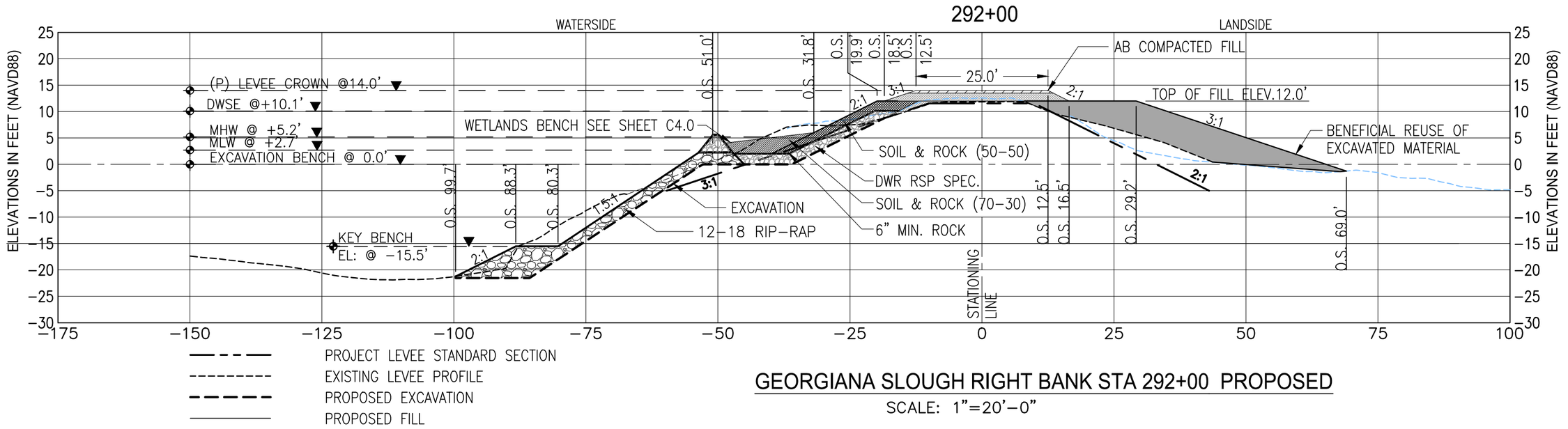
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

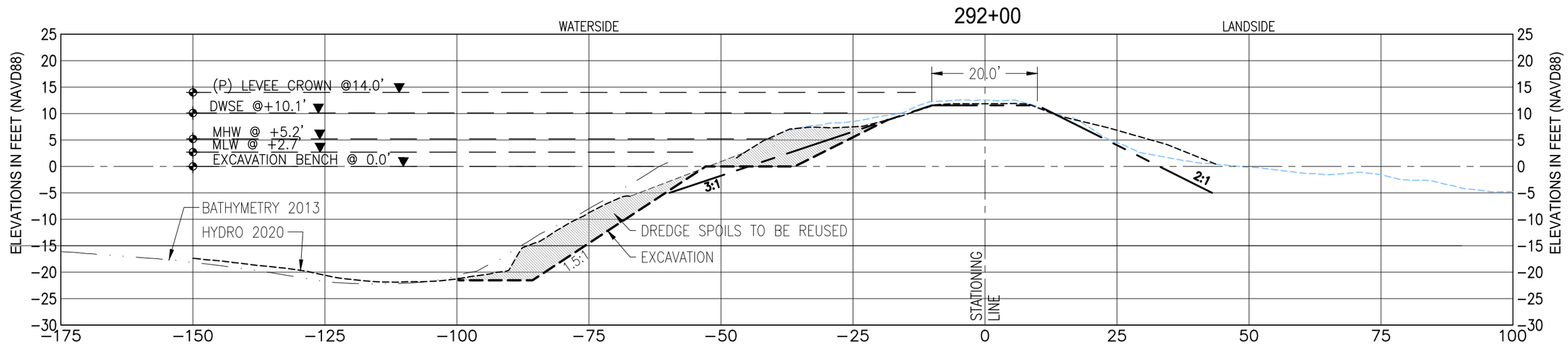
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 291+50

DATE: 12.21.2023
SHEET NUMBER: C5.1
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 292+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 292+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
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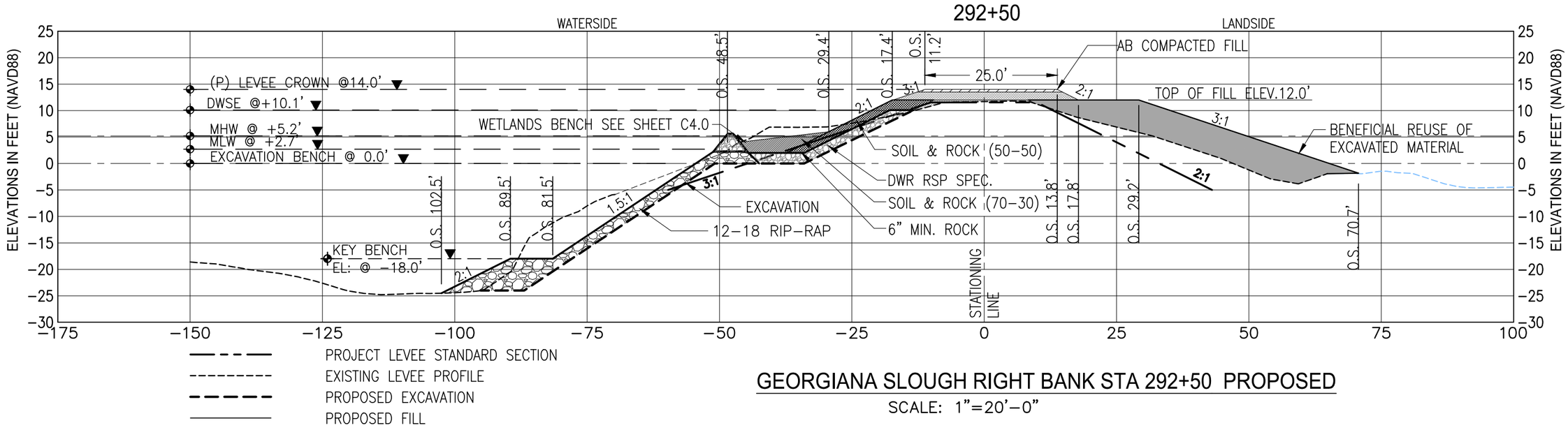
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

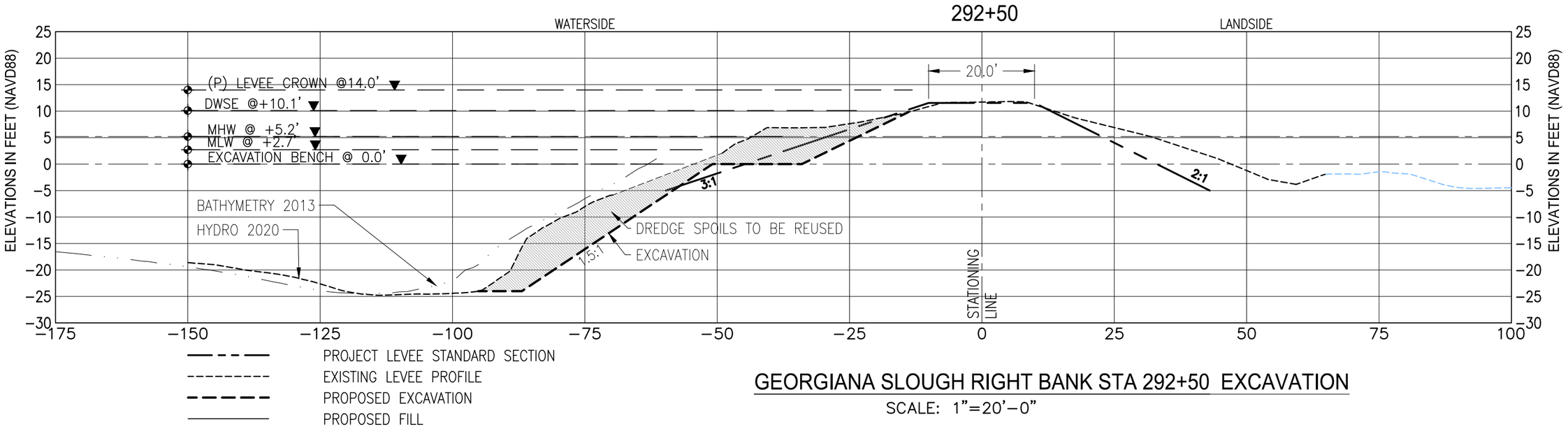
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 292+00

DATE: 12.21.2023
SHEET NUMBER: C5.2
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 292+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 292+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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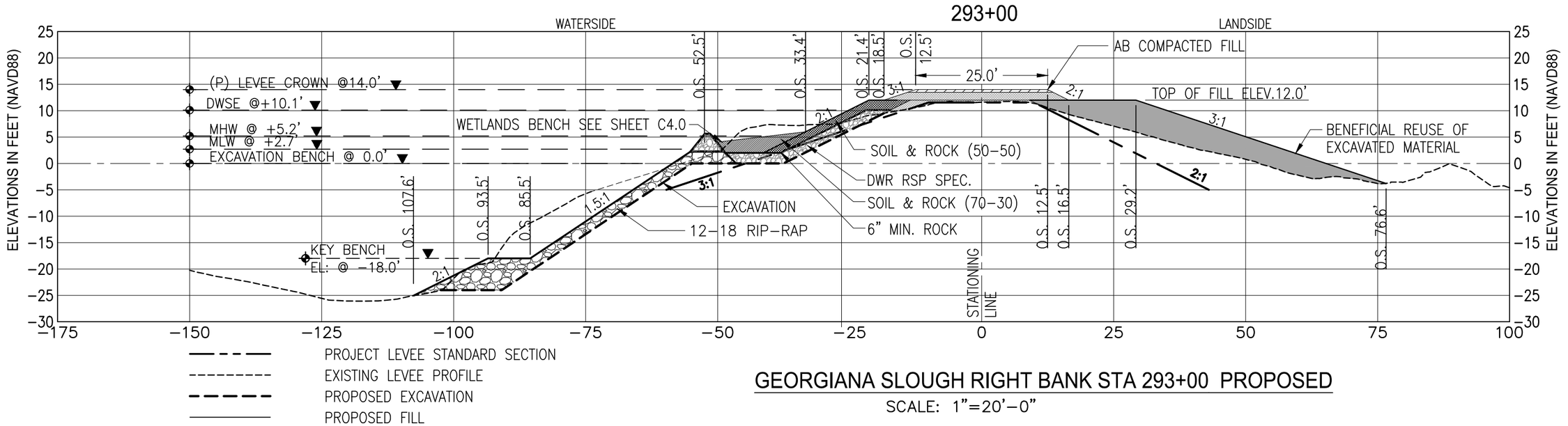
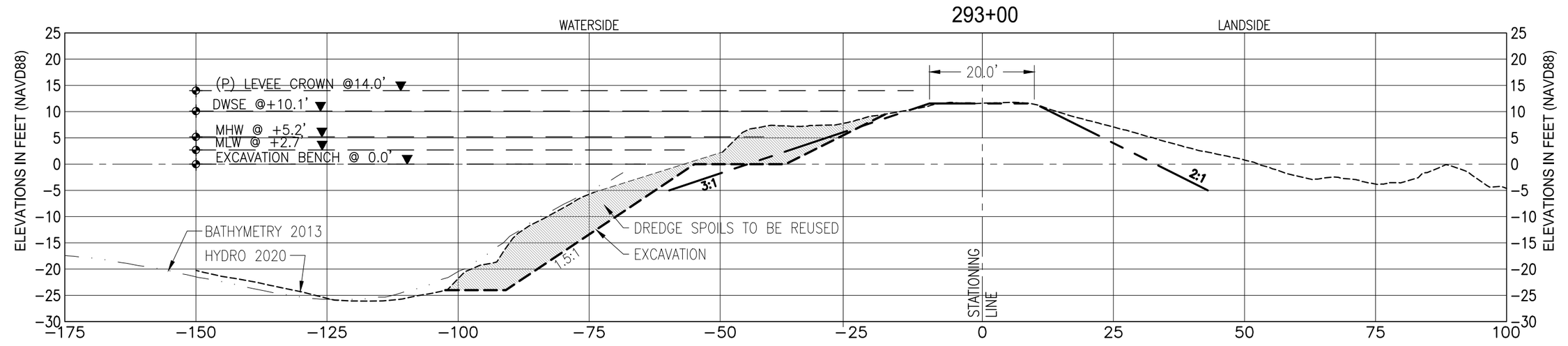
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 292+50

DATE: 12.21.2023
SHEET NUMBER: C5.3
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 293+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 293+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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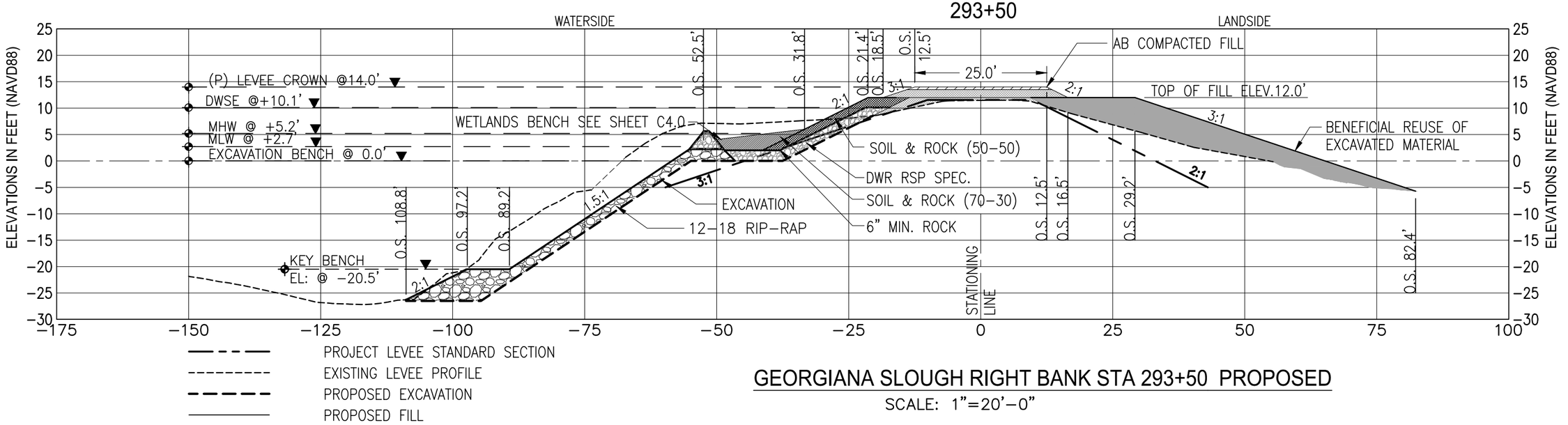
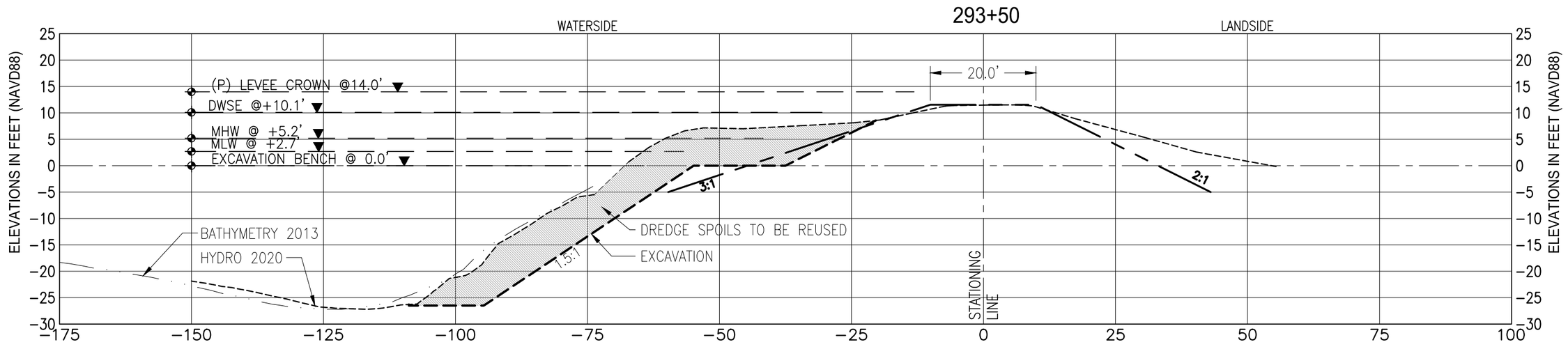
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 293+00

DATE: 12.21.2023
SHEET NUMBER: C5.4
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 293+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 293+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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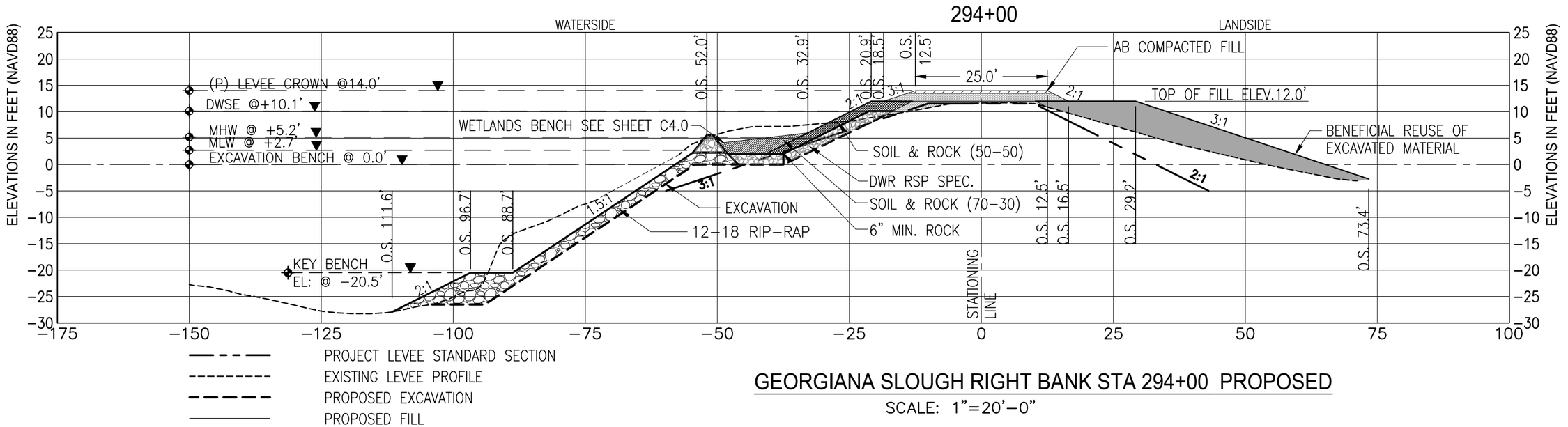
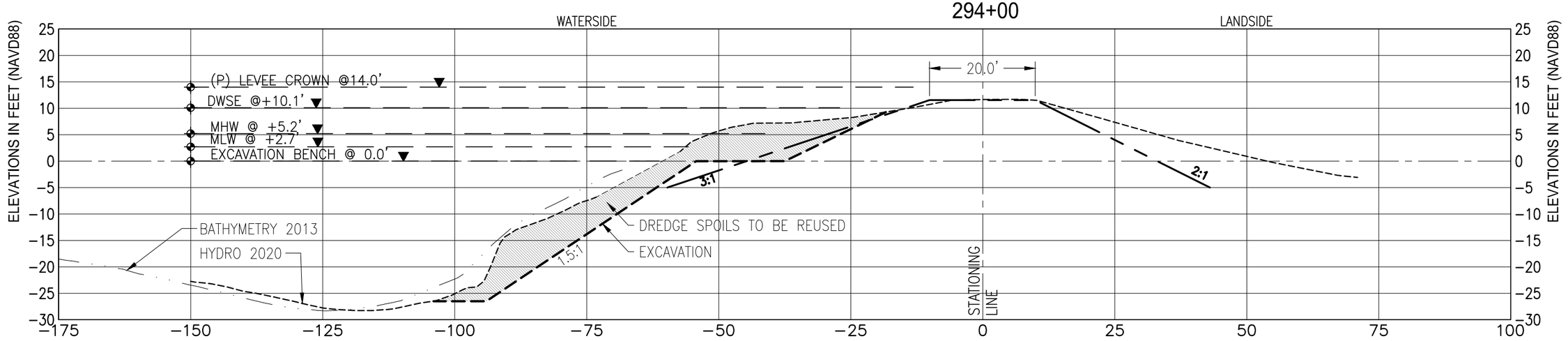
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 293+50

DATE: 12.21.2023
SHEET NUMBER: C5.5
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 294+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 294+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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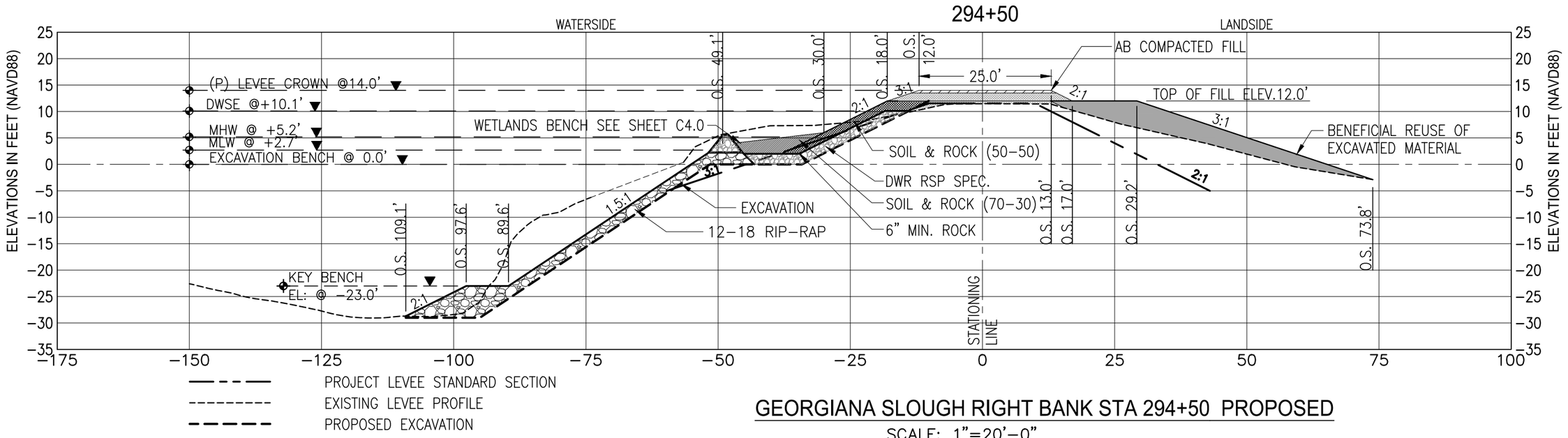
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

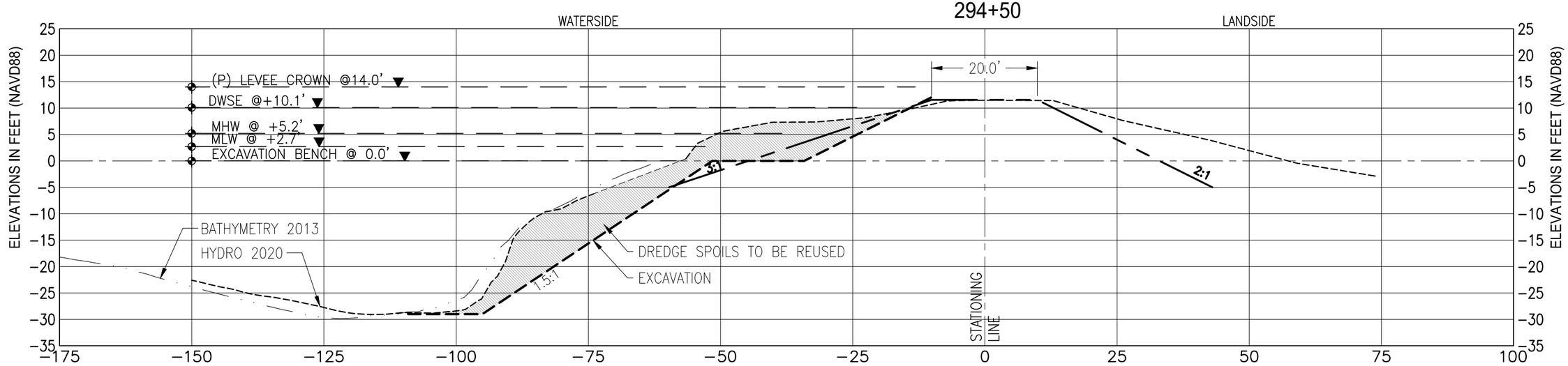
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 294+00

DATE: 12.21.2023
SHEET NUMBER: C5.6
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 294+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 294+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
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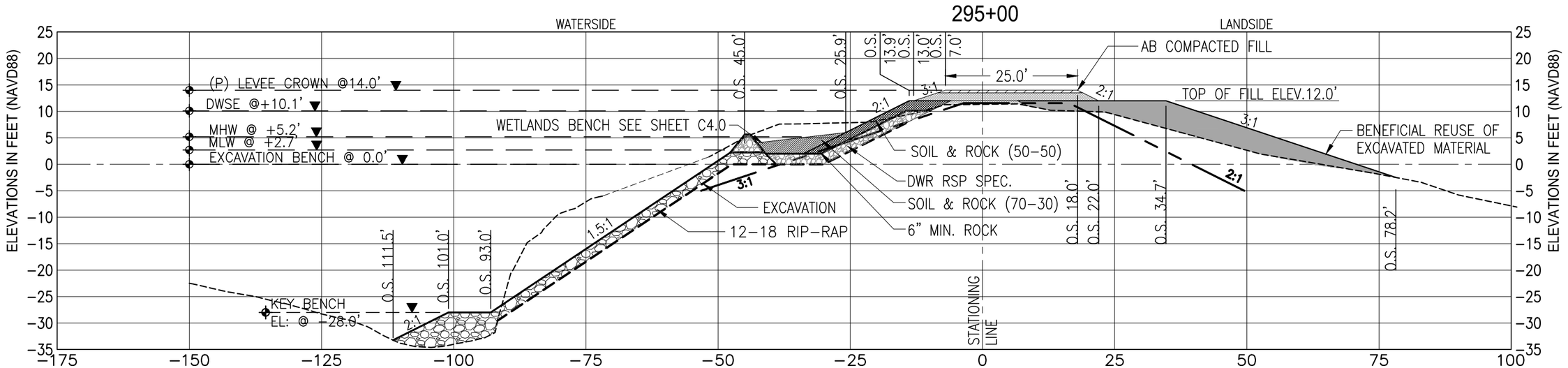
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

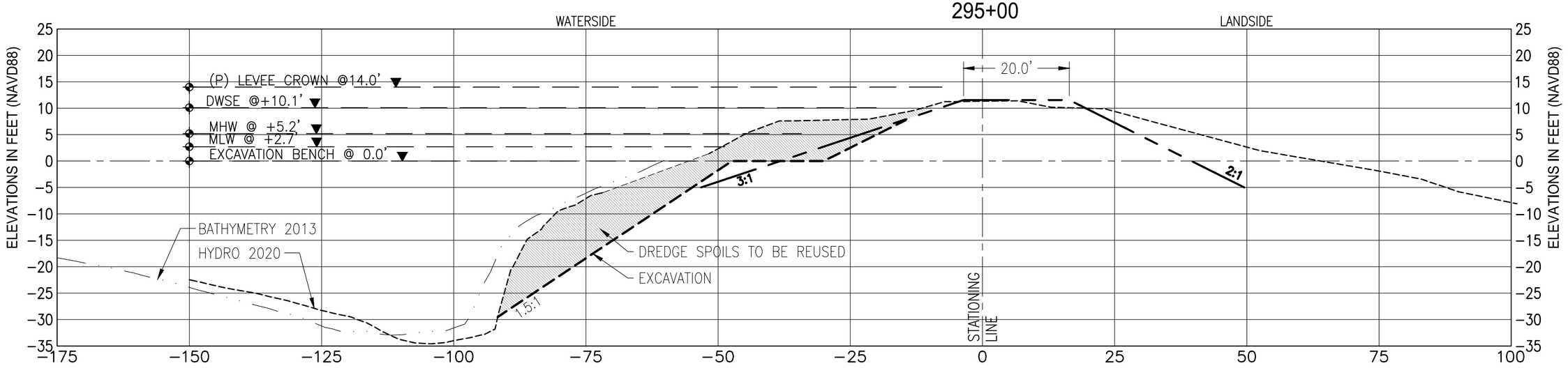
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 294+50

DATE: 12.21.2023
SHEET NUMBER: C5.7
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 295+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 295+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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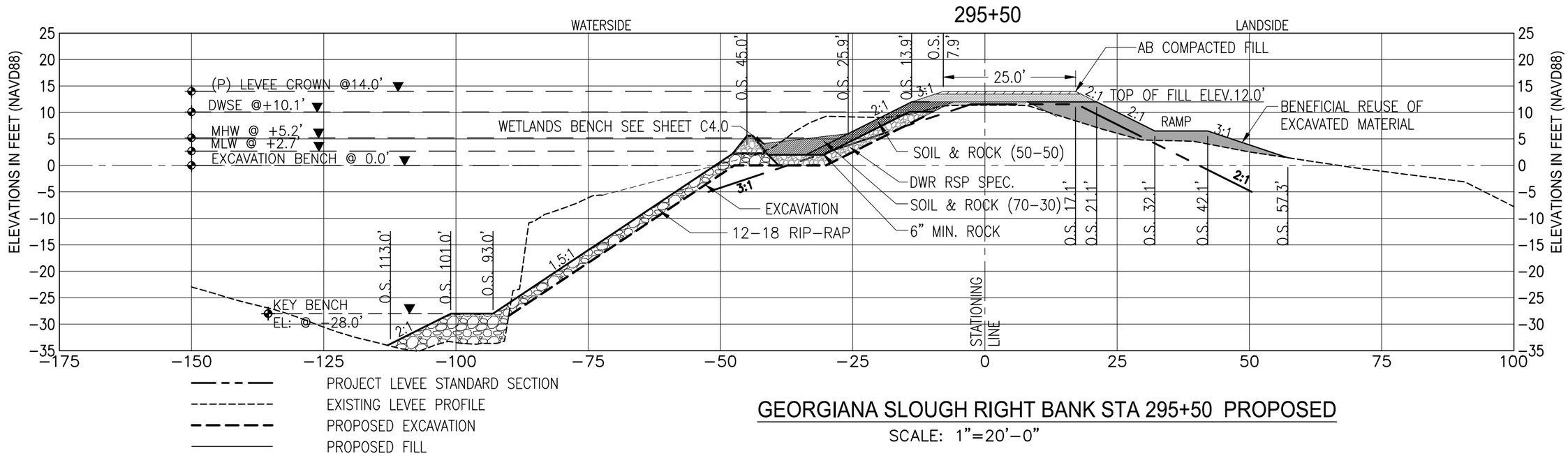
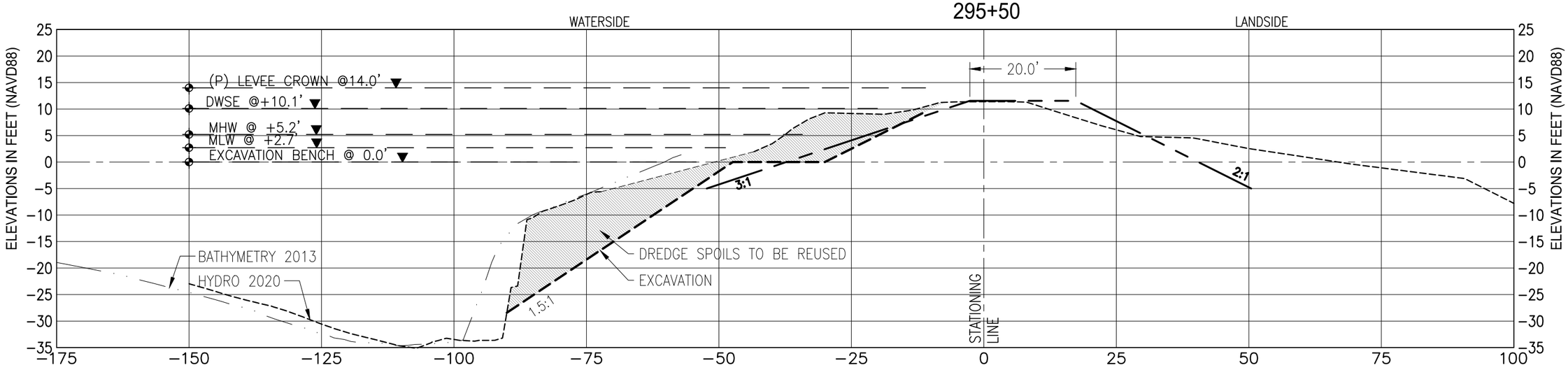
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 295+00

DATE: 12.21.2023
SHEET NUMBER: C5.8
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 295+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 295+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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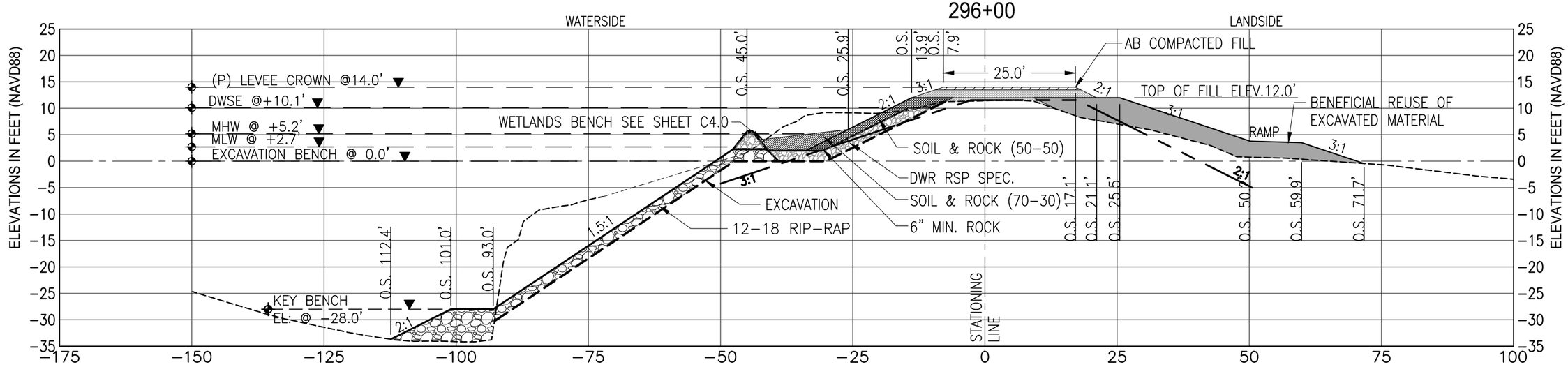
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

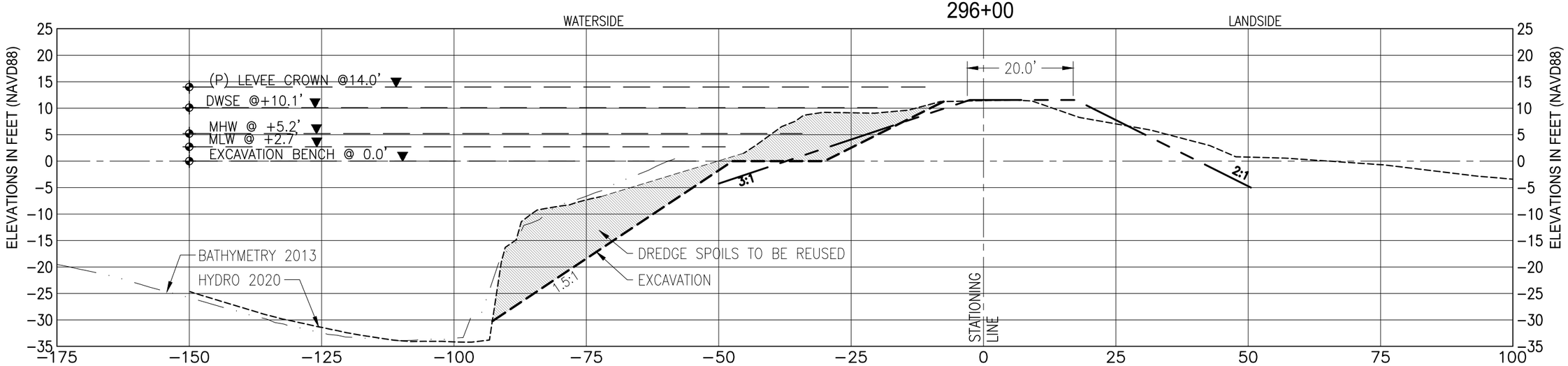
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 295+50

DATE: 12.21.2023
SHEET NUMBER: C5.9
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 296+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 296+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
4) THE BATHYMETRY DATA WAS COLLECTED IN JULY OF 2020.
5) DWSE (DESIGN WATER SURFACE ELEVATION PER USACE 1957)

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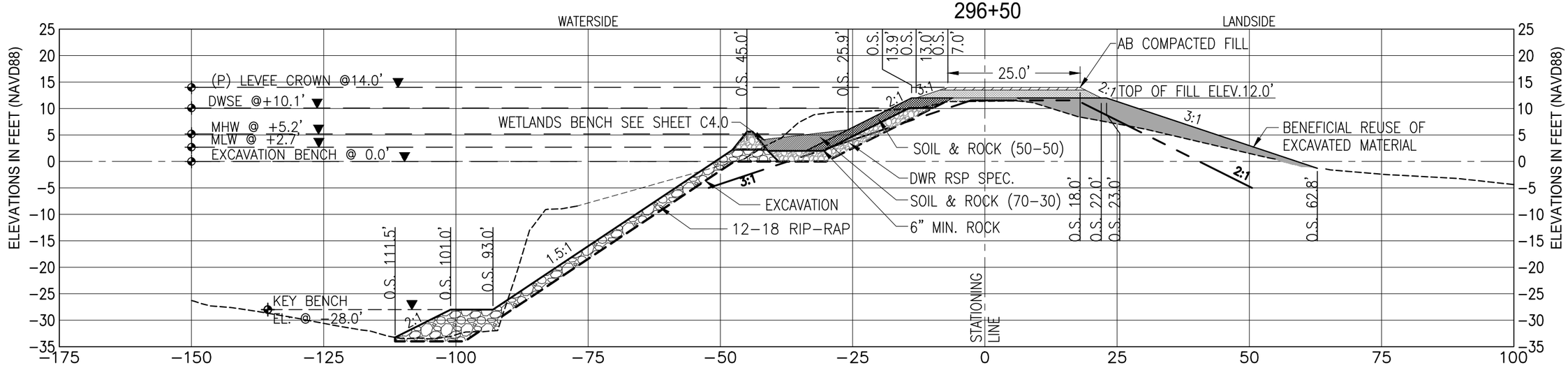
CIVIL ENGINEERING
PROJECT MANAGEMENT
P.O. BOX 929, WALNUT GROVE, CA 95690 TEL (916) 776-2277 FAX (916) 776-2282

DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

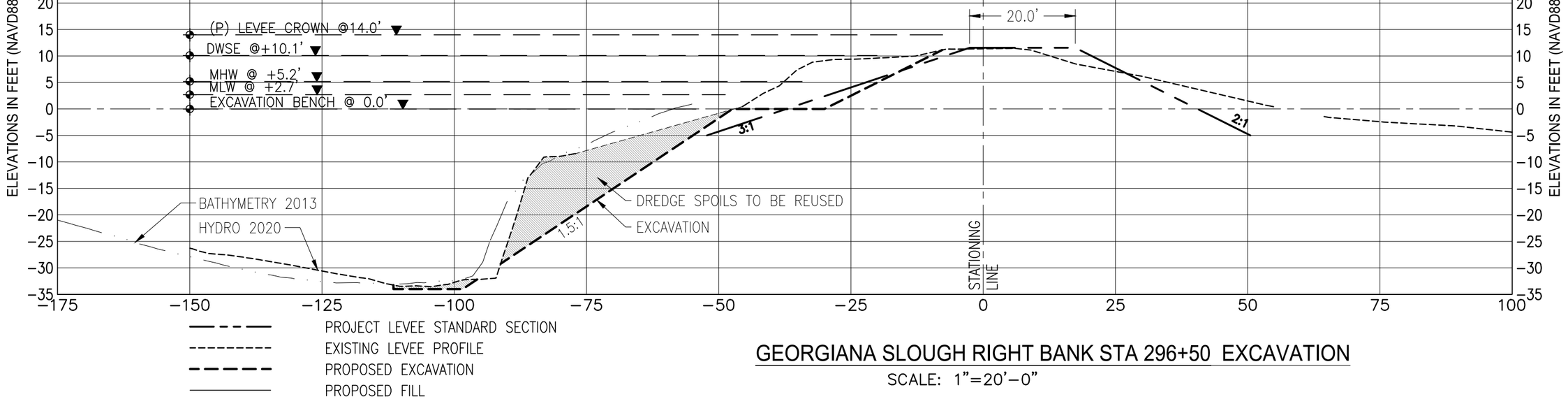
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 296+00

DATE: 12.21.2023
SHEET NUMBER: C5.10
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 296+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 296+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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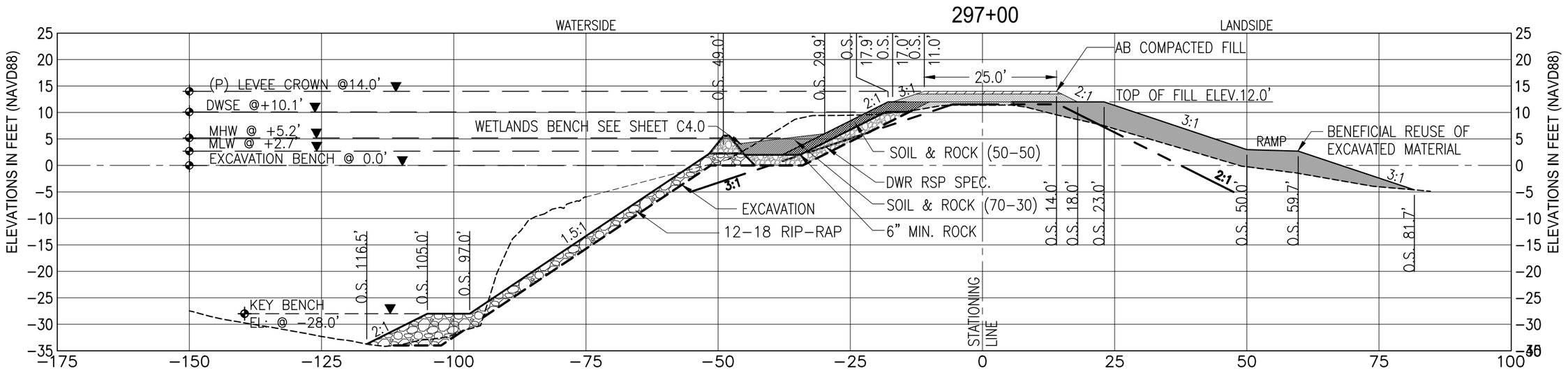
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

