Soil Investigations for Data Collection in the Delta

Initial Study

Proposed Mitigated Negative Declaration

November 2019

California Department of Water Resources

1416 Ninth Street

Sacramento, CA 95814

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INITIAL STUDY

SOIL INVESTIGATIONS FOR DATA COLLECTION IN THE DELTA

1. Proposed Project Title	Soil Investigations for Data Collection in the Delta
2. Lead Agency Name and Address	California Department of Water Resources 1416 Ninth Street Sacramento, California 95814
3. Contact Person and Phone Number	Katherine Marquez (916) 651-9569
4. Proposed Project Location	Sacramento-San Joaquin Delta
5. Proposed Project Sponsor's Name	California Department of Water Resources
6. General Plan Designation	General Plan designations in the Study Area of the Proposed Project allow a variety of uses including agriculture, outdoor recreation, wildlife habitat, public facilities, and limited areas for commercial, industrial, and rural residential development.
7. Zoning	Land use zoning codes in the Study Area of the Proposed Project allow a variety of uses including agriculture, outdoor recreation, wildlife habitat, public facilities, and limited areas for commercial, industrial, and rural residential development.
8. Description of Proposed Project	The primary objective of the proposed project is to determine the composition, location, and geotechnical properties of soil materials commonly found in the Delta which would inform the design, environmental analysis, and development of alternatives for a potential Delta conveyance project and contribute to DWR's overall understanding of Delta geology.
9. Surrounding Land Uses and Setting	Surrounding land uses in the Study Area of the Proposed Project include a

	variety of uses including agriculture, outdoor recreation, wildlife habitat, public facilities, and limited areas for commercial, industrial, and rural residential development.
10. Other Public Agencies Whose Approval is Required	California Department of Fish and Wildlife (CDFW), US Army Corps of Engineers (USACE), State Office of Historic Preservation, National Historic Preservation Act, US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), State Water Resources Control Board (SWB), and State Lands Commission (SLC).
11. Have California Native American tribes traditionally and culturally affiliated with the Proposed Project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?	Yes, consultation is on-going and the consultation process is described in more detail in the Tribal Cultural Resources section of the Initial Study.

MITIGATED NEGATIVE DECLARATION

PROPOSED PROJECT: Soil Investigations for Data Collection in the Delta

LEAD AGENCY: California Department of Water Resources

PROPOSED PROJECT LOCATION: The Proposed Project Study Area is located within the legal Delta in Alameda, Contra Costa, Sacramento, Solano, San Joaquin, and Yolo Counties.

PROPOSED PROJECT DESCRIPTION:

The Department of Water Resources (DWR) plans to conduct soil investigations for the purposes of measuring physical properties of the soils, location of the groundwater table, and other typical geologic and geotechnical parameters that will be used to inform and evaluate alternatives, consistent with Executive Order N-10-19, for a proposed single tunnel Delta conveyance (requiring a separate CEQA process) consistent with Governor Newsom's new approach to modernize Delta water conveyance.

The primary objective of the proposed soil investigation is to determine the composition, location, and geotechnical properties of soil materials, which are anticipated to be sand, silt,

clay and peat soils that are commonly found in the Delta. The planned work includes overwater and land-based soil borings, cone penetration tests (CPTs), and geophysical surveys. This testing is necessary because there is a lack of geotechnical data at relevant depths, available to the Department of Water Resources in the Study Area.

The Study Area includes a portion of the Sacramento-San Joaquin River Delta, encompassing the area from south of the City of West Sacramento to just north of Bethany Reservoir, and stretches from east of Interstate 5 to west of State Route 160 (River Road). The landscape within the Study Area includes a variety of land-uses including agriculture, parks and open space, urban and rural residential neighborhoods, commercial development, and scenic roadways and waterways.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this Proposed Project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages:

ENVIRONMENTAL CHECKLIST

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

DETERMINATION: On the basis of the following initial evaluation, I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made that mitigate the potential impacts to a level that is less than significant. A MITIGATED NEGATIVE DECLARATION will be prepared.

MITIGATION MEASURES: The following mitigation measures will be implemented as part of the Proposed Project to avoid, minimize, rectify, reduce or eliminate, or compensate for potentially significant environmental impacts. Implementation of these mitigation measures would reduce the potentially significant environmental impacts of the Proposed Project to less-than-significant levels:

MM AES-1:

a. Each Impact Area will be returned to as close to pre-activity conditions as possible.

b. No building structures will be removed or disturbed. Soil investigation activities will occur at a distance greater than 100 feet from residences and small business operations. If fencing needs to be removed for access, it would be replaced in kind after the work is completed.

c. No trees or vines will be removed during exploration activities; and only minor disturbances to vegetation would occur during mobilization of equipment. This minor disturbance may consist of mowing, removal of a few tree limbs, or trimming of bushes for site access. However, if access requires removal of any vegetation, the landowner would be consulted first to minimize the impact to both vegetation and the landowner.

MM AES-2:

a. Navigational lighting will be used as needed for overwater work, but will meet the standards required for waterway safety, and will not increase the existing ambient lighting of the area in a substantial way. Any lighting used on barges or drill ships will not exceed the standards of brightness for standard navigational safety requirements.

b. All work will occur between sunrise and sunset.

MM AGR-1:

Any proposed soil investigation activities that occur on agricultural lands will be grouted in accordance with ASTM standards to five feet below the surface. The final five feet of topsoil will be replaced to return the Impact Area to as close to pre-activity conditions as possible.

MM AIR-1:

a. Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads.

b. Cover or maintain at least six feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways will be covered.

c. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. Use wet power vacuum street sweepers to remove any visible track out mud or dirt onto adjacent public roads as needed. Use of dry power sweeping and blower devices is prohibited.

d. Limit vehicle speeds on unpaved roads to 15 miles per hour (mph).

MM BIO-1:

a. All litter, debris, unused materials, rubbish, supplies, or other material will be appropriately stored in closed containers until it can be removed from project sites and deposited at an appropriate disposal or storage site. All trash that is brought to a project site during soil investigation activities (e.g., plastic water bottles, plastic lunch bags, cigarettes) shall be removed from the site daily.

b. All on-land soil investigation Impact Areas will be located outside of wetlands as defined in the Corps of Engineers Wetlands Delineation Manual (USACE 1987).

c. Over-water sites will be located within portions of navigable channels or sloughs that generally do not provide appropriate habitat for terrestrial plant or wildlife species, and will be authorized under the Clean Water Act sections 401 and 404, and Fish and Game Code section 1602 et seq.

d. A qualified team of biologists will conduct a habitat assessment and reconnaissance level surveys approximately two weeks prior to the onset of ground disturbing soil investigation activities for any special status plants and wildlife that have the potential to occur within the project area. If the biologists identify the potential for special status wildlife impacts within the Impact Area and associated standard species buffers based on the site reconnaissance, the location will be shifted the minimum distance necessary to reduce the potential for biological impacts to a less than significant level without increasing impacts to other resources to above a level of significance. If a suitable location cannot be determined within adjacent areas, then the soil investigation at that location will not be conducted.

e. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify the specific species and associated habitat that could occur on site.

f. A qualified biologist will conduct an environmental awareness training session for all field personnel prior to the start of work. At a minimum, the training shall:

    i. include a description of each species with the potential to occur, including physical description, habitat needs, and life history as well as a discussion of the importance of avoiding impacts to special status wildlife.

    ii. explain the general measures that are being implemented to conserve these species as they relate to the project and project area, and procedures to follow should they encounter wildlife during work.

    iii. explain the stop work authority of biologists and/or cultural resource specialists.

g. Any observations of federally or state-listed species or California Species of Special Concern will be reported to CDFW within three (3) working days of the observation, and the observation(s) will be submitted to the California Natural Diversity Database (CNDDB). Any observations of federally listed species will also be reported to the U.S. Fish and Wildlife Service.

h. All federally or state-listed species observed will be allowed to leave the Impact Area on their own. If the biologist determines that continuing activities could potentially cause unpermitted take under federal or State law to a federally or state-listed species, activities must cease. Work may not resume until the on-site biologist has determined there is no longer the possibility of causing unpermitted take under federal and State law.

i. The area below any vehicle or piece of equipment that has been stationary for 24 hours or greater will be examined prior to operation to ensure that no wildlife species is present.

j. No pets or firearms will be permitted on site.

k. Any open holes or trenches that will be left exposed overnight will either be securely covered or have an escape ramp installed to prevent entrapment of any wildlife.

l. Any piping or casing left exposed overnight will be capped to prevent wildlife from entering.

MM BIO-2:

a. No project activities will be conducted during or within 24 hours following a rain event in locations that have a potential for special status amphibians to occur or are near wetlands or other water features.

b. In areas with the potential for special-status reptiles and amphibians to occur, prior to the onset of project activities at any Impact Area, a qualified biologist will conduct pre-activity surveys to determine whether any such species are present. A qualified biologist must, at a minimum, have experience conducting surveys to identify the California tiger salamander, California red-legged frog, western spadefoot, western pond turtle, and/or giant garter snake and their associated habitat.

c. Any active rodent burrows or suitable cracks identified by a qualified biologist during the pre-activity survey will be flagged so that they can be avoided.

d. Any burrows, cracks or fissures suitable for rodents that cannot be avoided, and will be temporarily impacted by the movement and placement of equipment or other project activities will be covered with plywood to avoid burrow collapse.

e. Leaf litter will be surveyed by the biologist for presence of wildlife prior to the onset of work, and if any special-status species are identified as using the leaf litter for

refuge it will be avoided and a buffer will be established by a qualified biologist and flagged.

f. If any special-status reptiles or amphibians are observed within the Impact Area, the on-site biologist will determine if the work can continue without harm to the individual(s). If the biologist determines that it is not safe to continue work, all work will cease until the animal has left the Impact Area. Once the individual(s) is determined by the on-site biologist to have left the Impact Area and is out of harm's way, work may resume.

g. Piles of rock, rip-rap, or other materials that could provide refuge to reptiles or amphibians will be avoided. If movement of such materials cannot be avoided, a qualified biologist will survey the area prior to disturbance and monitor the material movement and restoration of the area following completion of Proposed Project activities.

MM BIO-3: Western pond turtle

a. In areas with the potential for western pond turtle to occur, pre-activity presence/absence surveys for western pond turtle shall occur within 48 hours prior to the onset of project activities at any Impact Area.

b. If Western pond turtles are observed on land during the pre-activity surveys, the area within 100 meters of the boundary of the aquatic habitat will be flagged and avoided if feasible.

c. If western pond turtles are observed within the Impact Area during a pre-activity survey or during project activities, they will be relocated outside of the Impact Area to appropriate aquatic habitat by a qualified biologist.

MM BIO-4: Giant garter snake

a. Upland habitat within 200 feet of suitable aquatic habitat, that is suitable for giant garter snake (containing cracks or rodent burrows) will be flagged and avoided.

b. On-land soil investigations within suitable upland habitat for giant garter snake will be conducted during the snakes active season of May 1 through October 1.

MM BIO-5: Rookery Birds

To minimize and avoid the potential impacts to special-status rookery birds that may occur within the Study Area the following general measures will be implemented:

a. A pre-activity survey for active rookeries will be conducted (during nesting season between February 1 – August 31) a maximum of 72 hours prior to the onset of soil investigation field activities. The qualified biologist(s) must, at a minimum, have

experience conducting surveys to identify the specific rookery bird species and associated habitat that could occur on site.

b. If any active rookeries are identified within or adjacent to an Impact Area, a buffer will be put in place to ensure that the birds are not disturbed during work activities. This buffer will be up to 50 feet, but can be smaller, dependent on-site conditions and at the discretion of the qualified biologist.

MM BIO-6: Raptors (excluding Swainson's Hawk and Burrowing Owl)

To minimize and avoid the potential impacts to special-status raptors that may occur within the Study Area the following general measures will be implemented:

a. For soil investigation field activities that will occur between February 1 – August 31, a pre-activity survey for actively nesting raptors will be conducted by a qualified biologist a maximum of 72 hours prior to the onset of project activities. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify the specific species and associated habitat that could occur on site.

b. If any active raptor nests are identified within or adjacent to an Impact Area by the pre-action survey, a buffer will be put in place to avoid disturbance to birds during and as a result of work activities. This buffer will be up to 250 feet, but can be smaller, dependent on-site conditions and at the discretion of the qualified biologist.

c. Any identified actively nesting raptors will be monitored by a qualified biologist during activity activities for signs of distress or disturbance as a result of field activities. Should the birds show signs of distress, work will cease at that location until the birds have resumed normal behavior and it is determined by the on-site biologist that work can be resumed.

MM BIO-7: Tricolored Blackbird

To minimize and avoid the potential impacts to Tricolored Blackbird that may occur within the Study Area the following general measures will be implemented:

a. For soil investigation field activities that will occur March 15- July 31 in areas with potential breeding habitat for Tricolored Blackbird, a pre-activity survey for breeding colonies will be conducted by a qualified biologist within 1,300 feet of Impact Areas a maximum of 72 hours prior to the onset of soil investigtion activities. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify Tricolored Blackbird and associated habitat that could occur on site.

b. For soil investigation field activities that will occur August 1 – March 14 in areas with potential roosting habitat for Tricolored Blackbird, a pre-activity survey for roosting Tricolored Blackbirds will be conducted during the nonbreeding season within 300 feet of Impact Areas a maximum of 72 hours prior to the onset of soil investigation activities by a qualified biologist.

c. If active Tricolored Blackbird breeding colonies or roost sites are identified within or adjacent to an Impact Area, a buffer will be put in place to ensure that the birds are not disturbed during work activities. This buffer will be up to 1,300 feet but may be reduced to a minimum of 300 feet, dependent on-site conditions and at the discretion of the qualified biologist.

MM BIO-8: Nesting Birds

To minimize and avoid the potential impacts to nesting birds (non-raptor) protected by the MBTA and Fish and Game Code that may occur within the Study Area the following general measures will be implemented:

a. For soil investigation field activities that will occur February 1 – August 31, a pre-activity survey for actively nesting birds will be conducted a maximum of 72 hours prior to the onset of soil investigation activities by a qualified biologist. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify the specific species and associated habitat that could occur on site.

b. If any active nests are identified within or adjacent to an Impact Area, a buffer will be put in place to ensure that no take (as defined by MBTA), and no take, possession, or needless destruction (as prohibited under the Fish and Game Code) occurs. This buffer will be up to 50 feet, but can be smaller, dependent on-site conditions and at the discretion of the qualified biologist

MM BIO-9: Sandhill Crane

To minimize and avoid the potential indirect impacts to Lesser and Greater Sandhill Crane that may occur within the Study Area, the following general measures will be implemented:

a. For soil investigation field activities that will occur September 15 through March 15, during roosting season, pre-activity surveys and an assessment of known roost sites will be conducted within 0.75 mile of Impact Areas by a qualified biologist.

b. If roost sites are identified within 0.25 mile of Impact Areas by the qualified biologist, start of large equipment use for soil investigation activities will be delayed to an hour after sunrise and stop an hour before sunrise to minimize potential for noise disturbance at the roost site.

MM BIO-10: Burrowing Owl

To minimize and avoid the potential impacts to Burrowing Owl that may occur within the Study Area, the following general measures will be implemented:

a. In areas with the potential for Burrowing Owl to occur, prior to soil investigation field activities, a qualified biologist will conduct a pre-activity survey. The surveys will establish the presence or absence of Burrowing Owl and/or suitable habitat features and evaluate use by owls in accordance with CDFW survey guidelines (CDFW 1993). For each Impact Area, the biologist will survey the proposed disturbance footprint and a 500-foot radius from the perimeter of the proposed footprint to identify any suitable burrows and owls. Adjacent parcels under different land ownership will not be surveyed. Surveys should take place near sunrise or sunset in accordance with CDFW guidelines. Suitable burrows or Burrowing Owls will be identified and mapped. Surveys will take place no more than 30 days prior to soil investigation field activities. During the breeding season (February 1– August 31), surveys will document whether Burrowing Owls are nesting in or directly adjacent to any Impact Area. During the nonbreeding season (September 1–January 31), surveys will document whether Burrowing Owls are using habitat in or directly adjacent to any disturbance area. Survey results will be valid only for the season (breeding or nonbreeding) during which the survey is conducted.

b. If Burrowing Owls are found during the breeding season (February 1 – August 31), all nest sites that could be disturbed by project activities will be avoided during the remainder of the breeding season or while the nest is occupied by adults or young. Avoidance will include establishment of a non-disturbance buffer zone (described below in parts c and d).

c. Soil investigation activities may occur during the breeding season only if a qualified biologist monitors the nest and determines that the birds have not begun egg-laying and incubation or that the juveniles from the occupied burrows have fledged. During the nonbreeding season (September 1 – January 31) the owls and the burrows they are using should be avoided, if possible. Avoidance will include the establishment of a buffer zone (described below).

d. During the breeding season, buffer zones of at least 250 feet in which no soil investigation activities can occur will be established around each occupied burrow (nest site). Buffer zones of 160 feet will be established around each burrow being used during the nonbreeding season. The buffers will be delineated by highly visible, temporary fencing or flagging.

MM BIO-11: Swainson’s Hawk

To minimize and avoid the potential impacts to Swainson’s Hawk that may occur within the project area, the following general measures will be implemented:

a. If soil investigations field activities will occur during the nesting season (March 15–September 15), a pre-activity survey will be conducted by a qualified biologist within 0.25 mile of Impact Areas following the Recommended Timing and Methodology for

Swainson's Hawk Nesting Surveys in California's Central Valley (SWHA Technical Advisory Committee 2000) between 5 days and 72 hours prior to the start of soil investigation activities to identify Swainson's Hawk nests.

b. If active nests are observed within 0.25 mile of an Impact Area, project activities will be limited to outside of the breeding season (March 15 – September 15) or until the nest is determined to be inactive or fledged by a qualified biologist.

c. When soil investigation activities must occur within 0.25 mile of a known or potential nest during nesting season (March 15 – September 15), soil investigation field activities will be initiated prior to egg-laying, if possible. If soil investigation activities must begin after egg-laying, a 650-foot no-activity buffer will be established between an active nest and any soil investigation activities until eggs have hatched. If site-specific conditions or the nature of the project activity (e.g., steep topography, dense vegetation, limited activities) indicate that a smaller buffer could be used, the qualified biologist will determine the appropriate buffer size.

d. If young fledge prior to September 15, soil investigation activities can proceed normally, subject to confirmation by a qualified biologist that the young have fledged from active nest sites. If the active nest site is shielded from view and noise from the project site by other development, topography, or other features, the qualified biologist may determine that project activities can proceed.

e. A qualified biologist with stop-work authority will be present during soil investigation field activities and may halt project activities if the biologist determines that Swainson's Hawks in the vicinity of soil investigation activities are disturbed to the point where nest abandonment is likely. Additional protective measures, as determined by the qualified biologist, will be implemented prior to resuming soil investigation activities.

MM BIO-12: Vernal Pool Species

a. All ground disturbing activities (boring, CPT, or vegetation removal) shall be located at least 100 feet from a vernal pool to avoid impacts to sensitive vernal pool invertebrates.

b. No project activities shall take place within an area identified as vernal pool complex, as determined by a qualified biologist, when wet soil conditions would increase the likelihood of vehicle traffic or other activities altering the site topography.

MM BIO-13: Valley Elderberry Longhorn Beetle

To minimize and avoid the potential impacts to Valley Elderberry Longhorn Beetle (VELB) that may occur within the project area, the following measures will be implemented:

a. When feasible, project activities shall be sited at least 50 meters from elderberry shrubs with stem diameter greater than 1-inch.

b. If activities must be conducted within 50 meters of an elderberry shrub, the following measures will apply:

   i. activities will be conducted outside of VELB flight season (March 1-July 31);

   ii. a biological monitor will be present to monitor all project activities at the site;

   iii. all ground disturbing activities (boring, CPT, or vegetation removal) will be located at least 6 meters from the dripline of the elderberry shrub; and high visibility fencing or flagging will be installed to delineate the 6-meter avoidance buffer.

MM BIO-14: General Fish

Over-water activities will be limited to only being conducted during the fish work window (August 1 – October 31) to avoid impacts to sensitive fish species that have the potential to occur in the Study Area.

MM BIO-15: Special-Status Bats

To minimize and avoid the potential impacts to special-status bats that may occur within the project area, the following general measures will be implemented:

a. Pre-activity roosting special-status bat surveys and an evaluation of roosting habitat suitability for bats will be conducted by a qualified biologist familiar with the species that could potentially occur within the Impact Area. The qualified biologist should, at a minimum have experience conducting roosting bat surveys and be able to identify the presence of guano and urine stains.

b. Any identified roosts of special-status bats will be avoided, and a buffer of up to 100 feet will be established based on-site conditions and at the discretion of the biologist, to ensure that the roosting bats are not disturbed. If a nursery colony is identified, additional measures may be required including a larger buffer, to ensure no disturbance. Such additional measures will be determined and monitored by a qualified biologist.

MM BIO-16: American Badger

To minimize and avoid the potential impacts to American Badger that may occur within the Study Area, the following measures will be implemented:

a. A qualified biologist shall conduct pre-activity surveys for American badger and dens in suitable habitat within 48 hours prior to the start of soil investigation activities. If there is a lapse in soil investigation activities of two weeks or greater the area shall be resurveyed within 24 hours prior to recommencement of work. Potential American

badger dens identified in the project area shall be monitored by the qualified biologist to determine current use.

b. American badger dens determined by the qualified biologist to be occupied during the breeding season (February 15 through June 30) shall be flagged, and ground disturbing activities avoided, within 100 feet of the den to protect adults and nursing young. Buffers may be modified by the qualified biologist, depending on the applicable site conditions and characteristics of the den, and shall not be removed until the qualified biologist has determined that the den is no longer in use.

MM BIO-17: San Joaquin Kit Fox

To minimize and avoid the potential impacts to San Joaquin kit fox that may occur within the Study Area, the following general measures will be implemented:

a. Prior to any ground disturbance within an Impact Area, a qualified biologist will conduct a pre-activity survey in areas identified in the pre-activity surveys as supporting suitable breeding or denning habitat for San Joaquin kit fox. The surveys will establish the presence or absence of San Joaquin kit foxes and/or suitable dens and evaluate use by kit foxes in accordance with USFWS survey guidelines (U.S. Fish and Wildlife Service 1999).

b. Pre-activity surveys will be conducted within 30 days prior to ground disturbance. The biologist will survey the proposed Impact Area and a 250-foot buffer from the perimeter of the proposed Impact Area to identify San Joaquin kit foxes and/or suitable dens. Adjacent parcels under different land ownership, for which DWR not have access, will not be surveyed. The status of all dens will be determined and mapped. Written results of pre-activity surveys will be submitted to USFWS within 5 working days after survey completion and before the start of ground disturbance.

c. If San Joaquin kit foxes and/or suitable dens are identified within those areas included in the pre-activity survey area, the measures described below will be implemented.

    i. If a San Joaquin kit fox den is discovered in the Impact Area, the Impact Area will be moved at a minimum to meet the appropriate buffer distances as described below in subsection (c)(ii).

    ii. If dens are identified in the survey area but outside the Impact Area, exclusion zones around each den entrance or cluster of entrances will be demarcated. The configuration of exclusion zones should be circular, with a radius measured outward from the den entrance(s). No covered activities will occur within the exclusion zones. Exclusion zone radii for potential or atypical dens will be at least 50 feet and will be demarcated with four to five flagged stakes. Exclusion zone radii for known dens will be at least 100 feet and will be demarcated with staking and flagging that encircles each den or cluster of dens but does not prevent access to the den by kit fox.

iii. If a natal or pupping den is found within the Impact Area or within 200-feet of the Impact Area boundary, USFWS and CDFW will be notified immediately. The den will not be disturbed or destroyed, depending on the applicable site conditions and characteristics of the den, the soil investigation site may be moved.

MM BIO-18: Botanical Resources

a. All botanical evaluations will be conducted by a qualified botanist, who at a minimum shall have experience conducting floristic field surveys; knowledge of plant taxonomy and plant community ecology and classification; familiarity with the plants of the area, including special-status and locally significant plants; familiarity with the appropriate state and federal statutes related to plants and plant collecting; and experience with analyzing impacts of a project on native plants and communities.

b. A qualified botanist will conduct a habitat assessment to determine whether the habitat is appropriate for special-status plants. If suitable habitat is present, the qualified botanist will conduct a habitat quality assessment to determine the potential for presence of sensitive plant species. The habitat quality assessment will consider factors such as soil type, degree and frequency of previous soil disturbance, abundance of invasive species, and distance from known sensitive plant occurrences. If a qualified botanist determines that special-status plants are likely to occur at a proposed Impact Area, a botanical survey will be conducted within the Impact Area at each soil investigation site. When feasible based on scheduling and property access, the surveys will be conducted at proper times of year when special-status and locally significant plants are both evident and identifiable; will be floristic in nature, ensuring that all plants observed are identified to a level sufficient for determining rarity, and will be conducted using systematic field techniques in all habitats of the site to ensure thorough coverage of potential Impact Areas.

c. Any special-status plant species present within 10 meters of an Impact Area will be flagged, or mapped using a GPS, for avoidance. A qualified botanist will establish an appropriate buffer. During field activities avoidance of the buffered area will be enforced by an environmental monitor to ensure that special-status plants are avoided to the maximum extent practicable.

d. If special-status plant species (excluding listed species) are present within the Impact Area and impacts cannot practicably be avoided, a qualified botanist will evaluate the following criteria to ensure these impacts are less than significant:

   i. the total range and distribution of the species,
   ii. local population abundance,
   iii. approximate number of individuals potentially impacted,
   iv. area of habitat potentially impacted,
   v. life history of the species (annual versus perennial and seedbank dynamics),

vi. species sensitivity and response to disturbance,

vii. species fecundity, and

viii. the probability of population recovery from impacts.

If loss of individuals due to project activities would exceed 2% of the local population or if the particular life history of the plant species indicates that a loss of that scale would threaten the persistence of the local population, or if there are fewer than 10 statewide extant occurrences, the soil investigation will not be allowed to proceed at that location.

MM BIO-19: Botanical Considerations for Vegetation Removal

If access requires minor disturbances to or removal of vegetation, a qualified botanist will be consulted to ensure that no special-status vegetation is significantly impacted.

MM BIO-20: Botanical Avoidance Zones

Soil investigation activities will not be conducted within the intertidal zone of rivers or sloughs, including in-channel islands, or shoals to the extent feasible. If work in these areas is necessary, the Impact Area will be surveyed by a qualified botanist during tidal conditions that expose the intertidal area where Delta mudwort or Mason's lilaeopsis would occur. If Delta mudwort or Mason's lilaeopsis are identified, they will be flagged or mapped with a GPS for avoidance.

MM CUL-1:

a. All soil investigation locations would be reviewed by a qualified archaeologist to evaluate the potential for impacts, if any, to cultural resources.

b. Locations that have no previous survey coverage must be surveyed by, or under the direct supervision of a qualified archaeologist prior to the start of any ground disturbing activities.

c. If the archaeologist observes cultural or potential tribal cultural resources within the Impact Area or associated resource buffer as identified by a qualified archaeologist, the location will be shifted the minimum distance necessary to reduce the potential for significant cultural resource impacts without significantly increasing potential impacts to other resources.

d. A tribal representative from the consulting tribes will be invited to participate in the pre-activity field visits and archaeological surveys in Impact Areas specified as an area of interest/concern during consultation by that consulting tribe/tribes.

e. Consulting tribes will be informed of any potential tribal cultural resources located within the study area specified as an area of interest/concern by a consulting tribe/tribes.

f. If a suitable location cannot be determined within adjacent areas, then the soil investigation at that location would not be conducted.

MM CUL-2:

a. Should any unexpected cultural resources be exposed during project activities, all work would immediately stop in the immediate vicinity (e.g. 100 feet) of the find until it can be evaluated by a qualified archaeologist and an appropriate plan of action can be determined in consultation with the State Office of Historic Preservation, as necessary.

b. If the resource is associated with Native American contexts or is a potential Tribal Cultural Resource and is within a region specified as an area of interest/concern by a consulting tribe/tribes, the appropriate consulting tribal entity/entities will be contacted and consulted with to produce an appropriate plan of action.

MM CUL-3:

Should human remains be discovered during the course of project activities, all work would stop immediately in the vicinity (e.g. 100 feet) of the finds until they can be verified. The coroner would be contacted in accordance with Health and Safety Code section 7050.5(b). Protocol and requirements outlined in Health and Safety Code sections 7050.5(b) and 7050.5(c) as well as Public Resources Code section 5097.98 would be followed.

MM CUL-4:

Cultural sensitivity training will be provided for the environmental monitors and individuals conducting the field activities and geological analysis to ensure awareness about cultural resources, including identification of and proper protocol for handling any unexpected finds.

MM GHG-1

a. Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high efficiency technologies are appropriate and feasible for the project or specific elements of the project.

b. Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by the State airborne toxics control measure [Title 13, section 2485 of the California Code of Regulations]). This requirement will be enforced by the environmental monitor.

c. Maintain all soil investigation equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer’s recommendations, proper upkeep and replacement of filters and

mufflers, and maintenance of all engine and emissions systems in proper operating condition.

d. Implement tire inflation program on jobsite to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation.

e. Encourage carpools or shuttle vans for worker commutes as feasible.

MM HAZ-1

a. A Plan(s) (often a contractor's safety plan) with a section on Hazardous Materials shall be written and kept on site that describes the hazardous materials used during project activities, and how the materials will be properly stored, used, transported, and disposed of. All hazardous materials shall be properly labeled and be recycled properly or disposed of at a properly licensed disposal facility.

b. The contractor shall contact the local fire agency and the local CUPA for any site-specific requirements regarding hazardous materials or hazardous waste containment or handling.

c. If hazardous materials, such as oil, batteries or paint cans, are encountered in the Impact Area, the contractor(s) shall carefully remove and dispose of them according to the Safety Plan and Spill Prevention and Response Plan. All hazardous materials will be disposed of at a properly licensed disposal facility.

d. Contact of chemicals with precipitation shall be minimized by storing chemicals in watertight containers or in a storage shed (completely enclosed), with appropriate secondary containment to prevent any spillage or leakage.

e. Quantities of toxic materials, such as equipment fuels and lubricants, shall be stored with secondary containment that is capable of containing 110% of the primary container(s).

f. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials shall not contact soil and not be allowed to enter surface waters or the storm drainage system.

g. All toxic materials, including waste disposal containers, shall be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water.

h. Sanitation facilities (e.g., portable toilets) shall be sited in a manner that avoids any direct connection to the storm drainage system or receiving water.

i. Sanitation facilities shall be regularly cleaned and/or replaced and inspected daily for leaks and spills.

MM HAZ-2

A Plan(s) (often a contractor's safety plan) with a section on Spill Prevention and Response Plan shall be developed by the Contractor and submitted to DWR before any ground-disturbing activities in order to prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water (including untreated wastewater) into channels the following measures shall be included in the Plan:

a. All field personnel shall be appropriately trained in spill prevention, hazardous material control, and cleanup of accidental spills.

b. Equipment and materials for cleanup of spills will be available on site and spills and leaks shall be cleaned up immediately and disposed of according to guidelines stated in the Spill Prevention and Response Plan.

c. Field personnel shall ensure that hazardous materials are properly handled, and natural resources are protected by all reasonable means.

d. Spill prevention kits shall always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations). All field personnel shall be advised of these locations.

e. Field personnel shall routinely inspect the work site to verify that spill prevention and response measures are properly implemented and maintained.

f. Field personnel will routinely inspect the work site to verify that the Spill Prevention and Response Plan is properly implemented and maintained. Staff will notify contractors immediately if there is a noncompliance issue and will require immediate correction of any noncompliant behavior.

g. Absorbent materials will be used on small spills located on impervious surface rather than hosing down the spill; wash waters shall not discharge to the storm drainage system or surface waters. For small spills on pervious surfaces such as soils, wet materials will be excavated and properly disposed rather than burying it. The absorbent materials will be collected and disposed of properly and promptly.

