FINAL ◦ MAY 2017

Initial Study/Mitigated Negative Declaration
Bacon Island Levee Rehabilitation Project
State Clearinghouse No. 2017012062

PREPARED FOR

Reclamation District No. 2028
(Bacon Island)
343 East Main Street, Suite 815
Stockton, CA 95202

PREPARED BY

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Cover photo: View of Bacon Island's northwestern levee corner and surrounding interior lands.

PROJECT SUMMARY

Project title	Bacon Island Levee Rehabilitation Project
CEQA lead agency name and address	Reclamation District No. 2028 (Bacon Island) 343 East Main Street, Suite 815 Stockton, California 95202
CEQA responsible agencies	Department of Water Resources (DWR) Andrea Lobato, Manager The Metropolitan Water District of Southern California (Metropolitan) Deirdre West, Environmental Planning Manager
Contact person and phone number	David A. Forkel Chairman, Board of Trustees Reclamation District No. 2028 343 East Main Street, Suite 815 Stockton, California 95202 Cell: (510) 693-9977 Nate Hershey, P.E. District Engineer and Brian Janowiak, P.E. Project Engineer MBK Engineers 455 University Avenue, Suite 100 Sacramento, CA 95825 Office: (916) 456-4400 Fax: (916) 456-0253
Project location	Bacon Island, Sacramento-San Joaquin Delta, San Joaquin County
Project sponsor's name and address	Department of Water Resources Division of Flood Management Delta Levees Office (Special Projects) 3310 El Camino Avenue Sacramento, CA 95821
Zoning	Agriculture
Description of Project	Rehabilitate the west side (4.7 miles) of Bacon Island's levee system
Surrounding land uses and setting	Project is surrounded by Old River to the west and farmed lands to the east
Other public agencies whose approval may be required (e.g., permits, financing approval, or participation agreement)	• California Department of Water Resources, Special Flood Control Projects Program • California Department of Fish and Wildlife (Fish and Game Code Section 1600 Streambed Alteration Agreement, California Endangered Species Act consultation regarding State-protected species) • Contra Costa Water District • The Metropolitan Water District of Southern California • Santa Clara Valley Water District • San Francisco Public Utilities Commission • Alameda County Water District • Zone 7 Water Agency • East Bay Municipal Utility District

PROPOSED MITIGATED NEGATIVE DECLARATION

Project: Bacon Island Levee Rehabilitation Project

Lead Agency: Reclamation District No. 2028

Project Location: Bacon Island is located in the central Sacramento-San Joaquin River Delta, approximately halfway between the city of Antioch to the west and Stockton to the east, in San Joaquin County, California. It is situated south of Mandeville Island, west of Mildred Island and Lower Jones Tract, north of Woodward Island and east of Holland Tract.

Project Description: 4.7 miles of levee along Bacon Island's western side is currently at or below the Hazard Mitigation Plan (HMP) cross-section criteria, which requires levee crown elevations to be one foot above the 100-year flood elevation. Bacon Island's levee is substandard due to settlement of the levee from consolidation of the underlying peat foundation. The levee lacks the required stability to support the minimum HMP standard and an all-weather access road required by the District, and continued settlement over time increases potential for overtopping and catastrophic levee failure.

The Project includes landside and minor waterside work entirely above Mean High Water. Landside work involves raising the levee crown and stabilizing the slope by placing fill material on the levee toe, slope, and crown. Aggregate base will be placed on the levee crown to create an all-weather roadway. Waterside work involves armoring newly placed fill along the waterside of the levee. The Project will compensate for future settlement of the peat foundation as well as sea level rise and ensure a sustainable HMP cross-section standard by incorporating the recommended design cross section, which includes a toe berm and a wider levee crown.

Findings: An Initial Study has been prepared to assess the Project's potential effects on the environment and the significance of those effects. Based on the Initial Study, Reclamation District No. 2028 has determined that the Project will not have any significant effects on the environment once mitigation measures included in the Project design are implemented. This conclusion is supported by the following findings:

- The Project will result in no impacts on: land use and planning, mineral resources, population and housing, public services, recreation, transportation and traffic, and utilities/service systems.
- The Project will result in less-than-significant impacts on: aesthetics, agricultural and forest resources, air quality, geology and soils, greenhouse gas emissions, and noise.
- Mitigation is included in the Project design to reduce potentially significant impacts to less-than-significant levels for biological resources, cultural resources, hazards/hazardous materials, and hydrology/water quality.

Mandatory Findings of Significance:

- The Project will 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 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.

- The Project will not have environmental effects that are individually limited, but cumulatively considerable.
- The Project will not have environmental effects which would cause substantial adverse effects on human beings, either directly or indirectly.
- The Project will not achieve short-term environmental goals to the disadvantage of long-term environmental goals.
- No substantial evidence exists that the Project will have a negative or adverse effect on the environment.

Proposed Mitigation Measures: Mitigation measures included in the Project to avoid or minimize potential environmental impacts are included in the attached Initial Study, which is hereby incorporated and fully made part of this Mitigated Negative Declaration. Implementation of these mitigation measures will reduce the potential environmental impacts of the Project to a less-than-significant level. Reclamation District No. 2028 has agreed to implement each of the identified mitigation measures, which will be adopted as part of the Mitigation Monitoring and Reporting Program.

Determination

In accordance with Section 21082.1 of the California Environmental Quality Act (CEQA), Reclamation District No. 2028 has independently reviewed and analyzed the Initial Study and proposed Mitigated Negative Declaration for the Project and finds that the Initial Study and proposed Mitigated Negative Declaration reflects the independent judgment of Reclamation District No. 2028. The lead agency further finds that the Project mitigation measures will be implemented as stated in the Initial Study and Mitigated Negative Declaration. This Mitigated Negative Declaration is filed in accordance with CEQA and the State CEQA guidelines.

I hereby approve this Project:

_____ _____

Reclamation District No. 2028 Date

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1 INTRODUCTION

Reclamation District No. 2028 (District) plans to rehabilitate the west side of Bacon Island's levee system, 4.7 miles (mi) in length, to achieve a sustainable Hazard Mitigation Plan (HMP) cross-section standard[1] (Project). This Initial Study/Mitigated Negative Declaration (IS/MND) has been prepared in compliance with the California Environmental Quality Act (CEQA) to address the potential environmental effects of levee rehabilitation on Bacon Island.

1.1 Project Location

Bacon Island is located in the central Sacramento-San Joaquin River Delta, approximately halfway between the city of Antioch to the west and Stockton to the east, in San Joaquin County, California (Figure 1-1). The total size of the island is 5,625 acres (ac). It is situated south of Mandeville Island, west of Mildred Island and Lower Jones Tract, north of Woodward Island and east of Holland Tract (Figure 1-2). Waterways surrounding the island include Connection Slough to the north, Middle River to the east, Woodward Island Canal to the south, and Old River to the west which runs along the Project. The island is accessible from Bacon Island Road on Lower Jones Tract. Bacon Island Road runs along the levee of Bacon Island and provides the only road access to Mandeville Island, via a bridge to the north. Although there is boat traffic in the rivers and sloughs around the island, there are no boat docks on Bacon Island. There are a few active and inactive residences and outbuildings on the island, including several abandoned structures associated with an historical Japanese day-labor camp. The island is, however, predominantly used for agricultural crop production, specifically corn, rice, wheat, sunflower, and alfalfa (ICF International 2010, RD2028 2012). Vegetation on the crown and slopes of levees on Bacon Island is regularly controlled by mechanical mowing, herbicides, and/or sheep grazing.

1.2 Project Area

For the purposes of analyzing potential Project effects, the Project area includes: (1) the levee crown and the area extending landside to varying distances up to 120 feet (ft) from Stations 300+00 to 550+00 along the west side of the island; (2) the top of the bank along the waterside perimeter of the levee above Mean High Water[2] (MHW) also from Stations 300+00 to 550+00 along the west side of the island; and (3) three borrow sites. The Project area and levee stationing are depicted in Figure 1-2.

[1] The HMP cross-section standard design includes 3:1 landside slopes with a 21-foot crown width, a toe berm extending 120 feet landward of the new landside hinge, and a levee crown elevation of 1 foot above the 100-year flood elevation. An additional 1 foot of vertical overbuild will be included in the Project to account for future settlement.

[2] Mean High Water is defined as the average of all the high water heights observed over a span of time called the National Tidal Datum Epoch; in the United States this period spans 19 years.

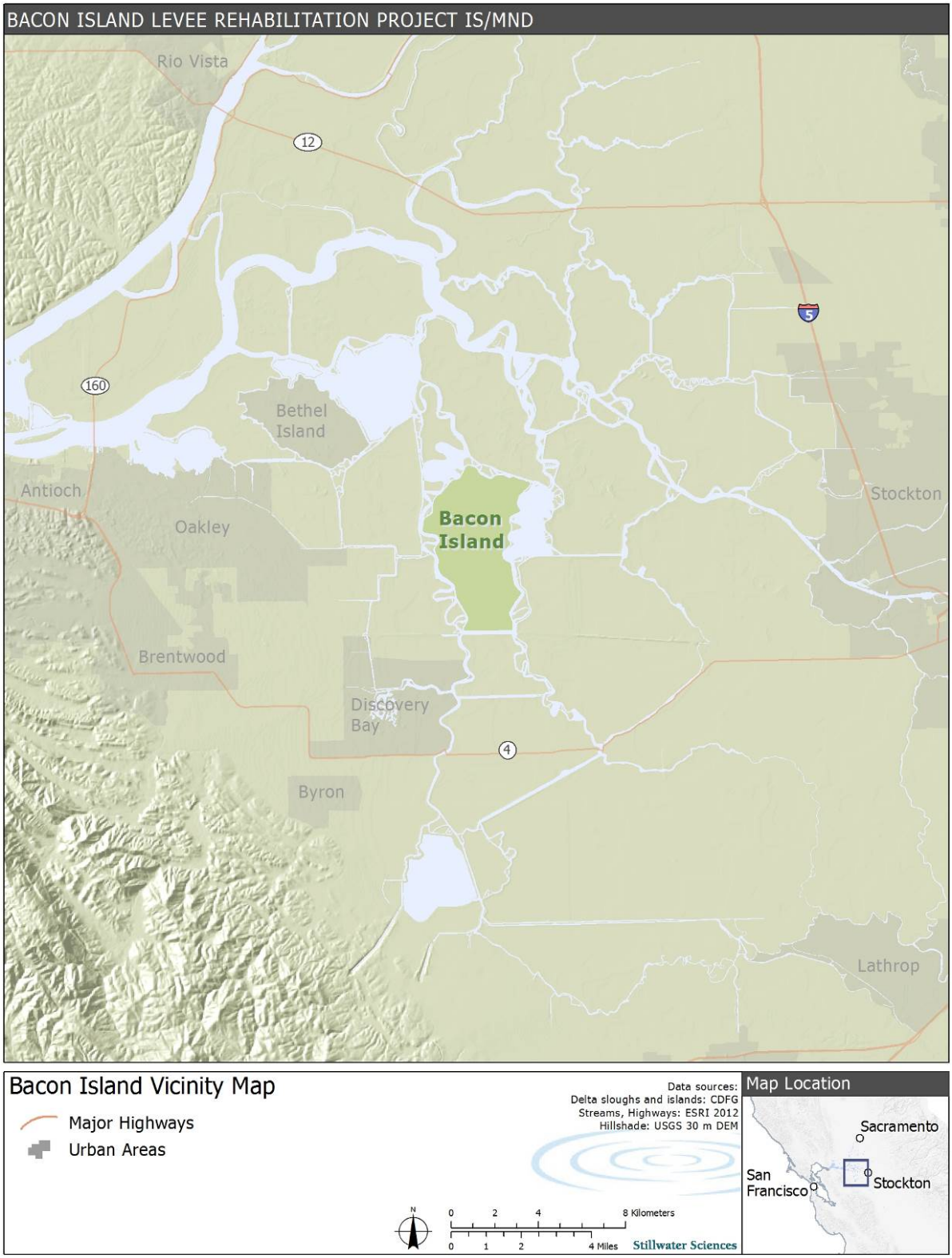

Figure 1-1. Bacon Island location.

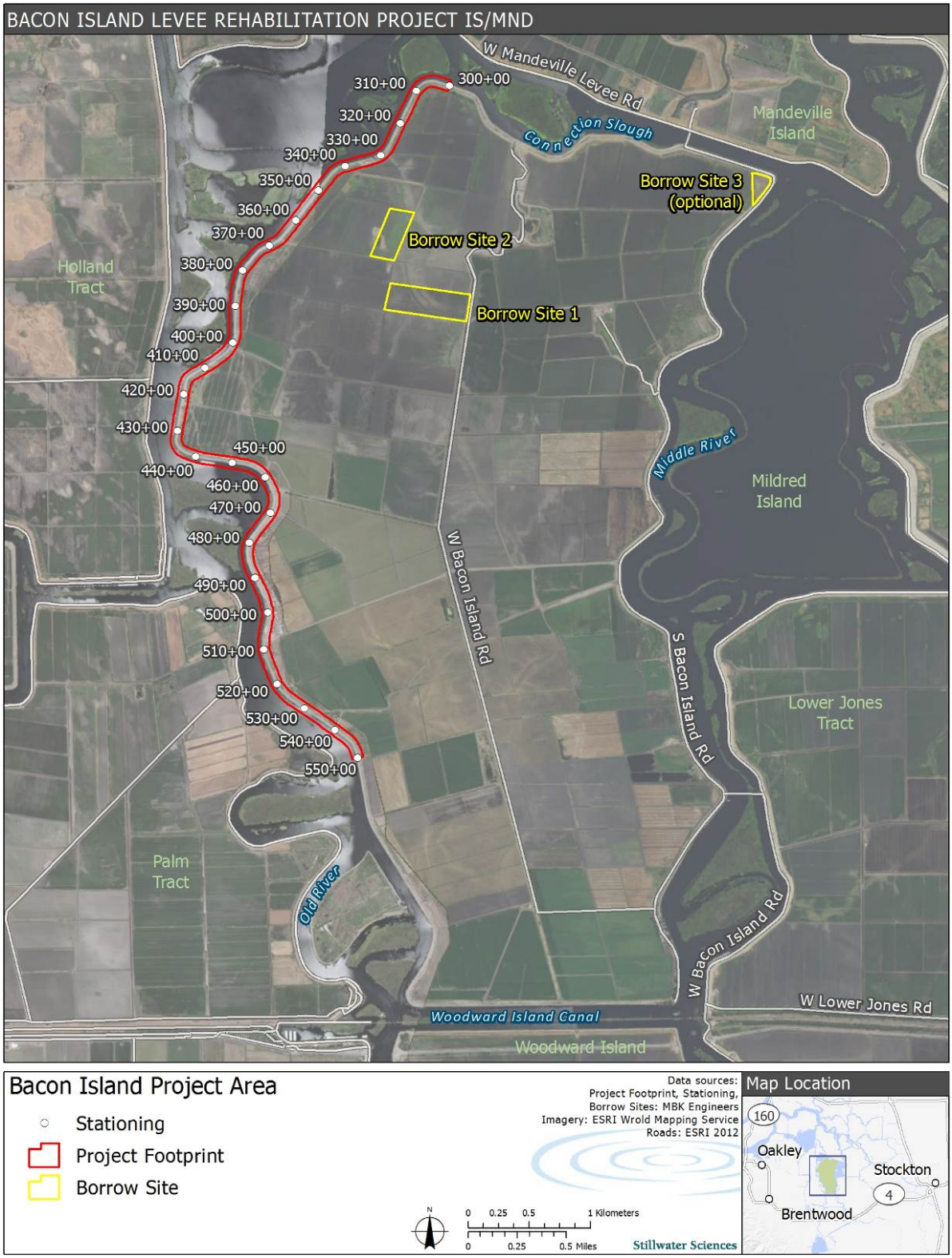

Figure 1-2. Bacon Island Levee Rehabilitation Project area.

1.3 Project Purpose and Benefits

The north and western sections of levee along Bacon Island are currently at or below the HMP cross-section criteria, which requires levee crown elevations at one foot above the 100-year flood elevation. Bacon Island's levee is substandard due to settlement of the levee from consolidation of the underlying peat foundation. The levee lacks the required stability to support the minimum HMP standard and an all-weather access road required by the District, and continued settlement over time increases potential for overtopping and catastrophic levee failure. The Project will compensate for future settlement of the peat foundation as well as sea level rise, and ensure a sustainable HMP cross-section standard by incorporating the recommended design cross section, which includes a toe berm and a wider levee crown.

This Project is funded by DWR's Delta Levees Special Projects Program (Project Funding Agreement BN-15-1.0-SP). Authorized under the California Water Code, this program provides funding to safeguard public benefits—including roads, utilities, water quality, recreation, navigation, and fish and wildlife—from flood hazards.

Benefits of the Project including improving the reliability of both in-Delta and export water supply and conveyance. The levee on Bacon Island protects channel integrity along Old and Middle[3] Rivers, which provide through-Delta conveyance for fresh water supplies pumped at the state and federal pumping facilities in the south Delta. The Project will reduce the risk of a levee failure, thus reducing associated risks to the water supply, such as the potential for salinity intrusion that could jeopardize the water supply for both local and export interests.

This Project will also increase the protection of emergency infrastructure. The District's levee system protects local public utilities and vehicular access corridors. As of 2007, the island has 37,654 feet of minor roads, 28,288 feet of natural gas pipelines, eight gas wells, and residential buildings (URS and Jack R. Benjamin & Associates, Inc. 2007). The District also provides the only road access to Mandeville Island, along Bacon Island Road. Utility providers include Pacific Gas and Electric (PG&E) and AT&T. PG&E maintains two large gas transmission lines from the McDonald Island Gas Storage Facility, as well as electrical lines servicing Bacon Island and adjacent islands. AT&T maintains the communication lines located on the island. The levee along the Old River corridor could provide secondary emergency access to Mandeville Island in the event there is a disruption of service on the county road providing primary access.

The Project levee also protects an important variety of habitat, as documented in a wetland delineation for the Delta Wetlands Project conducted in 2012 (ESA 2015). The habitat located on-island includes 116.9 acres of freshwater marsh, 8.8 acres of cottonwood-willow, 9.2 acres of Great Valley willow scrub, 27.4 acres of open water (e.g., canals, ditches, and permanent ponds), and 406.5 acres of farmed wetlands (ESA 2015). The District's levees also protect active agricultural operations on Bacon Island, including 4,752 acres of corn, wheat, sunflower, and alfalfa. Operations are supported by an on-island farming enterprise with warehouses, facilities, and farming equipment. These lands are seasonally flooded, adding to the available habitat for migratory waterfowl within the Pacific Flyway during the fall and winter.

[3] A breach in the Old River levee would flood the island, which would also threaten the integrity of the Middle River levee; the landside of the Middle River levee would quickly erode, also jeopardizing the reliability of the Middle River corridor for water supply.

1.4 Project Description

1.4.1 Levee configuration

The Project includes landside and waterside work. Landside work involves raising the levee crown and stabilizing the slope by placing fill material on the levee toe, slope, and crown. The typical resulting levee configuration and details are depicted in Figures 1-3 and 1-4. Aggregate base will be placed on the levee crown to create an all-weather roadway. Waterside work involves armoring newly placed fill along the waterside of the levee (i.e., riprap) entirely above MHW.

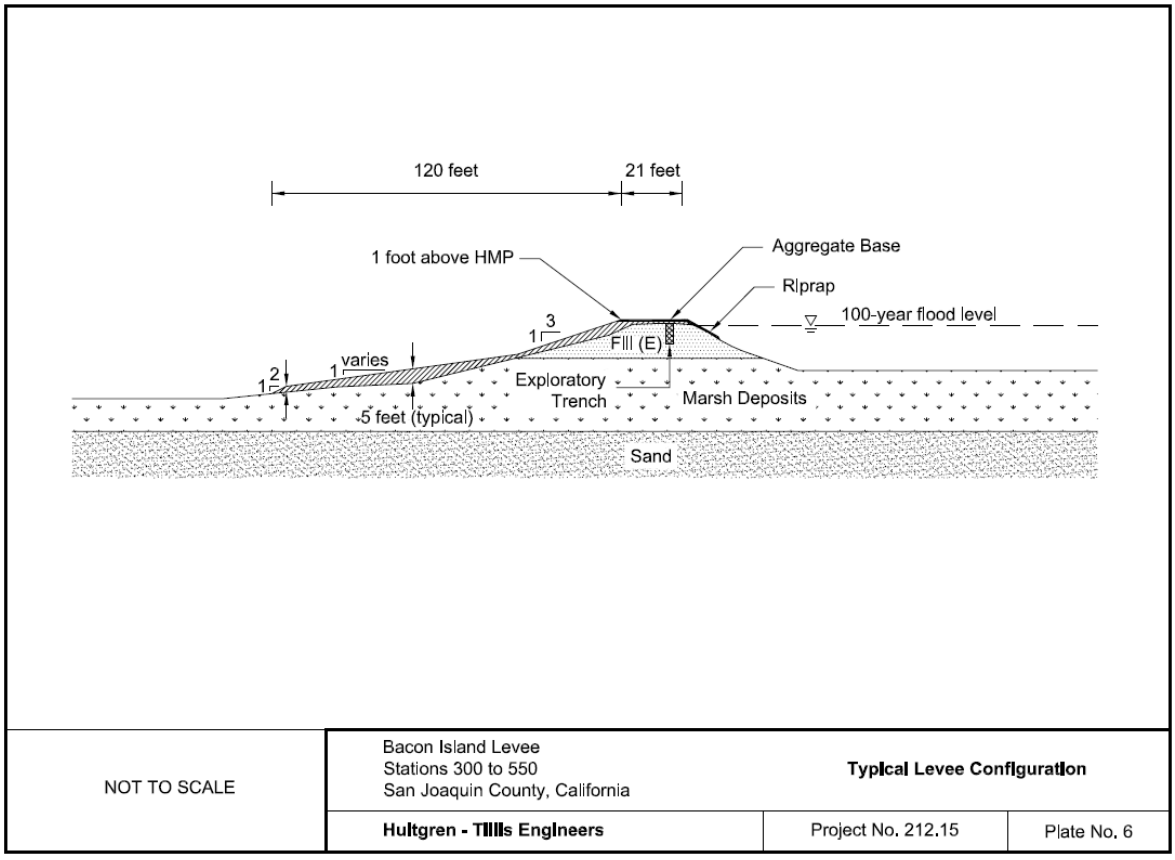

Figure 1-3. Typical levee configuration for Bacon Island Levee Rehabilitation Project, Stations 300 to 550.

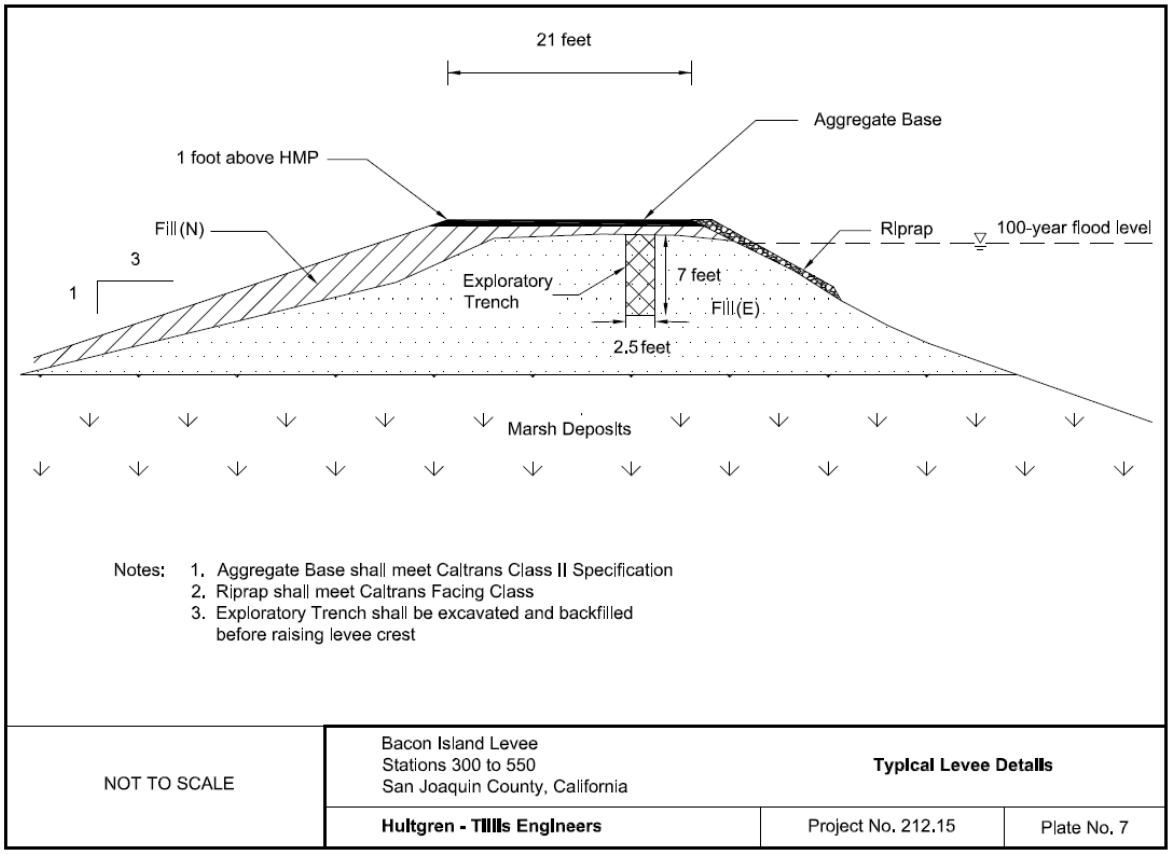

Figure 1-4. Typical levee details for Bacon Island Levee Rehabilitation Project, Stations 300 to 550.

1.4.2 Landside work

The Project includes the placement of fill material on the levee toe, landside slope, and crown. Class 2 Aggregate Base (AB) will be placed on the levee crown to create an all-weather road; an estimated 25,000 tons of AB will be required. Fill material obtained from on-site borrow locations will be placed and compacted to construct the rehabilitated levee slope. Once fill has been placed and the subgrade has been achieved on the levee crown, AB will be placed on the levee crown and compacted to construct the all-weather road surface. Construction activities will not require excavating existing soil on the levee slope.

These activities will total approximately 4.7 mi or 25,000 linear ft. The size of the repair footprint will vary based on site-specific conditions, including the height, width, slope, and elevation of the levee. Project activities will be limited to the area necessary for construction of a stable levee.

1.4.3 Waterside work

All work on the waterside of the levee will be completed above MHW. Clean quarry stone will be used to armor the newly placed fill along the waterside of the levee crown (i.e., riprap). Additional quarry stone will be used to supplement areas already armored to avoid any backfill or discontinuities. An estimated 20,000 tons of new quarry stone will be required.

1.4.4 Borrow sites

Fill material will be obtained from on-site borrow locations. An estimated 335,000 cubic yards of on-island borrow material will be used as fill for placement on the levee toe, landside slope, and crown. The final amount of fill required will depend upon final design recommendations and grading plans. Borrow material will be removed and transported using excavators, bulldozers, and dump trucks.

The three borrow site locations are depicted in Figure 1-2. Borrow Site 1 is approximately 34.3 ac and located in the northwest portion of the island, 0.40 mi east of the levee between Stations 351+00 and 366+00. Borrow Site 2 is approximately 18.6 ac and located 0.75 mi east of the levee between Stations 377+00 and 385+00, in the northwest portion of the island. Excavation at the borrow sites is expected to be up to 10 feet deep.

Agricultural production at Borrow Sites 1 and 2 during 2016 was rice and corn, respectively. Farming at these locations will be finished by the end of 2016. Any irrigation canals associated with these fields will be dry prior to the onset of Project construction activities. The trees associated with Borrow Site 2 will remain in-place and will not be disturbed.

Borrow Site 3 is approximately 6-ac and located at the northeast corner of the island (Figure 1-2). If used, Borrow Site 3 will be made up of dredge spoils from a nearby dredging operation. Borrow material will be removed and transported using bulldozers and dump trucks.

1.4.5 Imported materials

The Project will require an estimated 325,000 tons of material (i.e., fill, AB, quarry stone) imported from off-site locations. These materials will come from the surrounding areas (e.g., Lodi, Stockton, Manteca, Tracy, etc.). Sources for imported materials will be determined when the Project commences.