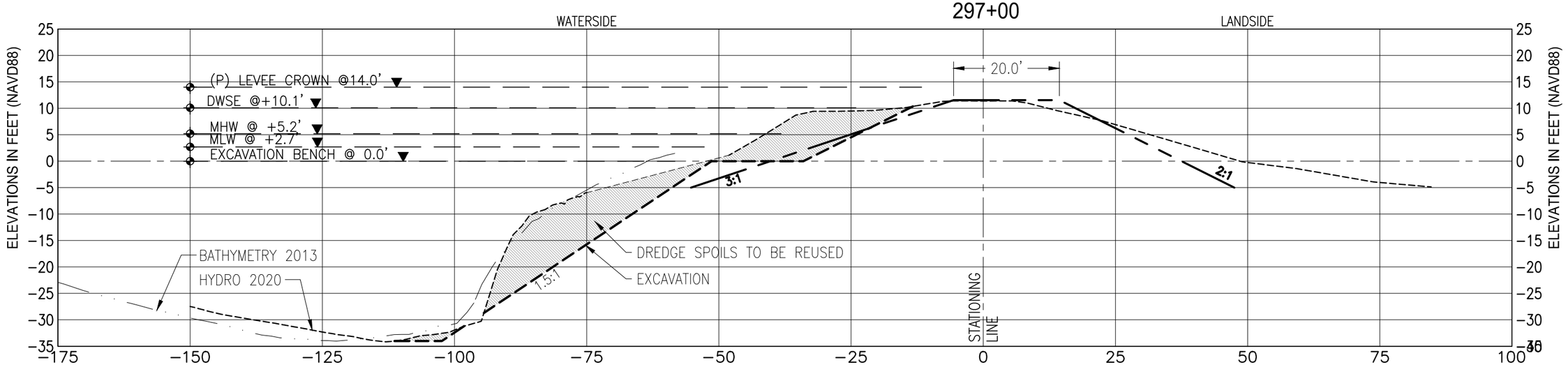
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 296+50

DATE: 12.21.2023
SHEET NUMBER: C5.11
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 297+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 297+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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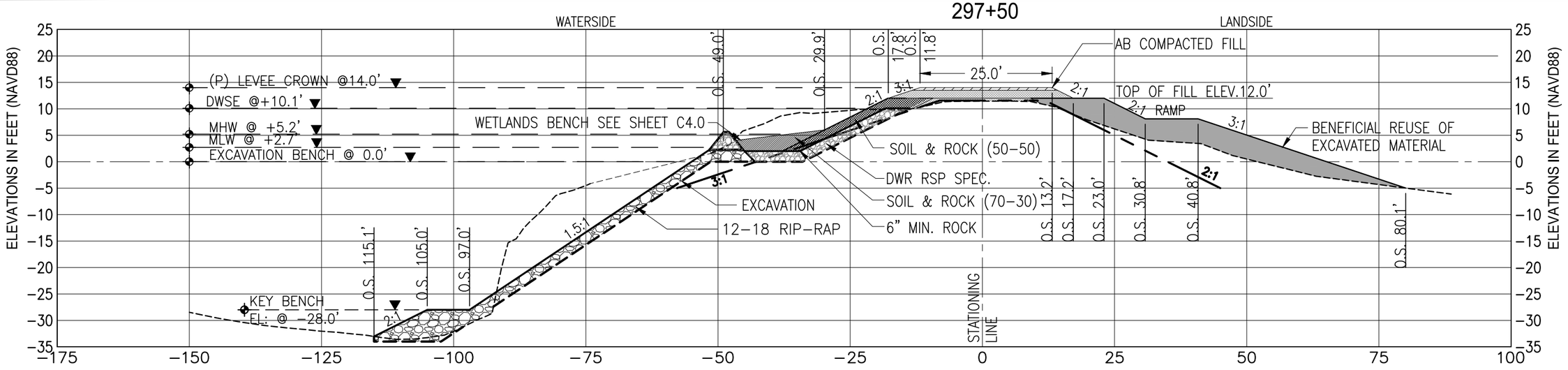
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 297+00

DATE: 12.21.2023
SHEET NUMBER: C5.12
PROJECT NUMBER: 7702.52

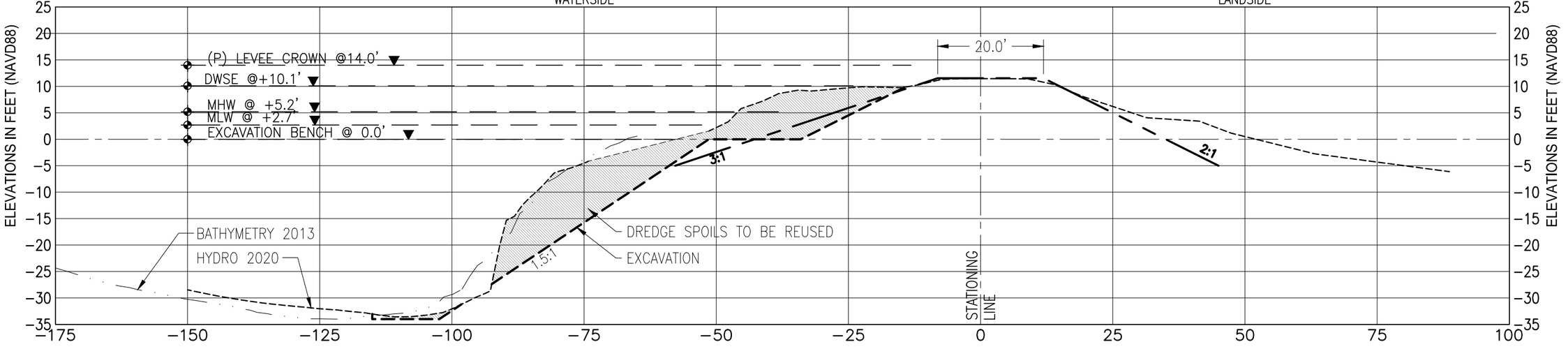
297+50



GEORGIANA SLOUGH RIGHT BANK STA 297+50 PROPOSED

SCALE: 1"=20'-0"

297+50



GEORGIANA SLOUGH RIGHT BANK STA 297+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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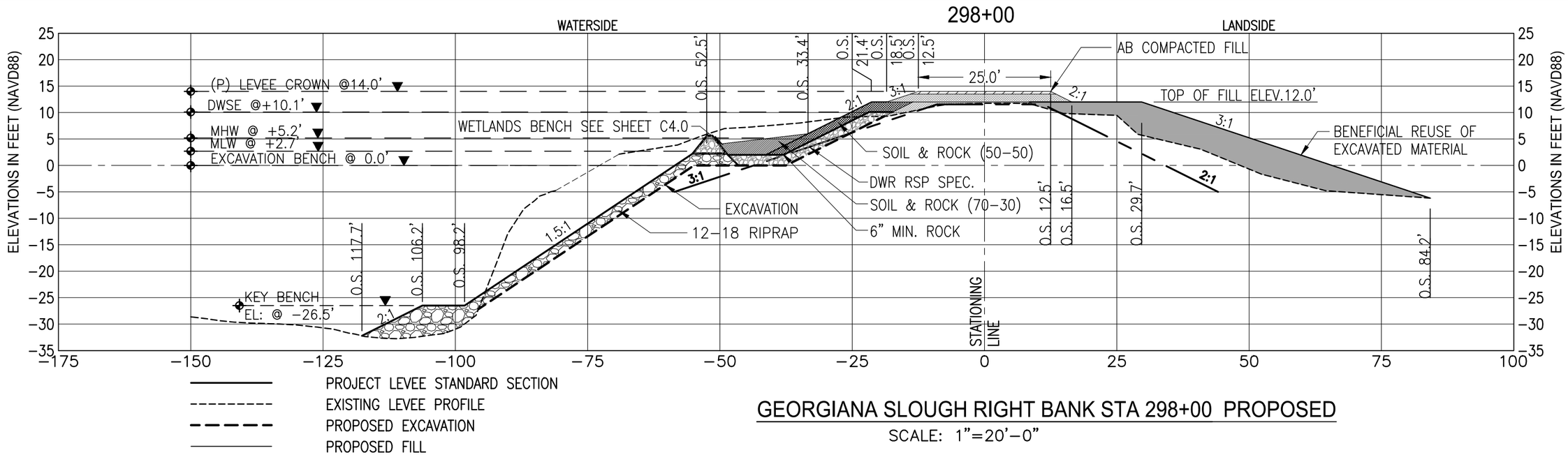
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

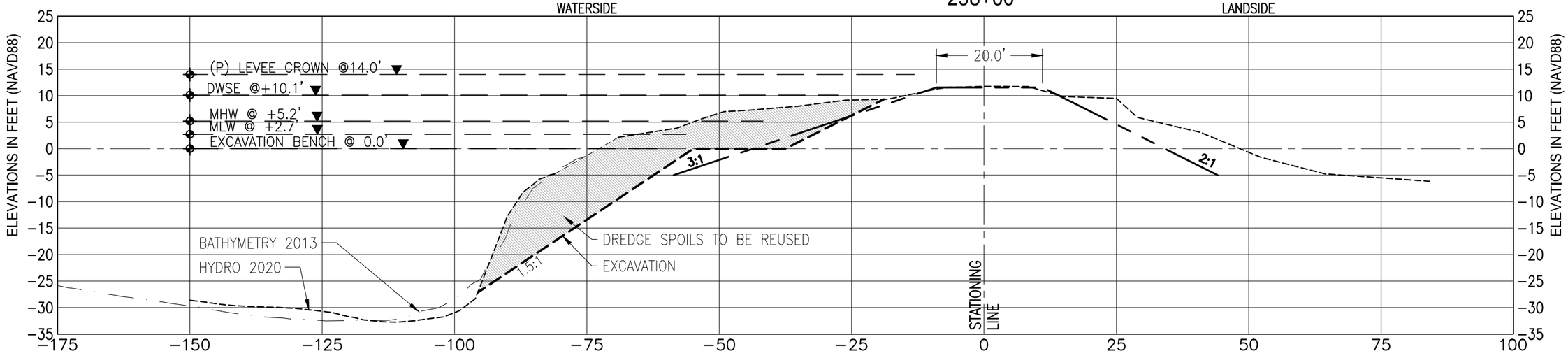
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 297+50

DATE: 12.21.2023
SHEET NUMBER: C5.13
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 298+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 298+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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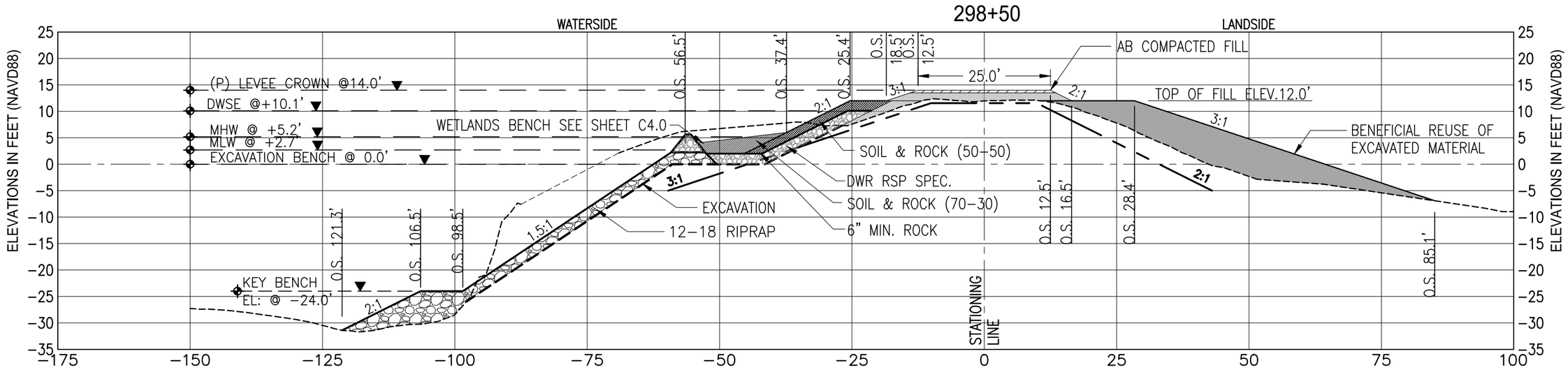
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

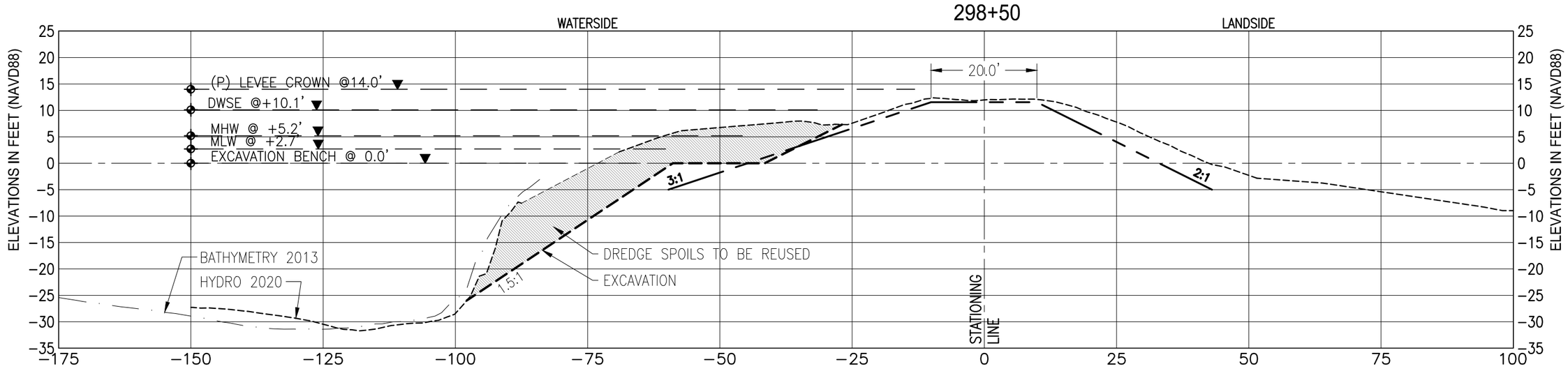
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 298+00

DATE: 12.21.2023
SHEET NUMBER: C5.14
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 298+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 298+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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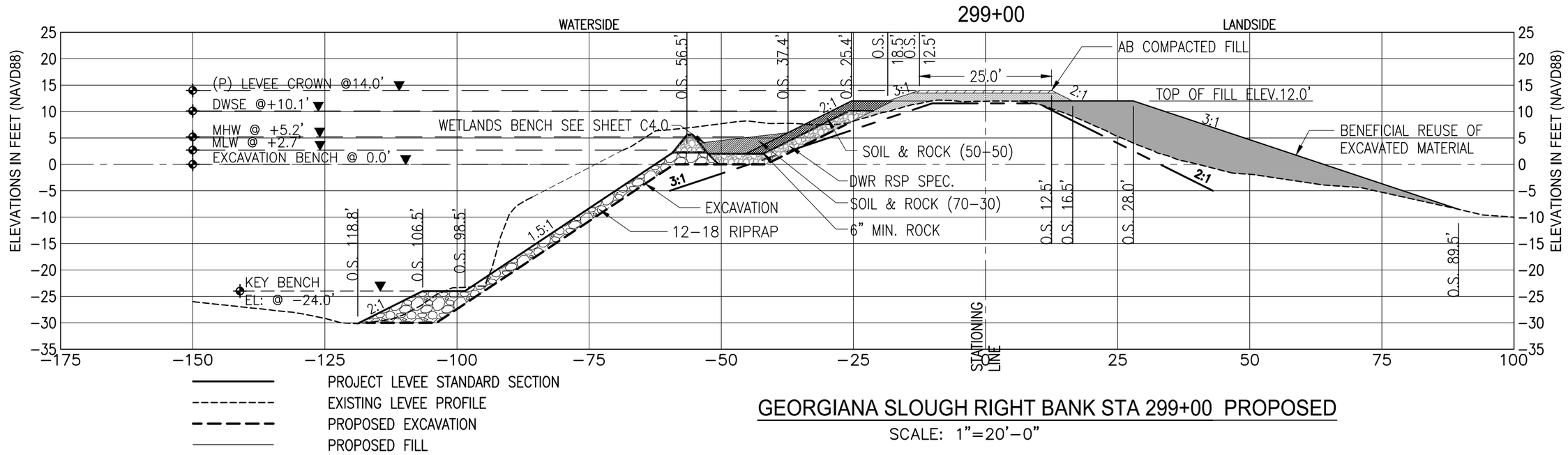
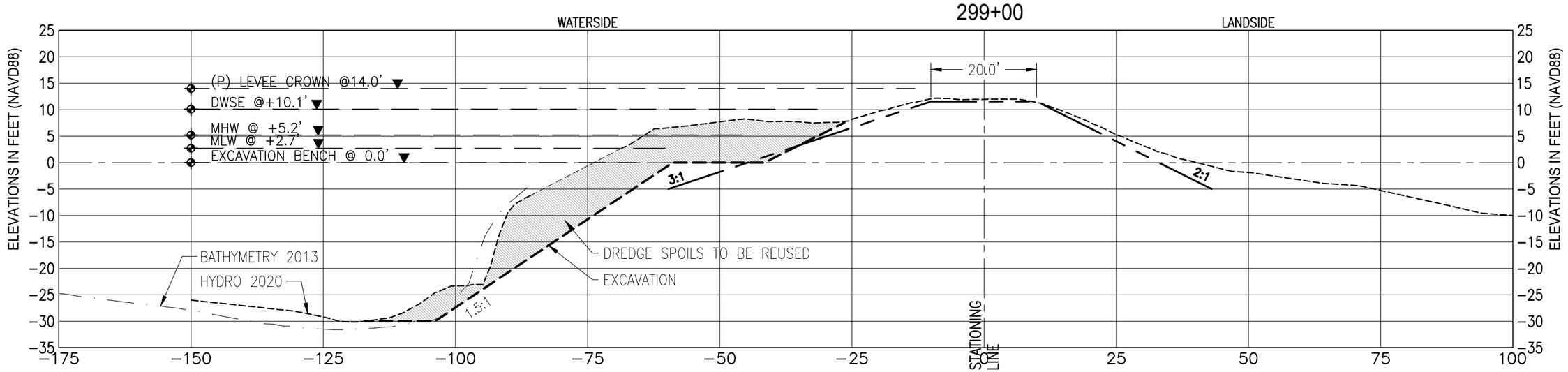
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 298+50

DATE: 12.21.2023
SHEET NUMBER: C5.15
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 299+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 299+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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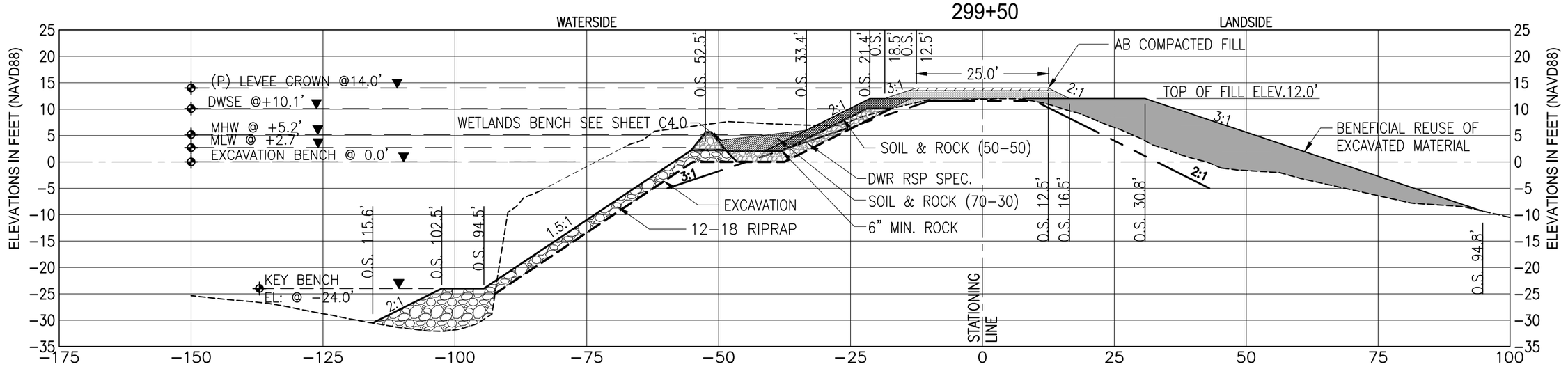
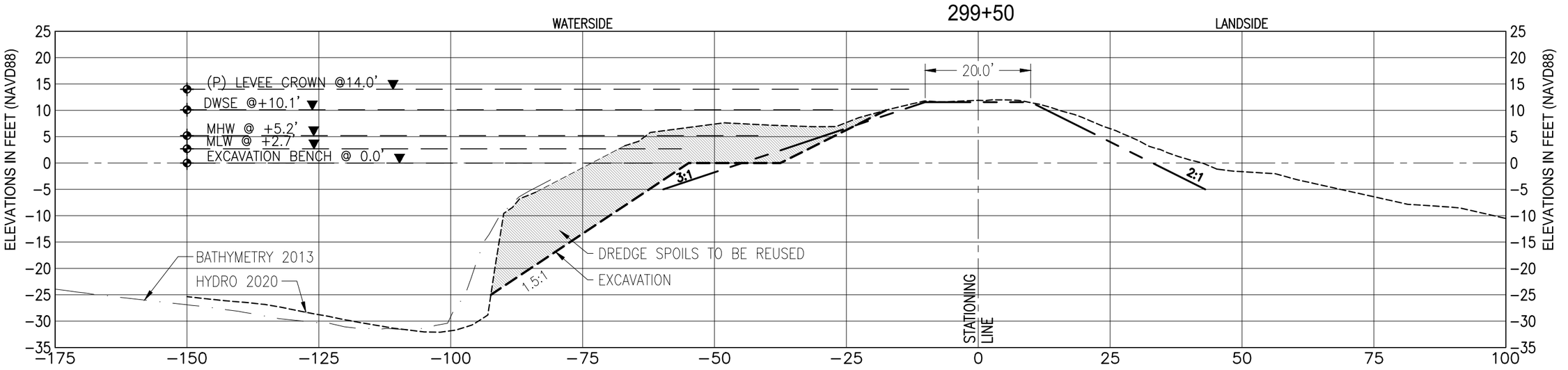
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 299+00

DATE: 12.21.2023
SHEET NUMBER: C5.16
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 299+50 PROPOSED

SCALE: 1"=20'−0"



GEORGIANA SLOUGH RIGHT BANK STA 299+50 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
3) THE HYDRO SURVEY DATA WAS COLLECTED IN 2013
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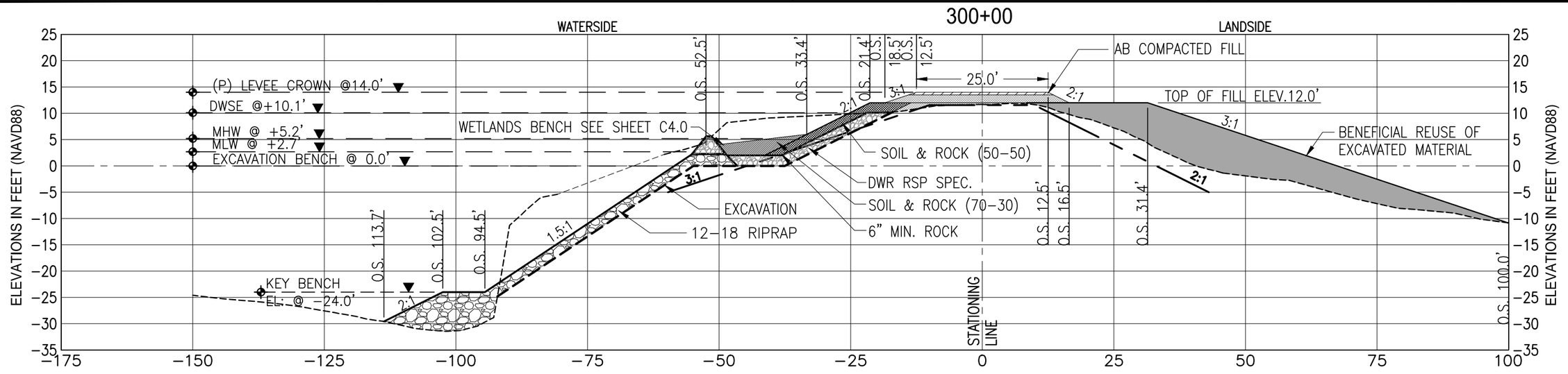
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

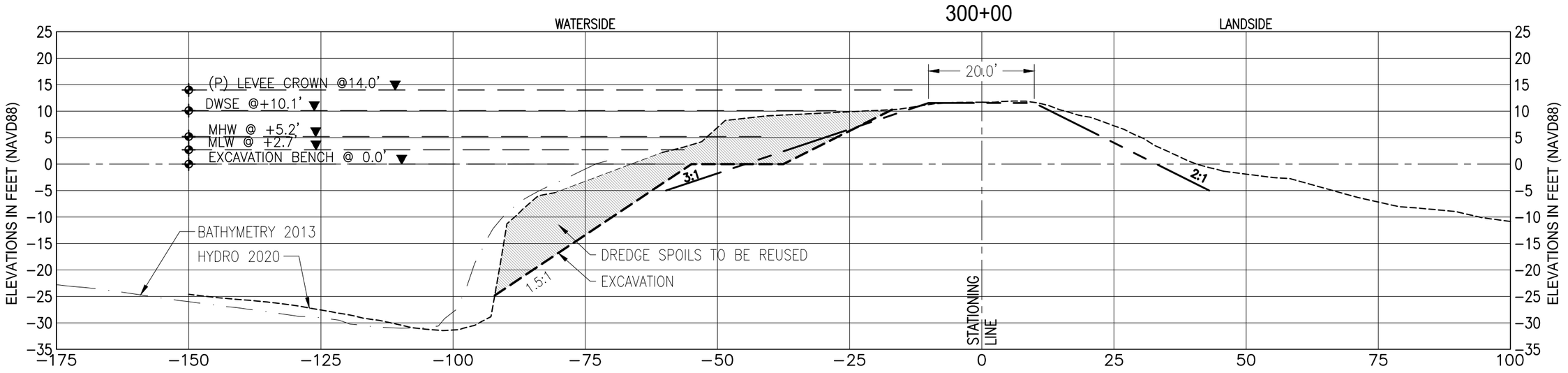
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 299+50

DATE: 12.21.2023
SHEET NUMBER: C5.17
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 300+00 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 300+00 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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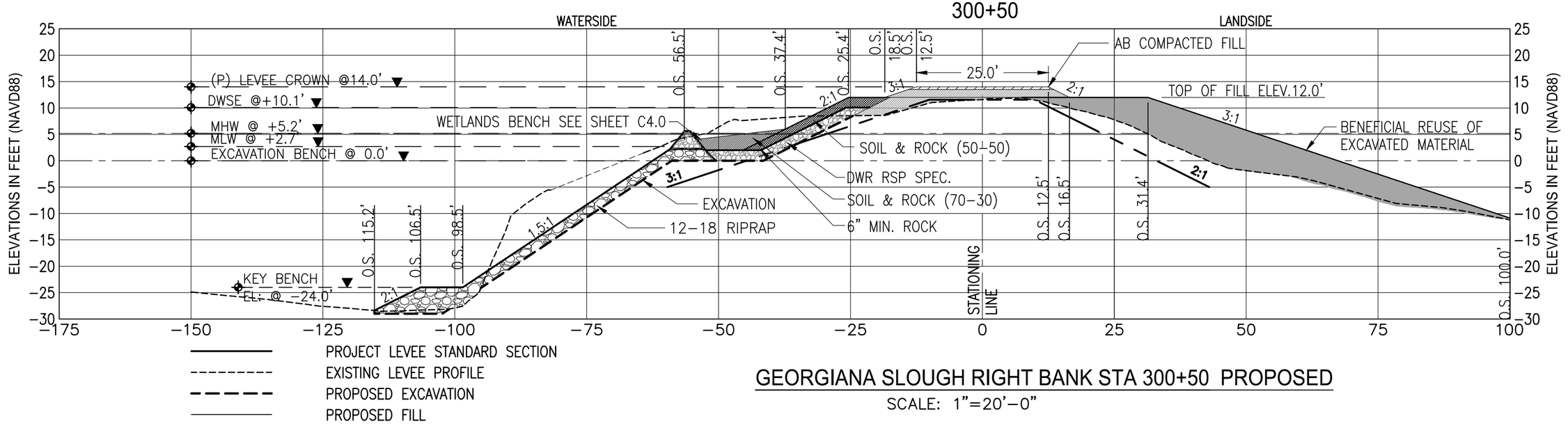
DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
.	.	.	.	.

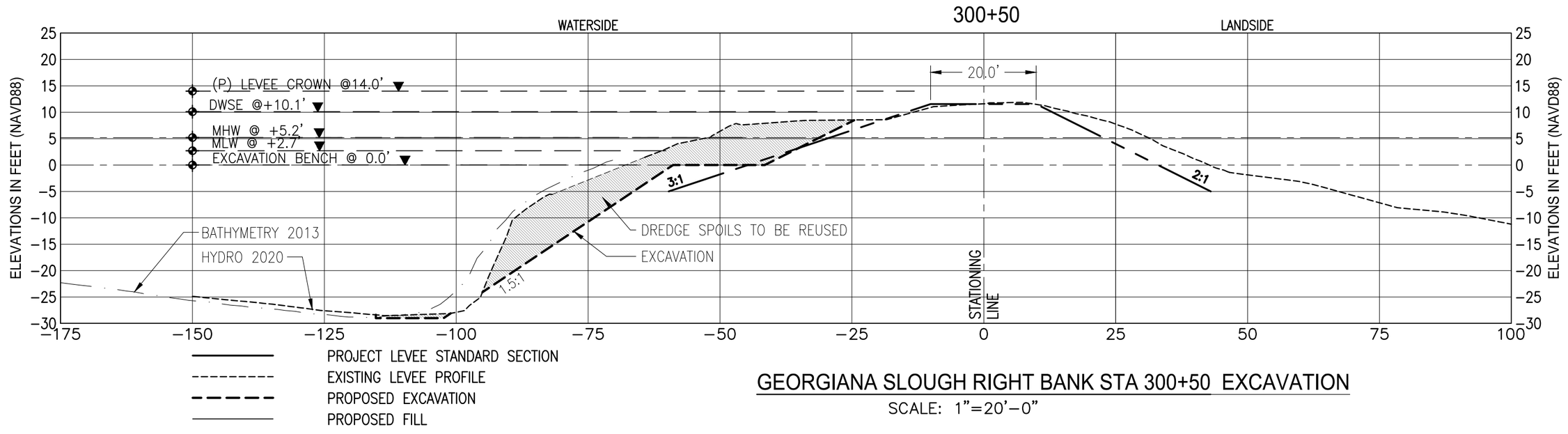
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 300+00

DATE: 12.21.2023
SHEET NUMBER: C5.18
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 300+50 PROPOSED

SCALE: 1"=20'-0"



GEORGIANA SLOUGH RIGHT BANK STA 300+50 EXCAVATION

SCALE: 1"=20'-0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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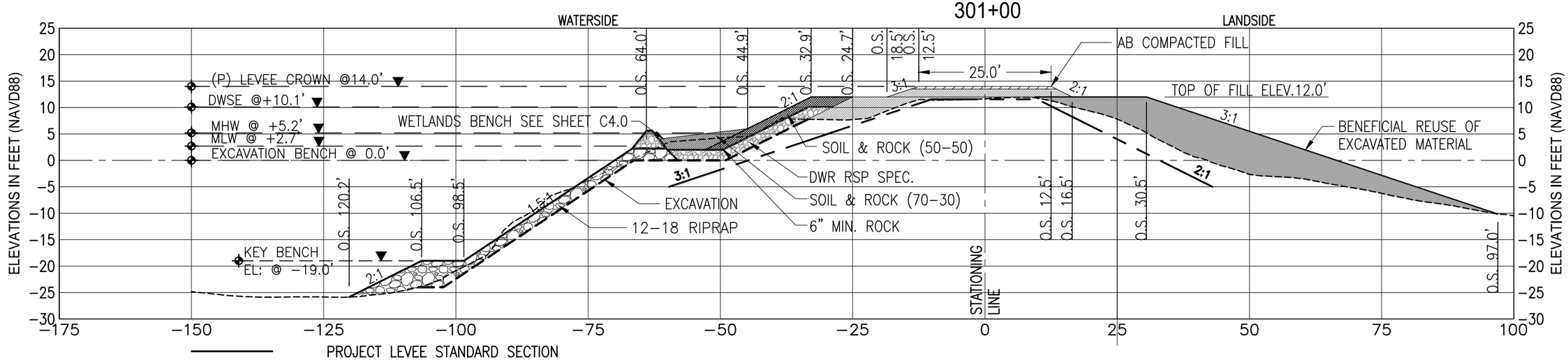
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED
CROSS SECTIONS STA 300+50

DATE: 12.21.2023
SHEET NUMBER: C5.19
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 301+00 PROPOSED

SCALE: 1"=20'−0"

GEORGIANA SLOUGH RIGHT BANK STA 301+00 EXCAVATION

SCALE: 1"=20'−0"

DATA REFERENCES:
1) VERTICAL DATUM: NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988)
2) THE LAND CONTOURS BASED ON THE DWR LIDAR SURVEY 2017.
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DESIGNED BY: G. LABRIE, E.PAPPALARDO
DRAWN BY: R.MONTANEZ
CHECK BY: G LABRIE
SCALE:
ORIGINAL DRAWING SCALE 0" 1/2" 1"

REVISIONS				
SYM	DESCRIPTION	DATE	BY	APRVD. BY
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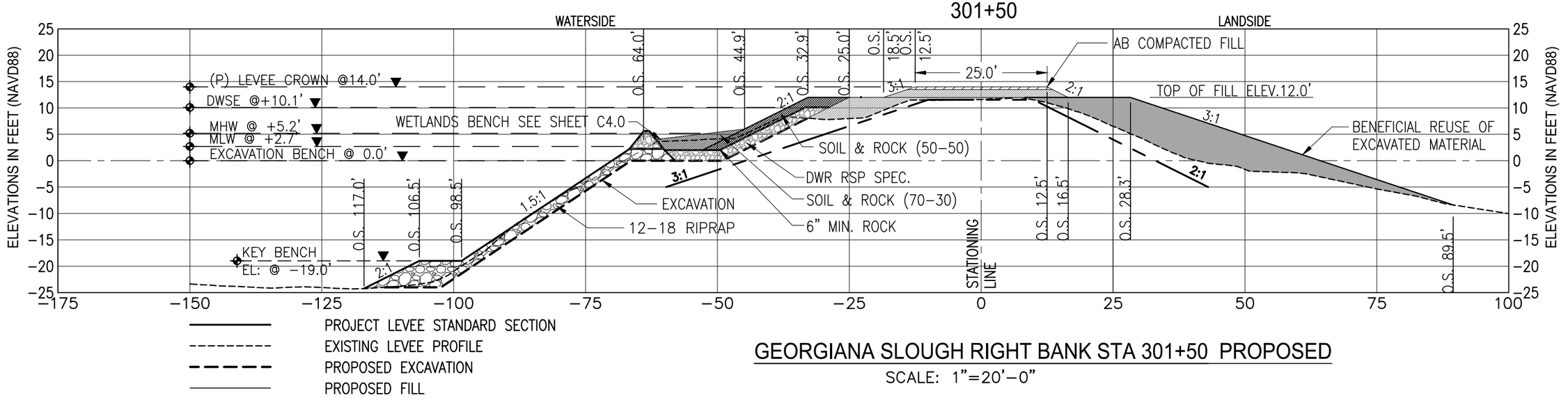
BRANNAN-ANDRUS LEVEE MAINTENANCE DISTRICT
GEORGIANA SLOUGH EROSION CONTROL AND WETLANDS RESTORATION
EXCAVATION & PROPOSED CROSS SECTIONS STA 301+00

DATE: 12.21.2023
SHEET NUMBER: C5.20
PROJECT NUMBER: 7702.52



GEORGIANA SLOUGH RIGHT BANK STA 301+50 PROPOSED

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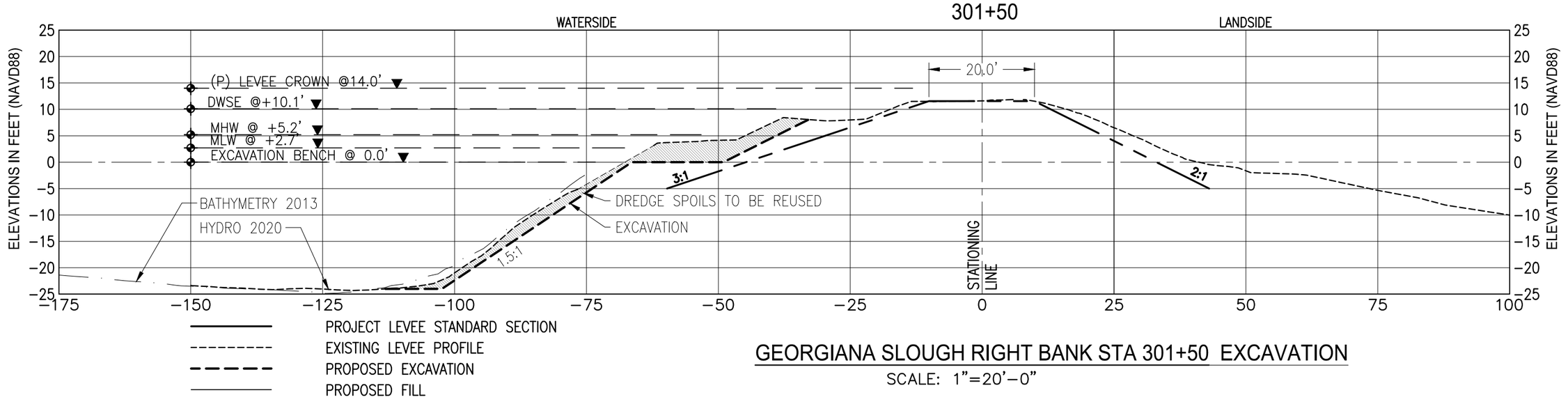

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DRAWN BY: R.MONTANEZ
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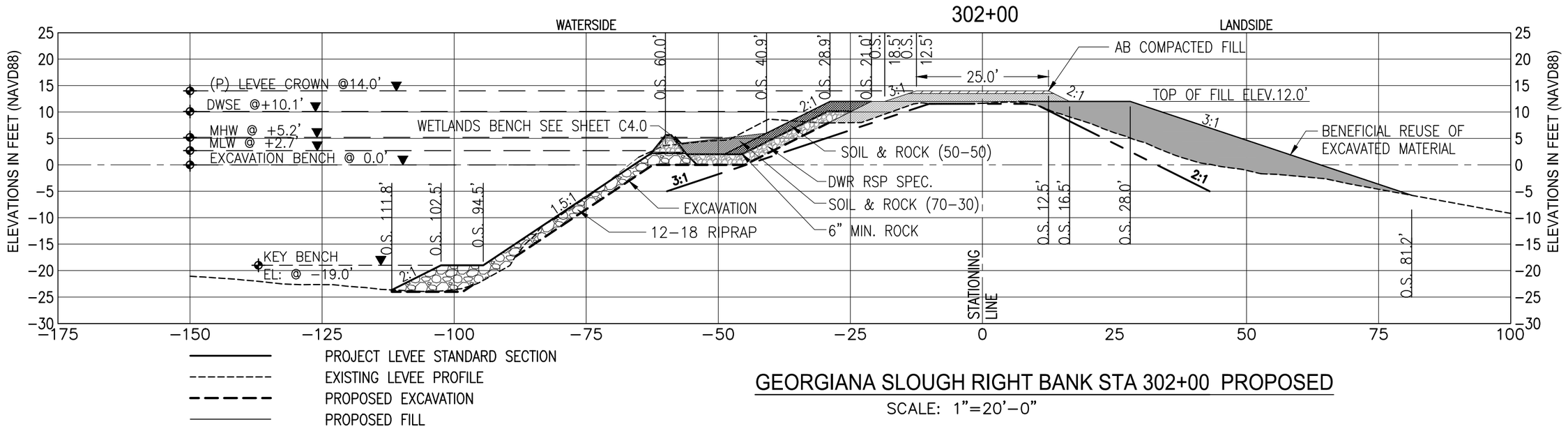
SHEET NUMBER: C5.21
PROJECT NUMBER: 7702.52



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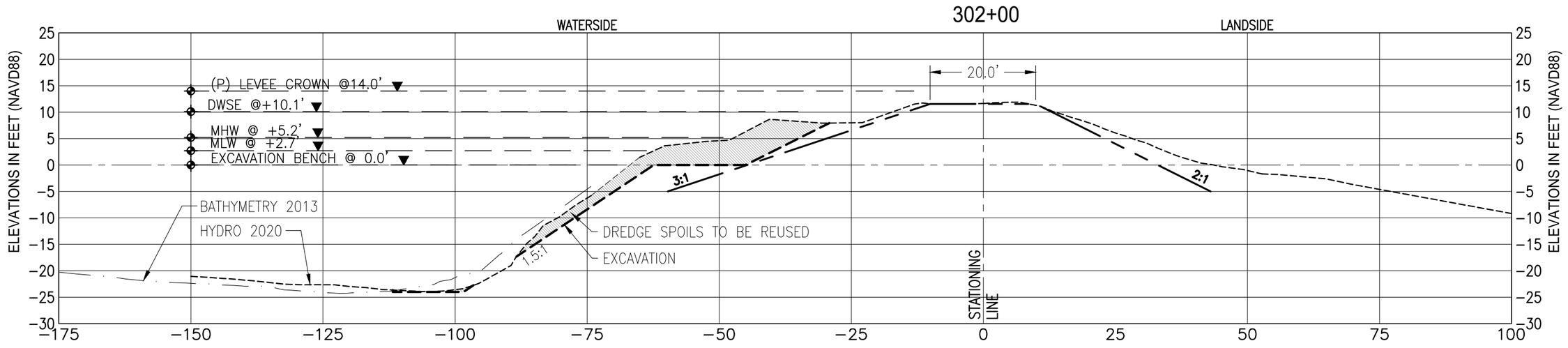

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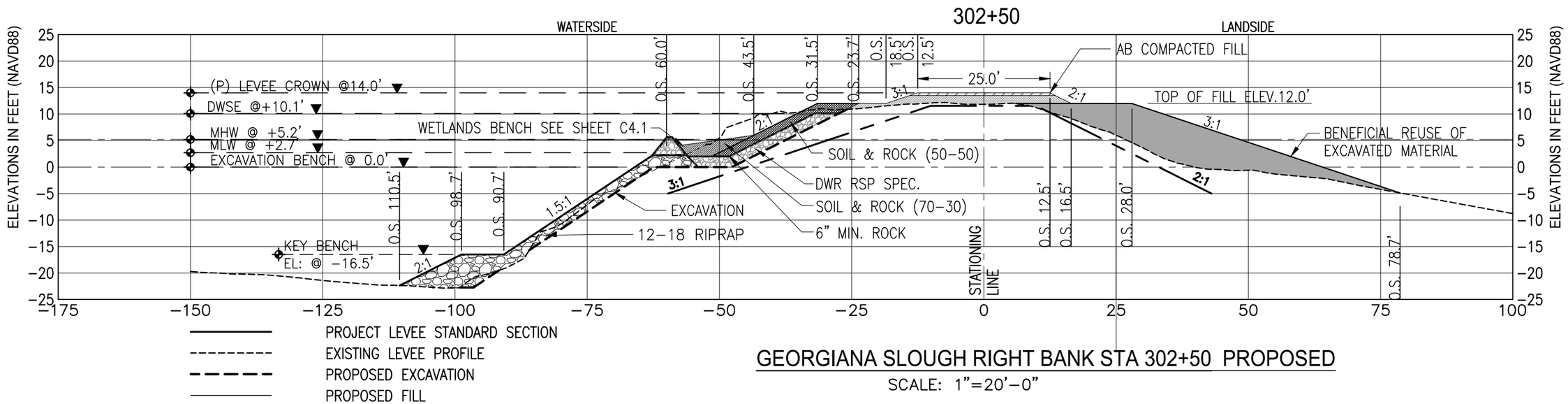