   As defined in 40 CFR 110, a federal reportable spill of petroleum products is the spilled quantity that:

   a) Violates applicable water quality standards;

   b) Causes a film or sheen on, or discoloration of, the water surface or adjoining shoreline; or

c) Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

h. If a spill is reportable, the contractor will notify the DWR staff, and the DWR staff will take action to contact the appropriate safety and cleanup crews to ensure that the Spill Prevention and Response Plan is followed. A written description of reportable releases must be submitted to the Regional Board and the California Department of Toxic Substances Control (DTSC). This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases will be documented on a spill report form.

i. If a significant spill has occurred, and results determine that project activities have adversely affected surface water or groundwater quality, a detailed analysis will be performed to the specifications of DTSC to identify the likely cause of contamination. This analysis will include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, the DWR or contractors will select and implement measures to control contamination, with a performance standard that surface, and groundwater quality must be returned to baseline conditions. These measures will be subject to approval by the DWR, DTSC, and the Regional Board.

MM HAZ-3:

a. Stockpiling materials, portable equipment, vehicles, and supplies, including chemicals, will be restricted to areas adjacent to the drill or CPT rig, and not adjacent or within riparian and wetlands areas or other sensitive habitats

b. Stockpiling materials, portable equipment, vehicles, and supplies, including chemicals, will be restricted to docks or within the drill barge or ship.

MM HAZ-4:

a. The contractor would develop a fire protection and prevention plan which incorporates fire safety measures on all equipment with the potential to create a fire hazard.

b. The plan would ensure that fire suppression equipment is onsite and that all employees have received appropriate fire safety training.

MM HYD-1:

a. All fueling and maintenance of vehicles or other equipment for on-land soil investigation activities shall occur on established roads, or in designated staging areas at least 50 feet away from any on-site water feature. Secondary containment for fuel and gas tanks will be used to prevent spills from entering any water features.

b. Absorbent materials will be available on-site. Any accidental leaks or spills will be immediately cleaned up per the procedures identified in the contractors Spill Prevention and Response Plan, and the equipment will not be able to return to the project area until it has been repaired sufficiently to prevent further leaks or spills.

c. For overwater soil investigations positive barriers consisting of hay waddles and/or other suitable type of spill-stoppage materials will be placed around the work area on the barge and ship decks.

d. Discarded soil samples, cuttings, and excess drilling fluids will be kept in a closed system, to prevent spillage of the drilling fluid and will be disposed of off-site at an appropriate landfill.

e. All over-water work will include the use of conductor casings to confine the drill fluid and cuttings to the drill hole and the operating deck of the barge or drill ship and prevent any inadvertent spillage into the water. Soil samples will be collected from within the conductor casing. The casing will remain in place until the bore hole is complete and has been filled in, to minimize sediment disturbance of the slough or river bottom.

f. During overwater soil investigations a qualified environmental monitor will watch for colored plumes (an indication that drilling fluid or other material is entering the water and may affect water quality). If found, activities will cease until appropriate corrective measures have been completed or it has been determined that the environment will not be harmed.

MM NOI-1:

All equipment will be properly tuned and shall utilize appropriate mufflers.

MM PUB-1:

a. A Plan(s) (often Contractor's safety plan) with a section on Fire Protection and Prevention will be submitted to DWR for review and approval which incorporates fire safety measures on all equipment with the potential to create a fire hazard.

b. The contractor will prepare a Safety Plan in accordance with the DWR protocols.

MM TRANS-1:

a. Where it is necessary, traffic controls (e.g. flaggers) will be put in place. Lanes may be closed off by traffic cones with flaggers posted to ensure the flow of traffic continues while maintaining safety measures for the crew. Traffic controls and lane closures will consider access for emergency services and be coordinated through the encroachment permit processes implemented by Caltrans and counties, with CHP coordination as required.

b. Parking on public roads and thoroughfares by crew vehicles will be avoided to the maximum extent practicable to allow for the flow of traffic to continue.

c. No public roads, waterways or land access will be closed.

d. For overwater sites, the project area shall be a no-wake zone, with boats not exceeding 5 mph within 500 feet of the work area.

MM UTI-1:

A field reconnaissance, marking or staking the exploration site, and calling Underground Service Alert (USA) for utility clearance will be conducted by qualified personnel for each planned soil exploration location. Based upon the information gathered, sites will be adjusted to ensure no utilities are impacted.

_____ _____

Carrie Buckman Date
California Department of Water Resources
Delta Conveyance, Environmental Program Manager

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Table of Contents

Figures

Tables

Appendices

1.0 BACKGROUND

The picturesque Sacramento-San Joaquin Delta (Delta) is the hub of California's water supply, supplying fresh water to two-thirds of the state's population and millions of acres of farmland. There is clear evidence of the vulnerabilities in the Delta posed by climate change and earthquake risk. As sea levels continue to rise, the Delta will be faced with increasing water levels and salinity, which will dramatically alter and harm water quality and supply both, locally, and for 27 million Californians across the state. Immediate action is needed to upgrade Delta infrastructure, ensuring the state's largest supply of clean water is climate resilient and able to respond to these risks.

On February 12, 2019, Governor Newsom introduced a new approach to modernize Delta water conveyance, one which included the consideration of a new, single-tunnel project alternative (Executive Order N-10-19).

Following Governor Newsom's Executive Order N-10-19, the Department of Water Resources (DWR) is pursuing a new environmental review and planning process for a single tunnel solution to modernize water infrastructure in the Delta. To inform this future process, DWR is proposing soil investigations to gather data on the physical properties of the soils and other typical geologic and geotechnical parameters that will be used to inform and evaluate future alternatives for a proposed single-tunnel Delta conveyance (requiring a separate California Environmental Quality Act (CEQA) process).

1.1 Purpose

The primary objective of the proposed project is to determine the composition, location, and geotechnical properties of soil materials commonly found in the Delta which would inform the design, environmental analysis, and development of alternatives for a potential Delta conveyance project and contribute to DWR's overall understanding of Delta geology. This work will further inform DWR on how to construct a project while avoiding, minimizing, or mitigating impacts to the surrounding residents and environment. Ultimately, this work will help to determine project features, potential alignment options and environmental impacts for analysis of a future single tunnel project consistent with Governor Newsom's new approach to modernize Delta water conveyance.

1.2 Regulatory requirements, permits, and approvals

DWR has the responsibility to ensure that all requirements of CEQA and other applicable regulations are met. Other permitting requirements for this Proposed Project are listed below:

- California Department of Fish and Wildlife (CDFW), Fish and Game Code section 1603 Streambed Alteration Agreement

- US Army Corps of Engineers (USACE), Clean Water Act, Section 404 – Nationwide Permit 6

  As a condition of working under the Nationwide Permit the following Federal regulations must be met by the USACE:

  - State Office of Historic Preservation, National Historic Preservation Act, Section 106, Letter of Concurrence

  - US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) Endangered Species Act, section 7, Biological Opinions or letters of concurrence

- State Water Resources Control Board (SWB), Clean Water Act, Section 401, General Water Quality Certification and Order for the 2017 Nationwide Permits

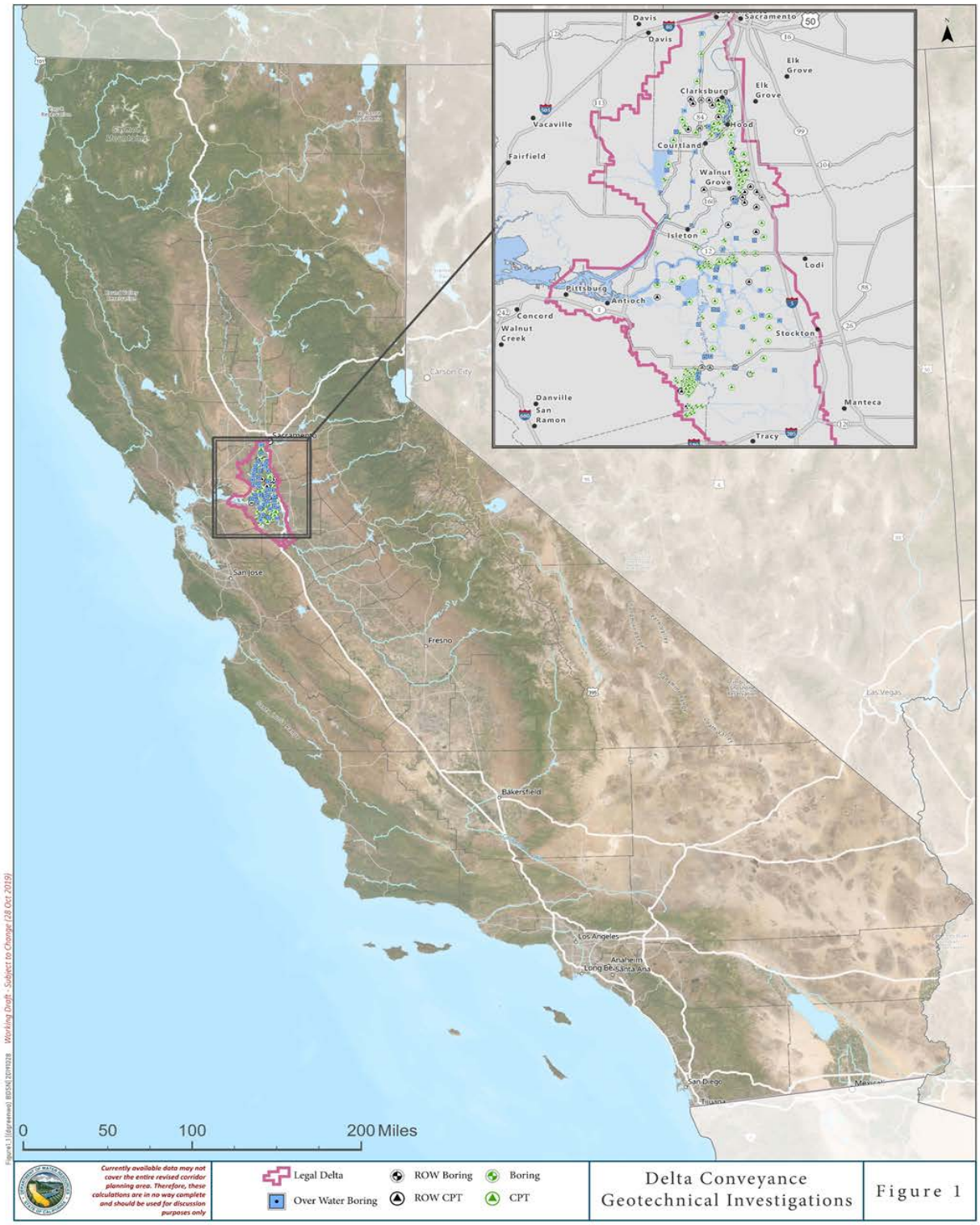
- State Lands Commission (SLC) 1979 Memorandum of Understanding between DWR and SLC providing for the utilization by DWR of State-owned sovereign lands under the jurisdiction of the CSLC for the Central Valley Project and the State Water Resources development system

- Various encroachment permits, as needed

1.3 Proposed Project Location

The Proposed Project area (Study Area) spans a portion of the Sacramento – San Joaquin River Delta including portions of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo counties. The Study Area is bordered to the north by the City of West Sacramento, the south by Kelso Road, to the west by west bank of the Toe Drain and communities including Rio Vista, Oakley, and Brentwood, and to the east by Interstate 5 (Figure 1). Mapped locations are approximate, several days to several weeks prior to investigations, DWR and Delta Conveyance Design and Construction Authority (DCA) engineers, geologists, environmental scientists, and the cultural resource team will perform a reconnaissance level site visit. The Impact Area for any given soil location is considered the soil investigation site itself and the area required for parking for various field personnel. If the team observes utility, biological, cultural, or other resource concerns within the Impact Area or associated resource buffer, the location will be shifted the minimum distance necessary to reduce the potential for utilities, biological or cultural resource impacts to a less than significant level without increasing impacts to other resources. If a suitable location cannot be determined within adjacent areas, then the soil investigation at that location will not be conducted.

Figure 1: Proposed Project Location



2.0 PROPOSED PROJECT DESCRIPTION

The Proposed Project consists of both on-land and overwater soil investigations as well as several on-land geophysical studies located within the Study Area (Figure 2a-c).

The on-land soil investigations will consist of the following:

- 167 soil borings from 50 feet to 200 feet below ground surface;
- 103 cone penetration tests (CPTs) from approximately 50 feet and 200 feet below ground surface; and
- Up to 5 noninvasive geophysical survey investigation arrays on up to five Impact Areas within a location on Bouldin Island (see Figure 2b).

The distribution of the various types of on-land soil investigations was determined to provide appropriate coverage to gain a preliminary understanding of the geological and geotechnical conditions in the Study Area. An effort was made to distribute soil borings at varying depths evenly throughout the Study Area; the location of CPTs was determined to provide supplementary subsurface information to complement the soil borings. Geophysical surveys can collect data to provide a more robust preliminary interpretation of regional subsurface conditions and identify anomalous features such as abandoned oil and gas wells or unmarked utilities. The planned geophysical surveys will be used as a test program to determine if these noninvasive surveys are appropriate for future use in other regions of the Delta, thereby reducing the potential need for soil borings or CPTs in certain areas.

Overwater soil investigations will consist of 57 soil borings up to 200 feet below the slough or river bottom (measured at the mudline).

Table 1 includes the Proposed Project's maximum total duration for each type of on-land soil investigation and overwater soil investigation that requires large equipment. Additional details regarding Impact Area-specific durations and equipment needed for each type of soil investigation are provided in the descriptions below.

Table 1: On-Land Soil Investigation Primary Equipment and Duration

Activity	**Equipment**	**Anticipated Duration**
Soil Borings	Up to 8 Drill Rigs	6 months
CPTs	Up to 3 Truck-Mounted CPT Rigs	6 months
Geophysical Surveys	Geophysical equipment (depending on method)	2.5 months
Overwater Borings	Up to 6 Drill Rigs (located on Boats or Barges)	3 months

Figure 2: Study Area

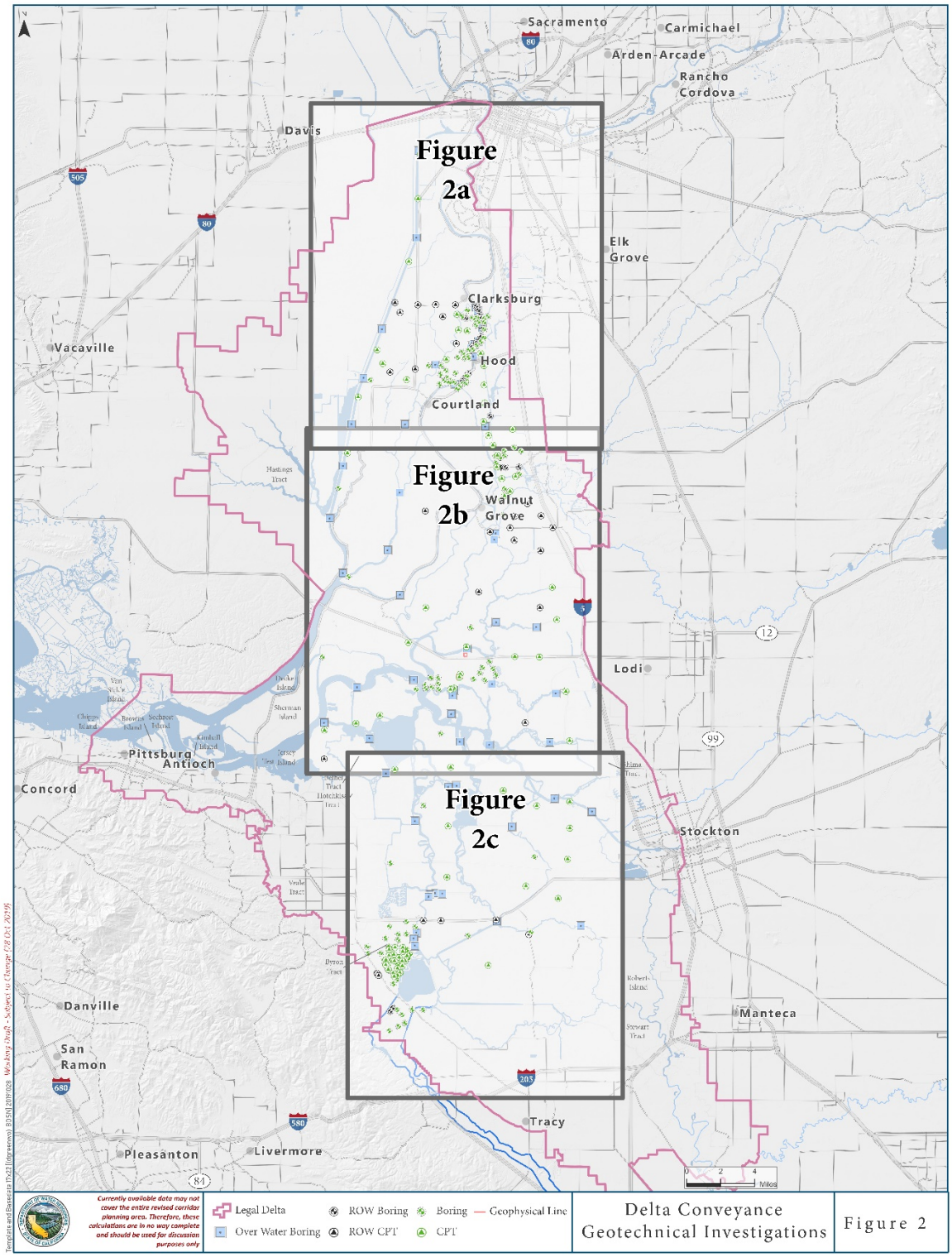


Figure 2a

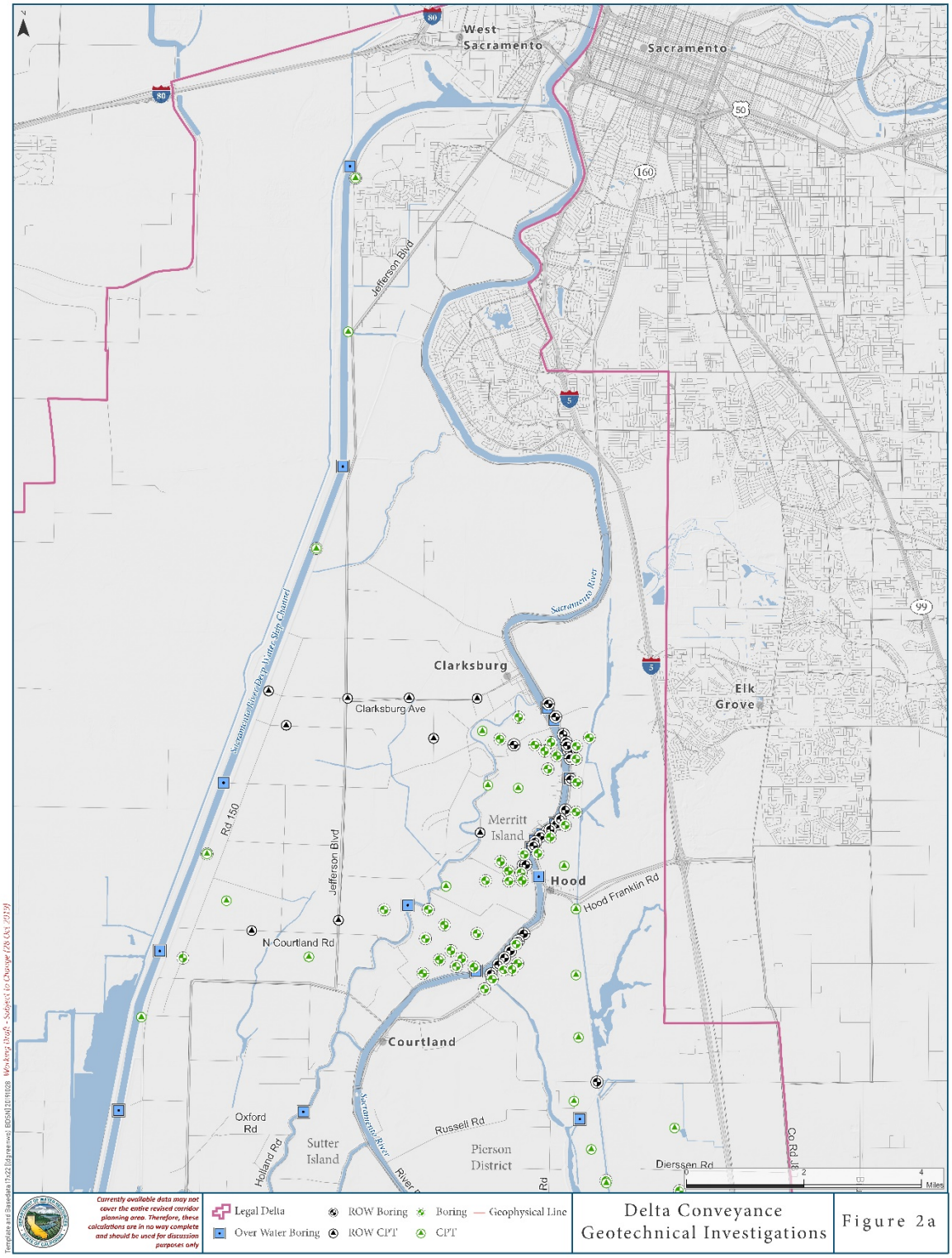
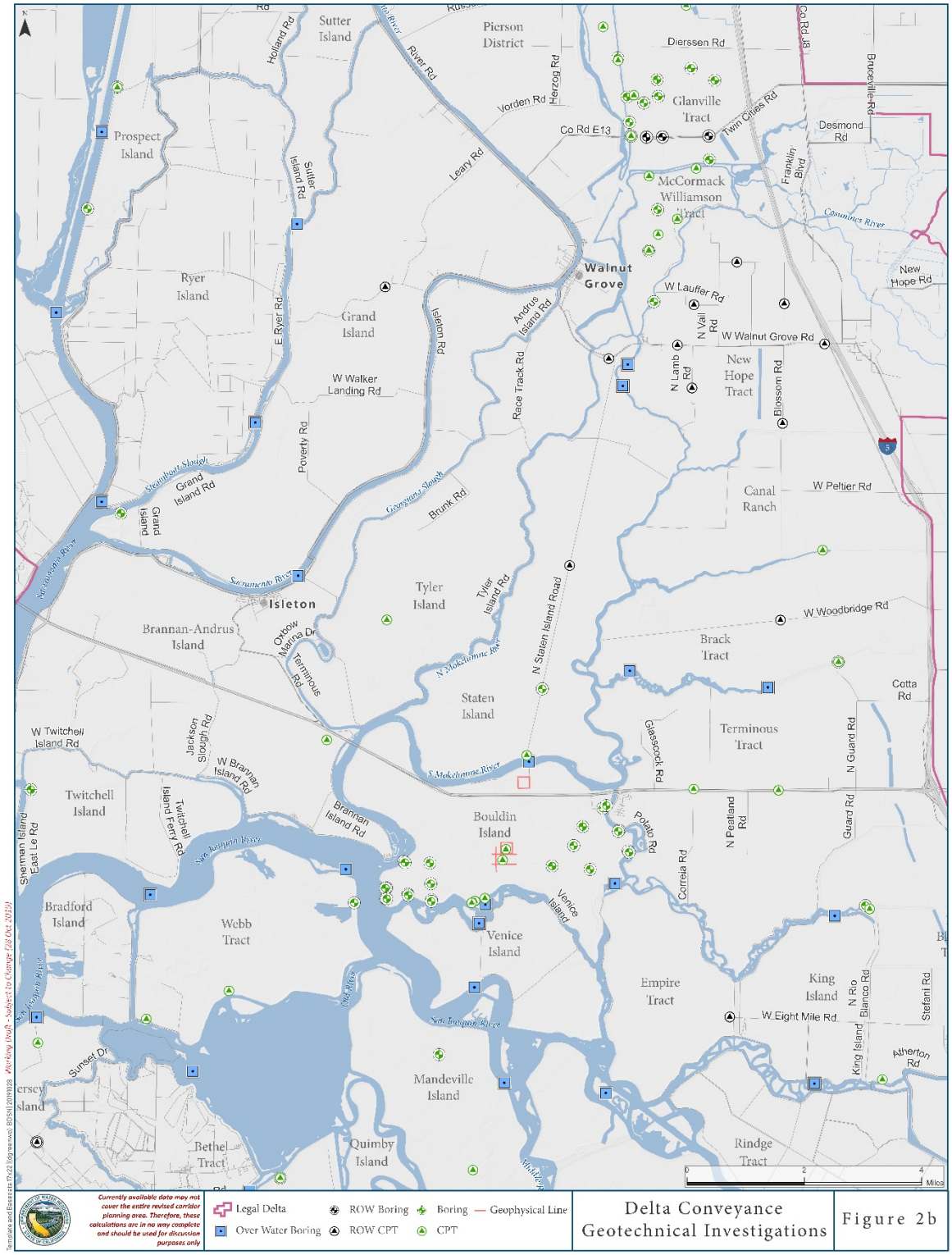

West Sacramento
Sacramento
Jefferson Blvd
Sacramento River
Clarksburg
Clarksburg Ave
Elk Grove
Merritt Island
Hood
Hood Franklin Rd
N Courtland Rd
Rd 150
Courtland
Oxford Rd
Holland Rd
Sutter Island
Russell Rd
Pierson District
Diessen Rd
Co Rd 18
Currently available data may not cover the entire revised corridor planning area. Therefore, these calculations are in no way complete and should be used for discussion purposes only
Legal Delta
Over Water Boring
ROW Boring
ROW CPT
Boring
CPT
Geophysical Line
Delta Conveyance Geotechnical Investigations
Figure 2a

Figure 2b


Sutter Island
Pierson District
Holland Rd
River Rd
Dierssen Rd
Co Rd J8
Bruceville Rd
Herzog Rd
Vorden Rd
Glanville Tract
Twin Cities Rd
Co Rd E13
Desmond Rd
Prospect Island
Sutter Island Rd
Leary Rd
McCormack Williamson Tract
Franklin Blvd
Cosumnes River
Walnut Grove
New Hope Rd
W Lauffer Rd
Ryer Island
E Ryer Rd
Grand Island
Isleton Rd
Andrus Island Rd
N Vail Rd
W Walnut Grove Rd
N Lamb Rd
New Hope Tract
Blossom Rd
W Walker Landing Rd
Race Track Rd
Poverty Rd
Steamboat Slough
Grand Island Rd
Grand Island
Georgiana Slough
Brunk Rd
Canal Ranch
W Peltier Rd
Sacramento River
Isleton
Tyler Island
Tyler Island Rd
N Staten Island Road
W Woodbridge Rd
Brannan-Andrus Island
Oxbow Marina Dr
Terminous Rd
N Mokelumne River
Brack Tract
Staten Island
Cotta Rd
W Twitchell Island Rd
Jackson Slough Rd
W Brannan Island Rd
Terminous Tract
Glasscock Rd
N Guard Rd
S Mokelumne River
Twitchell Island
Twitchell Island Ferry Rd
Brannan Island Rd
Bouldin Island
Potato Rd
N Peatland Rd
Guard Rd
Sherman Island East Le Rd
Sacramento River
Bradford Island
Webb Tract
Venice Island
Correia Rd
Venice Island
Empire Tract
King Island
N Rio Blanco Rd
Stefani Rd
W Eight Mile Rd
King Island
Old River
San Joaquin River
Sunset Dr
Atherton Rd
Mandeville Island
Bethel Tract
Quimby Island
Rindge Tract
Miles
Legal Delta
Over Water Boring
ROW Boring
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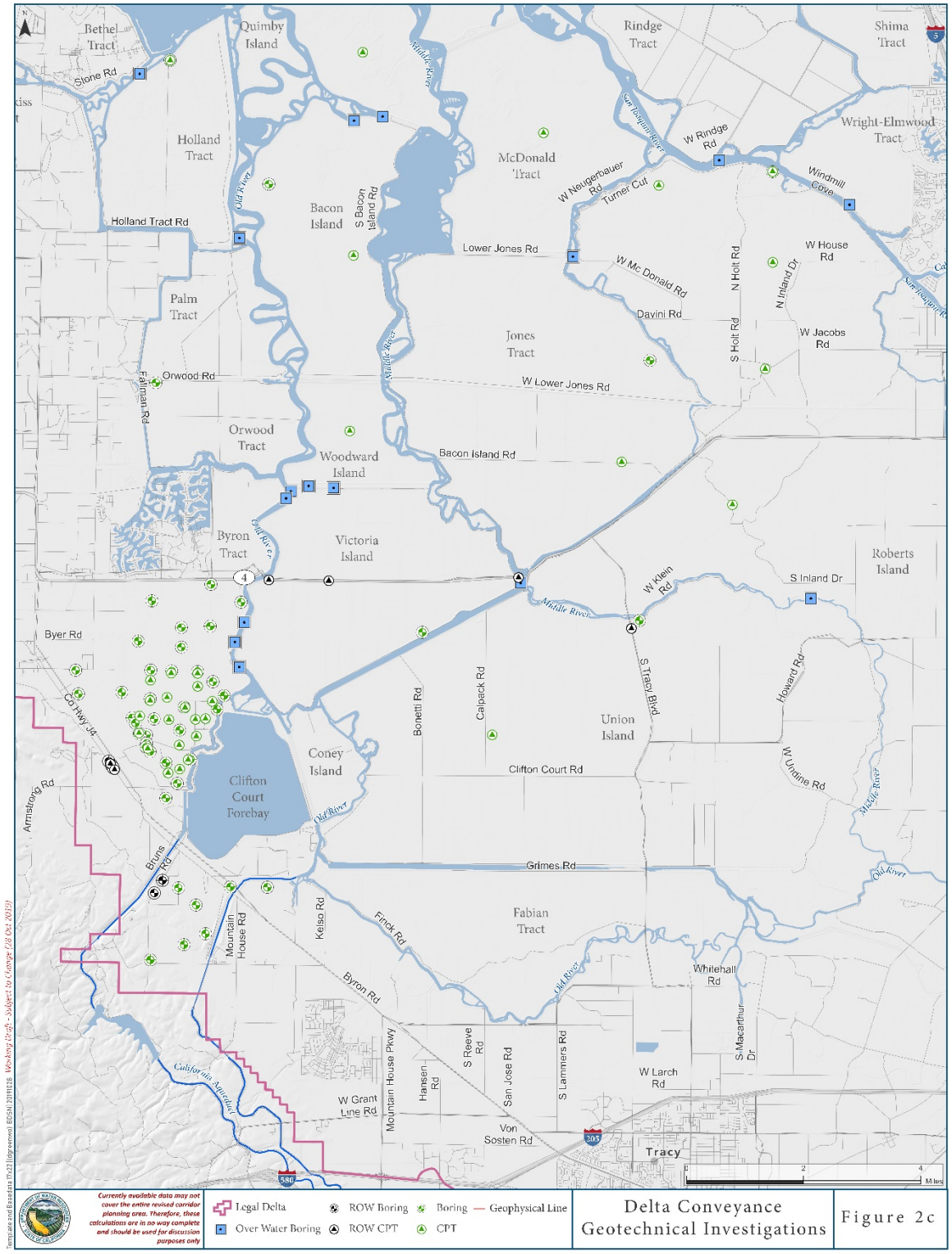
Boring
CPT
Geophysical Line
Currently available data may not cover the entire revised corridor planning area. Therefore, these calculations are in no way complete and should be used for discussion purposes only
Delta Conveyance Geotechnical Investigations
Figure 2b

Figure 2c


Bethel Tract
Quimby Island
Rindge Tract
Shima Tract
Stone Rd
Holland Tract
Wright-Elmwood Tract
McDonald Tract
W Rindge Rd
W Neugebauer Rd
Turner Cut
Windmill Cove
Bacon Island
S Bacon Island Rd
Holland Tract Rd
Lower Jones Rd
W Mc Donald Rd
W House Rd
N Holt Rd
N Inland Dr
Palm Tract
Davini Rd
S Holt Rd
W Jacobs Rd
Jones Tract
Orwood Rd
W Lower Jones Rd
Fallman Rd
Orwood Tract
Woodward Island
Bacon Island Rd
Byron Tract
Victoria Island
Roberts Island
W Klein Rd
S Inland Dr
Byer Rd
S Tracy Blvd
Howard Rd
Bonetti Rd
Calpack Rd
Union Island
Co Hwy 1A
Coney Island
Clifton Court Rd
W Jerome Rd
Armstrong Rd
Clifton Court Forebay
Brune Rd
Grimes Rd
Fabian Tract
Mountain House Rd
Kelso Rd
Finck Rd
Whitehall Rd
Byron Rd
S Macarthur Dr
S Reeve Rd
San Jose Rd
S Lammers Rd
W Larch Rd
California Aqueduct
Hansen Rd
W Grant Line Rd
Mountain House Pkwy
Von Sosten Rd
Tracy
Miles
Legal Delta
Over Water Boring
ROW Boring
ROW CPT
Boring
CPT
Geophysical Line
Currently available data may not cover the entire revised corridor planning area. Therefore, these calculations are in no way complete and should be used for discussion purposes only
Delta Conveyance Geotechnical Investigations
Figure 2c

2.1 On-Land Soil Boring Equipment

Vehicles at each Impact Area during the investigation may include a drill rig, support vehicles for drillers, a water truck, a liftgate truck, a tractor-trailer lowboy truck, traffic control trucks, and passenger vehicles (assume 1 drill rig and up to 17 other vehicles occasionally). The specific drill rig mobilized to the Impact Area will be dependent on access conditions and the purpose and depth of the soil boring. Drill rigs that will be used include truck-mounted rigs and track-mounted rigs (see Figures 3 and 4). The drill rigs are powered by a 120 to 550 horsepower diesel engine. Track-mounted rigs will be used if needed to minimize access impacts over soft ground; these rigs will be hauled to the site by a lowboy tractor-trailer rig. The Impact Area for any given soil location is considered the soil investigation site itself and the area required for parking various field personnel. While this complete list of vehicles may be used, not all of them would necessarily be required. For example, many of the Impact Areas will likely not require a tractor-trailer lowboy truck or traffic control trucks to safely direct traffic around any temporary partial road closures.