1.4.6 Site preparation

Landside vegetation will be cleared and grubbed, including any trees that are within the Project footprint on the landside of the levee. Any loss of riparian forest or scrub-shrub habitat as a result of levee maintenance and improvement is pre-mitigated by provision of such habitat at nearby Medford Island, as described in the mitigation agreement between the District and California Department of Fish and Game (CDFG) (now California Department of Fish and Wildlife, CDFW) (CDFG 1993). Preparation of the waterside of the levee for armoring the newly placed fill along the levee crown may require removing ruderal weeds and non-native annual plants. No waterside trees will be removed. The invasive plant giant reed (*Arundo donax*) will be removed from both the landside and waterside of the Project footprint. All cleared material will be disposed of outside the Project footprint on the landside of the levee or moved offsite. Soil will be graded to obtain the specified design grade throughout the Project area.

There are multiple existing siphons and pipes in the Project area that will be modified. Project activities will avoid both active residences and abandoned buildings, except for one non-historical vacant dwelling at Camp 3. Any standing historical structures near the Project will be completely avoided by construction activities and left intact in their current locations.

1.4.7 Seepage control and anomaly excavation

The Project will include excavation of a 30-inch wide, 7-ft deep exploratory trench through the levee crown along the entire Project length to expose shallow anomalies and investigate horizontal seepage paths. Afterwards, it will be backfilled and compacted, and surfaced with 6-inch deep gravel to create the new all-weather road.

1.4.8 Planting

After levee rehabilitation is complete, native grasses will be planted on the landside slope for erosion protection as well as to provide habitat for wildlife and pollinators. Soil preparation, seeding, and monitoring and maintenance will be conducted in general accordance with the Delta Levees Habitat Program Guide to Planting Native Grassland Habitat on a Reconstructed Landside Levee Slope (CDFW and DWR, unpublished memo), or other similar methods approved by CDFW. The native grass seed mix will be appropriate to soil conditions. Planting at the end of construction and prior to or during the rainy season will help minimize erosion during the wet months and naturally provide irrigation to support seed germination. Depending on levee slope steepness, seeding may be via drill-seeding or seed broadcasting. Another seeding method may be to incorporate the seeds into the ground (e.g., using a harrow), and then covering the seeded area by means of hydroseeding with mulch and tackifier; this method is different than typical hydroseeding where the seeds are sprayed with the mulch and tackifier. To ensure the permanency of the native grasses, regular maintenance—primarily weed maintenance—will be implemented. If funding is available, management during the first year will include monitoring to ensure germination success, supplemental watering if dry periods develop, mowing[4] with a minimum prescribed blade height from the ground, and, if appropriate, selectively using herbicides at the appropriate time for best weed control. The District will maintain and monitor the plantings for the duration of the funding agreement.

1.4.9 Erosion control

During construction, erosion will be controlled by working only during dry periods. A temporary berm comprised of the removed levee vegetation will be placed along the landside toe of work areas to act as an erosion control barrier (except for the invasive giant reed, *Arundo donax,* which will be removed from the Project area and disposed of offsite to prevent further establishment and spreading).

All landside slopes will be constructed with 3:1 (horizontal:vertical) smooth, uniform slope to minimize erosion, except in the areas where there is not enough room due to structures of cultural significance, which will have a 4:1 slope with no toe berm. These slopes will be track-walked perpendicular to the levee prior to hydroseeding. The levee crown roadway will have a 2% slope to the landside to minimize runoff into the adjacent waterway. All runoff will collect on-island and be routed through internal seepage ditches that slow runoff.

All erosion control measures will be implemented in accordance with the Association of Bay Area Governments Manual of Standards for Erosion and Sediment Control (ABAG 1995).

[4] The District has a routine maintenance agreement with CDFW, which has jurisdiction over the waterside of the levee; to avoid impacts on ground nesting birds, CDFW recommends all mowing activities should be completed between July 1 and February 14, outside of the nesting season.

1.4.10 Habitat enhancement

The District has preliminarily identified four levee-compatible habitat enhancement areas on the landside of the levee, totaling 4.3 ac, where scrub-shrub and riparian forest will be created or enhanced, using nursery plants, cuttings, or seed (see Figures 2-1 through 2-6 for potential habitat areas). These areas are outside the levee prism and can be utilized for habitat enhancement without conflicting with levee maintenance or operations. The adjacent toe ditch provides a natural barrier preventing farming activities from encroaching into and disturbing the habitat area. The landowner will maintain these proposed habitat enhancement areas according to a future management agreement with the California Department of Water Resources (DWR) and CDFW. The terms of the management agreement will be finalized as a part of habitat enhancement planning and implementation. These habitat enhancement areas are incorporated into the Project design to comply with funding requirements to integrate levee improvement with habitat enhancement; in this case, landside levee vegetation features that provide habitat for native plants and wildlife in support of a healthy ecosystem. These habitat features are not intended as mitigation to offset any potential project impacts.

1.4.11 Equipment and materials

Table 1-1 provides a list of equipment that is anticipated to be used for the Project. All construction equipment is compliant with San Joaquin Valley Air Pollution Control District (SJVAPCD) requirements.

Table 1-1. Equipment anticipated to be used for the Bacon Island Levee Rehabilitation Project.

Equipment type	Number of rigs (or loads, if specified)
Excavators	1–3
Bulldozers	2–3
Blades	1–2
Compactors	2
Water trucks	2–3
Semi-bottom dump trucks, onsite	10–30 looping trucks
Semi-bottom dump trucks, import fill and AB	50–150 loads per day
Side dump trucks, import quarry stone	~50 loads per day
Pumps (water truck)	2
Pumps (borrow sites)	2
Planting equipment	To be determined

Construction equipment and materials (e.g., rock revetment, aggregate base rock, any required planting materials, fill) will be transported to Bacon Island via truck. Dump trucks will move fill material to levee sections. AB will be transported to the site via semi-bottom dump trucks. Equipment to place and compact fill material will likely include excavators, blades, bulldozers, water trucks, and compactors. Semi-bottom dump trucks will remain onsite and deliver fill from the borrow sites to the Project area in a looping pattern. Haul routes will be restricted to existing roads (i.e., no new roads will be created).

Pumps will run as-needed at the borrow sites until excavation is complete to control water levels, and sporadically throughout the workday to fill water trucks to be used for dust control.

1.4.12 Construction schedule and timing

The Project is expected to occur in two phases over the course of two years, from July through October 2017 and from as early as May through October 2018. Work is planned for completion by December 2018. A typical workday is assumed to be 8 hours per day, during daylight hours, 5 days per week. Construction work will not occur prior to 7:00 am or after 6:00 pm. An estimated 245 working days will be necessary to complete the Project.

1.5 Conservation Measures

The following conservation measures will be implemented as part of the Project to help assure that the Project will have no impact or only less than significant impacts on the environment. These measures comply with existing regulations and/or requirements or standard practices to avoid, minimize, reduce, or compensate for potential impacts on environmental resources. Pre-construction surveys will be conducted for each year of project implementation. Results from all pre-construction surveys described in the following conservation measures will be provided to Delta Levee Program CDFW staff for review prior to the initiation of construction.

- **BIO-1.** The following measures will ensure that adverse effects on special-status plants are avoided or minimized (these measures may be replaced by equally or more protective measures as required by CDFW):
    a) Surveys for special-status plants will be conducted in accordance with the Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants (USFWS 1996) and Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities (CDFG 2009) and will be comprehensive for vascular plants. Two surveys will be conducted within the Project area to capture the appropriate phenological state of all special-status plants that may occur in the Project area (i.e., April and July; see Appendix A). If found, special-status plant populations will be documented using a California Natural Diversity Database (CNDDB) form, and completed forms will be submitted to CNDDB. CDFW (Delta Levee Program) will be provided GPS coordinates and/or maps for any special-status species located during pre-construction surveys.
    b) Each year, prior to construction, areas with special-status plants will be flagged or otherwise marked (e.g., stake, fence) for avoidance, including a 10-ft radius buffer. If work must be conducted within the 10-ft buffer area, CDFW recommends utilizing hand tools and hand placement of materials. A biological monitor will be present during construction in areas within a 10-ft buffer of special-status plants to ensure impacts are avoided.
    c) If avoidance is not possible, prior to construction, collect seeds during the blooming period prior to plant senescence, then salvage and transplant any plants that would otherwise be impacted by construction activities. Mitigation ratios, location, and timing will be determined in consultation with CDFW. A monitoring period of at least three years will be required, or as otherwise required by CDFW. Location of mitigation plantings will be recorded using GPS coordinates to enable location of the sensitive plant species after the monitoring period is complete.
- **BIO-2.** All contractors and equipment operators will be provided Worker Environmental Awareness Training to educate them on the environmental resources of the Project area, including the potential for special-status species to be present, and the required protection measures (including all the biological avoidance and minimization measures outlined in the Conservation Measures section [Section 1.5] of this IS/MND). Training will include

information about the federal and California Endangered Species Acts (ESA and CESA, respectively), and the consequences of noncompliance with these acts. Workers will be informed about the presence, life history, and habitat requirements of all special-status species that may be affected in the Project area. Training also will include information on State and federal laws protecting nesting birds, wetlands, and other water resources. This training will be conducted prior to construction for each year of Project implementation, and will be provided to any new staff/contractors added during the project.

- **BIO-3.** The following measures will be implemented to minimize effects on giant garter snake (*Thamnophis gigas*) or their habitat. They are based on the U.S. Fish and Wildlife Service's (USFWS) *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake Habitat, from Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California* (USFWS 1997).
    a) Construction activity within giant garter snake habitat (e.g., aquatic habitat, and upland habitat within 200 feet of aquatic margins) will be conducted between May 1 and October 1. This is the active period for the snake; direct mortality is lessened because snakes are expected to actively move and avoid danger. Construction activities within 200 feet from the banks of snake aquatic habitat will be avoided during the snake's inactive season.
    b) Aquatic habitat that will be disturbed or removed will be dewatered 15 days prior to the initiation of construction activities. If complete dewatering is not possible, potential snake prey (i.e., fish and tadpoles) will be removed so that snakes and other wildlife are not attracted to the construction area.
    c) All Project areas will be surveyed for giant garter snake by a qualified biologist, 7 days prior to the start of construction activities, and again if there is a lapse in construction activity of two weeks or more.
    d) The Project will prohibit use of erosion control materials potentially harmful to giant garter snake and other species, such as mono-filament netting (erosion control matting) or similar material, in potential giant garter snake habitat. Tightly woven fiber netting or similar material will be used for erosion control to ensure that giant garter snakes do not get trapped and become entangled.
    e) During construction operations, the number of access routes, number and size of staging areas, and the total area of the proposed project activity will be limited to the minimum necessary. Routes and boundaries will be clearly demarcated. Movement of heavy equipment to and from the Project site will be restricted to established roadways to minimize habitat disturbance. Project-related vehicles will observe a 20-mile-per-hour speed limit within the construction areas, except for County roads and on State and Federal highways.
    f) Confine all Project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities to the Project area using, to the extent possible, previously disturbed areas.
- **BIO-4.** For Project activities conducted during the bird breeding season (February 1–August 15), a pre-construction nest survey will be conducted. Surveys will include ground nesting birds and raptors (e.g., northern harriers and short-eared owls), as well as suitable trees, shrubs, buildings, etc., within 300 ft of the Project area. If active nests (nests containing eggs or young) are identified, a no-disturbance buffer zone will be established around the nest using flagging, fencing, and/or signage as appropriate. No construction activities will occur within the buffer zone until a qualified biologist has determined that

the young have fledged or that construction activities within the buffer zone are not disturbing the nesting birds. The width of the buffer zone will be determined by a qualified biologist in coordination with CDFW; recommended buffers are 500 ft for raptors and 100 ft for other birds.

- **BIO-5**. The following measures will be implemented between March 1 and August 15 to minimize effects on Swainson's hawk (*Buteo swainsoni*) and other protected raptors:
  a) In order to avoid take (FGC § 86) of protected raptors (FGC § 3503.5), a pre-construction raptor nest survey will be conducted within a quarter-mile (1,320 feet) of the project site, and within 15 days prior to the beginning of construction activities by a CDFW-approved biologist in order to identify active nests in the Project vicinity. The results of the survey will be submitted to the District and CDFW.
  b) If active nests are found, a quarter-mile initial temporary nest disturbance buffer will be established. If Project-related activities within the temporary nest disturbance buffer are determined to be necessary during the nesting season, then an on-site biologist/monitor experienced with raptor behavior will be retained by the project proponent to monitor the nest, and will along with the project proponent, consult with CDFW to determine the best course of action necessary to avoid nest abandonment or take of individuals.
  c) Work may be only allowed to proceed within the temporary nest disturbance buffer if raptors are not exhibiting agitated behavior such as defensive flights at intruders, getting up from a brooding position, or flying off the nest, and only with the agreement of CDFW. Based on the behavior observed, the buffer may be reduced if the birds are tolerant of construction activities. The designated on-site biologist/monitor shall be onsite daily while construction-related activities are taking place within the quarter-mile buffer and shall have the authority to stop work if raptors are exhibiting agitated behavior.
- **BIO-6.** The following measures will be implemented to avoid or minimize effects on California black rail (*Laterallus jamaicenis coturniculus*):
  a) If black rail nests are identified during the pre-construction nesting bird surveys, a 700-ft no-work buffer will be established around active nests. No Project-related activities will be allowed to occur within this buffer until young have fledged or the species is no longer attempting to nest. The buffer can be removed prior to the end of their breeding season (July 31) if a qualified biologist determines that all young have fledged or the nest did not end up being occupied.
  b) If the 700-ft no-disturbance buffer cannot be avoided, construction will be postponed in that area until after the breeding season or as approved by USFWS and CDFW.
- **BIO-7.** Western burrowing owl (*Athene cunicularia*) may be present in the work area. Avoidance of take of individual burrowing owls, their nests, and eggs is currently mandated under Fish and Game Code Sections 86, 3503, 3503.5 and 3513. CDFW recommends the District follow the 2012 Staff Report on Burrowing Owl Mitigation to reduce the chance of adversely impacting burrowing owls if they are thought to be present at the site. A copy of the guidelines can be found at: http://www.dfg.ca.gov/wildlife/nongame/docs/BUOWStaffReport.pdf. Occupied habitat includes areas burrowing owls may use for breeding/nesting (February 1 to August 31), wintering (September 1 to January 31), foraging, and/or migration stopovers. Occupancy of suitable burrowing owl habitat can typically be verified by an observation of at least one burrowing owl, or alternatively, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement, and/or loose soil near the burrow entrance.

- **BIO-8.** Impacts on freshwater marsh, riparian scrub-shrub, and riparian forest habitats due to levee rehabilitation and maintenance on Bacon Island have been pre-mitigated under the *Fish and Wildlife Habitat Mitigation Agreement by and Between Reclamation District 2041 and the California Department of Fish and Game* (CDFG 1993). This mitigation agreement, between CDFW and Reclamation District No. 2041 (Medford Island), provides mitigation lands on Medford Island for past and future long-term losses of freshwater marsh, riparian scrub-shrub, and riparian forest habitats resulting from levee maintenance and rehabilitation on specified Delta islands. Reclamation District No. 2028 (Bacon Island) is one of the islands covered by this agreement.
- **BIO-9.** Surveys for western pond turtles and any active pond turtle nests (during the nesting and emergence of hatchling season, April through November) will be conducted by a qualified biologist within seven days prior to onset of staging or construction activities. If a western pond turtle nest is found, a 100-foot no-disturbance buffer zone will be established around the nest using flagging, fencing, and/or signage as appropriate. No construction activities will occur within the buffer zone until a qualified biologist has determined that the nest in not in use. If an active western pond turtle nest is found, CDFW will be notified to determine the appropriate course of action. If a western pond turtle is observed at any time before or during construction, it will be left alone to move out of the area on its own or may be relocated by a qualified biologist to a suitable aquatic habitat outside of the Project area; translocation of turtles can only be performed in consultation with CDFW, and by an individual possessing a valid scientific collecting permit.
- **CUL-1.** The following measures will be implemented during the Project to avoid and minimize potential effects on cultural resources:
    a) During the initial stages of ground-disturbing activities (clearing and grubbing) within the portions of the Project area intersecting with historical labor Camps 2 through 6, an archaeological monitor will be present to ensure that areas with sensitive archaeological resources are avoided to the extent practicable. If feasible, sensitive archaeological areas will be flagged or fenced for avoidance prior to construction. If Project activities result in any newly exposed soils, the archaeological monitor will determine whether further monitoring is necessary for remaining Project activities.
    b) If intact archaeological deposits or features are found during monitoring, the archaeological team will conduct an immediate significance evaluation. If the deposits or features are determined to be significant, the archaeologists will work with Project personnel to avoid these resources and preserve them in place. If avoidance is not possible, then the archaeological team will work with the client and lead agency to develop an appropriate data recovery plan.
    c) If human remains are encountered during construction, work within the immediate area will halt and the San Joaquin County Coroner will be notified immediately. If the remains are determined to be Native American, then the Native American Heritage Commission (NAHC) will be notified within 24 hours as required by Public Resources Code 5097. The NAHC will notify the designated Most Likely Descendant who will provide recommendations for the treatment of the remains within 48 hours of being granted access to the site.
- **HAZ-1.** Following is a list of best management practices (BMPs) that will be used during the construction Project to avoid and minimize potential effects from hazards and hazardous materials:
    a) No potentially hazardous materials will be stored in a location where there is potential to enter any waterways and/or contaminate aquatic resources.

b) All construction materials with the potential to pollute runoff will be handled and delivered with care, and stored under cover and/or surrounded by berms when rain is forecast or during wet weather.

c) An effort will be made to store only enough of a product necessary to complete the job.

d) Materials, fuels, liquids and lubricants, and equipment supplies stored onsite will be stored in a neat, orderly manner, in their appropriate containers, with the original manufacturer's label and, if possible, in an enclosure.

e) Any hazardous materials will be stored and labeled according to local, State, and federal regulations.

f) If drums must be stored without overhead cover, they will be stored at a slight angle to reduce corrosion and ponding of rainwater on the lids.

g) Substances will not be mixed with one another unless recommended by the manufacturer.

h) Manufacturer's recommendations for proper use and disposal of a product will be followed.

i) Whenever possible, all of a product will be used up before disposal of its container.

j) If surplus product must be disposed of, the manufacturers or the local and State recommended methods for proper disposal will be followed.

- **HAZ-2.** The following are measures to prevent, control, and minimize impacts from a spill of a hazardous, toxic, or petroleum substance during construction of the Project:

  a) Minor spills are those that can be controlled by onsite personnel. The following actions will occur upon discovery of a minor spill:

     - The spread of the spill will be contained.
     - If the spill occurs on impermeable surfaces, such as any temporary surfaces installed for pollution prevention during construction, it will be cleaned up using "dry" methods (i.e., absorbent materials, cat litter, and/or rags).
     - If the spill occurs in permeable substrate areas, it will be immediately contained by constructing an earthen dike. The contaminated soil will be dug up and properly disposed of.
     - If the spill occurs during rain, the impacted area will be covered to avoid runoff, and appropriate clean-up steps will be taken after precipitation has ceased.
     - All steps taken to report and contain spill will be recorded.

  b) Onsite personnel should not attempt to control major spills until the appropriate and qualified emergency response staff has arrived at the site. Failure to report major spills can result in significant fines and penalties.

     - If a major spill occurs, the Governor's Office of Emergency Services Warning Center will be notified at (800) 852-7550 in addition to local authorities.
     - For spills of federal reportable quantities, the National Response Center will also be notified at (800) 424-8802. The federal reportable spill quantity for petroleum products is any oil spill that (1) violates applicable water quality standards, (2) causes a film or sheen upon or discoloration of the water surface or adjoining shoreline, or (3) causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.
     - A written report will be sent to all notified authorities.

c) Diesel fuel, oil, gasoline, and lubricants are considered petroleum products. These materials will be handled carefully to minimize their exposure to storm water. The risks in using petroleum products will be reduced by following these steps:
   - Waste oil and other petroleum products will not be discharged into the ground or other water bodies.
   - Petroleum products will be stored in tightly sealed containers that are clearly labeled, in a covered area, within prefabricated spill containment devices, earthen berms, or similar secondary containment features.
   - Onsite vehicles will be monitored for fluid leaks and receive regular preventative maintenance to reduce the chance of leakage (e.g., check for and fix fuel oil leaks in construction vehicles on a regular basis).
   - Bulk storage tanks having a capacity of more than 55 gallons will be provided with a secondary containment measure. Containment can be provided by a prefabricated temporary containment mat, a temporary earthen berm, or other measure.
   - Bulk fuel or lubricating oil dispensers will have a valve that must be held open to allow the flow of fuel into construction vehicles. During fueling operations, the contractor will have personnel present to detect and contain spills.

d) The following additional spill control and cleanup practices will be followed:
   - Spills will be contained and cleaned up immediately after discovery.
   - Manufacturer's methods for spill cleanup of a material will be followed as described on the material safety data sheet (MSDS) sheets (kept with product containers).
   - Materials and equipment needed for cleanup procedures will be kept readily available onsite, either at an equipment storage facility or on the contractor's trucks. Equipment to be kept onsite will include, but not be limited to, brooms, dust pans, shovels, granular absorbents, sand, sawdust, absorbent pads and booms, plastic and metal trash containers, gloves, and goggles.
   - Onsite personnel will be made aware of cleanup procedures, the location of spill cleanup equipment, and proper disposal procedures.
   - Toxic, hazardous, or petroleum product spills required to be reported by regulations will be documented and a record of the spills will be kept with this Project.
   - If a spill occurs that is reportable to the federal, State, or local agencies, the contractor is responsible for making and recording the reports.

- **HAZ-3.** The following are measures to reduce the potential for fire:
  a) Smoking will be permitted only in designated smoking areas or within the cabs of vehicles or equipment.
  b) Every fuel truck will carry a large fire extinguisher with a minimum rating of 40 B:C, and all flammable materials will be removed from equipment parking and storage areas.
- **HYD-1.** The following BMPs will be implemented during the Project to avoid and minimize potential impacts on waters from erosion:
  a) Construction will occur only during dry periods.
  b) Prior to storm events, all construction activities shall cease and appropriate erosion control measures implemented.

c) Soil, silt, or other organic materials will not be placed, stockpiled, or stored where such materials could pass into surface water or surface water drainage courses during unexpected rain events.

d) All areas disturbed by Project activities will be protected from washout or erosion prior to the onset of the rainy season.

e) All temporarily affected areas will be restored to pre-construction contours and conditions upon completion of construction activities.

f) Prior to initiation of any waterside work, erosion control measures will be utilized throughout all phases of operation where silt and/or earthen fill threaten to enter waters of the U.S and/or State.

2 ENVIRONMENTAL IMPACTS

Each of the following resource sections includes a completed checklist (from Appendix G of the CEQA Guidelines) of environmental factors potentially affected, and identifies potential Project impacts by significance level (i.e., no impact, less than significant impact, less than significant impact with mitigation incorporated, and potentially significant impact). The environmental factors checked in Table 2-1 would be potentially affected by this Project; mitigation measures will be implemented to reduce these potential impacts to less than significant levels.

Table 2-1. Summary of environmental factors potentially affected by the Project.

❑ Aesthetics	❑ Agriculture and Forest Resources	❑ Air Quality
✓ Biological Resources	✓ Cultural Resources	❑ Geology/Soils
❑ Greenhouse Gas Emissions	✓ Hazards and Hazardous Materials	✓ Hydrology/Water Quality
❑ Land Use and Planning	❑ Mineral Resources	❑ Noise
❑ Population and Housing	❑ Public Services	❑ Recreation
❑ Transportation and Traffic	❑ Utilities and Service Systems	❑ Mandatory Findings of Significance

2.1 Aesthetics

Issues	Potentially significant impact	Less Than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
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) Substantially degrade the existing visual character or quality of the site and its surroundings?	❑	❑	✓	❑
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	❑	❑	❑	✓

2.1.1 Environmental setting

The term “aesthetics” typically refers to the perceived visual character of an area, such as of a scenic view, open space, or architectural facade. The aesthetic value of an area is a measure of its visual character and visual quality combined with viewer response (FHA 1983). This combination may be affected by the components of a project (e.g., buildings constructed at heights that obstruct views, hillsides cut and graded, open space changed to an urban setting), as

well as the length and frequency of viewer exposure to the setting. Aesthetic impacts are changes in viewer response as a result of Project construction and operation.

The Bacon Island levee provides scenic views of the Sacramento-San Joaquin Delta and marsh habitats. Views of the island interior are largely agricultural. These views include the maintained levee, ruderal vegetation, managed corn and rice fields, and small patches of riparian forest. While Bacon Island is accessible by vehicle, the levee road in the Project area is behind a locked gate at Station 227+00 (at the Mandeville Island bridge), and is only used to access agricultural fields on the west side of the island, and for levee patrol and maintenance.

People boating in waterways surrounding the island are not generally able to see the interior part of the island because of the existing levee. Viewers include the people inhabiting the approximate 11 residences on the island, District employees who maintain the island, and farmers who manage the agricultural fields on the island.

2.1.2 Findings

a) Would the Project have a substantial adverse effect on a scenic vista?

Bacon Island is not a designated scenic vista and the rehabilitation of the levee will not damage any scenic resources. There will be no impact.

b) Would the Project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

Bacon Island is not located within a State scenic highway. There will be no impact.

c) Would the Project substantially degrade the existing visual character or quality of the site and its surroundings?

Construction activities will temporarily disrupt the visual character of the Project area. During Project construction, vegetation along the levee slopes will be removed and may temporarily degrade the visual quality of the site. Construction equipment may be visible for a limited number of boaters using nearby waters in the Delta or a limited number of visitors to the island by vehicle. These impacts will occur for short periods of time each year and will be seen by very few viewers during the construction period. After Project completion, the slopes will be revegetated and construction equipment will be removed. The rehabilitation of the levee will not change the visual character or the aesthetic quality of the Project area or surrounding areas. Therefore, effects are considered to be temporary and less than significant.

d) Would the Project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

There will be no nighttime construction or creation of a new source of substantial light or glare as a result of the Project. There will be no impact.

2.2 Agricultural and Forest Resources

Issues	Potentially significant impact	Less Than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural land?	❑	❑	✓	❑
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) 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?	❑	❑	✓	❑

2.2.1 Environmental setting

2.2.1.1 Farmland

The California Farmland Mapping and Monitoring Program (FMMP), administered by the State Division of Land Resource Protection, is responsible for producing agricultural resource maps based on soil quality and land use. The purpose of the FMMP is to provide information to be used in planning for current and future use of the State's agricultural lands. The FMMP designates land into the following categories: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban or Built-up Land, Other Land, and Water.

The majority of Bacon Island is designated as Prime Farmland (CFMMP 2014). Along the outer edge of the island, there are small areas of Non-agricultural and Natural Vegetation. Borrow sites 1 and 2, totaling 57 ac, are located on Prime Farmland (56.5 ac are currently active farmland; 0.5 ac at Borrow Site 2 are Riparian Forest). Borrow Site 3 is located on Farmland of Local Importance; this area is comprised of ruderal vegetation and is not currently used for farming.

2.2.1.2 Relevant Local or County Ordinance

In January 2016, the County of San Joaquin adopted Interim Urgency Ordinance 4472, which provides, in relevant part:

> 9-605.7. PROHIBITED USES. All uses, including, but not limited to flooding inconsistent with generally accepted agricultural practices or which presents or could

present a threat to the physical integrity of Delta levees, on land with a general plan designation of AG and located within the Primary Zone of the Sacramento-San Joaquin Delta are prohibited, except:

(a) Allowed uses as identified in Tables 9-605.2, 9-605.3 and 9-605.4 of the San Joaquin County Development Title;
(b) The Delta Wetlands Project as defined in the 2011 Delta Wetlands Project Place of Use Environmental Impact Report and reflected in the Protest Dismissal and Settlement Agreement reached in the matter of Central Delta Water Agency et al. v. Semitropic Water Storage District et al., San Francisco County Superior Court Case No. CPF-II-51175; and
(c) Easements obtained under the San Joaquin Multispecies Habitat Conservation Plan, but not greater than 80 cumulative acres by a single entity.