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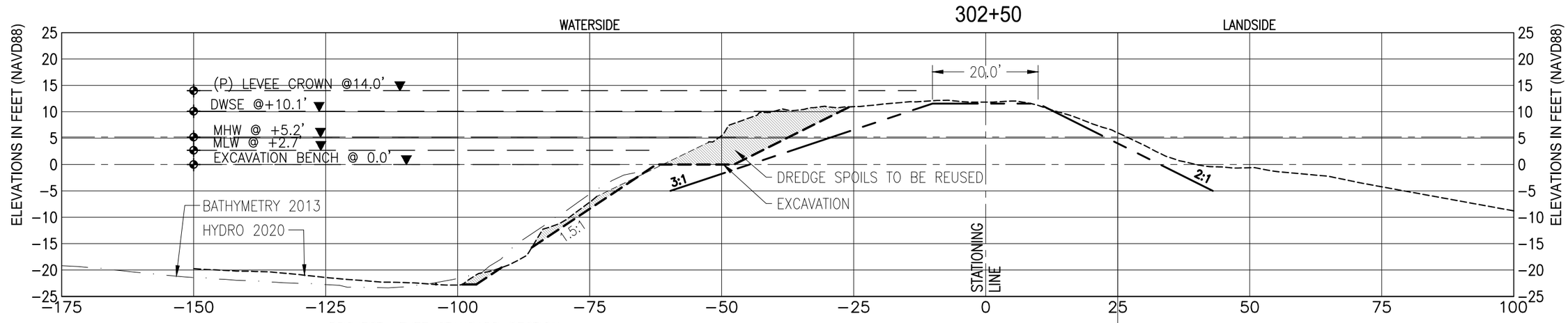

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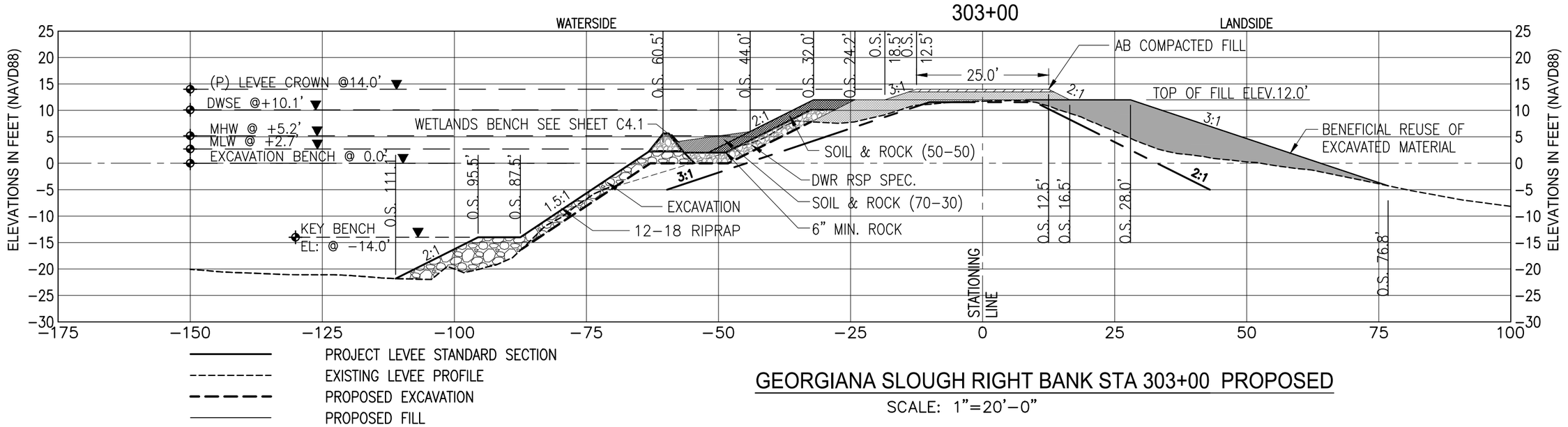

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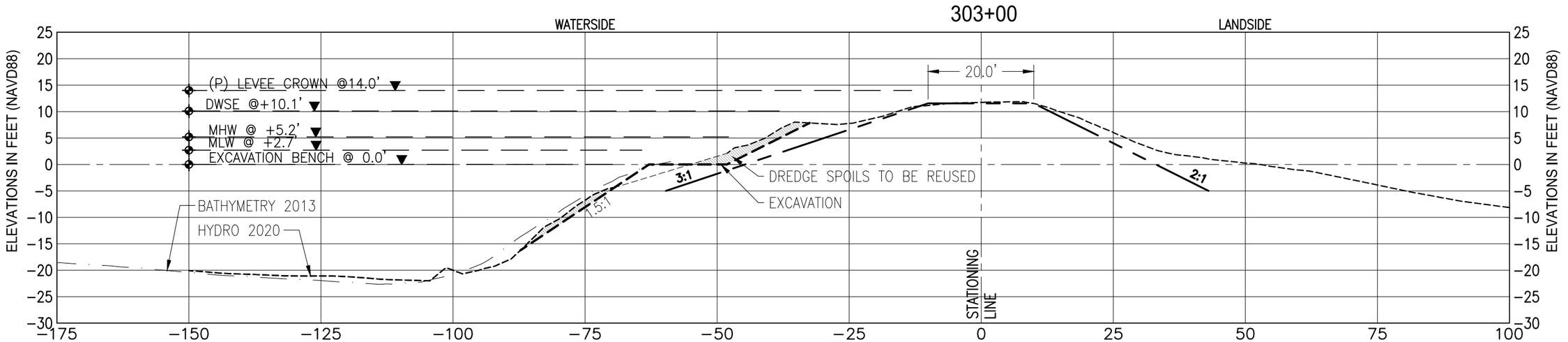

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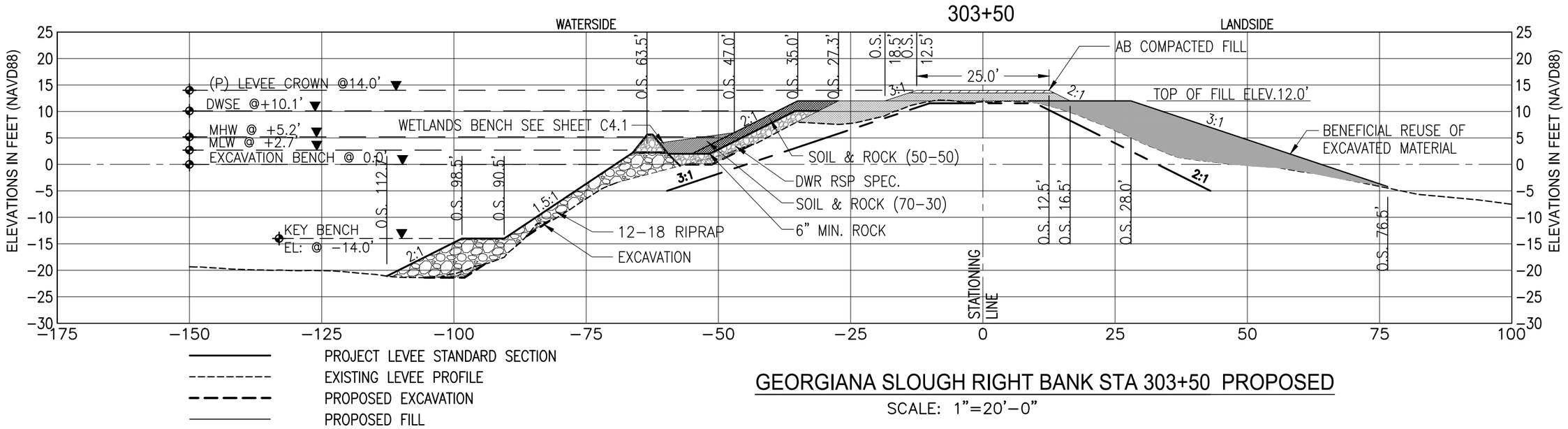

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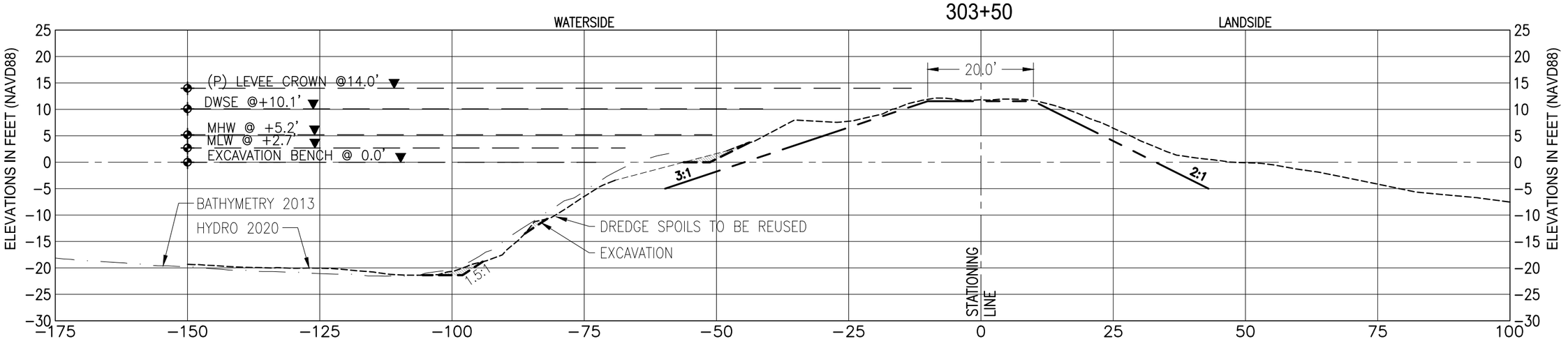

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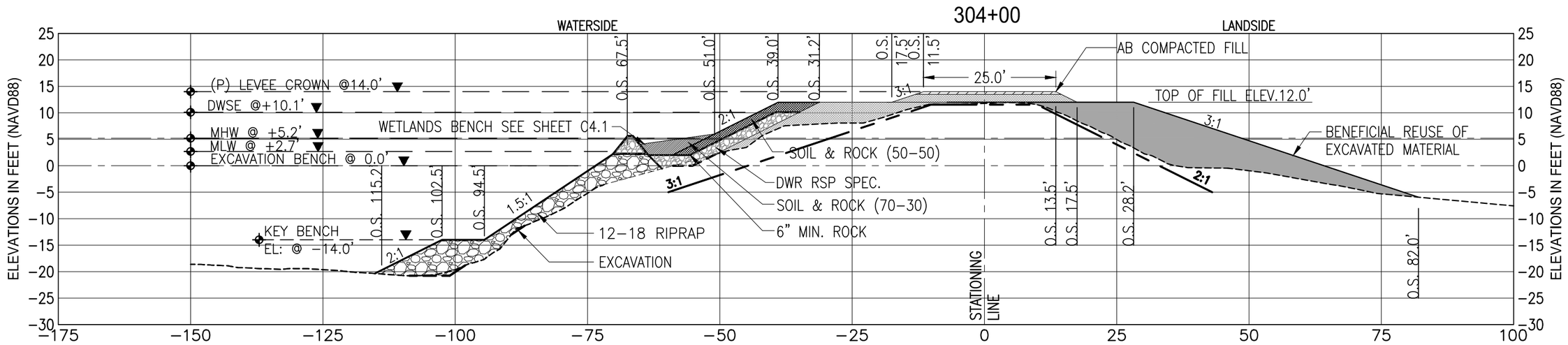

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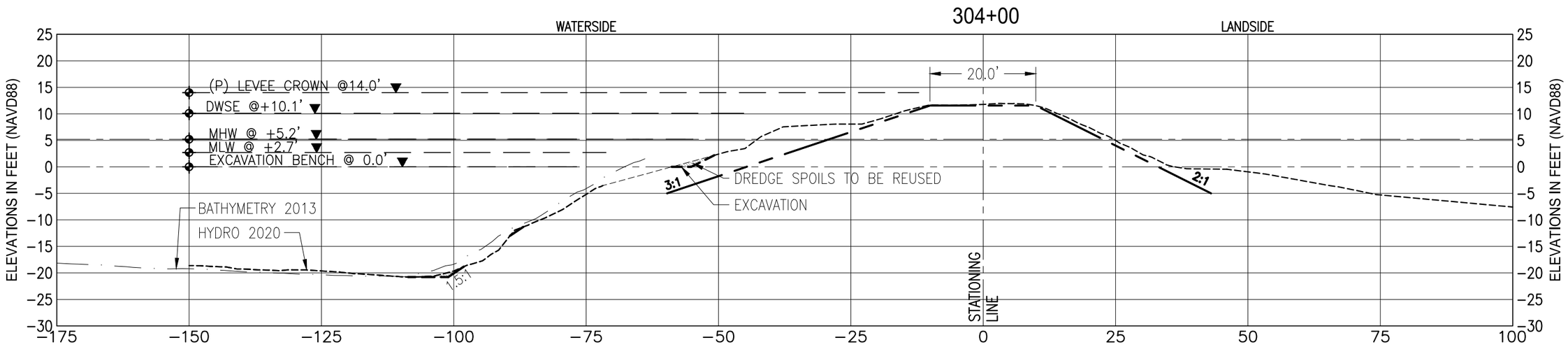

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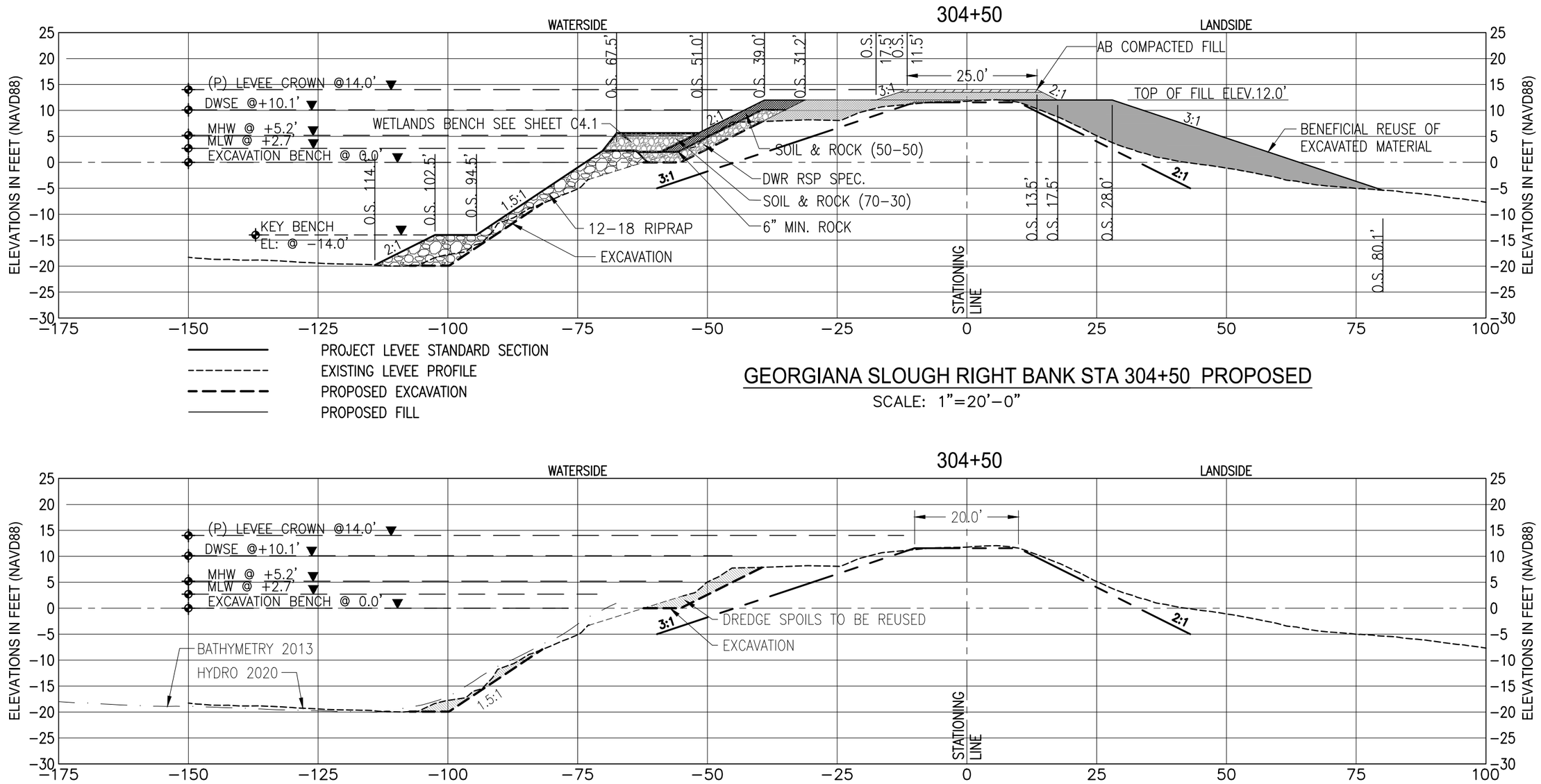

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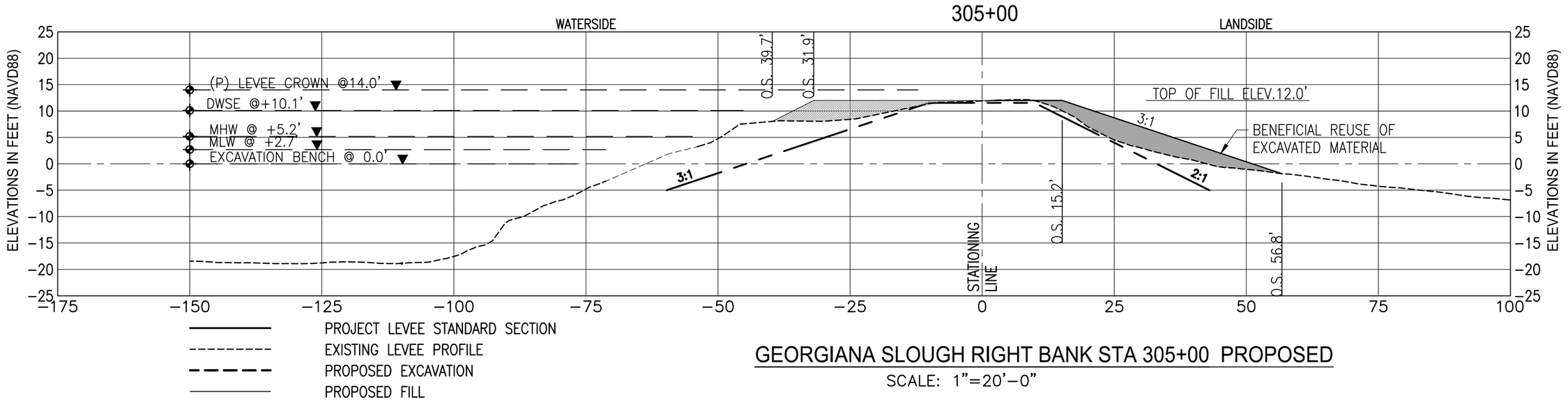

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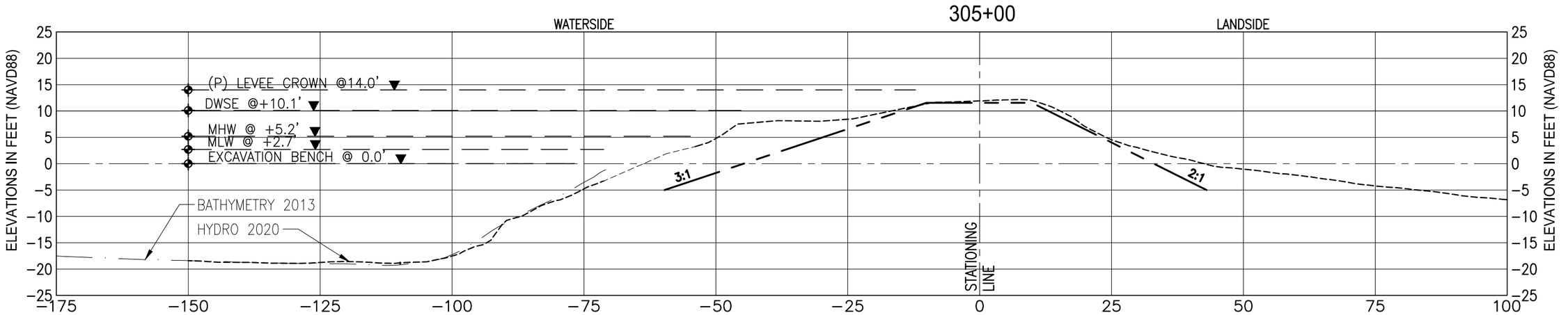

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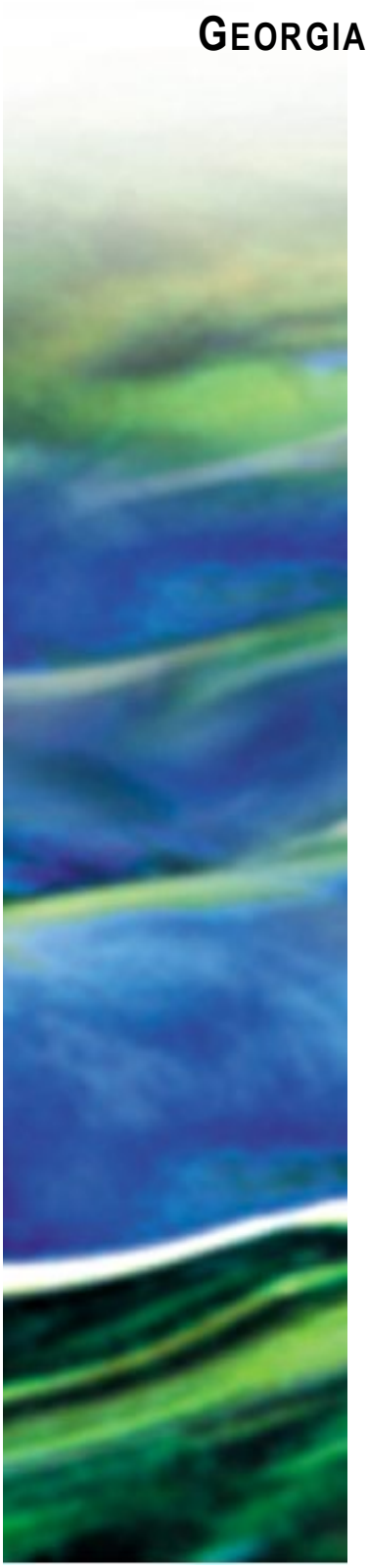
PROJECT NUMBER: 7702.52

Appendix D

Aquatic Resources Delineation

AQUATIC RESOURCE DELINEATION REPORT FOR THE GEORGIANA SLOUGH EROSION CONTROL AND HABITAT ENHANCEMENT PROJECT



Prepared for:

U.S. Army Corp of Engineers

On Behalf of:

Brannan-Andrus Levee Maintenance District

Prepared by:

ROBERTSON - BRYAN, INC.
Solutions for Progress

April 2024

AQUATIC RESOURCE DELINEATION REPORT FOR THE GEORGIANA SLOUGH EROSION CONTROL AND HABITAT ENHANCEMENT PROJECT

Prepared for:

U.S. Army Corp of Engineers
1325 J Street
Sacramento, CA 95814

On Behalf of:

Brannan-Andrus Levee Maintenance District
PO Box 338
Walnut Grove, CA 95690
916-776-9122

Prepared by:

ROBERTSON - BRYAN, INC.
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April 2024

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EXECUTIVE SUMMARY

Robertson-Bryan, Inc. conducted an aquatic resource delineation for the Georgiana Slough Erosion Control and Habitat Enhancement project area. The 7-acre project site is located on the right bank of Georgiana Slough, on Lower Andrus Island, in Sacramento County, California.

Two isolated wetlands, located outside of the project footprint, are present within the survey area, consisting of a **0.42-acre forested wetland** and a **1.45-acre scrub-shrub wetland.** Both wetlands lack a direct surface connection to other waterways and are thus recommended as **non-jurisdictional wetlands.**

There is one **3.19-acre tidal riverine** feature present (Georgiana Slough) which is a navigable waterway and is thus recommended as a **jurisdictional feature**.

1 INTRODUCTION

Robertson-Bryan, Inc. (RBI) conducted an aquatic resource delineation on behalf of Brannan-Andrus Levee Maintenance District (BALMD) for their Georgiana Slough Erosion Control and Habitat Enhancement Project. The purpose of this report is to identify and describe aquatic resources within the project area and to document the boundaries of those aquatic resources for review by regulatory authorities. The survey area included in this report, which includes the 7-acre project site, is an 14-acre area which extends from the bed and banks of Georgiana Slough to the landside levee (**Figure 2**).

Applicant:

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The purpose of the Project is to repair areas of levee erosion located on the right bank of Georgiana Slough, along Lower Andrus Island, near the confluence of Georgiana Slough and the Mokelumne River. Specifically, the Project is needed to resolve upper slope sloughing and major lower slope undercutting, increase levee stability and improve the level of flood protection for Lower Andrus Island by repairing areas of levee erosion. The proposed erosion control project will also implement/incorporate methods that provide enhanced fisheries and riparian habitat in this reach of the Sacramento-San Joaquin Delta that currently provides limited fish habitat. Once completed, the project would provide suitable erosion control to the levee utilizing recognized and effective erosion control methodologies and support fish-friendly habitat through the creation of wetland and riparian shaded riverine aquatic (SRA) habitat on the channel margin.

2 LOCATION

The project site is located on the on the right bank of Georgiana Slough, on Lower Andrus Island in Sacramento County, California. Specifically, the project site is located at 38.129258° Latitude, -121.584926° Longitude, including approximately 1,500 linear feet of the Georgiana Slough channel and levee (see **Figure 1**). This site is located within the U.S. Geological Survey (USGS) 7.5-minute Isleton Quadrangle.

To drive to the site, take Interstate 5 south bound to exit 485 for State Highway 12. Follow Highway 12 for approximately 11 miles and turn right onto Brannan Island Road and arrive at the project site on the left hand side.

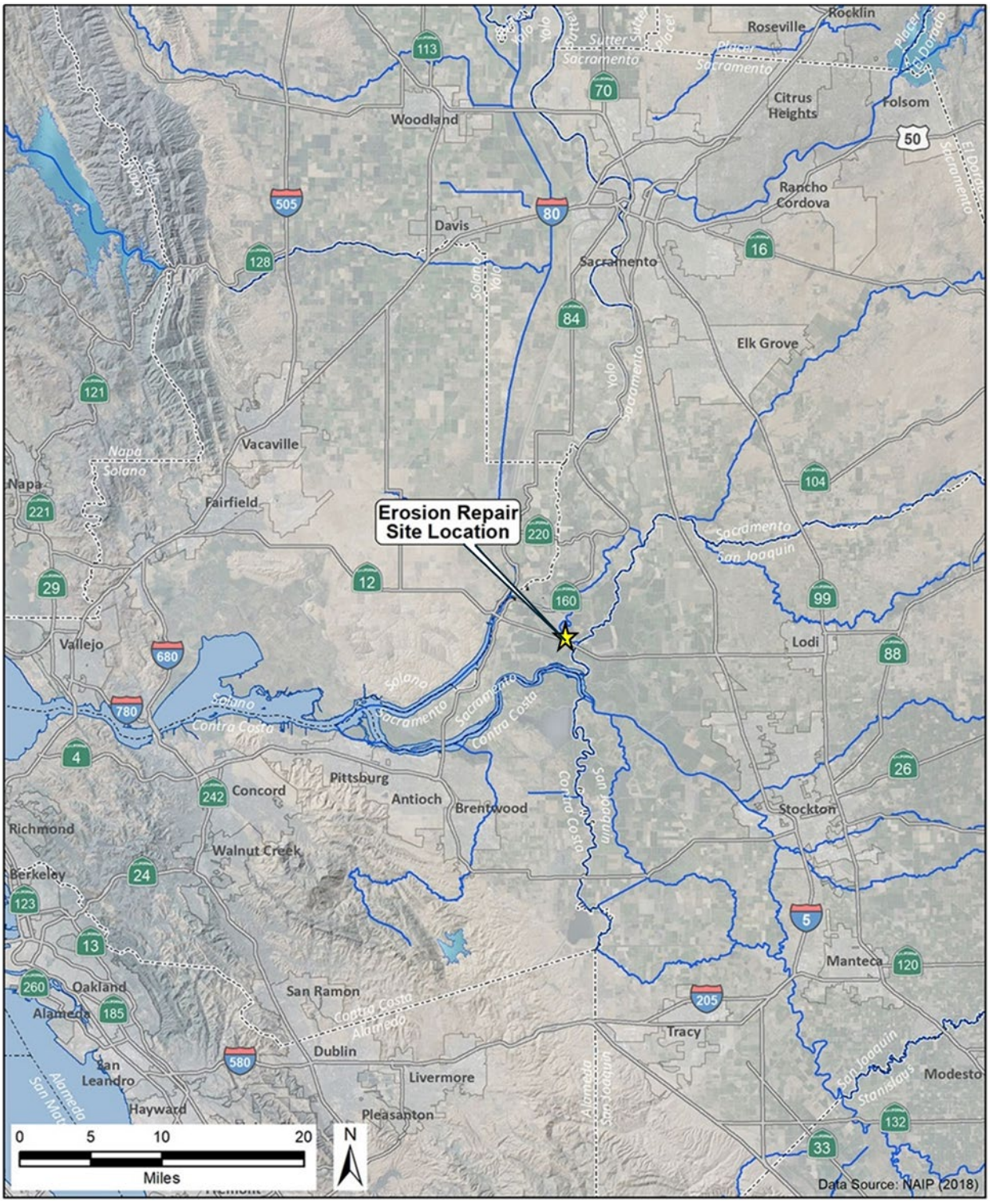

Figure 1. Location of the Georgiana Slough Erosions Control and Habitat Enhancement Project.

Figure 2. Delineation study area.

3 METHODS

The delineation was conducted in accordance with USACE guidelines including: *National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams* (David et al 2022), *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008), *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (U.S. Army Corp of Engineers 2008).

Preliminary research was conducted prior to the field delineation and included a review of the following sources:

- Natural Resource Conservation Service (NRCS) soil survey data
- U.S. Fish and Wildlife National Wetlands Inventory (NWI) data
- Satellite aerial imagery
- U.S. Geological Survey topographic maps
- Local stream gauges

The field delineation was conducted across two days, March 21st and April 1st, 2024, by RBI biologist Hailey Price, who is certified by the Wetland Training Institute (WTI). Field conditions and observations were recorded using the USACE's *Rapid Ordinary High Water Mark (OHWM) Field Identification Data Sheet* (2022), and *Arid West Region Automated Wetland Determination Data Sheet (ADS) version 1.17*. Location data and the OHWM boundary were recorded using a global positioning system (GPS) data logger in the North American datum of 1983. Data points were imported and mapped using recent high resolution aerial imagery.

4 RESULTS

4.1 LANDSCAPE SETTING

The study site is located along Georgiana Slough within the Upper Mokelumne watershed (HUC-8 18040012). Georgiana Slough is a tidally influenced river which flows from the Sacramento River and empties into the Mokelumne River. Within the project vicinity, the riverbed of Georgiana Slough is natural-bottomed with rock slope protection along its banks that extend into the river. The survey area is located on the right bank of Georgiana Slough, on Lower Andrus Island. The erosion control and habitat enhancement site extend over approximately 1,500 linear feet (LF) of bank, near the confluence of Georgiana Slough and the Mokelumne River.

4.2 AQUATIC RESOURCES

4.2.1 Overview

A search of NWI data identified one mapped tidal riverine feature in the survey area which corresponds to Georgiana Slough (see map in **Appendix D**). In addition to the slough, field surveys identified two isolated wetlands located at the landside levee toe (**Table 1**). Riverine

features were delineated using the methodology outlined in the national manual for rivers and streams (David et al 2022), while wetland features were delineated using the methodology outlined in the original wetland delineation manual (Environmental Laboratory 1987) and Arid West regional supplement (USACE 2008). The boundaries of these features are justified in the sections below and provided in the delineation map in **Appendix A.**

Table 1. Aquatic resources within the survey area.

Name	Cowardin Code	Area	Waters Type	Latitude	Longitude	Waterway
Riverine-1	R1UB	3.19 acres	A-1 TNW	38.129458°	-121.584977°	Georgiana Slough
Wetland-1	PSS	1.45 acres	Non-WOTUS	38.128937°	-121.586349°	None
Wetland-2	PFO	0.42 acre	Non-WOTUS	38.128947°	-121.584631°	None

4.2.2 Georgiana Slough

4.2.3 Hydrology

Within the project site, the Georgiana Slough channel is approximately 250 feet wide and generally carries flow from north to south with the exception of flood tide conditions in which flow directions reverse. Georgiana Slough's natural hydrology has been modified by the construction of levees on each bank of the slough. Because the slough is tidally influenced, river stage fluctuates throughout the day, though stage may also vary seasonally and annually based on a number of variables such as precipitation, snowpack, and water usage.

4.2.4 OHWM Rationale

The banks of Georgiana Slough have been significantly modified and are composed primarily of rip rap used for levee construction. As such many OHWM indicators, such as changes in sediment or break in slope, can not be applied as natural conditions are not present. River channels with armored banks may, however, still display vegetation indicators depending on vegetation management along the levees and by vegetative litter/debris lines. Within the project site, a distinct change in vegetation communities was observed along with frequent observations of matted vegetation along the same elevation as the vegetation community transition. Together these two vegetation indicators mark a reliable indicator of the OHWM and were thus used to record and map the OHWM of the slough.

4.3 ISOLATED WETLANDS

4.3.1 Vegetation

Each of the isolated wetlands contains distinct plant communities differentiating them from the adjacent uplands. Based on species composition and cover, the vegetation communities within both wetlands passed the Dominance Test and are thus considered hydrophytic plant communities (see W-1 and W-2 data sheets in **Appendix B**). Furthermore, these vegetation communities have a distinct border around the wetland areas in which the plant species clearly transition from hydrophytic community to upland plant communities. This distinct change in

vegetation cover marks a reliable indicator for the OWHM boundary (Lichvar and McColley 2008).

4.3.2 Soil

The mapped soil unit within the survey area consists of Valpac Sandy Loam, which is classified as a hydric soil due to its poor drainage properties (see Soil Resource Report in **Appendix E**). Soil profiles were completed on site for both wetlands to confirm the presence or absence of hydric soils. Based on the soil texture, color, and presence of redoximorphic features, soils within both wetlands were found to meet hydric soil criteria (see data sheets in Appendix B).

4.3.3 Hydrology

Surface water was present within a portion of both delineated wetlands during the field survey. Inundation or saturation on aerial imagery could not be identified due to dense tree and shrub cover which obscures the wetted areas on aerials. There are no direct surface water connections and no aquatic features directly adjacent to the wetlands. Based on the elevation of the wetland areas, which are at or below the surface water elevation of Georgiana Slough, it is likely that the primary wetland hydrology source is a subsurface connection to the slough via water seepage through the levee. In addition, precipitation runoff likely provides a secondary water source as hydric soils present within the wetlands may retain precipitation runoff for an extended period of time. As such, wetland hydrology is present and thus each wetland meets all three of the wetland determination criteria: hydrophytic vegetation, hydric soils, and wetland hydrology.

5 JURISDICTION

The USACE regulates activities in certain waterbodies under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Waterbodies that fall within USACE's regulatory jurisdiction are only those which are determined to be Waters of the U.S. (WOTUS) as defined in 33 CFR Part 328, which was recently revised by the September 2023 Revised Definition of "Waters of the United States"; Conforming (88 FR 61964), herein referred to as the 2023 Conforming Rule.

Waterbodies that are considered WOTUS under the 2023 Conforming Rule include the following general categories, as outlined in 33 CFR 328.3 paragraph (a):

(a)(1) navigable waters
(a)(2) impoundments of WOTUS
(a)(3) tributaries to navigable rivers or impoundments
(a)(4) adjacent wetlands, and
(a)(5) select lakes and ponds.

The following sections include background information needed to determine whether the identified aquatic resources meet the applicable WOTUS criteria outlined in the 2023 Conforming Rule. This information is provided to assist USACE staff in determining the jurisdictional status of the aquatic features identified in this report.

5.1 GEORGIANA SLOUGH

Per 33 CFR Part 329.4, all waterways subject to the ebb and flow of the tide are considered (a)(1) navigable waterways. Georgiana Slough is subject to the ebb and flow of the tide and is a mapped USACE navigable waterway. As such Georgiana Slough is recommended as a **jurisdictional feature.**

5.2 ISOLATED WETLANDS

Wetlands are considered a WOTUS when they are adjacent to a jurisdictional tributary. Under the 2023 Conforming Rule, adjacent is defined as having a *continuous surface connection* to the tributary. A continuous surface connection is considered to be a physical connection in which a wetland directly abuts the tributary or the wetland is connected to the tributary via a discrete physical feature such as a pipe or ditch. Note that a continuous surface connection does not require a continuous hydrological connection between the wetland and the tributary.