*Source: Central Mine Equipment Company 2019

Figure 3. Truck-mounted Rotary Drill Rig

*Source: Central Mine Equipment Company 2019

Figure 4. Track-mounted Rotary Drill Rig

2.1.1 On-Land Soil Boring Investigation Methods

Drilling activities will be conducted using a drill rig with auger, casing, and mud-rotary capabilities. Auger techniques may be used on the upper part of the boring. Mud-rotary techniques may be used to continue the boring started with the auger, or mud-rotary could be used for the entire boring starting at the ground surface. Casing may be used to maintain the hole stability. Auger techniques will generate an approximately 6.5 to 8-inch diameter boring. Mud-rotary drilling and sampling will generate 4 to 6-inch diameter

borings, unless casing is required, which will increase the boring diameter to 6 to 8 inches. Soil samples will be collected from borings using one or more of the following methods; a standard penetration test (SPT) barrel (split spoon sampler), Modified California sampler, Pitcher Barrel sampler, 101 mm Geobarrel, 134 mm Geobarrel, Shelby tubes, and grab samples of the cuttings.

Downhole testing will be performed in some of the borings using geophysical and mechanical methods. This will involve sending a small probe down the hole and taking readings periodically with depth.

The duration of investigation activities for the 167 borings will be up to:

- 5 work days for each of 22 borings up to 50 feet deep, and
- 13 work days for each of 145 borings 50 to 200 feet deep.

All cuttings and excess drilling fluid will be contained in drums, large containers, or vacuum trucks, and disposed of offsite at an appropriate landfill. Recirculation tanks (55-gallon storage drums) will be used to settle drill cuttings from drilling fluid (drilling polymers and/or bentonite clay). Discarded soil samples will also be placed in the storage drums. Drums would be stored on site at designated staging areas outside of environmentally sensitive areas at any given soil investigation site for up to 4 weeks for environmental testing prior to landfill disposal.

Following completion of soil investigation, holes will be sealed using cement-bentonite grout in accordance with California regulations and industry standards (Water Well Standards, DWR 74-81 and 74-90).

2.1.2 On-Land CPT Equipment

Vehicles at each Impact Area during the investigation may include a truck- or track-mounted, 20 to 30-ton push-capacity CPT truck (see Figures 5 and 6) that is typically powered by a 400 to 550 horsepower diesel engine, a tractor-trailer lowboy truck (if a track-mounted rig is required), traffic control trucks, and a grout trailer. Additionally, up to 15 support passenger vehicles may be present. While this complete list of vehicles may be used, not all of them are necessary for every site. For example, many of the Impact Areas will likely not require a tractor-trailer lowboy truck or traffic control trucks.

*Source: On-shore CPT Equipment 2019

Figure 5. Cone Penetrometer Testing Rig

*Source: Geoprobe 2019

Figure 6. Track-Mounted Cone Penetrometer Testing Rig

2.1.3 On-Land CPT Investigation Methods

To conduct a CPT, a cone-tipped rod with a diameter of 1 to 2 inches is pushed through the ground to measure various parameters including tip resistance, side friction, pore pressure, inclination, and shear wave velocity of the soil layers. While advancing the cone, bentonite may be used to reduce friction. The method to perform the deeper CPTs uses an automatic bentonite injection system to keep the friction low on the drilling string, allowing for CPTs of approximately 200 feet deep. The bentonite drilling fluids will be contained and removed from the Impact Area after completion. At various depths, the cone may be stopped, and testing will be performed, including pore pressure dissipation and shear wave velocity testing. During shear wave velocity testing, a source signal is induced in the ground using a small hammer and tapping on a beam pressed against the ground.

The duration of CPT investigation activities for the 103 CPTs will be up to 4 days for each Impact Area.

2.1.4 On-Land Geophysical Survey Equipment

Vehicles at each Impact Area during the surveys will include a rubber-tired truck to induce source vibrations (referred to as the EnviroVibe Minibuggy); a tractor-trailer lowboy truck for the EnviroVibe Minibuggy; and support passenger vehicles (assume up to 14 vehicles). The EnviroVibe Minibuggy is powered by a 113-horsepower diesel engine and will be on site for seismic reflection surveys at some geophysical survey sites. While this complete list of vehicles may be used, not all of them are necessary for every site. For example, many of the Impact Areas will likely not require a tractor-trailer lowboy truck or EnviroVibe Minibuggy.

2.1.5 On-Land Geophysical Surveys Methods

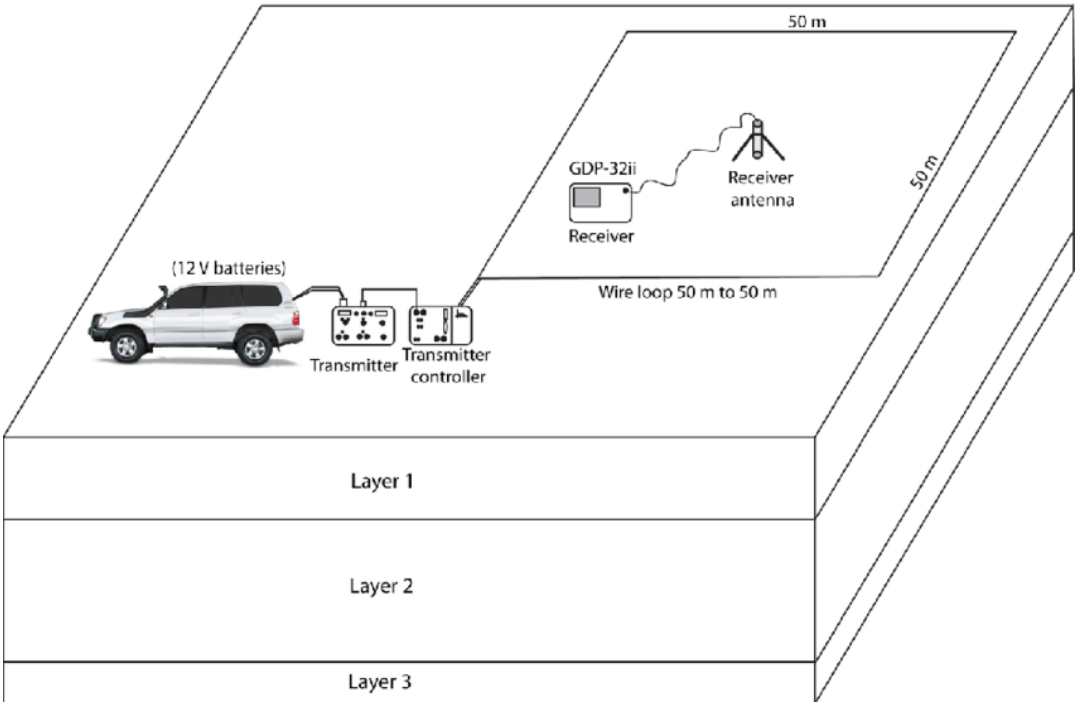
Geophysical surveys consist of noninvasive (i.e. does not require a soil boring) techniques that can be used to provide information on subsurface conditions and anomalies, such as buried casings or abandoned wells. Geophysical surveys will be conducted on up to five Impact Areas within a location on Bouldin Island (see Figure 2b). The five Impact Areas are comprised of three arrays approximately 2,300 feet long and 100 feet wide and two area grids (each approximately 1,000 feet by 1,000 feet; although surveys will only be conducted within a portion of the full grid measuring 500 feet by 500 feet). The geophysical surveys will be used as a test program to determine if these noninvasive surveys are appropriate for future use in other regions of the Delta, thereby reducing the potential need for soil borings or CPTs in certain areas.

One or more of the following geophysical survey techniques will be used at an Impact Area: Time Domain Electromagnetic (TDEM), Cesium Vaper Total Field Magnetometer (CVTFM), Electrical Resistivity Tomography (ERT), and Seismic Refraction/Reflection (Seismic). Each of these methods is described in detail below.

The duration to perform all of the geophysical surveys using any of the four aforementioned methods will be up to 21 days for the five Impact Areas.

2.1.5.1 Time Domain Electromagnetic (TDEM)

For the TDEM method, 10-gauge wire loop transmitters will be laid on the ground in a 100-foot by 100-foot grid transmitter wire to induce a low current in the ground, readings will be taken, and then the loop will be moved along a survey line up to 2,300-feet-long (Figure 7).



*Source: Chkirbene et al. 2014

Figure 7. Time Domain Electromagnetic (TDEM) System Schematic

Cesium Vaper Total Field Magnetometer (CVTFM)

For the CVTFM method, a magnetometer and GPS positioning unit are hand-carried by a technician to measure the ambient magnetic field (Figure 8). The technician walks a line collecting readings. This process is repeated for the next line spaced approximately 10 feet to 15 feet away from the first. The total survey area at a given location is approximately 500 feet by 500 feet.

*Source: Rogers et al. 2005

Figure 8. Cesium Vaper Total Field Magnetometer (CVTFM)

Electrical Resistivity Tomography (ERT)

For the ERT method, a linear array of removable small steel spike electrodes (approximately 0.5 inches in diameter by 8 inches long) will be driven 6 to 8 inches into the ground approximately every 10 feet over several hundred feet. Low amperage current is injected into the ground between varying pairs of electrodes and readings are taken (Figure 9). At each test setup, which consists of an 84-electrod array, low amperage currents are sent over two electrodes for up to a few seconds while readings

in other electrodes are taken. This procedure is repeated over a period of a few hours and is repeated along the survey line which is planned to be up to 2,300 feet long.

*Source: Plattner Geophysics Group 2019

Figure 9. Electrical Resistivity Tomography (ERT)

Seismic Refraction/Reflection (Seismic)

For the seismic surveys, seismic sensors (approximately 0.5 inches in diameter and 5 inches long) are driven into the ground 3 to 5 inches deep at a spacing of approximately 6.5 feet. The EnviroVibe Minibuggy is a vehicle that is positioned every 10 to 20 feet and a pad is lowered onto the ground to inject a seismic signal into the ground using swept frequency vibratory motion (Figure 10). The frequency sweeps are performed while sensor readings are taken. The sweeps take less than 30 seconds to complete. The source is then moved along the line and another sweep is performed. This process is repeated along the entire length of the survey line which is up to 2,300 feet long. The EnviroVibe Minibuggy is a small rubber-tire truck-mounted source (approximately 8 feet wide, 20 feet long, and 8 feet high) that creates minimal ground disturbance, much like typical rubber-tired farming equipment. Vibrations induced are relatively small, while

mild vibrations can typically be felt by people within approximately 50 feet of the EnviroVibe Minibuggy; at 100 feet, vibrations are typically not detectible by people. The levels of vibration are much smaller than vibrations required to induce damage in buildings and infrastructure.

*Source: Industrial Vehicles International 2019

Figure 10. EnviroVibe Minibuggy

2.2 Over-Water Boring Equipment

Primary equipment for over-water boring includes a rotary drill rig mounted on a shallow-draft barge or ship (see Figure 11). Vehicle use for over-water explorations will include up to 8 passenger vehicles for workers and monitors to the marinas, power boat for transport of workers and monitors to the drill barge or ship, and transport of the drill barge (with a tugboat) or ship from the marina to the on-water exploration site.

*Source: Liebherr 2019

Figure 11. Barge-mounted Rotary Drill Rig

2.2.1 Over-Water Soil Boring Investigations Methods

Several days to several weeks prior to investigations, vehicles at or near each Impact Area will include support vehicles or a boat for DWR and DCA engineers, geologists, environmental scientists, and the cultural resource team for a reconnaissance level site visit. In addition, a hazard survey will be performed by a small boat towing bathymetric and geophysical instruments to confirm mudline depths and confirm that there are no

obstructions or utilities that could endanger or be impacted by the drilling operations (e.g. old piles, cables, pipelines, etc.).

The driller will use a rotary drill rig mounted on a shallow-draft barge or ship. Multiple barges and/or ships may be operated concurrently. The barge or ship will be anchored into the bottom of the channel with two to four spuds or anchor lines to prevent the vessel from drifting while the work is being performed. The spuds are steel pipes mechanically lowered into the channel bottom. The anchor lines would be located near the 4 corners of the barge and set some distance away to anchor the vessel.

The Proposed Project consists of 57 soil borings from up to 200 feet below the slough or river bottom (measured at the mudline).

The drill apparatus is similar to the land-based apparatus described above and consists of a 6- to 8-inch-diameter conductor casing that extends from the barge or drill ship deck, through the water column, and into the soft sediments of the slough or river bottom. The casing is smaller than most piers and should not impede water flow or migration patterns of fish. All drilling rods, samplers, and other down-hole equipment will be fully enclosed within the casing, effectively separating all drilling equipment from the water.

The borings will be advanced using mud rotary method and will be drilled and sampled to a maximum depth of approximately 200 feet below the bottom of the slough or river. In this case, the term “mud” refers to the use of drilling polymers and/or bentonite clay added to the boring to allow removal of drill cuttings and to stabilize the boring walls. Initially, the boring will be advanced by pushing an approximate 6- to 8-inch-diameter conductor casing, which will extend from the top of the barge or drill ship deck, to an approximate depth of 10 to 15 feet or more below the mud line of the slough or river channel. The conductor casing will be used to confine the drill fluid (“mud”) and cuttings within the drill hole and operating deck of the barge or drill ship and prevent any inadvertent spillage into the water. Soil samples will be collected from within the casing. The drill hole below the conductor casing will be approximately 3.5 to 7.0 inches in diameter.

Only water will be circulated through the pumps and conductor casing when drilling and sampling within 15 to 20 feet of the slough or river mud line. For deeper drilling, the drilling fluid, consisting of a mixture of circulating water and drilling polymers and/or bentonite clay, will be introduced into the conductor casing via the drill string to create a more viscous drilling fluid (also called drilling mud). The drilling fluid will pass down the center of the drill rod to the cutting face in the formation being drilled and will return up the drilled hole with the suspended cuttings. The drilling fluids and cuttings will be confined by the borehole walls and the conductor casing. Return drill fluids will pass through the conductor casing to the barge or ship deck and then through a tee connection at the head of the conductor casing into the drilling fluid recirculation tank.

The drilling fluids will be kept in the closed system formed by the conductor casing, a tank on the barge or drill ship deck, and a heavy plastic sleeve over the conductor casing which drapes into an external mud tank. This system will provide a reliable seal and prevent significant spillage of the drilling fluid into the water. The drill rod and sample rod connections will be disconnected either directly over the conductor casing or the recirculation tank. Furthermore, positive barriers consisting of hay waddles and/or other suitable type of spill-stoppage materials will be placed around the work area on the barge and ship decks.

Drill cuttings that settle out in the recirculation tank will be collected into 55-gallon storage drums or larger bins. Good work practices and mitigation measure implementation will be observed and maintained in containing the drilling fluid, including taking care when transferring drill cuttings from the recirculation tank to the drums. The drums will be placed adjacent to the recirculation tank. If drilling fluid or drill cuttings material accidently spill onto the barge or drill ship deck outside of the containment area, they will be immediately picked up with a flat blade shovel and placed either into the recirculation tank or a storage drum, and the affected area will then be cleaned and mopped. Discarded soil samples will also be placed in the storage drums.

Soil samples will be collected from borings using a standard penetration test (SPT) barrel (split spoon sampler), Modified California sampler, Pitcher Barrel sampler, 101 mm Geobarrel, 134 mm Geobarrel, Shelby tubes, and grab samples of the cuttings.

The barge or ship will be mobilized from an established marina and will be anchored either at the Impact Areas or at Coast Guard established anchorage points. Personnel will access the barge and/or ship via a support boat from an established marina. Disturbance to the riverbank or levee banks will be limited to the minimum necessary to complete the work.

The duration of investigation activities will be up to 15 days at each site.

Following completion of a soil investigation, the boring will be grouted from the bottom of the borehole to within approximately 10 to 15 feet of the top with 5 percent (by weight) bentonite and 95 percent (by weight) cement grout. Water will first be introduced inside the drilled hole and circulated within the conductor casing to clear out any remaining drilling mud prior to grouting. Grouting of the drilled hole will be accomplished by lowering a pipe into the bottom of the borehole to pump grout into the bottom of the hole (tremie method). Grout will be placed from the bottom of the hole upward to a depth of approximately 10 feet below the bottom of the slough or river based on a calculated grout take volume to prevent grout migration into the slough or river water. At the completion of the grouting, the conductor casing will then be pulled out of the channel bottom to complete the overwater boring operation.

3.0 RESOURCE ANALYSIS

3.1 Aesthetics

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) Would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings?	☐	☐	☒	☐
d) Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

3.1.1 Environmental Setting

The Study Area overlaps several scenic resources, including 45.8 miles of California Route 160-River Road (SR 160) which was designated by the California Department of Transportation in 1969 (Caltrans 2019) as a County Scenic Highway from the Contra Costa County Line to the Sacramento City Limit at Freeport, and scenic waterways such as Snodgrass Slough, the Sacramento River, Frank's Tract State Recreation Area (CDPR 2019) and the waterways weaving through the islands of the Delta. Historic structures, such as those found in the historic town of Locke (Visit CA Delta 2019, Locke 2019), the Bing Kong Tong Museum in Isleton, El Dorado Elementary School and

Nippon Hospital (NoeHill 2019 a, b, c) in the vicinity of Mokelumne City, are near the Study Area as well. Many of the roadways within the Study Area are characterized by adjacent waterways, riparian corridors, vineyards, rural row-crop agriculture, orchards, irrigated pasture, and Delta islands.

3.1.2 Discussion

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

Less than Significant Impact. The Proposed Project is not expected to have a substantial adverse effect to any scenic vistas within the region due to the temporary nature of the work, and lack of any permanent structures associated with the Proposed Project. While there would be a less than significant impact to scenic vistas, implementation of the following Mitigation Measure would further avoid, minimize and/or reduce potential impacts:

MM AES-1:

a. Each Impact Area will be returned to as close to pre-activity conditions as possible.

b. No building structures will be removed or disturbed. Soil investigation activities will occur at a distance greater than 100 feet from residences and small business operations. If fencing needs to be removed for access, it would be replaced in kind after the work is completed.

c. No trees or vines will be removed during exploration activities; and only minor disturbances to vegetation would occur during mobilization of equipment. This minor disturbance may consist of mowing, removal of a few tree limbs, or trimming of bushes for site access. However, if access requires removal of any vegetation, the landowner would be consulted first to minimize the impact to both vegetation and the landowner.

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

Less than Significant Impact. The Proposed Project is not expected to cause substantial damage to scenic resources such as trees, rock outcroppings and historic buildings within a state scenic highway. Within the Study Area, the only scenic highway is SR 160, which is characterized by a discontinuous riparian corridor interspersed with views of the river and small historic towns, such as Locke. The highway crosses the river several times on historic bridges as it winds from Sacramento to the Antioch Bridge. All the land-based borings along SR 160 are planned to be conducted between Clarksburg and Courtland and are not in areas where they would be near enough to historical structures to have any impact. Proposed Project work near Isleton, which does have historic structures, is only

planned for overwater work and would therefore have no impact on the land based historical resources. Additionally, no rock outcroppings are known from this area and no structures or buildings are disturbed. While there would be a less than significant impact to scenic resources, implementation of Mitigation Measure MM AES-1 would further avoid, minimize and/or reduce the potential for impacts.

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

Less than Significant Impact. The Proposed Project is not expected to substantially degrade the existing visual character or quality of public views of the Study Area or surroundings due to the small footprint, temporary nature of the work, and lack of any permanent structures associated with the Proposed Project. While there would be a less than significant impact to existing visual character and quality of public views, implementation of Mitigation Measure MM AES-1 would further avoid, minimize and/or reduce potential impacts.

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

No Impact. The Proposed Project is not expected to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. Lighting may be used on barges or drill ships; however, it is not expected to adversely affect day or nighttime views. No permanent structures would be installed, and the Proposed Project does not include the use of equipment that would have reflective properties such that a substantial daytime glare would be created during soil investigation activities. While there would be no impact to permanent day or nighttime views in the area, implementation of Mitigation Measure MM AES-2 would further avoid, minimize and/or reduce the potential for any glare-related impacts.

MM AES-2:

a. Navigational lighting will be used as needed for overwater work, but will meet the standards required for waterway safety, and will not increase the existing ambient lighting of the area in a substantial way. Any lighting used on barges or drill ships will not exceed the standards of brightness for standard navigational safety requirements.

b. All work will occur between sunrise and sunset.

3.2 Agriculture & Forestry Resources

ENVIRONMENTAL ISSUES*	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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 use?	☐	☐	☐	☒
b) Would the project conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	☒
c) Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code (PRC) section 12220(g)), timberland (as defined by PRC section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Would the project result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) 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?	☐	☐	☐	☒

*In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land

Evaluation and Site Assessment Model (1997, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection (CalFire) regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board (CARB)

3.2.1 Environmental Setting

The Study Area spans the Sacramento – San Joaquin River Delta including portions of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties, and includes agricultural and forest landscapes. Agricultural lands are defined as important farmland by the Farmland Mapping and Monitoring Program of the California Department of Conservation (DOC), as well as the California Land Conservation Act of 1965 (Williamson Act) contract lands. Forestry resources are lands defined as forest land, including timberland in the Z'berg-Warren-Keene-Collier Forest Taxation Reform Act 1976 (Tax Reform Act).

3.2.1.1 Farmland

Important farmland is categorized by DOC as prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance. These categories consider physical and chemical features including soil quality, growing season, and moisture supply to rate the type of land that is currently, or was during the previous four years, used for agricultural purposes (DOC 2019a). Within each of the above counties, agriculture is the predominant use of land, with almost 1.5 million acres of important farmland designated in all of the counties in the Study Area combined. Of the proposed on-land soil investigation sites within the Study Area, approximately 80% of these sites are located on mapped important farmland (DOC 2016a).

3.2.1.2 Williamson Act Lands

California has some of the most productive land in the world. It has been managed by Native Americans, early settlers, and now by federal, State, and local agencies. Rapid conversion of California farmland and forest land to other uses led the state to create programs under the Williamson Act (1965) and the Tax Reform Act (1976) to protect these lands from conversion through tax incentives (CalFire 2018).

Under the Williamson Act (1965), local governments can enter into contracts with private property owners to protect land (within agricultural preserves) for agricultural and open space purposes. The program took off when it was added to the state's Constitution allowing for preferential assessments. Some counties are phasing out the Williamson Act Lands as they no longer receive financial assistance from the state in

the form of Open Space Subvention payments. Counties may not report updated Williamson Act enrollment figures because they lack planning staff to administer the Williamson Act program. Therefore, this analysis reflects the most recent available Williamson Act enrollment data reported by the counties.

Approximately 16 million acres has been consistently enrolled under the Williamson Act statewide since the early 1980s (DOC 2016b). This represents almost half of California's farmland and nearly one-third of its privately-owned land. Approximately 33% of the proposed on-land soil investigation sites are located on mapped Williamson Act Land (DOC 2019b).

3.2.1.3 Forest Land

Forest land is defined as native tree cover greater than 10% that allows for management of timber, aesthetics, fish and wildlife, recreation, and other public benefits (California Public Resources Code (PRC) Section 12220(g)). Natural forest and woodland vegetation types in the Study Area typically have greater than 10% cover generally characterized as Valley Foothill riparian with the regional dominant tree types being willow or riparian mixed hardwood. Approximately 1% of the proposed on-land Impact Areas are mapped as forest land on the Fire Return Interval Departure map and are made up of deciduous orchard and Valley oak woodland (Safford et al 2013).

Timberland, a subset of forest land, is defined by State law as land that is available for, and capable of, growing a crop of trees of any commercial species used to produce lumber and other forest products (PRC Section 4526), and can produce an average annual volume of wood fiber of at least 20 cubic feet per acre per year at its maximum production (PRC Section 51104(g)).The Study Area does not contain areas zoned for timber production.

3.2.2 Discussion

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 use?

No Impact. While some of the Study Area overlaps areas mapped as farmland, the Proposed Project activities would not convert prime farmland, unique farmland, or farmland of Statewide importance. On-land Impact Areas are primarily located on roads and road right of ways, and Impact Areas within agricultural fields would be temporary and would not require a conversion of land use. The Proposed Project would not convert prime or unique farmland or farmland of Statewide importance. While there would be no impact to Prime Farmland, Unique Farmland, or Farmland of Statewide Importance convergence, implementation of Mitigation Measure MM AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

MM AGR-1:

Any proposed soil investigation activities that occur on agricultural lands will be grouted in accordance with ASTM standards to five feet below the surface. The final five feet of topsoil will be replaced to return the Impact Area to as close to pre-activity conditions as possible.

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

No Impact. While some of the Study Area is zoned for Williamson Act contracts, the Proposed Project would not affect existing zoning (DOC 2019b) for agricultural use or a Williamson Act contract. While there would be no impact to existing zoning for agricultural use or a Williamson Act, implementation of Mitigation Measure MM AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

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 Impact. The land within the Study Area has a few sites that are mapped as forest land; however, it would not conflict with Public Resources Code section 12220 (g). The Study Area does not include land that is zoned for timberland as defined by PRC section 4526 or timberland zoned Timberland Production as defined by Government Code section 51104 (g). No rezoning would take place as part of Proposed Project activities. While there would be no impact to existing zoning for forest land, implementation of Mitigation Measure MM AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

d) Would the project result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. Impacts to forest land, including loss or conversion of forest land to non-forest uses, would not occur because no trees would be cut down on forest land and forest land will not be converted. While there would be no impact to loss of forest land, implementation of Mitigation Measure MM AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

e) 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?

No Impact. Impacts to Farmland, including loss or conversion to non-agricultural use, or loss or conversion of forest land to non-forest uses, would not occur because farmland and forest land is not being converted. While there would be no impact to

farmland or forest land conversion, implementation of Mitigation Measure MM AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

3.3 Air Quality

ENVIRONMENTAL ISSUES*	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) 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?	☐	☐	☒	☐
c) Would the project expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Would the project result in other emissions such as those leading to odors adversely affecting a substantial number of people?	☐	☐	☐	☒

*Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied on to make the following determinations.

3.3.1

3.3.2 Environmental Setting

The Study Area spans portions of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties. These counties fall within three air basins and four air districts (collectively referred to as “Air Districts”):

- Bay Area Air Quality Management District (BAAQMD),
- San Francisco Bay Area Air Basin (SFBAAB),
- Sacramento Valley Air Basin (SVAB),
- Sacramento Metropolitan Air Quality Management District (SMAQMD),

- San Joaquin Valley Air Pollution Control District (SJVAPCD),
- San Joaquin Valley Air Basin (SJVAB), and
- Yolo-Solano Air Quality Management District (YSAQMD).

National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) have been established for the following criteria pollutants: carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), and lead (Pb). These standards have been established with a margin of safety to protect the public's health. Both the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) designate areas of the state as attainment, nonattainment, maintenance, or unclassified for the various pollutant standards according to the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA), respectively.

An "attainment" designation for an area signifies that pollutant concentrations did not violate the NAAQS or CAAQS for that pollutant in that area. A "nonattainment" designation indicates that a pollutant concentration violated the standard at least once, excluding those occasions when a violation was caused by an exceptional event, as identified in the criteria. A "maintenance" designation indicates that the area was previously non-attainment and is currently attainment for the applicable pollutant; the area must demonstrate continued attainment for a specified number of years prior to re-designation as an "attainment" area. An "unclassified" designation signifies that data do not support either an attainment or nonattainment status. The attainment status for the jurisdictional Air Quality Management Districts is shown in Table 2.

Table 2: Attainment status for jurisdictional regional air districts[1]

Air Quality Parameters	SMAQMD State	SMAQMD Federal	YSAQMD State	YSAQMD Federal	BAAQMD State	BAAQMD Federal	SJVAPCD State	SJVAPCD Federal
O_3 1-hr	N	A	N	N	N	N/A	N	N (N/A)
O_3 8-hr	N	N	N	N	N	N	N	N
PM_{10} 24-hr	N	A	N	U	N	U	N	A
PM_{10} Annual	N	N/A	N	N/A	N	N/A	N	N/A
$PM_{2.5}$ 24-hr	N/A	N	N/A	N	N/A	N	N/A	N
$PM_{2.5}$ Annual	A	A	U	A	N	U/A	N	N

Notes:
A: attainment means the concentration of the pollutant does not exceed national or state Ambient Air Quality Standards.
N: non-attainment means the concentration of the pollutant exceeds national or state Ambient Air Quality Standards.
N/A: means not applicable, state or federal standard does not exist for the combination of pollutant and averaging time.
U: means unclassified areas are those for which air monitoring has not been conducted but which are assumed to be in attainment.

[1] Based on information collected from: BAAQMD 2019, SMAQMD 2019a, YSAQMD 2019, and SJVAPD 2019.

3.3.2.1 Air Basins

San Francisco Bay Area Air Basin. The SFBAAB consists of Alameda, Contra Costa, Marin, Napa, Santa Clara, San Francisco, and San Mateo Counties, the southern portion of Sonoma County, and the western portion of Solano County. While the topography of the SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges and inland valleys and bays, the Study Area within this air basin is located in the Sacramento-San Joaquin Delta, with flat terrain and lower elevations. The area is characterized by moderately wet winters and dry summers; winter rains account for about 75 percent of the average annual rainfall. Annual precipitation can vary greatly from one part of the air basin to another even within short distances, from 40 inches in the mountains to less than 16 inches in sheltered valleys. Temperatures can also vary greatly across the air basin; in the Study Area, high temperatures in summers often exceed 100 ºF, and the average high temperature is in the low 90s. The average low temperature in winter is in the high 30s.

The SFBAAB is classified as non-attainment for the State and Federal Ozone standards, the State PM_{10} and $PM_{2.5}$ standards and the Federal $PM_{2.5}$ standards.

Sacramento Valley Air Basin. The SVAB covers all of Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba Counties, the westernmost portion of Placer County and the northeastern half of Solano County. The SVAB is bound by the North Coast Ranges to the west and the Northern Sierra Nevada Mountains to the east. The intervening terrain is relatively flat. It has a Mediterranean climate characterized by hot dry summers and mild rainy winters. During the year the temperature may range from 20 to 115 ºF, with summer highs usually in the 90s and winter lows occasionally below freezing. Average annual rainfall is approximately 20 inches, with about 75 percent of the rain occurring during the rainy season generally from November through March. Ozone is the primary criteria pollutant of concern in the SVAB.

Portions of Study Area are within in the Sacramento Federal Ozone Nonattainment Area (SFNA), designated by the EPA as a “severe” ozone nonattainment area with an attainment date of 2005 for the federal one-hour ozone standard. Another criteria pollutant that exceeds NAAQS or CAAQS is particulate matter. The SMAQMD was designated as “nonattainment” for PM_{10} and $PM_{2.5}$ based on both NAAQS and CAAQS, and the classification is moderate for 24-hour PM_{10} by the national standard. Yolo County was also designated as a nonattainment area for the state PM_{10} standard.