Since its adoption, the County Board of Supervisors has extended the ordinance twice, and it is currently set to expire in January 2018, if the County does not adopt an ordinance to replace it before that time.

2.2.2 Findings

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

Borrow Sites 1 and 2 could be excavated to 10 feet below current grade, which could reach the existing water table, in which case water from the existing water table may seep into the bottom of the pits and form ponds. These two Borrow Sites, representing approximately 56.5 ac of current Prime Farmland, will be converted to non-agricultural uses, namely wildlife habitat in the form of freshwater ponds, freshwater marsh, and scrub shrub (presumed to become naturally established as a result of rainwater, and possibly groundwater, filling the depressions created from borrow material removal). The conversion will represent approximately 0.0093% of the total farmland and 0.075% of the total Prime Farmland in San Joaquin County according to the 2014 FMMP acreages. This conversion will not substantially affect overall farmland acreage or agricultural productivity in San Joaquin County. Because the conversion of Prime Farmland attributable to the Project will represent such a small fraction of the total farmland and Prime Farmland in the County, this will be considered a less-than-significant impact. In contrast to this small area of farmland conversion, the flood control improvements provided by the Project will protect the remaining 5,625 ac of farmland on Bacon Island from future flood damage. Therefore, the Project will have a cumulative benefit to agricultural resources. Further, the Project will convert the 57 ac of Prime Farmland to habitat and not to paved or developed land uses.

The Project also includes several Habitat Areas adjacent to the existing levee. These areas were selected for habitat enhancement because they were already unsuitable for farming.

For the abovementioned reasons, conversion of Prime Farmland in the Project is considered less than significant.

b) Would the Project conflict with existing zoning for agricultural use, or a Williamson Act contract?

Bacon Island is not under a Williamson Act contract (California Department of Conservation 2015/2016).

The Project will not conflict with goals or policies in the San Joaquin County General Plan (San Joaquin County 2010a) or the Land Use and Resource Management Plan for the Primary Zone of the Delta (DPC 1995). The San Joaquin County Wide General Plan establishes General Agriculture (AG) Zones to preserve agricultural lands for the continuation of commercial agricultural enterprises (San Joaquin County 2009). The two borrow sites are the only parts of the Project where a change in land use will occur. Borrow Site 1, which is 36.7 ac, is located in a 189-ac parcel zoned AG-80 ("80" means parcel sizes must be a minimum of 80 ac). Borrow Site 2, which is 20.5 ac, is located in a 167-ac parcel zoned AG-80. The majority of each parcel (80% of the Borrow Site 1 parcel and 88% of the Borrow Site 2 parcel) will continue to be actively managed for agriculture production. After the Project, the borrow site areas may provide freshwater pond, freshwater marsh, and/or scrub shrub habitat. These habitats do not substantially conflict with existing zoning for agricultural use on the island. One of the goals of the Land Use and Resource Management Plan for the Primary Zone of the Delta (DPC 1995) is to "encourage compatibility between agricultural practices and wildlife habitat." Agriculture will continue to be the primary land use on Bacon Island. This impact will therefore be less than significant.

c) Would the Project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

No portion of Bacon Island is zoned for forest land, timberland, or Timberland Production. There will be no impact.

d) Would the Project 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?

See answer to (b) above.

Based on review of the plain language of Interim Urgency Ordinance 4472 and the public record supporting its adoption and extensions, this ordinance does not prohibit use of on-site borrow pits for levee maintenance projects such as the Project, which are carried out as part of the District's routine maintenance of Delta levees to protect agricultural lands from inundation as the result of levee overtopping or failure. Indeed, if the use of on-site borrow pits would result in "flooded" pits because the excavation reaches the existing water table, such "flooding" is consistent with generally accepted agricultural practices in the Delta, since it protects the surrounding agricultural land from flooding, which preserves the ability to farm it. In addition, use of these on-site borrow areas would not threaten the integrity of any of the Bacon Island levees. To the contrary, their use is for the express purpose of improving a 4.7-mile segment of the levee along Old River, and is designed and supervised by licensed engineers.

2.3 Air Quality

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	❑	❑	✓	❑
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	❑	❑	❑	✓
c) 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 (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	❑	❑	✓	❑
d) Expose sensitive receptors to substantial pollutant concentrations?	❑	❑	❑	✓
e) Create objectionable odors affecting a substantial number of people?	❑	❑	❑	✓

2.3.1 Environmental setting

Bacon Island is located in the northern region of the San Joaquin Valley Air Basin (SJVAB), which includes Fresno, Kern (western and central), Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties, and is administered by the San Joaquin Valley Air Pollution Control District (SJVAPCD). The SJVAB is bounded by mountainous areas to the east, west, and south, with an opening to the north into the Sacramento Valley. The region experiences relatively long summers with generally hot and dry conditions, and short winters with sparse rainfall. Subtropical high air pressure events can occur year-round and result in the formation of strong atmospheric inversion layers. The combination of these topographical and meteorological conditions acts to prevent the dispersion of pollutants and are particularly conducive to poor air quality. Air quality data for the SJVAB from 2012 to 2015 are summarized in Table 2-2 and describe the existing conditions for air quality in the Project vicinity.

Table 2-2. Summary statistics for air quality data in the SJVAB from 2012 to 2015.

Year	Pollutant (averaging time)	Maximum concentration	No. of days exceeding federal standards	No. of days exceeding State standards
2012	Ozone (1 hour)	0.135 ppm	3	72
	Ozone (8 hour)	0.116 ppm	105	134
	CO (8 hour)	2.22 ppm	0	0
	$PM_{2.5}$ (daily)	93 µg/m^3	29	n/a
	PM_{10} (daily)	139 µg/m^3	0	89
2013	Ozone (1 hour)	0.123 ppm	0	41
	Ozone (8 hour)	0.106 ppm	89	112
	CO (8 hour)	ppm	n/a	n/a
	$PM_{2.5}$ (daily)	167 µg/m^3	50	n/a
	PM_{10} (daily)	224 µg/m^3	4	122
2014	Ozone (1 hour)	0.128 ppm	1	48
	Ozone (8 hour)	0.105 ppm	86	128
	CO (8 hour)	ppm	n/a	n/a
	$PM_{2.5}$ (daily)	107 µg/m^3	40	n/a
	PM_{10} (daily)	430 µg/m^3	8	139
2015	Ozone (1 hour)	0.135 ppm	1	47
	Ozone (8 hour)	0.110 ppm	82	99
	CO (8 hour)	ppm	n/a	n/a
	$PM_{2.5}$ (daily)	112 µg/m^3	38	n/a
	PM_{10} (daily)	143 µg/m^3	0	121

Source: California Air Resources Board (CARB 2016)
$PM_{2.5}$ = respirable particulate matter (less than 2.5 microns in diameter)
PM_{10} = respirable particulate matter (less than 10 microns in diameter)
CO = carbon monoxide
ppm = parts per million
ug/m^3 = micrograms per cubic meter of air
n/a = not available

The SJVAB does not consistently meet several applicable air quality standards (CARB 2016). Between 2012 and 2015, measures of 8-hour ozone frequently exceeded both federal and State standards, whereas concentrations of suspended particulate matter ($PM_{2.5}$ and PM_{10}) exceeded federal standards fewer times per year, but frequently exceeded State standards (Table 2-2). Concentrations of carbon monoxide (CO) did not exceed State or federal standards during 2012 and were not available during 2013 to 2015. Based on the federal and State standards, the SJVAB is currently designated federally as extreme non-attainment for 8-hour ozone standards, non-attainment for $PM_{2.5}$ standards, and attainment for PM_{10} and CO standards, and designated by the State as severe non-attainment for 1-hour ozone, non-attainment for 8-hour ozone, $PM_{2.5}$, and PM_{10}, and attainment for CO (SJVAPCD 2015).

For some air quality constituents, impacts are determined based on the distance to the closest "sensitive receptor." The nearest sensitive receptors to the Project are residential homes and businesses on Bethel Island (estimated population of 2,137), which is approximately 2.7 miles northwest of Bacon Island.

2.3.2 Findings

This section describes the potential air quality effects of the Project, including exhaust emissions from construction equipment, fugitive dust generated by construction activities, and vehicle travel over unpaved roads. To complete the air quality analysis, information was collected on Project construction activities, duration, timing, and equipment use for the anticipated construction period and used to run the Road Construction Emission Model Version 8.1.0 developed for the Sacramento Metro Area Air Quality Management District (SMAQMD) was used to estimate Project emissions. This model is approved for use by the SJVAPCD for linear projects that include construction of a new roadway, road widening, or levee construction.

The modeling was based on the material amounts and construction equipment assumptions described in Table 2-3, and: (1) a 179.1-acre Project area; (2) a 1.0-acre maximum daily disturbance; (3) a total of 1,384 cubic yards of on-site fill per day; (4) a total of 514 cubic yards of imported fill/aggregate per day; (5) a round-trip distance of 60 miles for imported material; and (6) a 5-day work week at 8 hours per day, totaling 88 days over the period of July 1 through October 31 in 2017, and 154 days over the period of April 1 through October 31 in 2018..

Table 2-3. Project emission sources and assumptions used to determine air emissions.

Emission source	Project assumptions
Material on-site used for cut/fill	335,000 cubic yards
Material imported used for cut/fill	112,000 cubic yards
Material imported used for paving	12,500 cubic yards
Fuel-fired construction equipment	Excavator (2) Bulldozer (2) Scraper (2) Compactor (2) Water truck (2) Pumps (2) Planting equipment (1)
Employee commute trips	10 employee trips/day, 20 miles each way

Emissions thresholds for criteria pollutants developed by the SJVAPCD and the U.S. Environmental Protection Agency (EPA) were used in determining the significance of Project-related air quality effects. Since the SJVAPCD thresholds are more stringent than the EPA thresholds, emissions would be considered significant if they exceeded the local thresholds established by the SJVAPCD for construction activities. Thresholds established by the SJVAPCD are:

- 10 tons per year of NO_X (nitrogen oxides)
- 10 tons per year of ROG (reactive organic gas)
- 15 tons per year of PM_{10} (summed for dust and exhaust)
- 15 tons per year of $PM_{2.5}$ (summed for dust and exhaust)
- 100 tons per year of CO

Model results for the average annual emissions in tons per year for the Project construction period are shown in Table 2-4.

Table 2-4. Average annual Project construction emission estimates (tons per year).

	NO_X	ROG	PM_{10}	$PM_{2.5}$	CO	CO2e
Project Construction	8.26	0.92	1.17	0.43	7.52	1,681
SJVAPCD Threshold	10	10	15	15	100	n/a[1]

[1] Although the SJVAPCD has not adopted quantitative threshold values for greenhouse gas emissions (SJVAPCD 2015), the State of California imposes a Mandatory Reporting Regulation (MMR) for greenhouse gas emissions, with a proposed annual State limit of 431 million metric tons of carbon dioxide equivalent (CO2e) (CARB 2016).

a) Would the Project conflict with or obstruct implementation of the applicable air quality plan?

Based on the air quality modeling, construction of the Project is expected to result in temporary emissions that are well below State standards. There will be no change in long-term operational emissions. This impact will therefore be less than significant.

b) Would the Project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

The model results show the construction of the Project is not expected to exceed State or federal air quality standards and therefore not violate any air quality standard or contribute substantially to an existing or projected air quality violation. There will be no impact.

c) Would the Project 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 (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

The model results show the construction of the Project is not expected to exceed the annual threshold criteria of pollutants for which the Project region is currently in non-attainment (including $PM_{2.5}$, PM_{10}, and ozone precursors [e.g. NO_x and ROG]). Although the Project will result in some emissions for which the SJVAB is not in attainment, the minimal amount and temporary nature of these emissions will not result in a cumulatively considerable net increase of these pollutants. Therefore, this impact would be less than significant.

d) Would the Project expose sensitive receptors to substantial pollutant concentrations?
The construction of the Project is not expected to expose sensitive receptors to substantial pollutant concentrations. The nearest sensitive receptors are residential homes and businesses on Bethel Island and the small number of people that reside on the island (estimated population of 2,137), approximately 2.7 mi to the northwest. The Project will not result in substantial pollutant concentrations, as demonstrated by the modeling results and do to the temporary nature of Project construction. Therefore, the Project is expected to have no impact on exposing sensitive receptors to substantial pollutant concentrations.

e) Would the Project create objectionable odors affecting a substantial number of people?

The construction of the Project is not expected to create any objectionable odors and the Project will not result in any change to current operations. Therefore, the Project is expected to have no impact with regards to creating objectionable odors affecting a substantial number of people.

2.4 Biological Resources

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	❑	✓	❑	❑
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 federally protected wetlands as defined by Section 404 of the Clean Water Act (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?	❑	❑	❑	✓

2.4.1 Environmental setting

2.4.1.1 Methodology

Special-status species are defined as those that are:

- listed as endangered or threatened, or are proposed/candidates for listing, under the ESA and/or CESA;
- designated by CDFW as a Species of Special Concern;
- designated by CDFW as Fully Protected under the California Fish and Game Code (Sections 3511, 4700, 5050, and 5515);
- protected under the federal Bald and Golden Eagle Protection Act;
- designated as rare under the California Native Plant Protection Act (CNPPA); and/or
- included on the CDFW's Special Vascular Plants, Bryophytes, and Lichens List with a California Rare Plant Rank (CRPR) of 1, 2, 3, or 4 (CDFW 2016).

Rare natural communities are vegetation communities considered to be natural communities of special concern (S1–S3) on CDFW's *List of California Terrestrial Natural Communities* (CDFG 2010).

Lists of special-status plant and wildlife species that may occur in the Project region were developed by querying the following databases:

- The USFWS list of federally listed and proposed endangered, threatened, and candidate species (IPaC Trust Resources Report) (USFWS 2016),
- The California Native Plant Society's (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2016), and
- CDFW's California Natural Diversity Database (CNDDB) (CDFW 2016).

These database queries were based on a search of the U.S. Geological Survey (USGS) 7.5-minute quadrangles in which the Project is located (Woodward Island and Bouldin Island), and the surrounding ten quadrangles (Rio Vista, Isleton, Thornton, Terminous, Holt, Union Island, Clifton Court Forebay, Byron Hot Springs, Brentwood, Jersey Island. The database query results are presented in Appendix A.

On October 12, 2016, a site reconnaissance—including habitat mapping and a habitat assessment for special-status wildlife and plant species—was conducted by a Stillwater Sciences' wildlife biologist (H. Burger), plant ecologist (M. Keever), and junior ecologist (S. Gabrielson).

The habitat preferences and distributional range of each species from the database queries were compared with existing information and the results of the site reconnaissance to determine the species likelihood to occur in the Project area, and refine the list of species that may be impacted by the Project (see Appendix A). If a species' required habitat was lacking from the Project area or if the Project area is outside the species' known distribution or elevation range, the species was considered not likely to occur. Fish species are not included, as there will be no work below MHW, or work affecting shaded riverine aquatic cover.

2.4.1.2 Vegetation types

Most of Bacon Island is in agricultural production (e.g., corn and rice production), including Borrow sites 1 and 2. Land cover and habitat types in the Project area are depicted in Figures 2-1 through 2-13 and summarized in Table 2-5. The majority of the Project area is composed of non-native ruderal herbaceous vegetation, which provides little habitat value. Vegetation on the crown and slopes of the levees is regularly mowed. Occasionally there are isolated trees or patches of scrub-shrub, freshwater marsh, and non-native Himalayan blackberry (*Rubus armeniacus*) brambles along the landside slope. The waterside of the levee is riprap that supports patches of riparian forest, scrub-shrub, freshwater marsh (including permanent and seasonal wetlands), non-native giant reed breaks, and water hyacinth mats (*Eichhornia crassipes*), primarily near the edge of open water. The habitat value of native vegetation is relatively low in the Project area due to its small and patchy distribution. There is very little Riparian Forest[5], Freshwater Marsh[6], or Scrub-shrub[7] habitat within the Project footprint, although these habitats are adjacent to the Project.

[5] Assembly Bill (AB) 360 Definition for Riparian Forest habitat includes woody vegetation (including isolated trees or shrubs) greater than 20 ft in height that may or may not overhang the water's edge. Often there is a dense, shrubby understory. The most common trees in the Delta include cottonwood, sycamore, alder, Oregon ash, willows, box elder, black walnut and various oaks.

[6] The AB 360 definition for Freshwater Marsh habitat includes tidal and non-tidal areas near levees, either on the waterside or landside where there are seeps or toe ditches. Common plant species include cattails and tules.

[7] The AB 360 Definition for Scrub-shrub habitat includes stands of woody vegetation predominantly less than 20 ft in height. The various tree and shrub species that make up Scrub-shrub are generally the same as for Riparian Forest, although in most instances alders and or willows are the dominant plants.

Figure 2-1. Vegetation types in the Project area, page 1. (Note that Habitat Area 1 comprises ruderal herbaceous vegetation; habitat enhancement will not therefore involve conversion of agriculture.)

Figure 2-2. Vegetation types in the Project area, page 2. (Note that Habitat Area 2 comprises ruderal herbaceous vegetation; habitat enhancement will not therefore involve conversion of agriculture.)

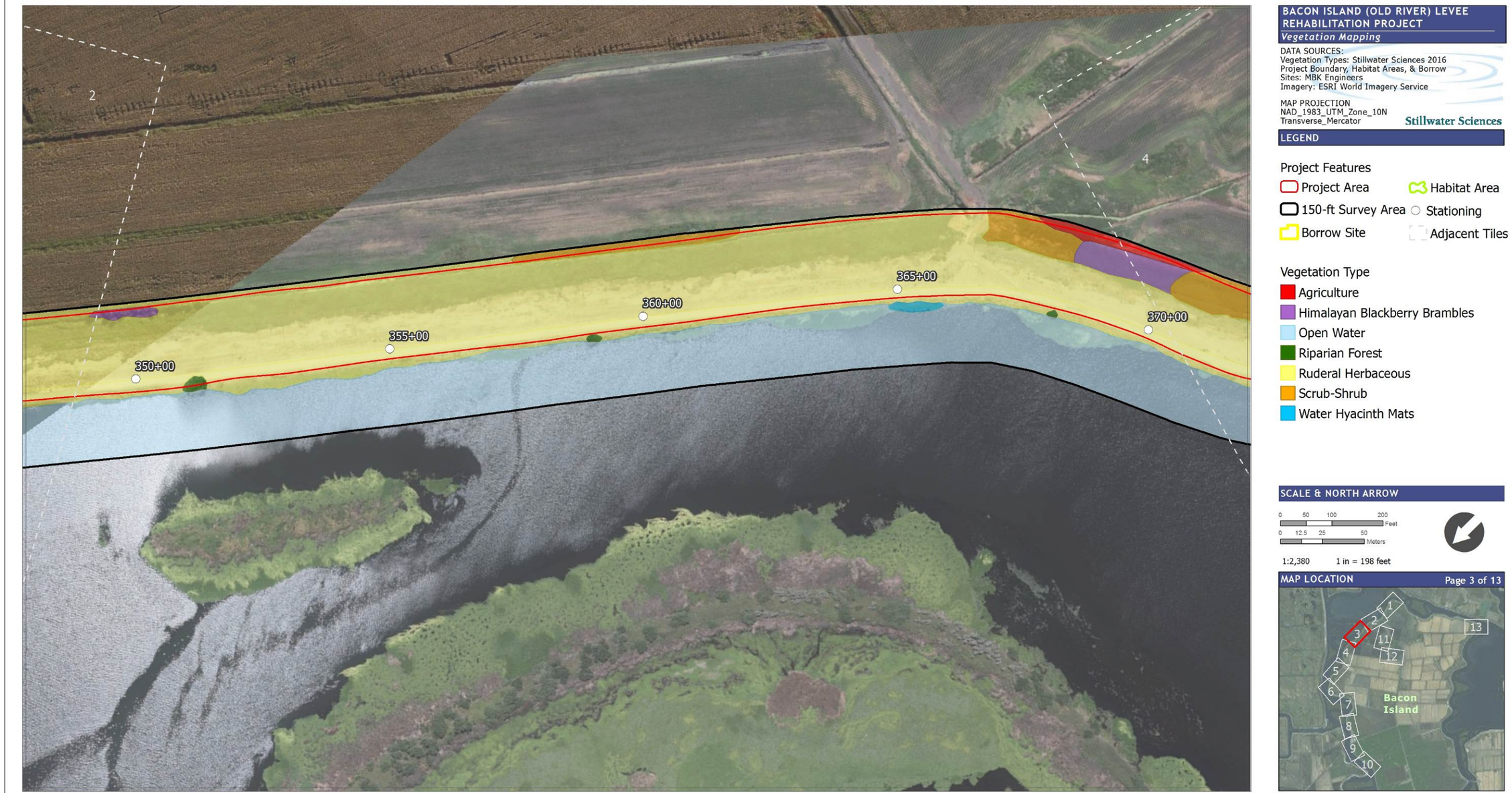

Figure 2-3. Vegetation types in the Project area, page 3.

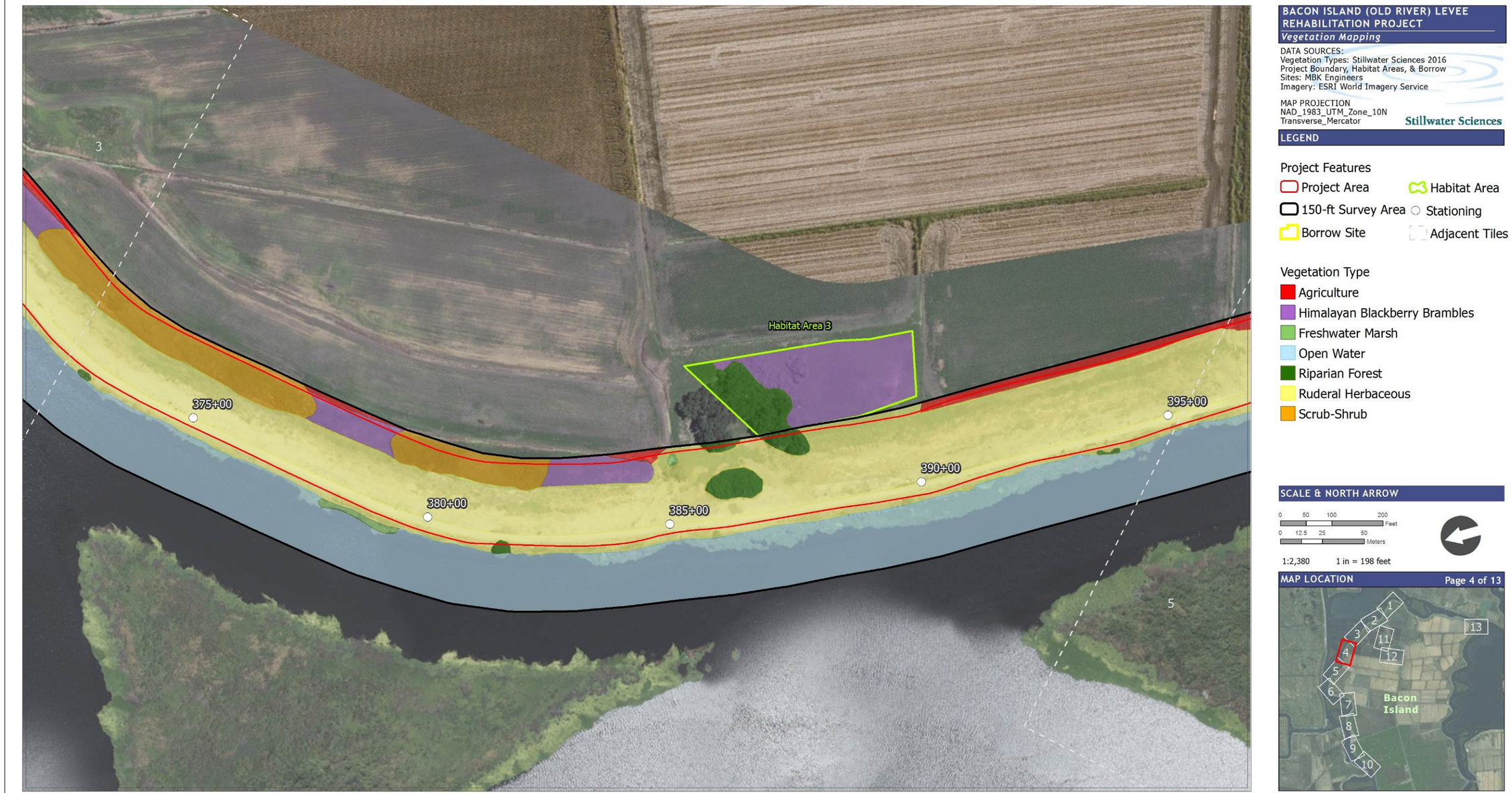

Figure 2-4. Vegetation types in the Project area, page 4. (Note that Habitat Area 3 comprises Himalayan blackberry brambles and riparian forest; habitat enhancement will not therefore involve conversion of agriculture.)

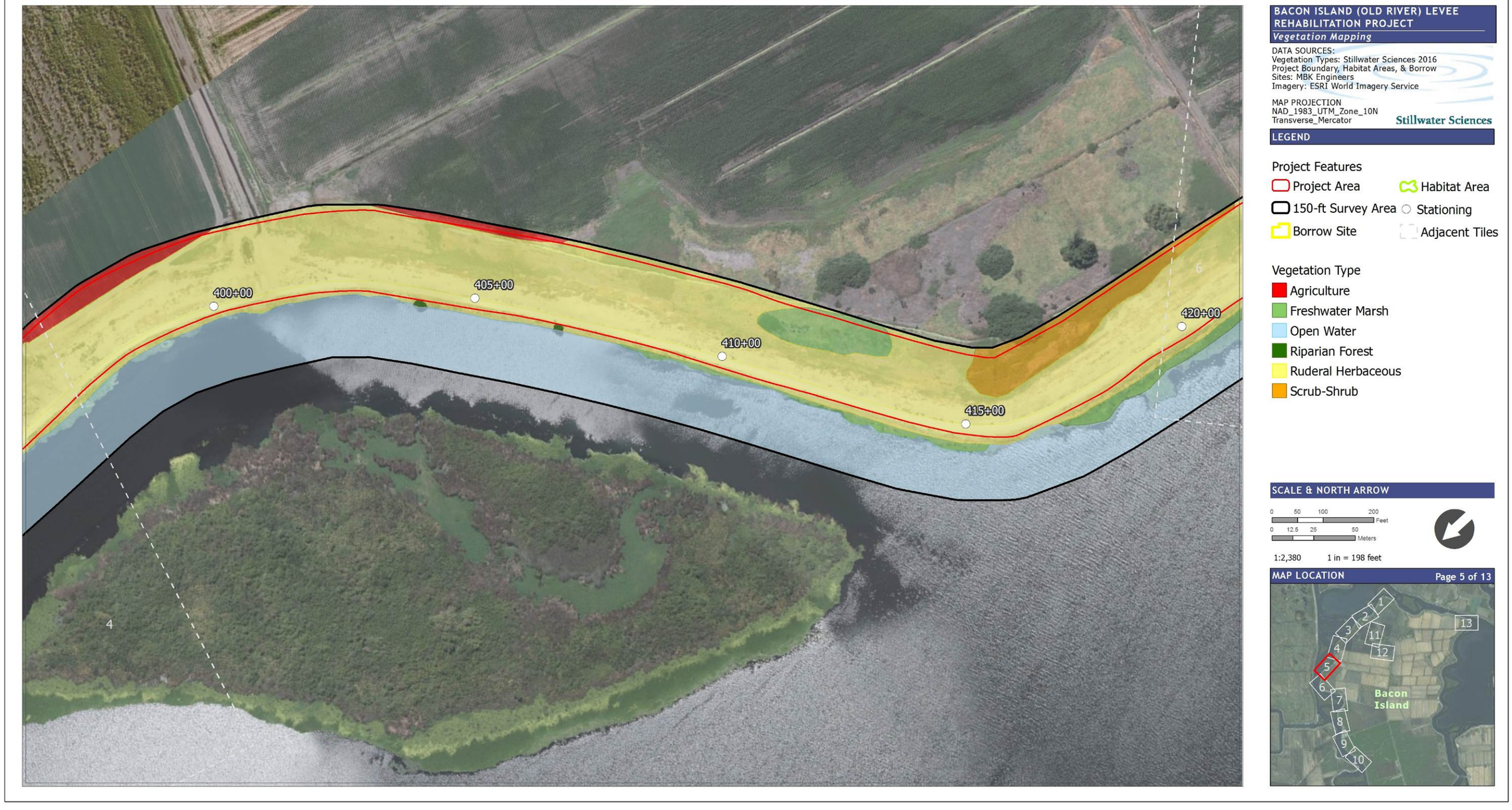

Figure 2-5. Vegetation types in the Project area, page 5.