No continuous surface connections are present between the two wetlands and Georgiana Slough. While the wetland hydrology may potentially be fed by water seepage through the levee, this would represent a subsurface connection and thus does not meet criteria surface-connection criteria for adjacent wetlands. As such, both of these wetlands are recommended as **non-jurisdictional features.**

6 REFERENCES

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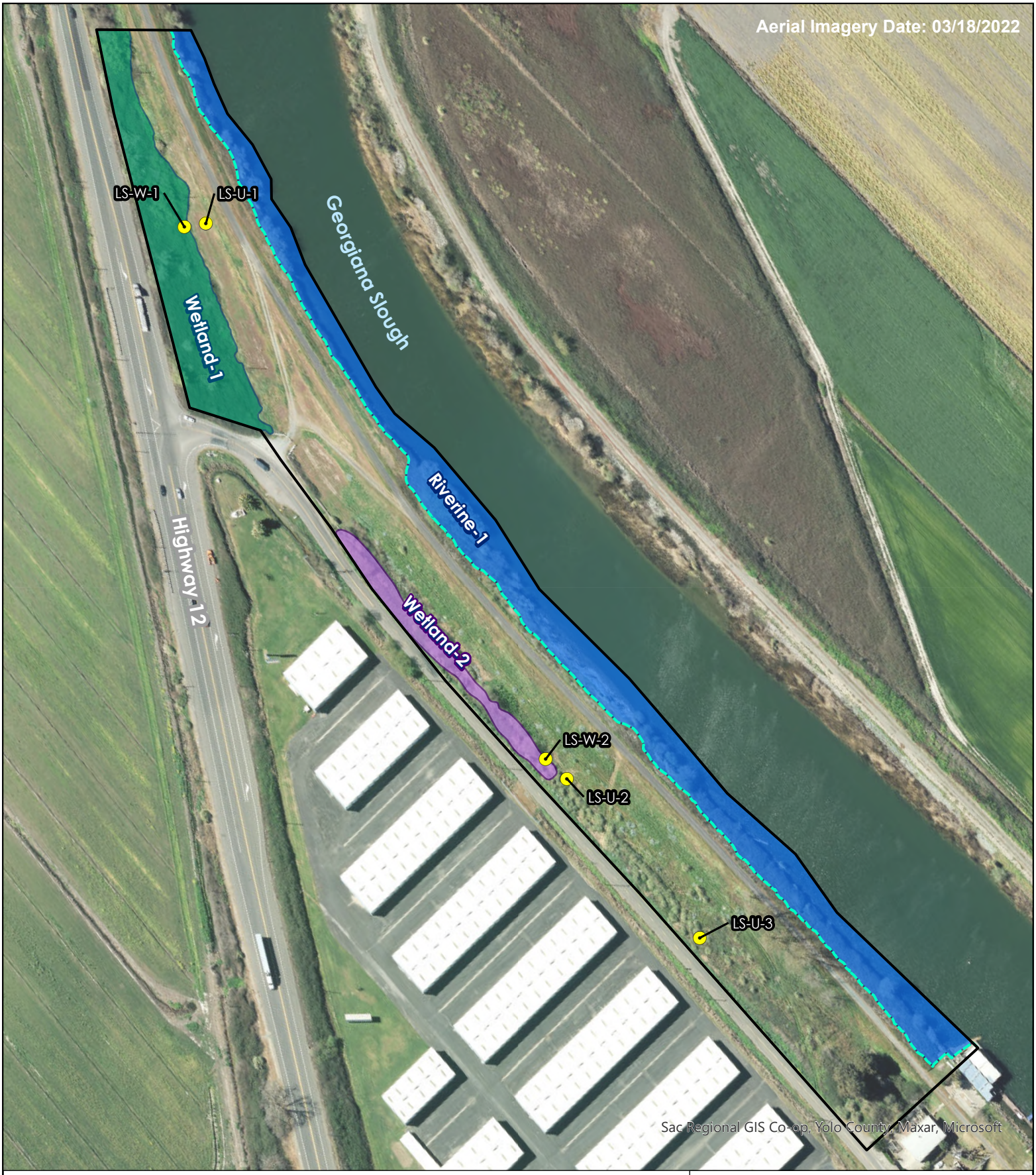
Appendix A: Aquatic Resource Delineation Map



N

0 195 390 780 Feet

Georgiana Slough Erosion Control and Habitat Enhancement Project

- Data Sheet Points
- Ordinary High Water Mark
- Survey Area - 14.11 acres
- Tidal Riverine (R1) - 3.19 acres
- Palustrine Forested (PFO) - 0.42 acre
- Palustrine Scrub-Shrub (PSS) - 1.45 acres

Map Generated by H. Price on 4/25/2024

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Appendix B: OHWM Data Sheets

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Arid West Region
See ERDC/EL TR-08-28; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Georgiana Slough Levee | City/County: Isleton, Sacramento County | Sampling Date: 03/22/2024
Applicant/Owner: BALMD | State: CA | Sampling Point: LS-W-1
Investigator(s): Hailey Price | Section, Township, Range: N/A
Landform (hillside, terrace, etc.): toe of levee slope | Local relief (concave, convex, none): concave | Slope (%): 0
Subregion (LRR): LRR C | Lat: 38.129182 | Long: -121.586755 | Datum: WGS 1984
Soil Map Unit Name: Valpac sandy loam | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 50 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix lasiolepis*	52	Yes	FACW
2.			
3.			
4.			
	52	=Total Cover	
Sapling/Shrub Stratum (Plot size: 20 ft)			
1. *Rubus armeniacus*	90	Yes	FAC
2.			
3.			
4.			
5.			
	90	=Total Cover	
Herb Stratum (Plot size: 10 ft)			
1. *Conium maculatum*	23	Yes	FACW
2. *Rupertia physodes*	5	No	UPL
3. *Carduus pycnocephalus*	2	No	UPL
4. *Rubus armeniacus*	5	No	FAC
5.			
6.			
7.			
8.			
	35	=Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____	=Total Cover	

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	95	x 3 =	285
FACU species	0	x 4 =	0
UPL species	7	x 5 =	35
Column Totals:	177 (A)		470 (B)

Prevalence Index = B/A = 2.66

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks:

SOIL

Sampling Point: LS-W-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
1-3								organic litter
3-8	10YR 2/1	100					Sandy	
8-13	10YR 3/2	95	10YR 4/4	5	C	M	Loamy/Clayey	Distinct redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ? Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	X	No	___	Depth (inches): 2
Water Table Present?	Yes	___	No	___	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes	___	No	___	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface water observed under dense blackberry thickets, depth is rough estimate as wetted portion was inaccessible.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Arid West Region
See ERDC/EL TR-08-28; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Georgiana Slough Levee | City/County: Isleton, Sacramento County | Sampling Date: 04/01/2024
Applicant/Owner: BALMD | State: CA | Sampling Point: LS-W-2
Investigator(s): Hailey Price | Section, Township, Range: N/A
Landform (hillside, terrace, etc.): toe of levee slope | Local relief (concave, convex, none): convex | Slope (%): 0-5
Subregion (LRR): LRR C | Lat: 38.129097 | Long: -121.583871 Y8 | Datum: WGS 1984
Soil Map Unit Name: Valpac sandy loam | NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation X , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? **Yes** X **No** ____

Remarks:
Vegetation was recently grazed.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 50 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *salix nigra*	30	Yes	OBL
2. *Salix lasiolepis*	22	Yes	FACW
3.			
4.			
	52	=Total Cover	
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____	=Total Cover	
Herb Stratum (Plot size: 15 ft)			
1. *Persicaria amphibia*	3	No	OBL
2. *Rupertia physodes*	1	No	UPL
3. *Schoenoplectus acutus*	38	Yes	OBL
4. *Carex obnupta*	18	No	OBL
5. *Cortaderia selloana*	32	Yes	FACU
6.			
7.			
8.			
	92	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft)			
1. *Rubus armeniacus*	10	Yes	FAC
2.			
	10	=Total Cover	

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	89	x 1 =	89
FACW species	22	x 2 =	44
FAC species	10	x 3 =	30
FACU species	32	x 4 =	128
UPL species	1	x 5 =	5
Column Totals:	154 (A)		296 (B)
Prevalence Index = B/A =	1.92		

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks:

SOIL

Sampling Point: LS-W-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
1-6	2.5Y 3/1	100					Loamy/Clayey	
6-12	2.5Y 3/1	97	2.5Y 4/3	3	C	M	Loamy/Clayey	Distinct redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ? Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ? Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): ___
Water Table Present?	Yes ___	No ___	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No ___	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Arid West Region
See ERDC/EL TR-08-28; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Georgiana Slough Levee City/County: Isleton, Sacramento County Sampling Date: 03/22/2024
Applicant/Owner: BALMD State: CA Sampling Point: LS-U-1
Investigator(s): Hailey Price Section, Township, Range: N/A
Landform (hillside, terrace, etc.): Local relief (concave, convex, none): concave Slope (%): 40
Subregion (LRR): LRR C Lat: 38.129273 Long: -121.586707 Datum: WGS 1984
Soil Map Unit Name: Valpac sandy loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? **Yes** ____ **No** X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ =Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ =Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1. *Erodium botrys*	8	No	FACU
2. *Bromus hordeaceus*	22	Yes	FACU
3. *Vulpia myuros*	5	No	FACU
4. *Vicia villosa*	20	Yes	UPL
5. *Avena barbata*	20	Yes	UPL
6.			
7.			
8.			
	75 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ =Total Cover		

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	35	x 4 =	140
UPL species	40	x 5 =	200
Column Totals:	75 (A)		340 (B)

Prevalence Index = B/A = 4.53

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%
____ Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ____ **No** X

Remarks:

SOIL

Sampling Point: LS-U-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

N//A, vegetation is not hydrophytic and no hydrology indicators observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ___ No ___ Depth (inches): ___

Saturation Present? Yes ___ No ___ Depth (inches): ___

(includes capillary fringe)

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Arid West Region
See ERDC/EL TR-08-28; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Georgiana Slough Levee City/County: Isleton, Sacramento County Sampling Date: 04/01/2024
Applicant/Owner: BALMD State: CA Sampling Point: LS-U-2
Investigator(s): Hailey Price Section, Township, Range: N/A
Landform (hillside, terrace, etc.): toe of levee slope Local relief (concave, convex, none): concave Slope (%): 0
Subregion (LRR): LRR C Lat: 38.129130 Long: -121.583733 Datum: WGS 1984
Soil Map Unit Name: Valpac sandy loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation X , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? **Yes** ____ **No** X

Remarks:
Vegetation on site has recently been grazed.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ =Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ =Total Cover		
Herb Stratum (Plot size: 10 ft radius)			
1. *Cortaderia selloana*	95	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	95 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ =Total Cover		

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	95	x 4 =	380
UPL species	0	x 5 =	0
Column Totals:	95 (A)		380 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ____ **No** X

Remarks:

SOIL

Sampling Point: LS-U-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Not applicable, vegetation is not hydrophytic and no hydrology indicators observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? Yes ___ No X Depth (inches): ___

(includes capillary fringe)

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed,

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Arid West Region
See ERDC/EL TR-08-28; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Georgiana Slough Levee City/County: Isleton, Sacramento County Sampling Date: 04/01/2024
Applicant/Owner: BALMD State: CA Sampling Point: LS-U-3
Investigator(s): Hailey Price Section, Township, Range: N/A
Landform (hillside, terrace, etc.): toe of levee slope Local relief (concave, convex, none): convex Slope (%): 0
Subregion (LRR): LRR C Lat: 38.129211 Long: -121.582819 Datum: WGS 1984
Soil Map Unit Name: Valpac sandy loam NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation X , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No ____
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? **Yes** ____ **No** X

Remarks:
Vegetation on site has recently been grazed.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ =Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ =Total Cover		
Herb Stratum (Plot size: 10 ft x 10 ft)			
1. *Juncus effusus*	2	No	FACW
2. *Rumex crispus*	30	Yes	FAC
3. *Schoenoplectus acutus*	2	No	OBL
4. *Poa annua*	8	No	FAC
5. *Mentha spicata*	4	No	FACW
6. *Cortaderia selloana*	17	Yes	FACU
7. *Carex obnupta*	2	No	OBL
8.			
	65 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ =Total Cover		

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	4	x 1 =	4
FACW species	6	x 2 =	12
FAC species	38	x 3 =	114
FACU species	17	x 4 =	68
UPL species	0	x 5 =	0
Column Totals:	65 (A)		198 (B)

Prevalence Index = B/A = 3.05

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%
____ Prevalence Index is ≤3.0[1]
____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ____ **No** ____

Remarks:

SOIL

Sampling Point: LS-U-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
1-10	2.5Y 2.5/1	100					Loamy/Clayey	
10-13	2.5Y 3/2	100					Loamy/Clayey	
13-16	2.5Y 4/2	93	7.5YR 4/6	7	C	M	Sandy	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ? Reduced Vertic (F18)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Mapped soil unit is not in the Vertisols order, hence the reduced vertic indicator is not applicable.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No ___	Depth (inches): ___
Water Table Present?	Yes X	No ___	Depth (inches): 8
Saturation Present? (includes capillary fringe)	Yes ___	No ___	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

High water table is likely due to water seepage from the levee as the levee is constructed of coarse water-permeable materials.

U.S. Army Corps of Engineers (USACE)

RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET

The proponent agency is Headquarters USACE CECW-CO-R.

OMB Control No. 0710-XXXX
Approval Expires:

Project ID #:	Site Name: Georgina Slough Levee	Date and Time: 04/01/24 10:00am
Location (lat/long): 38.129937, -121.585522	Investigator(s): Haley Price	

Step 1 Site overview from remote and online resources
Check boxes for online resources used to evaluate site:

- [x] gage data
- [x] LiDAR
- [ ] geologic maps
- [ ] climatic data
- [x] satellite imagery
- [ ] land use maps
- [x] aerial photos
- [x] topographic maps
- [ ] Other: _____

Describe land use and flow conditions from online resources. Were there any recent extreme events (floods or drought)?

Step 2 Site conditions during field assessment

First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.

OHWM is at a transition point, therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below `b', at `x', or just above `a' the OHWM.

OHWM. Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

Geomorphic indicators

- [ ] **Break in slope:**
  - [ ] *on the bank:*
  - [ ] *undercut bank:*
  - [ ] *valley bottom:*
  - [ ] Other: _____
- [x] **Shelving:**
  - [ ] *shelf at top of bank:*
  - [ ] *natural levee:*
  - [ ] *man-made berms or levees:*
  - [ ] *other berms:* _____
- [ ] **Channel bar:**
  - [ ] *shelving (berms) on bar:*
  - [ ] *unvegetated:*
  - [ ] *vegetation transition (go to veg. indicators)*
  - [ ] *sediment transition (go to sed. indicators)*
  - [ ] *upper limit of deposition on bar:*
- [ ] **Instream bedforms and other bedload transport evidence:**
  - [ ] *deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)*
  - [ ] *bedforms (e.g., poofs, riffles, steps, etc.):*
  - [ ] *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*
- [ ] **Secondary channels:**

Sediment indicators

- [ ] **Soil development:**
- [ ] **Changes in character of soil:**
- [ ] **Mudcracks:**
- [ ] **Changes in particle-sized distribution:**
  - [ ] *transition from* _____ to _____
  - [ ] *upper limit of sand-sized particles*
  - [ ] *silt deposits:*

Vegetation Indicators

- [x] **Change in vegetation type and/or density:**

Check the appropriate boxes and select the general vegetation change *(e.g., graminoids to woody shrubs).* ***Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.***

- [ ] *vegetation absent to:*
- [ ] *moss to:*
- [ ] *forbs to:*
- [x] *graminoids to:* woody shrubs
- [ ] *woody shrubs to:*
- [ ] *deciduous trees to:*
- [ ] *coniferous trees to:*
- [x] **Vegetation matted down and/or bent:**
- [ ] **Exposed roots below intact soil layer:**

Ancillary indicators

- [ ] **Wracking/presence of organic litter:**
- [ ] **Presence of large wood:**
- [ ] **Leaf litter disturbed or washed away:**
- [ ] **Water staining:**
- [ ] **Weathered clasts or bedrock:**

Other observed indicators?

Describe:

Step 4 Is additional information needed to support this determination?

- [ ] Yes
- [ ] No

If yes, describe and attach information to datasheet:

Project ID #: _____

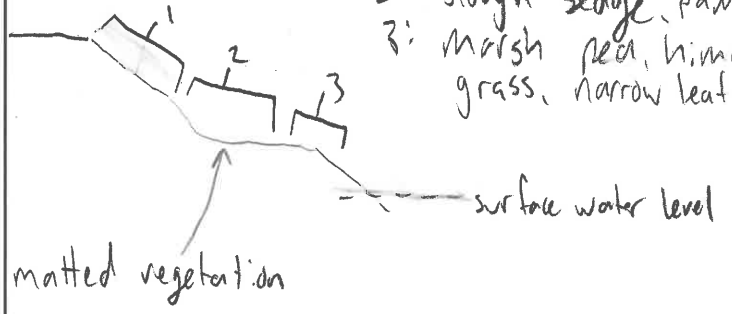
Step 5 Describe rationale for location of OHWM

OHWM recorded based on location of change in slope, change in vegetation community (from 2 to 1 as noted below) and presence of matted vegetation. Stream gage data also reviewed to supplement this determination.

Additional observations or notes

Veg communities

1: himalayan blackberry
2: slough sedge, pampas grass
3: marsh pea, himalayan blackberry, white alder, pampas grass, narrow leaf willow, arroyo willow,



Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☐ Yes ☒ No If no, explain why not: photos included in report.

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

Photo Number	Photograph description

Appendix C: Site Photographs

Figure 1. View of Georgiana Slough waterside levee slope.

Figure 2. View of Georgiana Slough waterside levee slope.

Figure 3. View of landside levee slope on east side of project site.

Figure 4. Overview of scrub-shrub wetland located at the levee toe adjacent to Highway 12 on the west side of the project site.

Figure 5. View of scrub-shrub wetland located at the levee toe on the west side of the project site.

Figure 6. View of landside levee slope on west side of project site and the scrub-shrub wetland.

Figure 7. View of forested wetland located at the levee toe on the east side of the project site.

Figure 8. View of forested wetland located at the levee toe on the east side of the project site.

Appendix D: Supporting Maps

Georgiana Slough Erosion Control and Habitat Enhancement Project

3/18/2024, 3:05:25 PM

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

Survey Area

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

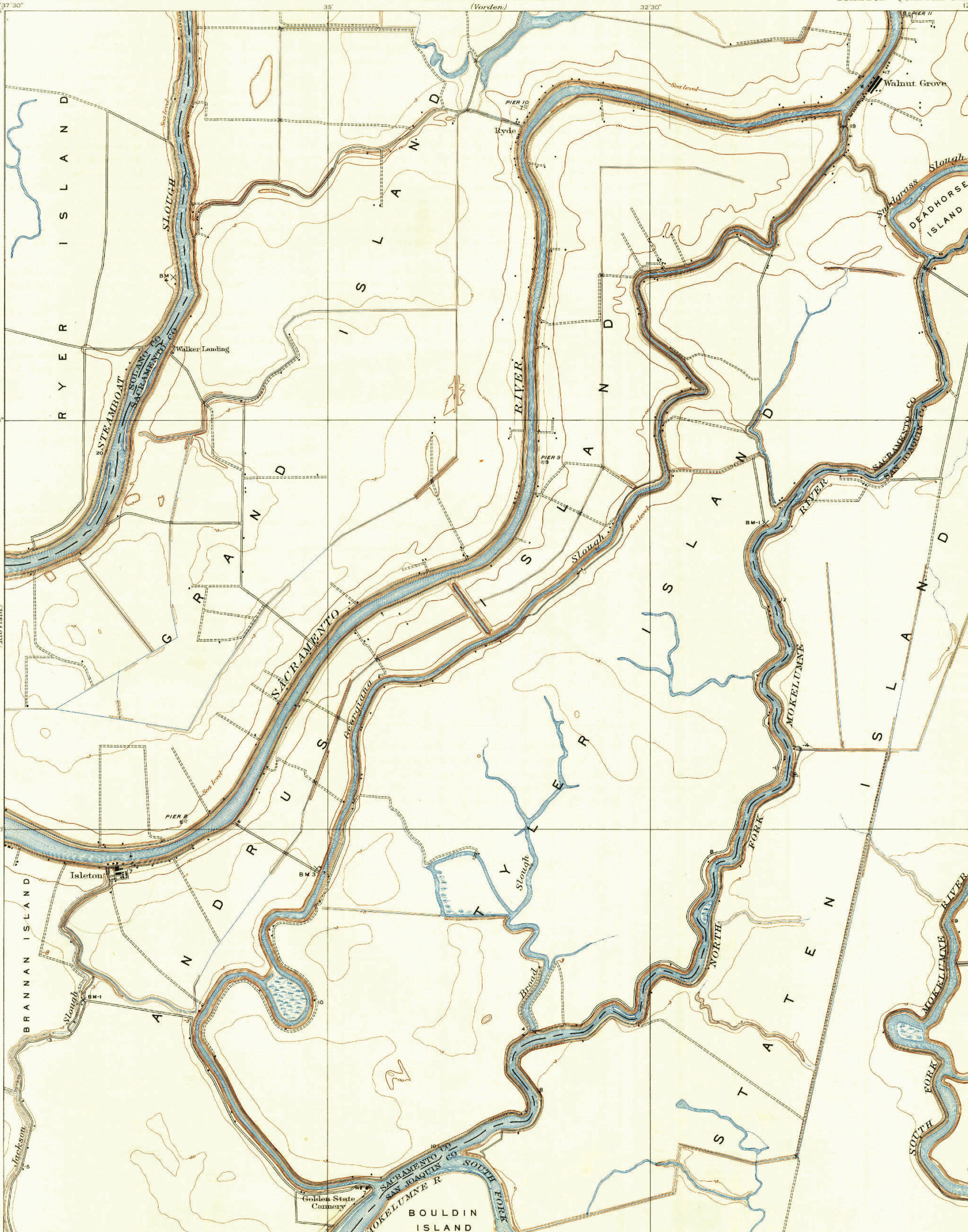
U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov, USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global

USGS

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

STATE OF CALIFORNIA
REPRESENTED BY THE
DIRECTOR OF PUBLIC WORKS

CALIFORNIA
ISLETON QUADRANGLE



38°07'30"
121°37'30"

ENGRAVED FEB. 1910 BY U.S.G.S.

R.B. Marshall, Chief Geographer.
T.G. Gerdine, Geographer in charge.
Topography by W.R. McKean and C.F. Eberly.
Control by R.A. Farmer, C.L. Nelson, L.F. Biggs, and B.A. Jenkins.
Surveyed in 1906 and 1908.

SURVEYED IN COOPERATION WITH THE STATE OF CALIFORNIA.

TRUE NORTH
MAGNETIC NORTH
18°
APPROXIMATE MEAN DECLINATION 1907.

Scale $\frac{1}{31680}$

1 ½ 0 1 Mile

1 ½ 0 1 Kilometer

Contour interval 5 feet.
Datum is mean sea level.

McKean
Eberly

Edition of Apr. 1910. reprinted 1937
Polyconic projection.

CALIF.
ISLETON

Appendix E. Soil Resource Report

United States Department of Agriculture

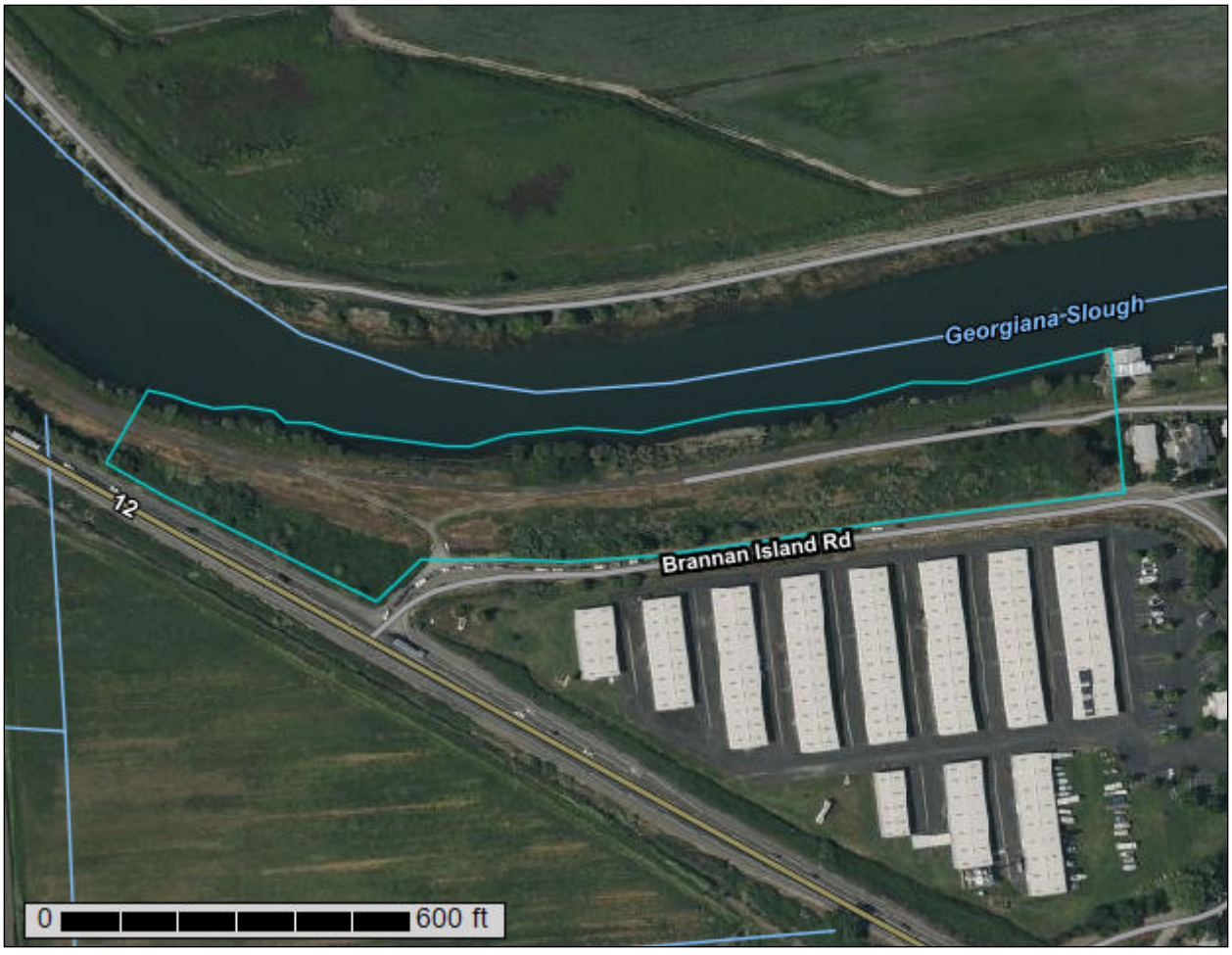
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Sacramento County, California

Georgiana Slough Erosion Control and Habitat Enhancement Project



April 2, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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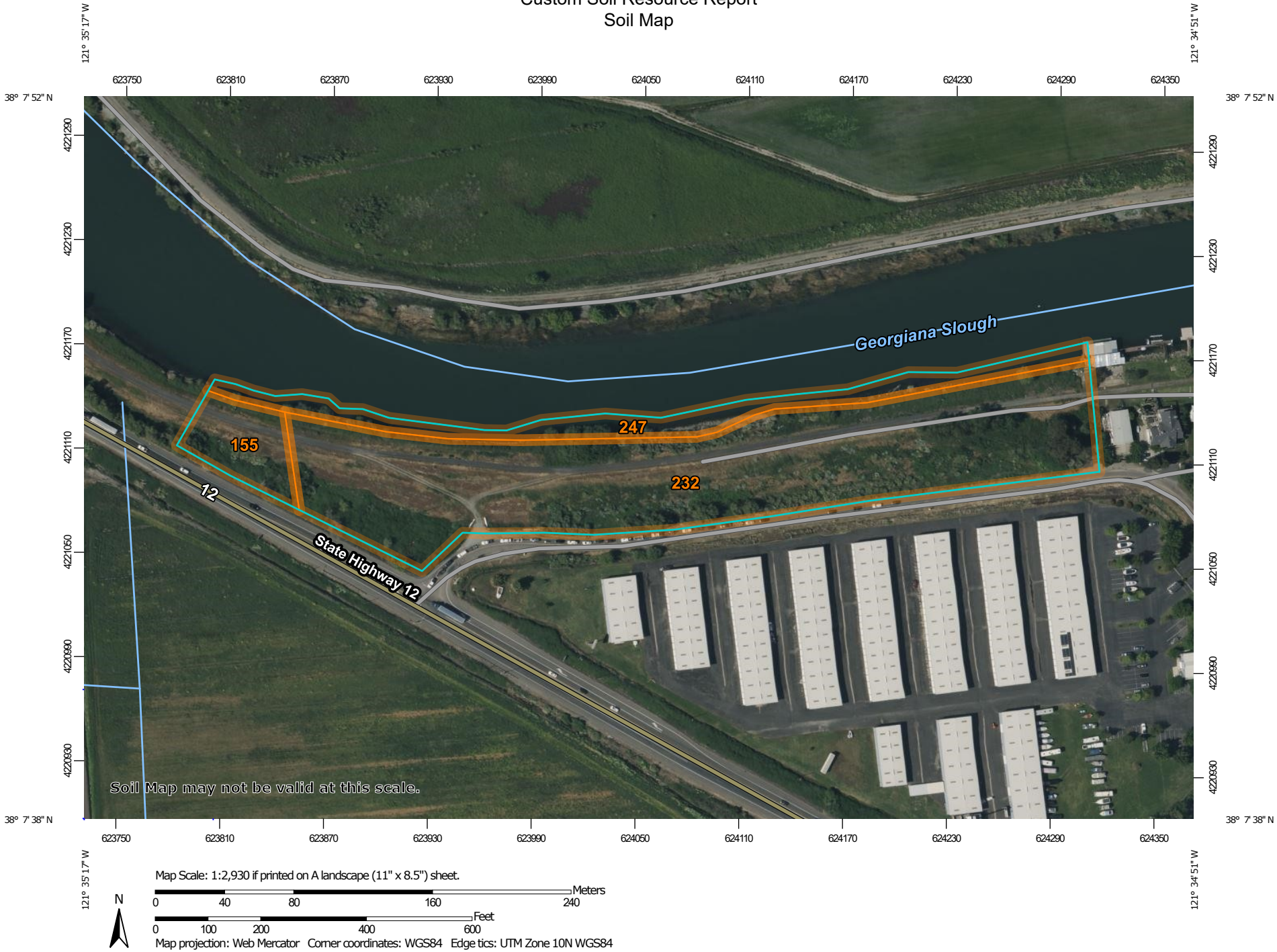
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,930 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sacramento County, California
Survey Area Data: Version 23, Aug 31, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 23, 2022—Apr 24, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
155	Gazwell mucky clay, partially drained, 0 to 2 percent slopes	0.7	7.6%
232	Valpac sandy loam, mucky substratum, partially drained, 0 to 2 percent slopes	6.8	78.0%
247	Water	1.3	14.4%
Totals for Area of Interest		**8.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Sacramento County, California

155—Gazwell mucky clay, partially drained, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hhmz
Elevation: 20 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 59 degrees F
Frost-free period: 275 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Gazwell and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gazwell

Setting

Landform: Backswamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 30 inches: mucky clay
2Ab - 30 to 36 inches: mucky silty clay
3Oa - 36 to 60 inches: muck

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: R016XA001CA - Tidally-Influenced, Freshwater
Hydric soil rating: Yes

Minor Components

Egbert

Percent of map unit: 4 percent
Landform: Flood plains

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Ecological site: R016XA001CA - Tidally-Influenced, Freshwater
Hydric soil rating: Yes

Rindge
Percent of map unit: 4 percent
Landform: Marshes
Ecological site: R016XA001CA - Tidally-Influenced, Freshwater
Hydric soil rating: Yes

Sailboat
Percent of map unit: 3 percent
Landform: Levees
Ecological site: R016XA002CA - Freshwater, Stratified, Fluventic
Hydric soil rating: Yes

Scribner
Percent of map unit: 3 percent
Landform: Backswamps
Ecological site: R016XA001CA - Tidally-Influenced, Freshwater
Hydric soil rating: Yes

Unnamed, clayey below 20in.
Percent of map unit: 1 percent
Hydric soil rating: No

232—Valpac sandy loam, mucky substratum, partially drained, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2yc92
Elevation: -10 to 0 feet
Mean annual precipitation: 17 to 20 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 320 to 327 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Valpac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valpac

Setting
Landform: Backswamps
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

Ap - 0 to 9 inches: sandy loam
A - 9 to 16 inches: sandy loam
C - 16 to 19 inches: sand
Ab1 - 19 to 25 inches: silt loam
2Ab2 - 25 to 33 inches: mucky silty clay
2Ab3 - 33 to 55 inches: mucky silty clay loam
2Ab4 - 55 to 60 inches: mucky clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 18 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: R016XA002CA - Freshwater, Stratified, Fluventic
Hydric soil rating: Yes

Minor Components

Gazwell

Percent of map unit: 4 percent
Landform: Backswamps
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R016XA001CA - Tidally-Influenced, Freshwater
Hydric soil rating: Yes

Sailboat

Percent of map unit: 4 percent
Landform: Flood plains on natural levees
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R016XA002CA - Freshwater, Stratified, Fluventic
Hydric soil rating: Yes

Rindge

Percent of map unit: 4 percent
Landform: Deltas
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Ecological site: R016XA001CA - Tidally-Influenced, Freshwater
Hydric soil rating: Yes

Scribner

Percent of map unit: 3 percent
Landform: Backswamps
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R016XA001CA - Tidally-Influenced, Freshwater
Hydric soil rating: Yes

247—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Appendix E

Terrestrial Species Biological Assessment

BIOLOGICAL ASSESSMENT

Brannan-Andrus Levee Maintenance District Georgiana Slough Erosion Control and Habitat Enhancement Project

Prepared for: Brannan-Andrus Levee Maintenance District
June 2024

acorn environmental

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Section 1 | Introduction

The purpose of this biological assessment (BA) is to address the potential for the Georgiana Slough Erosion Control and Habitat Enhancement Project (Proposed Action) to affect federally threatened, endangered, or proposed species. This BA has been prepared in accordance with legal requirements found in Section 7 (a)(2) of the Endangered Species Act (ESA; 16 U.S. C 1536(c)). The purpose of a biological assessment is to evaluate the potential effects of an action on species listed and proposed for listing, as well as designated and proposed critical habitat, and to determine whether any such species or habitat are likely to be adversely affected by the action. This BA addresses terrestrial species that fall under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS). Aquatic species falling under the jurisdiction of the National Marine Fisheries Service (NMFS) and USFWS are addressed within a separate analysis.

Pursuant to Section 14 of the Rivers and Harbors Act of 1899, 33 U.S.C. 408 (Section 408), the Brannan-Andrus Levee Maintenance District (BALMD) has requested permission through the Central Valley Flood Protection Board (CVFPB) from the US Army Corps of Engineers (Corps) to alter the Sacramento River Flood Control Project, an existing federal flood risk management project, authorized by the Flood Control Act of 1917. The BALMD is also seeking Corps authorization under Section 404 of the Clean Water Act for the discharge of dredged or fill material associated with the construction of the Project, including construction of habitat benches and levee reconfiguration to remediate ongoing erosion issues.

The following federally listed species were considered in this BA (**Table 1**).

Table 1: Species under USFWS Jurisdiction Evaluated in this BA

Species	Federal Status	Critical Habitat
Large-flowered Fiddleneck (*Amsinckia grandiflora*)	Endangered	Designated critical habitat does not occur within the Action Area
California Ridgway's Rail (*Rallus obsoletus obsoletus*)	Endangered	Designated critical habitat does not occur within the Action Area
Giant Garter Snake (*Thamnophis gigas*)	Threatened	Designated critical habitat does not occur within the Action Area
California Tiger Salamander (*Ambystoma californiense*)	Threatened	Designated critical habitat does not occur within the Action Area
Monarch Butterfly (*Danaus plexippus*)	Candidate	Designated critical habitat does not occur within the Action Area
Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)	Threatened	Designated critical habitat does not occur within the Action Area
Conservancy Fairy Shrimp (*Branchinecta conservatio*)	Endangered	Designated critical habitat does not occur within the Action Area
Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)	Threatened	Designated critical habitat does not occur within the Action Area
Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)	Endangered	Designated critical habitat does not occur within the Action Area

Section 2 | Description of Proposed Action and Action Area

2.1 PURPOSE OF THE PROPOSED ACTION

The BALMD is proposing the Georgiana Slough Erosion Control and Habitat Enhancement Project (Proposed Action) to resolve upper slope erosion problems and a major lower slope undercutting issue along the right bank levee of Georgiana Slough, on Lower Andrus Island. Once completed, the Proposed Action would provide suitable erosion control to the levee utilizing recognized and effective erosion control methodologies and would support fish-friendly habitat through the creation of wetland and riparian shaded riverine aquatic (SRA) habitat on the channel margin.

The project objectives are to:

- Provide suitable levee erosion control on approximately 1,500 linear feet (LF) of levee on the right bank of Georgiana Slough, corresponding to Stations 291+00 to 306+00 (Levee Mile 5.51 to 5.80).
- Provide fish-friendly habitat on the Georgiana Slough channel margin.
- Minimize long-term maintenance and repair costs by repairing existing areas of erosion using stable and effective erosion control methodologies.

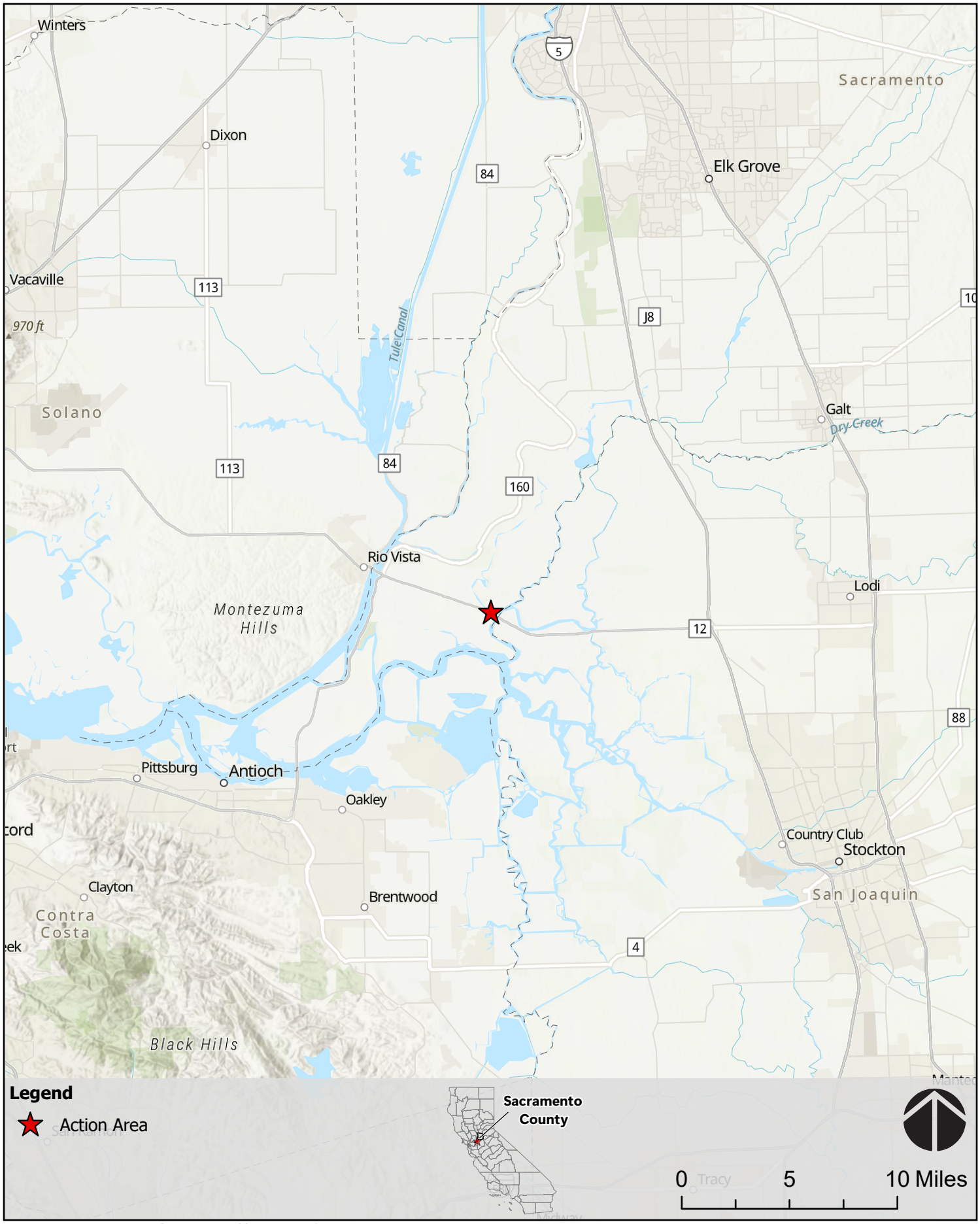
2.2 REGIONAL LOCATION

The Proposed Action is located in Sacramento County, in the primary zone of the Sacramento-San Joaquin Delta (**Figure 1**). Specifically, the Action Area is located on the right bank of Georgiana Slough on Lower Andrus Island. The site extends over 1,500 LF of bank, on Levee Mile 5.51 to 5.80, approximately a quarter mile from the confluence of the Mokelumne River (**Figure 2** and **Figure 3**).

The project also includes material source, storage, and staging areas, as shown on the site plan included as **Figure 4**. Quarried rock revetment material and 6-inch minus mineral filter would be sourced and transported to the site via material barges from the established quarry at San Rafael. Clean soil for filling the wetland bench would also be transported via barge from Decker Island. One location has been selected for staging construction materials and equipment in an area on the landside of the levee, immediately adjacent to the area of impact. Rock revetment, 6-inch minus, and fill will remain on the barge until final placement on the levee. Container plants required for the habitat features would be delivered periodically by pickup truck with trailer from a BALMD-approved nursery location within 75 miles of the Action Area.

2.3 ACTION AREA

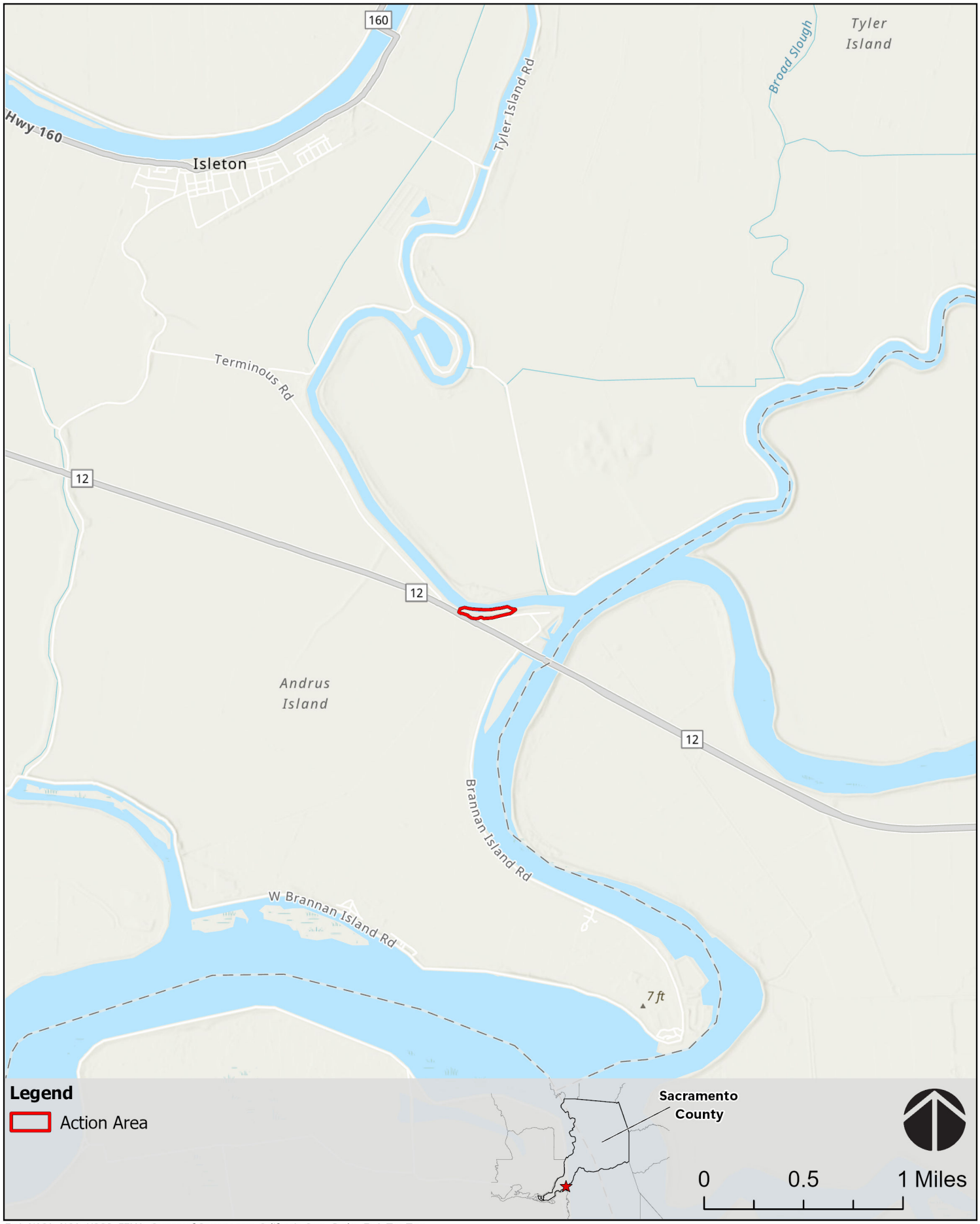
The Action Area for an ESA Section 7 consultation is defined as all areas that may be affected directly or indirectly by the Proposed Action, and not just the immediate area involved in the action. For the purposes of this BA, the Action Area includes the 1,500 LF of bank and levee, on River Mile 0.29 to 0.56, of Georgiana Slough plus two hundred feet upstream and downstream of the active construction areas due to possible



Esri, NASA, NGA, USGS, County of Sacramento, California State Parks, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USFWS

FIGURE 1

REGIONAL LOCATION



Esri, NASA, NGA, USGS, FEMA, County of Sacramento, California State Parks, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA,

FIGURE 2
SITE AND VICINITY

Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community, Yolo County, Maxar, Esri Community Maps Contributors, County of Sacramento,

FIGURE 3
AERIAL OVERVIEW

FIGURE 4
SITE PLAN

effects of construction on the water quality of the river (e.g., increased turbidity). Additionally, the Action Area for the Project includes the laydown areas on the other side of the levee for a total of 6.7 acres.

2.4 PROJECT COMPONENTS AND CONSTRUCTION PHASING

The Proposed Action would be implemented in the following seven phases:

1. Mobilization
2. Site Preparation
3. Waterside slope grading of overburden and landside slope fill placement
4. Waterside Levee Slope and Bench Construction
5. Removal/Relocation of Encroachments
6. Installation of Plants
7. Site Demobilization

Construction would occur beginning upstream to downstream.

Construction Materials

Material necessary for project construction, with exception of the landside fill, would be imported from offsite locations and transported to the Action Area by barge and truck, including:

- Quarry stone/rock slope protection (RSP; angular rock ranging from 15 to 400 pounds) and 6-inch minus rock - obtained from a quarry in San Rafael and transported via material barge and tug, approximately 46 nautical miles to the Action Area.
- Soil for the wetland bench would be obtained from Decker Island (15 nautical miles from the Action Area).
- Container plants would be obtained from a nursery within 75 miles of the Action Area.

Mobilization

Project mobilization would include all preparatory work necessary for the contractor to initiate construction activities. This work would include moving equipment and rock/soil supplies to the Action Area primarily by barge. A material barge, accompanied by tugboat, would be used to transport material from the quarry near San Rafael. A small tug (35-40 feet) would be used to move the crane barges between the Rio Vista staging and erosion repair site. Tugs used to maneuver the crane and material barges during site mobilization would be present on site periodically during the duration of construction activity (i.e. tugs may be moored, or go to other non-related job sites if there is no need to move a barge for a period of time, and the material barges would be traveling back and forth from the quarry sites). A work boat would be used to transport laborers from the barge to the Action Area. Plants would be transported to the site via pickup truck and trailer.

Mobilization also would include setting up the staging area adjacent to the impact area (**Figure 2**). Mobilization activities also would include any necessary pre-construction surveys and installation of erosion control and other Best Management Practices (BMP) measures as required.

Site Preparation

Initial site preparation would include debris removal, mowing, tree trimming, limited grubbing, and clearing on the waterside levee slope. As an initial step to preparing the levee slope for construction activities, any trash or other non-vegetated debris would be removed from the waterside levee slope and hauled to an appropriate refuse disposal site (the Keller Canyon Landfill in Pittsburgh, CA is the closet site).

The Proposed Action may remove some mature trees as well as require some tree trimming to allow for construction activities to occur under the tree canopy (i.e., to ensure worker safety, the crane boom on the barge must be able to swing freely, without hitting trees). Consistent with BALMD's existing routine maintenance agreement with the California Department of Fish and Wildlife (CDFW), trees less than 2 inches in diameter at 48-inches above the ground and large shrubs would be cut with a flail mower. Grasses and small shrubs also may be cut with a flail mower and left in place. As needed, small tree trunks (i.e., less than 4 inches in diameter), branches of larger trees, and larger shrubs would be removed with a chainsaw and chipped onsite using a trailer-mounted chipper and transported and stockpiled on a BALMD property on lower Andrus Island. Grubbing would occur to remove any remnant stands of Himalayan blackberry and Arundo donax and would be completed using a small excavator (e.g., a Bobcat). Invasive vegetation would be trucked to a landfill or other appropriate disposal site. Since the site is isolated from active roadway traffic, no traffic control is anticipated or needed during all phases of construction.