San Joaquin Valley Air Basin. The SJVAB consists of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties, and the western portion of Kern County. The SJVAB is bound by the Coast Ranges to the west, the Sierra Nevada Mountains to the east and the Tehachapi Mountains to the south. The intervening terrain is relatively flat with a slight downward gradient to the northwest. The SJVAB has an “inland Mediterranean” climate averaging over 260 sunny days per year. Summers are dry and warm, high temperatures often exceed 100ºF, and the average high temperature in the

north valley is in the low 90ºs. Winters are mild and humid, temperatures below freezing are unusual and the average daily low temperature is 45ºF. Average annual rainfall is approximately 20 inches in the north part of the air basin, and the majority of the precipitation is produced by winter storms.

The topographic features in the area restrict air movement through and out of the basin, leading to air pollution becoming trapped for long periods of time and producing harmful levels of pollutants. Local climatological effects, including wind speed and direction, temperature, inversion layers, and precipitation and fog, can exacerbate the air quality problem in the SJVAB.

The SJVAB is classified “severe nonattainment” for the state and the federal ozone standard and “serious nonattainment” for the federal PM_{10} standard.

3.3.2.2 Air Quality Management District Standards

Bay Area Air Quality Management District. The BAAQMD does not require quantification of construction emissions, although a Lead Agency may elect to do so. If all of the control measures indicated in Table 2 of the “Bay Area Air Quality Management District California Environmental Quality Act Guidelines” (as appropriate, depending on the size of the project area) will be implemented, then PM_{10} emissions from construction activities would be considered a less than significant impact (BAAQMD 2017).

Sacramento Metro Air Quality Management District. Because the Sacramento region exceeds state and federal ozone ambient air quality standards, ozone precursors such as nitrogen oxide are of greatest concern in the district. A project is considered significant if anticipated emissions of certain pollutants exceed, or contribute substantially to, an existing or projected violation of an ambient air quality standard, or expose sensitive receptors (e.g., children, athletes, elderly, sick populations) to substantial pollutant concentrations (SMAQCD 2019b).

San Joaquin Valley Air Pollution Control District. The SJVAPCD’s approach to California Environmental Quality Act analyses of construction PM_{10} impacts is to require implementation of effective and comprehensive control measures rather than to require detailed quantification of emissions. The SJFAPCD has determined that compliance with Regulation VIII for all sites and implementation of all other control measures indicated in Tables 6-2 and 6-3 of the “San Joaquin Valley Air Pollution Control District Guide” will constitute sufficient mitigation to reduce PM_{10} impacts to a level considered less than significant with mitigation (SJVAPCD 2015).

Yolo Solano Air Quality Management District. The YSAQMD sets project-level thresholds for pollutants of concern, toxics, odors, and cumulative impacts. Even projects not exceeding the district PM_{10} thresholds should comply with applicable district rules and implement best management practices to reduce dust emissions and avoid localized health impacts (YSAQMD 2007).

Thresholds of significance for criteria pollutants in the four air quality management districts are displayed in Table 3. The Air Districts have established screening levels to

assist project proponents in determining if emissions will exceed the District's construction thresholds for pollutants of concern. Construction of a project that does not exceed the screening levels, meets all of the screening parameters, and implements the Districts' air quality Best Management Practices will be considered to have a less than significant impact on air quality. The Districts' applicable air quality Best Management Practices have been incorporated into MM GHG-1.

Table 3: Thresholds of Significance for Criteria Pollutants

Pollutant	Significance Threshold BAAQMD	Significance Threshold SMAQMD	Significance Threshold SJVAPCD	Significance Threshold YSAQMD
reactive organic gases	54 lbs/day	--	10 tons/year	10 tons/year
nitrogen oxides	54 lbs/day	85 lbs/day	10 tons/year	10 tons/year
PM_{10}	82 lbs/day	80 lbs/day	15 tons/year	80 lbs/day
$PM_{2.5}$	54 lbs/day	82 lbs/day	15 tons/year	80 lbs/day

3.3.2.3 Impact Assessment Approach

The Proposed Project's impacts to air quality were assessed using methods and assumptions recommended by the Air Districts. The Proposed Project is a soil investigation and it does not involve building any permanent structures or facilities that would generate air pollutants. When the Proposed Project is complete, all activities will cease, and no further emissions will be generated. Because potential impacts to air quality would only occur during the period when soil investigations are being performed, this impact analysis will focus on air pollutant emissions from Proposed Project activities only.

3.3.3 Discussion

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

No Impact. The Proposed Project does not involve land development, nor would the Proposed Project induce growth. The Proposed Project does not conflict with or obstruct implementation of the air quality plans for the applicable Air Districts, therefore there would be no impact.

b) 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?

Less than Significant Impact. The Proposed Project is a soil investigation and all activities would cease upon completion of the study. No permanent facilities or structures that would generate air pollutant emissions would be built for the Proposed Project, therefore, the following discussion is focused on short-term soil investigation activity emissions. Table 4 shows the estimated emissions generated from the Proposed Project within each Air District's jurisdiction. Because the Proposed Project schedule will adhere to work windows to avoid impacts to sensitive species, on-land and overwater soil investigations may occur at different times, thus the emissions are quantified separately. The Proposed Project would implement all applicable Best Management Practices required by the Air Districts. The Proposed Project emissions would not exceed the Air District criteria pollutant significance thresholds (Table 5).

Table 4: Total Estimated Exhaust Emissions of Criteria Pollutants (in pounds per day based on Impact Areas per air district) for the Proposed Project in each Air District

Location	Pollutant	BAAQMD Exhaust Emissions	SMAQMD Exhaust Emissions	SJVAPCD Exhaust Emissions	YSAQMD Exhaust Emissions
On Land	reactive organic gases	2.3	1.7	2.8	1.3
On Land	nitrogen oxides	18.7	12.0	24.5	9.1
On Land	PM_{10}	0.7	0.4	1.0	0.3
On Land	$PM_{2.5}$	0.6	0.3	0.9	0.2
Over Water	reactive organic gases	2.5	1.8	5.8	4.3
Over Water	nitrogen oxides	25.2	17.7	58.0	42.9
Over Water	PM_{10}	0.9	0.6	2.0	1.5
Over Water	$PM_{2.5}$	0.9	0.6	2.0	1.5

Table 5: Estimated Exhaust Emissions of Criteria Pollutants (in pounds per day) for the Proposed Project compared to the Thresholds of Significance for the Air District

Location	Pollutant	BAAQMD Exhaust Emissions	BAAQMD Significance Threshold	SMAQMD Exhaust Emissions	Significance Threshold SMAQMD	SJVAPCD* Exhaust Emissions	Significance Threshold SJVAPCD	YSAQMD Exhaust Emissions	Significance Threshold YSAQMD
On Land	**reactive organic gases**	2.3	54	1.7	--	2.8 (0.36 tons)	10 tons/yr	1.3 (0.17 tons)	10 tons/yr
On Land	**nitrogen oxides**	18.7	54	12.0	85	24.5 (3.12 tons)	10 tons/yr	9.1 (1.16 tons)	10 tons/yr
On Land	**PM_{10}**	0.7	82	0.4	80	1.0 (0.13 tons)	15 tons/yr	0.3	80
On Land	**$PM_{2.5}$**	0.6	54	0.3	82	0.9 (0.11 tons)	15 tons/yr	0.2	80
Over Water	**reactive organic gases**	2.5	54	1.8	--	5.8 (0.26 tons)	10 tons/yr	4.3 (0.19 tons)	10 tons/yr
Over Water	**nitrogen oxides**	25.2	54	17.7	85	58.0 (2.61 tons)	10 tons/yr	42.9 (1.93 tons)	10 tons/yr
Over Water	**PM_{10}**	0.9	82	0.6	80	2.0 (0.09 tons)	15 tons/yr	1.5	80
Over Water	**$PM_{2.5}$**	0.9	54	0.6	82	2.0 (0.09 tons)	15 tons/yr	1.5	80

*Pounds per day converted to tons per expected duration of activity for comparison in SJVAPCD and YSAQMD.

Because the Proposed Project is short-term in duration and equipment emissions are below the established significance thresholds for criteria pollutants, the Proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Proposed Project region is non-attainment under an applicable federal or state ambient air quality standard. Therefore, the impact would be less than significant.

c) Expose sensitive receptors to substantial pollutant concentrations?

Less than Significant Impact. The Impact Areas are not adjacent to sensitive receptors such as schools or housing developments. Furthermore, Proposed Project impacts would be short-term in duration, involve minimal ground disturbance, and emissions are below the significance thresholds established by the Air Districts. While there would be a less than significant impact on sensitive receptors, implementation of Mitigation Measure MM AIR-1 would further avoid, minimize and/or reduce the potential for impacts.

MM AIR-1:

a. Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads.

b. Cover or maintain at least six feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways will be covered.

c. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. Use wet power vacuum street sweepers to remove any visible track out mud or dirt onto adjacent public roads as needed. Use of dry power sweeping and blower devices is prohibited.

d. Limit vehicle speeds on unpaved roads to 15 miles per hour (mph).

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

No Impact. The Proposed Project will not result in odor-causing emissions that will adversely affect a substantial number of people. The Impact Areas are small, discrete, and are located away from housing and public gathering areas. Additionally, the equipment used for the soil investigations do not generate strong odors, no odor-causing chemicals will be used, the Proposed Project would be short-

term in duration, and emissions would cease upon completion of the soil investigation. Therefore, there would be no impact.

3.4 Biological Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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 Game and the U.S. Fish and Wildlife Service?	☐	☒	☐	☐
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, or regulations or by the California Department of Fish and Game or the U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c) Would the project have a substantial adverse effect on federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☒	☐	☐
e) Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
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?	☐	☐	☒	☐

3.4.1 Environmental Setting

The Study Area spans a portion of the Sacramento – San Joaquin River Delta including portions of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties. It includes a variety of natural and built environments, including riverine, riparian, grassland, agriculture, and urban development. The Study Area is bordered to the north by the city of West Sacramento, the south by Kelso Road, to the west by west bank of the Toe Drain and communities including Rio Vista, Oakley, and Brentwood, and to the east by Interstate 5.

3.4.1.1 Methodology

DWR environmental scientists compiled a list of sensitive species and plant communities that may be in the Study Area (Appendix A). The list was developed from a review of the California Natural Diversity Database (CNDDB), Sacramento U.S. Fish and Wildlife Service website (USFWS), and the California Native Plant Society (CNPS) on-line Inventory of Rare and Endangered Plants for the following 42 USGS 7.5 minute Quadrangle maps: Gray's Bend, Taylor Mountain, Rio Linda, Davis, Sacramento West, Sacramento East, Saxon, Merritt, Clarksburg, Florin, Dixon, Elk Grove, Dozier, Liberty Island, Courtland, Bruceville, Galt, Lodi North, Thornton, Isleton, Rio Vista, Birds Landing, Antioch North, Jersey Island, Bouldin Island, Terminous, Lodi South, Stockton West, Holt, Woodward Island, Brentwood, Antioch South, Tassajara, Byron Hot Springs, Clifton Court Forebay, Union Island, Lathrop, Tracy, Midway, Livermore, Vernalis, and Altamont USGS 7.5' quadrangles. The complete list includes information on species status, habitat description, whether potential habitat occurs in the Study Area, and whether the species have the potential to occur within the Study Area.

The Study Area for evaluating the Proposed Project's potential impacts on sensitive wildlife species was established with 2 and 5-mile buffers around each soil investigation site to account for the life histories and potential migration of any given species. Expected wildlife species' potential to occur within the Study Area were determined through a review of CNDDB Geographic Information System (GIS) records (CDFW 2019), iNaturalist (2019) research grade occurrences[2], and analysis of aerial imagery. This evaluation does not include specific information that could only be attained via site visits, which have not been conducted for the project footprint.

The Study Area for evaluating the Proposed Project's potential impacts on sensitive plants was established as a 100-meter buffer around each soil investigation site. This buffer was established to account for potential site relocation and vegetation map resolution. Habitat types within the Study Area were characterized by the 2007 Vegetation and Land Use Classification and Map of the Sacramento-San Joaquin River Delta (Hickson & Keeler-Wolf 2007). These types were cross-walked to their respective Holland natural community types (Holland 1986, Sawyer et al 2009), which are used by the CNDDB and CNPS for habitat characterization of special-status plants (CNPS 2019).

Each species' potential to occur within the Study Area was determined by:

1) comparing natural community types within the Study Area to suitable habitat for each species, and

[2] A research grade is applied to an occurrence submitted to iNaturalist when the following has been verified: date is specified and accurate, location is specified and accurate, includes photos or audio, has ID confirmed by two or more people, the organism is wild and there is adequate evidence of the organism, and it is identified to species.

2) range and distribution relative to the Study Area.

Ranks were assigned based on the following criteria:

- None: The Study Area does not support suitable habitat for the species and/or the Study Area is outside of the known and presumed range of the species;

- Low: The Study Area includes limited or poor-quality habitat for the species and/or there are no documented occurrences within the vicinity of the Study Area;

- Moderate: The Study Area includes suitable habitat for the species and there are documented occurrences in the vicinity of the Study Area;

- High: The Study Area includes suitable habitat for the species and there are documented occurrences within the Study Area.

3.4.1.2 Habitat Types

The Holland natural community types within the Study Area include chenopod scrub, cismontane woodland, marshes and swamps, meadows and seeps, riparian scrub, riparian forest, riparian woodland, valley and foothill grassland, and vernal pools (Hickson & Keeler-Wolf 2007, Holland 1986, Sawyer et al 2009). A large portion of the Study Area has been developed or converted to cropland. These land cover types are not expected to support special-status plant species.

3.4.1.3 Special-Status Species

For the purposes of this analysis, special-status has been defined to include those species that meet the definitions of rare or endangered wildlife or plants under CEQA including species that are:

- Listed as endangered or threatened under the FESA (or formally proposed for, or candidates for, listing);

- Listed as endangered or threatened under CESA (or proposed for listing);

- Designated as endangered or rare, pursuant to California Fish and Game Code Section 1901;

- Designated as fully protected, pursuant to California Fish and Game Code Sections 3511, 4700, or 5050;

- Designated as a species of special concern to the CDFW; or

- Included in California Native Plant Society's Inventory of Rare Plants (Rare Plant Rank 1 through 4).

A total of 100 special-status wildlife species and 97 special-status plant species were identified in the quadrangle search based on the sources identified in the methodology section. Of those identified, 70 special-status wildlife species and 79 special-status plant species have at least some potential to occur within the respective sensitive wildlife or sensitive plant Study Areas.

3.4.2 Discussion

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, the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service?

Less than Significant with Mitigation Incorporated. As discussed above and noted in Appendix A, the Study Area provides potentially suitable habitat for 70 special-status wildlife species and 79 special-status plant species.

Ground-disturbing effects would be limited and temporary in nature, and vegetation management would be minimal. The implementation of Mitigation Measures MM AES-1 and AES-2, MM BIO-1 through 20, MM HYD-1, and MM HAZ-1 through 4 will reduce potential impacts to special-status species or modification of potential habitat to *Less than Significant with Mitigation Incorporated*. Species specific determinations are discussed in more detail below.

3.4.2.1 SPECIAL-STATUS WILDLIFE

The following section includes species accounts for each of the special-status wildlife species that has potential to occur (Appendix A) within the Study Area and provides effects determinations relative to the Proposed Project's anticipated impacts. For all 70 wildlife species with some potential to occur in the Study Area, it was determined that potential impacts relative to the Proposed Project would be Less Than Significant with Mitigation Incorporated.

California tiger salamander (*Ambystoma californiense*)

California tiger salamander Central California distinct population segment (DPS) is listed as Threatened under the FESA and as Threatened under the CESA (USFWS 2019a, CDFW 2019a). Critical habitat was finalized for the Central California DPS in 2005. California tiger salamander is a terrestrial mole salamander ranging from three to five inches, snout to vent (SVL), with a broad,

rounded snout, stocky body, and is black with large yellow oval or bar-shaped spots (Stebbins 2003). The species historically occurred throughout the Central Valley and surrounding foothills, from Yolo County south to Tulare County, and in the south coast ranges from north of Monterey Bay to San Luis Obispo County, although many of the populations in the Central Valley are now extirpated. There are also isolated populations in Sonoma and Santa Barbara counties (Nafis 2019) which are listed as Endangered under FESA. California tiger salamander inhabits annual grasslands, open mixed woodlands and oak savanna, spending most of its life underground in small mammal burrows. Central California tiger salamander has been shown to migrate from 1 to 1.3 miles between breeding ponds and upland habitat, depending upon the availability of suitable upland refugia (Jennings and Hayes 1994, Orloff 2007).

Breeding occurs in vernal pools, seasonal ponds, and constructed stock ponds that are generally free of fish and hold water during winter, often drying out by summer. Adults move from subterranean refuge sites to breeding pools during relatively warm late winter and spring rains (Jennings and Hayes 1994), usually from November through April. Breeding occurs following rains from December to March (Stebbins 2003). Eggs are laid individually or in clumps on submerged vegetation and debris in shallow water and generally hatch in 10 to 28 days (USFWS 2015a). Larvae are aquatic, taking from three to six months to metamorphose. Post-metamorphic juveniles disperse from breeding sites at night during the late spring or early summer to upland burrows or soil crevices.

California tiger salamander has a high potential to occur within the Study Area based upon presence of suitable aquatic and upland habitat and proximity to reported occurrences. There are several reported occurrences of California tiger salamander ranging from 300 feet to less than 0.5 mile from multiple Impact Areas in the southern portion of the Study Area, west of Byron Highway within Contra Costa and Alameda Counties.

Implementation of the following mitigation measures to avoid impacts to all suitable aquatic habitat, upland refugia habitat, and individuals that could be moving through the Study Area: MM AES-1, MM AES-2, MM BIO-1, and MM BIO-2, would reduce potential project impacts to California tiger salamander to: *Less than Significant with Mitigation Incorporated.*

MM BIO-1: General Wildlife

a. All litter, debris, unused materials, rubbish, supplies, or other material will be appropriately stored in closed containers until it can be removed from project sites and deposited at an appropriate disposal or storage site. All trash that is brought to a project site during soil investigation activities (e.g., plastic water bottles, plastic lunch bags, cigarettes) shall be removed from the site daily.

b. All on-land soil investigation Impact Areas will be located outside of wetlands as defined in the Corps of Engineers Wetlands Delineation Manual (USACE 1987).

c. Over-water sites will be located within portions of navigable channels or sloughs that generally do not provide appropriate habitat for terrestrial plant or wildlife species, and will be authorized under the Clean Water Act sections 401 and 404, and Fish and Game Code section 1602 et seq.

d. A qualified team of biologists will conduct a habitat assessment and reconnaissance level surveys approximately two weeks prior to the onset of ground disturbing soil investigation activities for any special status plants and wildlife that have the potential to occur within the project area. If the biologists identify the potential for special status wildlife impacts within the Impact Area and associated standard species buffers based on the site reconnaissance, the location will be shifted the minimum distance necessary to reduce the potential for biological impacts to a less than significant level without increasing impacts to other resources to above a level of significance. If a suitable location cannot be determined within adjacent areas, then the soil investigation at that location will not be conducted.

e. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify the specific species and associated habitat that could occur on site.

f. A qualified biologist will conduct an environmental awareness training session for all field personnel prior to the start of work. At a minimum, the training shall:

   i. include a description of each species with the potential to occur, including physical description, habitat needs, and life history as well as a discussion of the importance of avoiding impacts to special status wildlife.

   ii. explain the general measures that are being implemented to conserve these species as they relate to the project and project area, and procedures to follow should they encounter wildlife during work.

   iii. explain the stop work authority of biologists and/or cultural resource specialists.

g. Any observations of federally or state-listed species or California Species of Special Concern will be reported to CDFW within three (3) working days of the observation, and the observation(s) will be submitted to the California Natural Diversity Database (CNDDB). Any observations of federally listed species will also be reported to the U.S. Fish and Wildlife Service.

h. All federally or state-listed species observed will be allowed to leave the Impact Area on their own. If the biologist determines that continuing activities could potentially cause unpermitted take under federal or State law to a federally or state-listed species, activities must cease. Work may not resume until the on-site biologist has determined there is no longer the possibility of causing unpermitted take under federal and State law.

i. The area below any vehicle or piece of equipment that has been stationary for 24 hours or greater will be examined prior to operation to ensure that no wildlife species is present.

j. No pets or firearms will be permitted on site.

k. Any open holes or trenches that will be left exposed overnight will either be securely covered or have an escape ramp installed to prevent entrapment of any wildlife.

l. Any piping or casing left exposed overnight will be capped to prevent wildlife from entering.

MM BIO-2: Special-Status Reptiles and Amphibians

a. No project activities will be conducted during or within 24 hours following a rain event in locations that have a potential for special status amphibians to occur or are near wetlands or other water features.

b. In areas with the potential for special-status reptiles and amphibians to occur, prior to the onset of project activities at any Impact Area, a qualified biologist will conduct pre-activity surveys to determine whether any such species are present. A qualified biologist must, at a minimum, have experience conducting surveys to identify the California tiger salamander, California red-legged frog, western spadefoot, western pond turtle, and/or giant garter snake and their associated habitat.

c. Any active rodent burrows or suitable cracks identified by a qualified biologist during the pre-activity survey will be flagged so that they can be avoided.

d. Any burrows, cracks or fissures suitable for rodents that cannot be avoided, and will be temporarily impacted by the movement and placement of equipment or other project activities will be covered with plywood to avoid burrow collapse.

e. Leaf litter will be surveyed by the biologist for presence of wildlife prior to the onset of work, and if any special-status species are identified as using the leaf litter for refuge it will be avoided and a buffer will be established by a qualified biologist and flagged.

f. If any special-status reptiles or amphibians are observed within the Impact Area, the on-site biologist will determine if the work can continue without harm to the individual(s). If the biologist determines that it is not safe to continue work, all work will cease until the animal has left the Impact Area. Once the individual(s) is determined by the on-site biologist to have left the Impact Area and is out of harm's way, work may resume.

g. Piles of rock, rip-rap, or other materials that could provide refuge to reptiles or amphibians will be avoided. If movement of such materials cannot be avoided, a qualified biologist will survey the area prior to disturbance and monitor the material movement and restoration of the area following completion of Proposed Project activities.

California red-legged frog (*Rana draytonii*)

California red-legged frog is listed as Threatened under FESA (USFWS 2019b) and is identified as a California Department of Fish and Wildlife (CDFW) Priority One Species of Special Concern (CDFW 2019b, Thompson et al 2016). It is the largest California native frog, measuring 1.75 to 5.25 inches SVL, with smooth skin and prominent dorsolateral folds. Its coloration can vary from reddish-brown to gray or olive, often with a red lower belly and hindlegs (Nafis 2019). California red-legged frog is endemic to central California, with a range historically extending from southern Mendocino County southward along the interior Coast Ranges to northern Baja California, Mexico, and inland from the vicinity of Redding, Shasta County, California, along Sierra Nevada foothills south to Fresno County at elevations from sea level to approximately 5,000 feet (Nafis 2019, Thompson et al 2016). It is found in a variety of aquatic habitats including permanent and ephemeral ponds, perennial and intermittent streams, seasonal wetlands, springs, seeps, marshes, dune ponds, lagoons, coastal dune drainages, and human-made aquatic features (Thompson et al 2016, Halstead and Kleeman 2017), and has been known to migrate as much as a 1.7 miles into the upland. Upland habitat used includes woodlands, grasslands, and coastal scrub.

Breeding occurs from late November through late April, with earlier breeding generally occurring in southern localities. Females lay eggs in clusters up to 10 inches across, attached to vegetation two to six inches below the surface. Eggs hatch in 6-14 days, depending on water temperature (Thompson et al 2016), with tadpoles undergoing metamorphosis in four to seven months, although in some locations they have been known to overwinter (Nafis 2019) completing metamorphosis the following spring.

Red-legged frog has a high potential to occur within the Study Area based upon presence of suitable aquatic habitat and upland refugia and proximity to reported

occurrences. There are several reported occurrences of California red-legged frog less than 0.5 mile from multiple Impact Areas in the southern portion of the Study Area, east and southeast of the Clifton Court Forebay, within Contra Costa and Alameda Counties.

Implementation of the following mitigation measures to avoid impacts to all suitable aquatic habitat, upland refugia habitat, and individuals that could be moving through the Study Area: MM-AES-1, MM-AES-2, MM BIO-1, and MM BIO-2, would reduce potential project impacts to California red-legged frog to: *Less than Significant with Mitigation Incorporated.*

Western spadefoot (*Spea hammondii*)

Western spadefoot is identified as a CDFW Priority One Species of Special Concern (CDFW 2019b, Thompson et al 2016). It is an olive toad, ranging from 1.5 to 2.5 inches SVL, with orange tipped skin tubercles, vertical pupils, and a single black spade on each hind foot (Stebbins and McGinnis 2012, Thompson et al 2016). Western spadefoot is found throughout the Central Valley and coastal lowlands from the Shasta County in Northern California to Baja California in Mexico, at elevations ranging from sea level to 4,500 feet (Jennings and Hayes 1994, Stebbins and McGinnis 2012). This species occurs in grasslands, mixed woodland, open chaparral, and pine oak woodlands, with shallow temporary pools or washes.

Breeding coincides with the rainy season and usually occurs from January to May, peaking in February and March, in temporary pools and drainages, although breeding can also occur in man-made water sources such as cattle ponds (Thompson et al 2016). Adults remain in underground burrows for most of the year and will travel up to several meters on rainy nights (CDFW 2000a). Eggs are laid in cylindrical clusters and usually hatch in three to four days, with tadpoles metamorphing in 4 to 11 weeks (Nafis 2019). Juveniles will leave the pool a few days after metamorphosis. On land movement is generally thought to be nocturnal, with juveniles and adults able to dig burrows up to eight inches deep (Thompson et al 2016). They will also make use of existing mammal burrows.

Western spadefoot has a moderate potential to occur within the Study Area based upon presence of suitable habitat and proximity to reported occurrences. Although there are no reported occurrences within 8 miles of the Study Area displayed in the CNDDB GIS layer, there are several recent research grade occurrences reported on iNaturalist (2019) that are within established with 2 or 5 miles of the southernmost portion of the Study Area, south of Clifton Court Forebay, in Alameda County.

Implementation of mitigation measures to avoid impacts to all suitable aquatic habitat (MM BIO-1 and MM BIO-2), upland refugia habitat (MM AES-1 and MM BIO-2), and individuals that could be moving through the Study Area (MM AES-2, MM BIO-1 and MM BIO-2), would reduce potential project impacts to western spadefoot to: *Less than Significant with Mitigation Incorporated.*

California legless lizard (*Anniella pulchra*)

California legless lizard is identified as a CDFW Priority Two Species of Special Concern (CDFW 2019b, Thompson et al 2016). It is the only species of legless lizard found in California and ranges from Contra Costa County south to Baja California, at elevations from sea level to 5,900 feet (Thompson et al 2016, Stebbins 2003). California legless lizard is a medium sized lizard, ranging from four to seven inches SVL. It is metallic light silver, beige, olive brown or black with a yellow ventral surface, a shovel shaped snout, blunt tail and no external ear openings. It is found in oak woodland, chaparral, riparian woodland, oak-pine forest and desert scrub with loose soil or leaf litter for burrowing, and adequate moisture and surface cover. California legless lizard is primarily diurnal and crepuscular and is rarely active on the surface. It spends most of its time just beneath the surface but can be found in depths of up to 2 feet.

Breeding occurs between early spring and mid-summer, with an average gestation of four months (Thompson et al 2016). They bear one to four live young from September to November (Stebbins and McGinnis 2012). Sexual maturity is reached in males at 2 and females at 3 years of age (Thompson et al 2016).

California legless lizard has a low potential to occur within the Study Area based upon the presence of potentially suitable habitat, the southern portion of the Study Area being within the northern edge of the species range, and proximity to reported occurrences. The closest occurrences of California legless lizard are over 5 miles west of the Study Area in the vicinity of Brentwood and the Antioch Dunes.

Implementation of mitigation measures to avoid impacts to potential habitat (MM AES-1 and MM BIO-1), and individuals that could be moving through the Study Area (MM BIO-1 and MM BIO-2), would reduce impacts to California legless lizard to: *Less than Significant with Mitigation Incorporated*.

California glossy snake (*Arizona elegans occidentalis*)

California glossy snake is identified as a CDFW Priority One Species of Special Concern (CDFW 2019b, Thompson et al 2016). California glossy snake is a medium sized, from 25 to 39 inches SVL, tan or brown colubrid with dark brown blotches down the back. It has unkeeled scales giving it a glossy appearance, and a single pair of prefrontals. The species occurs from Contra Costa County

south to San Quintin, Baja California, including the central San Joaquin Valley and along the base of the Southern Coastal Range, at elevations ranging from sea level to 5,900 feet (Thompson et al 2016). It does not occur along the coast of California north of Ventura County. California glossy snake is found in grasslands, coastal sage scrub and chaparral in areas where soil is loose.

California glossy snake is primarily nocturnal, active between late February and November with activity peaking in May. Little is known about reproduction in the wild, but young of year are generally found in September. During the day, it will use existing mammal burrows and burrows under rocks or will dig their own burrows.

California glossy snake has a moderate potential to occur within the Study Area based upon presence of suitable habitat, species range and proximity to reported occurrences. Although there are no reported occurrences within 6 miles of the Study Area the reported occurrences occur both to the northwest south of the southernmost portion of the Study Area, ranging from the Antioch Dunes in Contra Costa County to south of Clifton Court Forebay, in Alameda County.

Implementation of mitigation measures to avoid impacts to potential habitat (MM BIO-1), and individuals that could be moving through the Study Area (MM AES-2, MM BIO-1 and MM BIO-2), would reduce impacts to California glossy snake to: *Less than Significant with Mitigation Incorporated*.

Western Pond Turtle (*Emys (= Actinemys) marmorata*)

Western pond turtle is under review for listing under the FESA and is a CDFW Priority One Species of Special Concern (USFWS 2015b, Thompson et al 2016). Western pond turtle is a small to medium-sized aquatic turtle, measuring 6.5 to seven inches straight carapace length. They are brown, tan, olive with a low, unkeeled carapace with a non-serrated rim (Nafis 2019, Stebbins 2003). Western pond turtle is found from the Pacific Coast inland to the Sierra Nevada foothills to elevations as high as 6,700 ft above sea level.

Western pond turtle is a highly aquatic species and can be found in a variety of habitat types including streams, rivers, sloughs, lakes, ponds, reservoirs, marshes, seasonal ponds, and other wetland habitats (Thompson et al 2016). It requires basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks for thermoregulation, and access to suitable upland habitat with loose soils for nesting, dispersal and overwintering (Thompson et al 2016). It is active year-round in warmer locations but will spend winter months in colder climates in a state of dormancy often burrowing into loose soil or leaf litter on land, or using undercut banks, snags, rocks or bottom mud in ponds (Thompson et al 2016). Western pond turtle diet consists of aquatic invertebrates, algae and other vegetation, small vertebrates and carrion.

Breeding occurs from spring through fall, with nesting taking place from spring to early summer. Nest sites are usually within 100 m of water, although nests have been reported as far away as 500 m. Females lay from one to 13 eggs, which will hatch in the fall, although the young will remain in the nest until the following spring.

Western pond turtle has a high potential to occur within the Study Area due to the availability of suitable aquatic and upland habitat, the known range of the species and many occurrences throughout the Study Area.

Implementation of mitigation measures to avoid impacts to all suitable aquatic habitat (MM BIO-1 and MM BIO-2), upland refugia habitat (MM BIO-2), and individuals that could be moving through the Study Area (MM BIO-1, MM BIO-2, and MM BIO-3), would reduce potential project impacts to western pond turtle to: *Less than Significant with Mitigation Incorporated.*

MM BIO-3: Western pond turtle

a. In areas with the potential for western pond turtle to occur, pre-activity presence/absence surveys for western pond turtle shall occur within 48 hours prior to the onset of project activities at any Impact Area.

b. If Western pond turtles are observed on land during the pre-activity surveys, the area within 100 meters of the boundary of the aquatic habitat will be flagged and avoided if feasible.

c. If western pond turtles are observed within the Impact Area during a pre-activity survey or during project activities, they will be relocated outside of the Impact Area to appropriate aquatic habitat by a qualified biologist.