Figure 2-6. Vegetation types in the Project area, page 6. (Note that Habitat Area 4 comprises ruderal herbaceous vegetation; habitat enhancement will not therefore involve conversion of agriculture.)

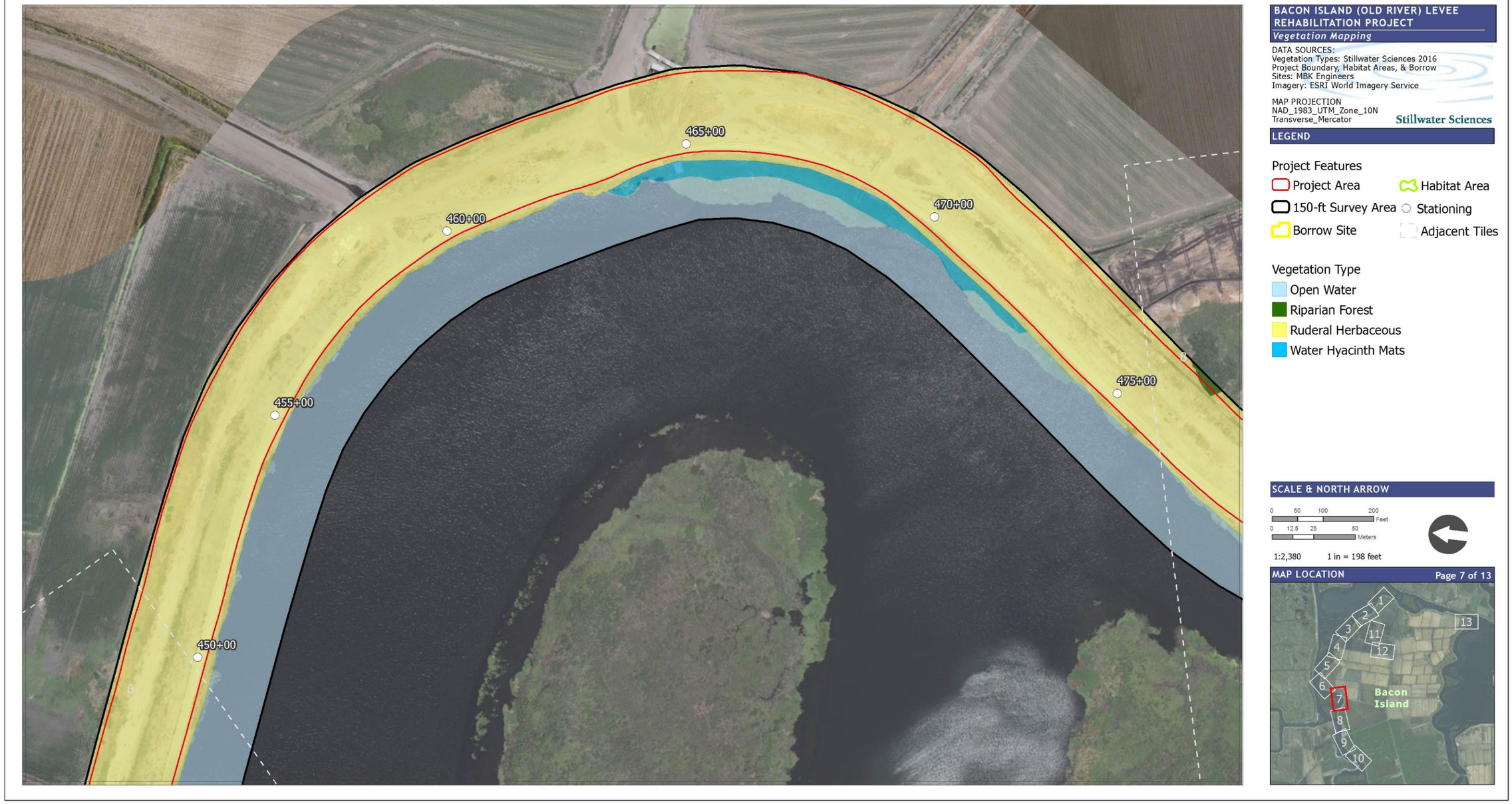

Figure 2-7. Vegetation types in the Project area, page 7.

Figure 2-8. Vegetation types in the Project area, page 8.

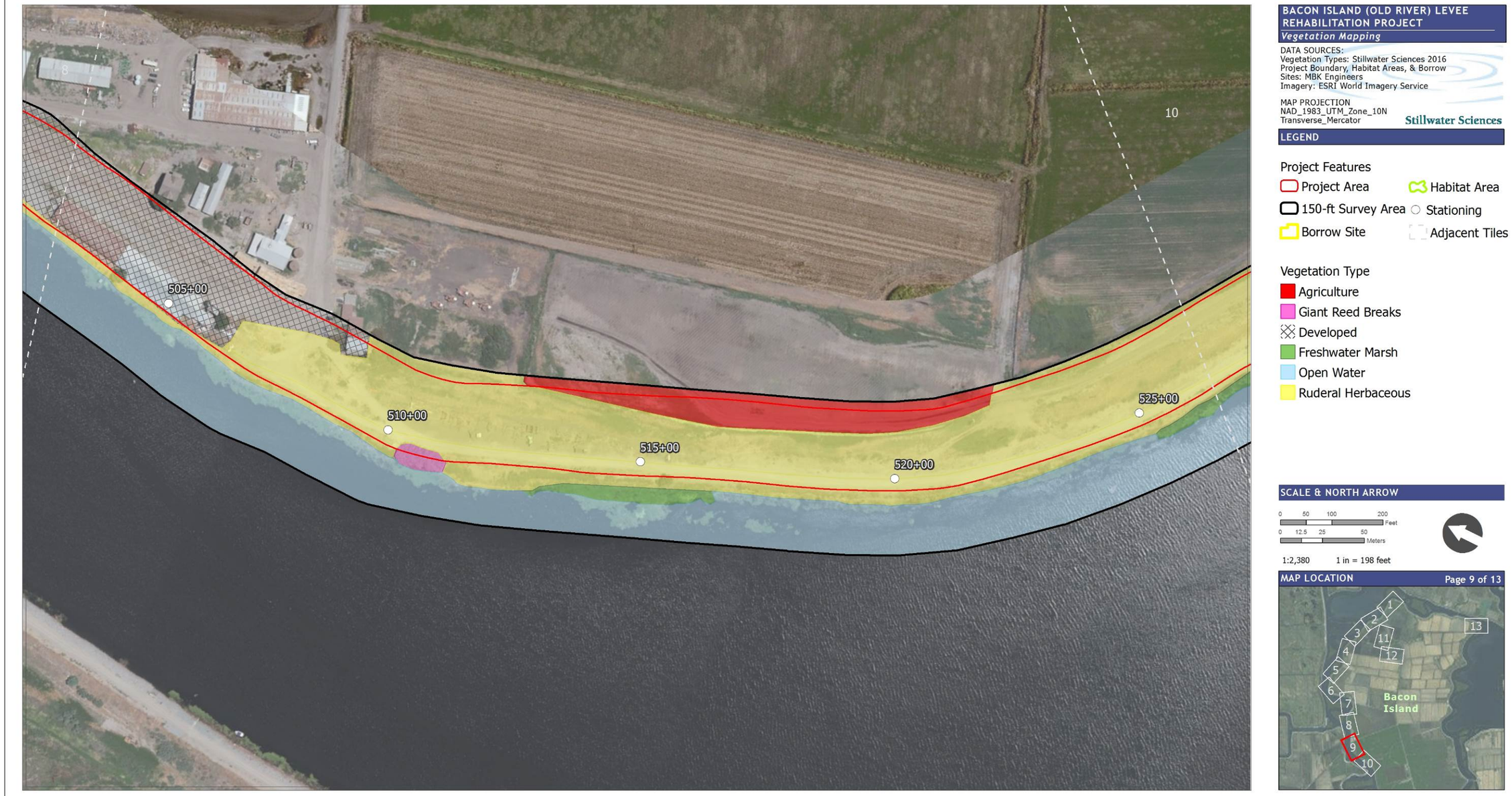

Figure 2-9. Vegetation types in the Project area, page 9.

Figure 2-10. Vegetation types in the Project area, page 10.

Figure 2-11. Vegetation types in the Project area, page 11.

Figure 2-12. Vegetation types in the Project area, page 12.

Figure 2-13. Vegetation types in the Project area, page 13.

Table 2-5. Summary of vegetation types in the Project area (in acres).

Habitat type	Landside	Waterside	Borrow Sites			Habitat Areas				Total Acres (% of Total)
			1	2	3	1	2	3	4	
Riparian forest	0.7	0.1	None	0.5[a]	None	0.1	None	0.3	None	3.8 (2%)
Scrub-shrub	2.4	<0.1	None	None	None	None	None	None	None	0.5 (0.3%)
Freshwater marsh	0.5	None	None	None	None	None	None	None	None	0.5 (0.3%)
Himalayan blackberry brambles	0.8	None	None	None	None	None	None	1.0	None	1.7 (1%)
Ruderal herbaceous	68.0	10.9	None	None	6.0	1.2	0.2	None	1.4	87.6 (56%)
Giant reed breaks	None	<0.1	None	None	None	None	None	None	None	<0.1 (0.02%)
Water hyacinth mats	None (only located in waterside buffer)									
Agriculture	2.4	None	36.7	19.9	None	None	None	None	None	59.0 (37%)
Developed	4.3	0.3	None	None	None	None	None	None	None	4.5 (3%)

[a] Riparian forest in Borrow Site 2 will not be affected by Project activities

Riparian forest

Riparian forest vegetation is present in the Project area as isolated trees along the waterside of the levee, small patches sporadically along the landside of the levee, within small patches in Habitat Areas 1 and 3, and within Borrow Site 2. Riparian forest vegetation is typically a mix of white alder (*Alnus rhombifolia*), northern California black walnut (*Juglans hindsii*), Fremont cottonwood (*Populus fremontii* subsp. *fremontii*), narrow-leaved willow (*Salix exigua*), Goodding's black willow (*Salix gooddingii*), and arroyo willow (*Salix lasiolepis*), in addition to non-native blue gum (*Eucalyptus globulus*) and non-native edible fig (*Ficus carica*). The mature trees in riparian forest vegetation in the Project area, particularly cottonwoods and willows, may provide cover, roosting, foraging, and nesting habitat for raptors, songbirds, sparrows, and other migratory birds.

Scrub-shrub

Scrub-shrub vegetation is patchily distributed along the landside levee toe and in small patches along the waterside of the levee. Dominant plant species include California button willow (*Cephalanthus occidentalis*), narrow-leaved willow, and arroyo willow. Scrub-shrub in the Project area may provide cover and foraging habitats for wildlife including birds and mammals.

Freshwater marsh

Freshwater marsh occurs patchily along the waterside of the levee, with the largest patches concentrated in the middle of the Project area (western-most tip of Bacon Island). In addition, pockets of freshwater marsh occur along the landside levee toe. Dominant plant species include common reed (*Phragmites australis*), tule (*Schoenoplectus acutus* var. *occidentalis*), California bulrush (*Schoenoplectus californicus*), cattails (*Typha* spp.), and stinging nettle (*Urtica dioica*).

Emergent freshwater marsh can provide nesting, foraging, roosting, and cover for a variety of species.

Himalayan blackberry brambles

Non-native Himalayan blackberry brambles are patchily distributed along the landside levee toe with patches also documented within Habitat Area 3. These areas are completely dominated by Himalayan blackberry as the species forms a dense thicket of vegetation. Himalayan blackberry fruits provide food for birds and mammals, and the dense brambles may provide cover for wildlife. It is a non-native and highly invasive species, however, and it often outcompetes and replaces native habitat. Even though it is non-native species, CDFW considers it to be scrub-shrub habitat for a variety of wildlife species and mitigation can be required for permanent impacts.

Ruderal herbaceous

Vegetation on the levee crown, landside levee slope, Habitat Areas 1, 2, 4 and portions of Habitat Area 3, as well as Borrow Site 3 and the riprapped waterside slope is dominated by non-native ruderal herbaceous vegetation. Dominant plant species include a mix of non-native grasses such as Bermuda grass (*Cynodon dactylon*), barnyardgrass (*Echinochloa crus-galli*), common reed, and Johnson grass (*Sorghum halepense*), as well as herbaceous species such as wild watermelon (*Citrullus lanatus* var. *citroides*), bindweed (*Convolvulus arvensis*), shortpod mustard (*Hirschfeldia incana*), prickly lettuce (*Lactuca serriola*), and radish (*Raphanus sativus*). Ruderal herbaceous areas can provide some wildlife species with food resources (for example, seeds from grasses and forbs), perching opportunities for common songbirds such as red-winged blackbird (*Agelaius phoeniceus*) and song sparrow (*Melospiza melodia*), and foraging opportunities for raptors. Raptors are frequently observed foraging for rodents on the landside of ruderal levee slopes (which are periodically mowed), including the levee on Bacon Island. However, in general, ruderal herbaceous vegetation does not provide high-quality wildlife habitat, particularly for special-status species.

Giant reed breaks

Adjacent to the levee crown on the waterside, there are a few stands of giant reed (*Arundo donax*). This species is listed as a highly invasive plant in California, and is known to spread rapidly in most aquatic and riparian systems (Cal-IPC 2016). Because giant reed has no structural similarity to the native riparian plants that it typically replaces, it offers little useful cover or nest placement opportunities for birds (McWilliams 2004). It also reduces habitat and food supply, particularly insect populations, for native birds.

Water hyacinth mats

Adjacent to the levee on the waterside, there are a few patches of water hyacinth. This species is listed as a highly invasive plant in California, is under management by the California Department of Boating and Waterways, and is known to spread rapidly throughout the Delta due to its rapid leaf production, fragmentation of daughter plants, and prolific seed production and germination (Godfrey 2000, Cal-IPC 2016). Water hyacinth reduces open water habitat for waterfowl and displaces native aquatic plants used for food or shelter by other wildlife species (Godfrey 2000). It alters localized water quality (e.g., lowers pH, dissolved oxygen and light; increases turbidity and carbon dioxide tension) which affects the health of fish, and the decaying plants make the water unfit for drinking by wildlife (Godfrey 2000).

Agriculture

Most of the interior of Bacon Island is used for agricultural production. Rice (*Oryza sativa*) is typically grown in Borrow Site 1 and corn (*Zea mays*) is typically grown in Borrow Site 2.

Agricultural lands now partially fill the habitat void from the loss of Delta wetlands. Corn fields on Bacon Island provide wildlife habitat when they are seasonally flooded (particularly for waterfowl), and unflooded fields provide habitat for rodents and the raptors that prey on them. Giant garter snake uses rice fields, particularly associated irrigation canals, for foraging and cover.

2.4.1.3 Waters and wetlands

Although a formal delineation of jurisdictional waters and wetlands has not been conducted for the Project area, the boundaries of such features can be reasonably approximated based on the associated vegetation and land cover type (see Figures 2-1 through 2-13), and the results of delineations for other Delta islands. On the waterside of the levee, all features below the MHW line are considered to be jurisdictional waters/wetlands. On the landside of the levee, areas of freshwater marsh, as well as some areas and/or portions of shrub-scrub and riparian forest, may be jurisdictional wetlands, although it is important to note that wetlands that are the result of levee seepage are not typically subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE) under the federal Clean Water Act (USACE 1995).

2.4.1.4 Special-status species and vegetation communities

Plant species and vegetation communities

Forty-five special-status plant species and eight rare natural communities were identified from the database queries as potentially occurring in the Project region (Appendix A). Most of these have little or no potential to occur in or near the Project area because no suitable habitat is present or the Project area is outside of the species' known range. Thirteen plant species and one natural community have moderate or high potential to occur within or near the Project area (Table 2-6). Plants and communities with high potential to occur in or adjacent to the Project area are discussed in greater detail below.

Table 2-6. Summary of special-status plant species and rare natural communities with the potential to occur in the Project area.

Scientific name	Common name	Status[1] Federal/State/CRPR	Potential for occurrence
Special-Status Plant Species			
Brasenia schreberi	watershield	–/–/2B.3	Moderate potential for suitable habitat within freshwater marsh
Carex comosa	bristly sedge	–/–/2B.1	Moderate potential for suitable habitat within freshwater marsh
Cicuta maculata var. *bolanderi*	Bolander's water-hemlock	–/–/2B.1	Moderate potential for suitable habitat within freshwater marsh
Hibiscus lasiocarpos var. *occidentalis*	woolly rose-mallow	–/–/1B.2	High potential to occur adjacent to (but not within) the Project area; previously documented on Bacon Island

Scientific name	Common name	Status[1] Federal/State/CRPR	Potential for occurrence
Juglans hindsii	Northern California black walnut	–/–/1B.1	High potential to occur; documented in the Project area during habitat assessment; however, black walnuts in the area are likely of hybrid origin and thus not protected
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	–/–/1B.2	High potential to occur adjacent to (but not within) the Project area; documented on adjacent Delta islands
Lilaeopsis masonii	Mason's lilaeopsis	–/CR/1B.1	High potential to occur adjacent to (but not within) the Project area; previously documented on Bacon Island
Limosella australis	Delta mudwort	–/–/2B.1	High potential to occur adjacent to (but not within) the Project area; documented on adjacent Delta islands
Potamogeton zosteriformis	eel-grass pondweed	–/–/2B.2	Moderate potential for suitable habitat within freshwater marsh
Sagittaria sanfordii	Sanford's arrowhead	–/–/1B.2	Moderate potential for suitable habitat within freshwater marsh
Scutellaria galericulata	marsh skullcap	–/–/2B.2	Moderate potential for suitable habitat within freshwater marsh
Scutellaria lateriflora	side-flowering skullcap	–/–/2B.2	Moderate potential for suitable habitat within freshwater marsh
Symphyotrichum lentum	Suisun Marsh aster	–/–/1B.2	High potential to occur adjacent to (but not within) the Project area; previously documented on Bacon Island
Rare Natural Communities			
N/A	Coastal and valley freshwater marsh	S2.1	High potential to occur; characteristic species occur adjacent to (but not within) the Project area below MHW

[1] Status:
Federal
– No federal status
State
CR California State listed as rare
– No State status

California Rare Plant Rank (CRPR)
1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)
State Ranks for Rare Natural Communities
S2 6–20 viable occurrences Statewide
0.1 Very threatened

Woolly rose-mallow. Woolly rose-mallow (*Hibiscus lasiocarpos* var. *occidentalis*) is a rhizomatous herb in the mallow (Malvaceae) family with a CRPR of 1B.2 (i.e., rare, threatened, or endangered in California and elsewhere; moderately threatened in California) (it is not federally or otherwise State-listed). It is endemic to California, occurring below 394 ft in elevation within the central and lower Sacramento Valley and delta, as well as in Butte, Contra Costa, Colusa, Glenn, Sacramento, San Joaquin, Solano, Sutter, and Yolo counties (CNPS 2016). Woolly rose-mallow typically occurs in or adjacent to freshwater wetlands, along wet banks, and within freshwater marshes and swamps (Baldwin et al. 2012) and blooms June to September (CNPS 2016). It is not known to occur along river channels that are characterized by strong currents, intense flood forces, or steep banks. Although it occurs in areas of the Delta that are influenced by tidal fluctuations, it appears to be restricted to freshwater habitats (CDFG 1995, CDFW 2016). This species is threatened by riverbank alteration (Baldwin et al. 2012). Woolly rose-mallow has been previously documented on Bacon Island, adjacent to but not within the Project area across four mapped polygons (CDFW 2016). In the Project area, woolly rose-mallow plants have the potential to occur along the waterside of the levee on riprapped banks at or just above mean higher high water at the transition between freshwater marsh and ruderal herbaceous.

Northern California black walnut. Northern California black walnut is a tree in the walnut family (Juglandaceae) that has a CRPR of 1B.1 (i.e., rare, threatened, or endangered in California and elsewhere; seriously threatened in California) (it is not federally or otherwise State-listed). It is endemic to California, occurring below 1,444 ft within the central Sacramento Valley and Delta, as well as in Contra Costa, Lake, and Napa counties (CNPS 2016). Although its native habitat is typically not within Delta islands (i.e., it is typically found in canyons and valleys 164 to 656 ft in elevation and native populations are thought to be restricted to 3-5 sites [Baldwin et al. 2012 and CNPS 2016]), the species has been widely planted, hybridizes readily with English walnut (*Juglans regia*), and has been naturalized from cultivation in many areas of the Delta. Northern California black walnut typically occurs in riparian forest and woodlands and blooms April to May (CNPS 2016). This species is threatened by hybridization with orchard trees, urbanization, and conversion to agriculture (CNPS 2016). In the Project area, approximately nine northern California black walnut trees occur along the waterside of the levee on riprapped banks, often near the levee crown.

Delta tule pea. Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*) is a vine-like perennial herb in the pea family (Fabaceae) with a CRPR of 1B.2 (i.e., rare, threatened, or endangered in California and elsewhere; moderately threatened in California) (it is not federally or otherwise State-listed). It is endemic to California, occurring below 16 ft within the Central Valley, especially in the San Francisco Bay region, in Alameda, Contra Costa, Napa, Sacramento, Santa Clara, San Joaquin, and Solano counties (CNPS 2016). Delta tule pea typically grows in tidally influenced brackish and freshwater wetlands. It is commonly associated with tules (*Schoenoplectus* spp.) and willows (*Salix* spp.). Populations of delta tule pea have been found throughout much of the Delta region at the water's edge along river banks or on the higher grounds of marshlands, as well as along older riprapped banks and blooms May to July, sometimes as late as September (CNPS 2016). This species is threatened by agriculture, water diversions, and erosion (CNPS 2016). Although it has not been previously found on Bacon Island specifically, Delta tule pea has been documented on adjacent Delta islands. In the Project area, there is a high potential for it to occur on the waterside of the levee.

Mason's lilaeopsis. Mason's lilaeopsis (*Lilaeopsis masonii*) is a perennial, rhizomatous herb in the carrot family (Apiaceae) that is State-listed as rare and has a CRPR of 1B.1 (i.e., rare, threatened, or endangered in California and elsewhere; seriously threatened in California) (it is not federally listed). It is endemic to California, occurring below 33 ft in elevation within the southern Sacramento Valley, the Sacramento-San Joaquin Delta, and the northeast San Francisco Bay area, in Alameda, Contra Costa, Napa, Sacramento, San Joaquin, and Solano counties (CNPS 2016). Mason's lilaeopsis is found in brackish or freshwater marshes and swamps and riparian scrub habitat and blooms April to November (CNPS 2016). It is a semi-aquatic plant restricted to the water's edge where it is inundated by waves and tidal fluctuations; it is usually found between 4 to 28 inches above the low tide mark. This species is threatened by erosion, channel stabilization, development, flood control projects, recreation, agriculture, shading resulting from marsh succession, and competition with non-native water hyacinth (CNPS 2016). Mason's lilaeopsis has been previously documented on Bacon Island adjacent to but not within the Project area across two mapped polygons (CDFW 2016). In the Project area, Mason's lilaeopsis has the potential to occur along the waterside of the levee below MHW.

Delta mudwort. Delta mudwort (*Limosella australis*) is a stoloniferous herb in the figwort family (Scrophulariaceae) that has a CRPR of 2B.1 (i.e., rare, threatened, or endangered in California but more common elsewhere; seriously threatened in California) (it is not federally or otherwise State-listed). It occurs below 10 ft in elevation, primarily in the Delta, in Contra Costa, Sacramento, San Joaquin and Solano counties in California, and also in Oregon and the Atlantic coast (CNPS 2016). (There is debate over whether this species is native to California or not [Baldwin et al. 2012, CNPS 2016]). Delta mudwort is found in mud banks of the delta in marshy or shrubby riparian associations, often co-occurring with Mason's lilaeopsis and blooms May to August. The species is threatened by trampling, erosion by wave and wave attenuation stream

bank alteration, and levee maintenance (CNPS 2016). Although it has not been previously found on Bacon Island specifically, Delta tule pea has been documented on adjacent Delta islands. In the Project area, there is high potential for it to occur on the waterside of the levee, as there is suitable habitat and the often co-occurring Mason's lilaeopsis has been documented on the island.

Suisun Marsh aster. Suisun Marsh aster is a perennial rhizomatous herb in the sunflower (Asteraceae) family that has a CRPR of 1B.2 (i.e., rare, threatened, or endangered in California and elsewhere; moderately threatened in California) (it is not federally or otherwise State-listed). It is endemic to California, occurring below 10 ft in elevation within the southern Sacramento Valley, the delta, and San Francisco Bay, as well as in Contra Costa, Napa, Sacramento, San Joaquin, Solano, and Yolo counties (CNPS 2016). Suisun Marsh aster typically occurs in brackish and freshwater marshes and swamps and blooms May to November (CNPS 2016). This species is threatened by habitat loss (Baldwin et al. 2012). Suisun Marsh aster has been previously documented on Bacon Island adjacent to but not within the Project area across three mapped polygons (CDFW 2016). In the Project area, Suisun Marsh aster has the potential to occur along the waterside of the levee on riprapped banks at or just above mean higher high water.

Coastal and valley freshwater marsh. Coastal and valley freshwater marsh is generally dominated by perennial, emergent monocots including tules (*Schoenoplectus* spp.) and cattails (*Typha* spp.) and often forms completely closed canopies (Holland 1986). Patches of these species occur in the Project area and may be considered a rare natural community.

Wildlife

Thirty special-status wildlife species were identified from the database queries as potentially occurring in the Project region (Appendix B). Eighteen species have no or little potential to occur in or near the Project area because no or marginally suitable habitat is present or the Project area is outside of the species' known range. The following 12 remaining species have moderate or high potential to occur within or near the Project area:

- Western pond turtle (*Actinemys marmorata*)
- Giant garter snake (*Thamnophis gigas*)
- White-tailed kite (*Elanus leucurus*)
- Northern harrier (*Circus cyaneus*)
- Swainson's hawk (*Buteo swainsoni*)
- California black rail (*Laterallus jamaicenis coturniculus*)
- Greater/Lesser sandhill crane (*Grus canadensis tabida/ canadensis*)
- Burrowing owl (*Athene cunicularia*)
- Loggerhead shrike (*Lanius ludovicianus*)
- Song sparrow ("Modesto" population) (*Melospiza melodia*)
- Tricolored blackbird (*Agelaius tricolor*)
- Western red bat (*Lasiurus blossevillii*)

These species are discussed in detail below, including listing status, habitat associations, and notable life history requirements. In addition to the species described below, other common and special-status amphibians, reptiles, birds, and mammals may use the study area for foraging, cover, dispersal, and breeding.

Western pond turtle. Western pond turtle, a CDFW Species of Special Concern, inhabits fresh or brackish water characterized by areas of deep water, low flow velocities, moderate amounts of riparian vegetation, warm water and/or ample basking sites, and underwater cover elements, such as large woody debris and rocks (Jennings and Hayes 1994). Along major rivers, western pond turtles are often concentrated in side channel and backwater areas. Turtles may move to off-channel habitats, such as oxbows, during periods of high flows (Holland 1994). Although adults are habitat generalists, hatchlings and juveniles require specialized habitat for survival through their first few years. Hatchlings spend much of their time feeding in shallow water with dense submerged or short emergent vegetation (Jennings and Hayes 1994). Although an aquatic reptile, western pond turtles require upland habitats for basking, overwintering, and nesting, typically within 0.6 mi from aquatic habitats (Holland 1994). Western pond turtles are likely present along the waterside of the Project area, and may migrate overland through the Project area. Stillwater Sciences (2016) biologists observed six western pond turtles using aquatic habitat on Bacon Island along the waterside of the eastern Bacon Island levee in spring of 2016. There are four additional CNDDB occurrence records for the species in the waterways along the west and north sides of the island (CDFW 2016). There is suitable aquatic and basking habitat in the waterways surrounding the island, and suitable upland nesting habitat on the interior of the island beyond the levee toe. Young-of-year or juvenile western pond turtles may use the landside drainage ditches located in some areas beyond the Project area. Western pond turtles do not likely nest on the levee slope because of the compact soils and active levee vegetation management.