Levee Slope and Bench Construction

Construction of the new levee slope would occur in three phases: 1.) First removing overburden and vegetation accumulated on the levee face. This borrowed overburden material would be then placed on the back/landside slope. 2.) Placing RSP and 6-inch minus backfill material on the waterside levee slope; and 3.) placing soil planting fill to complete final grade on the wetland bench and the levee slope utilizing barges, work boats, tugs, a long-reach excavator, dozer, and excavator.

Quarry Stone/Rock Slope Protection and 6-inch Minus Backfill Placement

Work would begin by removing excess overburden on the levee face with a long-reach excavator. This borrowed overburden material would be then placed on the back/landside slope (at a 2:1 to 3:1 slope) of the levee to expand the levee and increase landward stability. The excavated waterside slope would then form the foundation for placement of launchable rip rap (12-18-in) at the levee toe (between elevation -35.0 feet and -20.0 feet (NAVD 88) where a key bench (6-ft deep by 8-ft wide min.) would be placed to support rock being placed on the lower slope. 12-18" rip rap would then be placed up to the bottom of the waterside bench, at elevation +2.3 feet (NAVD88) at Mean Lower Low Water (MLLW) at a 1.5:1 slope. A triangular prism of quarry stone will also be constructed from MLLW to the Mean Higher High Water elevation (MHHW, elev. +5.6 NAVD88) to protect the wetland bench from wave wash.

DWR RSP (rock slope protection) would then be keyed into a bench at elevation 0.0 (NAVD88) and extend up to the Design Water Surface Elevation (DWSE) at +10.1 feet (NAVD88). A 6-in layer of 6-inch minus material will be placed over the rip rap to act as a natural filter material between the rock and soil. A minimum of 12 inches of imported/borrow fill will be provided/mixed as a "planting cap" over the quarry stone. Barges would transport material to the site directly from an established quarry in San Rafael, and material would be placed using a crane barge with a specialized clamshell attachment. Soil fill will be sourced at Decker Island and placed using a crane barge. Once offloaded, material can be moved and compacted by a long-reach excavator and small front loader from the levee crown. The launchable rip rap would be used to support armoring of the re-sloped embankment and create a new foundation for the

wetland habitat bench as well as a 2-foot veneer of erosion protection below the bench. RSP would be placed at a 2:1 slope.

The wetland bench will be constructed following the construction of the rock prism, rip rap and filter placement. The bottom of the wetland bench will be placed at Mean Low Water (MLW) at elevation +2.7-feet (NAVD88). The width of the wetland benches would vary from approximately 16-ft to 17-ft wide with a 7:1 slope, sloping towards the water. The top of the wetland bench will range from elevation +4.0-feet to +6.0-feet depending on topography. **Figure 4** shows a typical wetland cross section and detail of the levee design. Wetland plants would be installed into the soil filled bench with a modest band of scrub shrub and/or shaded riverine aquatic (SRA) habitat planted on and above the wetland bench from approximately elevation +5.2 to +10.0 (NAVD88) along the entire 1500-foot length of the site.

Crown Raising and Landside Slope Improvement

The excavated material from the water side slope will be used to increase the crown height to elevation +14.0 (NAVD88) to account for the impacts of climate change and increase freeboard above the DWSE. The material will be placed using a long-reach excavator and small front end loader. The existing levee crown width is approximately 15 to 20 feet wide, the proposed finished crown width will be 25-feet and with a 20-foot-wide gravel patrol road comprised of 6-inch deep Class II aggregate base. The excavated fill will also be placed on the landside slope utilizing a long-reach excavator and small front loader to both flatten the slope and increase the total width of the levee to capture the design levee section. The landside embankment off the crown will slope at 3:1 to the existing grade.

Wetland Bench - Freshwater Marsh

The freshwater marsh/wetland bench (**Figure 4**) would be constructed above MLW at elevation +4.0-feet (NAVD88) to allow frequent inundation and development of aquatic and semi-aquatic habitat. The area immediately above the bench will be planted with native riparian species (e.g. willow spp.) to provide long term habitat benefit as well as increase channel roughness to reduce wave velocity. For wetland benches, materials would include the use of beneficial reuse soil that will come from the waterside re-slope. The bench will have twelve-inches minimum of import fill with 0.5 feet of 6-inch minus to act as a filter between the soil and the 2-foot layer of quarry stone protection below. The bottom elevation of the wetland bench will be at MLW (+2.7-feet NAVD88). The top of the soil within the wetland bench will vary between elevation +4.0 to 6,0 feet NAVD88). Wetland bench width would also vary slightly, from approximately 16 feet to 17 feet wide, depending on the location along the levee. There would be a 7:1 slope maximum waterward within the bench to increase the variability of elevation (between +4.0 and +6.0 NAVD88) and encourage heterogeneity of species. The planted slope above the wetland benches would occur at a 2:1 slope. The project is anticipated to construct approximately 0.39 acres and 1,473 LF of freshwater marsh habitat. Species will be native hydrophytes grown/harvested locally where possible. Wetlands species, upon consult with CDFW, will include species that can be frequently inundated (CDFW Zone ‘B’) such as: plants (e.g., American bulrush, California tule, and some rush species).

The wetland bench to the DWSE will be faced with heavy coir fabric or another approved equivalent plantable erosion protection method to protect the lower slope from wave wash induced erosion until vegetation reaches full maturity and establishment.

Waterside Riparian Habitat

Waterside riparian habitat (combined of riparian forest, scrub shrub and shaded riverine aquatic (SRA) habitat) provides opportunities for terrestrial species and an important source for food inputs for aquatic species that utilize Georgiana Slough (**Figure 4**). A band of riparian habitat would be planted/established above the wetland benches on the waterside slope across the entire length of the proposed Georgiana Slough erosion repair. Ecologically suitable species that can be submerged in high water events (CDFW Zone 'C') such as: creeping wildrye, Santa Barbara sedge, rush species, Goodding's black willow, arroyo willow, sandbar willow, button willow and pacific willow, would be planted using hand tools from approximately +5.2 to +10.0 feet (NAVD88) elevation up the slope across the site. Approximately 1.12 acres/1,500 LF of riparian habitat (riparian forest, scrub shrub and SRA) habitat will be created.

Native Grassland

Native grassland habitat will be planted above the wetland benches at elevation +7.0 feet (NAVD88) and extend to the edge of the levee crown (approx. 14.0 ft NAVD88). The species include California fescue, small barley, creeping wildrye, salt grass, and one-sided bluegrass. In addition, the backside of the levee slope will be hydroseeded providing additional acreage of native grassland. A total of 0.75 acres of grasslands will be enhanced at the Action Area.

Site Demobilization

Site demobilization would include removal of all equipment and associated site BMPs. The staging areas would require minimal demobilization activities since most materials would be removed from the staging areas as they are used up during project implementation. Palettes and residual plant materials would be cleaned and removed from the site as the work progresses, leaving nothing onsite at the conclusion of construction. Plant delivery palettes would be returned via truck to the source nursery at the conclusion of construction. Minor trash/debris would be removed from the site and disposed of at an approved facility. Barges, tugs, and work boats would move on to the next unassociated job site or storage dock at the conclusion of construction.

Construction Equipment and Staffing

The types and number of pieces of equipment needed for each project phase and their anticipated duration of usage are shown in **Table 2**. Actual equipment use may vary, depending on contractor capabilities and preferences and equipment availability.

Table 2: Typical Equipment that may be used for Construction of the Proposed Action

Phase	Equipment Type	Number of Units	Estimated Duration of Use (# of workdays)	Estimated Truck or Barge Trips (one-way)
Mobilization	Flatbed Truck (plant transport)	1	3	3
	Pickup Truck (trailer transport)	1	Duration of project	1
	Construction Trailer	1	Duration of project	n/a
	Portable Toilets	2	Duration of project	n/a

Phase	Equipment Type	Number of Units	Estimated Duration of Use (# of workdays)	Estimated Truck or Barge Trips (one-way)
Site Preparation	Flail Mower	1	15	n/a
	Trailer-mounted Wood Chipper with Haul Truck	1	15	13
	Chainsaws	2	15	n/a
Levee Slope and Bench Construction	2,000 to 3,000 ton Material Barge (non-motorized)	2	66	36
	Crane Barge (non-motorized)	2	66	4
	Small Work Boat (40-ft max)	1	66	10
	Row Boat/12-ft Skiff (non-motorized crew transport)	1	66	n/a
	Long Reach Excavator	1	20	2
	Small Excavator (bobcat)	1	44	2
	Small Conveyor w/Generator (soil loading)	1	5	2
	Small Front-End Loader	1	5	2
	Tug Boat	1	22	36
Installation of Plants	Pickup Truck (trailer transport)	2	45	n/a
	Hydroseeding Truck	1	2	3
	1,000-gallon Water Truck	1	10	3
Site Demobilization	Pick-up Truck (trailer transport)	1	5	1

A maximum of approximately 30 construction personnel would work on the project, depending on the construction phase. Workers required for specific construction phases are anticipated to include:

- Two crew lead workers would be onsite, 8 hours per day, six days a week, for the duration of the project.
- Two, five person crews of operator engineers would operate one to two crane barges and one small work boat during levee slope and bench construction.
- The tug boat would have a crew of 4 people and would be onsite periodically, as needed.
- One long-reach excavator operator would work 10 hours per day during levee slope construction.
- A front loader would work approximately 10 hours per day during levee slope construction.
- One foreman and one laborer would be present on the Action Area during all site work.
- One surveyor would be onsite, as needed.
- A planting crew of four to six workers.

Construction Schedule

With favorable weather and tidal conditions, project construction is expected to be completed over approximately 120 days. In-water work would be conducted between August 1 and October 31. However, rock and rock soil mix placement above the OHWM may take place at any time over the duration of project construction. Any tree trimming/vegetation removal would occur during the nesting bird dormant season.

Work, including equipment operation, would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.). Equipment maintenance could occur before and after working hours and on Sunday.

Conservation Measures

The following environmental commitments have been incorporated into the Proposed Action to avoid or minimize the potential adverse effects fish and wildlife and their habitats and the physical environment:

CM 1: Timing of Work

- All in-water construction activity would be conducted between August 1 and October 31 to ensure protection of anadromous salmonids. This time period is the suggested work window for waterways located within the Delta.
- As much work below OHWM work as possible would be performed during low tide to reduce potential impacts to water quality.
- Work, including equipment operation, would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.).
- Equipment maintenance could occur before and after working hours and on Sunday.
- In-water construction activities would be limited to daylight hours, leaving a nighttime period for anadromous salmonids and Green Sturgeon to migrate past the Project area.

CM 2: Construction Best Management Practices (BMPs) and Monitoring

- Staging, and both temporary and long-term material disposal areas would be located away from Waters of the United States.
- Equipment would be refueled, maintained, and serviced at designated staging areas away from the erosion repair site. All refueling, maintenance, and staging of equipment and vehicles shall occur at least 60 feet from bodies of water and in a location where a potential spill would not drain directly toward aquatic habitat (e.g., on a slope that drains away from the water source). Fuel transfer vehicles would have absorbent pads, pillows, socks, booms or other spill containment materials placed under the fueling operation.
- Petroleum products would be stored in non-leaking containers at impervious storage site from which runoff is not permitted to escape.
- Movement of heavy equipment to and from the Proposed Project area shall be restricted to established roadways and equipment shall be stored in established staging areas away from Georgiana Slough.
- All feasible avoidance and minimization measures would be implemented to control erosion and runoff from areas associated with construction activities. Specifically, use of straw wattles, silt fences, or other erosion control measures would be used to ensure that constructed-related

materials do not reach Georgiana Slough. All areas of temporary impacts and all other areas of temporary disturbance which could result in a discharge to Georgiana Slough would be restored.

- Soil disturbance activities shall cease if adverse weather conditions substantially increase the likelihood of transporting soil off site.
- Active water quality monitoring shall occur during the construction portion of the project. Should construction create conditions that exceed standard water quality thresholds, remedial actions shall be employed to reduce them back to threshold limits.
- A planting, monitoring and adaptive management plan would be submitted to Resource Agencies.
- Wildlife observed within the Action Area shall be allowed to leave on their own unharmed.
- Fugitive dust would be minimized by watering or implementing other dust control measures. Fugitive dust would also be minimized by limiting construction vehicle speeds to 15 miles per hour or less, covering haul vehicles, installing wheel washers or other similar methods where vehicles exit the construction site onto paved roads.
- Construction activities would be limited to the designated work area, which would be clearly identified on the construction drawings and marked with fencing, stakes, and/or flags before ground-disturbing activities begin.
- All construction equipment would have sound-control devices no less effective than those provided on the original equipment; no equipment shall have an unmuffled exhaust system.
- No pets shall be allowed at the Action Area.
- All trash that may attract predators shall be properly contained in covered containers and removed from the work site on a regular basis.
- During construction, no litter or construction debris shall be placed within jurisdictional areas. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site. In addition, all project-generated debris, building materials, and rubbish shall be removed from jurisdictional areas and from areas where such materials could be washed into them.

CM 3: Protection of Landside Wetland Areas

CM 3 consists of the following measures to protect the non-jurisdictional wetlands identified on the landside of the levee in the Project area.

- Non-jurisdictional wetlands will be fenced off and no construction activities will occur within the fenced area.
- No construction equipment, staging materials, vehicles, spoil piles, etc., will be allowed within protected buffer areas.
- Wetland areas will remain fenced for the duration of the Project.

CM 4: Worker Environmental Awareness Training

- All contractors and equipment operators would participate in a Worker Environmental Awareness Program (WEAP) training regarding potential environmental impacts to make them aware of the ecological value of the area, including the potential for special status species and their habitat to be present near the Proposed Project area.
- The WEAP training would cover, at a minimum, the special status species listed that have the potential to occur in the Proposed Project area during construction, including but not limited to anadromous fishes, a description of the regulatory status and general ecological characteristics of sensitive resources, and review of the limits of construction and avoidance measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this

information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form provided by the trainer documenting they have attended the WEAP training and understand the information presented to them.

- The WEAP training shall be conducted by a qualified biologist, to aid workers in recognizing special status resources that may occur in the Action Area and vicinity.
- Personnel involved in the Proposed Project would be trained in emergency response and spill containment techniques.

CM 5: Vegetation Removal and Tree Protection

- Vegetation clearing would only occur within the project footprint.
- The Proposed Project would impact a total of 569 lineal feet of SRA and 0.5 acres of riparian habitat (0.09 acres of riparian forest, and 0.41 acres of scrub shrub); however, the project would create a total of 1.12 acres of riparian habitat (0.30 acres of riparian forest, and 0.82 acres of scrub shrub), and 1,500 LF of SRA.

The project would be a net benefit/enhancement for all vegetative habitat types.

CM 6: Construction Site Clean-up

CM 6 consists of the following construction site clean-up measures.

- All construction supplies, materials, and debris from the Proposed Project would be removed following completion of the Proposed Project.
- Plant delivery palettes would be returned via truck to the source nursery at the conclusion of construction.
- Minor trash/debris would be removed from the site and disposed of at an approved facility.

CM 7: Implementation of General Permit (General Permit for Storm water Discharges Associated with Construction Activities)

All measures described in the State Water Resources Control Board National NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit; Order No. 2022-0057-DWQNPDES Permit No. CAS000002) shall be implemented. A SWPPP shall be prepared that includes specific BMPs to avoid and minimize impacts on water quality during construction activities. The goals of the SWPPP would generally be to protect water quality; establish procedures to minimize accelerated soil erosion; and minimize non-storm water runoff. The SWPPP would define measures to prevent, control, and minimize impacts from a spill of hazardous, toxic, or petroleum substances during construction, as well as a description of potentially hazardous and non-hazardous materials that could be accidentally spilled, potential spill sources, potential spill causes, proper storage and transport methods, spill containment and recovery measures, agency notification, and responsible parties. Components of the SWPPP shall include measures that limit risk of release of contaminates to waterways. The SWPPP shall have the following primary objectives:

- Stabilization of the site as soon as possible.
- Controlling the perimeter of the Action Area.
- Protection of nearby receiving waters.
- Following all necessary pollution prevention measures.

- Minimization of the area and duration of exposed soils.

Post-Construction Habitat Maintenance and Monitoring

Following completion of the proposed action, BALMD would conduct a minimum of five years of maintenance and monitoring of the new habitat features to ensure the vegetation is establishing properly. Site maintenance would occur on an as needed basis and focus on managing noxious weeds and ensuring plants receive adequate irrigation (years 1-3) in order to become established and meet success criteria. Most plant maintenance would include regular, periodic watering and weed management so they become established. The tide would inundate portions of the levee slope twice per day, during portion of the months the tide would inundate partially up the slope and thus provide necessary moisture to wetland bench plants. It is anticipated that maintenance during the first two years would require bi-weekly to monthly site visits during the hot, active growing season (April through September) to ensure proper weed management and irrigation. Subsequent activities during the remaining five years of the maintenance period would occur on a monthly basis.

Biological monitoring of the habitat features would occur on an annual basis and begin during the first year following construction. Initial monitoring during the first year would occur in summer - fall to assess the preliminary condition of the plants relative to meeting overall habitat establishment and survival goals. Subsequent monitoring for the remaining four years of the monitoring period would occur in late summer/early fall.

Plants would be recorded as dead if no viable above ground growth is visible. Dead plants and trees would be replaced as necessary during the first year and annually in subsequent years. Any re-planting would occur either in spring or late fall. Cumulative survival of all plants and trees at the conclusion of the five-year monitoring period would be at least 80 percent.

Invasive weed cover would be estimated visually during annual monitoring. Vegetative cover by invasive species would be less than ten (10) percent of all cover throughout the five-year monitoring period. In the event invasive species cover exceeds the cover criteria during any of the annual monitoring events, maintenance actions would be taken to reduce this cover to less than 10 percent.

Section 3 | Listed Species and Critical Habitat

3.1 CRITICAL HABITAT

There is no designated critical habitat within, or adjacent to, the Action Area for terrestrial listed species. The nearest designated critical habitats for terrestrial species are for Fleshy owl's-clover (*Castilleja campestris* ssp*. succulenta*), 30 miles to the east of the Action Area, and for California tiger Salamander (*Ambystoma californiense*), 20 miles to the northwest of the Action Area.

The aquatic portions of the Action Area are situated in critical habitat for four listed fish species. USFWS designates critical habitat in Georgiana Slough for Delta Smelt (*Hypomesus transpacificus*) (USFWS 2024a). Four NMFS critical habitats occur within the Action Area in Georgiana Slough: Green Sturgeon (Southern DPS: *Acipenser medirostris*); Steelhead (California Central Valley DPS: *Oncorhynchus mykiss*); Chinook Salmon (Sacramento River winter-run ESU; *Oncorhynchus tshawytscha*) and Chinook Salmon (Central Valley spring-run ESU) (NOAA 2024a). All listed fish species, aquatic critical habitats, and essential fish habitat are being addressed under a separate analysis.

3.2 USFWS SPECIES LIST

An official USFWS species list was generated online using the USFWS' IPaC Trust Resource Report System (**Attachment A**). The following protected resources were identified:

Plants

- Large-flowered Fiddleneck (*Amsinckia grandiflora*) - Endangered

Birds

- California Ridgway's Rail (*Rallus obsoletus obsoletus*) - Endangered

Reptiles

- Giant Garter Snake (*Thamnophis gigas*) - Threatened

Amphibians

- California Tiger Salamander (*Ambystoma californiense*) - Threatened

Fishes

- Delta Smelt (*Hypomesus transpacificus*) – Threatened
- Longfin Smelt (*Spirinchus thaleichthys*) San Francisco Bay-Delta DPS – Proposed Endangered

Insects

- Monarch Butterfly (*Danaus plexippus*) – Candidate
- Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) - Threatened

Crustaceans

- Conservancy Fairy Shrimp (*Branchinecta conservatio*) – Endangered
- Vernal Pool Fairy Shrimp (*Branchinecta lynchi*) – Threatened
- Vernal Pool Tadpole Shrimp (*Lepidurus packardi*) - Endangered

Historical Occurrences of Listed Species

The California Natural Diversity Database (CNDDB) was queried and reported occurrences of listed species were plotted in relation to the Action Area boundary using GIS software (**Figure 5**). The CNDDB reported no terrestrial federally-listed species occurrences within the Action Area. The CNDDB reported one aquatic federally-listed species occurrences within the Action Area: Steelhead (California Central Valley DPS). This is generally mapped by CNDDB as "Populations in the Sacramento and San Joaquin Rivers and Their Tributaries."

Three additional species have been identified in the CNDDB as occurring within a mile radius of the Action Area: longfin smelt, Delta smelt, and northwestern pond turtle.

3.3 HABITAT CONSERVATION PLANS

The Action Area is not located within the covered area of any Habitat Conservation Plan or Natural Community Conservation Plan.

3.4 CONSULTATION TO DATE

Informal consultation with the USFWS has not yet been initiated.

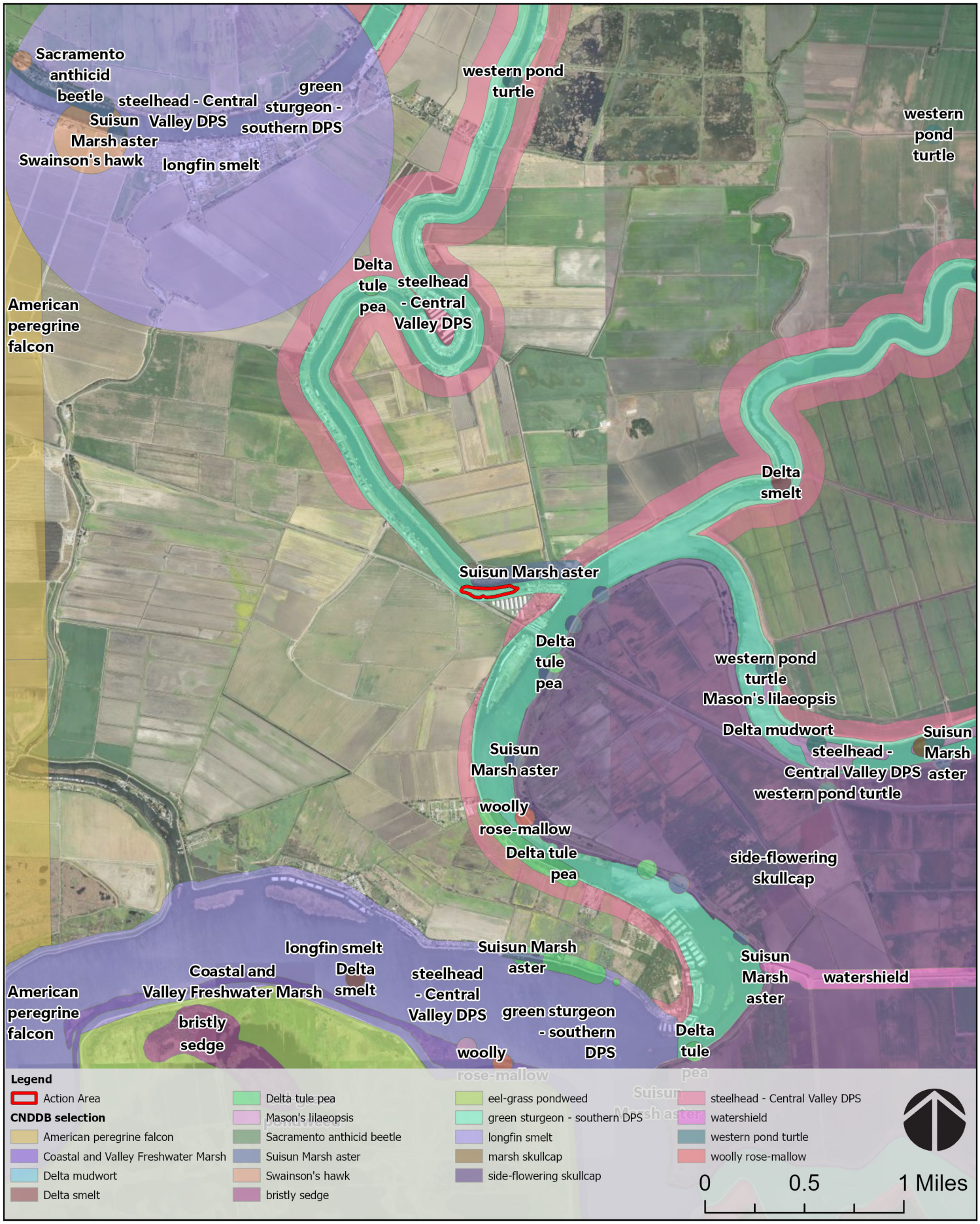


FIGURE 5
CNDDB INVENTORY

Section 4 | Methods

4.1 PRELIMINARY DATA GATHERING AND RESEARCH

Prior to conducting the field survey, the following information sources were reviewed:

- United States Geologic Service (USGS) 7.5 degree-minute topographic quadrangles of the Action Area and vicinity
- Aerial photography of the Action Area
- CNDDB, electronically updated monthly by subscription
- A query of the California Native Plant Society's database *Inventory of Rare and Endangered Plants of California* (online edition)
- USFWS National Wetlands Inventory (NWI) mapper
- USFWS species list (IPaC Trust Resources Report)

4.2 FIELD SURVEYS

Consulting biologist Dr. Geo Graening conducted a biological field assessment on September 14, 2023, and collected data on wildlife and plant species present, as well as habitat types and potentially jurisdictional waters. Variable-intensity pedestrian surveys were performed. Fauna and flora observed were recorded in a field notebook and identified to the lowest possible taxon. Survey efforts emphasized the search for federally-listed species that had documented occurrences in the CNDDB within the vicinity of the Action Area. Habitat types occurring in the Action Area were mapped on aerial photographs and information on habitat conditions and the suitability of habitats to support listed species was also recorded. The Action Area was also assessed for the presence of potentially-jurisdictional water features, including riparian zones, isolated wetlands and vernal pools, and other biologically-sensitive aquatic habitats.

4.3 MAPPING AND OTHER ANALYSES

Locations of species' occurrences and habitat boundaries within the Action Area were recorded on color aerial photographs and then digitized to produce the habitat maps. The boundaries of potentially jurisdictional water resources within the Action Area were identified and measured in the field and similarly digitized to calculate acreage and to produce informal delineation maps. Geographic analyses were performed using geographical information system software (ArcGIS 10, ESRI, Inc.). Vegetation communities (assemblages of plant species growing in an area of similar biological and environmental factors), were classified by Vegetation Series (distinctive associations of plants, described by dominant species and particular environmental setting) using the CNPS Vegetation Classification system (Sawyer and Keeler-Wolf, 1995). Wetlands and other aquatic habitats were classified using USFWS National Wetlands Inventory Classification System for Wetland and Deepwater Habitats, or "Cowardin class" (Cowardin et al., 1979; USFWS 2007).

Wildlife habitats were classified according to the CDFW's California Wildlife Habitat Relationships System (CDFW, 2024a). Species' habitat requirements and life histories were identified using the following sources: Baldwin et al. (2012); CNPS (2024), Calflora (2024); CDFW (2024b); and University of California at Berkeley (2024).

Section 5 | Results of Surveys

5.1 ENVIRONMENTAL SETTING

The Action Area is located within a large estuary (the Sacramento / San Joaquin River Delta). This area experiences a maritime and Mediterranean climate where summers are hot and dry and winters are cool and supply the majority of its rainfall. The topography of the Action Area is an elevated levee of the Georgiana Slough approximately 0.25 miles above its confluences with the Mokelumne River. The elevation ranges from 12 feet above sea level on the levee top to about 3 feet at the water surface when the slough is at low tide.

Land uses surrounding the Action Area are flood control structures, a transportation corridor, rural residential, row-crop agriculture, river-based commerce and recreation, boat docks, and the Delta Boat Storage yard.

The Natural Resources Conservation Service maps three soil types within the Action Area:

- 232: Valpac sandy loam, mucky substratum, partially drained, 0 to 2 percent slopes, hydric
- 155: Gazwell mucky clay, partially drained, 0 to 2 percent slopes, hydric
- 247: Water (unmapped)

5.2 INVENTORY OF FLORA AND FAUNA

Plants observed during surveys are listed in **Attachment B**.

Wildlife observed during the field survey include: fence lizard (*Sceloporus occidentalis*); minnow (*Cyprinidae*); orb weaver (*Argiope* sp.); ants (*Formicidae*); grasshoppers (*Orthoptera*); white skipper (*Heliopetes* sp.); swallow (*Petrochelidon pyrrhonota*); bushtit (*Psaltriparus minimus*); and American crow (*Corvus brachyrhynchos*). Wildlife activity was generally low during the field survey. Wildlife activity on the Action Area is likely to be depressed by ongoing disturbance from road and boat traffic and related noise, as well as activities from adjacent residences and boat docks.

Wildlife habitat types were classified using CDFW's Wildlife Habitat Relationship System. The Action Area contains the following wildlife habitat types: Annual Grassland; Valley Foothill Riparian; Fresh Emergent Wetland; Riverine; Urban; and Barren.

5.3 LISTED SPECIES OBSERVED DURING SURVEYS

No federally-listed plant or animal species were observed during surveys conducted within the Action Area.

5.4 TERRESTRIAL HABITATS

The Action Area is within the Sacramento Valley (ScV) geographic subregion of California. The ScV subregion is a component of the larger Great Central Valley geographic region, which occurs within the even larger California Floristic Province (Baldwin et al., 2012). A total of three vegetative communities

were observed within the Action Area: ruderal/developed, riparian forest, and scrub shrub. These are mapped in **Figure 6** and described in detail below. The terrestrial habitat types represent an approximately 5-acre portion of the Action Area, and the remaining 1.7 acres are open water within Georgiana Slough.

Ruderal / Developed (4.5 acres)

The Action Area consist mostly of ruderal and developed habitat. These areas consist of disturbed or converted natural habitat that is now either in ruderal state, or urbanized with gravel roads, structure, and utility placement. The banks of the levee are regularly mowed and trimmed for maintenance purposes. Vegetation within this habitat type consists primarily of nonnative European annual grasses (*Avena*, *Bromus*, *Hordeum*, and *Festuca* species) and weedy or invasive species lacking a consistent community structure. Landscape/ornamental species present are: blue gum eucalyptus (*Eucalyptus globulus*); cider gum (*Eucalyptus gunni*); black locust (*Robinia pseudoacacia*); and oleander (*Nerium* sp.) The disturbed and altered condition of these habitats greatly reduces their habitat value and ability to sustain rare plants or diverse wildlife assemblages. The CDFW (2024d) Terrestrial Natural Communities alliances are: 11.300.00 Disturbed Habitat; and 12.000.00 Urban/Developed.

Riparian Forest (0.09 acres)

Patches of riparian forest exist along the waterside slope of the levee; the dominant tree species are Oregon ash (*Fraxinus latifolia*) and white alder (*Alnus rhombifolia*), with some narrow-leaf willow (*Salix exigua*) and red willow (*Salix laevigata*). The understory contains Himalayan blackberry and California wild grape. The CDFW (2024d) Terrestrial Natural Communities alliances are: 61.207.00 Mixed Willow Riparian Forests and Woodland; and 61.420.00 White Alder Forest and Woodland.

Scrub Shrub (0.41 acres)

Patches of scrub shrub also exist along the waterside slope of the levee. The dominant community is willow thicket, and in the Action Area, this consists of narrow-leaf willow, red willow, sandbar willow (*Salix exigua*). Other willow species are present in the Delta: Goodding's black willow, arroyo willow, sandbar willow, button willow, and pacific willow. Other plant species in this scrub shrub habitat are Himalayan blackberry brambles, poison oak (*Toxicodendron diversilobum*), California mugwort (*Artemisia douglasiana*), giant reed (*Arundo donax*), and sedges (*Carex* spp.). The CDFW (2024d) Terrestrial Natural Communities alliances are: 61.209.00 Narrow-leaf Willow Riparian Scrub; and 63.100.00 Scrub Willow [*Salix* spp.].

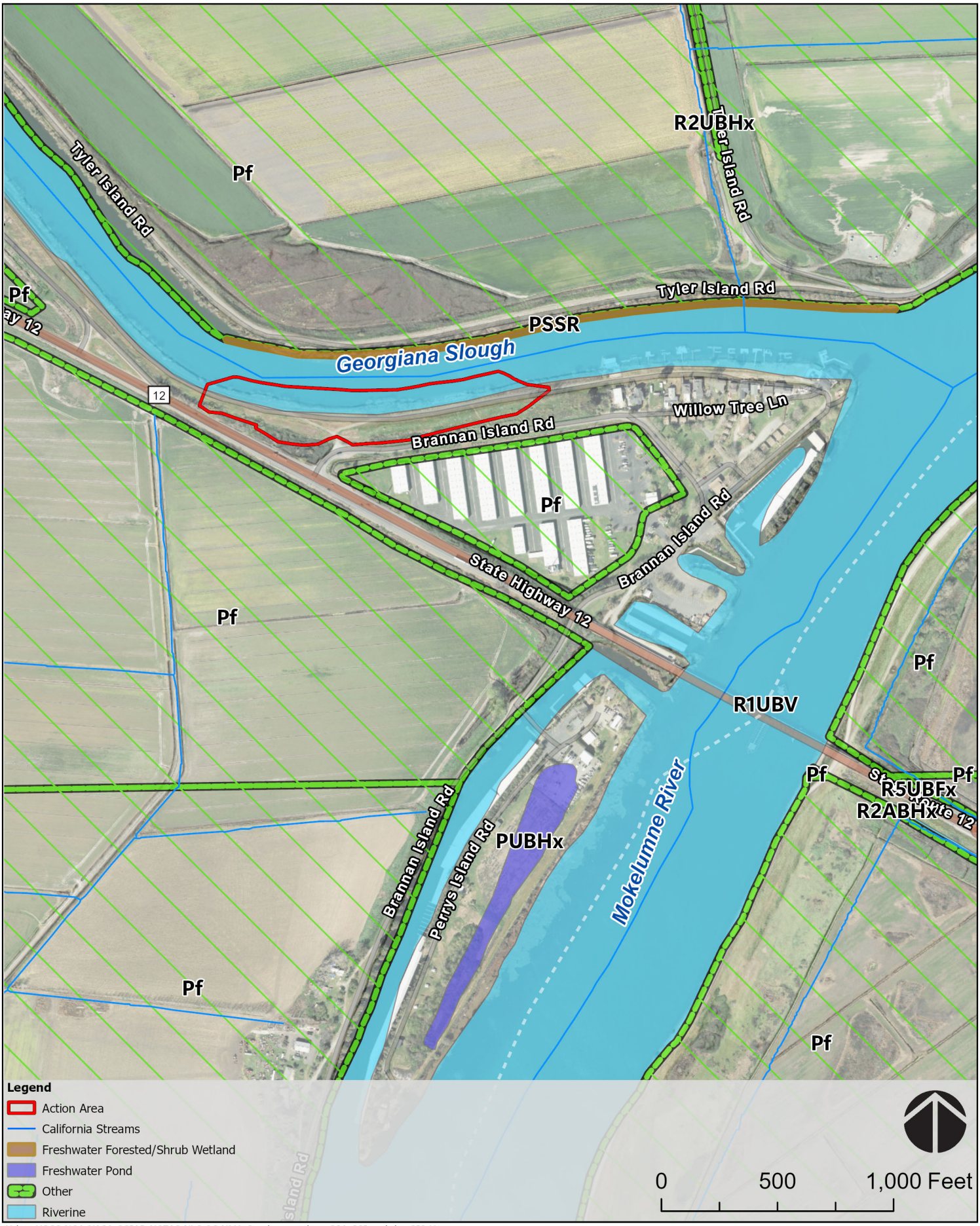
5.5 AQUATIC HABITATS

The portion of the Georgiana Slough where the Action Area is located straddles two watersheds: the South Mokelumne River-Mokelumne River watershed (HUC 180400121106) and the Threemile Slough-Sacramento River watershed (HUC 180201630703) (USEPA, 2024a, b). The levee marks the boundary between the two watersheds; the inside slope of the levee where the work will occur drains into the Georgiana Slough and the South Mokelumne River-Mokelumne River watershed, while the land side of the levee where the staging area is proposed drains southwest within the South Mokelumne-Mokelumne River-San Joaquin River watershed.

The USFWS National Wetland Inventory reported one water feature within the Action Area (**Figure 7**): "R1UBV: Freshwater Forested/Shrub Wetland"—which corresponds to the perennial channel of Georgiana Slough and associated forested/shrub wetlands along the banks of the levees. The riparian

FIGURE 6

VEGETATION COMMUNITIES



Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community, Yolo County, Maxar, Esri Community Maps Contributors, County of Sacramento,

FIGURE 7

NATIONAL WETLAND INVENTORY

vegetation communities (i.e. riparian forest) and the constructed levee would be considered part of the jurisdictional limits of the waters of the state by CDFW and/or Regional Water Quality Control Board (RWQCB). Portions of the Action Area within the slough up to the top of the levee would also be considered part of the jurisdictional limits of the Corps. A full jurisdictional delineation was beyond the scope of this analysis; however, any portions of the Action Area that include the slough, developed levee, and the riparian forest (out to the drip line) would likely fall within the jurisdiction(s) of USACE, CDFW, and/or RWQCB.

Section 6 | Species Accounts

6.1 PLANTS

Large-flowered Fiddleneck (*Amsinckia grandiflora*)

Large-flowered fiddleneck grows on hilly grasslands at lower elevations in clay-rich soil. It can be found on steep, north-facing slopes that are in shaded terrain and remain moist for longer into the day than surrounding areas. It prefers a moderate climate with average seasonal lows in the upper 30s and highs in the lower 90s. Currently, large-flowered fiddleneck is only found in 12 sites across Contra Costa, San Joaquin and Alameda counties, where it is closely monitored and managed (USFWS 2024b). The CNDDB reports the nearest occurrence to be 22 miles away from the Action Area at the base of Mount Diablo. The Action Area does not contain natural grassland habitat; the grass species that are present in the ruderal habitats of the Action Area are subject to frequent mowing. The Action Area does not have shaded, north-facing hillslopes. Large-flowered fiddleneck is extremely unlikely to be present in the Action Area.

6.2 BIRDS

California Ridgway's Rail (*Rallus obsoletus obsoletus*)

California Ridgway's rail inhabits saltwater marshes, freshwater marshes, and mangrove swamps in California, Arizona, Nevada, and coastal western Mexico. Populations are declining largely due to wetland loss and degradation (USFWS 2024b). In the Delta, Ridgway's rail forages in mudflats in tidal sloughs (USFWS 2024b). The CNDDB reports the nearest occurrence to be 28 miles away from the Action Area at Grizzly Bay. California Ridgway's rail has a low potential to occur in the portions of the Action Area along the margins of the slough.

6.3 REPTILES

Giant Garter Snake (*Thamnophis gigas*)

The CNDDB reports the nearest occurrence of giant garter snake to be 3 miles away from the Action Area in close proximity to the San Joaquin River. Giant garter snake typically inhabits marshes, sloughs, irrigation canals, rice paddies, ponds, and low-gradient streams. Specifically, giant garter snake prefers stagnant or slow-moving waterbodies with abundant emergent vegetation; consequentially, suitable habitats in the Sacramento Valley are primarily within the rice-growing regions on the valley floor (USFWS 1999). These habitats are not present in the Action Area as Georgiana Slough is too wide and contains

flows that are too high to be suitable for giant garter snake. Furthermore, the terrestrial portions of the Action Area do not provide any suitable habitat for this species. Suitable terrestrial habitat consists of grassy banks and openings near waterside vegetation for basking, and higher elevation upland habitats for cover and refuge from flood waters during the inactive winter season (USFWS 1999). Therefore, giant garter snake is not expected to occur within the Action Area.

Northwestern Pond Turtle (*Actinemys marmorata*)

The CNDDB has several records of northwestern pond turtle within 2 miles of the Action Area in the San Joaquin River and upstream in Georgiana Slough. Northwestern pond turtle is a species that is proposed for listing under the ESA. The species is known to occur in a wide variety of wetland habitats including rivers and streams, lakes, ponds, reservoirs, permanent and ephemeral shallow wetlands, stock ponds, and sewage treatment lagoons (Holland, 1994). Optimal habitat seems to be characterized by the presence of adequate emergent basking sites, emergent vegetation, and the presence of suitable refugia in the form of undercut banks, submerged vegetation, mud, rocks and logs. The Action Area has a small amount of suitable habitat along the margins of the slough. Therefore, northwestern pond turtle is not expected to occur within the Action Area.

6.4 AMPHIBIANS

California Tiger Salamander (*Ambystoma californiense*)

There is designated critical habitat for the California tiger Salamander, 20 miles to the northwest of the Action Area. The CNDDB reports the nearest occurrence to be 17 miles away from the Action Area in Antioch. California tiger salamanders require access to both aquatic and upland habitat throughout their life cycle. They use standing bodies of fresh water, like ponds, vernal pools and other ephemeral or permanent water bodies for breeding. These bodies of water must hold water for a minimum of 12 weeks to support the salamander larvae development. The salamanders also need access to upland habitat that contains small animal burrows or underground hideaways, including those constructed by California ground squirrel (*Spermophilus beecheyi*) and valley pocket gopher (*Thomomys bottae*). The California tiger salamander uses these underground burrows for shelter and protection from predators, desiccation during nonbreeding periods, and as a source of insects to eat. The Action Area does not contain ground squirrel colonies or any significant number of burrows. The Action Area is also regularly mowed. The Action Area does not have any suitable freshwater aquatic habitat. The Action Area has only the slough for a water resource, and this is brackish and subject to currents and tides. The Action Area is extremely unlikely to harbor California tiger salamander.

6.5 INSECTS

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

The valley elderberry longhorn beetle is dependent on its host plant, the elderberry, a shrub that grows in riparian areas and foothill oak woodlands in California. Females lay their eggs on the bark of the elderberry shrub. Larvae hatch and burrow into the stems. Larvae take one to two years to emerge as adults. Adults only live from a few days to a few weeks after emerging and likely die within three months. The field survey did not detect any elderberry shrubs in the Action Area. Therefore, it is concluded that valley elderberry longhorn beetle is not present in the Action Area.

6.6 CRUSTACEANS

Conservancy Fairy Shrimp (*Branchinecta conservatio*)

The CNDDB reports the nearest occurrence of Conservancy fairy shrimp to be at least 18 miles away from the Action Area. Conservancy fairy shrimp are limited to vernal pools in the Central Valley ecoregion. The Action Area does not contain any vernal pools and is located in the Delta ecoregion. Therefore, it is concluded that Conservancy fairy shrimp is not present in the Action Area.

Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)

The CNDDB reports the nearest occurrence of Vernal pool fairy shrimp to be at least 18 miles away from the Action Area. Vernal pool fairy shrimp are limited to vernal pools in the Central Valley ecoregion. The Action Area does not contain any vernal pools and is located in the Delta ecoregion. Therefore, it is concluded that Vernal pool fairy shrimp is not present in the Action Area.

Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)

The CNDDB reports the nearest occurrence of Vernal pool tadpole shrimp to be at least 15 miles away from the Action Area. Vernal pool tadpole shrimp are limited to vernal pools in the Central Valley ecoregion. The Action Area does not contain any vernal pools and is located in the Delta ecoregion. Therefore, it is concluded that Vernal pool fairy shrimp is not present in the Action Area.