San Joaquin coachwhip (*Masticophis flagellum ruddocki*)

San Joaquin (whipsnake) coachwhip is identified as a CDFW Priority 2 Species of Special Concern (CDFW 2019b, Thompson et al 2016). San Joaquin coachwhip is a large colubrid, measuring at 35 to 102 inches SVL. It is a tan, olive or yellow-brown colubrid with a yellow ventral surface and pink or orange cast to the tail. It is distinguished from other subspecies of coachwhip by its lack of the dark head and neck bands found in the other sub-species (Thompson et al 2016). It is endemic to California and is usually found from Arbuckle in the Sacramento Valley southward to the Grapevine section of I-5 in Kern County, and westward to the inner South Coast Ranges (Stebbins and McGinnis 2012). This diurnal snake generally occurs in open, dry, treeless areas, including grassland and saltbush scrub. It often will climb into vegetation to scan for prey or for shade and refuge and overwinters in mammal burrows.

San Joaquin coachwhip is active from March through October, with breeding occurring in May, and oviposition occurring in June or July (CDFW 2000b).

San Joaquin Coachwhip has a moderate potential to occur within the southern portion of the Study Area where the species range overlaps in Contra Costa and Alameda Counties, based upon the presence of suitable habitat and several occurrences within six miles to the west and south.

Implementation of mitigation measures to avoid impacts to potential habitat (MM BIO-1), and individuals that could be moving through the Study Area (MM BIO-1 and MM BIO-2), would reduce impacts to San Joaquin coachwhip to: *Less than Significant with Mitigation Incorporated*.

Coast horned lizard (*Phyrnosoma blainvillii*)

Coast horned lizard is identified as a CDFW Priority Two Species of Special Concern (CDFW 2019b, Thompson et al 2016). Coast horned lizard is a compressed oval bodied lizard, reaching a maximum length of 4.5 inches SVL, with a row of large horns behind its head, two of which are longer and separated at the base, and two rows of fringed scales running down each side of its body. It can be tan, yellow, red, brown, or grey with dark splotches down the back, with a lightly spotted yellow, cream or beige ventral surface. The species is found from Shasta County in the North to Baja California in the South and along the California coast inland to the Sierra Nevada and west of the Mojave Desert (Sherbrooke 2003, Thompson et al 2016). Coast horned lizard is found in a wide variety of habitat types including sage scrub, dunes, annual grassland, chaparral, oak woodland, riparian woodland, coniferous forest, Joshua tree woodland, and saltbush scrub, however it requires loose fine soils for burrowing, open areas for thermoregulation and an adequate prey base of native ants and other insects.

Coast horned lizard is active from February through November, peaking in April and July. Breeding occurs from March to June, with average clutch sizes of 11 eggs laid likely beginning in May, with an incubation period of approximately 60 days. Hatchlings are active from late July through November.

Coast horned lizard has a moderate potential to occur within the Study Area based upon the species range, the presence of suitable habitat and several occurrences within 2.5 and five miles to the west and south, respectively.

Implementation of mitigation measures to avoid impacts to potential habitat (MM BIO-1) and individuals that could be moving through the Study Area (MM BIO-1 and MM BIO-2), would reduce impacts to Coast horned lizard to: *Less than Significant with Mitigation Incorporated*.

Giant garter snake (*Thamnophis gigas*)

Giant garter snake is listed as Threatened under FESA and as Threatened under CESA (USFWS 2019c, CDFW 2019a). It is a large snake, reaching from 36 to 65

inches SVL. It ranges in coloration from olive drab to black with a dorsal and a side stripe that can range from bright to muted orange or yellow or in some cases be absent, a light-colored ventral surface, and keeled scales (Nafis 2019). Giant garter snakes historically occurred throughout the Central Valley of California, although its current range has been reduced to fragmented populations from Glenn County to the edge of the Delta, and south from Merced to Fresno Counties. Giant garter snakes are a highly aquatic, diurnal snake, relying on the presence of water throughout the summer months, and are found in marshes, sloughs, rice fields, and other water bodies with emergent vegetation, a suitable prey base and associated upland with burrows, crevices or rip-rap for use as refugia. While they are generally underground in refugia during the winter, they are not fully dormant during that time.

Breeding occurs shortly after emergence in March or April, depending upon the weather, with females giving birth to offspring between late July and early September.

Giant garter snake has a high potential to occur within the Study Area based upon presence of suitable aquatic habitat and upland refugia and proximity to reported occurrences. There are several reported occurrences of Giant garter snake from less than 0.5 mile to 2 miles from multiple Impact Areas along the length of the Study Area.

Implementation of mitigation measures to avoid impacts to all suitable aquatic habitat (MM BIO-1 and MM BIO-14), upland refugia habitat (MM BIO-2), and individuals that could be moving through the Study Area (MM BIO-1, MM BIO-2, and MM BIO-4) would reduce potential project impacts giant garter snake to*: Less than Significant with Mitigation Incorporated.*

MM BIO-4: Giant garter snake

a. Upland habitat within 200 feet of suitable aquatic habitat, that is suitable for giant garter snake (containing cracks or rodent burrows) will be flagged and avoided.

b. On-land soil investigations within suitable upland habitat for giant garter snake will be conducted during the snakes active season of May 1 through October 1.

Cormorants, Herons, and Egrets: Great Egret (*Ardea alba*), Great Blue Heron (*Ardea herodias*), Snowy Egret (*Egretta thula*), Black-crowned Night Heron (*Nycticorax nycticorax*), Double-crested Cormorant (*Phalacrocorax auritus*)

Tree-nesting waterbirds, specifically, Double-crested Cormorant, Great Blue Heron, Great Egret, Snowy Egret, and Black-crowned Night Heron, typically use

rookeries (colonial nest sites) that often include interspecies nesting and roosting with other species in this group. These species are widely distributed across North America. Nesting habitat includes mature riparian trees and snags adjacent to water, and the species forage by stalking in aquatic habitats for fish, small birds, mammals, reptiles, and amphibians. Tree-nesting waterbirds tend to exhibit high fidelity to rookery sites. While most species need mature, riparian trees, rookeries for Black-crowned Night Heron have also been located in riparian scrub (CDWR 2011). Breeding occurs between February and August at these rookeries (CDFW 2018). All of these species have a high potential to occur within the Study area based upon the known ranges, availability of suitable habitat and the presence of known roosts in the vicinity of the Study Area.

Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-5 would reduce potential project impacts to these five species by avoiding and reducing impacts to the roosting habitat in the Study Area to*: Less than Significant with Mitigation Incorporated.*

MM BIO-5: Rookery Birds

To minimize the potential impacts to special-status rookery birds that may occur within the Study Area the following general measures will be implemented:

a. A pre-activity survey for active rookeries will be conducted (during nesting season between February 1 – August 31) a maximum of 72 hours prior to the onset of soil investigation field activities. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify the specific rookery bird species and associated habitat that could occur on site.

b. If any active rookeries are identified within or adjacent to an Impact Area, a buffer will be put in place to ensure that the birds are not disturbed during work activities. This buffer will be up to 50 feet, but can be smaller, dependent on-site conditions and at the discretion of the qualified biologist.

Cooper's Hawk (*Accipiter cooperii*)

Cooper's Hawk is included on the CDFW Watch List. Cooper's Hawk is a crow-sized woodland raptor with orange-red eyes, blue-gray mantle feathers, barred underparts, and a dark crown. The species is found across North America from Southern Canada to Northern Mexico (Rosenfield et al 2019) and occurs throughout most of California where appropriate habitat exists. Habitat includes riparian and oak woodland, and trees in rural and suburban areas adjacent to foraging habitat. Cooper's Hawk forages and nests in live oak, riparian deciduous, or other forests where it hunts primarily for small birds and mammals (CDFW 1990a). Nests are built in mature trees, usually near streams. Breeding

occurs from March through August, with peak activity from May through July (CDFW 1990a).

Suitable habitat for Cooper's Hawk is found throughout the Study Area, and the Study Area is within the range, and therefore it has a moderate potential to occur. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-6 would reduce potential impacts to Cooper's Hawk to*: Less than Significant with Mitigation Incorporated.*

MM BIO-6: Raptors (excluding Swainson's Hawk and Burrowing Owl)

To minimize and avoid the potential impacts to special-status raptors that may occur within the Study Area the following general measures will be implemented:

a. For soil investigation field activities that will occur between February 1 – August 31, a pre-activity survey for actively nesting raptors will be conducted by a qualified biologist a maximum of 72 hours prior to the onset of project activities. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify the specific species and associated habitat that could occur on site.

b. If any active raptor nests are identified within or adjacent to an Impact Area by the pre-action survey, a buffer will be put in place to avoid disturbance to birds during and as a result of work activities. This buffer will be up to 250 feet, but can be smaller, dependent on-site conditions and at the discretion of the qualified biologist.

c. Any identified actively nesting raptors will be monitored by a qualified biologist during soil investigation activities for signs of distress or disturbance as a result of field activities. Should the birds show signs of distress, work will cease at that location until the birds have resumed normal behavior and it is determined by the on-site biologist that work can be resumed.

Tricolored Blackbird (*Agelaius tricolor*)

Tricolored Blackbird is listed as a Threatened under CESA and is currently under review for listing under FESA. Tricolored Blackbird is a medium-sized blackbird; males are larger than females with striking black plumage with red and white markings on the wings and females are dark brown with a whitish chin and throat (Beedy et al. 2017). The species is largely endemic to California, common locally throughout the Central Valley and along the coast. Preferred foraging habitats include crops such as rice, alfalfa, irrigated pastures, and ripening or cut grain fields, as well as annual grasslands and cattle feedlots. Tricolored Blackbirds also forage in remnant native habitats, including wet and dry vernal pools and

other seasonal wetlands, riparian scrub habitats, and open marsh borders. Wintering Tricolored Blackbirds often congregate in large, mixed-species blackbird flocks that forage in grasslands and agricultural fields with low-growing vegetation. Breeding habitats include wetland and silage fields with tall, dense cover near open water. Nesting colonies range in size from 50 nests to over 20,000 in an area of 10 acres or less (CDFW 2008a). Breeding usually occurs from mid-April into late July (CDFW 2008a).

Suitable habitat for Tricolored Blackbird is found within the project footprint, and several recorded occurrences are located near Impact Areas, therefore this species has a moderate potential to occur. Although wintering birds and a few individuals have been observed during breeding season, no nesting colonies have been identified within 1/4 mile of the Study Area. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-7 would reduce potential impacts to Tricolored Blackbird to*: Less than Significant with Mitigation Incorporated.*

MM BIO-7: Tricolored Blackbird

To minimize and avoid the potential impacts to Tricolored Blackbird that may occur within the Study Area the following general measures will be implemented:

a. For soil investigation field activities that will occur March 15- July 31 in areas with potential breeding habitat for Tricolored Blackbird, a pre-activity survey for breeding colonies will be conducted by a qualified biologist within 1,300 feet of Impact Areas a maximum of 72 hours prior to the onset of soil investigation activities. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify Tricolored Blackbird and associated habitat that could occur on site.

b. For soil investigation field activities that will occur August 1 – March 14 in areas with potential roosting habitat for Tricolored Blackbird, a pre-activity survey for roosting Tricolored Blackbirds will be conducted during the nonbreeding season within 300 feet of Impact Areas a maximum of 72 hours prior to the onset of soil investigation activities by a qualified biologist.

c. If active Tricolored Blackbird breeding colonies or roost sites are identified within or adjacent to an Impact Area, a buffer will be put in place to ensure that the birds are not disturbed during work activities. This buffer will be up to 1,300 feet but may be reduced to a minimum of 300 feet, dependent on-site conditions and at the discretion of the qualified biologist.

Grasshopper Sparrow (*Ammodramus savannarum*)

Grasshopper Sparrow is a California Species of Special Concern. The Grasshopper Sparrow is a small sparrow lacking distinct markings (Vickery 1996). The species breeding range in California is fragmented throughout the state west of the Cascade-Sierra Nevada Crest (Dobkin and Granholm 2008, Vickery 1996). Grasshopper Sparrow occurs in dry, dense grasslands with a variety of grasses and tall forbs and scattered shrubs for singing perches. The species may form semi-colonial breeding groups but does not form flocks in winter. Nests are built in shorter, moderately grazed open grasslands but have also been recorded in grassland-like cultivated lands such as alfalfa (Unitt 2008, Grinnell and Miller 1944). Breeding occurs from early April to mid-July, with a peak activity in May and June (CDFW 2008b).

Grasshopper Sparrows have been observed rarely in the winter in the vicinity of the Study Area, however minimal suitable nesting habitat is present, and there are no occurrences within 5 miles. Therefore, Grasshopper Sparrow has a low potential to occur within the Study Area and potential impacts would *be less than significant*. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-8 would further avoid, minimize and/or reduce the potential for impacts to Grasshopper Sparrows.

MM BIO-8: Nesting Birds

To minimize and avoid the potential impacts to nesting birds (non-raptor) protected by the MBTA and Fish and Game Code that may occur within the Study Area the following general measures will be implemented:

a. For soil investigation field activities that will occur February 1 – August 31, a pre-activity survey for actively nesting birds will be conducted a maximum of 72 hours prior to the onset of soil investigation activities by a qualified biologist. The qualified biologist(s) must, at a minimum, have experience conducting surveys to identify the specific species and associated habitat that could occur on site.

b. If any active nests are identified within or adjacent to an Impact Area, a buffer will be put in place to ensure that no take (as defined by MBTA), and no take, possession, or needless destruction (as prohibited under the Fish and Game Code) occurs. This buffer will be up to 50 feet, but can be smaller, dependent on-site conditions and at the discretion of the qualified biologist

Lesser Sandhill Crane (*Antigone canadensis canadensis*)

Lesser Sandhill Crane is a California species of special concern. Lesser Sandhill Crane is a large gray, heavy-bodied bird with a long neck, long legs, and red plumage on top of the head. The subspecies range includes much of North America; the population that occurs in the Study Area breeds in Alaska and

migrates to the Central Valley of California to overwinter (Littlefield 2008). Foraging habitat is consistent with Greater Sandhill Crane (although the foraging values of crop types differ between the two subspecies) and consists mainly of harvested corn fields, winter wheat, irrigated pastures, alfalfa fields, and fallow fields. Mid-day loafing typically occurs in wetlands and flooded fields along agricultural field borders, levees, rice checks, and ditches, and in alfalfa fields or pastures. Night roosting is in shallowly flooded open fields and open wetlands interspersed with uplands. Sandhill Cranes are omnivores and primarily forage in row crops (primarily grains, such as corn) for grain, seeds, and will opportunistically consume small rodents, birds, and invertebrates, and tend to congregate in small to large flocks. Greater and Lesser Sandhill Cranes use similar roost sites and are both sensitive to human disturbance. Lesser Sandhill Cranes are less traditional than Greater Sandhill Cranes and are more likely to move between different roost site complexes and different wintering regions. Lesser Sandhill Cranes are winter residents and migrants in the study area, arriving during early September and reaching maximum densities during December and January and departing during early March (Ivey et al. 2016, Littlefield 2008).

Lesser Sandhill Crane has been observed regularly in the winter in the vicinity of the Study Area, and there are known roost sites within the Study Area. Therefore, Lesser Sandhill Crane has a high potential to occur within the Study Area. Implementation of Mitigation Measures MM BIO-1 and MM BIO-9 would reduce potential impacts to Lesser Sandhill Crane to*: Less than Significant with Mitigation Incorporated.*

MM BIO-9: Sandhill Crane

To minimize and avoid the potential indirect impacts to Lesser and Greater Sandhill Crane that may occur within the Study Area, the following general measures will be implemented:

a. For soil investigation field activities that will occur September 15 through March 15, during roosting season, pre-activity surveys and an assessment of known roost sites will be conducted within 0.75 mile of Impact Areas by a qualified biologist.

b. If roost sites are identified within 0.25 mile of Impact Areas by the qualified biologist, start of large equipment use for soil investigation activities will be delayed to an hour after sunrise and stop an hour before sunrise to minimize potential for noise disturbance at the roost site.

Greater Sandhill Crane (*Antigone canadensis tabida*)

Greater sandhill crane is listed as threatened under CESA and Fully Protected under California Fish and Game Code and. Greater sandhill crane is the largest

sandhill crane subspecies, with gray plumage, heavy body, long neck and legs, and red plumage on top of the head. The subspecies range includes much of North America; the population that occurs in the Study area breeds in western Canada, Washington, and Oregon, with a small number breeding in northeastern California, and migrates to the Central Valley of California to overwinter (CDFW 1994). Night roosting occurs in shallowly flooded open fields and open wetlands interspersed with uplands. Foraging habitat consists mainly of harvested corn fields, followed by winter wheat, irrigated pastures, alfalfa fields, and fallow fields close to roost sites (Ivey et al. 2016). Mid-day loafing typically occurs in wetlands and flooded fields along agricultural field borders, levees, rice checks, and ditches, and in alfalfa fields or pastures. Portions of the study area are used regularly and by large numbers of greater sandhill cranes (Ivey et al. 2016). Sandhill cranes are omnivores and primarily forage in harvested row crops (grains such as corn) for grains, seeds, and roots, and will opportunistically consume small rodents, birds, and invertebrates (CDFW 1994). The species tends to congregate in small to large flocks, exhibits strong site fidelity to traditional roost sites, and is sensitive to human disturbance Greater sandhill cranes are winter residents in the study area, arriving during early September, reaching maximum densities during December and January and departing during early March.

Greater Sandhill Crane has been observed regularly in the winter in the vicinity of the Study Area, and there are known roost sites within the Study Area. Therefore, Greater Sandhill Crane has a high potential to occur within the Study Area. No take of Greater Sandhill Crane per California Fish and Game Code Section 3511 would occur due to the Proposed Project; however, CEQA considers potential effects beyond direct take of Fully Protected species. Implementation of Mitigation Measures MM BIO-1 and MM BIO-9 would reduce potential impacts to Greater Sandhill Crane to*: Less than Significant with Mitigation Incorporated*

Golden Eagle (*Aquila chrysaetos*)

Golden Eagle is designated as Fully Protected under California Fish and Game Code and protected by the federal Bald and Golden Eagle Protection Act. Golden Eagle is a large eagle that is uniformly dark with golden neck (Kochert et al. 2002). The species is found throughout North America but are more common in western North America. The bird is an uncommon permanent resident and migrant throughout California that lives in open and semi-open country featuring native vegetation where they forage in grasslands, rolling foothills, mountain areas, and desert. Golden Eagle forages for ground squirrels, rabbits, other mammals, and some carrion in open terrain. Nests are built on cliffs adjacent to open habitats, such as grasslands, oak savannas, and open shrublands (Grinnell and Miller 1944) although trees are also used for nesting. Breeding occurs from late January through August (CDFW 1990b).

Golden Eagle is regularly observed foraging and suitable foraging habitat and nest trees exist in the Study Area, however no nesting has been recorded within 1 mile of the Study Area. Therefore, Golden Eagle has a moderate potential to occur within the Study Area. No take of Golden Eagle per California Fish and Game Code Section 3511 would occur due to the Proposed Project; however, CEQA considers potential effects beyond direct take of Fully Protected species. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-6 would reduce impacts to Golden Eagle to: *Less than Significant with Mitigation Incorporated*.

Short-eared Owl (*Asio flammeus*)

Short-eared Owl is a California Species of Special Concern. Short-eared Owl is a medium-sized owl with brown and cream streaked plumage and yellow eyes (Wiggins et al. 2006). The species range includes much of North America; in California, it is patchily distributed throughout the state, including portions of the Sacramento and San Joaquin Valleys, northeastern California, and a few scattered coastal sites (Roberson 2008). Breeding and foraging habitat for Short-eared Owl includes emergent wetland, grasslands, and grassland-like cultivated lands such as pastures and alfalfa fields. Short-eared Owl hunts around dawn and dusk, primarily for small mammals (Fisler 1960, Wiggins et al. 2006). Nests are constructed on dry ground in a depression concealed by vegetation. Breeding occurs from early March through July (CDFW 2005a).

Short-eared Owl has been observed at several locations in the vicinity of the Study Area, and some suitable nesting habitat may be present in wetlands within the Study Area, therefore Short-eared Owl is considered to have a moderate potential to occur. Implementation of Mitigation Measures MM BIO-1 and MM BIO-6 would reduce potential impacts to Short-eared Owl to*: Less than Significant with Mitigation Incorporated.*

Western Burrowing Owl (*Athene cunicularia*)

Western Burrowing Owl is a California Species of Special Concern. Burrowing Owl is a small, ground-dwelling owl with brown and cream plumage and yellow eyes. The species' range extends from Canada to Mexico and is found throughout California except for high elevations (Poulin et al. 2011). It primarily inhabits grasslands with abundant ground squirrel populations, but also occurs in desert and open shrub habitats. Burrowing Owl uses burrows in areas with relatively short vegetation with sparse shrubs or taller vegetation for roosting and nesting and can persist in human-altered landscapes. Individuals in agricultural environments nest along roadsides and water conveyance structures. Breeding occurs from February through September (CDFW 1999a).

Western Burrowing Owl has a high potential to occur within the Study Area, as suitable habitat occurs in many locations and there are several reported

occurrences. Implementation of Mitigation Measures MM BIO-1 and MM BIO-10 would reduce potential impacts to Western Burrowing Owl to*: Less than Significant with Mitigation Incorporated.*

MM BIO-10: Burrowing Owl

To minimize and avoid the potential impacts to Burrowing Owl that may occur within the Study Area, the following general measures will be implemented:

a. In areas with the potential for Burrowing Owl to occur, prior to soil investigation field activities, a qualified biologist will conduct a pre-activity survey. The surveys will establish the presence or absence of Burrowing Owl and/or suitable habitat features and evaluate use by owls in accordance with CDFW survey guidelines (CDFW 1993). For each Impact Area, the biologist will survey the proposed disturbance footprint and a 500-foot radius from the perimeter of the proposed footprint to identify any suitable burrows and owls. Adjacent parcels under different land ownership will not be surveyed. Surveys should take place near sunrise or sunset in accordance with CDFW guidelines. Suitable burrows or Burrowing Owls will be identified and mapped. Surveys will take place no more than 30 days prior to soil investigation field activities. During the breeding season (February 1– August 31), surveys will document whether Burrowing Owls are nesting in or directly adjacent to any Impact Area. During the nonbreeding season (September 1–January 31), surveys will document whether Burrowing Owls are using habitat in or directly adjacent to any disturbance area. Survey results will be valid only for the season (breeding or nonbreeding) during which the survey is conducted.

b. If Burrowing Owls are found during the breeding season (February 1 – August 31), all nest sites that could be disturbed by project activities will be avoided during the remainder of the breeding season or while the nest is occupied by adults or young. Avoidance will include establishment of a non-disturbance buffer zone (described below in parts c and d).

c. Soil investigation activities may occur during the breeding season only if a qualified biologist monitors the nest and determines that the birds have not begun egg-laying and incubation or that the juveniles from the occupied burrows have fledged. During the nonbreeding season (September 1 – January 31) the owls and the burrows they are using should be avoided, if possible. Avoidance will include the establishment of a buffer zone (described below).

d. During the breeding season, buffer zones of at least 250 feet in which no soil investigation activities can occur will be established around each occupied burrow (nest site). Buffer zones of 160 feet will be established

around each burrow being used during the nonbreeding season. The buffers will be delineated by highly visible, temporary fencing or flagging.

Ferruginous Hawk (*Buteo regalis*)

Ferruginous Hawk is a USFWS Bird of Conservation Concern. The species is a large, broad-winged hawk with a large head and pale underparts with rusty legs that form a V when soaring. Ferruginous Hawks range from breeding grounds in southern Canada to wintering grounds in Mexico. They overwinter in California in grasslands and agricultural areas, including sagebrush flats, desert scrub, low foothills surrounding valleys, and fringes of pinyon-juniper habitats. Ferruginous Hawk forages in open, dry grassland habitats (Polite and Pratt 1999, Ng et al. 2017), also in open cultivated lands such as grain and hay crops, recently plowed fields, and pastures. Nesting has not been recorded in California (CDFW 1999b).

Ferruginous Hawk is regularly observed in the winter, suitable foraging habitat is present in the Study Area, and several occurrences have been documented within 0.5 to 3 miles of Impact Areas, however no nesting occurs in California. Therefore, Ferruginous Hawk has a moderate potential to occur within the Study Area. Implementation of Mitigation Measures MM BIO-1 and MM BIO-6 would reduce potential impacts to Ferruginous Hawk to: *Less than Significant with Mitigation Incorporated*.

Swainson's Hawk (*Buteo swainsoni*)

Swainson's Hawk is listed as Threatened under CESA. Swainson's Hawk is a medium-sized hawk with tapered wings that have contrasting light wing lining and dark flight feathers (Bechard et al. 2010). It migrates from Central and South America to breed in western North America, primarily in California and the Great Basin. The Central Valley breeding population largely winters from Mexico to central South America (Hull et al. 2008). Foraging habitat includes hay and alfalfa fields, grassland, pastures, grain crops, and row crops; nesting occurs in mature riparian woodland, roadside or isolated trees near foraging habitat; trees in urban or rural neighborhoods are also used (Estep 1984, Schlorff and Bloom 1984, England et al. 1997). Swainson's Hawk forages in large open habitats, such as hay and alfalfa fields, pastures, grain crops, and row crops primarily for small mammals such as voles, but will opportunistically take invertebrates, small birds, and reptiles. The species is monogamous and exhibits strong site fidelity to nesting territories, occupying the same sites over many years (Hull et al. 2008). Breeding occurs from late March to late August, with peak activity from late May through July (CDFW 2006).

Swainson's Hawk has a high potential to occur within the Study Area, as suitable foraging and nesting habitat occurs in many locations within the Study Area and there are many reported occurrences. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-11 would reduce potential impacts to Swainson's Hawk to*: Less than Significant with Mitigation Incorporated.*

MM BIO-11: Swainson's Hawk

To minimize and avoid the potential impacts to Swainson's Hawk that may occur within the project area, the following general measures will be implemented:

a. If soil investigations field activities will occur during the nesting season (March 15–September 15), a pre-activity survey will be conducted by a qualified biologist within 0.25 mile of Impact Areas following the Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (SWHA Technical Advisory Committee 2000) between 5 days and 72 hours prior to the start of soil investigation activities to identify Swainson's Hawk nests.

b. If active nests are observed within 0.25 mile of an Impact Area, project activities will be limited to outside of the breeding season (March 15 – September 15) or until the nest is determined to be inactive or fledged by a qualified biologist.

c. When soil investigation activities must occur within 0.25 mile of a known or potential nest during nesting season (March 15 – September 15), soil investigation field activities will be initiated prior to egg-laying, if possible. If soil investigation activities must begin after egg-laying, a 650-foot no-activity buffer will be established between an active nest and any soil investigation activities until eggs have hatched. If site-specific conditions or the nature of the project activity (e.g., steep topography, dense vegetation, limited activities) indicate that a smaller buffer could be used, the qualified biologist will determine the appropriate buffer size.

d. If young fledge prior to September 15, soil investigation activities can proceed normally, subject to confirmation by a qualified biologist that the young have fledged from active nest sites. If the active nest site is shielded from view and noise from the project site by other development, topography, or other features, the qualified biologist may determine that project activities can proceed.

e. A qualified biologist with stop-work authority will be present during soil investigation field activities and may halt project activities if the biologist determines that Swainson's Hawks in the vicinity of soil investigation activities are disturbed to the point where nest abandonment is likely. Additional protective measures, as determined by the qualified biologist, will be implemented prior to resuming soil investigation activities.

Mountain Plover (*Charadrius montanus*)

Mountain Plover is a California Species of Special Concern. Mountain Plover is a medium-sized shorebird with brown and cream plumage (Knopf and Wunder 2006). Mountain Plover winters in California from September to March in the Central Valley, San Joaquin Valley foothills, and southern California (Hickey et al. 2003). Suitable habitat for Mountain Plover includes heavily grazed grassland, short hay crops such as alfalfa, freshly tilled fields, and alkali flats (Knopf and Rupert 1995; Hunting and Edson 2008). Nesting has not been recorded in California, but the species is present in the state from September through mid-March (Hunting and Edson 2008).

Mountain Plover is considered to have a low potential to occur within the Study Area due to minimal suitable habitat, no recorded occurrences within four miles of the Study Area, and its lack of breeding in California. Therefore, potential impacts to Mountain Plover would be *less than significant*. Implementation of Mitigation Measure MM BIO-1 would further avoid, minimize and/or reduce the potential for impacts.

Northern Harrier (*Circus hudsonius*)

Northern Harrier is a California species of special concern. Northern Harrier is a medium-sized, slender low-flying raptor with a white rump; males have gray and females have brown plumage (Smith et al. 2011). The species occurs throughout North America and is a year-round resident in California and its breeding range covers northern California, the Central Valley, the central coast, and portions of southern deserts (Davis and Niemela 2008). It uses meadows, grasslands, open rangelands, desert sinks, and fresh and saltwater emergent wetlands for foraging and nesting. Northern Harriers forage for small mammals, reptiles by flying low to the ground. Nests are built on the ground in dense vegetation. Breeding occurs from April to September (CDFW 1990c).

Suitable foraging habitat and nesting habitat for Northern Harrier is present within the Study Area, and there are known occurrences within the Study Area. Therefore, Northern Harrier has a high potential to occur within the Study Area. Implementation of Mitigation Measures MM BIO-1 and MM BIO-6 would reduce potential impacts to Norther Harrier to: *Less than Significant with Mitigation Incorporated*.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

Western Yellow-billed Cuckoo is listed as Threatened under FESA and Endangered under CESA. Western Yellow-billed Cuckoo is a slender bird with brown plumage on its back and white below, long tail with black and white spots, and a curved yellow bill. The species' historical breeding distribution extended throughout western North America, including the Central Valley, where it was considered common (Belding 1890). Currently, the only known populations of breeding Western Yellow-billed Cuckoo are in several disjunct locations in

California, Arizona, and western New Mexico (Halterman 1991; Johnson et al. 2007; Dettling et al. 2015; Stanek 2014; Parametrix Inc. and Southern Sierra Research Station 2015). Western Yellow-billed Cuckoos winter in South America from Venezuela to Argentina (Hughes 2015; Sechrist et al. 2012). The Western Yellow-billed Cuckoo is a riparian obligate species, primarily willow-cottonwood riparian forest, but use other tree species such as white alder (*Alnus rhombifolia*) and box elder (Acer negundo) in some areas, including formerly occupied sites along the Sacramento River (Laymon 1998). Western Yellow-billed Cuckoo is a highly secretive species that forages for insects and requires large insects to feed their nestlings. Nests are primarily in willow (Salix spp.) trees; however, other tree species are occasionally used, including Fremont cottonwood (*Populus fremontii*) and alder. They arrive at California breeding grounds between May and July, but primarily in June (Gaines and Laymon 1984; Hughes 2015; USFWS 2014); breeding occurs in mid-June to August (CDFW 1999c).

Western Yellow-billed Cuckoo is considered to have a low potential to occur within the Study Area due to minimal suitable migratory and nesting habitat. There are known occurrences within the Study Area, but no recorded breeding in the vicinity. Implementation of Mitigation Measures MM BIO-1 and MM BIO-8 would reduce potential impacts to Western Yellow-billed Cuckoo to: *Less than Significant with Mitigation Incorporated*.

White-tailed Kite (*Elanus leucurus*)

White-tailed Kite is designated as Fully Protected under California Fish and Game Code. This medium sized raptor has long wings and tail and gray and white plumage with black wing patches (Dunk 1995). The species is widely distributed in North America; the majority occur in California. Most White-tailed Kites in the Sacramento Valley are found in oak and cottonwood riparian forests, valley oak woodlands, or other groups of trees and are usually associated with compatible foraging habitat consisting large patches of low-growing, herbaceous vegetation (Erichsen et al. 1996). The species forages primarily for small mammals in pasture and hay crops, compatible row and grain crops, and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen 1995). Breeding occurs from February to October in trees with dense canopies (CDFW 2005b).