Giant garter snake. Giant garter snake is federally and State-listed as threatened. Highly aquatic, this species inhabits marshes, sloughs, ponds, low-gradient streams, agricultural wetlands (predominantly rice fields) and associated waterways including irrigation and drainage canals and ditches, and adjacent uplands. The three main habitat components required by giant garter snakes are: (1) adequate water and emergent, herbaceous wetland vegetation—such as bulrush or cattails—during the active season for foraging and escape cover; (2) grassy banks and openings in waterside vegetation for basking; and (3) higher elevation uplands with terrestrial burrows or crevices for cover, hibernation, and refugia from seasonal floods (USFWS 1999, Fisher et al. 1994). The active season for giant garter snake is generally early April through late October (USFWS 1999). There is low to moderate potential for giant garter snake to use the Project area for dispersal. The closest documented occurrence to the Project area, from 1996, is approximately 2.5 mi to the northeast, located on the southwest end of Medford Island (CDFW 2016); the record is for a reported shed giant garter snake skin. Other observations of giant garter snake—as recent as 2015 and 2016—have been confirmed on other Delta islands, including but not limited to: Sherman Island, Twitchell Island, Bouldin Island, Jersey Island, Bradford Island, and Empire Tract (CDFW 2017). Canals located along the interior of the island with emergent vegetation and water present between May and mid-September, such as the rice canals associated with Borrow Site 1, may provide suitable aquatic habitat for giant garter snake. However, there is no resident breeding population currently known on Bacon Island (Hansen pers. comm., as cited in ICF International 2010), and the extent of the available suitable aquatic habitat is likely not large enough to support a sustainable on-site population. Ditches located beyond the levee toe are unsuitable since they do not provide a permanent source of water during the snake's active season.

White-tailed kite. White-tailed kite is a CDFW Fully Protected species. White-tailed kite is a resident (breeding and wintering) species throughout central and coastal California, up to the western edge of the foothills of the Sierra Nevada; California constitutes the stronghold of its North American breeding range (Zeiner et al. 1990a). They are not migratory, but may make slight seasonal range shifts in coastal areas during winter (Zeiner et al. 1990a). White-tailed kites breed in lowland grasslands, oak woodlands or savannah, and wetlands with open areas. Riparian corridors represent a preferred landscape characteristic for kites in both the breeding and non-breeding seasons (Erichsen 1995). Groves of trees are required for perching and nesting, though kites do not seem to associate with particular tree species (Dunk 1995). Preferred foraging sites include open and ungrazed grasslands, agricultural fields, wetlands, and meadows that support large populations of small mammals. The white-tailed kite's year-round diet consists almost entirely of small mammals (Erichsen 1995), but can also include birds, insects, and reptiles. White-tailed kites breed between February and October, with peak breeding in May through August (Zeiner et al. 1990a). There is suitable foraging habitat for white-tailed kite in the vegetation along the interior levee. White-tailed kite may nest in isolated trees or groups of trees within the vicinity of the Project.

Northern harrier. Northern harrier is a CDFW Species of Special Concern. It is a fairly common winter visitor, and small numbers remain in California to breed. The breeding population now appears to be restricted to north coastal lowlands, the central coast, the northern Central Valley, Klamath Basin, and Great Basin (MacWhirter et al. 1996, Davis and Niemela 2008). Meadows, marshes, and wetlands are optimal habitat types; other suitable habitats include grasslands, ungrazed or lightly grazed pastures, and grain fields (Davis and Niemela 2008). Northern harriers nest on the ground in shrubby vegetation, usually along the edge of marshes. Nests are constructed of larger plants (e.g., willows, cattails) at the base with grasses and sedges lining the interior. Northern harriers feed primarily on voles or other small mammals; birds, frogs, reptiles, and invertebrates make up the rest of their diet (MacWhirter et. al.1996). This highly territorial species breeds from April through September, with peak breeding occurring during June and July (Zeiner et al. 1990a). Northern harriers have been observed foraging on Bacon Island in the Project area. There is no suitable nesting habitat in the Project area.

Swainson's hawk. Swainson's hawk, a migratory raptor that is a spring and summer resident in California's Central Valley, is State-listed as threatened. Swainson's hawk nests in only a few species of trees, such as oaks, cottonwoods, sycamores, or willows (CDFG 1994) near large, sparsely vegetated flatlands characterized by valleys, plateaus, broad flood plains, and large open expanses (Bloom 1980). Although Swainson's hawk is not an obligate riparian species, the availability of nesting trees is closely tied to riparian areas, usually associated with main river channels (Bloom 1980, Estep 1989). Nesting sites tend to be adjacent or close to suitable foraging grounds, which may include recently harvested alfalfa, wheat, or hay crops; low-growing crops, such as beets or tomatoes; open pasture; non-flooded rice fields; or post-harvest cereal grain crops (Bloom 1980; CDFG 1992, 1994). Swainson's hawks forage in open areas with low vegetative cover that provides good visibility of prey, such as voles (*Microtus californicus*), ground squirrels (*Spermophilus beecheyi*), pocket gophers (*Thomomys bottae*), and deer mice (*Peromyscus* spp.); they avoid foraging in fields with tall crops that grow much higher than native grasses, which makes prey more difficult to find (CDFG 1994). Migrating Swainson's hawks first arrive in the Central Valley in mid-March through May and migrate south in September and October (Zeiner et al. 1990a). Breeding occurs from late March to late August, with peak activity from late May through July (Zeiner et al. 1990a). Most clutches are completed by mid-April, with fledging occurring from July to mid-August (Estep 1989). There is high potential for Swainson's hawk to nest within 0.25 mi of the Project area. A nesting Swainson's hawk was documented along Old River at the northern tip of Bacon Island in 2009 (CDFW 2016). Swainson's hawk nests were

also documented in riparian trees on neighboring Holland Tract in 2009 (CDFW 2016), less than 0.25-mi away from the Project area. While not abundant, there is suitable Swainson's hawk nesting habitat near the Project area in relatively small patches of riparian forest and a few isolated trees.

California black rail. California black rail, State-listed as threatened and a CDFW Fully Protected species, is a very secretive bird associated with emergent tidal wetlands, especially where pickleweed (*Salicornia* spp.) and cordgrass (*Spartina* spp.) dominate. Black rails are typically found in the immediate vicinity of tidal sloughs, at higher zones at the upper limit of tidal flooding where effects from tidal fluctuations are minimal (Zeiner et al. 1990a). During high flows, black rails may rely on adjacent upland areas for cover (Zeiner et al. 1990a). There is no potential for black rail to occur in the Project area; however, there is moderate potential for black rail to occur within 700 ft of the Project area. There are three documented occurrences of black rail using in-channel islands—composed of emergent wetland vegetation—in Old River and outside of the Project area, but these records are from 1989 through 1992 (CDFW 2016), and there is no suitable marsh habitat on the interior of Bacon Island.

Greater/Lesser sandhill crane. Greater sandhill crane is State-listed as threatened and a CDFW Fully Protected species. Lesser sandhill crane is a CDFW Species of Special Concern. Both subspecies roost and forage in the Delta and Central Valley during winter months. In California, sandhill cranes are associated with freshwater marshes and grasslands and also forage in harvested rice fields, corn stubble, barley and newly-planted grain fields (Littlefield and Ivey 2000, 2002; Ivey et al. 2003). Sandhill cranes were observed foraging on the eastside of Bacon Island in January 2015 (Stillwater Sciences 2015), and may use flooded corn fields near the Project area in winter.

Burrowing owl. Burrowing owl, a CDFW Species of Special Concern, is a year-round resident through much of the State. Burrowing owl is found primarily in sparse, open grasslands or shrublands characterized by low growing vegetation, but may be found in areas highly altered by human activity, including airports, golf courses, and cemeteries (Poulin et al. 2011). Burrows are the essential component of burrowing owl habitat, and are used for nesting and roosting. Individuals primarily use burrows made by ground squirrels (*Spermophilus beecheyi*), but may also use those excavated by other fossorial (ground-denning) mammals, including badger (*Taxidea taxus*) and coyote (*Canis latrans*), or may excavate their own (Poulin et al. 2011, Gervais et al. 2008). Burrowing owls may be found occupying human made structures, such as levees, culverts, pipes, and debris piles (California Burrowing Owl Consortium 1993, Gervais et al. 2008), and have been found on the edges of drains and canals that border agricultural fields (Rosenburg and Haley 2004). There is low potential for burrowing owl to occur in the Project area; no suitable burrows or burrow complexes were identified in the Project area during field surveys, though new burrows may become established prior to construction.

Loggerhead shrike. Loggerhead shrike, a CDFW Species of Special Concern, prefers open areas with scattered trees or shrubs and short vegetation and and/or bare ground for hunting. This species is highly territorial and aggressive during the breeding season. Loggerhead shrikes prefer tall perches such as trees, tall shrubs, fences, posts, and/or power lines for hunting, territory observation, and breeding defense (Zeiner et al. 1990a, Humple 2008). Nest sites are typically in isolated trees or large shrubs with dense foliage (Yosef 1996). There is moderate potential that loggerhead shrikes occur in or near the Project area. Loggerhead shrikes are commonly observed in the Delta and may nest in isolated trees or large shrubs in the Project area.

Modesto song sparrow. The "Modesto" population of song sparrow (*Melospiza melodia*) (hereafter referred to as Modesto song sparrow) is a year-round resident of California and a CDFW Species of Special Concern. This population is endemic to the north-central portion of the Central Valley, locally abundant in the Sacramento–San Joaquin River Delta and Butte Sink areas. The Modesto song sparrow occupies freshwater marsh, riparian woodland, and riparian scrub habitats, as well as vegetated irrigation canals and levees (Gardali 2008). Emergent marsh and riparian scrub may provide primary nesting habitat. Modesto song sparrows breed from mid-March to early August (Gardali 2008). Modesto song sparrows have been observed in Old River near the Project area in 2009 (CDFW 2016), and may nest in emergent tule marshes on the waterside of the Project levee.

Tricolored blackbird. Tricolored blackbird, a CDFW Species of Special Concern, is largely endemic to California. It nests in large colonies, typically between February 1 and August 31, in protected stands of cattails, tules, blackberry brambles, or willows within 1,600 ft of open, accessible water (Beedy and Hamilton 1997). Tricolored blackbirds forage in a variety of habitats, including agricultural fields (such as cut grain fields, rice, and alfalfa), dairies and feedlots, irrigated pastures, annual grasslands, ephemeral pools and ponds, wetlands, scrub-shrub, and freshwater marsh (Beedy and Hamilton 1997). There is moderate potential for tricolored blackbird to forage in agricultural areas in the Project vicinity, or nest in emergent tule marsh on the waterside of the Project levee.

Other migratory birds and nesting raptors. Non-listed migratory birds or raptors could establish nests in suitable trees or other nesting habitat in the Project area. The nesting season for migratory birds and raptors is generally between February 15 and August 31.

Western red bat. Western red bat is a CDFW Species of Special Concern. This species roosts non-colonially, in dense canopies and within tree foliage, beneath overhanging leaves (Constantine 1959, Shump and Shump 1982), from 1–12 m (2 to 40 ft) above ground level (Zeiner et al. 1990b). Roosts have often been observed in edge habitats – near streams, fields, orchards, or urban areas (Zeiner et al. 1990b). Studies in the Central Valley found more abundant populations in remnant riparian forests with large trees than in younger, less-extensive stands (Pierson et al. 2000). Individuals may forage up to 0.3–0.6 mi from their day roosts (Zeiner et al. 1990b), both at canopy height and low over the ground (Shump and Shump 1982). This species feeds primarily on small moths, but its diet may include a variety of other insects, such as crickets, beetles, and cicadas (Zeiner et al. 1990b). Mating occurs in August and September. Breeding females are found in association with the same cover requirements as for roost sites, and within cottonwood/ sycamore riparian habitats along large river drainages in the Central Valley (Zeiner et al. 1990b, Pierson and Rainey 2003). Fertilization is delayed until March or April. After an 80- to 90-day gestation period, pups are born from late May through early July. There is moderate potential for western red bat to occur in a relatively small patch of riparian forest located near Station 385+00 (Habitat Area 3, Figure 2-4).

2.4.2 Findings

a) Would the Project 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?

Plant species and communities

Six special-status plants and one rare natural community have a high potential to occur within or adjacent to the Project area, several of which have been previously documented on Bacon Island: woolly rose mallow (previously documented), northern California black walnut (documented during habitat assessment), Delta tule pea (not previously documented), Mason's lilaeopsis (previously documented), Delta mudwort (not previously documented), Suisun marsh aster (previously documented), and Coastal and valley freshwater marsh (documented during habitat assessment). Per the conservation measures in **BIO-1**, comprehensive botanical surveys will be conducted prior to any construction, and any special-status plants or rare natural communities that are within or adjacent to Project work areas that could potentially be damaged or destroyed by Project activities will be staked, fenced, and/or flagged for avoidance prior to construction. A biological monitor will be present during construction in areas with special-status plants. If avoidance is not possible, plants will be salvaged and transplanted. In addition, implementation of **BIO-2** includes training construction personnel on the presence of and avoidance measures for special-status plants. There will, therefore, be less than significant effects on special-status plants with the **BIO-1** and **BIO-2** measures and mitigation incorporated.

Wildlife

Western pond turtle. Turtles can be injured or killed by Project vehicles or construction equipment. However, there will be no dewatering of suitable habitat, and turtles in harm's way will be allowed to move from the construction area on their own accord. Measure **BIO-9** will be implemented to ensure that western pond turtles are not adversely affected by the Project. In addition, implementation of **BIO-2** includes training construction personnel in what to do in the event a western pond turtle is encountered. Therefore, impacts on western pond turtle are less than significant with **BIO-2** and **BIO-9** incorporated.

Giant garter snake. All potential aquatic giant garter snake habitat will be fully avoided during construction; there will therefore be no net loss of potential giant garter snake habitat, and no freshwater marsh habitat will be dewatered. The irrigation canals associated with the rice field in Borrow Site 1will be dried prior to construction. Giant garter snakes may, however, occur in the Project area as individuals dispersing to suitable aquatic habitats. Injury or mortality of such giant garter snakes could occur during such construction activities including grading, clearing, or equipment staging. After the initial clearing phases of construction, visibility of any giant garter snakes will be enhanced and will facilitate avoidance. Measure **BIO-3** will be implemented to ensure that giant garter snakes are not adversely affected by the Project. In addition, implementation of **BIO-2** includes training construction personnel in what to do in the event a giant garter snake is encountered. Potential impacts on giant garter snake will be less than significant with **BIO-2** and **BIO-3** incorporated.

Nesting birds and raptors. There may be Project-related effects on nesting birds and raptors (including migratory birds, white-tailed kite, Swainson's hawk, California black rail, burrowing owl, loggerhead shrike, Modesto song sparrow, and tricolored blackbird) if disturbance occurs to or near active nest sites during the breeding season. Direct impacts may occur as a result of removing or trimming of trees, wetland vegetation, or other that plants/structures that provide nesting habitat. Indirect impacts may occur from construction noise (for example, from heavy equipment, vehicles, generators, and human presence) or vibration, which could lead to nest abandonment or premature fledging. Implementation of measures **BIO-2, BIO-4, BIO-5, BIO-6, and BIO-7** will reduce impacts to less than significant levels.

Several special-status bird species (the above-mentioned nesting birds and raptors, and northern harrier) may occasionally forage in or near the Project area during construction. Foraging birds can easily disperse away from temporary Project construction noise and vibration; therefore,

Project-related adverse effects on these bird species are not anticipated. Because Project implementation will not occur during the winter months, effects on foraging sandhill cranes will be fully avoided.

Western red bat. Since the riparian forest near Habitat Area 3 and in Borrow Site 2 will not be affected, there will be no impacts on western red bats potentially roosting in this area.

b) Would the Project 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?

In accordance with the requirements of Assembly Bill 360 and DWR's Delta Flood Protection Program requirement for net aquatic habitat improvement, this discussion is focused on freshwater marsh, scrub-shrub, riparian forest, and Shaded Riverine Aquatic habitats, and divided into potential waterside effects and potential landside/borrow area effects.

Waterside. Preparation of the waterside of the levee for armoring the newly placed fill along the levee crown may require removing ruderal weeds and non-native annual plants. The Project will avoid impacts on freshwater marsh on the waterside by only working above MHW. Preparation of the waterside of the levee will impact scrub-shrub (less than 0.1 acres). In the small number of expected cases where waterside rock revetment is to be placed over scrub-shrub habitats. These impacts have been pre-mitigated as described in **BIO-8**. The Project will avoid impacts on freshwater marsh on the waterside by only working above MHW and will retain all waterside riparian forest trees. As a result, there are no anticipated effects on Shaded Riverine Aquatic habitat.

Landside. There is the potential that site preparation and placement of fill material may degrade or remove riparian forest (0.7 acres), scrub-shrub (2.4 acres), and freshwater marsh (0.5 acres) habitats on the landside levee slope and toe, if it lies within the Project footprint. This habitat is associated with existing seepage ditches along the landside toe of the levee. The Project will try to avoid removal of large trees, but in some cases trees may need to be removed on the landside if necessary for stable levee slope construction. These impacts have been pre-mitigated as described in **BIO-8**.

Potential effects on riparian habitat or other sensitive natural communities will be therefore less than significant with **BIO-8** incorporated.

Borrow Sites. Construction activities will fully avoid the 0.5-ac riparian forest in Borrow Site 2, thereby resulting in no impact. The remaining areas identified for borrow sites are agricultural lands with no impacts on special habitats.

c) Would the Project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Waters and wetlands on the waterside of the levee will be avoided by the Project, since no work will occur below the MHW line. While potential wetland areas on the landside of the levee will be avoided to the extent practicable, some areas of freshwater marsh and other potential wetland areas along the landside levee toe may be impacted by vegetation clearing and placement of fill. Landside wetland areas that are the result of levee seepage are not subject to the jurisdiction of

the USACE under the federal Clean Water Act (USACE 1995). With implementation of **BIO-8**, impacts on wetlands will be pre-mitigated; therefore, impacts on wetlands are considered to be less than significant with mitigation incorporated.

d) Would the Project 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 includes modifications to existing levee infrastructure, and will not include construction of any elements that will block wildlife movement. Therefore, the Project will not interfere substantially with the movement of any native resident wildlife species, nor impede the use of any wildlife nursery sites (see above for discussion of special-status wildlife species, nesting raptors, and migratory birds). No impact will occur.

e) Would the Project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

San Joaquin County has a tree ordinance to protect native oak trees, heritage trees, and historical trees (San Joaquin County 2010a). Native oak trees include valley oak (*Quercus lobata*), interior live oak (*Quercus wislizenii*), coast live oak (*Quercus agrifolia*), and blue oak (*Quercus douglasii*) trees. Heritage oak trees are defined as native oak trees that have a single trunk diameter of 32 inches or greater measured at 4.5 ft above the ground. Historical trees include any tree or group of trees designated by the Planning Commission because of size, age, location, or history. No oak trees were documented within the Project footprint; thus, there will be no impact.

f) Would the Project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?

No Habitat Conservation Plans or Natural Community Conservation Plans include the Project area. There will be no impact.

2.5 Cultural Resources

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	❑	✓	❑	❑
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	❑	✓	❑	❑
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	❑	❑	❑	✓
d) Disturb any human remains, including those interred outside of formal cemeteries?	❑	✓	❑	❑

2.5.1 Environmental setting

The Sacramento-San Joaquin River Delta is a large inland river delta consisting of a network of shallow channels and marshy islands at the confluence of the Sacramento and San Joaquin Rivers (Pierce 1988). It began forming toward the end of the Pleistocene, as rising sea levels and associated slowing of river currents caused wetlands to expand and river sediments to accumulate in this region. Over the next several thousand years, sediment continued to accumulate creating thick deposits of peat, sand, and silt in many areas of the Delta creating natural levees. However, until the mid-nineteenth century, settlement in the area was limited because of the shortage of solid ground and constantly shifting banks of sand and organic material, though there is evidence that Native American groups have been occupying this area for thousands of years.

2.5.1.1 Pre-contact context

Cultural taxonomic sequences developed for the Central California region have distinguished several discrete prehistoric temporal periods marked by changes in settlement distribution, subsistence orientation, and morphologically distinct artifact types (Beardsley 1954; Fredrickson 1974; Bennyhoff and Hughes 1987; Milliken and Bennyhoff 1993; Hylkema 2002). Temporal definitions for these schemes have been based upon archaeological assemblages from northern San Francisco Bay and the interior Delta-Central Valley region.

Windmiller Pattern (Early Period 2050 BC–500 BC). Dating primarily to the Middle Archaic Period, the Windmiller pattern has been largely defined by archaeological sites of the Delta-Central Valley. Sites are characterized by a co-occurrence of occasional milling slabs and handstones with small “paint” mortars, a high frequency of polished stone implements, perforated charmstones, and a low frequency of polished bone tools. The low frequency of milling tools implied that there was a greater emphasis on hunting. Large non-obsidian stemmed dart and spear points characterized the hunting equipment, although dart (atlatl) spurs were rare and late in the pattern. In conjunction with robust faunal assemblages, patterns suggest hunting was an important activity. Another hallmark of the Windmiller Pattern is mortuary patterns marked by abundant and diverse ideotechnic artifact types accompanying burials; interments were typically ventrally extended, sometimes-dorsally extended with a westerly orientation. Sites dating to this time have been interpreted as reflecting the emergence of logistically organized settlement organization, centered along river corridors of the Sacramento and San Joaquin Valleys (Rosenthal et al. 2007).

Berkeley Pattern (Middle Period 500 BC–AD 700). The Berkeley pattern was proposed on the basis of observed trends at north San Francisco Bay sites where a larger population, implied by an extensive distribution of sites frequently containing large volumes of human skeletal remains, began an intensive tidal marsh economy. The earliest manifestations are contemporaneous with Windmiller, but were replaced in the Central Valley after 2500 BP. Large and small cobble mortars and various pestle types are commonly found in assemblages dating to this interval, indicating a significant reliance on acorns and other seeds. Berkeley pattern sites exhibit a decrease in chipped stone projectile points, with contracting-stemmed and large expanding stemmed forms predominant. Hunting appears to have been less significant than at Windmiller sites, although there was a greater emphasis on bone implements. Double pronged fish spears appeared and are useful as temporally diagnostic artifacts (Bennyhoff 1950). Serrated bone scapulas and innominates increased in numbers compared to Windmiller sites, as do beveled elk antler wedges. Flexed burials with no patterned orientation, randomly interred in residential middens accompanied by fewer artifacts (with little emphasis on wealth), and occasional

expressions of cosmological beliefs in the form of animal burials, charmstones, quartz crystals, and bone whistles, characterize this pattern. Evidence for expanding trade networks and intergroup violence from Bay Area sites suggests this time period was marked by population expansion and intensified group interactions.

Meganos Tradition. Sometime during the Middle Period, an influx of people with their own distinctive cultural traits defined as the Meganos tradition emerged along the southeast margin of the Bay, establishing themselves between the tidal marsh people of the south Bay and those to the north. The roots of what appears to have been a population movement can be seen at sites around the sloughs and mouth of the San Joaquin River in the Stockton District where many cultural traits of the earlier Windmiller pattern appeared south of their earlier origin in the lower Sacramento Valley. Concurrently, sites within what was formerly Windmiller country have been found to exhibit characteristics of the Berkeley pattern. Site CA-ALA-413 in Livermore Valley provided evidence that the Meganos tradition had spread into the interior valleys of the northern Diablo Range by the early phase of the Middle Period (Bennyhoff in Hughes 1994, Wiberg 1984). During the upper Middle Period, the Meganos tradition extended into the Fremont Plain of the southeast Bay and mixed with the populations of Santa Clara Valley. The amalgamation of some "Bay" traits with the new arrivals developed into a cultural tradition that was defined by Bennyhoff as the Meganos Aspect (Bennyhoff in Hughes 1994). According to Bennyhoff, Meganos Aspect traits included ventrally and dorsally extended burials without specific compass orientation, a co-occurrence of flexed burials, and very few grave associated artifacts. Bennyhoff viewed the Meganos culture as "a hybrid of a Windmiller population intermarrying with Berkeley neighbors" (Bennyhoff in Hughes 1994). The Meganos culture appeared to have been at a border with Berkeley pattern cultural groups of the southeast Bay. Bennyhoff proposed that by the time of the terminal years of the Middle Period the Meganos people eventually withdrew progressively back towards the San Joaquin River delta and the Stockton District became their cultural center (see distribution maps drawn by Bennyhoff in Hughes 1994). Bennyhoff (1994) has suggested that the Meganos Pattern is indicative of a semi-sedentary settlement arrangement, marked by increased seasonal movement of villages, a departure from earlier, more sedentary patterns.

Augustine Pattern (Middle Late Transition and Late Periods AD 700–AD 1800). The Augustine Pattern is composed of three temporal phases: Middle/Late transition, Late Period Phase 1, and Phase 2. Together these phases delineate a progressive intensification of localized economic systems and greater distinctions in social ranking, possibly the result of intrusive traits accompanying the southward movement of Wintuan peoples in to the lower Sacramento Valley (Wiberg 2010).

2.5.1.2 Ethnographic context

The Native Americans who occupied the Mount Diablo and Delta regions at the time of the 1770s Spanish entrada are now commonly known as "Bay Miwok". The Miwok language family consisted of multiple groups, occupying a diverse range of territory and could be distinguished linguistically and geographically. Bay Miwok territory extended from the Sacramento-San Joaquin delta along the southern shore of the Suisun Bay and south past the eastern slopes of Mt. Diablo to the area surrounding the city of Danville. Archaeological and linguistic evidence seems to suggest the Miwok arrived in the area about 2000 years ago, entering into the lower Sacramento and Delta area, possibly displacing a previously established group, possibly speakers of Hokan languages (Moratto 1984).

The Bay Miwok lived closely to a number of other groups including the Yokuts to the southeast, the Plains Miwok to the northeast, the Patwin to the north and the Costanoan-Ohlone to the south

and west. Prior to the arrival of Euro-Americans in the mid to late eighteenth century, the Bay Miwok relied upon annual cycles of hunting, gathering, and fishing to procure items for subsistence, trade and material needs. The Miwok territory encompassed a wide range of environments, some rich enough to support permanent villages, other less abundant necessitating a more mobile way of life. Tribelets were the predominant political unit among the Bay Miwok. Each tribelet occupied and maintained distinct boundaries that were generally recognized and respected by neighboring tribelets (Bennyhoff 1977). Within each tribelet there were lineages and settlements between 20 and 300 persons with the larger villages along the rivers and bay.

In the mid to late eighteenth century, Bay Miwok lives were significantly altered with the beginning of Spanish expeditions around the San Francisco Bay area. Native American groups within the San Francisco Bay Area endured the arrival of Euro-American explorers and settlers at a much earlier date than other Native groups in California. Spanish explorers arrived in the Bay Area in the 1760s, almost seventy-five years prior to visits within some areas in the Sierra Nevada Mountains. Spanish expeditions resulted in a series of events that significantly reduced the Bay Miwok population, changed their political and social organization, and altered their traditional territory. The biggest change to Bay Miwok lives occurred with the establishment of two nearby Franciscan missions, San Francisco de Asís (1776) and Mission San José (1797). The missionaries were focused on the acculturation of the Indians and their indoctrination to Catholicism.

2.5.1.3 Historic context

The history of land reclamation and early historic period settlement and agricultural development of Bacon Island and the larger Delta region is addressed in detail in the *Determination of Eligibility Report for the Bacon Island Rural Historic District* (Maniery 1993). As a result, only a brief outline of this history will be provided here as it relates to historical resources within the Project area.

Land reclamation, involving construction of artificial levees to create a series of islands from the Delta marshland, began in the 1850s but peaked in the early twentieth century associated with intensive agricultural development of the area. The Swamp and Overflow Land Act of 1850 and an 1855 law enacted by State Legislature transferred Delta lands to State ownership and allowed purchase of land by private individuals. Early landowners attempted to reclaim Delta land with small irregular levees, but were largely unsuccessful in holding back the water. However, in the early 1860s the Arkansas Act permitted the State legislature to appropriate funds to aid in levee construction. In 1868, land owners were able to acquire unrestricted acreage, drawing the interest of corporate San Francisco entrepreneurs and land speculators, including Henry Bacon.