Section 7 | Effects of the Action

Based on guidance provided by the ESA Section 7 Effects Determination Guidance, possible effects determinations for the Proposed Action are:

- **No effect:** The proposed action will not affect the listed species or critical habitat.
- **May affect but is not likely to adversely affect:** The proposed action will affect a listed species in a way that is discountable, insignificant, or completely beneficial. Discountable effects are extremely unlikely to occur; insignificant effects are impacts small enough that they never reach the scale where a take occurs, and completely beneficial effects are positive effects without any adverse effects to the species.
- **May affect and is likely to adversely affect:** The proposed action will either directly or indirectly, or through its interrelated and interdependent actions, adversely affect a listed species.

These guidelines were used in determining conclusions of this BA and are discussed for the critical habitat, and listed species.

7.1 POTENTIAL ADVERSE EFFECTS ON CRITICAL HABITAT

There is no designated critical habitat within, or adjacent to, the Action Area for terrestrial listed species. The nearest designated critical habitats are for Fleshy owl's-clover (30 miles east of the Action Area) and for California tiger Salamander (20 miles northwest of the Action Area). The aquatic portions of the Action Area are situated in critical habitat for Delta Smelt, Green Sturgeon, Steelhead, and Chinook Salmon. These listed fish species are being addressed under a separate analysis. Implementation of the Proposed Action will have No Effect on designated critical habitat for any terrestrial federally listed species.

7.2 POTENTIAL ADVERSE EFFECTS ON LISTED SPECIES

Listed Plants

The Action Area does not contain the requisite natural habitat for Large-flowered fiddleneck (i.e., shaded, north-facing hillslopes with grasslands and clay-rich soils). Large-flowered fiddleneck is extremely unlikely to be present in the Action Area. Because non-listed, special-status plant species have the potential to occur in the Action Area, pre-construction protocol botanical field surveys have been prescribed (BIO-1 Special Status Plant Avoidance, Minimization, and Mitigation Measures). These botanical surveys will include Large-flowered fiddleneck as a target species. Avoidance and minimization measures have been prescribed in the event that a listed plant species is detected. Furthermore, invasive plant species eradication measures will be implemented. By removal of invasive giant reed and Himalayan blackberry and developed habitat, and the enhancement of riparian and native grassland habitat and the creation of marsh, the Proposed Project would create habitat complexity and increase the site's value for listed plants. Implementation of the Proposed Action will have No Effect on Large-flowered fiddleneck.

Listed Birds and Migratory Birds

California Ridgway's rail has a low potential to occur in the portions of the Action Area along the margins of the slough. Suitable nesting habitat for raptors and for bird species protected under the MBTA is

present within the Action Area and in the vicinity. Impacts to nesting birds may include injury or mortality as a result of nest destruction during vegetation clearing, tree removal or trimming, or nest abandonment from construction activity and noise. To ensure that California Ridgway's rail, raptors, and any nesting birds are not present in the Action Area, pre-construction protocol raptor surveys and nesting bird surveys have been prescribed (BIO-2 Raptor Avoidance and Minimization Measures and BIO-3 Non-Raptor Nesting Bird Avoidance and Minimization Measures). Avoidance and minimization measures have been prescribed in the event that a nesting bird is detected, which would reduce potential impacts to a less than significant level. Implementation of the Proposed Project would ultimately be beneficial for nesting birds through enhancement of riparian habitat and creation of marsh habitat. Implementation of the Proposed Action will have No Effect on California Ridgway's rail.

Reptiles and Amphibians

The terrestrial portions of the Action Area do not provide any suitable habitat for giant garter snake. Georgiana Slough is too wide and contains water flows that are too fast to be suitable for giant garter snake. Therefore, this species is not expected to occur within the Action Area. Implementation of the Proposed Project would ultimately be beneficial for giant garter snake through enhancement of riparian habitat and creation of marsh habitat that may provide marginal suitable habitat. Implementation of the Proposed Action will have No Effect on giant garter snake.

The Action Area has a small amount of suitable near-shore habitat for northwestern pond turtle, along the margin of the slough. To ensure that northwestern pond turtle is not present in the Action Area, pre-construction wildlife surveys have been prescribed (BIO-5 Pre-construction Northwestern Pond Turtle Survey). Avoidance and minimization measures have been prescribed in the event that northwestern pond turtle is detected, which would reduce potential impacts to a less than significant level. Implementation of the Proposed Project would ultimately be beneficial for northwestern pond turtle through enhancement of riparian habitat and creation of marsh habitat. Implementation of the Proposed Action will have No Effect on northwestern pond turtle.

California tiger salamanders requires aquatic and upland habitat that are not present in the Action Area. The Action Area does not have any suitable freshwater aquatic habitat. The Action Area has only the slough for a water resource, and this is brackish and subject to currents and tides. The Action Area is extremely unlikely to harbor California tiger salamander. Pre-construction wildlife surveys that have been prescribed will confirm that California tiger salamander is not present. Avoidance and minimization measures have been prescribed in the event that California tiger salamander is detected, which would reduce potential impacts to a less than significant level. Implementation of the Proposed Action will have No Effect on California tiger salamander.

Listed Invertebrates

The field survey did not detect any elderberry shrubs in the Action Area. Therefore, it is concluded that valley elderberry longhorn beetle is not present in the Action Area. Implementation of the Proposed Action will have No Effect on valley elderberry longhorn beetle.

The Action Area does not contain any vernal pools or freshwater marshes, which are requisite habitat for Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, and Vernal Pool Tadpole Shrimp. Implementation of the Proposed Project will have No Effect on Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, or Vernal Pool Tadpole Shrimp.

7.3 INDIRECT EFFECTS AND CUMULATIVE EFFECTS

For the purposes of this assessment, indirect effects consist primarily of the permanent loss of habitat, the restriction of wildlife movement, or the degradation of water quality.

The Proposed Action is not expected to result in permanent loss of habitat due to the restoration of riparian and wetland habitat. After implementation, the Proposed Action would result in beneficial impacts, as the proposed enhancement of riparian habitat and creation of wetland benches would create habitat complexity and increase biodiversity. Note also the tree protection measures (CM 5: Vegetation Removal and Tree Protection) will be implemented to ensure that mature native trees that must be removed are replaced with new tree plantings. This will ensure that there is no net loss in tree habitat.

The Action Area functions as a part of a wildlife corridor because Georgiana Slough and the levee banks allow wildlife movement and fish passage. Maritime and commercial structures, residences, and roads function as barriers. Georgiana Slough and the adjacent Mokelumne River and Sacramento River contain significant fishery resources, which will be addressed in a separate analysis. During construction, ground-disturbing activities and the presence of construction equipment will discourage terrestrial animal use and movement through the Action Area. However, this impact is temporary, and the prescribed Avoidance, Minimization, and Mitigation Measures will ensure that no wildlife is present in work areas and that the construction footprint remains as small as possible. Implementation of the Proposed Project will not create any new barriers, such as the construction of docks, levees, buildings, or roads. Once completed, the Proposed Project would ultimately be beneficial for wildlife movement through the enhancement and creation of riparian, wetland, and native grassland habitats. Therefore, project-related impacts to wildlife movement are considered to be less than significant.

During construction, surface water quality has the potential to be degraded from storm water transport of sediment from disturbed soils or by accidental release of hazardous materials or petroleum products from sources such as heavy equipment servicing or refueling. However, the project design includes the creation and implementation of a storm water pollution prevention plan, erosion control plan, and a hazardous materials management/spill response plan. Implementation of these measures mandated by law would reduce potential construction-related impacts to water quality greatly. For protection of water quality during in-water work, the Contractor will continually monitor turbidity both upstream and downstream (approximately 300 ft) of the Action Area. Should turbidity exceed required limits established for the Delta, a turbidity curtain will be deployed. These measures will ensure that turbidity is controlled and that it remains a less than significant impact upon aquatic habitats.

7.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

BIO-1 Special Status Plant Avoidance, Minimization, and Mitigation Measures

- Prior to construction, a qualified biologist or botanist shall survey all areas of suitable habitat for listed and special status plant species with potential to occur on the Action Area. If any are detected, the location of all individual of special status plant species shall be mapped. Where feasible, individuals shall be fenced for avoidance during construction. Where avoidance is not feasible, losses shall be offset through inclusion of these species into the restoration planting palette.

- All efforts should be made to avoid the spread or introduction of invasive weeds during implementation of the Proposed Project. Appropriate best management practices that are intended and designed to curtail the spread of invasive plant species should be implemented during construction. These include, but are not limited to, the following:
    - During construction, the project will make all reasonable efforts to ensure imported material is free of invasive plant species.
    - Equipment and vehicles must be free of caked on mud and weed seeds/propagules before accessing and leaving the Action Area
    - Landscaping materials should not include invasive, non-native ornamentals as identified by the California Invasive Plant Council (Cal-IPC) Inventory.

BIO-2 Raptor Avoidance and Minimization Measures

- With implementation of the proposed avoidance and minimization measures described below, no significant impacts to raptors are expected.
- If feasible, all vegetation clearing, tree removal, and tree trimming should occur outside of the nesting season (September 1 through February 14).
- If construction activity is scheduled during the nesting season (February 15 through August 31), a qualified biologist should conduct a pre-construction survey for raptors. Surveys should be conducted within two weeks of the start of construction activities that are scheduled to occur during the nesting/breeding season. The survey should include the project area plus a 0.5 mile buffer. The pre-construction survey should be conducted during the time of day when the birds are active and should be of sufficient duration to reliably conclude presence/absence of raptor nests. A report of the survey results should be submitted to the BALMD prior to issuance of any grading or building permits.
- If no active raptor nests are detected, no additional action is required.
- If active raptor nests are observed within 0.5 mile of the project, a minimum avoidance buffer will be established around each nest in consultation with the appropriate agencies. Any variance for smaller avoidance buffers should only be allowed with the approval of USFWS and/or CDFW, and the BALMD. Active nests should be monitored by a qualified biologist during project-related activities. The avoidance buffer should be maintained for the duration of the project, unless the biologist has determined that the young have fledged or are no longer dependent upon the nest and parental care.
- If a raptor is observed perched or foraging in the project area, all project-related work should cease and the individual will be allowed to leave the Action Area unimpeded and of its own accord before work may resume.
- Work activities should be avoided within active raptor nest buffers until young birds have fledged and left the nest(s). Readily visible exclusion zones should be established in areas where nests must be avoided.

BIO-3 Non-Raptor Nesting Bird Avoidance and Minimization Measures

- If feasible, removal and/or trimming of trees will be scheduled to occur in the outside of the nesting season during non-breeding fall/winter months (September 1 through February 14), after fledging and before the initiation of the nesting season.
- If project activities occur between February 15 and August 31, a qualified biologist should conduct pre-construction surveys for nesting birds no more than 14 days prior to construction. The survey should include the entire Action Area and a 250-foot buffer. If active nests are found, the qualified

biologist should establish an appropriate species-specific avoidance buffer of sufficient size to prevent disturbance of the nest by project activity (typically a minimum of 50 feet). If no active nests are detected, no additional action is required.

- If applicable (i.e., nests are detected as a result of the pre-construction surveys), the qualified biologist should perform at least two hours of pre-construction monitoring of the nest to characterize "typical" bird behavior. The qualified biologist should monitor the nesting birds and should increase the buffer if the qualified biologist determines the birds are showing signs of unusual or distressed behavior by project activities. Atypical nesting behaviors which may cause reproductive harm include, but are not limited to, defensive flights/vocalizations directed toward project personnel, standing up from a brooding position, and flying away from the nest.
- If applicable, the qualified biologist should have authority to order the cessation of all project activities if the nesting birds exhibit atypical behavior which may cause reproductive failure (nest abandonment and loss of eggs and/or young) until an appropriate buffer is established. To prevent encroachment, the established buffer(s) should be clearly marked by high visibility material. The established buffer(s) should remain in effect until the young have fledged or the nest has been abandoned as confirmed by the qualified biologist. Any sign of nest abandonment should be reported to CDFW within 48 hours.

BIO-4 Pre-construction Northwestern Pond Turtle Survey

- Because northwestern pond turtle could migrate into the Action Area between the time that the field survey was completed and the start of construction, a pre-construction survey for northwestern pond turtle should be performed by a qualified biologist to ensure that northwestern pond turtle is not present. The survey should be performed within 2 weeks of project initiation/ground disturbance. If northwestern pond turtle is detected, construction should be delayed in that area, and the appropriate wildlife agency (CDFW and/or USFWS) should be consulted and avoidance and minimization measures implemented.

Section 8 | References

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Section 9 | Qualifications of Preparers

G.O. Graening, Ph.D., M.S.E.

G.O. Graening holds a Doctorate in Biological Sciences and a Master of Science in Biological Engineering, and is a certified arborist (International Society of Arboriculture). Dr. Graening has over 26 years of experience in environmental assessment and research, including the performance of numerous wetland delineations and aquatic restoration projects. Dr. Graening also served as an adjunct professor of biology at California State University Sacramento for 10 years and was an active researcher in the area of conservation biology and groundwater ecology.

Kelli Raymond, B.S.

Ms. Raymond holds a B.S. in Animal Biology with a focus on Wildlife Ecology. She has approximately 10 years of experience collecting field data and preparing environmental reports. Ms. Raymond has worked in several states across the U.S. performing biological resources surveys, including plant surveys, habitat mapping, and wildlife utilization monitoring. She also has experience live handling numerous wildlife species, including fish, migratory birds, and big game. Ms. Raymond is experienced in the preparation of Biological Resources Assessments and environmental review under the California Environmental Quality Act and National Environmental Policy Act.

Attachment A

USFWS Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
Phone: (916) 930-5603 Fax: (916) 930-5654

In Reply Refer To: March 05, 2024
Project Code: 2024-0058394
Project Name: Georgiana Slough Erosion Control and Habitat Enhancement Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
(916) 930-5603

PROJECT SUMMARY

Project Code: 2024-0058394
Project Name: Georgiana Slough Erosion Control and Habitat Enhancement Project
Project Type: Flooding
Project Description: levee erosion control and habitat enhancement
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.130674549999995,-121.58217523120894,14z

Counties: Sacramento County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
California Ridgway"s Rail *Rallus obsoletus obsoletus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4240

REPTILES

NAME	STATUS
Giant Garter Snake *Thamnophis gigas*	Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4482

AMPHIBIANS

NAME	STATUS
California Tiger Salamander *Ambystoma californiense*	Threatened

Population: U.S.A. (Central CA DPS)
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2076

FISHES

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened
Longfin Smelt *Spirinchus thaleichthys* Population: San Francisco Bay-Delta DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9011	Proposed Endangered
Longfin Smelt *Spirinchus thaleichthys* Population: San Francisco Bay-Delta DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9011	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850	Threatened

CRUSTACEANS

NAME	STATUS
Conservancy Fairy Shrimp *Branchinecta conservatio* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp *Lepidurus packardi* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2246	Endangered

FLOWERING PLANTS

NAME	STATUS
Large-flowered Fiddleneck *Amsinckia grandiflora* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5558	Endangered

CRITICAL HABITATS

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* https://ecos.fws.gov/ecp/species/321#crithab	Final

IPAC USER CONTACT INFORMATION

Agency: Brannan Andrus Levee Maintenance District
Name: G.O. Graening
Address: 343 Carpenter Hill Road
City: Folsom
State: CA
Zip: 95630
Email ggraening@gmail.com
Phone: 9164525442

Attachment B

List of Plants Detected

Plants Observed During the Field Survey

Common Name	Scientific Name
White alder	*Alnus rhombifolia*
alligatorweed	*Alternanthera philoxeroides*
Giant reed	*Arundo donax*
Wild oat	*Avena fatua*
Black mustard	*Brassica nigra*
Sedge	*Carex* sp.
Hottentot fig	*Carpobrotus edulis*
Yellow star thistle	*Centaurea solstitialis*
Field bindweed	*Convolvulus arvensis*
Artichoke	*Cynara cardunculus*
Bermuda grass	*Cynodon dactylon*
horsetail	*Equisetum*
horseweed	*Erigeron*
Broad leaved filaree	*Erodium botrys*
Blue Gum Eucalyptus	*Eucalyptus globulus*
Cider gum	*Eucalyptus gunni*
Edible fig	*Ficus carica*
Fennel	*Foeniculum vulgare*
Oregon ash	*Fraxinus latifolia*
Rush	*Juncus* sp.
Prickly lettuce	*Lactuca serriola*
Mallow	*Malva sp.*
Evening primrose	*Oenothera* sp.
Oleander	*Nerium* sp.
Black locust	*Robinia pseudoacacia*
Himalayan blackberry	*Rubus armeniacus*
Broadleaf arrowhead	*Sagittaria latifolia*
Bulltongue arrowhead	*Sagittaria lancifolia*
Sandbar willow	*Salix exigua*
Red willow	*Salix laevigata*
Tule	*Schoenoplectus acutus*
Cattail	*Typha spp.*
Winter vetch	*Vicia villosa*

Attachment C

Site Photographs

View looking northwest of the bank of Georgiana Slough containing a patch of riparian forest

View looking northeast of mowed bank of Georgiana Slough (landward side) and levee access road.

View looking northeast of the mowed bank of the levee (waterside) and a temporary barge staging area.

View looking west of the bank of Georgiana Slough with trimmed vegetation on riprap.

View looking east of a patch of riparian scrub (blackberry briars).

View looking northwest of the mowed levee (landward side) with invasive pampas grass visible.

View looking east of ruderal habitat, with grass moved and invasive species such as pampas grass present.

View of the water's edge at the levee bank armored with riprap, with briars in the front and aquatic vegetation in the channel.

View looking east of the boundary between a patch of riparian scrub and ruderal habitat.

View looking east of the tidal marsh habitat in between riprap containing tule and other sedges and reeds, willows, and pampas grass.

View looking east and downstream of the open water in Georgiana Slough as well as marsh and riparian forest habitat in the background.

Appendix F

Biological Resources Assessment

BIOLOGICAL RESOURCES ASSESSMENT

Brannan-Andrus Levee Maintenance District Georgiana Slough Erosion Control and Habitat Enhancement Project

Prepared for: Brannan-Andrus Levee Maintenance District
May 2024

acorn environmental

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Section 1 | Introduction

1.1 PROJECT OVERVIEW

This Biological Resources Assessment was conducted for the proposed Georgiana Slough Erosion Control and Habitat Enhancement Project (Proposed Project). The Georgiana Slough is subject to areas of levee erosion requiring repair and erosion control in order to maintain the levee and safety of the surrounding area. Maintenance of the Georgiana Slough is managed by the Brannan Andrus Levee Maintenance District (BALMD). The Proposed Project is located along an approximately 1,500 linear-foot stretch of the levee along the Georgiana Slough (Project Site). This specific stretch was selected due to the severity of erosion and the potential for establishing suitable habitat for fish.

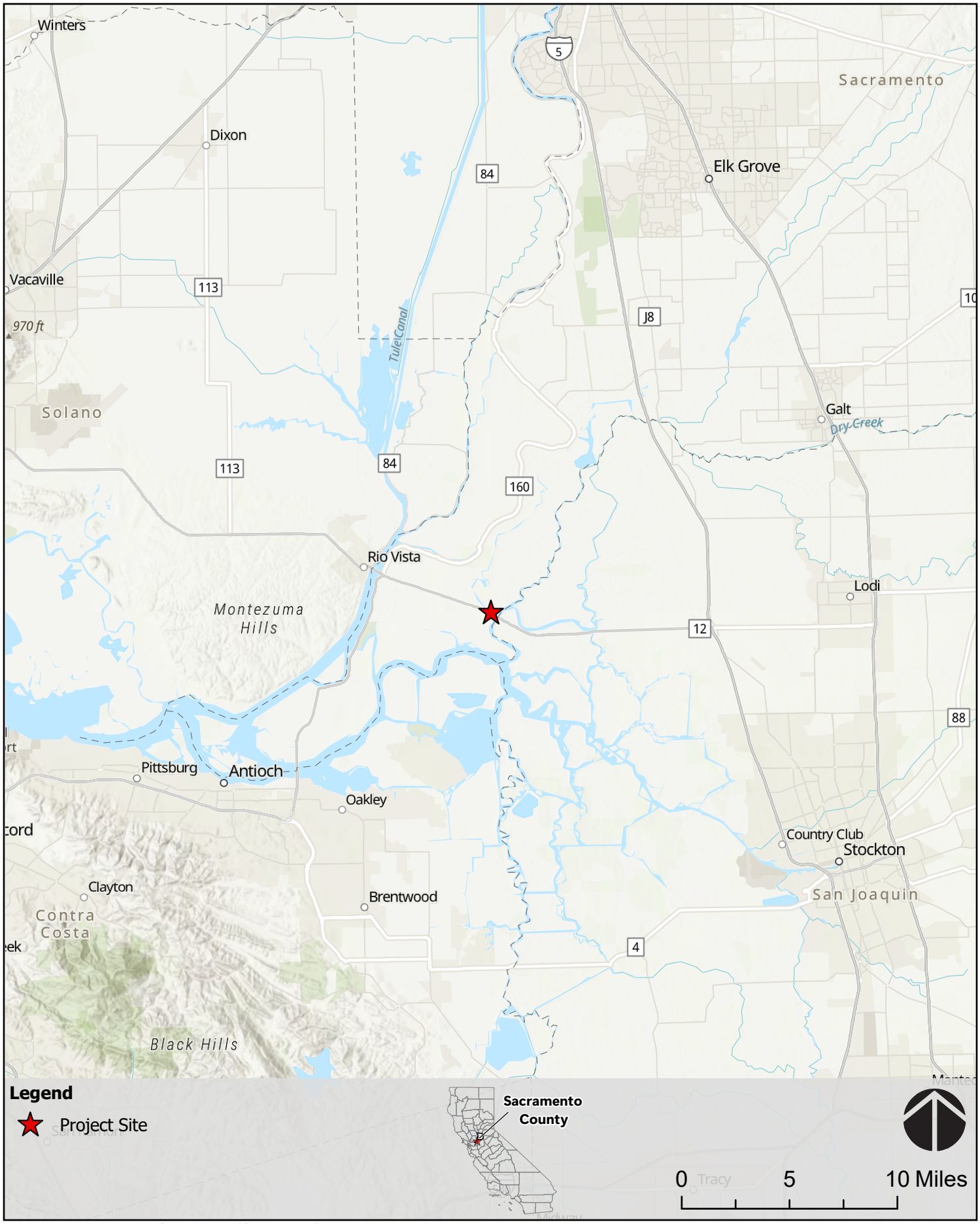
The Proposed Project would involve construction of proven erosion control methods involving placement of quarry stone rip rap (or rock slope protection - RSP) at the toe of the levee, which doubles as a foundational base for a habitat bench that will be constructed along the entire length of the Project Site. These methods were selected as they allow and promote natural establishment of vegetation and habitat, which assists in regulation of water temperature and provision of shade relief for aquatic species. The BALMD has implemented similar projects in the vicinity of the Project Site. Specifically, the Proposed Project is expected to create 0.30 acres of riparian forest, 1,500 linear feet (LF) of shaded riverine aquatic (SRA) habitat, 1,473 linear feet/0.39 acres of freshwater marsh habitat, 1.12 acres of total riparian habitat (comprised of riparian forest, shrub scrub and SRA habitat), and 0.75 acres of native grassland habitat.

This report evaluates terrestrial biological resources only focusing on project activities above the ordinary high water mark (OHWM) of Georgiana Slough and those biological resources that could be affected by ground disturbance and other construction activity on the terrestrial portions of the Project Site. An analysis of aquatic resources and potential impacts to aquatic resources and associated wildlife will be addressed in a separate report.

1.2 PROJECT LOCATION

The Proposed Project is located in Sacramento County, in the primary zone of the Sacramento-San Joaquin Delta. Specifically, the Project Site is located on the right (south) bank of Georgiana Slough on Lower Andrus Island, and is approximately 6.7 acres in size. The Project Site is immediately north of Highway 12 and is accessible via Brannan Island Road. Unimproved access roads connect to Brannan Island Road and cross through the Project Site. The Project Site extends over 1,500 LF from Levee Mile 5.51 (38.129721, -121.587691) to 5.80 (38.129592, -121.582281), approximately a quarter mile from the confluence with the Mokelumne River. The staging area is located immediately adjacent to the area of impacts, on the landside of the levee, and has been included as part of the Project Site.

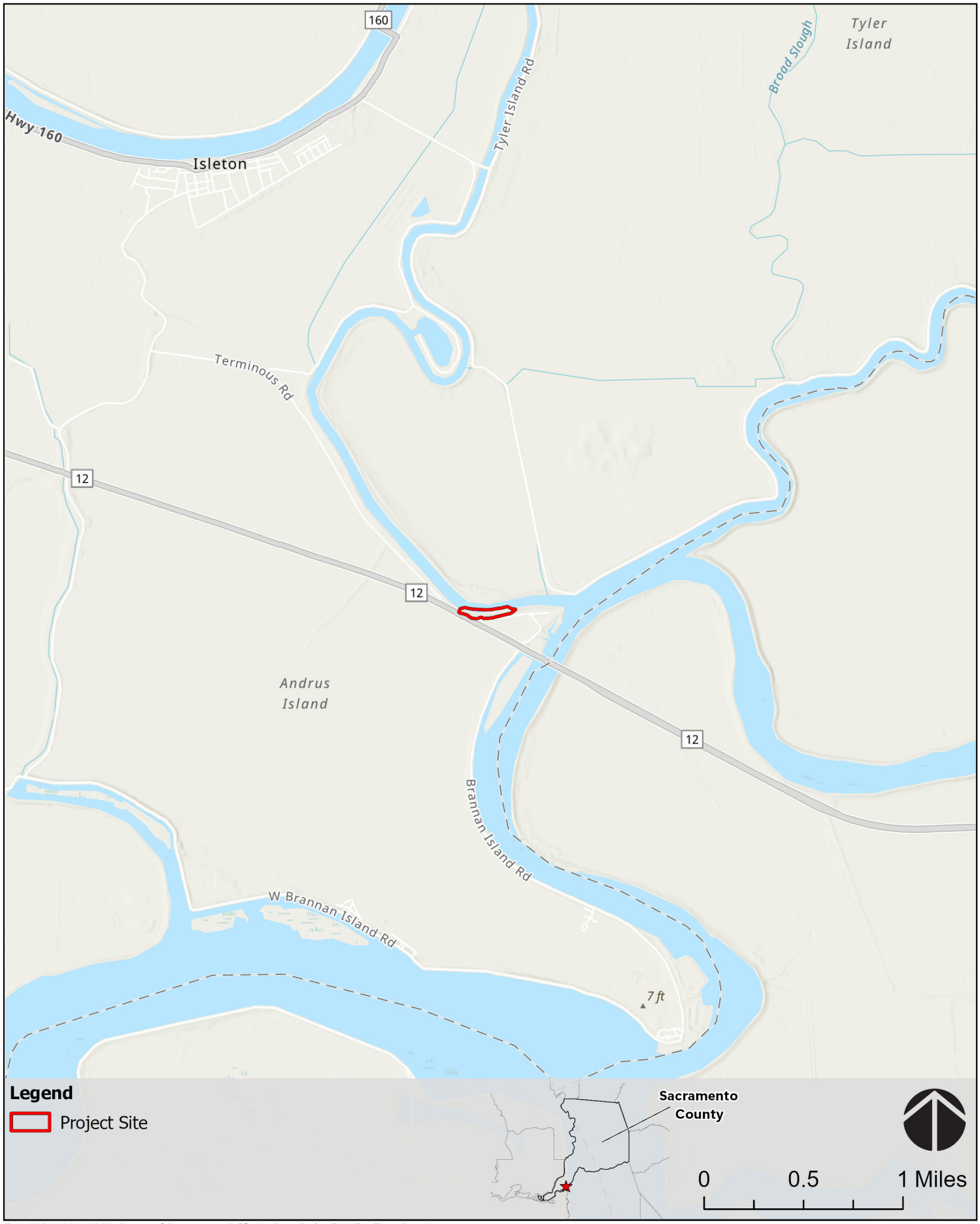
A map depicting the regional location of the project site is provided as **Figure 1. Figure 2** identifies the location of the Project Site on the USGS 7.5-minute Quadrangle Map. An aerial photograph of the Project Site can be viewed in **Figure 3**.



Esri, NASA, NGA, USGS, County of Sacramento, California State Parks, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USFWS

FIGURE 1

REGIONAL LOCATION



Esri, NASA, NGA, USGS, County of Sacramento, California State Parks, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS,

FIGURE 2
SITE AND VICINITY

Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community, Yolo County, Maxar, Esri Community Maps Contributors, County of Sacramento,

FIGURE 3
AERIAL OVERVIEW

1.3 PROJECT DESCRIPTION

1.3.1 Project Purpose and Objectives

BALMD is proposing the Georgiana Slough Erosion Control and Habitat Enhancement Project to resolve upper slope erosion problems and a major lower slope undercutting issue along the right bank levee of Georgiana Slough, on Lower Andrus Island. Once completed, the Proposed Project would provide suitable erosion control to the levee utilizing recognized and effective erosion control methodologies and support fish-friendly habitat through the creation of wetland and riparian SRA habitat on the channel margin.

The project objectives are to:

- Provide suitable levee erosion control on approximately 1,500 linear feet (LF) of levee on the right bank of Georgiana Slough, corresponding to Stations 291+00 to 306+00 (Levee Mile 5.51 to 5.80).
- Provide fish-friendly habitat on Georgiana Slough channel margin.
- Minimize long-term maintenance and repair costs by repairing existing areas of erosion using stable and effective erosion control methodologies.

1.3.2 Project Location

The Proposed Project is located in Sacramento County, in the primary zone of the Sacramento-San Joaquin Delta (**Figure 1**). Specifically, the Project Site is located on the right bank of Georgiana Slough on Lower Andrus Island. The site extends over 1,500 LF of bank, on Levee Mile 5.51 to 5.80, approximately a quarter mile from the confluence of the Mokelumne River (**Figure 2** and **Figure 3**).

The Project Site also includes material source, storage, and staging areas, as shown on the site plan included as **Figure 4**. Quarried rock revetment material and 6 inch minus mineral filter would be sourced and transported to the Project Site via material barges from the established quarry at San Rafael. Clean soil for filling the wetland bench would also be transported via barge from Decker Island. One location has been selected for staging construction materials and equipment in an area on the landside of the levee, immediately adjacent to the area of impact. Rock revetment, 6-inch minus, and fill will remain on the barge until final placement on the levee. Container plants required for the habitat features would be delivered periodically by pickup truck with trailer from a BALMD-approved nursery location within 75 miles of the Project Site.

1.3.3 Project Components and Construction Phasing

Construction would occur beginning upstream to downstream. The Proposed Project would be implemented in the following seven phases:

1. Mobilization
2. Site Preparation
3. Waterside slope grading of overburden and landside slope fill placement
4. Waterside Levee Slope and Bench Construction
5. Removal/Relocation of Encroachments
6. Installation and Maintenance of Plants
7. Site Demobilization

Yolo County, Maxar, Microsoft

FIGURE 4
SITE PLAN

Construction Materials

Material necessary for project construction, with exception of the landside fill, would be imported from offsite locations and transported to the Project Site by barge and truck, including:

- Quarry stone/rock slope protection (RSP; angular rock ranging from 15 to 400 pounds) and 6-inch minus rock - obtained from a quarry in San Rafael and transported via material barge and tug, approximately 46 nautical miles to the Project Site.
- Soil for the wetland bench would be obtained from Decker Island (15 nautical miles from the Action Area).
- Container plants would be obtained from a nursery within 75 miles of the Project Site.

Mobilization

Project mobilization would include all preparatory work necessary for the contractor to initiate construction activities. This work would include moving equipment and rock/soil supplies to the Project Site primarily by barge. A material barge, accompanied by tugboat, would be used to transport material from the quarry near San Rafael. A small tug (35-40 feet) would be used to move the crane barges between the Rio Vista staging and erosion repair site. Tugs used to maneuver the crane and material barges during site mobilization would be present on site periodically during the duration of construction activity (i.e. tugs may be moored or go to other non-related job sites if there is no need to move a barge for a period of time, and the material barges would be traveling back and forth from the quarry sites). A work boat would be used to transport laborers from the barge to the Project Site. Plants would be transported to the site via pickup truck and trailer.

Mobilization also would include setting up the staging area adjacent to the project area (**Figure 4**). Mobilization activities also would include any necessary pre-construction surveys and installation of erosion control and other Best Management Practices (BMP) measures as required.

Site Preparation

Initial site preparation would include debris removal, mowing, tree trimming, limited grubbing, and clearing on the waterside and landside levee slope. As an initial step to preparing the levee slope for construction activities, any trash or other non-vegetated debris would be removed from the waterside and landside levee slope and hauled to an appropriate refuse disposal site (the Keller Canyon Landfill in Pittsburgh, CA is the closet site).

The Proposed Project may remove some mature trees as well as require some tree trimming to allow for construction activities to occur under the tree canopy (i.e., to ensure worker safety, the crane boom on the barge must be able to swing freely, without hitting trees). Consistent with BALMD's existing routine maintenance agreement with the California Department of Fish and Wildlife (CDFW), trees less than 2 inches in diameter at 48-inches above the ground and large shrubs would be cut with a flail mower. Grasses and small shrubs also may be cut with a flail mower and left in place. The District will avoid cutting trees larger than 2-inches in diameter as much as practicable. As needed, small tree trunks (i.e., less than 4 inches in diameter), branches of larger trees, and larger shrubs would be removed with a chainsaw and chipped onsite using a trailer-mounted chipper and transported and stockpiled on a BALMD property on lower Andrus Island. Grubbing would occur to remove any remnant stands of invasive Himalayan blackberry and giant reed and would be completed using a small excavator (e.g., a Bobcat). Invasive

vegetation would be trucked to a landfill or other appropriate disposal site. Since the site is isolated from active roadway traffic, no traffic control is anticipated or needed during all phases of construction.

Levee Slope and Bench Construction

Construction of the new levee slope would occur in three phases: 1) First removing overburden and vegetation accumulated on the levee face. This borrowed overburden material would be then placed on the back/landside slope. 2) Placing RSP and 6-inch minus backfill material on the waterside levee slope; and 3) placing soil planting fill to complete final grade on the wetland bench and the levee slope utilizing barges, work boats, tugs, a long-reach excavator, dozer, and excavator.

Quarry Stone/Rock Slope Protection and 6-inch Minus Backfill Placement

Work would begin by removing excess overburden on the levee face with a long-reach excavator. This borrowed overburden material would be then placed on the back/landside slope (at a 3:1 slope) of the levee to expand the levee and increase landward stability. The excavated waterside slope would then form the foundation for placement of launchable rip rap (12-18-in) at the levee toe (between elevation -35.0 feet and -20.0 feet (NAVD 88)) where a key bench (6-ft deep by 8-ft wide min.) would be placed to support rock being placed on the lower slope. Rip rap measuring 12-18 inches would then be placed up to the bottom of the waterside bench, at elevation +2.3 feet (NAVD88) at Mean Lower Low Water (MLLW) at a 1.5:1 slope. A triangular prism of quarry stone will also be constructed from MLLW to the Mean Higher High Water elevation (MHHW, elev. +5.6 NAVD88) to protect the wetland bench from wave wash.

DWR RSP would then be keyed into a bench at that elevation 0.0 (NAVD88) and extend up to the Design Water Surface Elevation (DWSE) at +10.1 feet (NAVD88). A 6-in layer of 6-inch minus material will be placed over the rip rap to act as a natural filter material between the rock and soil. A minimum of 12 inches of imported/borrow fill will be provided/mixed as a “planting cap” over the quarry stone. Barges would transport material to the site directly from an established quarry in San Rafael, and material would be placed using a crane barge with a specialized clamshell attachment. Soil fill will be sourced at Decker Island and placed using a crane barge. Once offloaded by the crane barge, material can also be moved and compacted by a long-reach excavator and small front loader from the levee crown. The launchable rip rap would be used to support armoring of the re-sloped embankment and create a new foundation for the wetland habitat bench as well as a 2-foot veneer of erosion protection below the bench. RSP would be placed at a 2:1 slope, depending on the existing topography.

The wetland bench will be constructed following the construction of the rock prism, rip rap and filter placement. The bottom of the wetland bench will be placed at Mean Low Water (MLW) at elevation +2.7-feet (NAVD88). The width of the wetland benches would vary from approximately 16-ft to 17-ft wide with a 7:1 slope, sloping towards the water. The top of the wetland bench will range from elevation +4.0-feet to +6.0-feet depending on topography. **Figure 4** shows a typical wetland cross section and detail of the levee design. Wetland plants would be installed into the soil filled bench with a modest band of scrub shrub and/or shaded riverine aquatic (SRA) habitat planted on and above the wetland bench from approximately elevation +5.2 to +10.0 (NAVD88) along the entire 1500-foot length of the site.

Crown Raising and Landside Slope Improvement

The excavated material from the water side slope will be used to increase the crown height to elevation +14.0 (NAVD88) to account for the impacts of climate change and increase freeboard above the DWSE. The material will be placed using a long-reach excavator and small front end loader. The existing levee

crown width is approximately 15 to 20 feet wide, the proposed finished crown width will be 25-feet and with a 20-foot-wide gravel patrol road comprised of 6-inch deep Class II aggregate base. The excavated fill will also be placed on the landside slope utilizing a long-reach excavator and small front loader to both flatten the slope and increase the total width of the levee to capture the design levee section. The landside embankment off the crown will slope at a 3:1 to the existing grade.

Wetland Bench - Freshwater Marsh

The freshwater marsh/wetland bench (**Figure 4**) would be constructed above MLW at elevation +4.0-feet (NAVD88) to allow frequent inundation and development of aquatic and semi-aquatic habitat. The area immediately above the bench will be planted with native riparian species (e.g. willow spp.) to provide long term habitat benefit as well as increase channel roughness to reduce wave velocity. For wetland benches, materials would include the use of beneficial reuse soil that will come from the waterside re-slope. The bench will have twelve-inches minimum of import fill with 0.5 feet of 6-inch minus to act as a filter between the soil and the 2-foot layer of quarry stone protection below. The bottom elevation of the wetland bench will be at MLW (+2.7-feet NAVD88). The top of the soil within the wetland bench will vary between elevation +4.0 to 6.0 feet NAVD88). Wetland bench width would also vary slightly, from approximately 16 feet to 17 feet wide, depending on the location along the levee. There would be a 7:1 slope maximum waterward within the bench to increase the variability of elevation (between +4.0 and +6.0 NAVD88) and encourage heterogeneity of species. The planted slope above the wetland benches would occur at a 2:1 slope. The Proposed Project is anticipated to construct approximately 0.39 acres and 1,473 LF of freshwater marsh habitat. Species will be native hydrophytes grown/harvested locally where possible. Wetlands species, upon consult with CDFW, will include species that can be frequently inundated (CDFW Zone 'B') such as: plants (e.g., American bulrush, California tule, and some rush species).

The wetland bench to the DWSE will be faced with heavy coir fabric or another approved equivalent plantable erosion protection method to protect the lower slope from wave wash induced erosion until vegetation reaches full maturity and establishment.

Waterside Riparian Habitat

Waterside riparian habitat (combination of riparian forest, scrub shrub and SRA habitat) provides opportunities for terrestrial species and an important source for food inputs for aquatic species that utilize Georgiana Slough (**Figure 4**). A band of riparian habitat would be planted/established above the wetland benches on the waterside slope across the entire length of the proposed Georgiana Slough erosion repair. Ecologically suitable species that can be submerged in high water events (CDFW Zone 'C') such as: creeping wildrye, Santa Barbara sedge, rush species, Goodding's black willow, arroyo willow, sandbar willow, button willow and pacific willow, would be planted using hand tools from approximately +5.2 to +10.0 feet (NAVD88) elevation up the slope across the site. Approximately 1.12 acres/1,500 LF of riparian habitat (riparian forest, scrub shrub and SRA) will be created.

Native Grassland

Native grassland habitat will be planted above the wetland benches at elevation +7.0 feet (NAVD88) and extend to the edge of the levee crown (approx. 14.0 ft NAVD88). The species include California fescue, small barley, creeping wildrye, salt grass, and one-sided bluegrass. In addition, the backside of the levee slope will be hydroseeded providing additional acreage of native grassland. A total of 0.75 acres of grasslands will be enhanced at the Project Site.

1.3.4 Site Demobilization

Site demobilization would include removal of all equipment and associated site BMPs. The staging areas would require minimal demobilization activities since most materials would be removed from the staging areas as they are used up during project implementation. Palettes and residual plant materials would be cleaned and removed from the site as the work progresses, leaving nothing onsite at the conclusion of construction. Plant delivery palettes would be returned via truck to the source nursery at the conclusion of construction. Minor trash/debris would be removed from the site and disposed of at an approved facility. Barges, tugs, and work boats would move on to the next unassociated job site or storage dock at the conclusion of construction.

1.3.5 Construction Equipment and Staffing

The types and number of pieces of equipment needed for each project phase and their anticipated duration of usage are shown in **Table 1**.

Table 1: Typical Equipment that may be used for Construction of the Proposed Project

Phase	Equipment Type	Number of Units	Estimated Duration of Use (# of workdays)	Estimated Truck or Barge Trips (one-way)
Mobilization	Flatbed Truck (plant transport)	1	3	3
	Pickup Truck (trailer transport)	1	Duration of project	1
	Construction Trailer	1	Duration of project	n/a
	Portable Toilets	2	Duration of project	n/a
Site Preparation	Flail Mower	1	15	n/a
	Trailer-mounted Wood Chipper with Haul Truck	1	15	13
	Chainsaws	2	15	n/a
Levee Slope and Bench Construction	2,000 to 3,000 ton Material Barge (non-motorized)	1	66	36
	Crane Barge (non-motorized)	1	66	4
	Small Work Boat (40-ft max)	1	66	10
	Row Boat/12-ft Skiff (non-motorized crew transport)	1	66	n/a
	Long Reach Excavator	1	20	2
	Small Excavator (bobcat)	1	44	2
	Small Conveyor w/Generator (soil loading)	1	5	2
	Small Front-End Loader (conveyor loading)	1	5	2
	Tug Boat	1	22	36

Installation of Plants	Pickup Truck (trailer transport)	2	45	n/a
	Hydroseeding Truck	1	2	3
	1,000-gallon Water Truck	1	10	3
Site Demobilization	Pick-up Truck (trailer transport)	1	5	1

Actual equipment use may vary, depending on contractor capabilities and preferences and equipment availability. A maximum of approximately 30 construction personnel would work on the Proposed Project, depending on the construction phase. Workers required for specific construction phases are anticipated to include:

- Two crew lead workers would be onsite, 8 hours per day, six days a week, for the duration of the project.
- Two, 5-person crews of operator engineers would operate one to two crane barges and one small work boat during levee slope and bench construction.
- One tug boat would have a crew of 4 persons each and would be onsite periodically, as needed.
- One long-reach excavator operator would work 10 hours per day during levee slope construction.
- A front loader would work approximately 10 hours per day during levee slope construction.
- One foreman and one laborer would be present on the Project Site during all site work.
- One surveyor would be onsite, as needed.
- A planting crew of four to six workers.

1.3.6 Construction Schedule

With favorable weather and tidal conditions, project construction is expected to be completed over approximately 120 days. In-water work would be conducted between August 1 and October 31. However, rock and rock soil mix placement above the OHWM may take place at any time over the duration of project construction. Any tree trimming/vegetation removal would occur during the nesting bird dormant season.

Work, including equipment operation, would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.). Equipment maintenance could occur before and after working hours and on Sunday.