Suitable foraging habitat and nesting habitat for White-tailed Kite is present within the Study Area, and there are several reported occurrences near Impact Areas. Therefore, White-tailed Kite has a moderate potential to occur within the Study Area. No take of White-tailed Kite per California Fish and Game Code Section 3511 would occur due to the Proposed Project; however, CEQA considers potential effects beyond direct take of Fully Protected species. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-6 would reduce potential impacts to White-tailed Kite to: *Less than Significant with Mitigation Incorporated.*

California Horned Lark (*Eremophila alpestris actia*)

California Horned Lark is a CDFW Watch List species. This songbird has a pale, yellow face and throat, a black bib, pale breast and belly, a broad black stripe under the eye, a black tail with white outer feathers, and black tufts on top of its head resembling horns (Beason 1995). The year-round range of the California Horned Lark encompasses the majority of the state west of the Cascade-Sierra Nevada Crest (CDFW 1990d) The species inhabits open grassland and cultivated lands such as alfalfa, fallow fields, and pastures dominated by sparse, low herbaceous vegetation or widely scattered low shrubs. California Horned Lark forages on seeds and insects and nest in hollows on the ground. Breeding occurs from March through July, with peak activity in May (CDFW 1990d).

California Horned Lark is considered to have a moderate potential to occur within the Study Area due to the presence of suitable habitat and known occurrences within one to two miles of several Impact Areas within Contra Costa County. Implementation of Mitigation Measures MM BIO-1, MM BIO-7 and MM BIO-8 will reduce potential impacts to California Horned Lark to: *Less than Significant with Mitigation Incorporated*.

Yellow-Breasted Chat (*Icteria virens*)

Yellow-breasted Chat is a California Species of Special Concern and a USFWS Bird of Conservation Concern. Yellow-breasted Chat is a medium-sized warbler with a long tail, large head, yellow breast plumage, gray back, and white stripes above and below the eye. The species winters in Mexico and Central America and is patchily distributed across North America south of Canada during breeding season; within the Central Valley, chats are found in the Sacramento-San Joaquin Delta. Habitat includes riparian thickets near water with a dense understory layer, including willow, blackberry, and wild grape (USFWS 2019d). Yellow-breasted Chat forages primarily on spiders and insects but will also take fruits and berries. Nests are built low in dense vegetation and breeding occurs from late April through early August (Comrack 2008).

Yellow-breasted Chat has been observed in riparian thickets and in-channel islands throughout the Sacramento-San Joaquin Delta, thus the species has a high potential to occur within the Study Area. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-8 would reduce impacts to Yellow-breasted Chat to: *Less than Significant with Mitigation Incorporated*.

Merlin (*Falco columbarius*)

Merlin is a California Department of Fish and Wildlife Watch List species (CDFW 1999d). Merlin is a small, dark-colored falcon with sharply pointed wings, broad chest and medium-length tail. This species has a broad geographical range

throughout the northern hemisphere and can be observed in California during the non-breeding season. During migration Merlin use grasslands, open forests, and coastal areas. They winter in similar habitats across the western United States. Breeding occurs in the northern portions of North America (Warkentin et al. 2005).

Suitable foraging habitat for Merlin is present within the Study Area, and there are several reported occurrences near Impact Areas. Therefore, Merlin has a low potential to occur within the Study Area. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-6 would reduce impacts to Merlin to: *Less than Significant with Mitigation Incorporated*.

Prairie Falcon (*Falco mexicanus*)

Prairie Falcon is a California Department of Fish and Wildlife Watch List species (CDFW 2019b). This large pale falcon is brownish above and whitish below with long dark narrow mustache marks (Steenhof 2013). Uncommon throughout western North American, ranging north into southern Canada and south in to Mexico, Prairie Falcons are solitary birds found primarily in open dry habitats including desert, prairies, and grasslands. They nest on cliff ledges and hunt for small mammals, birds and large insects. Nesting occurs from mid-February through mid- September with a peak in April to early August (CDFW 2005c).

Suitable foraging habitat for Prairie Falcon is present within the Study Area, and the species has been observed foraging, however no suitable nesting habitat exists. Therefore, Prairie Falcon has a low potential to occur within the Study Area. Implementation of Mitigation Measures MM BIO-1 and MM BIO-6 would reduce potential impacts to Prairie Falcon to: *Less than Significant with Mitigation Incorporated*.

American Peregrine Falcon (*Falco peregrinus anatum*)

American Peregrine Falcon is delisted from CESA and FESA and is Fully Protected under California Fish and Game Code. Peregrine Falcon is a medium-sized dark gray falcon with dark helmet, pale whitish underparts, and a small, strongly hooked bill. The species has a worldwide range and is found throughout North America; in California it is resident on the coast and far northern and southern reaches of the state and is found in the Central Valley in the winter (White et al. 2002). Peregrine Falcon occurs in a wide variety of habitats, including woodlands and open landscape, near water and nest sites. The species hunts by diving and catching prey in mid-air; it primarily consumes birds, but also will hunt for bats and steal prey from other raptors (White et al. 2002). Nests consist of a scrape or depression on cliffs or human-made structures such as tall buildings. Breeding occurs from March through August (White et al. 2002).

Suitable foraging habitat for American Peregrine Falcon is present within the Study Area, and the species has been observed foraging, however no suitable

nesting habitat exists. Therefore, American Peregrine Falcon has a low potential to occur within the Study Area. No take of American Peregrine Falcon per California Fish and Game Code Section 3511 would occur due to the Proposed Project; however, CEQA considers potential effects beyond direct take of Fully Protected species. Implementation of Mitigation Measures MM BIO-1 and MM BIO-6 would reduce potential impacts to American Peregrine Falcon to: *Less than Significant with Mitigation Incorporated*.

Loggerhead Shrike (*Lanius ludovicianus*)

The Loggerhead Shrike is a California Species of Special Concern and a USFWS Bird of Conservation Concern. Loggerhead Shrike is a medium-sized passerine with gray plumage and a black mask around the eyes and forehead (Yosef 1996). This species is found throughout North America and is a common resident and winter visitor in lowlands and foothills in California. Loggerhead Shrikes use a variety of open grasslands across their range, including grasslands, desert scrub, shrub-steppe, open savannah, irrigated pasture, grain and hay crops, and alkali seasonal wetland (Yosef 1996, Pandolfino and Smith 2011). Loggerhead Shrikes nest in shrubs and trees surrounded by open habitat. Breeding occurs from March through July (CDFW 1990e).

Loggerhead Shrike has a high potential to occur within the Study Area due to the presence of suitable habitat and several recorded occurrences near Impact Areas. implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-8 would reduce potential impacts to Loggerhead Shrike to*: Less than Significant with Mitigation Incorporated.*

California Black Rail (*Laterallus jamaicensis coturniculus*)

California Black Rail is listed as Threatened under CESA, Fully Protected under California Fish and Game Code, and is a USFWS bird of conservation concern. California Black Rail is a small-sized rail with mostly dark gray feathers, a small black bill, red eyes, white-speckled back, belly, and flanks, and chestnut colored nape and upper back. Approximately 80% of the California Black Rail subspecies resides in the San Francisco Bay estuary (Evens et al. 1991), with other populations in the Sacramento-San Joaquin Delta, coastal southern California at Morro Bay, and a few inland locations (Eddleman et al. 1994). The species most commonly occurs in tidal brackish or freshwater emergent wetlands dominated by pickleweed and bulrush and occurs in non-tidal freshwater marsh habitat as well as in immediate vicinity of tidal sloughs. Black rail inhabits shallow and high elevation areas of densely-vegetated wetlands where it consumes a variety of small terrestrial invertebrates. Nests are completely concealed by vegetation in high portions of tidal marshes, shallow freshwater marshes, wet meadows, and flooded grassy vegetation (Eddleman et al. 1994). Breeding occurs from mid-March through June (CDFW 1999e).

California Black Rail is considered to have a moderate potential to occur within the Study Area due to the presence of suitable habitat and several recorded occurrences near Impact Areas. No take of California Black Rail per California Fish and Game Code Section 3511 would occur due to the Proposed Project; however, CEQA considers potential effects beyond direct take of Fully Protected species. Implementation of Mitigation Measures MM BIO-1 and MM BIO-8, would reduce impacts to California Black Rail to: *Less than Significant with Mitigation Incorporated*.

Song Sparrow "Modesto" Population (*Melospiza melodia*)

Song Sparrow "Modesto" population (hereafter referred to as Modesto Song Sparrow), is a California Species of Special Concern. While Song Sparrow ranges widely throughout North America; the Modesto population is endemic to the north-central portion of the Central Valley and is ubiquitous in the Delta (Gardali 2008). Modesto Song Sparrow uses emergent marsh and riparian scrub habitats (Grinnell and Miller 1944), In addition, the species has been observed to nest in valley oak riparian forests with a dense blackberry understory, vegetated irrigation canals and levees, and recently planted Valley Oak restoration sites (Gardali 2008). Breeding occurs from April to August (CDFW 1990f).

Modesto Song Sparrow is considered to have a high potential to occur within the Study Area due to the presence of suitable habitat and many recorded occurrences throughout the Study Area. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-8 would reduce potential impacts to Modesto Song Sparrow to*: Less than Significant with Mitigation Incorporated.*

Osprey (*Pandion haliaetus*)

Osprey is a species on the CDFW Watch List. Osprey is a large raptor with brown back and wings, white underparts, brown line through the eye, and hooked beak. The species' range includes all of North America; in California, it breeds primarily from the Cascade Range to Lake Tahoe and south to Marin County. Their year-round range includes the northern and western portions of the Central Valley (CDFW 1990g). Habitat includes riparian, lakes, coastal Osprey nest in large open forest trees and snags, and on man-made structures in close proximity to open water. Osprey hunt for fish by diving into open water and clasping prey in their talons (Bierregaard et al 2016). Nests are built in large open forest trees and snags, and on man-made structures in close proximity to open water (Bierregaard et al 2016). Breeding takes place from March through September (CDFW 1990g).

Suitable habitat for Osprey is present and the species has been observed foraging within the Study Area. Therefore, Osprey has a high potential to occur within the Study Area. Implementation of Mitigation Measures MM AES-1, MM

BIO-1 and MM BIO-6 would reduce potential impacts to Osprey to: *Less than Significant with Mitigation Incorporated.*

White-faced Ibis (*Plegadis chihi*)

The White-faced Ibis is on the CDFW watch list. White-faced Ibis is a dark wading bird with long decurved bill; breeding adults have metallic bronze plumage with dark green wings. The species' range includes western and central United States and winters in southeastern California, Gulf Coast, and Mexico (Ryder and Manry 1994); in California breeds uncommonly in southern California, and in isolated areas of the Central Valley (CDFW 2005d). White-faced ibis breeds in freshwater emergent and managed wetland habitats (CDFW 2005d) with cattail and bulrush, and also forages in flooded meadows, agricultural fields, and brackish wetlands (Ryder and Manry 1994). The species probes in mud for earthworms and invertebrates and will also forage in shallow water for amphibians and small fish (CDFW 2005d). White-faced Ibis nests colonially in dense emergent vegetation. Breeding occurs May-July (CDFW 2005d).

White-faced Ibis is considered to have a moderate potential to occur within the Study Area due to the presence of suitable habitat and many recorded occurrences throughout the Study Area. Breeding white-faced ibis have been recorded in the Yolo Bypass Wildlife Area but are not expected to breed in the remainder of the Study Area. Implementation of Mitigation Measures MM BIO-1 and MM BIO-8 would reduce potential impacts to White-faced ibis to*: Less than Significant with Mitigation Incorporated.*

Purple Martin (*Progne subis*)

Purple Martin is a California Species of Special Concern. Purple Martin is a large swallow with purple plumage and dark wings; females are duller with some gray plumage. The species breeds primarily in the eastern United States and winters in Mexico to central South America, but it also breeds in coastal Northern California, Sierra Nevada, and isolated locations in the Central Valley (Brown and Tarof 2013). Purple Martin inhabits woodlands, urban parks, and wetlands, often near cities (Airola and Williams 2008). An aerial insectivore, Purple Martin diet consists of a variety of flying insects caught while flying over open areas, including parks, open water, and wetlands. Nests are built in cavities and manmade structures such as bird houses. Breeding occurs between May and mid-August (Airola and Williams 2008).

Purple Martin is considered to have a low potential to occur within the Study Area due to minimal suitable nesting habitat and rare occurrences in the vicinity of the Study Area. Implementation of Mitigation Measures MM BIO-1 and MM BIO-8 would reduce potential impacts to Purple Martin to: *Less than Significant with Mitigation Incorporated*.

Bank Swallow (*Riparia riparia*)

The Bank Swallow is listed as Threatened under CESA. It is a small brown and white songbird with a small bill, long wings, and a dark breastband contrasting with a white chin and belly (Garrison 1999). This species is a neotropical migrant that breeds across North America, Europe, and Asia and winter in Central and South America and Africa (Garrison 1999). Approximately 70 - 90 % of the breeding population in California is dependent on habitats which occur along the Sacramento and Feather Rivers (Humphrey and Garrison 1986, Garrison et al. 1987, CDFW 1992). Breeding habitat includes riparian, lacustrine, and coastal areas with vertical banks, bluffs, cliffs, and occasionally sand quarries, with fine-textured or sandy soils (Garrison et al. 1987, Bank Swallow Technical Advisory Committee 2013). The species is dependent on bank erosion from high winter river flows to create suitable burrow substrate (Garrison 1999, Garrison 2004, Moffat et al. 2005). Bank Swallow forages predominantly over open riparian areas but also over brushland, grassland, wetlands, water, and cropland. Bank Swallow nests in colonies ranging in size from 3 to over 3,000 nest burrows, with nests placed in burrows dug into vertical banks (Bank Swallow Technical Advisory Committee 2013). Breeding occurs from April through June (CDFW 1999f).

Bank Swallow has a low potential to occur within the Study Area due to no suitable nesting habitat present in the Study Area, although the species has been observed foraging in the vicinity. Implementation of Mitigation Measure MM BIO-1 would reduce potential impacts to Bank Swallow to: *Less than Significant with Mitigation Incorporated*.

Yellow Warbler (*Setophaga petechia*)

Yellow Warbler is a California Species of Special Concern and a USFWS Bird of Conservation Concern. Yellow Warbler is a small, bright yellow bird with yellow-green back, round head and beady black eyes; males have chestnut streaks on the breast. The species is a Neotropical migrant that breeds throughout the northern portions of North America, extending into southern mountain ranges; the species historically occurred throughout California, but is now largely restricted to the coast and Sierra Nevada (Heath 2008). Yellow Warbler is a riparian obligate species that uses willow shrubs and thickets, and other riparian plants including cottonwoods, sycamores, ash, and alders. The species was once a common breeder in the Central Valley, but is largely extirpated in the Sacramento Valley, the Delta and San Joaquin Valley because of widespread habitat loss (Riparian Habitat Joint Venture 2004, Grinnell and Miller 1944). Recent breeding south of the Study Area on the San Joaquin River National Wildlife Refuge is largely attributed to riparian habitat restoration (Dettling et al. 2012). Yellow Warblers consume insect prey by gleaning along slender branches and leaves of shrubs and small trees. The species is territorial; males sing from perches at the top of

vegetation and will defend their territories from many species. Nesting occurs during June and July (Lowther et al. 1999).

Yellow Warbler has a moderate potential to occur within the Study Area. Breeding is limited in the Central Valley in recent history, but the species has been observed in the Study Area during migration (Trochet et al. 2017). Implementation of Mitigation Measures MM AES-1 and MM BIO-1 and MM BIO-8 would reduce potential impacts to Yellow Warbler to: *Less than Significant with Mitigation Incorporated.*

California Least Tern (*Sternula antillarum browni*)

California Least Tern is listed as Endangered under CESA and FESA and is designated as Fully Protected under California Fish and Game Code. Least Tern is a small tern with narrow pointed wings, black crown, and white forehead. The historical breeding range of the California Least Tern extends along the Pacific Coast from approximately Moss Landing to the southern tip of Baja California (Grinnell and Miller 1944). However, since about 1970, colonies have been reported north to San Francisco Bay (USFWS 2006a). California Least Terns nest in loose colonies on barren or sparsely vegetated sandy or gravelly substrates above the high tide line along the coastline and in lagoons and bays of the California coast. Colonies occur near water that provides opportunities to forage for fish in shallow estuaries or lagoons (Thompson et al. 1997, CDFW 2005e, USFWS 2006a). Breeding occurs from mid-May through August (Massey and Atwood 1981, CDFW 2005e).

California Least Tern has a low potential to occur within the Study Area. No suitable nesting habitat and no known nesting colonies are located within the Study Area, and foraging birds are rarely observed in the vicinity. No take of California Least Tern per California Fish and Game Code Section 3511 would occur due to the Proposed Project; however, CEQA considers potential effects beyond direct take of Fully Protected species. Implementation of Mitigation Measure MM BIO-1 would reduce potential impacts to California Least Tern to: *Less than Significant with Mitigation Incorporated*.

Least Bell's Vireo (*Vireo bellii pusillus*)

Least Bell's Vireo is listed as Endangered under FESA and CESA. Least Bell's vireo is a small, drab songbird with brownish-gray plumage and two pale wingbars. The species' historical distribution extended from coastal southern California through the San Joaquin and Sacramento Valleys as far north as Tehama County near Red Bluff (Kus 2002). The current breeding range is restricted to southern California, primarily San Diego County; however, recent nesting events at the San Joaquin River National Wildlife Refuge, along Putah Creek in Yolo Bypass, and Bradford Island in the central Delta indicate the species is attempting to recolonize the Central Valley. Least Bell's Vireo typically breeds in willow riparian forest supporting a dense, shrubby understory of

mulefat (*Baccharis salicifolius*) and other mesic species (Goldwasser 1981; Gray and Greaves 1981; Franzreb 1989). Oak woodland with a willow riparian understory is also used in some areas (Gray and Greaves, 1981), and individuals sometimes enter adjacent chaparral, coastal sage scrub, or desert scrub habitats to forage (Kus et al 2010). Foraging occurs most frequently in willows (Salata 1983; USFWS 1998a) but occurs on a wide range of riparian species and even some nonriparian plants that may host relatively large proportions of large prey (USFWS 1998a). Least Bell's Vireos are insectivorous and prey on a wide variety of insects, including bugs, beetles, grasshoppers, moths, and especially caterpillars (Chapin 1925; Bent 1950). Breeding occurs between April and August, with peak egg laying in May to early June (CDFW 1990h).

Least Bell's Vireo has a moderate potential to occur within the Study Area due to the presence of suitable nesting habitat in the Study Area, and recent observations of the species in the Yolo Bypass Wildlife Area and Bradford Island during breeding season. Implementation of Mitigation Measures MM AES-1, MM BIO-1 and MM BIO-8 would reduce potential impacts to Least Bell's Vireo to*: Less than Significant with Mitigation Incorporated.*

Yellow-Headed Blackbird (*Xanthocephalus xanthocephalus*)

Yellow-Headed Blackbird is a California species of special concern. Yellow-Headed Blackbird is a large blackbird with large head and long conical bill; males have a bright yellow head and breast and glossy black body and females are brown with dull yellow head and breast. The species' range includes western and central North America; in California it is found in northeastern California, Central Valley, Imperial Valley, and Colorado River Valley (Jaramillo 2008). Yellow-Headed Blackbird breeding habitat includes freshwater emergent wetlands, while associated foraging habitat includes irrigated pastures and alfalfa fields (Twedt and Crawford 1995, Jamarillo 2008). The species forages primarily for seeds and some insects; during breeding season insects are the primary prey (Jaramillo 2008). Nests are constructed in tall emergent vegetation in open areas over relatively deep water (Orians and Willson 1964). Breeding occurs from mid-April through late July (Twedt and Crawford 1995).

Yellow-Headed Blackbird has a moderate potential to occur within the Study Area due to the presence of suitable foraging habitat and minimal suitable nesting habitat in the Study Area. Implementation of Mitigation Measures MM BIO-1 and MM BIO-8 would reduce potential impacts to Yellow-Headed Blackbird to*: Less than Significant with Mitigation Incorporated.*

Antioch Dunes anthicid beetle (*Anthicus antiochensis*)

Antioch Dunes anthicid beetle has a NatureServe ranking of G1S1 and is included on CDFW's Special Animals List but is not listed under FESA or CESA. This species is a 4.7-5.4 mm long terrestrial beetle that resembles an ant in appearance. It is endemic to California, and it has been detected at Antioch

Dunes in Contra Costa County as well as several sites along the Sacramento River in Glenn, Tehama, Shasta, and Solano counties, and one site at Nicolas on the Feather River in Sutter County. It typically occurs on interior sand dunes and sand bars (CDFW 2019c). Antioch Dunes anthicid beetles are thought to be microscavengers, feeding on dead insects and soil fungi at night and remaining inactive in burrows during the day. Adults overwinter and emerge in the spring to lay eggs. A second generation of adults emerge in early summer (CDFW 2019c).

Antioch Dunes anthicid beetle has the potential to occur in the Study Area; however, this potential is low because suitable habitat is highly localized and there are few known occurrences. Implementation of Mitigation Measure MM BIO-1, which would avoid and minimize adverse impacts to suitable habitat, would reduce potential impacts to Antioch Dunes anthicid beetle and suitable habitat to: L*ess than Significant with Mitigation Incorporated.*

Sacramento anthicid beetle (*Anthicus sacramento*)

Sacramento anthicid beetle has a NatureServe ranking of G1S1 and is included on CDFW's Special Animals List but is not listed under FESA or CESA. This species is a 3.18-3.63 mm long terrestrial beetle that resembles an ant in appearance. It is endemic to California, and it has been detected in several locations along the Sacramento and San Joaquin Rivers from Shasta to San Joaquin counties, and one site at Nicolas on the Feather River in Sutter County. It typically occurs in interior sand dunes and sand bars, as well as in dredge spoil heaps (CDFW 2019c). Like other species in its genus, Sacramento anthicid beetles are thought to be microscavengers, feeding on dead insects and soil fungi. Adults are most commonly collected in June, July, and August, likely with two generations produced each year (CDFW 2019c).

Sacramento anthicid beetle has the potential to occur in the Study Area; however, this potential is low because suitable habitat is highly localized and there are few known occurrences. Implementation of Mitigation Measure MM BIO-1, which would avoid and minimize adverse impacts to suitable habitat, would reduce potential impacts to Sacramento anthicid beetle to: L*ess than Significant with Mitigation Incorporated.*

Crotch bumble bee (*Bombus crotchii*)

Crotch bumble bee has a NatureServe ranking of G2G3S3 and is included on CDFW's Special Animals List but is not listed under FESA or CESA. This species is a generalist, colonial nesting bee. The current range of this species in California is from coastal California to the Sierra-Cascade Crest. Habitat for this species is not specific because the food plant genera used by obscure bumble bee (*Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia, and Eriogonum*) are widely distributed in different habitats. Like most other species of bumble bees, Crotch bumble bees typically nest in underground cavities such as

animal burrows, though nests have also been reported from above-ground structures that provide suitable cavities. Colonies are established by mated queens who produce female workers to forage for pollen and nectar, defend the colony, and feed developing larvae, with individual colonies remaining active for only one season (Koch et al. 2012).

Crotch bumble bee has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measure MM BIO-1, which would avoid and minimize adverse impacts to suitable habitat, would reduce potential impacts to Crotch bumble bee to: L*ess than Significant with Mitigation Incorporated.*

Western bumble bee (*Bombus occidentalis*)

Western bumblebee has a NatureServe ranking of G4S1 and is included on CDFW's Special Animals List but is not listed under FESA or CESA. This species is a generalist, colonial nesting bee. The known range of this species extends throughout California, though populations from Central California to the northern border have declined sharply since the late 1990's, particularly from lower elevation sites. The habitat for this species varies widely and includes open grassy areas, urban parks and gardens, chaparral and scrub lands, and mountain meadows. Like most other species of bumblebees, western bumblebees typically nest in underground cavities such as animal burrows, though nests have also been reported from above-ground structures that provide suitable cavities. Colonies are established by mated queens who produce female workers to forage for pollen and nectar, defend the colony, and feed developing larvae. Within California, the flight period for western bumblebee is from early February to late November, with individual colonies remaining active for only one season (Hatfield et al. 2015).

Western bumble bee has high potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measure MM BIO-1 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to western bumble bee to: L*ess than Significant with Mitigation Incorporated.*

Conservancy fairy shrimp (*Branchinecta conservatio*)

Conservancy fairy shrimp is listed as Endangered under FESA but not listed under CESA, and has a NatureServe ranking of G2S2. This species is a 1.3 to 2.5 cm short-lived aquatic crustacean found in ephemeral freshwater habitats. It is endemic to California, and its known range is limited to the Central Valley, with the exception of one occurrence in Ventura County. Conservancy fairy shrimp are found in vernal pools; generally large, turbid playa pools that may be inundated well into the summer (USFWS 2007a). Conservancy fairy shrimp hatch from cysts that remain in the soil until the first winter rains and complete their lifecycle by early summer when warm water temperatures and drying

conditions render the habitat unsuitable. Cysts are shed by mated females and remain in the soil until the following winter (USFWS 2017a). Conservancy fairy shrimp require an average of 49 days to reach maturity and are known to survive in temperatures ranging from 41 to 75 degrees Fahrenheit (Eriksen and Belk, 1999).

Conservancy fairy shrimp has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to Conservancy fairy shrimp to: L*ess than Significant with Mitigation Incorporated.*

MM BIO-12: Vernal Pool Species

a. All ground disturbing activities (boring, CPT, or vegetation removal) shall be located at least 100 feet from a vernal pool to avoid impacts to sensitive vernal pool invertebrates.

b. No project activities shall take place within an area identified as vernal pool complex, as determined by a qualified biologist, when wet soil conditions would increase the likelihood of vehicle traffic or other activities altering the site topography.

Longhorn fairy shrimp (*Branchinecta longiantenna*)

Longhorn fairy shrimp is listed as Endangered under FESA but is not listed under CESA. It has a NatureServe ranking of G2S2 and is included on CDFW's Special Animals List. This species is a 1.3 to 2 cm short-lived aquatic crustacean found in ephemeral freshwater habitats. It is endemic to California, and its known range is limited to four areas within and adjacent to the following locations: Carrizo Plain National Monument in San Luis Obispo County, San Luis National Wildlife Refuge Complex in Merced County, Brushy Peak Preserve in Alameda County, and Vasco Caves Preserve in Contra Costa County (USFWS 2007b). Longhorn fairy shrimp are found in vernal pools which may be clear or turbid. They have been found in clearwater depressions in sandstone outcroppings, grass-bottomed pools, and claypan pools. Like other fairy shrimp, longhorn fairy shrimp hatch from desiccated cysts that remain in the soil until the first winter rains and complete their lifecycle by early summer. Cysts are shed by mated females and remain in the soil until the following winter (USFWS 2017b). Longhorn fairy shrimp mature in approximately 43 days and are known to survive in temperatures ranging from 50 to 82 degrees Fahrenheit (Erickson and Belk 1999).

Longhorn fairy shrimp has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts

to suitable habitat and would reduce potential impacts to longhorn fairy shrimp to: L*ess than Significant with Mitigation Incorporated.*

Vernal pool fairy shrimp (*Branchinecta lynchi*)

Vernal pool fairy shrimp is listed as Threatened under FESA but is not listed under CESA. It has a NatureServe ranking of G3S3 and is included on CDFW's Special Animals List. This species is a 0.12 to 1.5-inch short-lived aquatic crustacean found in ephemeral freshwater habitats. The current range in California includes the Central Valley, Coast Ranges, and disjunct locations in Riverside County. Vernal pool fairy shrimp are found in a variety of vernal pool habitat types, ranging from small, clear sandstone pools to large turbid, alkaline pools. It is most frequently found in pools measuring less than 0.05 acres but has been found in pools exceeding 25 acres. Like other fairy shrimp, vernal pool fairy shrimp hatch from desiccated cysts that remain in the soil until the first winter rains and complete their lifecycle by early summer. Cysts are shed by mated females and remain in the soil until the following winter. Individuals hatch in water temperatures of 50 degrees Fahrenheit or lower and reach maturity approximately 40 days later depending on temperature (USFWS 2007c). The upper temperature tolerance for this species is approximately 75 degrees Fahrenheit (Erickson and Belk 1999). Threats to this species include habitat loss and fragmentation due to urbanization, agricultural conversion, and mining.

Vernal pool fairy shrimp has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to vernal pool fairy shrimp to: L*ess than Significant with Mitigation Incorporated.*

Midvalley fairy shrimp (*Branchinecta mesovallensis*)

Midvalley fairy shrimp has a NatureServe ranking of G2S2S3 and is included on CDFW's Special Animals List but is not listed under FESA or CESA. This species is a 7 to 20 mm short-lived aquatic crustacean found in ephemeral freshwater habitats. It is endemic to California, and its known range is limited to the Central Valley. Midvalley fairy shrimp are found in vernal pools; primarily small, short-lived pools and grass-bottomed swales that are less than 10 cm in depth. This species has been found in relatively alkaline pools, but its tolerance range for variations in water chemistry are not well known. Like other fairy shrimp, this species hatch from cysts that remain in the soil until the first winter rains; however, they mature comparatively quickly, in as little as 8 days (CDFW 2019c). This species is unusually tolerant of warm water temperatures of at least 90 degrees Fahrenheit and potentially higher, which helps them survive when the water in their typically small, shallow pools heats up (Erickson and Belk 1999).

Midvalley fairy shrimp has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation

Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to midvalley fairy shrimp to: L*ess than Significant with Mitigation Incorporated.*

Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)

Valley elderberry longhorn beetle is listed as Threatened under FESA but is not listed under CESA. It has a NatureServe ranking of G3T2S2 and is included on CDFW's Special Animals List. This species is a terrestrial, wood-boring beetle whose larvae feed exclusively on elderberry (*Sambucus* sp.). It is endemic to California, and its known range extends through the Central Valley. It typically occurs in riparian or other habitat that supports its elderberry host plants, typically below 500 feet in elevation. Adult beetles emerge in spring and summer and lay eggs on the elderberry leaves. Upon hatching, larvae bore into the stems and create feeding galleries in the pith, where they will reside for several months. Prior to pupation, the larva creates an exit hole, then returns to the gallery where it pupates. The adult beetle will then emerge approximately one month later. Threats to the species include agricultural conversion, urban development, stream channelization, and channel hardening, which eliminate habitat for the host plant (USFWS 2017).

Valley elderberry longhorn beetle has high potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measure MM BIO-13 would reduce potential impacts to valley elderberry longhorn beetle to: *Less than Significant with Mitigation*.

MM BIO-13: Valley Elderberry Longhorn Beetle

To minimize and avoid the potential impacts to Valley Elderberry Longhorn Beetle (VELB) that may occur within the project area, the following measures will be implemented:

a. When feasible, project activities shall be sited at least 50 meters from elderberry shrubs with stem diameter greater than 1-inch.

b. If activities must be conducted within 50 meters of an elderberry shrub, the following measures will apply:

   i. activities will be conducted outside of VELB flight season (March 1-July 31);

   ii. a biological monitor will be present to monitor all project activities at the site;

   iii. all ground disturbing activities (boring, CPT, or vegetation removal) will be located at least 6 meters from the dripline of the elderberry shrub;

and high visibility fencing or flagging will be installed to delineate the 6-meter avoidance buffer.

Ricksecker's water scavenger beetle (*Hydrochara ricksecker*i)

Ricksecker's water scavenger beetle has a NatureServe ranking of G2S2 and is included on CDFW's Special Animals List but is not listed under FESA or CESA. This species is an aquatic beetle typically known from shallow water habitats. It is endemic to California, and it has been detected in Lake, Marin, Placer, Sacramento, San Joaquin, San Mateo, Solano, and Sonoma counties. Specific habitat requirements for this species are not known but may include a variety of aquatic habitats including artificial ponds. Both adults and larvae of this species are aquatic (NatureServe 2019a).

Ricksecker's water scavenger beetle has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to Ricksecker's water scavenger to: L*ess than Significant with Mitigation Incorporated.*

Curved-foot hygrotus diving beetle (*Hygrotus curvipes*)

Curved-foot hygrotus diving beetle has a NatureServe ranking of G1S1 and is included on CDFW's Special Animals List but is not listed under FESA or CESA. This species is a predaceous diving beetle known only from Alameda and Contra Costa counties (NatureServe 2019b). Specific habitat requirements and life history for this species are not known, although like other beetles in the family, both larvae and adults are predators of other aquatic organisms.