Bacon and two partners purchased what would become Bacon Island in 1872 and constructed a levee around the island the same year, with the first agricultural crop planted during the 1872-1873 season. The levee failed, the crop was destroyed, and Bacon and his partner Sherman Day, who owned the western part of the island, tried many methods of levee construction over the following years that included use of Chinese labor. However, by the turn of the century, these methods had proven unsuccessful and Bacon Island, like many others, continued to experience seasonal flooding making agriculture difficult, if not impossible.

Permanent reclamation of Delta islands followed invention of industrial dredging machines, mechanical ditch diggers, and steam-powered (and later electrical) water pumps in the late nineteenth and early twentieth centuries. This was accompanied by consolidation of land ownership under companies undertaking large-scale reclamation projects, beginning around the

turn of the century. It was via one of these companies, run by Los Angeles-based businessman Lee Phillips, that Bacon Island was permanently leveed around 1915. Phillips then leased the land to farmers.

One of these farmers was Japanese immigrant George Shima, who arrived in the United States in 1888. After working as a laborer to learn American agricultural techniques, and after several false starts as an agricultural entrepreneur, Shima entered into an agreement with Phillips to lease and farm the land reclaimed by Phillips' company on a series of Delta islands; Shima later purchased much of his own land. Shima's main crop was potatoes and his success soon earned him the nickname "Potato King". On Bacon Island he also grew beans and barley, often via tenant farmers and sharecroppers that included Japanese and Anglo Americans. He became a leader in the Japanese American community, was active in the local Delta community, and fought against Anti-Asian legislation at the State and federal levels. As such, today Shima is recognized as a major figure in the early history and development of the Delta region and the early Japanese American community.

In about 1915, Shima constructed a series of twelve farm labor camps along the levee around the island's perimeter (see Figure 2-14), with bunkhouses, boarding houses, cook's houses and mess halls, barns, garages, machine shops, Japanese style baths, and other structures, depending on the size of the camp. Occupants included tenants, sharecroppers, and employees of Shima's company, with smaller camps housing 20 to 50 men, and larger ones accommodating up to 400. Camp size varied according to the agricultural acreage each camp was responsible for, with camps operating independent of one another under a foreman. Meals consisted of a combination of American and Japanese style foods prepared by a Japanese cook. The population of most camps was dominated by men, but some women and families were also present, often housed in separate quarters. Women worked in the fields and did much of the daily labor in camp. Considerable historical evidence is available on life in Delta camps, including contemporary records and interviews, plus oral histories collected years later.

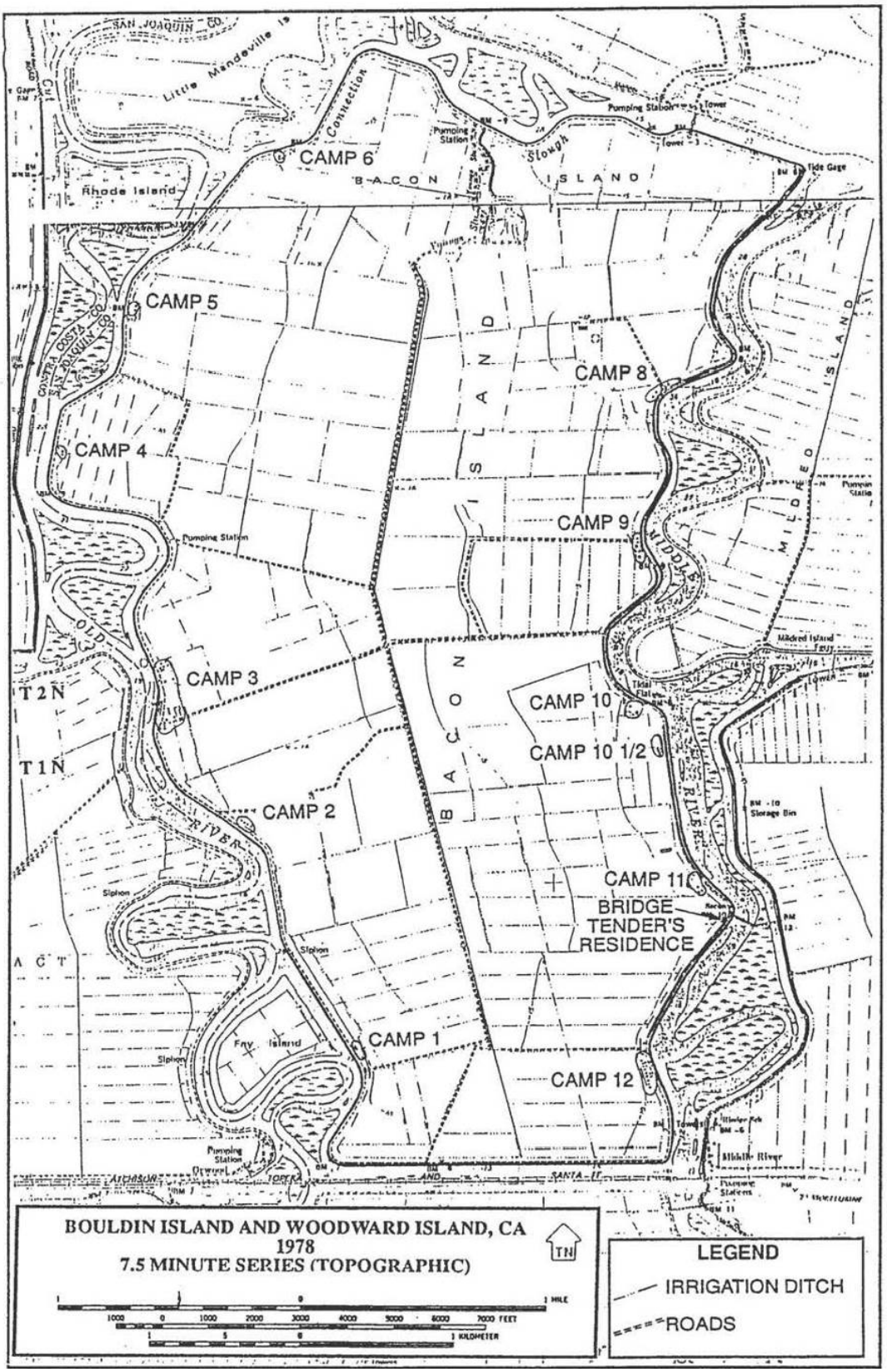

Figure 2-14. Historical camp locations around Bacon Island, from Maniery 1993.

Shima died in 1926, and following his death Bacon Island changed ownership and farming in the Delta changed in significant ways. This included increased mechanization, subdivision of large land holdings, and a shift in crops, with farmers on Bacon Island focusing on crops such as sugar beets. Increasing discrimination against Asian Americans also led to a sharp decrease in the number of Japanese farmers in the Delta. They were increasingly replaced by Anglo and Filipino American farmers. In 1942, during World War II, Japanese Americans were forcibly removed from the coast and sent to a series of inland relocation centers in California and several other states. Many Delta farms lay fallow during the war and, although farming resumed in 1945, continued developments in agriculture reduced the number of laborers needed to operate each farm.

Until the 1980s, Bacon Island continued to be operated by Asian American companies, two Japanese and one Chinese. It is one of the few Delta islands to retain intact farm labor camps from the early twentieth century.

2.5.1.4 Record search

A record search at the Central California Information Center (CCIC) (File No. 1003OL) was conducted to determine if cultural resources are recorded in or near the Project area. The following sources were consulted:

- Historic Property Data File for San Joaquin County managed by the State Office of Historic Preservation (including the California Register, California Historical Landmarks, and California Points of Historical Interest)
- California Inventory of Historic Resources for San Joaquin County managed by the State of California Department of Parks and Recreation
- CCIC Digital Resource and Report Database

The Historic Property Data File and California Inventory of Historic Resources list no historic properties or resources within a ¼-mile radius of the Project area. The CCIC Database lists seven archaeological reports and seven archaeological resources inside or within a ¼-mile radius of the Project area. Of the seven reports, three were done for the Delta Wetlands Storage Project survey conducted in San Joaquin and Contra Costa Counties in the late 1980s and early 1990s. These surveys included the Project area and led to the designation of Bacon Island in its entirety as a Rural Historic District listed on the California Register of Historic Resources (CRHR) and eligible for inclusion on the National Register of Historic Places (NRHP) (Maniery and Syda 1989, Maniery 1993, Jones & Stokes Associates 1995). All archaeological resources recorded in the Project area contribute to the District. Three other reports relate to the Line 57 Reliability Project natural gas line survey in San Joaquin and Contra Costa Counties, two of which included the Project area (Werner 2005, Lloyd and Baloin 2005, Lloyd 2006). The final report is for a supplemental survey for the Doughty Cut Water Monitoring Project in San Joaquin and Contra Costa Counties, conducted near the Project area (Gilbert 2011).

There are six previously recorded archaeological resources from the CCIC Database located within the Project area (Camps 2–6 and the Old River Levees); a seventh resource (a saké bottle fragment) may be within the Project area. Camps 2–6 (designated in the database as P-39-000326, P-39-000327, P-39-000328, P-39-000329, and P-39-000337) are among the historic farm labor camps, which are part of the Bacon Island Rural Historic District (Maniery 1993). The Old River Levees (P-39-00038) is a system of historic earthen levees along the Old River that includes the levee on Bacon Island within the Project area. An isolated Japanese saké bottle fragment (P39-

004857), originally plotted as just outside the Project area midway between Camps 3 and 4, may have been mis-plotted in the database, since a similar artifact was coincidentally reported at Camp 2 in the 1990s.

2.5.1.5 Field results

On October 24, 2016 Albion Senior Historical Archaeologist Douglas Ross and Archaeological Technician David Knight conducted a field reconnaissance of the Project area, including levee and borrow sites, to assess potential Project impacts on cultural resources. The field crew focused on assessing previously recorded archaeological resources for potential impacts, including pedestrian examination of the sections of each camp falling within the Project area, combined with visual examination of the remainder of the Project area. The crew documented these efforts with detailed written notes, combined with photographs and GPS points where appropriate. The field crew encountered no precontact Native American archaeological resources during their reconnaissance; there is only a very low potential for buried precontact archaeological resources to be present anywhere within the Project area.

Project Area along the Levee. The Project area along the levee intersects with portions of five of the historic farm labor camps contributing to the Bacon Island Rural Historic District. Pedestrian examination of the landside part of the levee between Camp 2 and the southern boundary of the Project Area revealed that the area between the road bed at the crown of the levee and the interior agricultural fields consists primarily of fill material making up the levee embankment and the gently sloping terrain transitioning into the fields. Adjacent to the levee proper, this terrain is a mix of patchy vegetation, rough dirt roads, and highly disturbed soils. It contains scattered fragments of historic and modern cultural material, dominated by glass and ceramics, plus fragments of marine shell. This fill material could have been brought in from anywhere on the island or elsewhere, and there is no evidence for intact archaeological deposits or features outside the camps along this section of the Project area. Visual inspection by vehicle of the remainder of the Project area between camps revealed similar disturbed deposits, and a lack of historically documented settlement along the levee outside the known camps makes it unlikely that buried archaeological deposits from the historic period exist in these areas. Pedestrian inspection of the Project area where it intersects with Camps 2 through 6 revealed the same levee fill with fragments of historic and modern cultural material. However, the volume of cultural material increased in these locations and it is possible that archaeological deposits associated with the camps have been incorporated into this fill. It is also possible that intact archaeological deposits and features associated with the camp remain beneath the levee fill.

Bacon Island Rural Historic District Camps. The four camps in and near the Project area are all historic resources as defined by CEQA and all are contributing elements to the Bacon Island Rural Historic District listed on the CRHR and eligible for the NRHP. The camps are all similar in condition to that recorded in 1992 (Maniery 1993). Camps 2 and 3 are occupied, Camp 4 is abandoned, and Camps 5 and 6 have no remaining standing structures. Camps 2, 3, and 4 have a combination of intact historical structures, missing historical structures, and modern buildings of no historical significance. While no intact archaeological deposits or features were encountered at any of the camps in the Project area, fragments of historic and modern cultural material, such as Japanese porcelain, were observed. The absence of intact archaeological resources visible on the surface does not preclude the presence of intact subsurface archaeological remains. Camps like the ones on Bacon Island are known to contain abundant remains of household refuse scattered throughout the site and buried in subsurface pits. There is therefore a potential for buried archaeological deposits and features within the Project Area associated with all five historic farm

labor camps, especially given the limited amount of development on Bacon Island since the early twentieth century.

Borrow Sites. Access to Borrow Sites 1 and 2 was restricted by the presence of crops in both fields, and the crew was not able to conduct a detailed examination of either area. Historical records indicate that these areas were dedicated agricultural fields, with dwellings, farm buildings, and other activity areas concentrated along the levee and the roadways that crisscross the island. Consequently, no historic period cultural resources are anticipated in these two locations. Borrow Site 3, at the northeastern tip of the island, is roughly triangular in shape and located between the levee and active agricultural fields further inland. It has a rough dirt road around the northern and eastern perimeters and is overgrown with grass and weeds. The ground surface is only visible in patches, but the soil is loose and heavily disturbed and any shallow buried cultural deposits would be visible on the surface. The crew did not encounter any historic period archaeological remains. This is not surprising, given that no structures or activities are documented in this location historically, aside from its function as an agricultural field.

2.5.2 Findings

a) Would the Project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

Based on results of the record search and surface reconnaissance of the Project area, the Project will not cause a substantial adverse change in the significance of a historical resource as defined in §15064.5. The levee itself is recognized as a historical resource, but since the goal of the Project is to maintain and repair the levee, Project activities should not have a significant impact on its value as a historical resource. Because no intact cultural deposits or features were identified during the field reconnaissance of the Project Area, including the three borrow sites, the Project will have no impact on historical resources visible on the surface. The standing historic structures at Camps 2, 3, and 4 will be avoided by Project activities and left intact in their current locations. It is possible that intact subsurface cultural deposits are present within the portions of Camps 2 through 6 (all defined as historical resources under CEQA) that intersect with the Project area. Disturbance of these deposits could cause a substantial adverse change in the significance of these historical resources. With incorporation of **CUL-1**, this impact will be less than significant.

b) Would the Project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

As defined by CEQA, archaeological resources are a type of historical resource. Since Camps 2 through 6 can be defined as both historical and archaeological resources, the same response applies to question (b) as to question (a).

c) Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

The Project will not destroy a unique paleontological resource or site or unique geologic feature. There will be no impact.

d) Would the Project disturb any human remains, including those interred outside of formal cemeteries?

Historical documents and results of the CCIC record search do not indicate any human burials within the Project area, and no human remains were encountered during the surface reconnaissance of the Project area. While there is a low potential for encountering undocumented human remains during the Project, based on current information the Project will not disturb any human remains, including those interred outside of formal cemeteries. **CUL-1** describes measures to take in the rare event that human remains are encountered during construction and, with that measure incorporated impacts will be less than significant.

2.6 Geology and Soils

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Expose people or structures to 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?	❑	❑	❑	✓
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?	❑	❑	✓	❑
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?	❑	❑	❑	✓

2.6.1 Environmental setting

Bacon Island is composed predominately of marsh muds and peats that accumulated throughout the Holocene (<11,000 years before present) (Atwater 1982, Helley and Graymer 1997). This process of tidal marshland formation, principally overlying older sand and eolian deposits from the Pleistocene-age Modesto Formation, occurred throughout the Delta region until land reclamation began in the late 1800s during Euro-American settlement (Whipple et al. 2012). Reclamation entailed levee construction around the Delta islands to facilitate agricultural

practices absent of annual flooding that once supported the marsh setting. Oxidation of the drying peat soils has led to its depletion and, thus, subsidence of the Delta islands, including Bacon Island. The levee-crown elevation will be a minimum of one foot above the 100-year flood elevation and crest width will be 21 ft. An additional 1 ft of vertical overbuild will be included to account for future settlement.

Soils are generally poorly drained, silty-clayey loams (USDA NCSS 2015). In general, Delta island soils have a relatively high potential for shrink-swell behavior, a primary characteristic of expansive soils[8] (San Joaquin County 2010a). A recent geotechnical study performed at Borrow Sites 1 and 2 within the interior of Bacon Island, which will supply fill material for the Project, confirmed that the borrow site soils included peat, elastic silt, lean and fat clays, and sand down to a depth of about 10 ft below ground surface (Hultgren-Tillis Engineers 2016). Specifically, laboratory analysis of soil samples collected during the geotechnical investigation had plasticity indices greater than 20% and more than 15% of soil particles passed a No. 200 sieve; the other two provisions that help characterize expansive soils—presence of >10% soil particles being <0.005 mm and soils having an expansion index of >20—were not analyzed. The study investigators concluded that the peat "should not be used for levee or toe berm fill and should be stripped and hauled to a designated area outside of the borrow site."

The geotechnical study estimated that the island interior in the vicinity of Borrow Sites 1 and 2 presently lies between 18.5 and 20.1 ft below sea level as referenced to the National Geodetic Vertical Datum of 1929 (NGVD29) (Hultgren-Tillis Engineers 2016). Groundwater depth was observed to vary in the study area, and was encountered as shallow as 3 ft below ground surface. The study authors stated that groundwater levels are artificially maintained below the island interior by evapotranspiration from the farmed crops and by pumping and irrigation.

The Project area lies within the Great Valley geomorphic province that is crossed by few faults, but is bordered by the Coast Range province hosting several active fault zones, predominately exhibiting right-lateral, strike-slip motion. The Hayward Fault Zone lies about 35 mi to the southwest of the Project area. The closest "active" faults[9] designated by the California Geological Survey (CGS) are the Greenville Fault Zone and Green Valley-Concord fault zones, located about 17 mi to the southwest and 26 mi to the west, respectively (San Joaquin County 2010a, Bryant and Hart 2007, CGS 2010). The closest potentially active lineament is the Midland Fault Zone running north-south through the Delta and positioned about 2 mi to the west (Unruh and Hitchcock 2009, CGS 2010). The most recent displacement along this fault is estimated by the CGS (2010) fault to be mid- to early-Quaternary (0.7–2.6 million years before present).

The Greenville and Green Valley-Concord faults have estimated slip rates of 1–3 and 2–8 mm/yr, respectively (USGS 1999), and the USGS estimates a 16% probability of the faults experiencing an earthquake of magnitude 6.7 or greater by the year 2043 (Aagaard et al. 2016). Peak ground

[8] Expansive soils are characterized by the ability to undergo significant volume change as a result of varying soil-moisture content. The 2010 California Building Code, Title 24, Part 2, Section 1803.5.3: Geotechnical Investigations defines an expansive soil as meeting the following provisions: (1) plasticity index of $\geq$15; (2) >10% soil particles pass a No. 200 sieve (0.075 mm); (3) >10% soil particles are <0.005 mm; and (4) expansion index of >20.

[9] An "active fault" is defined by the California Geological Survey as a fault having surface displacement within the Holocene epoch, or the past 11,000 years (Bryant and Hart 2007).

motion[10] estimated by the CGS in the Project area is assigned a moderately low value of 0.3 for alluvial materials (CGS 2016). San Joaquin County as a whole is not affected by ground-rupture hazards. Delta islands are, however, susceptible to liquefaction due to shallow groundwater depths and presence of sandy-peaty soils having low cohesive strength (San Joaquin County 2010a,b). These lands are also susceptible to levee damage caused by seismically induced waves in the Delta channels (San Joaquin County 2010a).

2.6.2 Findings

a) Would the Project expose people or structures to 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?

The Project area is not located near a delineated Alquist-Priolo Zoned fault and the closest potentially active fault, located 17 mi to the southwest, has not been active in nearly a million years. The Project levee rehabilitation will result in no operational or land use change that will alter the people or structures exposed to potential rupture of an earthquake fault. Therefore, there will be no impact.

ii) Strong seismic ground shaking?

The Project area is not located near active faults and, accordingly, lies in a zone with a low potential for strong seismic ground shaking. The Project levee rehabilitation will result in no operational or land use change that will alter the people or structures exposed to strong seismic ground shaking. Therefore, there will be no impact.

iii) Seismic-related ground failure, including liquefaction?

The Project area lies in the Delta, which is potentially susceptible to seismically induced liquefaction that could cause the earthen levee-integrity to fail, thereby breaching the levees and flooding the island. The Project is being done specifically to minimize this risk and meet or exceed HMP standards for the levee. In addition, the Project levee rehabilitation will result in no operational or land use change that will alter the people or structures exposed to seismic-related ground failure. Therefore, there will be no impact.

iv) Landslides?

The Project area has a flat topography, with the exception of the levees surrounding the island, which are designed with slopes that are not conducive to sliding. Accordingly, the Project area is not susceptible to landslides. The Project levee rehabilitation will result in no operational or land use change that will alter the people or structures exposed to landslides. Therefore, there is no impact regarding this issue in the Project vicinity.

[10] Peak ground motion (10% probability of being exceeded in 50 years) is expressed as a percent of the acceleration due to gravity.

b) Would the Project result in substantial soil erosion or the loss of topsoil?

In the short-term and mostly during active construction, there is potential for stormwater-related erosion of surficial soil from the levee slopes. The levee is and will be made of fill, and there is no topsoil present. To minimize the risk of soil erosion, the Project will compact embankment fill, and reseed the new levee embankment with a native grass mixture. In the long-term, these measures will stabilize the levee slope, which has been designed to have a stable gradient. Therefore, effects of the Project on soil erosion and loss of topsoil will be less than significant.

c) Would the Project 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?

The existing earthen levees surrounding Bacon Island overlie potentially unstable geologic units comprised of peat and silty-clayey loams. The Project includes an additional 1 ft of vertical overbuild to account for future settlement. Overall, levee rehabilitation will substantially improve the stability to the levee; therefore, the Project will have a beneficial effect regarding unstable soils.

d) Would the Project 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?

The levee areas and borrow sites within the Project area are composed of expansive soils. The Project has, however, been designed to address the potential for expansive soil. Overall, by protecting existing land uses from potential levee failure, the Project will reduce risks to life and property from expansive soil and, therefore, potential effects from the Project being located on and/or utilizing expansive soils will be less than significant.

e) Would the Project 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?

There are six residences in the Project area (see Section 2.13 Population and Housing) that are expected to use septic tanks. The Project will not include installation or disturbance to any existing septic tanks or alternative wastewater disposal systems. Therefore, there is no impact regarding this issue.

2.7 Greenhouse Gas Emissions

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	❑	❑	✓	❑
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	❑	❑	❑	✓

2.7.1 Environmental setting

Greenhouse gases are gases that can absorb and emit infrared radiation, trapping energy in the atmosphere and causing it to warm. Greenhouse gases have impacts that are more global than regional and are different from air pollutants that impact the general area near where they are released. Greenhouse gases can occur naturally or be the direct result of human activities.

In January 2008, California Assembly Bill 32, the Global Warming Solutions Act of 2006, went into effect. This bill required CARB to develop regulations to address global climate change due to greenhouse gas emissions. In December 2009, recommended regulatory guidance on the analysis and mitigation of greenhouse gases were adopted. Updated Statewide guidelines (Section 15064.4) were implemented on March 18, 2010 that require an agency "make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." which may be done either through modeling or through reliance "on a qualitative analysis or performance based standards" (AEP 2014).

State law defines greenhouse gases to include the following emissions: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (Health and Safety Code, section 38505(g)). The most common greenhouse gas that results from human activity is carbon dioxide, followed by methane and nitrous oxide. A preliminary threshold of 7,000 metric tonnes[11] of CO_2 equivalent per year (7,716 tons per year) for operational emissions (excluding transportation), and performance standards for construction and transportation emissions has been proposed by CARB (CARB 2008). The SJVAPCD has not adopted quantitative threshold values for greenhouse gas emissions (SJVAPCD 2015).

There are no formal attainment concentration standards established by the federal or State government for greenhouse gases, although CARB has set the current 2020 GHG emission limit for the State at 431 million metric tonnes of carbon dioxide equivalent (MMTCO2e).

2.7.2 Findings

a) Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

The construction of the Project is not expected to generate greenhouse gas emissions that would have a significant impact on the environment during any of the annual phases scheduled for the months of June–October in 2017, and May–October in 2018. The results from the Road Construction Emissions model used for determining the significance of Project-related air quality effects shown in Section 2.3 (Air Quality) predict a total of 2,089 metric tonnes of CO2e over the duration of the Project, which is well below the 7,000 metric tons of CO2e that has been proposed as a standard for construction projects by CARB. Therefore, impacts regarding the generation of greenhouse gas emissions are expected to be less than significant.

b) Would the Project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

[11] A metric tonne (British), also called a "long ton," represents 2,240 pounds. It is distinct from a "ton" (U.S. standard), also called a "short ton," which represents 2,000 pounds.

The construction of the Project will not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases, as it will not change land use or transportation infrastructure. Therefore, the Project will have no impact.

2.8 Hazards and Hazardous Materials

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	❑	✓	❑	❑
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	❑	✓	❑	❑
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	❑	❑	❑	✓
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	❑	❑	❑	✓
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard for people residing or working in the Project area?	❑	❑	❑	✓
f) For a Project within the vicinity of a private airstrip, would the Project result in a safety hazard for people residing or working in the Project area?	❑	❑	❑	✓
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	❑	❑	❑	✓
h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	❑	❑	❑	✓

2.8.1 Environmental setting

Land uses surrounding the Project area are predominantly agricultural and open space, along with some residential uses. These lands have the potential to contain hazardous substances. Petroleum products and pesticides are the most likely materials that may have been stored or released into the surrounding environment. Older gas wells and underground storage tanks used to store

petroleum products and other hazardous materials may develop leaks. These leaks can lead to the contamination of soils and groundwater. A query of the California Department of Toxic Substances Control's (CDTSC's) database reveals that there are no known sites in the Project area having cleanup, permitted, or other hazardous materials status (CDTSC 2016).

The surrounding river elevation fluctuates seasonally and the groundwater elevation is assumed to fluctuate with river levels. Even during periods of low tide, it is likely that groundwater flows toward the island and that any contaminated water could be transported to the soils within and near the levees. As the levee system was built, non-hazardous and hazardous materials were potentially incorporated into levee construction and repair. In addition to soil, rock, and concrete, materials used for bank protection may have included other available materials, including asphalt, fiberglass, automobile bodies and tires, asbestos fiber, and metal. Therefore, the underlying materials of the existing levees may contain hazardous substances. The exact composition of the levee materials below the surface is not wholly known throughout the Project area. Potential sources of contamination of the surface of the levees may include trash and debris from litter and illegal dumping, contaminant-laden sediment transported in the waterway and deposited on the levee, and surficial application of herbicides commonly used for weed control along the levee. A recent geotechnical study performed at Borrow Sites 1 and 2 within the interior of Bacon Island, which will supply fill material for the Project, did not encounter any hazardous materials (Hultgren-Tillis Engineers 2016).

2.8.2 Findings

a) Would the Project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

The Project has the potential to accidently spill diesel fuel and other hazardous materials used by construction equipment during the levee rehabilitation work. To minimize the risk of hazardous-materials release during construction, the Project will implement hazardous materials BMPs as outlined in **HAZ-1** and **HAZ-2**. All fuels and other hazardous materials will be handled and stored according to the manufacturer's specifications. A containment area will be established for construction equipment staging and the ground will be protected from potential contamination within the containment area. In the event of a spill, crew personnel will stop the spillage at its source, contain the spilled material, and notify Project supervisors and appropriate agency representatives. Therefore, this issue will have a less than significant impact with HAZ-1 and HAZ-2 incorporated.

b) Would the Project 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?

As stated above, the Project will implement hazardous materials management BMPs as outlined in **HAZ-1** and **HAZ-2** (see Section 1.5.4) during construction; therefore, there will be a less than significant impact with HAZ-1 and HAZ-2 incorporated.

c) Would the Project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

There are no schools located within one-quarter mile of the Project area. The closest existing school to the Project area is Old River Elementary School—reopened in the 2016–2017 school

year— located about 3.5 mi to the southwest in Contra Costa County. Therefore, the Project will have a no impact.

d) Would the Project 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?

The Project area and the remainder of Bacon Island are not included on a list of hazardous materials sites. Therefore, the Project will have no impact.