1.3.7 Project Environmental Commitments

The following environmental commitments have been incorporated into the Proposed Project to avoid or minimize the potential adverse effects fish and wildlife and their habitats and the physical environment:

CM 1: Timing of Work

- All in-water construction activity would be conducted between August 1 and October 31 to ensure protection of anadromous salmonids. This time period is the suggested work window for waterways located within the Delta.
- As much work below OHWM work as possible would be performed during low tide to reduce potential impacts to water quality.

- Work, including equipment operation, would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.).
- Equipment maintenance could occur before and after working hours and on Sunday.
- In-water construction activities would be limited to daylight hours, leaving a nighttime period for anadromous salmonids and Green Sturgeon to migrate past the Project area.

CM 2: Construction Best Management Practices (BMPs) and Monitoring

- Staging, and both temporary and long-term material disposal areas would be located away from Waters of the United States.
- Equipment would be refueled, maintained, and serviced at designated staging areas away from the erosion repair site. All refueling, maintenance, and staging of equipment and vehicles shall occur at least 60 feet from bodies of water and in a location where a potential spill would not drain directly toward aquatic habitat (e.g., on a slope that drains away from the water source). Fuel transfer vehicles would have absorbent pads, pillows, socks, booms or other spill containment materials placed under the fueling operation.
- Petroleum products would be stored in non-leaking containers at impervious storage site from which runoff is not permitted to escape.
- Movement of heavy equipment to and from the Proposed Project area shall be restricted to established roadways and equipment shall be stored in established staging areas away from Georgiana Slough.
- All feasible avoidance and minimization measures would be implemented to control erosion and runoff from areas associated with construction activities. Specifically, use of straw wattles, silt fences, or other erosion control measures would be used to ensure that constructed-related materials do not reach Georgiana Slough. All areas of temporary impacts and all other areas of temporary disturbance which could result in a discharge to Georgiana Slough would be restored.
- Soil disturbance activities shall cease if adverse weather conditions substantially increase the likelihood of transporting soil off site.
- Active water quality monitoring shall occur during the construction portion of the project. Should construction create conditions that exceed standard water quality thresholds, remedial actions shall be employed to reduce them back to threshold limits.
- A planting, monitoring and adaptive management plan would be submitted to Resource Agencies.
- Wildlife observed within the project site shall be allowed to leave on their own unharmed.
- Fugitive dust would be minimized by watering or implementing other dust control measures. Fugitive dust would also be minimized by limiting construction vehicle speeds to 15 miles per hour or less, covering haul vehicles, installing wheel washers or other similar methods where vehicles exit the construction site onto paved roads.
- Construction activities would be limited to the designated work area, which would be clearly identified on the construction drawings and marked with fencing, stakes, and/or flags before ground-disturbing activities begin.
- All construction equipment would have sound-control devices no less effective than those provided on the original equipment; no equipment shall have an unmuffled exhaust system.
- No pets shall be allowed at the project site.
- All trash that may attract predators shall be properly contained in covered containers and removed from the work site on a regular basis.
- During construction, no litter or construction debris shall be placed within jurisdictional areas. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site. In

addition, all project-generated debris, building materials, and rubbish shall be removed from jurisdictional areas and from areas where such materials could be washed into them.

CM 3: Protection of Landside Wetland Areas

CM 3 consists of the following measures to protect the non-jurisdictional wetlands identified on the landside of the levee in the Project area.

- Non-jurisdictional wetlands will be fenced off and no construction activities will occur within the fenced area.
- No construction equipment, staging materials, vehicles, spoil piles, etc., will be allowed within protected buffer areas.
- Wetland areas will remain fenced for the duration of the Project.

CM 4: Worker Environmental Awareness Training

- All contractors and equipment operators would participate in a Worker Environmental Awareness Program (WEAP) training regarding potential environmental impacts to make them aware of the ecological value of the area, including the potential for special status species and their habitat to be present near the Proposed Project area.
- The WEAP training would cover, at a minimum, the special status species listed that have the potential to occur in the Proposed Project area during construction, including but not limited to anadromous fishes, a description of the regulatory status and general ecological characteristics of sensitive resources, and review of the limits of construction and avoidance measures required to reduce impacts to biological resources within the work area. A fact sheet conveying this information shall also be prepared for distribution to all contractors, their employers, and other personnel involved with construction of the project. All employees shall sign a form provided by the trainer documenting they have attended the WEAP training and understand the information presented to them.
- The WEAP training shall be conducted by a qualified biologist, to aid workers in recognizing special status resources that may occur in the project site and vicinity.
- Personnel involved in the Proposed Project would be trained in emergency response and spill containment techniques.

CM 5: Vegetation Removal and Tree Protection

- Vegetation clearing would only occur within the project footprint.
- The Proposed Project would impact a total of 569 lineal feet of SRA and 0.5 acres of riparian habitat (0.09 acres of riparian forest, and 0.41 acres of scrub shrub); however, the project would create 0.30 acres of riparian forest, 0.82 acres of scrub shrub (1.12 acres of total riparian habitat), and 1,500 LF of SRA.

The project would result in a net benefit/enhancement for all vegetative habitat types.

CM 6: Construction Site Clean-up

CM 6 consists of the following construction site clean-up measures.

- All construction supplies, materials, and debris from the Proposed Project would be removed following completion of the Proposed Project.
- Plant delivery palettes would be returned via truck to the source nursery at the conclusion of construction.
- Minor trash/debris would be removed from the site and disposed of at an approved facility.

CM 7: Implementation of General Permit (General Permit for Storm water Discharges Associated with Construction Activities)

All measures described in the State Water Resources Control Board National NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit; Order No. 2022-0057-DWQNPDES Permit No. CAS000002) shall be implemented. A SWPPP shall be prepared that includes specific BMPs to avoid and minimize impacts on water quality during construction activities. The goals of the SWPPP would generally be to protect water quality; establish procedures to minimize accelerated soil erosion; and minimize non-storm water runoff. The SWPPP would define measures to prevent, control, and minimize impacts from a spill of hazardous, toxic, or petroleum substances during construction, as well as a description of potentially hazardous and non-hazardous materials that could be accidentally spilled, potential spill sources, potential spill causes, proper storage and transport methods, spill containment and recovery measures, agency notification, and responsible parties. Components of the SWPPP shall include measures that limit risk of release of contaminates to waterways. The SWPPP shall have the following primary objectives:

- Stabilization of the site as soon as possible.
- Controlling the perimeter of the project site.
- Protection of nearby receiving waters.
- Following all necessary pollution prevention measures.
- Minimization of the area and duration of exposed soils.

1.3.8 Post-Construction Habitat Maintenance and Monitoring

Following completion of the Proposed Project, BALMD would conduct a minimum of five years of maintenance and monitoring of the new habitat features to ensure the vegetation is establishing properly. Site maintenance would occur on an as needed basis and focus on managing noxious weeds and ensuring plants receive adequate irrigation (years 1-3) in order to become established and meet success criteria. Most plant maintenance would include regular periodic watering and weed management so they become established. The tide would inundate portions of the levee slope twice per day, during portion of the months the tide would inundate partially up the slope and thus provide necessary moisture to wetland bench plants. It is anticipated that maintenance during the first two years would require bi-weekly to monthly site visits during the hot, active growing season (April through September) to ensure proper weed management and irrigation. Subsequent activities during the remaining three years of the maintenance period would occur on a monthly basis.

Biological monitoring of the habitat features would occur on an annual basis and begin during the first year following construction. Initial monitoring during the first year would occur in summer - fall to assess the preliminary condition of the plants relative to meeting overall habitat establishment and survival goals. Subsequent monitoring for the remaining four years of the monitoring period would occur in late summer/early fall.

Plants would be recorded as dead if no viable above ground growth is visible. Dead plants and trees would be replaced as necessary during the first year and annually in subsequent years. Any re-planting would occur either in spring or late fall. Cumulative survival of all plants and trees at the conclusion of the five-year monitoring period would be at least 80 percent.

Invasive weed cover would be estimated visually during annual monitoring. Vegetative cover by invasive species would be less than ten (10) percent of all cover throughout the five-year monitoring period. In the event invasive species cover exceeds the cover criteria during any of the annual monitoring events, maintenance actions would be taken to reduce this cover to less than 10 percent.

Section 2 | Methodology

2.1 REGULATORY OVERVIEW

Regulated or sensitive resources studied and analyzed herein include special status plant and wildlife species, nesting birds and raptors, sensitive plant communities, jurisdictional waters and wetlands, wildlife movement, and locally protected resources, such as protected trees.

2.1.1 Environmental Statutes

Potential impacts to biological resources were analyzed based on the following federal, state, and local regulations and policies. These regulations are described in detail within **Attachment A**.

- California Environmental Quality Act (CEQA)
- Federal Endangered Species Act (ESA)
- California Endangered Species Act (CESA)
- Federal Clean Water Act (CWA)
- California Fish and Game Code (CFGC)
- Migratory Bird Treaty Act (MBTA)
- Bald and Golden Eagle Protection Act
- Porter-Cologne Water Quality Control Act
- Sacramento County General Plan of 2005 – 2030
- Sacramento County Tree Ordinance

2.1.2 Guidelines for Determining CEQA Significance

The following threshold criteria, as defined by the CEQA *Guidelines* Appendix G Checklist, were used to evaluate potential environmental effects. Under CEQA, a project would have a significant effect on biological resources if it would:

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

2.2 LITERATURE REVIEW

Queries of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation system (IPaC; **Attachment B**), CDFW California Natural Diversity Database (CNDDB) (**Figure 5**), and the California Native Plant Society (CNPS) Online Inventory of Rare and Endangered Plants of California (**Attachment B**) were conducted to obtain comprehensive information regarding state and federally listed species as well as other special status species considered to have potential to occur within the Isleton, Rio Vista, Liberty Island, Courtland, Bruceville, Thornton, Terminous, Bouldin Island, and Jersey Island, California U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles. The results of these scientific database queries were compiled into a table that is presented as **Attachment C**.

In addition, the following resources were reviewed for information about the Project Site:

- Aerial photographs of the Project Site and vicinity;
- Isleton, Rio Vista, Liberty Island, Courtland, Bruceville, Thornton, Terminous, Bouldin Island, and Jersey Island, California USGS 7.5-minute topographic quadrangles;
- U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS, 2024);
- USFWS Critical Habitat Portal (USFWS, 2024); and
- USFWS National Wetlands Inventory (**Figure 6**).

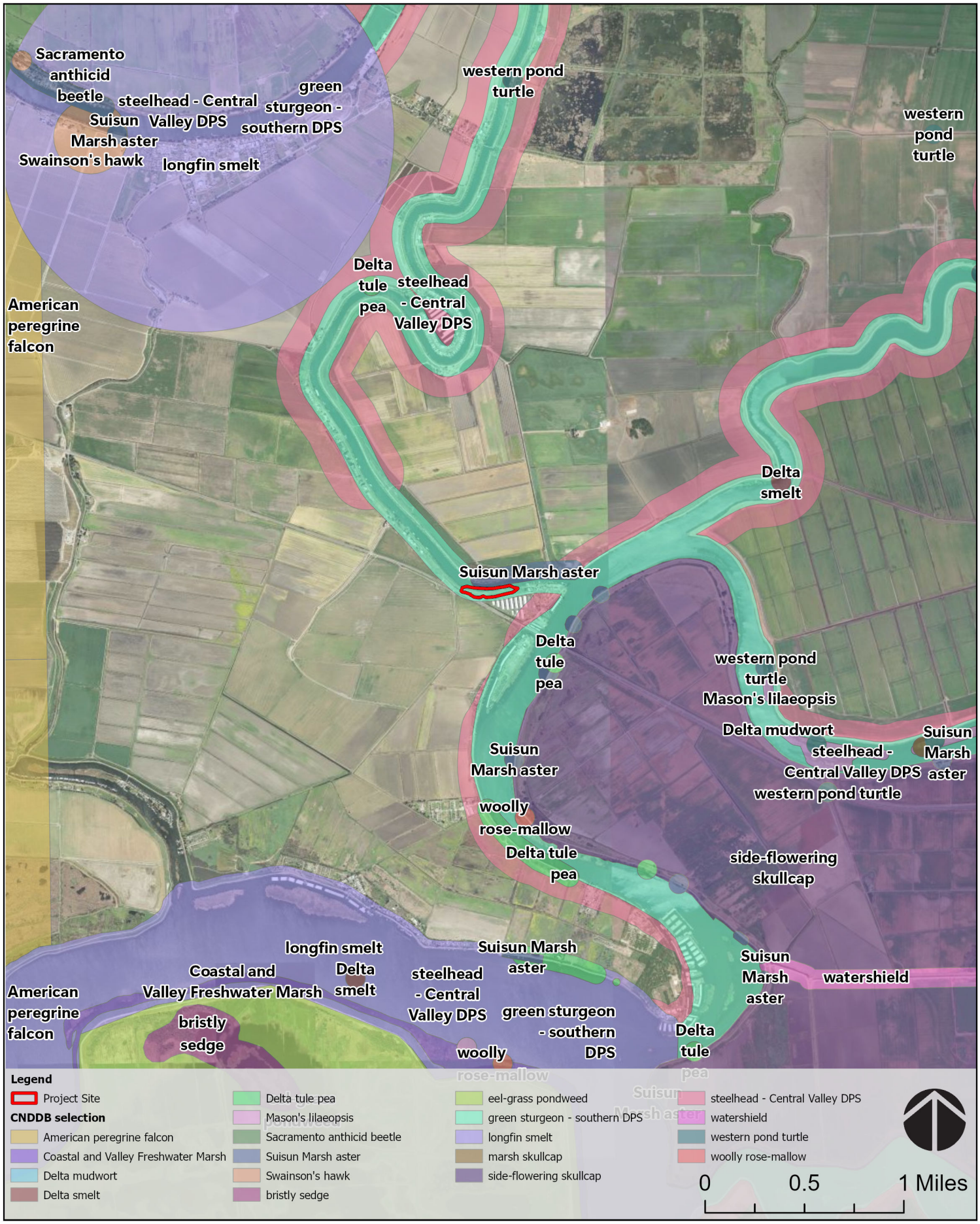
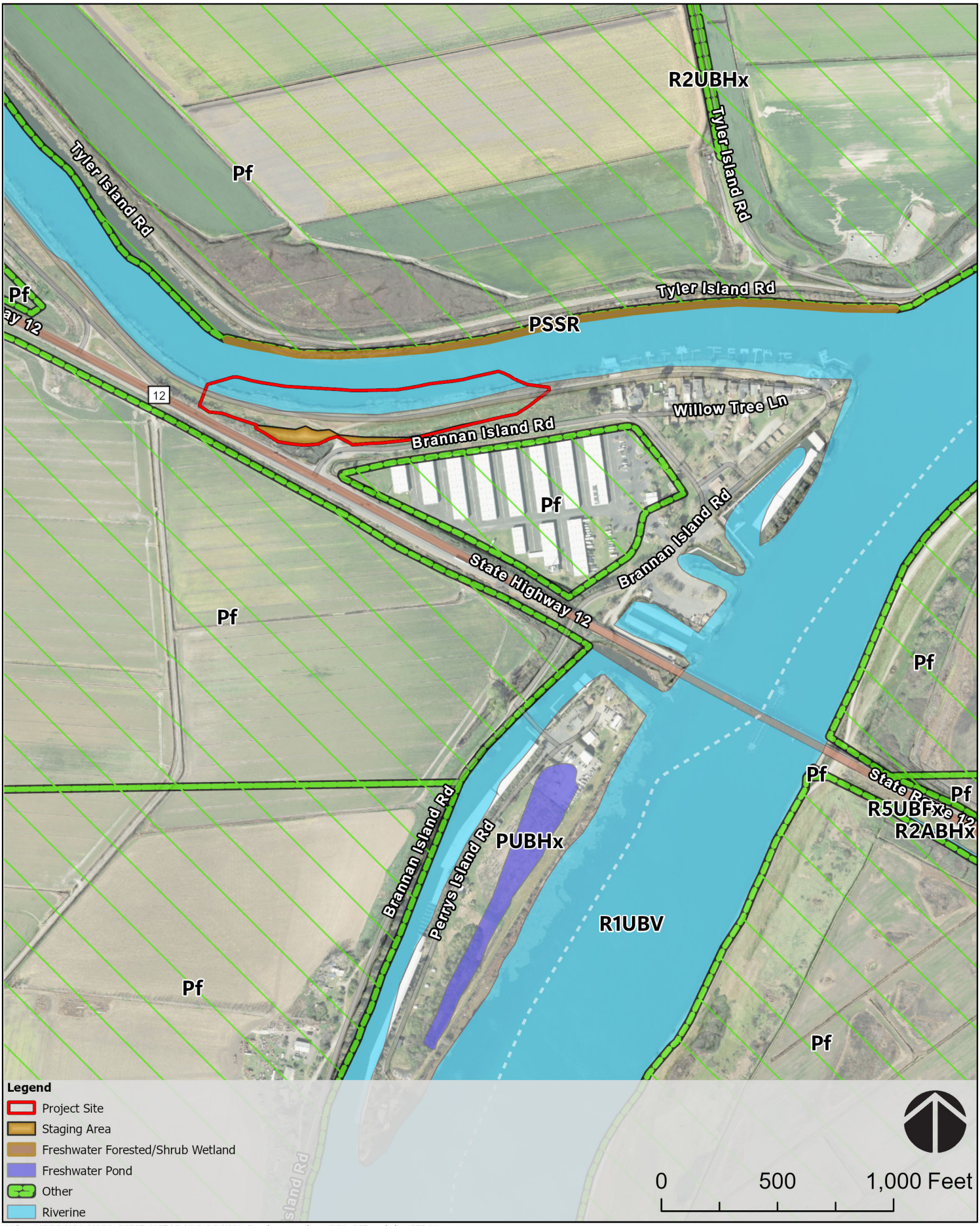


FIGURE 5
CNDDB INVENTORY



Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community, Yolo County, Maxar, Esri Community Maps Contributors, County of Sacramento,

FIGURE 6

NATIONAL WETLAND INVENTORY

2.3 FIELD SURVEY

Consulting biologist Dr. Geo Graening conducted a biological field assessment on September 14, 2023. Weather conditions were cool and sunny. A variable-intensity pedestrian survey was performed, and modified to account for differences in terrain, vegetation density, and visibility. All visible fauna and flora observed were recorded in a field notebook and identified to the lowest possible taxon. Survey efforts emphasized the search for any special-status species or suitable habitat for such species that had documented occurrences within the vicinity of the Project Site (**Attachment B**; **Figure 5**). The Project Site was also informally assessed for the presence of potentially-jurisdictional water features.

Locations of species' occurrences and vegetation communities were recorded on color aerial photographs and then digitized to produce the final habitat maps. Geographic analyses were performed using geographical information system software (ArcGIS 11, ESRI, Inc.). Vegetation communities were classified by Vegetation Series using the CNPS Vegetation Classification system (Sawyer and Keeler-Wolf, 1995). Wildlife habitats were classified according to the CDFW's California Wildlife Habitat Relationships System (CDFW, 2024a). Species' habitat requirements and life histories were identified using the following sources: Baldwin et al. (2012); CNPS (2024), Calflora (2024); CDFW (2024 b, c, d); and University of California at Berkeley (2024a,b).

Wildlife identification and nomenclature followed standard reference texts including *Sibley Field Guide to Birds of Western North America* (Sibley, 2003), *Field Guide to Western Reptiles and Amphibians* (Stebbins, 2003), and *Mammals of North America* (Bowers et al., 2004). The habitat requirements for each regionally occurring special status species were assessed and compared to the type and quality of the habitats observed within the Project Site during the field survey. Several sensitive species were eliminated from consideration as potential to occur on site due to lack of suitable habitat, lack of suitable soils/substrate, and/or known regional distribution.

Section 3 | Existing Conditions

This section provides the results of the field survey and background research described in **Section 2**. An assessment of special-status species with the potential to occur in the vicinity of the Project Site is provided as **Attachment C**. Representative site photos of the project site are included as **Attachment D**.

3.1 PHYSICAL CHARACTERISTICS

The Project Site is located within a large estuary (the Sacramento / San Joaquin River Delta). This area experiences a maritime and Mediterranean climate where summers are hot and dry and winters are cool and supply the majority of its rainfall. The topography of the Project Site is an elevated levee of the Georgiana Slough approximately 0.25 miles above the confluence with the Mokelumne River. The elevation ranges from 12 feet above sea level on the levee top to about 3 feet at the water surface when the slough is at low tide.

Land uses surrounding the Project Site are flood control structures, a transportation corridor, rural residential, row-crop agriculture, river-based commerce and recreation, boat docks, and the Delta Boat Storage yard.

3.1.1 Watershed and Drainages

The portion of the Georgiana Slough where the Project Site is located straddles two watersheds: the South Mokelumne River-Mokelumne River watershed (HUC 180400121106) and the Threemile Slough-Sacramento River watershed (HUC 180201630703) (USEPA, 2024a, b). The levee marks the boundary between the two watersheds; the inside slope of the levee where the work will occur drains into the Georgiana Slough and the South Mokelumne River-Mokelumne River watershed, while the land side of the levee where the staging area is proposed drains southwest within the South Mokelumne-Mokelumne River-San Joaquin River watershed.

3.1.2 Soils

The Natural Resources Conservation Service maps three soil types within the Project Site:

- 232: Valpac sandy loam, mucky substratum, partially drained, 0 to 2 percent slopes, hydric
- 155: Gazwell mucky clay, partially drained, 0 to 2 percent slopes, hydric
- 247: Water (unmapped)

Valpac Sandy Loam, Mucky Substratum, Partially Drained, 0 to 2 Percent Slopes

Valpac sandy loam is a hydric soil type that is not prone to flooding or ponding. Depth to the water table is approximately 18 inches. This soil type is considered poorly drained with a high runoff class. Depth to restrictive features is over 80 inches. This soil type is considered prime farmland if irrigated.

Gazwell Mucky Clay, Partially Drained, 0 to 2 Percent Slopes

This soil type is considered a hydric soil with a low runoff class that is not prone to flooding or ponding. Free water is common (depth to water of 0 inches). Depth to restrictive feature is more than 80 inches. Gazwell mucky clay is considered prime farmland if irrigated.

3.2 VEGETATION

The Project Site is within the Sacramento Valley (ScV) geographic subregion of California. The ScV subregion is a component of the larger Great Central Valley geographic region, which occurs within the even larger California Floristic Province (Baldwin et al., 2012). A list of plant species observed during the field survey is provided as **Attachment E**.

A total of three vegetative communities were observed within the Project Site: ruderal/developed, riparian forest and scrub shrub. These are mapped in **Figure 7** and described in detail below. The terrestrial habitat types below represent an approximately 5-acre portion of the Project Site. The remaining 1.7 acres are open water within the Georgiana Slough channel.

3.2.1 Ruderal / Developed (4.5 acres)

The Project Site consist mostly of ruderal and developed habitat. These areas consist of disturbed or converted natural habitat that is now either in ruderal state, or urbanized with gravel roads, structure, and utility placement. The banks of the levee are regularly mowed and trimmed for maintenance purposes. Vegetation within this habitat type consists primarily of nonnative European annual grasses

FIGURE 7

VEGETATION COMMUNITIES

(*Avena*, *Bromus*, *Hordeum*, and *Festuca* species) and weedy or invasive species lacking a consistent community structure. Landscape/ornamental species present are: blue gum eucalyptus (*Eucalyptus globulus*); cider gum (*Eucalyptus gunni*); black locust (*Robinia pseudoacacia*); and oleander (*Nerium* sp.) The disturbed and altered condition of these habitats greatly reduces their habitat value and ability to sustain rare plants or diverse wildlife assemblages. The CDFW (2024d) Terrestrial Natural Communities alliances are: 11.300.00 Disturbed Habitat; and 12.000.00 Urban/Developed.

3.2.2 Riparian Forest (0.09 acres)

Patches of riparian forest exist along the inside slope of the levee; the dominant tree species are Oregon ash (*Fraxinus latifolia*) and white alder (*Alnus rhombifolia*), with some narrow-leaf willow *(Salix exigua*) and red willow (*Salix laevigata*). The understory contains blackberry and California wild grape. The CDFW (2024d) Terrestrial Natural Communities alliances are: 61.207.00 Mixed Willow Riparian Forests and Woodland; and 61.420.00 White Alder Forest and Woodland.

3.2.3 Scrub Shrub (0.41 acres)

Patches of riparian scrub also exist along the inside slope of the levee. The dominant community is willow thicket, and in the Project Site, this consists of narrow-leaf willow, red willow, sandbar willow (*Salix exigua*). Other willow species are present in the Delta: Goodding's black willow, arroyo willow, sandbar willow, button willow, and pacific willow. Other plant species in this riparian scrub habitat are blackberry brambles, poison oak (*Toxicodendron diversilobum*), California mugwort (*Artemisia douglasiana*), giant reed (*Arundo donax*), and sedges (*Carex* spp.). The CDFW (2024d) Terrestrial Natural Communities alliances are: 61.209.00 Narrow-leaf Willow Riparian Scrub; and 63.100.00 Scrub Willow [*Salix* spp.].

3.3 WILDLIFE

Wildlife observed during the field survey are: fence lizard (*Sceloporus occidentalis*); minnow (*Cyprinidae*); orb weaver (*Argiope* sp.); ants (*Formicidae*); grasshoppers (*Orthoptera*); white skipper (*Heliopetes* sp.); swallow (*Petrochelidon pyrrhonota*); bushtit (*Psaltriparus minimus*); and American crow (*Corvus brachyrhynchos*). Wildlife activity was generally low during the field survey. Wildlife activity on the Project Site is likely to be depressed by ongoing disturbance from road and boat traffic and related noise, as well as activities from adjacent residences and boat docks.

Wildlife habitat types were classified using CDFW's Wildlife Habitat Relationship System. The Project Site contains the following wildlife habitat types: Annual Grassland; Valley Foothill Riparian; Fresh Emergent Wetland; Riverine; Urban; and Barren.

Section 4 | Sensitive Biological Resources

Local, state, and federal agencies regulate special status species and require an assessment of their presence or potential presence to be conducted on-site prior to the approval of any proposed development on a property. This section discusses sensitive biological resources observed on the Project Site, and evaluates the potential for the Project Site to support other sensitive biological resources. Assessments for the potential occurrence of special status species are based upon known ranges, habitat preferences for the species, species occurrence records from the CNDDB, species occurrence records from

other sites in the vicinity of the survey area, and previous reports for the Project Site. The potential for each special status species to occur in the survey area was evaluated according to the following criteria:

- **Absent.** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) and/or appropriately-timed protocol or focused surveys have been completed and the species has been determined to be absent.
- **Not Expected.** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
- **Low Potential.** Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- **Moderate Potential**. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- **High Potential.** All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- **Present.** Species is observed on the site or has been recorded (e.g., CNDDB, other reports) on the site recently (within the last 5 years).

The results of the CNDDB and CNPS searches, the IPaC-generated list of federally listed species, and conditions observed during the survey resulted in a total of 25 species (12 plants and 13 animals) evaluated as having some potential to occur within the terrestrial portions of the Project Site. A complete list of species evaluated for this project can be found in **Attachment C**.

One USFWS-designated critical habitat occurs within the Project Site in Georgiana Slough: Delta Smelt (*Hypomesus transpacificus*) (USFWS, 2024). Four NMFS-desginated critical habitats occur within the Project Site in Georgiana Slough: Green Sturgeon (Southern DPS: *Acipenser medirostris*); Steelhead (California Central Valley DPS: *Oncorhynchus mykiss*); Chinook Salmon (Sacramento River winter-run ESU; *Oncorhynchus tshawytscha*) and Chinook Salmon (Central Valley spring-run ESU) (NOAA, 2024). All sensitive fish species, aquatic critical habitats, and essential fish habitat are being addressed under a separate analysis. No terrestrial critical habitat has been designated within the Project Site or vicinity.

4.1 SPECIAL-STATUS SPECIES

For the purposes of this assessment, “special status” is defined to be species that are of management concern to state or federal natural resource agencies, and include those species that are:

- Listed as endangered, threatened, proposed, or candidate for listing under the Federal Endangered Species Act;
- Listed as endangered, threatened, rare, or proposed for listing, under the California Endangered Species Act of 1970;
- Designated as endangered or rare, pursuant to California Fish and Game Code (§1901);
- Designated as fully protected, pursuant to California Fish and Game Code (§3511, §4700, or §5050);
- Designated as a species of special concern by CDFW;

- Plants considered to be rare, threatened or endangered in California by the California Native Plant Society (CNPS); this consists of species on Lists 1A, 1B, and 2 of the CNPS Ranking System; or
- Plants listed as rare under the California Native Plant Protection Act.

Additionally, rookery sites for species that nest colonially, such as egrets and herons, and bat maternity roosts are also treated as special status. In addition to plants listed under the federal ESA or CESA, special status plants are those with a California Rare Plant Rank (CRPR) of 1 or 2, which are defined as:

- Rank 1A = Plants presumed extinct in California;
- Rank 1B.1 = Rare or endangered in California and elsewhere; seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- Rank 1B.2 = Rare or endangered in California and elsewhere; fairly endangered in California (20-80% occurrences threatened);
- Rank 1B.3 = Rare or endangered in California and elsewhere, not very endangered in California (<20% of occurrences threatened or no current threats known); and

Rank 2 = Rare, threatened or endangered in California, but more common elsewhere. No locally designated CRPR 3 and 4 species and no type localities or unique vegetation types of which CRPR 3 or 4 species are a component are present in the Project Site.

4.1.1 Special-Status Plants

Based on the database and literature review of records discussed in **Section 2.2** above, 20 special status plant species are known to occur, or have the potential to occur, within the regional vicinity of the Project Site (**Attachment C**). Of these, 12 special status plant species may occur on site based on the presence of suitable habitat within or immediately adjacent to the Project Site. While no special-status plant species have been previously documented within the Project Site, there is a CNDDB record for Suisun marsh aster (*Symphyotrichum lentum*) in Georgiana Slough on the bank directly opposite of the Project Site. Also in the immediate vicinity are CNDDB records for Delta tule pea, side-flowering skullcap, Delta mudwort, and Mason's lilaeopsis. The following special status plant species have the potential to occur in the Project Site:

- Suisun marsh aster (*Symphyotrichum lentum*), California Rare Plant Rank (CRPR) 1B.2. This species has a moderate potential to occur because it was reported on the opposite bank of Georgiana Slough. This plant occurs in marshes and swamps on substrates in tidally-influenced waters. This species was not documented during the site surveys; however, they were conducted outside the blooming period for this species.
- Mason's lilaeopsis (*Lilaeopsis masonii*); State Rare, CRPR 1B.1. This species has a moderate potential to occur because it was reported in the vicinity by CNDDB. This plant occurs on mud banks and flats and in marsh and riparian vegetation along erosional zones of creek-banks, sloughs, and rivers. This species was not documented during the site surveys; however, they were conducted outside the blooming period for this species.
- Other marsh and riparian species with a lower potential to occur:
    - bristly sedge (*Carex comosa*); CRPR 2B.1
    - Bolander's water-hemlock (*Cicuta maculata var. bolanderi*); CRPR 2B.1
    - Wooly rose-mallow (*Hibiscus lasiocarpos* var. *occidentalis*); CRPR 1B.2
    - Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*); CRPR 1B.2
    - Delta mudwort (*Limosella australis*); CRPR 2B.1

- Eel-grass pondweed (*Potamogeton zosteriformis*); CRPR 2B.2
- Sanford's arrowhead (*Sagittaria sanfordii*); CRPR 1B.2
- Marsh skullcap (*Scutellaria galericulata*); CRPR 2B.2
- Side-flowering skullcap (*Scutellaria lateriflora*); CRPR 2B.2
- watershield (*Brasenia schreberi*); CRPR 2B.3

4.1.2 Special-Status Wildlife

Based on the database and literature review of records discussed in **Section 4.1** above, 26 terrestrial special status wildlife species are known to or have the potential to occur within the regional vicinity of the Project Site (**Attachment C**). All special-status fish species are being addressed under a separate analysis. Of the 26 species evaluated, 13 special status wildlife species have some potential to occur on site based on the presence of suitable habitat, known species ranges and distributions, recorded occurrence data, or observations made during the field survey. These species are:

- tricolored blackbird (*Agelaius tricolor*); CT
- great blue heron (*Ardea herodias*); SSC
- Swainson's hawk (*Buteo swainsoni*); CT
- white-tailed kite (*Elanus leucurus*); FP
- northwestern pond turtle (*Emys marmorata*); FP, SSC
- American peregrine falcon (*Falco peregrinus anatum*); FP
- western red bat (*Lasiurus blossevillii*); SSC
- hoary bat (*Lasiurus cinereus*); SSC
- California black rail (*Laterallus jamaicensis coturniculus*); CE
- song sparrow ("Modesto" population) (*Melospiza melodia*); SSC
- bank swallow (*Riparia riparia*); CT
- riparian brush rabbit (*Sylvilagus bachmani riparius*); FE, CE
- American badger (*Taxidea taxus*); SSC

The CNDDB was queried and reported occurrences of special-status species were plotted in relation to the Project Site boundary using GIS software (**Figure 5**). The CNDDB reported no special-status animal species in the Project Site. In the vicinity of the Project Site, the following special-status species were reported: Delta smelt; steelhead – Central Valley DPS; and northwestern pond turtle.

The following special-status animals have a low or moderate potential to occur within the Project Site:

- Shorebirds/wading birds: California black rail, song sparrow ("Modesto" population), bank swallow, great blue heron, and tricolored blackbird could utilize the riparian and scrub shrub habitats of the Project Site.
- Birds of prey: American peregrine falcon, white-tailed kite, and Swainson's hawk could forage in the ruderal areas or perch in trees in the Project Site.
- Bats: Western red bat and hoary bat could utilize the trees in the Project Site for roosting and could forage for insects over the open water.
- Other riparian/aquatic species: Riparian brush rabbit, American badger, curved-foot hygrotus diving beetle, Ricksecker's water scavenger beetle, and northwestern pond turtle could occur in the riparian habitats of the Project Site.

4.2 SENSITIVE PLANT COMMUNITIES

The CNDDB reports the following sensitive plant communities in the 9-quadrangle buffer around the Project Site: Valley Oak Woodland; Northern Hardpan Vernal Pool; Great Valley Mixed Riparian Forest; Great Valley Valley Oak Riparian Forest; and Coastal and Valley Freshwater Marsh. None of these sensitive plant communities exist in the Project Site because there are no vernal pools onsite, and the forest types are not associated with the Great Central Valley, but instead, with the Delta.

4.3 JURISDICTIONAL WATERS AND WETLANDS

As described in **Section 1.2**, the Project Site is located on the bank of the Georgiana Slough, which is a jurisdictional waters of the U.S. The USFWS National Wetland Inventory reported one water feature within the Project Site (**Figure 6**): "R1UBV:Freshwater Forested/Shrub Wetland"—which corresponds to the perennial channel of Georgiana Slough and associated forested/shrub wetlands along the banks of the levees. The riparian vegetation communities (i.e. riparian forest) and the constructed levee would be considered part of the jurisdictional limits of the waters of the state by CDFW and/or Regional Water Quality Control Board (RWQCB). Portions of the Project Site within the river up to the top of the levee would also be considered part of the jurisdictional limits of the U.S. Army Corps of Engineers (USACE). A full jurisdictional delineation was beyond the scope of this analysis; however, any portions of the Project Site that include the river, developed levee, and the riparian forest (out to the drip line) would likely fall within the jurisdiction(s) of USACE, CDFW, and/or RWQCB.

There are no vernal pools or other isolated wetlands in the Project Site.

4.4 WILDLIFE MOVEMENT

Wildlife movement corridors, or habitat linkages, are generally defined as connections between habitat patches that allow for physical and genetic exchange between otherwise isolated animal populations. Such linkages may serve a local purpose, such as providing a linkage between foraging and denning areas, or they may be regional in nature. Some habitat linkages may serve as migration corridors, wherein animals periodically move away from an area and then subsequently return. Others may be important as dispersal corridors for young animals. A group of habitat linkages in an area can form a wildlife corridor network. The habitats within the link do not necessarily need to be the same as the habitats that are being linked. Rather, the link merely needs to contain sufficient cover and forage to allow temporary inhabitation by ground-dwelling species. Typically, habitat linkages are contiguous strips of natural areas, though dense plantings of landscape vegetation can be used by certain disturbance-tolerant species. Depending upon the species using a corridor, specific physical resources (such as rock outcroppings, vernal pools, or oak trees) may need to be located within the habitat link at certain intervals to allow slower-moving species to traverse the link. For highly mobile or aerial species, habitat linkages may be discontinuous patches of suitable habitat spaced sufficiently close together to allow travel along the route.

Regionally, the Project Site is not located within an Essential Connectivity Area (ECA) as mapped in the report California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California (Spencer et al. 2010; BIOS 2024). ECAs represent principal connections between Natural Landscape Blocks; Georgiana Slough is part of an existing Natural Landscape Block. ECAs are regions in which land conservation and management actions should be prioritized to maintain and enhance ecological connectivity.

Georgiana Slough and the adjacent Mokelumne River function as wildlife movement corridors between downstream and upstream natural areas. Levees, commercial structures, residences, and roads function as barriers.

4.5 RESOURCES PROTECTED BY LOCAL POLICIES AND ORDINANCES

Sacramento County regulates tree removal and pruning within the unincorporated County. The Project Site contains tree resources in the riparian forest habitat, including white alder, Oregon ash, western sycamore, black locust, and several willows. These portions of the project sites include protected trees covered under the Sacramento County Tree Ordinance.

Section 5 | Impact Analysis and Mitigation Measures

5.1 SPECIAL-STATUS SPECIES

The Proposed Project would have a significant effect on biological resources if it would:

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

5.1.1 Special-Status Plants

The Proposed Project has potential to result in direct impacts to special status plant species if populations are present in the Project Site. Based on the presence of suitable habitat in the Project Site, twelve special status plant species have a low to moderate potential to occur within the Project Site (**Appendix C**). In particular, Suisun marsh aster and Mason's lilaeopsis could be found in the Project Site because they occur nearby; Suisun marsh aster was reported from the opposite bank of Georgiana Slough, and Mason's lilaeopsis occurs about 1.5 miles away from the Project Site. Although the project implementation would not fully eliminate a special status species since there are other populations offsite, impacts to individuals would be potentially significant without mitigation due to the rarity of these plant species. Implementation of Measure BIO-1, which includes pre-construction botanical surveys and the salvage and replanting of special-status plants, will reduce potential direct impacts to special status plant populations to a less than significant level. The Proposed Project is not expected to result in permanent loss of habitat due to both mitigation and enhancement/restoration of riparian forest, scrub shrub and freshwater marsh habitat. After implementation, the Proposed Project would result in beneficial impacts, as the proposed enhancement of riparian habitat and creation of wetland benches would create habitat complexity and increase the sites value for special status plants.

The remaining potentially occurring species are listed by CNPS as rank 1B.1, 1B.2, 2B.1 or 2B.2. Impacts to these species would only be considered significant under CEQA if the loss of individual on the Project Site

represented a population-level impact that resulted in a loss of, or risk to the entire regional population. Given the small size of the project area, and the presence of extensive areas of similar habitat (i.e., freshwater marsh, riparian forest and scrub shrub) along the banks of the sloughs both upstream and downstream from the Project Site, impacts to special status plants that may occur are unlikely to be considered significant under CEQA. Additionally, the Proposed Project will not result in permanent impacts to riparian habitats, and all riparian areas would be restored and enhanced following project restoration activity. As a result, any temporary loss of special status plants would be offset by mitigation and enhancement/restoration activity that is incorporated into the project design.

The Proposed Project has potential to result in indirect impacts to special status plant species by the spread of invasive, non-native species from construction equipment or imported fill materials. Invasive, non-native plant species can out-compete native species and/or alter habitat towards a state that is unsuitable for special status species. For example, the spread of certain weed species can reduce the biodiversity of native habitats through displacement of vital pollinators, potentially eliminating special status plant species. Impacts to special status plants species from invasive weeds are potentially significant because invasive weeds can spread to the extent that they affect rare plants at the local and/or regional population-level. By removal of invasive giant reed and Himalayan blackberry and developed habitat, and the enhancement of riparian and native grassland habitat and the creation of freshwater marsh, the Proposed Project would create habitat complexity and increase the site's value for special status plants. To address the spread of invasive species, Measure BIO-1 includes construction best management practices.

Avoidance, Minimization, and Mitigation Measures

BIO-1 Special Status Plant Avoidance, Minimization, and Mitigation Measures

Prior to construction, a qualified biologist or botanist shall survey all areas of suitable habitat for special status plant species with potential to occur on the Project Site. If any are detected, the location of all individual of special status plant species shall be mapped. Where feasible, individuals shall be fenced for avoidance during construction. Where avoidance is not feasible, losses shall be offset through inclusion of these species into the mitigation/restoration planting palette.

If detected in the Project Site and to the extent feasible, rhizomes of the Suisun Marsh aster and Mason's lilaeopsis shall be salvaged and stored in damp soil and cared for by a qualified biologist or nursery professional until the habitat restoration components of the project are implemented. Salvage of Mason's lilaeopsis if found, may require additional authorizations from CDFW due to its status as a State rare species. Any agency consultations shall be completed prior to the start of construction in occupied areas, and the applicant shall submit written documentation of the results of such consultations. Mason's lilaeopsis and Suisun Marsh aster shall be included in the plant palette at a minimum 1.5 to 1 ratio of individuals planted to individuals removed.

All efforts should be made to avoid the spread or introduction of invasive weeds during implementation of the Proposed Project. Appropriate best management practices that are intended and designed to curtail the spread of invasive plant species should be implemented during construction. These include, but are not limited to, the following:

- During construction, the project will make all reasonable efforts to ensure imported material is free of invasive plant species.

- Equipment and vehicles must be free of caked on mud and weed seeds/propagules before accessing and leaving the project site
- Landscaping materials should not include invasive, non-native ornamentals as identified by the California Invasive Plant Council (Cal-IPC) Inventory.

5.1.2 Special-Status Terrestrial Animals and Nesting Birds

Implementation of the Proposed Project has the potential to impact special-status animals. Seventeen special-status terrestrial animal species have a low to moderate potential to occur in the Project Site, although none have yet been detected during surveys (**Appendix C**).

State-listed Species

Swainson's Hawk

Swainson's hawk is State listed as Threatened. The larger trees within the vicinity of the Project Site provide suitable nesting habitat for the Swainson's hawk, but there are no trees of adequate size to support nesting within the Project Site itself. The CNDDB contains four records of this species within five miles of the Project Site. This species has potential to be present (nesting) within or in the immediate vicinity of the Project Site during construction. Direct impacts to Swainson's hawk are unlikely to occur on the Project Site but could occur if the species is nesting within a half mile of the Project Site. Direct impacts could include injury to or mortality of individuals through destruction of active nests during tree removal or vegetation trimming, or through nest failure from noise and other disturbance in the vicinity of a nest. Any direct impacts to Swainson's hawk would be considered significant under CEQA. Implementation of the Proposed Project would ultimately be beneficial for Swainson's hawk through enhancement of riparian habitat (which can be used for nesting). The Project Site provides some suitable foraging habitat for Swainson's hawk, but project activity would not be expected to have indirect impacts to the species because there will be no net loss of foraging habitat. Implementation of the proposed avoidance and minimization measures described below would avoid impacts to individuals from project activity and would reduce impacts to a less than significant level.