Curved-foot hygrotus diving beetle has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to curved-foot hygrotus diving beetle to: *Less than Significant with Mitigation Incorporated.*

Vernal pool tadpole shrimp (*Lepidurus packardi*)

Vernal pool tadpole shrimp is listed as Endangered under FESA but is not listed under CESA. It has a NatureServe ranking of G4S3S4 and is included on CDFW's Special Animals List. This species is a 0.6 to 3.3-inch aquatic crustacean with a shield-like carapace, found in ephemeral freshwater habitats. It is endemic to California, and is patchily distributed throughout the Central Valley, from Shasta County to Tulare County, with isolated occurrences in Alameda and Contra Costa counties. It typically occurs in vernal pools containing clear to highly turbid water. They feed on both living organisms, such as fairy shrimp, as well as detritus. The vernal pool tadpole shrimp produces

cysts that lie buried in the soil until winter rains trigger hatching. Individuals reach maturity in 3 to 4 weeks, at approximately 0.4 inches or more in carapace length. Multiple hatchings within a single wet season allow the vernal pool tadpole shrimp to persist within pools as long as the habitat remains inundated, though hatching rates become significantly lower once water temperatures reach 68 degrees Fahrenheit (USFWS 2007d).

Vernal pool tadpole shrimp has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to vernal pool tadpole shrimp to: L*ess than Significant with Mitigation Incorporated.*

California linderiella (*Linderiella occidentalis*)

California linderiella has a NatureServe ranking of G2G3S2S3 and is included on CDFW's Special Animals List but is not listed under FESA or CESA. This species is a 9 to 10 mm long, short-lived aquatic crustacean found in ephemeral freshwater habitats. It is endemic to California, and its known range is limited to the Central Valley. It occurs in vernal pools that vary widely in size but are generally found in deeper pools with clear to turbid water. California fairy shrimp are the longest-lived fairy shrimp species in the Central Valley, having been observed to live up to 168 days, and requiring a minimum of 31 days to reach maturity. They are also highly tolerant of high water temperatures and have been found in pools ranging from 41 to 85 degrees Fahrenheit. This species frequently co-occurs with vernal pool fairy shrimp and is usually numerically dominant (CDFW 2019c).

California linderiella has moderate potential to occur within the Study Area based on the presence of suitable habitat. Implementation of Mitigation Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to California linderiella to: L*ess than Significant with Mitigation Incorporated.*

Molestan blister beetle (*Lytta molesta*)

Molestan blister beetle has a NatureServe ranking of G2S2 and is included on CDFW's Special Animals list but is not listed under FESA or CESA. This species is a ground nesting beetle that feeds on flowers. It is endemic to California, and its current known range includes the Central Valley. The species occurs in grasslands and vernal pools. Very little is known about the life history or behavior of this species. Other species in the genus Lytta oviposit in the underground nests of solitary bees, where their larvae consume pollen stores, and sometimes bee larvae. It has been collected from early April through early July (CDFW 2019c).

Molestan blister beetle has the potential to occur in the Study Area; however, this potential is low because the closest known occurrence of this species is

approximately 5 miles from any of the Impact Sites. Implementation of Mitigation Measures MM BIO-1 and MM BIO-12 would avoid and minimize adverse impacts to suitable habitat and would reduce potential impacts to molestan blister beetle to: L*ess than Significant with Mitigation Incorporated.*

Green Sturgeon (*Acipenser medirostris*)

There are two DPSs of North American green sturgeon: the Northern DPS, which includes fish spawned in the Eel River and northward; and the Southern DPS, which includes all fish spawned south of the Eel River. The Northern DPS currently spawns in the Klamath River in California and the Rogue River in Oregon, and is listed as a Species of Concern (NMFS 2004). Only the Southern DPS, which is listed as a threatened species under FESA, is found in the Delta and the Sacramento River and its tributaries.

In its final rule to list the Southern DPS as threatened (NMFS 2006a), NMFS cited threats as concentration of the only known spawning population into a single river (Sacramento River), loss of historical spawning habitat, mounting threats with regard to maintenance of habitat quality and quantity in the Delta and Sacramento River, and an indication of declining abundance based upon salvage data at the State and Federal salvage facilities. Included in the listing are green sturgeon originating from the Sacramento River basin, including the spawning population in the Sacramento River and green sturgeon living in the Sacramento River, the Delta, and the San Francisco Estuary.

Adult North American green sturgeon are believed to spawn every 3 to 5 years, but can spawn as frequently as every 2 years (NMFS 2005a) and reach sexual maturity at an age of 15 to 20 years, with males maturing earlier than females. Adult Green Sturgeon enter San Francisco Bay in late winter through early spring and migrate to spawning areas in the Sacramento River primarily from late February through April. Spawning primarily occurs April through late July although late summer and early fall spawning may also occur based on the presence of larvae in the fall (Heublein et al. 2017). Historical and recent information confirms that both green and white sturgeons occasionally range into the Feather, Yuba, and Bear rivers but numbers are low (Beamesderfer et al. 2004). It is unknown whether green sturgeon historically spawned in the Feather River either downstream or upstream of Oroville Dam or the Thermalito Afterbay outlet. Spawning is suspected to have occurred in the past due to the continued presence of adult green sturgeon in the river below Fish Barrier Dam. This continued presence of adults below the dam suggests that fish are trying to migrate to upstream spawning areas now blocked by the dam, which was constructed in 1968.

Little is known about rearing, migratory behavior, and general emigration patterns of juvenile Southern DPS Green Sturgeon. Based on captures of juveniles in the Sacramento River near Red Bluff, it is likely that juveniles rear near spawning habitat for a few months or more before migrating to the Delta (Heublein et al. 2017). Juvenile green sturgeon continue to exhibit nocturnal behavior beyond the

metamorphosis from larval to juvenile stages. After approximately 10 days, larvae begin feeding and growing rapidly, and young green sturgeon appear to rear for the first 1 to 2 months in the upper Sacramento River between Keswick Dam and Hamilton City (CDFW 2002). Length measurements estimate juveniles to be 2 weeks old (24 to 34 millimeters [0.95 to 1.34 inch] fork length) when they are captured at the Red Bluff Diversion Dam (CDFW 2002; USFWS 2002), and three weeks old when captured further downstream at the Glenn-Colusa facility (Van Eenennaam et al. 2001). Growth is rapid as juveniles reach up to 30 centimeters (11.8 inches) the first year and over 60 centimeters (24 inches) in the first 2 to 3 years (Nakamoto et al. 1995). Juveniles spend 1 to 4 years in freshwater and estuarine habitats before they enter the ocean (Nakamoto et al. 1995). According to Heublein et al. (2009), in 2006 all tagged adult green sturgeon emigrated from the Sacramento River prior to September. Lindley et al. (2008) found frequent large-scale migrations of green sturgeon along the Pacific Coast. Kelly et al. (2007) reported that green sturgeon enter the San Francisco Estuary during the spring and remain until fall. Juvenile and adult green sturgeon enter coastal marine waters after making significant long-distance migrations with distinct directionality thought to be related to resource availability.

Overall, designated in-water work windows would reduce exposure of sensitive fish species and life stages to in-water work activities. The activities of the Proposed Project would be minor in scope and would not result in degradation of aquatic habitat or water quality conditions and any potential effects related to potential increase in suspended sediment concentrations and contaminants due to disturbance of the river bed would be negligible. Implementation of Mitigation Measures MM BIO-14, along with MM HYD-1 and MM HAZ-1 through 4 would reduce potential impacts to green sturgeon to: *Less than Significant with Mitigation Incorporated*.

MM-BIO-14: General Fish

> Over-water activities will be limited to only being conducted during the fish window (August 1 – October 31) to avoid impacts to sensitive fish species that have the potential to occur in the Study Area.

Delta Smelt (*Hypomesus transpacificus*)

Delta Smelt is listed as a threatened species under the FESA and was listed as a threatened species under the CESA in 1993. In 2009, Delta Smelt was reclassified as an endangered species under the CESA. The 2010 5-year status review recommended up-listing Delta Smelt from threatened to endangered status under the FESA (USFWS 2010a). However, as of the time of this writing, Delta Smelt remain listed as threatened under the FESA.

Delta Smelt are endemic to the San Francisco Estuary, found nowhere else in the world (Bennett 2005). The Delta functions as a migratory corridor, as rearing habitat, and as spawning habitat for Delta Smelt. Overall, the Delta Smelt life

cycle is completed in the brackish and tidal freshwater reaches of the upper San Francisco Estuary. In addition, a freshwater resident life history type was found by Bush (2017), which primarily occurs in the Cache Slough region year-round (Sommer et al. 2011). Salinity requirements vary by life stage. Apart from spawning and egg-embryo development, the distribution and movements of all life stages are influenced by transport processes associated with water flows in the estuary, which also affect the quality and location of suitable open water habitat (Dege and Brown 2004; Feyrer et al. 2007; Nobriga et al. 2008). Delta Smelt are weakly anadromous and undergo a spawning migration from the low salinity zone (LSZ; 1–6 parts per thousand [ppt]) to freshwater in most years (Grimaldo et al. 2009; Sommer et al. 2011). Most of the later life-stage Delta smelt captured during the FMWT were collected in the 1 to 5 ppt salinity zone (Kimmerer et al. 2013). Spawning migrations occur between late December and late February, typically during “first flush” periods when inflow and turbidity increase on the Sacramento and San Joaquin Rivers (Grimaldo et al. 2009, Sommer et al. 2011). Adult smelt do not spawn immediately after migration to freshwater but appear to stage in upstream habitats (Sommer et al. 2011). Spawning primarily occurs during April through mid-May (Moyle 2002). There are a wide range of perspectives in the scientific literature regarding the extent to which the spatial distribution of Delta Smelt co-varies with X2 with more recent data and analyses suggesting factors other than X2 explain the distribution of the species (Murphy and Hamilton 2013; Manly et al. 2015; Latour 2016; Polanksy et al. 2018, Murphy and Weiland 2019). Dege and Brown (2004) found that larvae less than 20 mm rear 3–12 miles (5–20 km) upstream of X2 (Dege and Brown 2004; Sommer and Mejia 2013). As larvae grow and water temperatures increase in the Delta (~73°F [23 °C]), their distribution shifts towards the low salinity zone (Dege and Brown 2004; Nobriga et al. 2008). By fall, the centroid of Delta Smelt distribution is tightly coupled with X2 (Sommer et al. 2011; Sommer and Mejia 2013). While salinity is generally seen as a key driver of Delta smelt distribution, more recent research suggests other factors, such as water velocity (Bever et al. 2016), may be an important predictor of Delta smelt presence. Similarly, Murphy and Weiland (2019) demonstrate salinity alone may not be the best predictor of Delta smelt abundance and distribution.

Overall, designated in-water work windows would reduce exposure of sensitive fish species, including Delta smelt, and life stages to in-water work activities. The activities of the Proposed Project would be minor in scope and would not result in degradation of aquatic habitat or water quality conditions and any potential effects related to potential increase in suspended sediment concentrations and contaminants due to disturbance of the river bed would be negligible. Implementation of Mitigation Measures MM BIO-14, along with MM HYD-1 and MM HAZ-1 through 4 would reduce potential impacts to Delta Smelt to: *Less than Significant with Mitigation Incorporated*.

Steelhead – Central Valley DPS (*Oncorhynchus mykiss irideus pop. 11*)

The CCV steelhead evolutionarily significant unit (ESU) was listed as a threatened species under FESA on March 19, 1998 (USFWS 1998b). In addition, the species is also listed as threatened under the CESA. On November 4, 2005, the National Marine Fisheries Service (NMFS) proposed that all west coast steelhead be reclassified from ESUs to Distinct Population Segments (DPSs) and proposed to retain CCV steelhead as threatened (NMFS 2005b). On January 5, 2006, after reviewing the best available scientific and commercial information in a status review (Good et al. 2005), National Marine Fisheries Service (NMFS) issued its final rule to retain the status of CCV steelhead as threatened and applied its hatchery listing policy to include the Coleman National Fish Hatchery and Feather River Hatchery steelhead programs as part of the DPS (NMFS 2006b).

In its latest 5-year status review, NMFS determined that the CCV steelhead DPS should remain classified as threatened. While various habitat restoration efforts, such as those in Clear Creek, appear to be benefitting CCV steelhead, the concerns raised in the previous status reviews remain. These concerns include low adult abundances, loss of spawning and rearing habitat, and a higher proportion of hatchery produced fish. As such, CCV steelhead remain listed as threatened and are likely to become endangered within the foreseeable future throughout all or a significant portion of its range. In addition, based on new genetic evidence by Pearse and Garza (2015), NMFS recommended that steelhead originating from the Mokelumne River Hatchery be added to the CCV steelhead DPS, as Feather River Hatchery fish are considered to be a native Central Valley stock and are listed as part of the DPS (NMFS 2016a).

Steelhead have two life history types: stream-maturing and ocean-maturing. Stream-maturing steelhead enter fresh water in a sexually immature condition and require several months to mature before spawning, whereas ocean-maturing steelhead enter fresh water with mature gonads and spawn shortly after river entry. A variation of the two forms occurs in the Central Valley and primarily migrates into the system in the fall, then holds in suitable habitat until spawning during the winter and early spring (McEwan and Jackson 1996). Peak immigration seems to have occurred historically in the fall from late September to late October (Hallock 1989), with peak spawning typically occurring January through March (Hallock et al. 1961; McEwan and Jackson 1996). Unlike Pacific salmon, steelhead are capable of spawning more than once before death (Busby et al. 1996). Most juvenile steelhead spend two years rearing, although some spending less and a very few spending more (Hallock et al. 1961). Central Valley steelhead typically spend two years in the ocean before returning to their natal stream to spawn. About 70% of CCV steelhead spend 2 years within their natal streams before migrating out of the Sacramento-San Joaquin system as smolts, with small percentages (29%) and (1%) spending 1 or 3 years, respectively (Hallock et al. 1961). Juvenile steelhead smolts emigrate primarily from natal streams in response to the first heavy runoff in the late winter through spring (Hallock et al. 1961). Emigrating CCV steelhead use the lower reaches of the Sacramento and San Joaquin Rivers and the Delta as a migration corridor to the

ocean. Nobriga and Cadrett (2001) verified these temporal findings (spring migration) based on analysis of captures in USFWS salmon monitoring conducted near Chipps Island.

Overall, designated in-water work windows would reduce exposure of sensitive fish species and life stages to in-water work activities. The activities of the Proposed Project would be minor in scope and would not result in degradation of aquatic habitat or water quality conditions and any potential effects related to potential increase in suspended sediment concentrations and contaminants due to disturbance of the river bed would be negligible. Implementation of Mitigation Measures MM BIO-14, along with MM HYD-1 and MM HAZ-1 through 4 would reduce potential impacts to steelhead to: *Less than Significant with Mitigation Incorporated*.

Chinook Salmon – Central Valley Spring-run ESU (*Oncorhynchus tshawytscha*)

The Central Valley (CV) spring-run Chinook salmon ESU is listed as a threatened species under FESA. CV spring-run Chinook salmon are also listed as threatened under CESA. The ESU includes all naturally spawned populations of spring-run Chinook salmon in the Sacramento River and its tributaries in California, and the Feather River Hatchery spring-run Chinook program. As described in the latest NMFS 5-Year Review for Central Valley spring-run Chinook salmon, the status of the ESU has probably improved since the previous status review. Both the Mill and Deer Creek independent populations have improved from high extinction risks to moderate extinction risks, while the Butte Creek population remains at low risk. Nevertheless, the ESU remains classified as threatened (NMFS 2016b).

Chinook salmon exhibit two generalized freshwater life history types (Healey 1991). Stream-type adults enter fresh water months before spawning and juveniles reside in fresh water for a year or more following emergence, whereas ocean-type adults spawn soon after entering fresh water and juveniles migrate to the ocean as fry or parr in their first year. Adequate instream flows and cool water temperatures are more critical for the survival of Chinook salmon exhibiting a stream-type life history due to over-summering by adults and/or juveniles. Spring-run Chinook salmon are somewhat anomalous in that they have characteristics of both stream- and ocean-type races (Healey 1991). Adults enter fresh water in early-late spring, and delay spawning until late summer or early fall (stream-type). However, most juvenile spring-run Chinook salmon migrate out of their natal stream after only a few months of river life (ocean-type), or they may remain for up to 15 months within their natal stream. This life-history pattern differentiates the spring-run Chinook from other Sacramento River Chinook runs and from all other populations within the range of Chinook salmon (Hallock and Fisher 1985).

Spring-run Chinook salmon emigration timing is highly variable, as they may migrate downstream as young-of-the-year or as juveniles or yearlings. The modal

size of fry migrants at approximately 40 millimeters between December and April in Mill, Butte, and Deer Creeks reflects a prolonged emergence of fry from the gravel (Lindley et al. 2004). Studies in Butte Creek found that the majority of CV spring-run Chinook salmon migrants are fry occurring primarily during December, January, and February, and that fry movements appeared to be influenced by flow (Ward et al. 2002, 2003; McReynolds et al. 2005). Small numbers of CV spring-run Chinook salmon remained in Butte Creek to rear and migrated as yearlings later in the spring. Juvenile emigration patterns in Mill and Deer Creeks are very similar to patterns observed in Butte Creek, with the exception that juveniles from Mill and Deer creeks typically exhibit a later young-of-the-year migration and an earlier yearling migration (Lindley et al. 2006). Peak movement of yearling CV spring-run Chinook salmon in the Sacramento River at Knights Landing occurs in December, and is high in January, tapering off through the middle of February; however, juveniles were also observed between November and the end of February (Snider and Titus 2000).

Overall, designated in-water work windows would reduce exposure of sensitive fish species, including Chinook salmon, and life stages to in-water work activities. The activities of the Proposed Project would be minor in scope and would not result in degradation of aquatic habitat or water quality conditions and any potential effects related to potential increase in suspended sediment concentrations and contaminants due to disturbance of the river bed would be negligible. Implementation of Mitigation Measures MM BIO-14, along with MM HYD-1 and MM HAZ-1 through 4 would reduce potential impacts to CV spring-run Chinook salmon to: *Less than Significant with Mitigation Incorporated*.

Sacramento River winter-run ESU of Chinook Salmon (*Oncorhynchus tshawytscha*)

The Sacramento River winter-run Chinook salmon ESU was initially listed as a threatened species in August 1989, under emergency provisions of the federal Endangered Species Act (FESA) (NMFS 1989) and was listed as threatened in a final rule in November 1990 (NMFS 1990). The ESU consists of only one population confined to the mainstem of the upper Sacramento River in California's Central Valley below Keswick Dam. The ESU was reclassified as endangered under the FESA on January 4, 1994 (NMFS 1994), because of increased variability of run sizes, expected weak returns as a result of two small year classes in 1991 and 1993, and a 99% decline between 1966 and 1991. The National Marine Fisheries Service (NMFS) reaffirmed the listing of the Sacramento River winter-run Chinook salmon ESU as endangered on June 28, 2005 (NMFS 2005c) and included winter-run Chinook salmon in the Livingston Stone National Fish Hatchery artificial propagation program in the ESU. In addition to the federal listing, Sacramento River winter-run Chinook salmon are listed as endangered under the CESA.

Sacramento River winter-run Chinook salmon adults enter the Sacramento River basin between December and July; the peak occurs in March (Yoshiyama et al.

1998, Moyle 2002). Because winter-run Chinook salmon use only the Sacramento River system for spawning, adults are likely to migrate upstream primarily along the western edge of the Delta through the Sacramento River corridor. Their migration past RBDD at river mile 242 begins in mid-December and continues into early August. The majority of the run passes RBDD between January and May, with the peak in mid-March (Hallock and Fisher 1985). The timing of migration may vary somewhat due to changes in river flows, dam operations, and water year type (Yoshiyama et al. 1998, Moyle 2002). Sacramento River winter-run Chinook salmon migrate into freshwater while still being immature and delay spawning for weeks or months upon reaching their spawning grounds (Healey 1991).

Emigrating juvenile winter-run Chinook salmon pass the Red Bluff Diversion Dam beginning as early as mid-July, typically peaking in September, and can continue through March in dry years (Vogel and Marine 1991; NMFS 1997). Many juveniles apparently rear in the Sacramento River below Red Bluff Diversion Dam for several months before they reach the Delta (Williams 2006). From 1995 to 1999, all winter-run Chinook salmon outmigrating as fry passed the Red Bluff Diversion Dam by October, and all outmigrating presmolts and smolts passed the Red Bluff Diversion Dam by March (Martin et al. 2001). Juvenile winter-run Chinook salmon are present in the Delta primarily from November through early May based on data collected from trawls in the Sacramento River at West Sacramento (river mile 55) (USFWS 2006b), although the overall timing may extend from September to early May (NMFS 2012). The timing of migration varies somewhat because of changes in river flows, dam operations, seasonal water temperatures, and hydrologic conditions (water year type).

Overall, designated in-water work windows would reduce exposure of sensitive fish species, including Sacramento River winter-run Chinook Salmon ESU and life stages to in-water work activities. The activities of the Proposed Project would be minor in scope and would not result in degradation of aquatic habitat or water quality conditions and any potential effects related to potential increase in suspended sediment concentrations and contaminants due to disturbance of the river bed would be negligible. Implementation of Mitigation Measures MM BIO-14, along with MM HYD-1 and MM HAZ-1 through 4 would reduce potential impacts to Sacramento River winter-run Chinook salmon to: *Less than Significant with Mitigation Incorporated*.

Sacramento Splittail (*Pogonicthys macrolepidotus*)

The Sacramento splittail was listed as threatened under the federal Endangered Species Act (FESA) on February 8, 1999 (NMFS 1999). This ruling was challenged by two lawsuits (*San Luis & Delta-Mendota Water Authority v. Anne Badgley et al.* and *State Water Contractors et al. v. Michael Spear et al.*). On June 23, 2000, the Federal Eastern District Court of California found the ruling to be unlawful and on September 22 of the same year remanded the determination back to the U.S Fish and Wildlife Service (USFWS) for re-evaluation of their

original listing decision. Upon further evaluation, splittail was removed from the FESA on September 22, 2003 (USFWS 2003). On August 13, 2009, the Center for Biological Diversity (2009) challenged the 2003 decision to remove splittail from the FESA. However, on October 7, 2010, the USFWS found that listing of splittail was not warranted (USFWS 2010b). The splittail is designated as a species of special concern by the California Department of Fish and Wildlife (CDFW).

Mature splittail begin a gradual upstream migration towards spawning areas sometime between late November and late January, with larger splittail migrating earlier (Caywood 1974; Moyle et al. 2004). The relationship between migrations and river flows is poorly understood, but it is likely that splittail have a positive behavioral response to increases in flows and turbidity. Feeding in flooded riparian areas in the weeks just prior to spawning may be important for later spawning success and for postspawning survival. Not all splittail make significant movements prior to spawning, as indicated by evidence of spawning in Suisun Marsh (Meng and Matern 2001) and the Petaluma River.

The upstream movement of splittail is closely linked with flow events from February to April that inundate floodplains and riparian areas (Garman and Baxter 1999; Harrell and Sommer 2003). Seasonal inundation of shallow floodplains provides both spawning and foraging habitat for splittail (Caywood 1974; Daniels and Moyle 1983; Baxter et al. 1996; Sommer et al. 1997). Evidence of splittail spawning on floodplains has been found on both the San Joaquin and Sacramento Rivers. In the San Joaquin River drainage, spawning has apparently taken place in wet years in the region where the San Joaquin River is joined by the Tuolumne and Merced Rivers (Moyle et al. 2004). In the Plan Area, splittail spawn on inundated floodplains in the Yolo and Sutter Bypasses, which are extensively flooded in wet years, and along the Cosumnes River area from February to July (Sommer et al. 1997, 2001, 2002; Crain et al. 2004; Moyle et al. 2004). When floodplain inundation does not occur in the Yolo or Sutter Bypasses, adult splittail migrate farther upstream to suitable habitat along channel margins or flood terraces; spawning in such locations occurs in all water year types (Feyrer et al. 2005). Although spawning is typically greatest in wet years, CDFW surveys demonstrate spawning takes place every year along the river edges and backwaters created by small increases in flow. In the eastern Delta, the floodplain along the lower Cosumnes River appears to be important as spawning habitat. Ripe splittail have been observed in areas flooded by levee breaches, turbid water, and flooded terrestrial vegetation.

Overall, designated in-water work windows would reduce exposure of sensitive fish species, including Sacramento splittail, and life stages to in-water work activities. The activities of the Proposed Project would be minor in scope and would not result in degradation of aquatic habitat or water quality conditions and any potential effects related to potential increase in suspended sediment concentrations and contaminants due to disturbance of the river bed would be negligible. Implementation of Mitigation Measures MM BIO-14, along with MM

HYD-1 and MM HAZ-1 through 4 would reduce potential impacts to Sacramento Splittail to: *Less than Significant with Mitigation Incorporated*.

Longfin Smelt (*Spirinchus thaleichthys*)

The Bay-Delta population of Longfin Smelt is designated as a candidate for listing under the FESA (USFWS 2012) and, since June 26, 2009, the Longfin Smelt is listed as threatened under the CESA.

Longfin Smelt are anadromous and semelparous, moving from saline to brackish or freshwater for spawning from November to May (Moyle 2002; Rosenfield and Baxter 2007) Longfin Smelt usually live for 2 years, spawn, and then die (Rosenfield 2010). Peak spawning takes place in January and February of most years and appears to be centered in brackish water (1–8 ppt); their habitat typically extends from San Pablo Bay to the confluence of the Sacramento River and San Joaquin River. Newly hatched Longfin Smelt larvae are planktonic and probably do not control their position in the water column before they develop an air bladder. Once their air bladder is developed (~12 mm standard length) they are capable of controlling their position in the water column by undergoing reverse diel vertical migrations, which allows them to maintain position on the axis of the estuary (Bennett et al. 2002).

The geographic distribution of larval and early juvenile life stages of Longfin Smelt may be influenced by freshwater inflows to the Delta during late winter and spring, although the mechanisms are complicated and not fully understood (Hieb and Baxter 1993; Baxter 1999; Dege and Brown 2004). Juvenile Longfin smelt move seaward, mostly west of Carquinez Bridge, by late summer and fall. Rosenfield and Baxter (2007) suggest that juvenile Longfin Smelt seek cooler and deeper water in the summer months.

Overall, designated in-water work windows would reduce exposure of sensitive fish species, including Longfin smelt and life stages to in-water work activities. The activities of the Proposed Project would be minor in scope and would not result in degradation of aquatic habitat or water quality conditions and any potential effects related to potential increase in suspended sediment concentrations and contaminants due to disturbance of the river bed would be negligible. Implementation of Mitigation Measures MM BIO-14, along with MM HYD-1 and MM HAZ-1 through 4 would reduce potential impacts to Longfin Smelt to: *Less than Significant with Mitigation Incorporated*.

Western Red Bat (*Lasiurus blossevillii*)

Western red bat is identified as a CDFW Species of Special Concern. It is a medium bat with mottled reddish grayish pelage but can range from bright orange to yellow-brown, and short rounded ears. This species is locally common in some areas of California, occurring from Shasta County to the Mexico border, west of the Sierra Nevada/Cascade crest and deserts. Their winter range includes western lowlands and coastal regions south of San Francisco Bay.

Short migrations occur between summer and winter ranges, and migrants may be found outside the normal range. Roosting habitat includes forests and woodlands from sea level up through mixed conifer forests. Western red bat roost primarily in trees (less often in shrubs), typically in edge habitats adjacent to streams, fields, or urban areas. The species prefers roost sites that are protected from above, open below, and located above dark ground-cover. They form nursery colonies, and family groups are known to roost together. Foraging habitat includes grasslands, shrublands, open woodlands and forests, and croplands. Mating occurs in August and September, with delayed fertilization until the following spring, and young born from late May through early July (CDFW 1990i).

Western red bat has a moderate potential to occur within the Study Area due to the presence of suitable habitat and reported occurrences within two and five miles of the Study Area. Implementation of Mitigation Measures MM AES-1, MM AES-2, MM BIO-1 and MM BIO-15 would reduce potential impacts to western red bat to: *Less than Significant with Mitigation Incorporated*.

MM BIO-15: Special-Status Bats

To minimize and avoid the potential impacts to special-status bats that may occur within the project area, the following general measures will be implemented:

a. Pre-activity roosting special-status bat surveys and an evaluation of roosting habitat suitability for bats will be conducted by a qualified biologist familiar with the species that could potentially occur within the Impact Area. The qualified biologist should, at a minimum have experience conducting roosting bat surveys and be able to identify the presence of guano and urine stains.

b. Any identified roosts of special-status bats will be avoided, and a buffer of up to 100 feet will be established based on-site conditions and at the discretion of the biologist, to ensure that the roosting bats are not disturbed. If a nursery colony is identified, additional measures may be required including a larger buffer, to ensure no disturbance. Such additional measures will be determined and monitored by a qualified biologist.

Hoary Bat (*Lasiurus cinereus*)

Hoary bat is identified by the Western Bat Working Group (WBWG) as Moderate priority. It is a large bat that has a coat of dense, dark brown pelage with a frosted appearance. This species is the most widespread North American bat and may be found nearly everywhere in California from sea level to 13,200 feet, although its distribution is patchy in southeastern deserts. It is a common, solitary species that winters along the coast and in southern California, breeds inland

and north of the winter range. Hoary bat generally roosts in dense foliage of medium to large trees that are hidden from above, with few branches below, and have ground cover of low reflectivity. This species prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for foraging. Breeding habitat includes all woodlands and forests with medium to large-size trees and dense foliage. Hoary bat mate in the fall in their winter range, with delayed fertilization until the following spring. Young are born from mid-May through early July (CDFW 1990j).

Hoary bat has a moderate potential to occur within the Study Area due to the presence of suitable habitat and reported occurrences within two and five miles of the Study Area. Implementation of Mitigation Measures MM AES-1, MM AES-2, MM BIO-1 and MM BIO-15 would reduce potential impacts to hoary bat to: *Less than Significant with Mitigation Incorporated*.

San Joaquin Pocket Mouse (*Perognathus inornatus*)

San Joaquin pocket mouse has a NatureServe global and state rarity and imperilment ranking of G2G3 and S2S3. San Joaquin pocket mouse is a small rodent with silky pelage containing no bristles or spines and a tail that is slightly longer than 50% of their total length. The San Joaquin pocket mouse occurs between 1,100 and 2,000 ft elevation, spanning through the San Joaquin Valley, Delta, Sacramento Valley through Colusa County, and portions of the southern Coast Ranges. Habitat includes shrubby ridge tops and hillsides in dry, open grasslands or scrub areas with friable soils. Young are born and raised in burrows in the spring and early summer.

San Joaquin pocket mouse has a moderate potential to occur within the Study Area due to the presence of suitable habitat and reported occurrences within two and five miles of the Study Area. Implementation of Mitigation Measure MM BIO-1 would reduce potential impacts to San Joaquin pocket mouse to: *Less than Significant with Mitigation Incorporated*.

American Badger (*Taxidea taxus*)

American badger is identified as a CDFW Species of Special Concern. It has a stocky, low-slung body with short, powerful legs, identifiable by its large foreclaws and distinct black and white head markings. American badger is an uncommon solitary species that is widely distributed throughout the state except in the northern North Coast area, from below sea level to over 12,000 ft. This species inhabits a variety of open, arid habitats but is most abundant in drier open stages of most shrub, forest, and herbaceous habitats with friable soils for burrowing. Home range typically varies in size between 5 and 1,800 acres but can become much larger during breeding season as males locate receptive females. Natal dens are constructed in dry, sandy soil with sparse overstory. Breeding occurs between July and August, with young born in March and April and disperse after three to four months.

American Badger has a moderate potential to occur within the Study Area due to the presence of suitable habitat and reported occurrences within two and five miles of the Study Area. Implementation of Mitigation Measures MM BIO-1 and MM BIO-16 would reduce potential impacts to American Badger to: *Less than Significant with Mitigation Incorporated*.

MM BIO-16: American Badger

To minimize and avoid the potential impacts to American Badger that may occur within the Study Area, the following measures will be implemented:

a. A qualified biologist shall conduct pre-activity surveys for American badger and dens in suitable habitat within 48 hours prior to the start of soil investigation activities. If there is a lapse in soil investigation activities of two weeks or greater the area shall be resurveyed within 24 hours prior to recommencement of work. Potential American badger dens identified in the project area shall be monitored by the qualified biologist to determine current use.

b. American badger dens determined by the qualified biologist to be occupied during the breeding season (February 15 through June 30) shall be flagged, and ground disturbing activities avoided, within 100 feet of the den to protect adults and nursing young. Buffers may be modified by the qualified biologist, depending on the applicable site conditions and characteristics of the den, and shall not be removed until the qualified biologist has determined that the den is no longer in use.