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

There are no public-use airports within two miles of the Project area. The closest public or public-use airport to the Project area is Byron Airport located about 10 mi to the south-southwest according to the San Francisco sectional aeronautical chart last updated in August 2016 and published by the Federal Aviation Administration (FAA 2016). Therefore, the Project will have no impact regarding this issue.

f) For a Project within the vicinity of a private airstrip, would the Project result in a safety hazard for people residing or working in the Project area?

There are no known private airstrips within the vicinity of the Project area. The closest private airports are Lost Island Seaport and Funny Farm Airport, located about 3.5 mi to the east and 4.4 mi to the southwest, respectively (FAA 2016). Therefore, the Project will have no impact regarding this issue.

g) Would the Project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

There are 11 residences on Bacon Island, six of which are located within the Project area (see Section 2.13 Population and Housing), that will continue to have access to alternative roads when Project construction activities on the levee may limit local traffic. Further, the Project will not alter navigation on adjacent waterways as the Project will not include the use of barges. All roadway traffic supporting Project construction will adhere to all applicable laws for motor vehicles and with the county's Office of Emergency Services. Therefore, the Project will have no impact regarding this issue.

h) Would the Project expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The whole of Bacon Island has been designated by the Department of Forestry and Fire Protection (CalFire) as "Unzoned Local Responsibility Area" having no "moderate" to "very high" fire hazard severity zones (CalFire 2007). Accordingly, the Project will not expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands. In addition, the Project will implement **HAZ-3** to reduce the potential for a grass fire. The Project will have no impact.

2.9 Hydrology and Water Quality

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Violate any water quality standards or waste discharge requirements?	❑	✓	❑	❑
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	❑	❑	❑	✓
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	❑	❑	✓	❑
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	❑	❑	❑	✓
e) 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?	❑	❑	✓	❑
f) Otherwise substantially degrade water quality?	❑	✓	❑	❑
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	❑	❑	❑	✓
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	❑	❑	✓	❑
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	❑	❑	❑	✓
j) Inundation by seiche, tsunami, or mudflow?	❑	❑	❑	✓

2.9.1 Environmental setting

Bacon Island is completely surrounded by navigable waterways. The island is encircled by a flood control levee maintained by the District. The Project levee-crest elevations will range from 8.89 to 9.51 ft above sea level (having the highest point on the water side) and crest width of 21 ft (see Section 1.4 Project Description). The island interior presently lies between 18.5 and 20 ft

below sea level (NGVD29) according to the Project's geotechnical investigation (Hultgren-Tillis Engineers 2016). Groundwater levels are artificially maintained below the island interior by evapotranspiration from the farmed crops and by pumping (Hultgren-Tillis Engineers 2016).

The Delta experiences a two-season Mediterranean-type climate, with wet cool winters and dry warm summers. The Central Valley and its surrounding upland drainages receive highly variable annual rainfall punctuated by episodic large events that typically coincide with the El Niño-Southern Oscillation climatic phenomenon having a 1–1.5-year duration and a 3–8-year recurrence period. Mean annual rainfall at Bacon Island between 1981 and 2010 was 13 inches (PRISM 2016). Water levels in the adjacent waterways fluctuate predominately by tidal action and experience episodic flood events typically in winter and spring. Bi-directional flow therefore occurs in this part of the Delta due to winter storms (riverflow directed toward the Sacramento-San Joaquin confluence to the northwest of Bacon Island), tidal actions (daily fluctuations), and water-supply pumping in the south Delta (at the State Water Project intakes). Bacon Island is currently mapped within FEMA's effective 100-year recurrence floodplain designation, but not their effective 500-year designation (FEMA 2016, CDWR 2016). The Project vicinity is also zoned as part of San Joaquin County's Special Flood Hazard and Potential Dam Inundation areas (San Joaquin County 2010a). As discussed above under Geology and Soils, a seismically induced wave in the Delta channels could damage levees causing localized flooding (San Joaquin County 2010a). There are no tsunami risks in the Project vicinity according to the State of California's tsunami inundation map (State of California 2016).

The majority of Delta channels including around Bacon Island have been classified as *impaired* by the State Water Resources Control Board (SWRCB 2010). This designation is given to streams for which a standard of water quality for beneficial uses (such as drinking water and water for recreation) has not been met. The regional water body in contact with Bacon Island—Delta Waterways: central portion—is classified as impaired for metals (mercury), pesticides (chlorpyrifos, DDT, diazinon, group A pesticides), toxicity (unknown toxicity), and miscellaneous (invasive aquatic species) (SWRCB 2010).

Turbidity is determined by the cloudiness or haziness of a fluid caused by individual particles (suspended solids). Turbidity directly affects water temperature by absorbing light, which in turn warms the water and lessens the water's ability to hold oxygen. Elevated turbidity concentrations can therefore impact aquatic habitat quality. Continuous turbidity measurements made since 2010 at the USGS river gage near Mandeville Island (north of Bacon Island) recorded values ranging up to approximately 100 nephelometric turbidity units (NTU), with the highest concentrations correlated with winter storm events (USGS 2016).

2.9.2 Findings

a) Would the Project violate any water quality standards or waste discharge requirements?

Project-related ground disturbance could temporarily increase the potential for localized erosion and sediment-laden stormwater runoff. To minimize the risk of soil erosion during construction, the Project will implement **HYD-1** to minimize potential erosion and stormwater runoff. The Project will also implement hazardous materials BMPs (**HAZ-1** and **HAZ-2**) to minimize the potential for accidental spills of hazardous materials to enter waterways. In the long-term, the Project should decrease the potential for runoff since the new levee will be more stable, have an all-weather AB road, and be stabilized with hydroseeding. Implementation of the Project will have a less than significant impact with **HYD-1**, **HAZ-1**, and **HAZ-2** incorporated.

b) Would the Project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

The Project will not alter existing groundwater pumping rates or natural recharge potential on Bacon Island. Therefore, the Project will have no impact regarding this issue.

c) Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

The Project involves rehabilitation of the existing levees and will not substantially alter the existing drainage patterns or adjacent stream courses. Earth movement and rock placement will be conducted during rehabilitation work which could temporarily disturb surficial soils and alter runoff potential at low levels. Therefore, the Project will have a less than significant impact regarding this issue.

d) Would the Project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

The Project will not alter existing drainage patterns. Therefore, the Project will have no impact regarding this issue.

e) Would the Project 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?

There is no existing or planned stormwater drainage system on Bacon Island. The Project will rehabilitate an existing structure and should minimize the potential for runoff relative to current conditions through the more stable levee design and soil stabilization methods. Although an all-weather access road will be established along the levee crest, the road will be made of unpaved AB, with similar drainage patterns and capacity to current conditions Therefore, the Project will have a less than significant impact regarding this issue.

f) Would the Project otherwise substantially degrade water quality?

See item (a) above.

g) Would the Project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

The Project will not involve construction of new housing nor will it place existing structures within the 100-year floodway. Therefore, the Project will have no impact regarding this issue.

h) Would the Project place within a 100-year flood hazard area structures which would impede or redirect flood flows?

The Project is rehabilitating the existing levee to protect against the 100-year flood. While earth movement and rock placement on the levee will technically occur within the 100-year floodway, it will be mostly surficial in nature and above the MHW, which will avoid redirection of flood flows within the adjacent waterway. Therefore, the Project will have a less than significant impact on this issue.

i) Would the Project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

The rehabilitation of the levees along the western side of Bacon Island will increase flood protection on the landside of the island. Therefore, the Project will have no impact regarding this issue.

j) Would the Project result in inundation by seiche, tsunami, or mudflow?

The portion of the Bay-Delta where Bacon Island is situated is not at risk from tsunamis or mudflows (State of California 2016). Seismically induced earth movements and seiches are possible in the Delta channels. However, the Project will not alter the potential for this type of event and the Project will increase the ability of the levee to protect the landside of the island from such events. Therefore, the Project will have no impact regarding this issue.

2.10 Land Use and Planning

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Physically divide an established community?	❑	❑	❑	✓
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	❑	❑	❑	✓
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	❑	❑	❑	✓

2.10.1 Environmental setting

The zone designation for Bacon Island under the San Joaquin General Plan (2010a) is agriculture. Bacon Island is also part of the Delta Primary Zone, as defined by the Delta Protection Act of 1992. The Primary Zone includes approximately 500,000 acres of waterways, levees and farmed lands throughout five counties (DPC 1995). The Land Use and Resource Management Plan for the Primary Zone of the Delta guides planning for the conservation and enhancement of the natural resources of the Delta, while sustaining agriculture and meeting increased recreational demand (DPC 1995).

Bacon Island is located within in the area covered by the Delta Plan, a comprehensive, long-term management plan for the Delta and Suisun Marsh required by the 2009 Delta Reform Act. The Delta Reform Act also included the creation of The Delta Stewardship Council, the State agency responsible for developing and implementing the Delta Plan. The Delta Plan includes new rules and recommendations based on the best available science to achieve the coequal goals of protecting and enhancing the Delta ecosystem and providing for a more reliable water supply for California, while protecting and enhancing the unique agricultural, cultural, and recreational, characteristics of the Delta. The Project will not be considered a "covered action" under the Delta Plan, since California Water Code section 85057.5(b)(5) states that a "covered action" does not include routine maintenance and operation of a facility located in the Delta that is owned or operated by a local public agency.

2.10.2 Findings

a) Would the Project physically divide an established community?

There are no established communities located on Bacon Island and the Project will not change the character or access to any of the residences or farm buildings; therefore, the Project will have no impact.

b) Would the Project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

The Project will not conflict with goals or policies in the San Joaquin County General Plan (San Joaquin County 2010a) or the Land Use and Resource Management Plan for the Primary Zone of the Delta (DPC 1995).

While not a covered action, the Project is consistent with the Delta Plans coequal goals of protecting and enhancing the Delta ecosystem and providing for a more reliable water supply for California, while protecting and enhancing the unique agricultural, cultural, and recreational, characteristics of the Delta.

The Project will have no impact related to this issue.

c) Would the Project conflict with any applicable habitat conservation plan or natural community conservation plan?

There are no applicable habitat conservation plans or natural community conservation plans in the Project area. The Project will have no impact related to this issue.

2.11 Mineral Resources

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?	❑	❑	❑	✓
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?	❑	❑	❑	✓

2.11.1 Environmental setting

There are few mineral resources of economic value found in the Delta, although extraction of peat and sand-gravel has and does occur on other Delta islands. The closest of these activities is located approximately 2 mi to the northwest of the Project area (Clinkenbeard 2012, USGS 2013). The San Joaquin County General Plan (San Joaquin County 2010a) similarly reveals no mineral deposits of economic value in the Project area, as pursuant to the California Surface Mining and Reclamation Act of 1975 (SMARA).

2.11.2 Findings

a) Would the Project 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?

There are no known mineral resources in the Project area. The geotechnical study of Borrow Sites 1 and 2 did note the presence of peat in the soils (Hultgren-Tillis Engineers 2016), but the amount and quality of the peat in the soil are not of value. Therefore, the Project will have no impact regarding this issue.

b) Would the Project 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?

There are no known mineral resources in Project area. Therefore, the Project will have no impact regarding this issue.

2.12 Noise

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	❑	❑	❑	✓
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	❑	❑	✓	❑
c) A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?	❑	❑	❑	✓
d) A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project?	❑	❑	✓	❑
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?	❑	❑	❑	✓
f) For a Project within the vicinity of a private airstrip, would the Project expose people residing or working in the Project area to excessive noise levels?	❑	❑	❑	✓

2.12.1 Environmental setting

Noise-sensitive land uses are defined as uses that can be adversely affected by high levels of noise. Residences, schools, hospitals, nursing homes, religious facilities, libraries, hotels, and other areas of similar use are often considered to be sensitive receptors to noise. Due to its remote location, there is very little noise in the Project area. What noise does occur is primarily caused by boat traffic along adjacent waterways and routine agricultural and maintenance activities on Bacon Island. Potentially sensitive receptors (e.g., residences) to noise in the Project area are limited to six residences on Bacon Island within the Project area, and Holland Riverside Marina (a private boat launch). The Holland Riverside Marina is approximately 2,300 feet away from the Project area. The six residences are within 100 ft of the Project area.

Noise can be defined as unwanted sound and is generally measured in decibels (dB). In order to make the measurements more quantifiable by humans, the decibel scale is weighted. The most common metric is A-weighting, which measures noise levels in a way that can be easily perceived by humans. A whisper is about 30 dBA, normal speaking is roughly 60 dBA, and a shout is about 100 dBA. Based on this scale, a change of 3 dBA is considered noticeable, but acceptable. A significant impact could result from an increase of 5 dBA or more. Long-term exposure to noises, exceeding a level of 70 dBA, can cause hearing loss. Construction between the hours of 7:00 a.m. and 10:00 p.m. would create an adverse effect if levels reach 60 dBA at surrounding residential locations, where the current ambient noise levels are less than 60 dBA.

Typical construction equipment noise emissions for the Project are estimated between 80 and 85 dB, 50 ft from the source equipment (Table 2-7). A general rule is that noise generally decreases by 10 dB with every 100 ft from the source (Solano County Planning Department 1977).

Table 2-7. Typical construction equipment noise levels.

Equipment description	Typical noise level (dB) from 50 ft
Backhoe	80
Dozer	85
Dump Truck	84
Excavator	85
Flat Bed Truck	84
Front End Loader	80
Grader	85
Scraper	85
Tractor	84

Source: U.S. Department of Transportation 2006

2.12.2 Findings

a) Would the Project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

There are no established standards or noise ordinances in the San Joaquin County General Plan (2010a). Therefore, there is no impact.

b) Would the Project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

The nearest sensitive receptor off Bacon Island is Holland Riverside Marina. Due to its distance of 2,300 ft, the noise created by construction will diminish substantially and will not impact the Marina.

The nearest potential sensitive receptors on Bacon Island are associated with six buildings along an approximately 550-ft section of the Project area, located within 100 ft of the potential construction zone. The closest occupied structure (residence) is over 100 ft away from areas of construction or haul roads. Some structures are within 30 feet of haul roads and construction areas; however, they are not occupied. The unoccupied structures are used for farm equipment and storage purposes. Construction traffic will not pass within 500 ft of any other residences on Bacon Island.

People using the occupied structures along the Project area located over 100 ft away from construction activities, or temporarily using the unoccupied storage buildings, may experience some minor increased groundborne vibration and noise levels while levee rehabilitation is taking place nearby. As work progresses along the Project levee, the noise levels will vary for each area, diminishing substantially as the construction work moves farther away. The number of estimated days of work is 242 (see Section 2.3). If the work is accomplished at an even pace, this rate would suggest that there will be potentially increased noise levels in proximity to each residence or

outbuilding for only up to three working days. However, construction work will not occur outside of the approved working hours of 7:00 am and 6:00 pm. This time limitation will prevent any increased noise levels from interfering with residents' sleep. In addition, the construction areas and haul roads in the Project area are regularly travelled, and often already have equipment and noise associated with farming activities (e.g., disking, harvesting, or ground/aerial pesticide application). Additionally, island residents are likely away from residences during construction hours. Due to the short duration of exposure to noise, restricted work hours, and existing ambient noise associated with daily farming activities, the potential exposure of persons to increase groundborne vibration or noise is less than significant.

c) Would the Project result in a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?

Any increases in ambient noise levels on Bacon Island during construction will be temporary. Therefore, the Project will not result in permanent increase in ambient noise levels in the Project vicinity and there will be no impact.

d) Would the Project result in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project?

See item (b) above.

e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

The Project site is not located within an airport land use plan or within two miles of a public or public use airport; therefore, there will be no impact.

f) For a Project within the vicinity of a private airstrip, would the Project expose people residing or working in the Project area to excessive noise levels?

The Project is not located within the vicinity of a private airstrip; therefore, there will be no impact.

2.13 Population and Housing

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Induce substantial 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 housing, necessitating the construction of replacement housing elsewhere?	❑	❑	❑	✓
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	❑	❑	❑	✓

2.13.1 Environmental setting

Bacon Island is not zoned for housing, and is managed primarily for agriculture. The island currently includes three clusters of buildings which include abandoned buildings and a few active residences; there is one residence at Camp 2, there are five residences at Camp 3, and there are five residences at Camp 12. Camps 2 and 3 occur along the Project area at Stations 540+00 and 500+00, respectively (Figures 2-15 and 2-16). Project activities will avoid both active residences and abandoned buildings, with the exception of one non-historical vacant dwelling at Camp 3.

Figure 2-15. One residence and out buildings at Camp 2 on Bacon Island (2015 satellite photo).

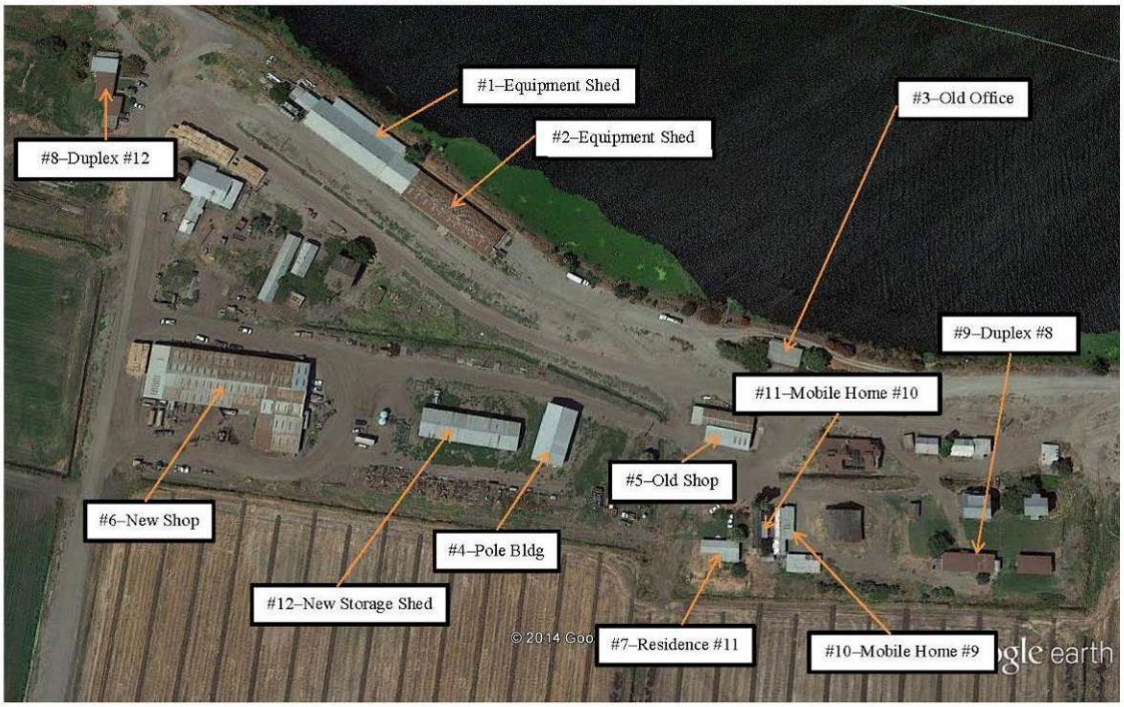

Figure 2-16. Five residences (Duplex #12, Residence #11, Mobile Home #9, Mobile Home #10, and Duplex #8) at Camp 3 on Bacon Island (2015 satellite photo).

2.13.2 Findings

a) Would the Project induce substantial 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)?

This Project does not include new homes or businesses. While the Project will rehabilitate the levee and reduce flood risk, the zoning of Bacon Island as agriculture precludes substantial population growth, and the Project will not result in population growth. There will be no impact.

b) Would the Project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

Existing housing on Bacon Island will not be displaced. There will be no impact.

c) Would the Project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

The Project will not displace any people. There will be no impact.

2.14 Public Services

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	❑	❑	❑	✓
Fire protection?	❑	❑	❑	✓
Police protection?	❑	❑	❑	✓
Schools?	❑	❑	❑	✓
Parks?	❑	❑	❑	✓
Other public facilities?	❑	❑	❑	✓

2.14.1 Environmental setting

Bacon Island is a privately-owned island, maintained by Reclamation District No. 2028. The island is managed primarily for agriculture. There are no government facilities, public resources, or services on the island.

2.14.2 Findings

a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:
Fire protection?
Police protection?
Schools?
Parks?
Other public facilities?

The Project will not affect fire protection services, police protection services, schools, parks, or other public facilities. None of these services exist on Bacon Island, and access routes will be maintained to allow fire and police protection services to reach the residents that live near the Project area. There will be no impact.

2.15 Recreation

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
a) Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	❑	❑	❑	✓
b) Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	❑	❑	❑	✓

2.15.1 Environmental setting

The Sacramento-San Joaquin Delta waterways surrounding Bacon Island are a recreational resource for boating, fishing, wildlife viewing, and hunting. Because Bacon Island is a privately-owned island, it is not designated by the County as a Recreation Area, Boater Destination Site, or Fishing Access Site.

2.15.2 Findings

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

The Project will not change the current use of recreational facilities near the island. There will be no impact.

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

The Project does not include recreational facilities or require the construction or expansion of recreational facilities. Therefore, there will be no impact regarding this issue.

2.16 Transportation and Traffic

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	❑	❑	❑	✓
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	❑	❑	❑	✓
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	❑	❑	❑	✓
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	❑	❑	❑	✓
e) Result in inadequate emergency access?	❑	❑	❑	✓
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	❑	❑	❑	✓

2.16.1 Environmental setting

Bacon Island is accessible by only one bridge from Lower Jones Tract. Bacon Island Road is located along the levee, and provides the only road access to Mandeville Island to the north, via a bridge. The Project area levee road is behind a locked gate west of the Mandeville Island bridge and is only used to access agricultural fields on the west side of the island. This section of the levee road is used solely by the Reclamation District for island maintenance and by farmers who lease land from the District for agriculture.

2.16.2 Findings

a) Would the Project conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

There are no transportation plans established for Bacon Island; the general public does not use Bacon Island for transportation. There will be no impact.

b) Would the Project conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Bacon Island does not have a congestion management program. There will be no impact.

c) Would the Project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

The Project will not affect air traffic patterns. There will be no impact.

d) Would the Project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The design features of the improved levee road will be similar to the existing road and will be compatible with existing uses of the island. There will be no impact.

e) Would the Project result in inadequate emergency access?

The island is accessible by one bridge from Lower Jones Tract and provides road access to Mandeville Island via one bridge at the north end of Bacon Island. The improvements to the levee will increase road quality and reduce the likelihood of a catastrophic flood or levee breach. There will be no change to emergency access to the island; therefore, there will be no impact.

f) Would the Project conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

There are no public transportation facilities on Bacon Island. There will be no impact.

2.17 Utilities and Service Systems

Issues	Potentially significant impact	Less than significant with mitigation incorporated	Less than significant impact	No impact
Would the Project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	❑	❑	❑	✓
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	❑	❑	❑	✓
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	❑	❑	❑	✓
d) Have sufficient water supplies available to serve the Project from existing entitlements and resources, or are new or expanded entitlements needed?	❑	❑	❑	✓
e) 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?	❑	❑	❑	✓
f) Be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs?	❑	❑	❑	✓
g) Comply with federal, State, and local statutes and regulations related to solid waste?	❑	❑	❑	✓

2.17.1 Environmental setting

There are no public wastewater treatment facilities, stormwater drainage facilities, or other public utilities or service systems located on the island. Waste is managed by a septic system.

2.17.2 Findings

a) Would the Project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

The Project will not impact the wastewater treatment practices for Bacon Island. There will be no impact.

b) Would the Project require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

There will be no construction or expansion of wastewater treatment facilities on the island as a result of the Project. There will be no impact.

c) Would the Project require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

There will be no new storm water drainage facilities as a result of the Project. There will be no impact.

d) Would the Project have sufficient water supplies available to serve the Project from existing entitlements and resources, or are new or expanded entitlements needed?

The proposed levee rehabilitation Project will not create a need for an increased water supply. There will be no impact.

e) Would the Project 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?

The Project will not create a need for increased wastewater treatment capacity. There will be no impact.

f) Would the Project be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs?

There will be no solid waste created by the Project and, as a result, no impact on landfills.

g) Would the Project comply with federal, State, and local statutes and regulations related to solid waste?

There will be no solid waste created by the Project and no violation of statutes and regulations. There will be no impact.

2.18 Mandatory Findings of Significance

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

3 DETERMINATION

On the basis of this initial evaluation:

I find that the Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.	❑
I find that although the 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 Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.	❑
I find that the 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 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 Project, nothing further is required.	❑

_____ _____

Signature Date

_____ _____

Printed Name For

4 LIST OF PREPARERS

The table below lists the preparers of this Initial Study/Mitigated Negative Declaration and participants in the related planning, data gathering, and analytical tasks.

Name	Title	Affiliation	Project role
Tina Anderson	Water Resources Associate	MBK Engineers	Project management and support
Brian Janowiak, P.E.	Project Engineer	MBK Engineers	Engineering, Project design
Holly Burger	Wildlife Biologist	Stillwater Sciences	Environmental analysis, document preparation, wildlife resources
Kelli Dawson	Document Production	Stillwater Sciences	Document production
Zooey Diggory	Senior Ecologist	Stillwater Sciences	Document review
Sara Gabrielson	Junior Ecologist	Stillwater Sciences	Environmental analysis, document preparation, GIS resources
Paul Glendening	GIS Analyst	Stillwater Sciences	GIS resources
Megan Keever	Botanist	Stillwater Sciences	Environmental analysis, document preparation, botanical resources
Jake Kramer	Junior Environmental Scientist	Stillwater Sciences	Environmental analysis, document preparation, hydrology, geology, and mineral resources
Glen Leverich	Senior Geomorphologist/ Geologist	Stillwater Sciences	Environmental analysis, document preparation, hydrology, geology, and mineral resources, hazardous materials
Wayne Swaney	Environmental Scientist	Stillwater Sciences	Environmental analysis, document preparation, air quality, greenhouse gases
David Knight	Archaeological Technician	Albion Environmental, Inc.	Cultural resources
Douglas Ross, PhD.	Senior Historical Archaeologist	Albion Environmental, Inc.	Cultural resources
Thomas Garlignhouse, PhD.	Senior Archaeologist	Albion Environmental, Inc.	Cultural resources

5 CONSULTATION AND COORDINATION

5.1 Agency Personnel Consulted

The following agency personnel were consulted during the drafting of this document:

- Carlous Johnson, DWR
- Jennifer Hogan, DWR
- Molly Ferrell, DWR

5.2 Public Involvement

This IS/MND was circulated to State, federal, and local agencies, and made available to the public for a 30-day review period. The public was notified as follows:

- A Notice of Intent (NOI) to adopt an MND was posted for publication in The Record, Stockton's local newspaper, and filed with the San Joaquin County Clerk.
- 15 copies of the Proposed MND with an attached Notice of Completion (NOC) were received by the State Clearinghouse on January 30, 2017 for distribution.
- Copies of the Proposed MND were distributed by the State Clearinghouse to interested parties.
- Copies of the Proposed MND were made available for public review at MBK Engineers offices in Sacramento.

6 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

6.1 Federal

Clean Air Act. Section 176(c) of this act prohibits federal action or support of activities that do not conform to a State Implementation Plan. The Project is not expected to violate any air quality standard, increase air quality violations in the Project region, exceed the EPA's general conformity *de minimis* threshold, or hinder the attainment of air quality objectives in the local air basin. The Project will have no adverse effect on the future air quality of the Project area and is in compliance with this act.

Clean Water Act (Sections 401 and 404). Section 404 of this act requires that a permit be obtained from the USACE for fill of waters of the U.S., including wetlands, prior to Project implementation. In compliance with Section 401 of the Act, a water quality certification or a waiver of water quality certification needs to be obtained from the Central Valley Regional Water Quality Control Board (RWQCB). This Project does not require 404 or 401 permits since there will be no waterside work below MHW. If it is determined that the Project may impact waters of the U.S., then Section 404 and 401 permits will be secured prior to Project implementation, in compliance with this act.

Endangered Species Act. The ESA prohibits unauthorized take of species listed or proposed for listing as threatened or endangered. The ESA also ensures that the actions of federal agencies do not jeopardize the continued existence of threatened and endangered species. The conservation measures incorporated into the Project will assure compliance with the ESA.