Species of Special Concern

Song Sparrow ("Modesto" population)

Suitable habitat occurs within the Project Site for the song sparrow ("Modesto" population). This species could nest within the shrubs and trees found on site. Potential impacts to this species, if nesting onsite during project construction activities, include injury or mortality from direct destruction of nests, or nest abandonment from construction activity or noise. These impacts would be considered significant if the regional population were to be adversely affected by the loss of individuals at the Project Site. Given the small size of the Project Site in comparison to the available nesting habitat in the surrounding region indicates that the loss of individuals at the Project Site is unlikely to result in a population-level effect. Additionally, because the Project Site will be restored and enhanced, there would be no net loss of suitable breeding habitat. Implementation of the Proposed Project would ultimately be beneficial for song sparrow through enhancement of riparian habitat and creation of freshwater marsh habitat. Furthermore, implementation of the proposed avoidance and minimization measures described below would avoid impacts to individuals from project activity and would reduce impacts to a less than significant level.

Northwestern Pond Turtle

Georgiana Slough contains areas of suitable habitat for the northwestern pond turtle. The species is known to occur in a wide variety of waters and wetland habitats including rivers and streams, lakes, ponds, reservoirs, permanent and ephemeral shallow wetlands, stock ponds, and sewage treatment lagoons (Holland, 1994). Optimal habitat seems to be characterized by the presence of adequate emergent basking sites, emergent vegetation, and the presence of suitable refugia in the form of undercut banks, submerged vegetation, mud, rocks and logs. The Project Site has a small amount of suitable habitat, and project construction will disturb this habitat. Implementation of the proposed avoidance and minimization measures described below would avoid impacts to individuals from project activity and would reduce impacts to a less than significant level. Implementation of the Proposed Project would ultimately be beneficial for northwestern pond turtle through enhancement of riparian habitat and creation of freshwater marsh habitat.

Bats

Bats, primarily Western red bat and hoary bat, could utilize the trees in the Project Site for roosting and could forage for insects over the open water. Similar to bird species, bats could be directly impacted by vegetation trimming or grubbing and excavation activities, and indirectly impacted by construction-generated noise and vibration which could cause roost abandonment. Implementation of the Proposed Project would ultimately be beneficial for bats and through the creation and enhancement of riparian and freshwater marsh habitats. Implementation of the proposed avoidance and minimization measures described below would reduce potential impacts to bats to less than significant.

Fully Protected Species

White-tailed Kite

Suitable habitat occurs within the Project Site for the white-tailed kite, a State Fully Protected Species. This species could nest within the riparian habitat present on site. Potential impacts to this species, if nesting during project activity, include injury or mortality from nest destruction or nest abandonment. The species forages in undisturbed, open grasslands, meadows, farmlands and emergent wetland. The Project Site does not provide suitable foraging habitat for this species, and indirect impacts through loss of foraging habitat are not expected. Implementation of the Proposed Project would ultimately be beneficial for white-tailed kite through creation and enhancement of riparian habitat and creation of freshwater marsh habitat. Because of the current conservation status of this species, any impact to this species would be considered significant under CEQA. Implementation of the proposed avoidance and minimization measures described below would reduce potential impacts to less than significant.

Species Considered but Rejected from Further Analysis

Three additional species were analyzed in detail but determined to have no potential to occur. These species and the rationale for determining that no impact would occur are presented below.

Western Yellow-billed Cuckoo

Western yellow-billed cuckoo is federally listed as endangered. The willow thickets and riparian forest patches within the Project Site and in the vicinity of the Project Site are comprised of habitat features that have generally been associated with suitable nesting and foraging habitat for the western yellow-billed cuckoo. However, this species prefers a minimum breeding plot size of 15 to 20 hectares (approximately

37 to 49 acres), and riparian woodland composition is a critical factor for breeding site selection by this species. The riparian forest patches on the Project Site are too small (on the order of hundreds of square feet) to function effectively as cuckoo breeding habitat, and are in too close proximity to roads and agricultural fields. Because of the lack of requisite habitat size and the presence of stressors, the species is not expected to occur at the project sites, and no impacts to western yellow-billed cuckoo are expected.

Giant Garter Snake

This species typically inhabits marshes, sloughs, irrigation canals, rice paddies, ponds, and low-gradient streams. Specifically, giant garter snake prefers stagnant or slow-moving waterbodies with abundant emergent vegetation; consequentially, suitable habitats in the Sacramento Valley are primarily within the rice-growing regions on the valley floor (USFWS, 1999). These habitats are not present in the Project Site. Furthermore, the terrestrial portions of the Project Site do not provide any suitable habitat for this species. Suitable terrestrial habitat consists of grassy banks and openings near waterside vegetation for basking, and higher elevation upland habitats for cover and refuge from flood waters during the inactive winter season (USFWS, 1999). Therefore, giant garter snake is not expected to occur within the Project Site and no impacts are expected.

Nesting Birds

Suitable nesting habitat for a wide variety of birds protected under the MBTA and/or California Fish and Game Code is present on the project sites and in the vicinity of the Project Site. Impacts to nesting birds may include injury or mortality as a result of nest destruction during vegetation clearing, tree removal or trimming, or nest abandonment from construction activity and noise. For impacts to nesting birds not listed under CESA or ESA to be considered significant under CEQA, the impact would have to jeopardize a local or regional population. Given the small size of the Project Site and the abundance of similar nesting habitat (i.e., riparian woodland along the sloughs and rivers) in the area, it is unlikely that impacts to non-listed species would be considered significant under CEQA. Implementation of the Proposed Project would ultimately be beneficial for nesting birds through enhancement of riparian habitat and creation of marsh habitat. Furthermore, implementation of mitigation measure BIO-3 would avoid impacts to nesting birds and as such would reduce potential impacts to a less than significant level.

Special Status Animal Avoidance, Minimization, and Mitigation Measures

BIO-2 Raptor Avoidance and Minimization Measures

With implementation of the proposed avoidance and minimization measures described below, no significant impacts to Swainson's hawk and white-tailed kite are expected.

- If feasible, all vegetation clearing, tree removal, and tree trimming should occur outside of the nesting season (September 1 through February 14).
- If construction activity is scheduled during the nesting season (February 15 through August 31), a qualified biologist should conduct a pre-construction survey for Swainson's hawk, white-tailed kite and active Swainson's hawk and white-tailed kite nests. Surveys should be conducted within two weeks of the start of construction activities that are scheduled to occur during the nesting/breeding season. The survey should include the project area plus a 0.5 mile buffer. The pre-construction survey should be conducted during the time of day when the birds are active and should be of sufficient duration to reliably conclude presence/absence of Swainson's hawk and white-tailed kite nests. A report of the survey results should be submitted to the BALMD prior

to issuance of any grading or building permits. As a fully protected species, there is no allowable "take" for white-tailed kite under any circumstances. As a State endangered species, there is no "take" of Swainson's hawk without "take" authorization from CDFW.

- If no active Swainson's hawk or white-tailed kite nests are detected, no additional action is required.
- If active Swainson's hawk nests are observed within 0.5 mile of the project, a minimum 0.25 mile avoidance buffer will be established around each nest. If active white-tailed kite nests are identified within 0.5 mile of the project, a minimum avoidance buffer of 500 feet should be established. Any variance for smaller avoidance buffers should only be allowed with the approval of CDFW and the BALMD. Active nests should be monitored by a qualified biologist during project-related activities. The avoidance buffer should be maintained for the duration of the project, unless the biologist has determined that the young have fledged or are no longer dependent upon the nest and parental care.
- If a Swainson's hawk or white-tailed kite is observed perched or foraging in the project area, all project-related work should cease and the individual will be allowed to leave the project site unimpeded and of its own accord before work may resume.
- Work activities should be avoided within active raptor nest buffers until young birds have fledged and left the nest(s). Readily visible exclusion zones should be established in areas where nests must be avoided.

BIO-3 Non-Raptor Nesting Bird Avoidance and Minimization Measures

- If feasible, removal and/or trimming of trees will be scheduled to occur in the outside of the nesting season during non-breeding fall/winter months (September 1 through February 14), after fledging and before the initiation of the nesting season.
- If project activities occur between February 15 and August 31, a qualified biologist should conduct pre-construction surveys for nesting birds no more than 14 days prior to construction. The survey should include the entire project site and a 250-foot buffer. If active nests are found, the qualified biologist should establish an appropriate species-specific avoidance buffer of sufficient size to prevent disturbance of the nest by project activity (typically a minimum of 50 feet). If no active nests are detected, no additional action is required.
- If applicable (i.e., nests are detected as a result of the pre-construction surveys), the qualified biologist should perform at least two hours of pre-construction monitoring of the nest to characterize "typical" bird behavior. The qualified biologist should monitor the nesting birds and should increase the buffer if the qualified biologist determines the birds are showing signs of unusual or distressed behavior by project activities. Atypical nesting behaviors which may cause reproductive harm include, but are not limited to, defensive flights/vocalizations directed toward project personnel, standing up from a brooding position, and flying away from the nest.
- If applicable, the qualified biologist should have authority to order the cessation of all project activities if the nesting birds exhibit atypical behavior which may cause reproductive failure (nest abandonment and loss of eggs and/or young) until an appropriate buffer is established. To prevent encroachment, the established buffer(s) should be clearly marked by high visibility material. The established buffer(s) should remain in effect until the young have fledged or the nest has been abandoned as confirmed by the qualified biologist. Any sign of nest abandonment should be reported to CDFW within 48 hours.

BIO-4 Roosting Bats Avoidance and Minimization Measures

- Prior to construction activities that require removal of trees or large shrubs, a qualified biologist shall conduct a survey of potential bat roosts to determine if roosting bats are present. If a bat roost is found, further analysis shall be conducted sufficient to determine the species present and the type of roost (day, night, maternity, etc.). If the bats are not part of an active maternity colony, passive exclusion measures may be implemented in close coordination with CDFW prior to removal of the affected vegetation. These exclusion measures may include one-way valves that allow bats to exit the structure but are designed so that the bats may not re-enter if the roost is a cavity roost. For non-maternity tree roosts, the roost shall be checked daily until the bats have moved. Once movement has been confirmed, vegetation removal can proceed with a monitor present. Maternal bat colonies may not be disturbed while young are present and dependent on the roost.

BIO-5 Pre-construction Northwestern Pond Turtle Survey

- Because northwestern pond turtle could migrate into the Project Site between the time that the field survey was completed and the start of construction, a pre-construction survey for northwestern pond turtle should be performed by a qualified biologist to ensure that northwestern pond turtle is not present. The survey should be performed within 2 weeks of project initiation/ground disturbance. If northwestern pond turtle is detected, construction should be delayed in that area, and the appropriate wildlife agency (CDFW and/or USFWS) should be consulted and avoidance and minimization measures implemented.

5.2 SENSITIVE HABITATS

The Proposed Project would have a significant effect on biological resources if it would:

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 U.S. Fish and Wildlife Service.

The Proposed Project would result in impacts to the Georgiana Slough and adjacent riparian forest and scrub shrub habitats which are under CDFW jurisdiction pursuant to Section 1600 *et seq.* of the CFGC and are considered sensitive communities under CEQA. Direct impacts are expected to consist of vegetation trimming, grubbing and excavation activities, and rock installation. However, these impacts are considered temporary and would be offset through implementation of the habitat restoration and enhancement components of the Proposed Project and therefore, no measures are recommended. Additionally, implementation of the Proposed Project would ultimately be beneficial for sensitive natural communities through the creation and enhancement/restoration of riparian, native grassland habitat and creation of new freshwater marsh habitat.

5.3 JURISDICTIONAL WATER RESOURCES

The Proposed Project would have a significant effect on biological resources if it would:

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.

The Proposed Project would result in temporary impacts to aquatic resources that are protected under the Clean Water Act, the Porter Cologne Act, and other state regulations. Temporary impacts consist of the removal of riparian and riverine vegetation, excavation in a channel and associated wetlands, and open water work which may cause siltation. The Proposed Project will require a CWA Section 404 Nationwide Permit from the USACE. Likewise, a CWA Section 401 Water Quality Certification from the RWQCB and a Streambed Alteration Agreement from the CDFW will also be required. Impacts to jurisdictional areas are potentially significant without mitigation incorporated; however, because the project is designed as a riparian and aquatic habitat restoration and enhancement project, and no permanent impacts are anticipated, restoration of all temporary impacts to riparian and aquatic habitat and implementation of standard BMPs outlined in the project description (Project Environmental Commitments) and Avoidance and Minimization Measures BIO-1 through BIO-6 are considered sufficient to ensure impacts are less than significant under CEQA.

5.4 WILDLIFE MOVEMENT

The Proposed Project would have a significant effect on biological resources if it would:

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

The Project Site functions as a part of a wildlife corridor because Georgiana Slough and the levee banks allow wildlife movement and fish passage. Maritime and commercial structures, residences, and roads function as barriers. Georgiana Slough and the adjacent Mokelumne River and Sacramento River contain significant fishery resources, which will be addressed in a separate analysis. During construction, ground-disturbing activities and the presence of construction equipment will discourage terrestrial animal use and movement through the Project Site. However, this impact is temporary, and the previously-prescribed Avoidance, Minimization, and Mitigation Measures will ensure that no wildlife is present in work areas and that the construction footprint remains as small as possible. Implementation of the Proposed Project will not create any new permanent barriers, such as the construction of docks, levees, buildings, or roads. Once completed, the Proposed Project would ultimately be beneficial for wildlife movement through the enhancement and creation of riparian, wetland, and native grassland habitats. Therefore, project-related impacts to wildlife movement are considered to be less than significant.

5.5 LOCAL POLICIES AND ORDINANCES

The Proposed Project would have a significant effect on biological resources if it would:

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

The Proposed Project would not conflict with any local policies or ordinances protecting biological resources including the Sacramento County tree ordinance because the project will not remove any native oak trees or oak woodlands. The project is a multi-benefit flood protection project that includes both mitigation and enhancement/restoration of riparian forest, scrub shrub and freshwater marsh habitats included as part of the project description.

5.6 ADOPTED APPROVED PLANS

The Proposed Project would have a significant effect on biological resources if it would:

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan.

The Proposed Project is not located within the plan areas for any adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan. As such, the Proposed Project would not conflict with the provisions of any such plans.

Section 6 | Report Preparers

6.1 ACORN ENVIRONMENTAL

G.O. GRAENING, Ph.D., M.S.E., Senior Biologist

Dr. Graening holds a PhD in Biological Sciences and a Master of Science in Biological and Agricultural Engineering. Dr. Graening was an adjunct Professor at California State University at Sacramento, and was an active researcher in the area of conservation biology; his publication list is available online at http://www.csus.edu/indiv/g/graeningg/pubs.htm. Dr. Graening is also a Certified Arborist (ISA # WE-6725A). Dr. Graening has 30 years of experience in environmental assessment and biological resource inventory, including previous employment with The Nature Conservancy, Tetra Tech Inc., and CH2M Hill, Inc.

KELLI RAYMOND, B.S., Senior Biologist

Ms. Raymond holds a B.S. in Animal Biology with a focus on Wildlife Ecology. She has approximately 10 years of experience collecting field data and preparing environmental reports. Ms. Raymond has worked in several states across the U.S. performing biological resources surveys, including plant surveys, habitat mapping, and wildlife utilization monitoring. She also has experience live handling numerous wildlife species, including fish, migratory birds, and big game. Ms. Raymond is experienced in the preparation of Biological Resources Assessments and environmental review under the California Environmental Quality Act and National Environmental Policy Act.

ANNALEE SANBORN, B.S., Project Manager

Ms. Sanborn holds a B.S. in Environmental Resources Science. She has approximately 12 years of experience as an environmental analyst and project manager experienced in all aspects of preparing CEQA and NEPA compliance documents. She provides professional consulting services for local, State, and federal agencies as well as private enterprises seeking permitting assistance. Her CEQA expertise includes the preparation of Initial Studies and Environmental Impact Reports for water development projects, housing and related infrastructure, vineyards, water rights, restoration projects, timber harvesting, and more. Ms. Sanborn also has experience preparing and facilitating Clean Water Act (CWA) and Streambed Alteration Agreement (SAA) applications.

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Attachment A

Regulatory Setting

Attachment A - Expanded Regulatory Setting

INTRODUCTION

This Attachment summarizes the framework of biological resources laws, regulations, and agreements pertaining to the project site and actions outlined throughout the Biological Resources Assessment. While most regulations discussed within the document are described herein, this list is not comprehensive and is limited to the primary regulations relevant to the analysis within the Biological Resources Assessment.

Federal

Federal Endangered Species Act (FESA)

The United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service implement the Federal Endangered Species Act of 1973 (FESA) (16 USC §1531 et seq.). Threatened and endangered species on the federal list (50 CFR §17.11, 17.12) are protected from "take" (direct or indirect harm), unless a FESA Section 10 Permit is granted or a FESA Section 7 Biological Opinion with incidental take provisions is rendered. Pursuant to the requirements of FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed species may be present in the project area and determine whether the proposed project will have a potentially significant impact upon such species. Under FESA, habitat loss is considered to be an impact to the species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC §1536[3], [4]). Therefore, project-related impacts to these species or their habitats would be considered significant and would require mitigation. Species that are candidates for listing are not protected under FESA; however, USFWS advises that a candidate species could be elevated to listed status at any time, and therefore, applicants should regard these species with special consideration.

Clean Water Act

CWA (33 U.S. Code [USC] § 1251-1376), as amended by the Water Quality Act of 1987, is the major federal legislation governing water quality. The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The U.S. Environmental Protection Agency (USEPA) is delegated as the administrative agency under the CWA. Relevant sections of the CWA are as follows.

- Sections 303 and 304 provide for water quality standards, criteria, and guidelines. Section 303(d) requires states to identify impaired off-Reservation water bodies, rank these impaired bodies based on severity of contamination and uses for the waters, and develop water quality management strategies, usually in the form of total maximum daily loads for the contaminant(s) of concern.
- Section 401 (Water Quality Certification) requires an applicant for any federal permit that proposes an activity that may result in a discharge to Waters of the U.S., to obtain certification from the USEPA for on-trust land activities, or the state for off-Reservation activities, that the discharge will comply with other provisions of the CWA.
- Section 402 establishes the National Pollutant Discharge Elimination System (NPDES), a permitting system for the discharge of any pollutant (except for dredged or fill material) into Waters of the U.S. Each NPDES

permit contains limits on concentrations of pollutants discharged to surface waters to prevent degradation of water quality and protect beneficial uses.

The Federal Antidegradation Policy was adopted as part of the 1972 amendments to the CWA. Federal policy (Code of Federal Regulations [CFR], Title 40, Part 131.12) specifies that each state must develop, adopt, and retain an anti-degradation policy to protect the minimum level of off-Reservation surface water quality necessary to support existing uses. Each state must also develop procedures to implement the anti-degradation policy through water quality management processes. Each state anti-degradation policy must include implementation methods consistent with the provisions outlined in 40 CFR § 131.12.

Magnuson-Stevens Act and Sustainable Fisheries Act

The Magnuson–Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the primary law that governs marine fisheries management in U.S. federal waters. First passed in 1976, the Magnuson-Stevens Act fosters the long-term biological and economic sustainability of marine fisheries. Its objectives include: preventing overfishing; rebuilding overfished stocks; increasing long-term economic and social benefits; ensuring a safe and sustainable supply of seafood; and protecting habitat that fish need to spawn, breed, feed, and grow to maturity.

The Sustainable Fisheries Act of 1996 (Public Law 104-297) amended the Magnuson-Stevens Act to establish new requirements for fishery management councils to identify and describe Essential Fish Habitat (EFH) and to protect, conserve, and enhance EFH for the benefit of fisheries. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The Sustainable Fisheries Act also established an EFH consultation process. An adverse effect includes direct or indirect physical, chemical, or biological alternations to waters or substrate, species and their habitat, quality and/or quantity of EFH, or other ecosystem components. A 2002 update to EFH regulations allowed fishery management councils to designate Habitat Areas of Particular Concern, specific areas within EFH that have extremely important ecological functions and/or are especially vulnerable to degradation.

Migratory Bird Treaty Act (MBTA)

Migratory birds are protected under the MBTA of 1918 (16 USC 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed under 50 CFR 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). The direct injury or death of a migratory bird due to construction activities or other construction-related disturbance that causes nest abandonment, nestling abandonment, or forced fledging would be considered take under federal law. As such, project-related disturbances must be reduced or eliminated during the nesting season.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act was originally enacted in 1940 to protect bald eagles and was later amended to include golden eagles (16 USC Subsection 668-668). This act prohibits take, possession, and commerce of bald and golden eagles and associated parts, feathers, nests, or eggs with limited exceptions. The definition of take is the same as the definition under the FESA. The USFWS established five recovery programs in the mid-1970s based on geographical distribution of the species, with California located in the Pacific Recovery Region. Habitat conservation efforts in the Pacific Recovery Region, including laws and management practices at federal, state, and community levels, have helped facilitate bald eagle population increases. Critical habitat for bald and golden eagles was not designated as part of the Pacific Recovery Plan created under FESA. Likewise, critical habitat was not designated by regulation under FESA.

In 1995, the USFWS reclassified the bald eagle from endangered to threatened under FESA in the contiguous 48 states, excluding Michigan, Minnesota, Wisconsin, Oregon, and Washington where it had already been listed as threatened. In 2007, the bald eagle was federally delisted under FESA. However, the provisions of the act remain in place for protection of bald and golden eagles.

State and Local

CEQA

The California Environmental Quality Act (CEQA) (Public Resources Code §15380) defines "rare" in a broader sense than the definitions of threatened, endangered, or fully protected. Under the CEQA definition, CDFW can request additional consideration of species not otherwise protected. CEQA requires that the impacts of a project upon environmental resources must be analyzed and assessed using criteria determined by the lead agency. Sensitive species that would qualify for listing but are not currently listed may be afforded protection under CEQA. The CEQA Guidelines (§15065) require that a substantial reduction in numbers of a rare or endangered species be considered a significant effect. CEQA Guidelines (§15380) provide for assessment of unlisted species as rare or endangered under CEQA if the species can be shown to meet the criteria for listing. Plant species on the California Native Plant Society (CNPS) Lists 1A, 1B, or 2 are typically considered rare under CEQA. California "Species of Special Concern" is a category conferred by CDFW on those species that are indicators of regional habitat changes or are considered potential future protected species. While they do not have statutory protection, Species of Special Concern are typically considered rare under CEQA and thereby warrant specific protection measures.

California Endangered Species Act

The California Endangered Species Act of 1970 (CESA) (California Fish and Game Code §2050 et seq., and CCR Title 14, §670.2, 670.51) prohibits "take" (defined as hunt, pursue, catch, capture, or kill) of species listed under CESA. A CESA permit must be obtained if a project will result in take of listed species, either during construction or over the life of the project. Section 2081 establishes an incidental take permit program for state-listed species. Under CESA, the California Department of Fish and Wildlife (CDFW) has the responsibility for maintaining a list of threatened and endangered species designated under state law (CFG Code 2070). CDFW also maintains lists of species of special concern, which serve as "watch lists." Pursuant to requirements of CESA, an agency reviewing proposed projects within its jurisdiction must determine whether any state-listed species may be present in the project area and determine whether the proposed project will have a potentially significant impact upon such species. Project-related impacts to species on the CESA list would be considered significant and would require mitigation.

California Fish and Game Code

California Fish and Game Code Sections 4700, 5050, and 5515 designates certain mammal, amphibian, and reptile species "fully protected", making it unlawful to take, possess, or destroy these species except under issuance of a specific permit. The California Native Plant Protection Act of 1977 (CFG Code §1900 et seq.) requires CDFW to establish criteria for determining if a species or variety of native plant is endangered or rare. Section 19131 of the code requires that landowners notify CDFW at least 10 days prior to initiating activities that will destroy a listed plant to allow the salvage of plant material. The Native Plant Protection Act of 1977 and implementing regulations in Section 1900 et seq. of the California Fish and Game Code designate special-status plant species and provide specific protection measures for identified populations. The CDFW administers the Native Plant Protection Act.

The CDFW Code § 3503 also states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird except as otherwise provided by the code. Section 3503.5 states that it is unlawful to take, possess, or destroy any birds in the taxonomic order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird. Section 3513 states that it is unlawful to take or possess any migratory non-game bird as designated in the MBTA or any part of such migratory non-game bird except as provided by rules and regulations adopted by the U.S. Secretary of the Interior under provisions of the MBTA. CDFW cannot provide take authorization under the CESA for impacts to migratory birds.

California Fish and Game Code (§1601 - 1607) protects fishery resources by regulating "any activity that may substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake." CDFW requires notification prior to commencement, and issuance of a Lake or Streambed Alteration Agreement, if a proposed project will result in the alteration or degradation of ''waters of the State". The limit of CDFW jurisdiction is subject to the judgment of the Department; currently, this jurisdiction is interpreted to be the "stream zone", defined as "that portion of the stream channel that restricts lateral movement of water" and delineated at "the top of the bank or the outer edge of any riparian vegetation, whichever is more landward". CDFW reviews the proposed actions and, if necessary, submits to the applicant a proposal for measures to protect affected fish and wildlife resources. The final proposal that is mutually agreed upon by the CDFW and the applicant is the Streambed Alteration Agreement.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act provides the basis for surface water and groundwater quality regulation within California. The act established the authority of the SWRCB and the nine Regional Water Quality Control Boards (RWQCB). The act requires the State, through the SWRCB and the RWQCBs, to designate beneficial uses of surface waters and groundwater and specify water quality objectives designed to protect those uses. These water quality objectives are presented in the Regional Water Quality Control Plans. The surface water quality standards for State of California include both narrative and numerical water quality objectives to keep California's waters swimmable, fishable, drinkable, and suitable for use by industry, agriculture, and the citizens of the state.

Sacramento County General Plan

The Sacramento County General Plan outlines County-wide growth, development, and resource use goals and policies within the unincorporated portions of the County. The Open Space Element, Conservation Element, and Delta Protection Element of the General Plan are most applicable to work in and around the project site. These elements contain the County's goals and policies as it relates to the protection, management, and impacts to sensitive biological resources.

Sacramento County Tree Ordinance

According to the Sacramento County Office of Planning and Environmental Review, "a Tree Pruning or Tree Removal Permit is required to prune or remove any public tree and certain private trees. Public Trees are those that occur on any County owned land (parks, building grounds, etc.) and/or within Right-of-Way situations. Privately owned trees also require a tree permit in accordance with Zoning Code Regulations and the County's Tree Preservation and Protection Ordinance."

Attachment B

Species Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
Phone: (916) 930-5603 Fax: (916) 930-5654

In Reply Refer To: March 05, 2024
Project Code: 2024-0058394
Project Name: Georgiana Slough Erosion Control and Habitat Enhancement Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

San Francisco Bay-Delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
(916) 930-5603

PROJECT SUMMARY

Project Code: 2024-0058394
Project Name: Georgiana Slough Erosion Control and Habitat Enhancement Project
Project Type: Flooding
Project Description: levee erosion control and habitat enhancement
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.130674549999995,-121.58217523120894,14z

Counties: Sacramento County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
California Ridgway"s Rail *Rallus obsoletus obsoletus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4240

REPTILES

NAME	STATUS
Giant Garter Snake *Thamnophis gigas*	Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4482

AMPHIBIANS

NAME	STATUS
California Tiger Salamander *Ambystoma californiense*	Threatened

Population: U.S.A. (Central CA DPS)
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2076

FISHES

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened
Longfin Smelt *Spirinchus thaleichthys* Population: San Francisco Bay-Delta DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9011	Proposed Endangered
Longfin Smelt *Spirinchus thaleichthys* Population: San Francisco Bay-Delta DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9011	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850	Threatened

CRUSTACEANS

NAME	STATUS
Conservancy Fairy Shrimp *Branchinecta conservatio* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp *Lepidurus packardi* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2246	Endangered

FLOWERING PLANTS

NAME	STATUS
Large-flowered Fiddleneck *Amsinckia grandiflora* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5558	Endangered

CRITICAL HABITATS

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* https://ecos.fws.gov/ecp/species/321#crithab	Final

IPAC USER CONTACT INFORMATION

Agency: Brannan Andrus Levee Maintenance District
Name: G.O. Graening
Address: 343 Carpenter Hill Road
City: Folsom
State: CA
Zip: 95630
Email ggraening@gmail.com
Phone: 9164525442

California Native Plant Society

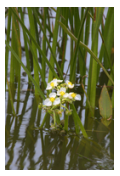
CNPS Rare Plant Inventory

Search Results

14 matches found. Click on scientific name for details

Search Criteria: CA Indigenous is **True**, 9-Quad include [**3812124:3812125:3812126:3812136:3812135:3812134:3812115:3812114:3812116**]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	CA ENDEMIC	DATE ADDED	PHOTO
Centromadia parryi ssp. *parryi*	pappose tarplant	Asteraceae	annual herb	May-Nov	None	None	G3T2	S2	1B.2	Yes	2004-01-01	 © 2016 John Doyen
Centromadia parryi ssp. *rudis*	Parry's rough tarplant	Asteraceae	annual herb	May-Oct	None	None	G3T3	S3	4.2	Yes	2007-05-22	 © 2019 John Doyen
Chloropyron molle ssp. *molle*	soft salty bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Nov	FE	CR	G2T1	S1	1B.2	Yes	1974-01-01	 © 2014 John Doyen
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G2	S2	1B.2	Yes	1988-01-01	No Photo Available
Hibiscus lasiocarpos var. *occidentalis*	woolly rose-mallow	Malvaceae	perennial rhizomatous herb (emergent)	Jun-Sep	None	None	G5T3	S3	1B.2	Yes	1974-01-01	 © 2020 Steven Perry
Lasthenia ferrisiae	Ferris' goldfields	Asteraceae	annual herb	Feb-May	None	None	G3	S3	4.2	Yes	2001-01-01	 © 2009 Zoya Akulova
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	Fabaceae	perennial herb	May-Jul(Aug-Sep)	None	None	G5T2	S2	1B.2	Yes	1974-01-01	 © 2003 Mark Fogiel

Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.1	Yes	1974-01-01	 ©2000 John Game
Lepidium latipes var. heckardii	Heckard's pepper-grass	Brassicaceae	annual herb	Mar-May	None	None	G4T1	S1	1B.2	Yes	1994-01-01	 2018 Jennifer Buck
Lilaeopsis masonii	Mason's lilaeopsis	Apiaceae	perennial rhizomatous herb	Apr-Nov	None	CR	G2	S2	1B.1	Yes	1974-01-01	No Photo Available
Oenothera deltoides ssp. howellii	Antioch Dunes evening-primrose	Onagraceae	perennial herb	Mar-Sep	FE	CE	G5T1	S1	1B.1	Yes	1974-01-01	No Photo Available
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	None	None	G3	S3	1B.2	Yes	1984-01-01	 ©2013 Debra L. Cook
Symphyotrichum lentum	Suisun Marsh aster	Asteraceae	perennial rhizomatous herb	(Apr)May-Nov	None	None	G2	S2	1B.2	Yes	1974-01-01	No Photo Available
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.2	Yes	2001-01-01	 © 2005 Dean Wm Taylor

Showing 1 to 14 of 14 entries

Suggested Citation:

California Native Plant Society, Rare Plant Program. 2024. Rare Plant Inventory (online edition, v9.5). Website https://www.rareplants.cnps.org [accessed 18 March 2024].

Attachment C

Special-Status Species Evaluation Table

Special-status Species Reported by IPaC, CNDDB, and CNPS in the Vicinity of the Study Area

Scientific Name	Common Name	Status*	General Habitat**	Microhabitat**	Potential to Occur in Project Area
PLANTS					
Amsinckia grandiflora	Large-flowered fiddleneck	FE, CE	native perennial bunch grass communities	None listed	Absent
Brasenia schreberi	watershield	CRPR 2B.3	freshwater marshes and swamps	aquatic from water bodies both natural and artificial in California	Low Potential
Carex comosa	bristly sedge	CRPR 2B.1	marshes and swamps	lake margins, wet places; site below sea level is on a Delta island. elev. 5-1.005 m.	Low Potential
Centromadia parryi ssp. parryi	papoose tarplant	CRPR 1B.2	coastal prairie, meadows and seeps, coastal salt marsh, valley and foothill grassland	vernally mesic, often alkaline sites. 2-420 m.	Absent
Chloropyron molle ssp. molle	soft salty bird's-beak	FE	coastal salt marsh	in coastal salt marsh with *Distichlis, salicornia, Frankenia*, etc. 0-3 m.	Absent
Cicuta maculata var. bolanderi	Bolander's water-hemlock	CRPR 2B.1	marshes, fresh or brackish water.	0-200 m.	Low Potential
Extriplex joaquinana	San Joaquin spearscale	CRPR 1B.2	chenopod scrub, alkali meadow, valley and foothill grassland	in seasonal alkali wetlands or alkali sink scrub with *Distichlis spicata, Frankenia*, etc. 1-250 m.	Absent
Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	CRPR 1B.2	marshes and swamps (freshwater)	moist, freshwater-soaked river banks & low peat islands in sloughs; in CA, known from the delta watershed. 0-150 m.	Low Potential
Lathyrus jepsonii var. jepsonii	Delta tule pea	CRPR 1B.2	freshwater and brackish marshes	often found w/ *Typha, aster lentus, rosa calif., juncus spp., Scirpus*, etc. usually on marsh and slough edges.	Low Potential
Legenere limosa	legenere	CRPR 1B.1	vernal pools (many historical occurrences are extirpated)	in beds of vernal pools. 1-880 m.	Absent
Lepidium latipes var. heckardii	Heckard's pepper-grass	CRPR 1B.2	valley and foothill grassland	grassland, and sometimes vernal pool edges. alkaline soils. 2-200 m.	Not Expected
Lilaeopsis masonii	Mason's lilaeopsis	CRPR 1B.1	freshwater and brackish marshes, riparian scrub	tidal zones, in muddy or silty soil formed through river deposition or riverbank erosion. 0-10 m.	Moderate Potential
Limosella australis	Delta mudwort	CRPR 2B.1	delta region	aquatic	Low Potential
Oenothera deltoides ssp. howellii	Antioch Dunes evening-primrose	FE, CE	interior dunes	remnant river bluffs and sand dunes east of Antioch. 0-30 m.	Absent
Potamogeton zosteriformis	eel-grass pondweed	CRPR 2B.2	marshes and swamps	ponds, lakes, streams. 0-1,860 m.	Low Potential
Sagittaria sanfordii	Sanford's arrowhead	CRPR 1B.2	marshes and swamps	in standing or slow-moving freshwater ponds, marshes, and ditches. 0-610 m.	Low Potential

Scutellaria galericulata	marsh skullcap	CRPR 2B.2	marshes and swamps, lower montane coniferous forest, meadows and seeps	swamps and wet places. 0-2,100 m.	Low Potential
Scutellaria lateriflora	side-flowering skullcap	CRPR 2B.2	meadows and seeps, marshes and swamps	wet meadows and marshes. in the delta, often found on logs. -3-500 m.	Low Potential
Symphyotrichum lentum	Suisun Marsh aster	CRPR 1B.2	marshes and swamps (brackish and freshwater)	most often seen along sloughs with *phragmites, Scirpus*, blackberry, Typha, etc. 0-3m.	Moderate Potential
Trifolium hydrophilum	saline clover	CRPR 1B.2	marshes and swamps, valley and foothill grassland, vernal pools	mesic, alkaline sites. 0-300 m.	Not Expected
ANIMALS					
Agelaius tricolor	tricolored blackbird	CT	highly colonial species, most numerous in central valley & vicinity. largely endemic to California.	requires open water, protected nesting substrate, & foraging area with insect prey within a few km of the colony.	Low Potential
Ambystoma californiense	California tiger salamander (central CA DPS)	FT	standing bodies of fresh water, like ponds, vernal pools and other ephemeral or permanent water bodies for breeding	upland habitat that contains small animal burrows or underground hideaways	Not Expected
Anthicus antiochensis	Antioch Dunes anthicid beetle	SSC	extirpated from Antioch dunes but present in several localities along the Sacramento and feather rivers	sand dunes	Absent
Anthicus sacramento	Sacramento anthicid beetle	SSC	restricted to sand dune areas	inhabit sand slipfaces among bamboo and willow but may not depend on presence of these plant species.	Absent
Ardea herodias	great blue heron	SSC	colonial nester in tall trees, cliffsides, and sequestered spots on marshes	rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows.	Moderate Potential
Athene cunicularia	burrowing owl	SSC	open, dry annual or perennial grasslands, deserts & scrublands characterized by low-growing vegetation	subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Not Expected
Bombus crotchii	crotch bumble bee	SSC	grasslands	None listed	Absent
Bombus occidentalis	western bumble bee	SSC	grasslands: once common & widespread, species has declined precipitously from central CA to southern BC, perhaps from disease	None listed	Absent
Branchinecta conservatio	Conservancy fairy shrimp	FE	inhabits vernal pools and swales in the Great Central Valley	None listed	Absent
Branchinecta lynchi	vernal pool fairy shrimp	FT	endemic to the grasslands of the central valley, central coast mtns, and south coast mtns, in astatic rain-filled pools	inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	Absent
Buteo swainsoni	Swainson's hawk	CT	breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, & agricultural or ranch lands	requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	Low Potential

Coccyzus americanus occidentalis	western yellow-billed cuckoo	FT, CE	riparian forest nester, along the broad, lower flood-bottoms of larger river systems	nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape.	Not Expected
Danaus plexippus	Monarch Butterfly	FC	Grasslands with milkweed host plants	None listed	Not Expected
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	FT	occurs only in the central valley of California, in association with blue elderberry (*Sambucus mexicana*)	prefers to lay eggs in elderberrries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	Absent
Elanus leucurus	white-tailed kite	FP	rolling foothills and valley margins with scattered oaks & 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.	Moderate Potential
Emys marmorata	northwestern pond turtle	FP, SSC	a thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches, usually with aquatic vegetation,	need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying	Low Potential
Eucerceris ruficeps	redheaded sphecid wasp	SSC	central California interior dunes	nest in hard-packed sand utilizing abandoned halictine bee burrows.	Absent
Falco peregrinus anatum	American peregrine falcon	FP	near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures	nest consists of a scrape or a depression or ledge in an open site.	Low Potential
Lasiurus blossevillii	western red bat	SSC	roosts primarily in trees, 2-40 ft above ground, from sea level up through mixed conifer forests	prefers habitat edges & mosaics with trees that are protected from above & open below with open areas for foraging.	Low Potential
Lasiurus cinereus	hoary bat	SSC	prefers open habitats or habitat mosaics, with access to trees for cover & open areas or habitat edges for feeding	roosts in dense foliage of medium to large trees. feeds primarily on moths. requires water.	Low Potential
Laterallus jamaicensis coturniculus	California black rail	CE	inhabits freshwater marshes, wet meadows & shallow margins of saltwater marshes bordering larger bays	needs water depths of about 1 inch that does not fluctuate during the year & dense vegetation for nesting habitat.	Low Potential
Lepidurus packardi	vernal pool tadpole shrimp	FE	inhabits vernal pools and swales in the Sacramento valley containing clear to highly turbid water	pools commonly found in grass bottomed swales of unplowed grasslands. some pools are mud-bottomed & highly turbid.	Absent
Linderiella occidentalis	California linderiella	SSC	seasonal pools in unplowed grasslands with old alluvial soils underlain by hardpan or in sandstone depressions	water in the pools has very low alkalinity, conductivity, and tds.	Absent
Melospiza melodia	song sparrow ("Modesto" population)	SSC	favors brushland and marshes, including salt marshes	None listed	Low Potential
Perdita scitula antiochensis	Antioch andrenid bee	SSC	known only from Antioch dunes and Oakley	visits flowers of *Eriogonum, gutierrezia californica, heterotheca grandiflora, lessingia glandulifera*.	Absent
Riparia riparia	bank swallow	CT	colonial nester; nests primarily in riparian and other lowland habitats west of the desert	requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	Not Expected

Sylvilagus bachmani riparius	riparian brush rabbit	FE, CE	riparian areas on the San Joaquin River in northern Stanislaus County	dense thickets of wild rose, willows, and blackberries.	Low Potential
Taxidea taxus	American badger	SSC	most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils	needs sufficient food, friable soils & open, uncultivated ground. preys on burrowing rodents. digs burrows.	Low Potential
Thamnophis gigas	giant gartersnake	FT, CT	prefers freshwater marsh and low gradient streams. has adapted to drainage canals & irrigation ditches	this is the most aquatic of the garter snakes in California.	Not Expected

*Definitions of Status Codes: FE = Federally listed as endangered; FT = Federally listed as threatened; FPE = Federally proposed for listing as endangered; FPT = Federally proposed for listing as threatened; FC = Candidate for Federal listing; MB = Migratory Bird Act; CE = California State listed as endangered; CT = California State listed as threatened; CSSC = California species of special concern; CR = California rare species; CFP = California fully protected species; CRPR (California Rare Plant Rank) List 1A = Plants presumed extinct in California by; CRPR List 1B = Plants designated rare, threatened or endangered in California and elsewhere; CRPR List 2A = Plants presumed extirpated in California but common elsewhere; CRPR 2B = Plants rare threatened or endangered in California, but more common elsewhere; CRPR 3 Review List: Plants about which more information is needed and CRPR 4 = Watch List: Plants of limited distribution. CRPR Threat Ranks: 0.1 = seriously threatened in California; S2 = moderately threatened in California; S3 = not very threatened in California.

**Copied verbatim from CNDDB, unless otherwise noted.

Attachment D

Site Photographs

View looking northwest of the bank of Georgiana Slough containing a patch of riparian forest

View looking northeast of mowed bank of Georgiana Slough (landward side) and levee access road.

View looking northeast of the mowed bank of the levee (waterside) and a temporary barge staging area.

View looking west of the bank of Georgiana Slough with trimmed vegetation on riprap.

View looking east of a patch of riparian scrub (blackberry briars).

View looking northwest of the mowed levee (landward side) with invasive pampas grass visible.

View looking east of ruderal habitat, with grass moved and invasive species such as pampas grass present.

View of the water's edge at the levee bank armored with riprap, with briars in the front and aquatic vegetation in the channel.

View looking east of the boundary between a patch of riparian scrub and ruderal habitat.

View looking east of the tidal marsh habitat in between riprap containing tule and other sedges and reeds, willows, and pampas grass.

View looking east and downstream of the open water in Georgiana Slough as well as marsh and riparian forest habitat in the background.

Attachment E

Table of Species Observed On Site

Plants Observed During the Field Survey

Common Name	Scientific Name
White alder	*Alnus rhombifolia*
alligatorweed	*Alternanthera philoxeroides*
Giant reed	*Arundo donax*
Wild oat	*Avena fatua*
Black mustard	*Brassica nigra*
Sedge	*Carex* sp.
Hottentot fig	*Carpobrotus edulis*
Yellow star thistle	*Centaurea solstitialis*
Field bindweed	*Convolvulus arvensis*
Artichoke	*Cynara cardunculus*
Bermuda grass	*Cynodon dactylon*
horsetail	*Equisetum*
horseweed	*Erigeron*
Broad leaved filaree	*Erodium botrys*
Blue Gum Eucalyptus	*Eucalyptus globulus*
Cider gum	*Eucalyptus gunni*
Edible fig	*Ficus carica*
Fennel	*Foeniculum vulgare*
Oregon ash	*Fraxinus latifolia*
Rush	*Juncus* sp.
Prickly lettuce	*Lactuca serriola*
Mallow	*Malva sp.*
Evening primrose	*Oenothera* sp.
Oleander	*Nerium* sp.
Black locust	*Robinia pseudoacacia*
Himalayan blackberry	*Rubus armeniacus*
Broadleaf arrowhead	*Sagittaria latifolia*
Bulltongue arrowhead	*Sagittaria lancifolia*
Sandbar willow	*Salix exigua*
Red willow	*Salix laevigata*
Tule	*Schoenoplectus acutus*
Cattail	*Typha spp.*
Winter vetch	*Vicia villosa*

Appendix G

Cultural Resources Assessment

CONFIDENTIAL

The following report is confidential and not for public distribution.