Migratory Bird Treaty Act. Protection of migratory birds, their occupied nests, and their eggs is required by the Migratory Bird Treaty Act (MBTA) (16 USC 703 et seq.), Title 50 Code of Federal Regulations (part 10), and CDFG Code Sections 3503, 3513, and 3800. The full list of the species protected under the MBTA appears in Title 50, section 10.13, of the Code of Federal Regulations (50 CFR 10.13), and includes federally and State-listed migratory birds as well as other non-listed migratory birds. Conservation measures incorporated into the Project will assure compliance with the MBTA.

6.2 State

California Environmental Quality Act. This Initial Study/Mitigated Negative Declaration has been prepared to comply with CEQA.

California Endangered Species Act. Generally, CDFW administers the State laws providing protection of fish and wildlife resources, including the CESA. CESA parallels the ESA and was written to protect State endangered and threatened species. Conservation measures incorporated into the Project, including consultation with CDFW regarding State-listed and sensitive species that may be impacted, will assure compliance with CESA.

Native Plant Protection Act. The California Native Plant Protection Act (NPPA) of 1973 directed CDFW to preserve, protect, and enhance native plants. It gave CDFW the power to designate native plants as endangered or rare and requires that landowners who have been

notified of State-listed species on their property, and who wish to destroy those plants and their habitat, must provide CDFW with 10 days' notice to salvage the plants before destruction occurs. Many of the species designated under the NPPA were subsumed by CESA, but there is a subset of species, subspecies, and varieties of plants that were not, and are protected as rare under the NPPA. Conservation measures incorporated into the Project, which include NPPA rare plants that may be impacted, will assure compliance with NPPA.

Fish and Game Code Sections 3503 and 3513. Under California Fish and Game Code Section 3503 it is unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as otherwise provided. Fish and Game Code Section 3503.5 protects all birds-of-prey (raptors) and their eggs and nests and under Section 3513 it is unlawful to take or possess any migratory non-game bird designated under the MBTA. Conservation measures incorporated into the Project will assure compliance with these Fish and Game Code sections.

Fish and Game Code Wetland Regulation (Section 1600 et seq.). California Fish and Game Code Section 1600 et seq. gives authority to CDFW to regulate activities that would interfere with the natural flow of, or substantially alter the channel, bed, or bank of a lake, river, or stream. Any work on the waterside levee, from the hinge point down, requires the District to notify CDFW and apply for a Lake or Streambed Alteration Agreement. If it is determined that the activity will have substantial adverse effects on fish and wildlife resources, the Lake or Streambed Alteration Agreement includes conditions to protect these resources. The Project is in compliance with these Fish and Game Code sections.

Delta Protection Act

The Delta Protection Act was established in recognition of the increasing threats to the resources of the Primary Zone of the Delta from urban and suburban encroachment which have the potential to impact agriculture, wildlife habitat, and recreational uses. Pursuant to the Delta Protection Act, the Land Use and Resource Management Plan for the Primary Zone of the Delta was completed and adopted by the Delta Protection Commission in 1995 (updated in 2002). The Project will not result in urban or suburban encroachment and is, therefore, in compliance with this act.

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Appendices

Appendix A

Special-status Plant Species and Rare Natural Communities Documented in the Project Region

Table A-1. Special-status plant species and rare natural communities documented in the Project region.

Common name	Scientific name	Query sources	Status[1]: Federal/ State/CRPR	Blooming period	Elevation range (ft)	Suitable habitat type	Likelihood of occurrence in Project area
Vascular plants							
large-flowered fiddleneck, including critical habitat	*Amsinckia grandiflora*	USFWS	FE/CE/1B.1	March–May	886–1,804	Cismontane woodland and valley and foothill grassland	None; Project is outside elevation range
California androsace	*Androsace elongata* subsp. *acuta*	CNPS	–/–/4.2	March–June	492–3,937	Chaparral, cismontane woodland, coastal scrub, meadows and seeps, pinyon and juniper woodland, and valley and foothill grassland	None; Project is outside elevation range
Contra Costa manzanita	*Arctostaphylos manzanita* subsp. *laevigata*	CNDDB	–/–/1B.2	January–April	1,411–3,609	Rocky areas of chaparral	None; Project is outside elevation range
alkali milk-vetch	*Astragalus tener* var. *tener*	CNPS, CNDDB	–/–/1B.2	March–June	3–197	Alkaline areas in playas, valley and foothill grassland (adobe clay), and vernal pools	None; no suitable habitat present
heartscale	*Atriplex cordulata* var. *cordulata*	CNPS, CNDDB	–/–/1B.2	April–October	0–1,837	Saline or alkaline areas of chenopod scrub, meadows and seeps, and sandy areas of valley and foothill grassland	None; no suitable habitat present
crownscale	*Atriplex coronata* var. *coronata*	CNPS	–/–/4.2	March–October	3–1,936	Alkaline, often clay areas of chenopod scrub, valley and foothill grassland, and vernal pools	None; no suitable habitat present

Common name	Scientific name	Query sources	Status[1]: Federal/ State/CRPR	Blooming period	Elevation range (ft)	Suitable habitat type	Likelihood of occurrence in Project area
Lost Hills crownscale	*Atriplex coronata* var. *vallicola*	CNPS	–/–/1B.2	April–September	164–2,083	Alkaline areas of chenopod scrub, valley and foothill grassland, and vernal pools	None; no suitable habitat present
brittlescale	*Atriplex depressa*	CNPS, CNDDB	–/–/1B.2	April–October	3–1,050	Alkaline/clay areas of chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools	None; no suitable habitat present
big tarplant	*Blepharizonia plumosa*	CNPS, CNDDB	–/–/1B.1	July–October	98–1,657	Usually clay areas in valley and foothill grassland	Low; suitable habitat is not likely present
watershield	*Brasenia schreberi*	CNPS, CNDDB	–/–/2B.3	June–September	98–7,218	Freshwater marshes and swamps	Moderate; suitable habitat may be present
round-leaved filaree	*California macrophylla*	CNPS, CNDDB	–/–/1B.2	March–May	49–3,937	Clay areas in cismontane woodland and valley and foothill grassland	Low; suitable habitat is not likely present
Mt. Diablo fairy-lantern	*Calochortus pulchellus*	CNPS, CNDDB	–/–/1B.2	April–June	98–2,756	Chaparral, cismontane woodland, riparian woodland, and valley and foothill grassland	Low; suitable habitat is not likely present
bristly sedge	*Carex comosa*	CNPS, CNDDB	–/–/2B.1	May–September	0–2,051	Coastal prairie, marshes and swamps (lake margins), and valley and foothill grassland	Moderate; suitable habitat may be present
Congdon's tarplant	*Centromadia parryi* subsp. *congdonii*	CNPS, CNDDB	–/–/1B.1	May–October (November)	0–755	Alkaline areas of valley and foothill grassland	None; no suitable habitat present
Parry's rough tarplant	*Centromadia parryi* subsp. *rudis*	CNPS	–/–/4.2	May–October	0–328	Alkaline, vernally mesic, seeps, and sometimes roadsides in valley and foothill grassland and vernal pools	Low; suitable habitat is not likely present

Common name	Scientific name	Query sources	Status[1]: Federal/ State/CRPR	Blooming period	Elevation range (ft)	Suitable habitat type	Likelihood of occurrence in Project area
soft bird's-beak	*Chloropyron molle* subsp. *molle*	CNPS, CNDDB	FE/CR/1B.2	July–November	0–10	Coastal salt marshes and swamps.	None; no suitable habitat present
Bolander's water-hemlock	*Cicuta maculata* var. *bolanderi*	CNPS, CNDDB	–/–/2B.1	July–September	0–656	Coastal, fresh or brackish water marshes and swamps	Moderate; suitable habitat may be present
small-flowered morning-glory	*Convolvulus simulans*	CNPS	–/–/4.2	March–July	98–2,428	Clay or serpentinite seeps in chaparral openings, coastal scrub, and valley and foothill grassland	None; no suitable habitat present
recurved larkspur	*Delphinium recurvatum*	CNPS, CNDDB	–/–/1B.2	March–June	10–2,592	Alkaline areas in chenopod scrub, cismontane woodland, and valley and foothill grassland	None; no suitable habitat present
Delta button-celery	*Eryngium racemosum*	CNPS, CNDDB	–/CE/1B.1	June–October	10–98	Vernally mesic clay depressions in riparian scrub	None; no suitable habitat present
spiny-sepaled button-celery	*Eryngium spinosepalum*	CNPS, CNDDB	–/–/1B.2	April–June	262–3,199	Valley and foothill grassland and vernal pools	None; Project is outside elevation range
San Joaquin spearscale	*Extriplex joaquinana*	CNPS, CNDDB	–/–/1B.2	April–October	3–2,740	Alkaline areas of chenopod scrub, meadows and seeps, playas, and valley and foothill grassland	None; no suitable habitat present
stinkbells	*Fritillaria agrestis*	CNPS, CNDDB	–/–/4.2	March–June	33–5,102	Clay, sometimes serpentinite areas in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland	None; no suitable habitat present

Common name	Scientific name	Query sources	Status[1]: Federal/ State/CRPR	Blooming period	Elevation range (ft)	Suitable habitat type	Likelihood of occurrence in Project area
Diablo helianthella	*Helianthella castanea*	CNPS	–/–/1B.2	March–June	197–4,265	Usually rocky, axonal soils (often in partial shade) in broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland	None; no suitable habitat present
hogwallow starfish	*Hesperevax caulescens*	CNPS	–/–/4.2	March–June	0–1,657	Sometimes alkaline areas in mesic/clay valley and foothill grassland and shallow vernal pools	None; no suitable habitat present
Brewer's western flax	*Hesperolinon breweri*	CNPS, CNDDB	–/–/1B.2	May–July	98–3,100	Usually serpentinite areas in chaparral, cismontane woodland, valley and foothill grassland	None; no suitable habitat present
woolly rose-mallow	*Hibiscus lasiocarpos* var. *occidentalis*	CNPS, CNDDB	–/–/1B.2	June–September	0–394	Often in riprap on sides of levees in freshwater marshes and swamps	High; potential to occur adjacent to (but not within) the Project area; previously documented on Bacon Island
Northern California black walnut	*Juglans hindsii*	CNDDB	–/–/1B.1	April–May	0–1,444	Riparian forest and riparian woodland	High; documented in the Project area during habitat assessment; however, black walnuts in the area are likely of hybrid origin and thus not protected

Common name	Scientific name	Query sources	Status[1]: Federal/ State/CRPR	Blooming period	Elevation range (ft)	Suitable habitat type	Likelihood of occurrence in Project area
Contra Costa goldfields	*Lasthenia conjugens*	CNPS	FE/–/1B.1	March–June	0–1,542	Mesic areas of cismontane woodland, alkaline playas, valley and foothill grassland, and vernal pools	None; no potential habitat
Ferris' goldfields	*Lasthenia ferrisiae*	CNPS	–/–/4.2	February–May	66–2,297	Alkaline and clay areas of vernal pools	None; no potential habitat
Delta tule pea	*Lathyrus jepsonii* var. *jepsonii*	CNPS, CNDDB	–/–/1B.2	May–July (August), (September)	0–16	Freshwater and brackish marshes and swamps	High; potential to occur adjacent to (but not within) the Project area; documented on adjacent Delta islands
Mason's lilaeopsis	*Lilaeopsis masonii*	CNPS, CNDDB	–/CR/1B.1	April–November	0–33	Marshes and swamps (brackish or freshwater) and riparian scrub	High; potential to occur adjacent to (but not within) the Project area; previously documented on Bacon Island
Delta mudwort	*Limosella australis*	CNPS, CNDDB	–/–/2B.1	May–August	0–10	Usually mud banks of marshes and swamps (freshwater or brackish) and riparian scrub	High; potential to occur adjacent to (but not within) the Project area; documented on adjacent Delta islands
little mousetail	*Myosurus minimus* subsp. *apus*	CNPS	–/–/3.1	March–June	66–2,100	Valley and foothill grassland and alkaline areas of vernal pools	Low; suitable habitat is not likely present

Common name	Scientific name	Query sources	Status[1]: Federal/ State/CRPR	Blooming period	Elevation range (ft)	Suitable habitat type	Likelihood of occurrence in Project area
adobe navarretia	*Navarretia nigelliformis* subsp. *nigelliformis*	CNPS	–/–/4.2	April–June	328–3,281	Clay, sometimes serpentinite areas in vernally mesic valley and foothill grassland and sometimes vernal pools	None; Project is outside elevation range
Antioch Dunes evening-primrose	*Oenothera deltoides* subsp. *howellii*	CNPS, CNDDB	FE/CE/1B.1	March–September	0–98	Inland dunes	None; no suitable habitat present
eel-grass pondweed	*Potamogeton zosteriformis*	CNPS, CNDDB	–/–/2B.2	June–July	0–6,102	Assorted freshwater marshes and swamps	Moderate; suitable habitat may be present
California alkali grass	*Puccinellia simplex*	CNPS, CNDDB	–/–/1B.2	March–May	7–3,051	Alkaline or vernally mesic sinks, flats, and lake margins in chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools	None; no suitable habitat present
Sanford's arrowhead	*Sagittaria sanfordii*	CNDDB	–/–/1B.2	May–November	0–2,133	Assorted shallow freshwater marshes and swamps	Moderate; suitable habitat may be present
marsh skullcap	*Scutellaria galericulata*	CNPS, CNDDB	–/–/2B.2	June–September	0–6,890	Lower montane coniferous forest, meadows and seeps (mesic), and marshes and swamps	Moderate; suitable habitat may be present
side-flowering skullcap	*Scutellaria lateriflora*	CNPS, CNDDB	–/–/2B.2	July–September	0–1,640	Meadows and seeps (mesic) and marshes and swamps	Moderate; suitable habitat may be present
chaparral ragwort	*Senecio aphanactis*	CNPS, CNDDB	–/–/2B.2	January–April (May),	49–2,625	Sometimes alkaline areas of chaparral, cismontane woodland, and coastal scrub	None; no suitable habitat present

Common name	Scientific name	Query sources	Status[1]: Federal/ State/CRPR	Blooming period	Elevation range (ft)	Suitable habitat type	Likelihood of occurrence in Project area
Suisun Marsh aster	*Symphyotrichum lentum*	CNPS, CNDDB	–/–/1B.2	(April) May–November	0–10	Brackish and freshwater marshes and swamps	High; potential to occur adjacent to (but not within) the Project area; previously documented on Bacon Island
caper-fruited tropidocarpum	*Tropidocarpum capparideum*	CNPS, CNDDB	–/–/1B.1	March–April	3–1,493	Alkaline hills in valley and foothill grassland	None; no suitable habitat present
Rare natural communities							
Alkali Meadow	N/A	CNDDB	S2.1	N/A	0–7,000	On fine-textured, more or less permanently moist, alkaline soils	None; characteristic species not present
Alkali Seep	N/A	CNDDB	S2.1	N/A	0–6,889	Temporarily exposed to permanently flooded alkali marshes	None; characteristic species not present
Cismontane Alkali Marsh	N/A	CNDDB	S1.1	N/A	0–1,000	Standing water or saturated alkaline soil	None; characteristic species not present
Coastal and Valley Freshwater Marsh	N/A	CNDDB	S2.1	N/A	0–6,889	Quiet sites (lacking significant current) permanently flooded by fresh water (rather than brackish, alkaline, or variable)	High; characteristic species occur adjacent to (but not within) the Project area below MHW

Common name	Scientific name	Query sources	Status[1]: Federal/ State/CRPR	Blooming period	Elevation range (ft)	Suitable habitat type	Likelihood of occurrence in Project area
Great Valley Oak Riparian Forest	N/A	CNDDB	S1.1	N/A	0–2,543	Restricted to the highest parts of floodplains, most distant from or higher above active river channels and therefore less subject to physical disturbance from flooding, but still receiving annual inputs of silty alluvium and subsurface irrigation	None; characteristic species not present
Northern Claypan Vernal Pool	N/A	CNDDB	S1.1	N/A	0–328	Fairly old, circum-neutral to alkaline, Si-cemented hardpan soils	None; characteristic species not present
Valley Needlegrass Grassland	N/A	CNDDB	S1.1	N/A	0–4,265	Usually on fine-textured (often clay) soils, moist or even waterlogged during winter, but very dry in summer	None; characteristic species not present
Valley Sink Scrub	N/A	CNDDB	S1.1	N/A	0–5,906	Heavy, saline and/or alkaline clays of lakebeds or playas	None; characteristic species not present

[1] Status:

Federal
FE Federally listed endangered
– No federal status

State
CE California State listed endangered
CR California State listed as rare
– No State status

California Rare Plant Rank (CRPR)
1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list
0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

State Ranks for Rare Natural Communities
S1 Fewer than 6 viable occurrences Statewide
S2 6–20 viable occurrences Statewide
0.1 Very threatened

Appendix B

Special-status Wildlife Species Documented in the Project Region

Table B-1. Special-status wildlife species documented in the Project region.

Common name Scientific name	Query sources	Status[a] Federal/ State	Distribution in California	Habitat association	Likelihood to occur in Project area
Invertebrates					
Longhorn fairy shrimp *Branchinecta longiantenna*	CNDDB, USFWS	FE/–	Four known populations in San Luis Obispo, Merced, Alameda, and Contra Costa counties	Vernal pools; also found in sandstone rock outcrop pools, grass-bottomed pools, and claypan pools	None; no suitable habitat present
Vernal pool fairy shrimp *Branchinecta lynchi*	CNDDB, USFWS	FT/–	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County	Vernal pools; also found in sandstone rock outcrop pools	None; no suitable habitat present
Vernal pool tadpole shrimp *Lepidurus packardi*	USFWS	FE/–	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds	None; no suitable habitat present
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	CNDDB, USFWS	FT/–	Streamside habitats throughout the Central Valley	Riparian and oak savanna habitats below 915 m (3,000 ft) with host plant *Sambucus* sp. (blue elderberry)	None; no suitable elderberry habitat present
San Bruno elfin butterfly *Callophrys mossii bayensis*	USFWS	FE/–	Largest population on San Bruno Mountain in San Mateo County; smaller populations may occur in Contra Costa and Marin counties	Coastal scrub; host plant is Pacific stonecrop (*Sedum spathulifolium*)	None; no suitable habitat present, and outside of species' range
Amphibians					
California tiger salamander *Ambystoma californiense*	CNDDB, USFWS	FT/ST	Very fragmented; along the coast from Sonoma County to Santa Barbara County, in the Central Valley and Sierra foothills from Sacramento County to Tulare County	Grassland, oak savannah, or edges of woodland that provide subterranean refuge (typically mammal burrows); breeds in nearby temporary ponds, vernal pools, or slow-moving parts of streams	None; no suitable habitat present, and outside of species' range

Common name Scientific name	Query sources	Status[a] Federal/ State	Distribution in California	Habitat association	Likelihood to occur in Project area
California red-legged frog *Rana draytonii*	CNDDB, USFWS	FT/SSC	Largely restricted to coastal drainages on the central coast from Mendocino County to Baja California; in the Sierra foothills south to Tulare and possibly Kern counties	Breeds in still or slow-moving water with emergent and overhanging vegetation, including wetlands, wet meadows, ponds, lakes, and low-gradient, slow moving stream reaches with permanent pools; uses adjacent uplands for dispersal and summer retreat	None; outside of species' range
Reptiles					
Western pond turtle *Actinemys marmorata*	CNDDB	–/SSC	From the Oregon border along the coast ranges to the Mexican border, and west of the crest of the Cascades and Sierras	Permanent, slow-moving fresh or brackish water with available basking sites and adjacent open habitats or forest for nesting	High; suitable aquatic and upland nesting habitat in Project vicinity; species documented on Bacon Island (Stillwater Sciences 2016, CDFW 2016)
Coast horned lizard *Phrynosoma blainvillii*	CNDDB	–/SSC	West of deserts and Cascade-Sierran highlands, as far north as Shasta Reservoir	Open areas with sandy soil and/or patches of loose soil and low/scattered vegetation in scrublands, grasslands, conifer forests, and woodlands; frequently found near ant hills	None; outside of species' range
California legless lizard *Anniella pulchra*	CNDDB	–/SSC	Northern Contra Costa County south to northwestern Baja California; scattered occurrences in San Joaquin Valley, along the southern Sierra Nevada mountains, and in the western Mojave Desert	Sparsely vegetated areas of beach dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces; warm, moist, loose soil for burrowing	None; outside of species' range
Alameda whipsnake *Masticophis lateralis euryxanthus*	CNDDB	FT/ST	Inner coast range, mostly Contra Costa and Alameda counties; additional records in San Joaquin and Santa Clara counties	Chaparral (northern coastal sage scrub and coastal sage) and rocky outcrops; may venture into adjacent habitats including grassland, oak savanna, and woodlands	None; no suitable habitat present, and outside of species' range

Common name Scientific name	Query sources	Status[a] Federal/ State	Distribution in California	Habitat association	Likelihood to occur in Project area
San Joaquin whipsnake *Masticophis flagellum ruddockii*	CNDDB	–/SSC	From the Sacramento Valley (Colusa County) south to San Joaquin Valley (Kern County) and west into the South Coast Ranges; an isolated population in the Sutter Buttes	Open, dry, treeless areas, including grassland and saltbush scrub; uses rodent burrows, shaded vegetation, and surface objects as refuge	None; outside of species' range
Giant garter snake *Thamnophis gigas*	CNDDB, USFWS	FT/ST	Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno	Sloughs, canals, low- gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	Moderate; marginally suitable habitat present
Birds					
White-tailed kite *Elanus leucurus*	CNDDB	–/SFP	Year-round resident; found in nearly all lowlands of California west of the Sierra Nevada mountains and the southeast deserts	Lowland grasslands and wetlands with open areas; nests in trees near open foraging area	Moderate; may forage or nest in the Project vicinity
Northern harrier *Circus cyaneus*	CNDDB	–/SSC	Year-round resident; scattered throughout California; in the northwest, nests largely within coastal lowlands from Del Norte County south to Bodega Head in Sonoma County, inland to Napa County	Nests, forages, and roosts in wetlands or along rivers or lakes, but also in grasslands, meadows, or grain fields	High; may forage in Project vicinity; observed foraging on Bacon Island (Stillwater Sciences 2016)
Swainson's hawk *Buteo swainsoni*	CNDDB	–/ST	Summer resident; breeds in lower Sacramento and San Joaquin valleys, the Klamath Basin, and Butte Valley; highest nesting densities occur near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain fields	High; may nest or forage in Project vicinity; observed nesting and foraging on Bacon Island (Stillwater Sciences 2016, CDFW 2016)

Common name Scientific name	Query sources	Status[a] Federal/ State	Distribution in California	Habitat association	Likelihood to occur in Project area
Golden eagle *Aquila chrysaetos*	CNDDB	BGEPA/SFP	Uncommon permanent resident and migrant throughout California, except center of Central Valley	Open woodlands and oak savannahs, grasslands, chaparral, sagebrush flats; nests on steep cliffs or large trees	Low (foraging only); marginally suitable foraging habitat present
American peregrine falcon *Falco peregrinus anatum*	CNDDB	FD/SD, SFP	Most of California during migrations and in winter; nests primarily in the Coast Ranges, northern Sierra Nevada Mountains, and other mountainous areas of northern California	Wetlands, woodlands, cities, agricultural lands, and coastal area with cliffs (and rarely broken-top, predominant trees) for nesting; often forages near water	Low (foraging only); marginally suitable foraging habitat present
California black rail *Laterallus jamaicenis coturniculus*	CNDDB	–/ST, SFP	Northern San Francisco Bay area (primarily San Pablo and Suisun bays) and Sacramento-San Joaquin Delta	Large tidally-influenced marshes with saline to brackish water, typically with a high proportion of pickleweed (*Salicornia virginica*); also can be associated with bulrush (*Schoenoplectus* spp.), cattail (*Typha* spp.), or rushes (*Juncus* spp.); peripheral vegetation at and above mean high higher water necessary to protect nesting birds during extremely high tides	Moderate; may nest in marsh habitats in Old River near but outside of Project area
California clapper rail *Rallus longirostris obsoletus*	USFWS	FE/SE, SFP	Predominantly in the marshes of the San Francisco estuary: South San Francisco Bay, North San Francisco Bay, San Pablo Bay, and sporadically throughout the Suisun Marsh area east to Browns Island	Salt and brackish water marshes, typically dominated by pickleweed (*Salicornia virginica*) and Pacific cordgrass (*Spartina foliosa*)	None; outside of species' range
Greater sandhill crane/ Lesser sandhill crane *Grus canadensis tabida/ Grus canadensis*	Stillwater Sciences 2015	Greater: –/ST, SFP Lesser: –/SSC	Winter visitor and migrant; scattered locations in the Central Valley; Greaters breed in extreme northeastern California	Forages in freshwater marshes and grasslands as well as harvested rice fields, corn stubble, barley, and newly planted grain fields	High (foraging only); sandhill crane observed foraging in agricultural fields on Bacon Island in winter (Stillwater Sciences 2015)

Common name Scientific name	Query sources	Status[a] Federal/ State	Distribution in California	Habitat association	Likelihood to occur in Project area
Burrowing owl *Athene cunicularia*	CNDDB	–/SSC	Year-round resident throughout much of the state; Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low-stature grassland or desert vegetation with available burrows	Moderate; no suitable burrows currently identified in Project area
Loggerhead shrike *Lanius ludovicianus*	CNDDB	–/SSC	Year-round resident in most of California except for the forested coastal slope and the high elevations of the Sierra Nevada, southern Cascade, and Transverse Ranges	Open shrubland or woodlands with short vegetation and and/or bare ground for hunting; some tall shrubs, trees, fences, or power lines for perching; typically nest in isolated trees or large shrubs	Moderate; may forage or nest in Project vicinity
Bank swallow *Riparia*	CNDDB	–/ST	Summer resident; occurs along the Sacramento River from Tehama County to Sacramento County, along the Feather and lower American rivers; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou counties; small populations near the coast from San Francisco County to Monterey County	Nests in vertical bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam	None; no suitable habitat present
Song sparrow ("Modesto" population) *Melospiza melodia*	CNDDB	–/SSC	Year-round resident; north-central portion of the Central Valley	Emergent freshwater marshes, riparian willow thickets, and riparian forests	Moderate; may nest in Project vicinity
Tricolored blackbird *Agelaius tricolor*	CNDDB	–/SSC	Permanent resident, but makes extensive migrations both in breeding season and winter; common locally throughout Central Valley and in coastal areas from Sonoma County south	Feeds in grasslands and agriculture fields; nesting habitat components include open accessible water, a protected nesting substrate (including flooded or thorny vegetation), and a suitable nearby foraging space with adequate insect prey	Moderate; may nest or forage in Project vicinity

Common name Scientific name	Query sources	Status[a] Federal/ State	Distribution in California	Habitat association	Likelihood to occur in Project area
Mammals					
Riparian brush rabbit *Sylvilagus bachmani riparius*	CNDDB	FE/SE	Single, known extant population restricted to the Stanislaus River in Caswell Memorial State Park	Brushy understory of valley riparian forests	None; outside of species' range
Western red bat *Lasiurus blossevillii*	CNDDB	–/SSC	Near the Pacific Coast, Central Valley, and the Sierra Nevada	Riparian forests, woodlands near streams, fields and orchards	Moderate; may nest in riparian habitats
San Joaquin kit fox *Vulpes macrotis mutica*	CNDDB, USFWS	FE/ST	San Joaquin Valley floor and surrounding foothills of the coastal ranges, Sierra Nevada, and Tehachapi mountains	Annual grasslands or open areas dominated by scattered brush, shrubs, and scrub	None; outside of species' range
American badger *Taxidea taxus*	CNDDB	–/SSC	Throughout the State except in the humid coastal forests of Del Norte County and the northwest portion of Humboldt County	Shrubland, open grasslands, fields, and alpine meadows with friable soils	None; no suitable habitat present

[a] Status codes:

Federal
FE = Listed as endangered under the federal Endangered Species Act
FT = Listed as threatened under the federal Endangered Species Act
FD = Federally delisted
BGEPA = Federally protected under the Bald and Golden Eagle Protection Act

State
SE = Listed as Endangered under the California Endangered Species Act
ST = Listed as Threatened under the California Endangered Species Act
SD = State Delisted
SSC = CDFW Species of Special Concern
SFP = CDFW Fully Protected species