San Joaquin Kit Fox (*Vulpes macrotis mutica*)

San Joaquin kit fox is listed as Endangered under FESA and Threatened under CESA. It is the smallest canid species in North America, about 32 inches in length and 12 inches high. Its ears are disproportionately large and has a black-tipped tail. San Joaquin kit fox is endemic to the Central Valley and currently inhabit suitable habitat in the San Joaquin Valley and in surrounding foothills of the Coast Ranges, Sierra Nevada, and Tehachapi Mountains, from southern Kern County north to Contra Costa County. Habitat for San Joaquin kit fox include alkali sink, alkali flat, and grasslands (USFWS 2010c). In the northern part of its range (including San Joaquin, Alameda, and Contra Costa Counties) where most habitat on the valley floor has been eliminated, it now occurs primarily in foothill grassland, valley oak savanna, and alkali grasslands. The home ranges of San Joaquin kit foxes are extensive and vary by location and is thought to be related to prey abundance. Dens are used for temperature regulation, shelter and protection from adverse weather and predators. Many dens may be used throughout the year, and individuals may change dens often.

During September and October, females begin to clean and enlarge natal dens. Mating occurs between December and March, and pups are born in February or March and generally disperse after four or five months.

San Joaquin kit fox has a moderate potential to occur within the Study Area due to the presence of suitable habitat and reported historic occurrences within two and five miles of the Study Area. Implementation of Mitigation Measures MM AES-2, MM BIO-1 and MM BIO-17 would reduce potential impacts to San Joaquin kit to*: Less than Significant with Mitigation Incorporated.*

MM BIO-17: San Joaquin Kit Fox

To minimize and avoid the potential impacts to San Joaquin kit fox that may occur within the Study Area, the following general measures will be implemented:

a. Prior to any ground disturbance within an Impact Area, a qualified biologist will conduct a pre-activity survey in areas identified in the pre-activity surveys as supporting suitable breeding or denning habitat for San Joaquin kit fox. The surveys will establish the presence or absence of San Joaquin kit foxes and/or suitable dens and evaluate use by kit foxes in accordance with USFWS survey guidelines (U.S. Fish and Wildlife Service 1999).

b. Pre-activity surveys will be conducted within 30 days prior to ground disturbance. The biologist will survey the proposed Impact Area and a 250-foot buffer from the perimeter of the proposed Impact Area to identify San Joaquin kit foxes and/or suitable dens. Adjacent parcels under different land ownership, for which DWR not have access, will not be surveyed. The status of all dens will be determined and mapped. Written results of pre-activity surveys will be submitted to USFWS within 5 working days after survey completion and before the start of ground disturbance.

c. If San Joaquin kit foxes and/or suitable dens are identified within those areas included in the pre-activity survey area, the measures described below will be implemented.

    i. If a San Joaquin kit fox den is discovered in the Impact Area, the Impact Area will be moved at a minimum to meet the appropriate buffer distances as described below in subsection (c)(ii).

    ii. If dens are identified in the survey area but outside the Impact Area, exclusion zones around each den entrance or cluster of entrances will be demarcated. The configuration of exclusion zones should be circular, with a radius measured outward from the den entrance(s). No covered activities will occur within the exclusion zones. Exclusion zone radii for

potential or atypical dens will be at least 50 feet and will be demarcated with four to five flagged stakes. Exclusion zone radii for known dens will be at least 100 feet and will be demarcated with staking and flagging that encircles each den or cluster of dens but does not prevent access to the den by kit fox.

iii. If a natal or pupping den is found within the Impact Area or within 200-feet of the Impact Area boundary, USFWS and CDFW will be notified immediately. The den will not be disturbed or destroyed, depending on the applicable site conditions and characteristics of the den, the soil investigation site may be moved.

SPECIAL-STATUS PLANTS

The following section includes species accounts for each of the special-status plant species that has potential to occur within the Study Area and provides effects determinations relative to the Proposed Project's anticipated impacts. These accounts can be found in Attachment A. For all 79 plant species that have some potential to occur within the Study Area, it was determined that potential impacts relative to the Proposed Project would be "Less Than Significant with Mitigation Incorporated".

Large-flowered fiddleneck (*Amsinckia grandiflora*)

Large-flowered fiddleneck has a CRPR of 1B.1 and is listed as Endangered under FESA and CESA. This species is an annual herb in the forget-me-not family, and it blooms from April through May, and sometimes in March (CNPS 2019). It is endemic to California, and its current range includes the northwestern San Joaquin Valley (CNPS 2019; Jepson Flora Project 2019). It typically grows in cismontane woodland and valley and foothill grassland (CNPS 2019). Large-flowered fiddleneck is threatened by agriculture, development, grazing, non-native plants, trampling and altered fire frequency (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to large-flowered fiddleneck to: *Less than Significant with Mitigation Incorporated*.

MM BIO-18: Botanical Resources

a. All botanical evaluations will be conducted by a qualified botanist, who at a minimum shall have experience conducting floristic field surveys; knowledge of plant taxonomy and plant community ecology and classification; familiarity with the plants of the area, including special-status and locally significant plants; familiarity with the appropriate state and federal statutes related to plants and plant collecting; and experience with analyzing impacts of a project on native plants and communities.

b. A qualified botanist will conduct a habitat assessment to determine whether the habitat is appropriate for special-status plants. If suitable habitat is present, the qualified botanist will conduct a habitat quality assessment to determine the potential for presence of sensitive plant species. The habitat quality assessment will consider factors such as soil type, degree and frequency of previous soil disturbance, abundance of invasive species, and distance from known sensitive plant occurrences. If a qualified botanist determines that special-status plants are likely to occur at a proposed Impact Area, a botanical survey will be conducted within the Impact Area at each soil investigation site. When feasible based on scheduling and property access, the surveys will be conducted at proper times of year when special-status and locally significant plants are both evident and identifiable; will be floristic in nature, ensuring that all plants observed are identified to a level sufficient for determining rarity, and will be conducted using systematic field techniques in all habitats of the site to ensure thorough coverage of potential Impact Areas.

c. Any special-status plant species present within 10 meters of an Impact Area will be flagged, or mapped using a GPS, for avoidance. A qualified botanist will establish an appropriate buffer. During field activities avoidance of the buffered area will be enforced by an environmental monitor to ensure that special-status plants are avoided to the maximum extent practicable.

d. If special-status plant species (excluding listed species) are present within the Impact Area and impacts cannot practicably be avoided, a qualified botanist will evaluate the following criteria to ensure these impacts are less than significant:

   i. the total range and distribution of the species,
   ii. local population abundance,
   iii. approximate number of individuals potentially impacted,
   iv. area of habitat potentially impacted,
   v. life history of the species (annual versus perennial and seedbank dynamics),
   vi. species sensitivity and response to disturbance,
   vii. species fecundity, and
   viii. the probability of population recovery from impacts.

   If loss of individuals due to project activities would exceed 2% of the local population or if the particular life history of the plant species indicates that a loss of that scale would threaten the persistence of the local population, or if

there are fewer than 10 statewide extant occurrences, the soil investigation will not be allowed to proceed at that location.

MM BIO-19: Botanical Considerations for Vegetation Removal

If access requires minor disturbances to or removal of vegetation, a qualified botanist will be consulted to ensure that no special-status vegetation is significantly impacted.

Bent-flowered fiddleneck (*Amsinckia lunaris*)

Bent-flowered fiddleneck has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is an annual herb in the forget-me-not family, and it blooms from March to June (CNPS 2019). It is endemic to California, and its current range includes the North Coast Ranges, southwest Sacramento Valley, Central Coast, and San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019). It typically grows in coastal bluff scrub, cismontane woodland, and valley and foothill grassland (CNPS 2019). The microhabitat for bent-flowered fiddleneck includes gravelly slopes, grassland, and openings in woodland, often on serpentine soils (Jepson Flora Project 2019). Bent-flowered fiddleneck is threatened by development, competition from non-native plants, and mining (CNPS 2019). Potentially suitable habitat for bent-flowered fiddleneck is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located outside of its known range so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to Bent-flowered fiddleneck.

California androsace (*Androsace elongata* ssp. *acuta*)

California androsace has a CRPR of 4.2, but it is not listed under FESA or CESA. This species is an annual herb in the primrose family, and it blooms from March to June (CNPS 2019). The current range of this species in California includes the Inner North Coast Ranges, Cascade Ranges, southern Sierra Nevada Foothills, Central Valley, San Francisco Bay Area, Inner South Coast Ranges, South Coast, Western Transverse Ranges, San Bernardino Mountains, and Peninsular Ranges (CNPS 2019, Jepson Flora Project 2019). It typically grows in chaparral, cismontane woodland, coastal scrub, meadows and seeps, pinyon and juniper woodland, and valley and foothill grassland (CNPS 2019). The microhabitat for California androsace includes dry, grassy slopes (Jepson Flora Project 2019). Threats to this species include grazing, trampling, non-native plants, alteration of fire regimes, recreational activities, and wind energy development (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to California androsace to: *Less than Significant with Mitigation Incorporated*.

Depauperate milk-vetch (*Astragalus pauperculus*)

Depauperate milk-vetch has a CRPR of 4.3, but it is not listed under FESA or CESA. This species is an annual herb in the pea family, and it blooms from March through June (CNPS 2019). It is endemic to California, and its current range includes the Cascade Range, northern Sierra Nevada Foothills, and northern Sacramento Valley (CNPS 2019; Jepson Flora Project 2019). It typically grows in chaparral, cismontane woodland, and valley and foothill grassland (CNPS 2019). The microhabitat for depauperate milk-vetch includes vernally mesic sites, stony flats and shallow depressions, and thin soils of red sand or clay of volcanic origin (CDFW 2019). Depauperate milk-vetch is threatened by vehicles and non-native plants (CNPS 2019). Potentially suitable habitat for depauperate milk-vetch is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to depauperate milk-vetch to: *Less than Significant with Mitigation Incorporated*.

Ferris' milk-vetch (*Astragalus tener* var*. ferrisiae*)

Ferris's milk-vetch has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the pea family, and it blooms from April through May (CNPS 2019). It is endemic to California, and its current range includes the Sacramento Valley (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from Solano County. It typically grows in meadows and seeps and valley and foothill grasslands (CNPS 2019). The microhabitat for Ferris's milk-vetch includes subalkaline flats on overflow land in the Central Valley, usually on dry, adobe soil (CDFW 2019). The majority of this species' habitat has been impacted by agriculture (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat therefore potential impacts would be *Less than Significant with Mitigation Incorporated*.

Implementation of mitigation measures MM BIO-1b, MM BIO-18 and MM BIO-19 would reduce potential impacts to Ferris' milk-vetch to: *Less than Significant with Mitigation Incorporated*.

Alkali milk-vetch (*Astragalus tener* var*. tener*)

Alkali milk-vetch has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the pea family, and it blooms from March through June (CNPS 2019). It is endemic to California, and its current range

includes the southern Sacramento Valley, northern San Joaquin Valley, eastern San Francisco Bay Area, and Inner South Coast Ranges (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from Contra Costa, Monterey, San Benito, Santa Clara, San Francisco, San Joaquin, Sonoma, and Stanislaus counties. It typically grows in alkali playas, valley and foothill grasslands, and vernal pools, often on adobe soils (CNPS 2019). The microhabitat for Ferris's milk-vetch includes low ground, alkali flats, and flooded lands (CDFW 2019). Alkali milk-vetch is threatened by development, competition from non-native plants, and habitat destruction, especially agricultural conversion (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Alkali milk-vetch to: *Less than Significant with Mitigation Incorporated*.

Heartscale (*Atriplex cordulata* var. *cordulata*)

Heartscale has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is an annual herb in the goosefoot family that blooms from April through October (CNPS 2019). It is endemic to California, and its current range includes the Central Valley (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from San Joaquin, Stanislaus, and Yolo counties. It typically grows on saline or alkaline soils in chenopod scrub, meadows and seeps, and sandy valley and foothill grassland habitats (CNPS 2019). The microhabitat for heartscale includes sandy soils in alkaline flats and scalds in the Central Valley (CDFW 2019). Heartscale is threatened by competition from non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to heartscale to: *Less than Significant with Mitigation Incorporated*.

Crownscale (*Atriplex coronata* var*. coronata*)

Crownscale has a CRPR of 4.2, but it is not listed under FESA or CESA. This species is an annual herb in the goosefoot family that blooms from March through October (CNPS 2019). It is endemic to California, and its current range includes the southern Sacramento Valley, the San Joaquin Valley, and the eastern Inner South Coast Ranges (CNPS 2019; Jepson Flora Project 2019). It typically grows in chenopod scrub, valley and foothill grassland, and vernal pool habitats (CNPS 2019). The microhabitat for this species includes fine, alkaline soils, and clay soils (CDFW 2019). Threats to this species have not been identified (CNPS 2019, CDFW 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to crownscale to: *Less than Significant with Mitigation Incorporated*.

Lost Hills crownscale (*Atriplex coronata* var*. vallicola*)

Lost Hills crownscale has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is an annual herb in the goosefoot family that blooms from April through August (CNPS 2019). It is endemic to California, and its current range includes the San Joaquin Valley (CNPS 2019; Jepson Flora Project 2019). It typically grows in chenopod scrub, valley and foothill grassland, and vernal pool habitats (CNPS 2019). The microhabitat for this species includes fine, alkaline soils (CDFW 2019). Threats to this species include grazing, vehicles, agricultural conversion, hydrological alterations, and energy development. Occurrences of this species in Alameda County are thought to be misidentifications of *A. coronata* var. *coronata* (R. Preston, pers. comm.). If correct, the Study Area is outside the range of this species, however for the purposes of this evaluation, this species will be treated as having a moderate potential to occur due to the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Lost Hills crownscale to: *Less than Significant with Mitigation Incorporated*.

Brittlescale (*Atriplex depressa*)

Brittlescale has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is an annual herb in the goosefoot family, and it blooms from April through October (CNPS 2019). It is endemic to California, and its current range includes the Central Valley (CNPS 2019; Jepson Flora Project 2019). It typically grows in chenopod scrub, meadows and seeps, playas, valley and foothill grasslands, and vernal pools (CNPS 2019). The microhabitat for brittlescale includes alkaline and clay soils (CDFW 2019). Brittlescale is threatened by development, grazing, and trampling (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to brittlescale to: *Less than Significant with Mitigation Incorporated*.

Lesser saltscale (*Atriplex minuscula*)

Lesser saltscale has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the goosefoot family, and it blooms from May through October (CNPS 2019). It is endemic to California, and its current range includes the San Joaquin Valley and San Francisco Bay Area (CNPS 2019; Jepson Flora Project 2019). It typically grows in chenopod scrub, playas, valley

and foothill grassland, and vernal pools (CNPS 2019). Threats to lesser saltscale include agriculture and solar energy development (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to lesser saltscale to: *Less than Significant with Mitigation Incorporated*.

Vernal pool smallscale (*Atriplex persistens*)

Vernal pool smallscale has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is an annual herb in the goosefoot family, and it blooms from June through October (CNPS 2019). It is endemic to California, and its current range includes the Central Valley (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from Stanislaus County. It typically grows in alkaline vernal pools (CNPS 2019). Threats to vernal pool smallscale include agriculture and flood control activities (CNPS 2019). Potentially suitable habitat for vernal pool smallscale is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to vernal pool smallscale.

Big-scale balsamroot (*Balsamorhiza macrolepis*)

Big-scale balsamroot has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is a perennial herb in the sunflower family, and it blooms from March through June (CNPS 2019). Its current range includes the Sierra Nevada Foothills, central High Sierra Nevada, Sacramento Valley, Inner North Coast Ranges, and eastern San Francisco Bay Area (CNPS 2019; Jepson Flora Project 2019). It typically grows in chaparral, cismontane woodland, and valley and foothill grasslands (CNPS 2019). The microhabitat for big-scale balsamroot includes some serpentine sites (CDFW 2019). Current threats to this species include grazing, residential and recreational development, energy development, and non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to big-scale balsamroot to: *Less than Significant with Mitigation*.

Big tarplant (*Blepharizonia plumosa*)

Big tarplant has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from July

through October (CNPS 2019). It is endemic to California, and its current range includes the San Joaquin Valley and San Francisco Bay Area (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from Solano County. It typically grows in valley and foothill grasslands (CNPS 2019). The microhabitat for big tarplant includes dry hills and plains in annual grassland with clay to clay-loam soils, often in burned areas (CDFW 2019). Historical occurrences of this species were likely extirpated by agriculture and non-native plants. Current threats to this species include urbanization, disking, residential development, and non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to big tarplant to: *Less than Significant with Mitigation Incorporated*.

Watershield (*Brasenia schreberi*)

Watershield has a CRPR of 2B.3, but it is not listed under FESA or CESA. This species is a perennial rhizomatous herb in the fanwort family, and it blooms from June through September (CNPS 2019). The current range of this species in California includes the Klamath Ranges, North Coast Ranges, High Cascades Range, High Sierra Nevada, Modoc Plateau (except the Warner Mountains), and Sacramento Valley (CNPS 2019; Jepson Flora Project 2019). It typically grows in freshwater marshes and swamps, including both natural and artificial water bodies (CNPS 2019, CDFW 2019). Threats to this species have not been identified (CNPS 2019, CDFW 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to watershield to: *Less than Significant with Mitigation Incorporated*.

Valley Brodiaea (*Brodiaea rosea* ssp. *vallicola*)

Valley brodiaea has a CRPR of 4.2, but it is not listed under FESA or CESA. This species is a perennial bulbiferous herb in the brodiaea family, and it blooms from April through May, and sometimes in June. This species is endemic to California, and its current known range includes the eastern Sacramento Valley. It typically grows in vernal pools and swales within valley and foothill grasslands. The microhabitat for valley brodiaea includes old alluvial terraces, and silty, sandy, or gravelly loam. Threats to valley brodiaea include urbanization (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to valley brodiaea to: *Less than Significant with Mitigation Incorporated*.

Mt. Diablo fairy-lantern (*Calochortus pulchellus*)

Mt. Diablo fairy-lantern has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is a perennial herb in the lily family, and it blooms from April through June (CNPS 2019). This species is endemic to California, and its current known range includes the San Francisco Bay Area (CNPS 2019; Jepson Flora Project 2019). It typically grows in chaparral, cismontane woodland, riparian woodland and valley and foothill grassland (CNPS 2019, CDFW 2019). Threats to this species include grazing, urbanization, horticultural collection, and feral pigs (CNPS 2019, CDFW 2019). Suitable habitat for Mt. Diablo fairy lantern is present within the study area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to Mt. Diablo fairy lantern.

Bristly sedge (*Carex comosa*)

Bristly sedge has a CRPR of 2B.1, but it is not listed under FESA or CESA. This species is a perennial rhizomatous herb in the sedge family, and it blooms from May through September (CNPS 2019). The current range of this species in California includes the Klamath Ranges, interior North Coast Ranges, High Cascade Range, Central Valley, northern Central Coast, San Francisco Bay Area, and Modoc Plateau (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from San Bernardino and San Francisco counties. It typically grows in coastal prairie, marshes and swamps, and valley and foothill grasslands (CNPS 2019). The microhabitat for bristly sedge includes lake margins and other wet places (CDFW 2019). Threats to bristly sedge include marsh drainage and road maintenance (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to bristly sedge to: *Less than Significant with Mitigation Incorporated*.

Lemmon's jewelflower (*Caulanthus lemmonii*)

Lemmon’s jewelflower has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is an annual herb in the mustard family, and it blooms from March through May (CNPS 2019). It is endemic to California, and its current range includes the southwestern San Joaquin Valley, southeastern San Francisco Bay Area, and South Coast Ranges (CNPS 2019; Jepson Flora Project 2019). It typically grows in pinyon and juniper woodland and valley and foothill grassland (CNPS 2019). Threats to this species include development, grazing, and vehicles (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to Lemmon's jewelflower to: *Less than Significant with Mitigation Incorporated*.

Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*)

Congdon's tarplant has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from May through October (CNPS 2019). It is endemic to California, and its current range includes the Central Coast, San Francisco Bay Area, and South Coast Ranges (CNPS 2019; Jepson Flora Project 2019). It typically grows in alkaline valley and foothill grasslands (CNPS 2019). Threats to this species include development, grazing, and non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to Congdon's tarplant to: *Less than Significant with Mitigation Incorporated*.

Pappose tarplant (*Centromadia parryi* ssp. *parryi*)

Pappose tarplant has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from May through November (CNPS 2019). It is endemic to California, and its current range includes the southern North Coast Ranges, southern Sacramento Valley, and northern Central Coast (CNPS 2019; Jepson Flora Project 2019). It typically grows in chaparral, coastal prairie, meadows and seeps, coastal saltmarshes, and valley and foothill grasslands (CNPS 2019). The microhabitat for pappose tarplant includes vernally mesic, often alkaline sites (CDFW 2019). Threats to this species include agriculture, competition from non-native plants, development, grazing, foot traffic, habitat disturbance, and road maintenance (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to pappose tarplant to: *Less than Significant with Mitigation Incorporated*.

Parry's rough tarplant (*Centromadia parryi* ssp. *rudis*)

Parry's rough tarplant has a CRPR of 4.2, but it is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from May through October (CNPS 2019). It is endemic to California, and its current range includes the southern Interior North Coast Ranges, Central Valley, and Modoc Plateau (CNPS 2019; Jepson Flora Project 2019). It typically grows in vernal pools and valley and foothill grasslands (CNPS 2019). The microhabitat for Parry's rough tarplant includes alkaline, vernally mesic seeps, sometimes on

roadsides (CDFW 2019). Threats to this species include development, habitat alteration and disturbance, grazing, and road maintenance (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Parry's rough tarplant to: *Less than Significant with Mitigation Incorporated*.

Hispid salty bird's-beak (*Chloropyron molle* ssp. *hispidum*)

Hispid salty bird's beak has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual hemiparasitic herb in the broomrape family, and it blooms from June through September (CNPS 2019). It is endemic to California, and its current range includes the Central Valley (CNPS 2019; Jepson Flora Project 2019). It typically grows in meadows and seeps, playas, and valley and foothill grassland (CNPS 2019). The microhabitat for hispid salty bird's beak includes alkaline soils (CDFW 2019). Threats to this species include agricultural conversion, development, and grazing (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to hispid salty bird's-beak to: *Less than Significant with Mitigation Incorporated*.

Soft salty bird's-beak (*Chloropyron molle* ssp. *molle*)

Soft salty bird's beak is listed as Endangered under FESA and Rare under CESA, and it has a CRPR of 1B.2. This species is an annual hemiparisitic herb in the broomrape family, and it blooms from June through November (CNPS 2019). It is endemic to California, and its current range includes the northern Central Coast and the Sacramento-San Joaquin Delta region of the Central Valley (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from Marin, Sacramento, and Sonoma counties. It typically grows in coastal saltmarshes and swamps (CNPS 2019). The microhabitat for soft salty bird's beak includes coastal saltmarsh with Distichlis, Salicornia, and Frankenia (CDFW 2019). Threats to this species include non-native plants, erosion, feral pigs, trampling, urbanization, and marsh drainage (CNPS 2019). Potentially suitable habitat for soft salty bird's-beak is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range and there is limited salt-marsh habitat in the Study Area so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to soft bird's-beak.

Palmate-bracted salty bird's-beak (*Chloropyron palmatum*)

Palmate-bracted salty bird's beak is listed as Endangered under FESA and CESA, and it has a CRPR of 1B.1. This species is an annual hemiparisitic herb in the broomrape family, and it blooms from May through October (CNPS 2019). It is endemic to California, and its current range includes the Central Valley (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from San Joaquin County. It typically grows on alkaline soils within chenopod scrub and valley and foothill grasslands (CNPS 2019). Palmate-bracted salty bird's beak typically occurs on Pescadero silty clay, which is alkaline, along with Distichlis, Frankenia, and other species characteristic of chenopod scrub (CDFW 2019). This species is threatened by agriculture, urbanization, vehicles, altered hydrology, grazing, and development (CNPS 2019). Potentially suitable habitat for palmate-bracted salty bird's-beak is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to palmate-bracted salty bird's-beak.

Bolander's water-hemlock (*Cicuta maculata* var. *bolanderi*)

Bolander's water-hemlock has a CRPR of 2B.1, but it is not listed under FESA or CESA. This species a perennial herb in the carrot family, and it blooms from July through September (CNPS 2019). The current range of this species in California includes the southern Sacramento Valley, Central Coast, and South Coast (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from Santa Barbara County. It typically grows in coastal freshwater or brackish marshes and swamps (CNPS 2019). Threats to Bolander's water-hemlock include development, non-native plants, and hydrological alterations (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to Bolander's water-hemlock to: *Less than Significant with Mitigation Incorporated*.

Slough thistle (*Cirsium crassicaule*)

Slough thistle has a CRPR of 1B.1 but is not listed under FESA or CESA. This species is an annual or perennial herb in the sunflower family, and it blooms from May to August (CNPS 2019). It is endemic to California, and its current range is limited to the San Joaquin Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in chenopod scrub, marshes and swamps, and riparian scrub (CNPS 2019). The microhabitat for slough thistle includes sloughs, riverbanks, and marshy areas (CDFW 2019). Threats to this species include agriculture and

non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to slough thistle to: *Less than Significant with Mitigation Incorporated*.

Small-flowered morning-glory (*Convolvulus simulans*)

Small-flowered morning glory has a CRPR of 4.2 but is not listed under FESA or CESA. This species is an annual herb in the morning glory family, and it blooms from March to July (CNPS 2019). The current range of this species in California includes the southern Sierra Foothills, San Joaquin Valley, San Francisco Bay Area, inner and outer South Coast Ranges, South Coast, northern and southern Channel Islands, Western Transverse Ranges, and Peninsular Ranges excluding the San Jacinto Mountains. It typically grows in openings in chaparral, coastal scrub, and valley and foothill grassland (CNPS 2019). The microhabitat for small-flowered morning glory includes wet clay and serpentine ridges (CDFW 2019). Threats to this species include development, vehicle traffic, and non-native plants. Potentially suitable habitat for small-flowered morning-glory is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to small-flowered morning-glory.

Hoover's cryptantha (*Cryptantha hooveri*)

Hoover’s cryptantha has a CRPR of 1A but is not listed under FESA or CESA. This species is an annual herb in the borage family, and it blooms from April to May (CNPS 2019). It is endemic to California, and its current range includes the northern and central San Joaquin Valley. It is presumed extirpated in Contra Costa, Madera, and Stanislaus counties, and has not been detected anywhere within its known range since 1937 (CNPS 2019; Jepson Flora Project 2019). It typically grows in inland dunes and valley and foothill grassland (CNPS 2019). The microhabitat for Hoover’s cryptantha includes coarse sand (CDFW 2019). Threats to this species include development and habitat conversion (CDFW 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to Hoover’s cryptantha to: *Less than Significant with Mitigation Incorporated*.

Peruvian dodder (*Cuscuta obtusiflora* var. *glandulosa*)

Peruvian dodder has a CRPR of 2B.2 but is not listed under FESA or CESA. This species is an annual parasitic vine in the morning glory family, and it blooms from July to October (CNPS 2019). Its current range in California includes the Central Valley and South Coast, and southern Outer North Coast Ranges; however, the last confirmed sighting of this species in California was in 1948 (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from San Bernardino County, and records from Sacramento County are of uncertain identity. It typically grows in marshes and swamps (CNPS 2019). Threats to this species have not been identified (CNPS 2019, CDFW 2019). Potentially suitable habitat for Peruvian dodder present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located outside of its known range so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18 and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to Peruvian dodder.

Livermore tarplant (*Deinandra bacigalupii*)

Livermore tarplant is listed as Endangered under CESA and has a CRPR of 1B.1 but is not listed under FESA. This species is an annual herb in the sunflower family, and it blooms from June to October (CNPS 2019). It is endemic to California, and its current range includes the northwest San Joaquin Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in meadows and seeps (CNPS 2019). The microhabitat for Livermore tarplant includes alkaline meadows (CDFW 2019). Threats to this species include urbanization and development (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to Livermore tarplant to: *Less than Significant with Mitigation Incorporated*.

Recurved larkspur (*Delphinium recurvatum*)

Recurved larkspur has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is a perennial herb in the buttercup family, and it blooms from March through June. It is endemic to California, and its current range includes the San Joaquin Valley, southern Inner South Coast Ranges, and western Mojave Desert (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from the Sacramento Valley as well as from Butte and Colusa counties (CNPS 2019; Jepson Flora Project 2019). It typically grows in valley and foothill grassland, chenopod scrub, and cismontane woodland. The microhabitat for recurved larkspur includes alkaline soils in valley saltbush and valley chenopod scrub (CDFW 2019). Threats to this species include agricultural conversion, grazing,

trampling, and non-native plants. This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to recurved larkspur to: *Less than Significant with Mitigation Incorporated*.

Dwarf downingia (*Downingia pusilla*)

Dwarf downingia has a CRPR of 2B.2 but is not listed under FESA or CESA. This species is an annual herb in the bellflower family, and it blooms from March to May (CNPS 2019). The current range of this species in California includes the southern Outer North Coast Ranges, Inner North Coast Ranges, Sacramento Valley, northern and central San Joaquin Valley, and northern San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019). It typically grows in valley and foothill grassland and vernal pools (CNPS 2019). The microhabitat for dwarf downingia includes vernal lake and pool margins and a variety of vernal pool types (CDFW 2019). Threats to this species include urbanization, development, agriculture, grazing, non-native plants, vehicles, and industrial forestry. (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat and vernal pools will be avoided so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to dwarf downingia.

Mt. Diablo buckwheat (*Eriogonum truncatum*)

Mt Diablo buckwheat has a CRPR of 1B.1 but is not listed under FESA or CESA. This species is an annual herb in the buckwheat family, and it blooms from April to September, sometimes into December (CNPS 2019). It is endemic to California, and its current range includes the Sacramento-San Joaquin Delta region of the Central Valley (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Solano County. It typically grows in chaparral, coastal scrub, and valley and foothill grassland (CNPS 2019). The microhabitat for Mt. Diablo buckwheat includes dry, exposed clay or sandy substrates (CDFW 2019). Threats to this species include trampling, non-native plants, and urbanization (CNPS 2019). Potentially suitable habitat for Mt. Diablo buckwheat is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to Mt. Diablo buckwheat to: *Less than Significant with Mitigation Incorporated*.

Jepson's coyote thistle (*Eryngium jepsonii*)

Jepson's coyote-thistle has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is a perennial herb in the carrot family, and it blooms from April to August (CNPS 2019). It is endemic to California, and its current range includes the southern Inner North Coast Ranges, the Sacramento-San Joaquin Delta region of the Central Valley, and the San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019). It typically grows in valley and foothill grassland and vernal pools (CNPS 2019). The microhabitat for Jepson's coyote-thistle includes clay soils (CDFW 2019). Threats to this species include development (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Jepson's coyote thistle to: *Less than Significant with Mitigation Incorporated*.

Delta button-celery (*Eryngium racemosum*)

Delta button-celery has a CRPR of 1B.1 and is listed as Endangered under CESA but is not listed under FESA. This species is an annual or sometimes perennial herb in the carrot family, and it blooms from June to October (CNPS 2019). It is endemic to California, and its current range includes the northern Sierra Nevada Foothills and northern San Joaquin Valley (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from San Joaquin County. It typically grows in riparian scrub in vernally mesic clay depressions (CNPS 2019). The microhabitat for Delta button-celery includes seasonally inundated floodplains on clay (CDFW 2019). Threats to this species include agriculture, non-native plants, and flood control activities (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to Delta button-celery to: *Less than Significant with Mitigation Incorporated*.

Spiny-sepaled button-celery (*Eryngium spinosepalum*)

Spiny-sepaled button-celery has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is an annual or perennial herb in the carrot family, and it blooms from April to June (CNPS 2019). It is endemic to California, and its current range includes the southern Sierra Nevada Foothills and the San Joaquin Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in valley and foothill grassland and vernal pools (CNPS 2019). The microhabitat for spiny-sepaled button-celery includes clay soil of granitic origin and vernal pools within grassland (CDFW 2019). Threats to this species include development, grazing, road maintenance, hydrological alterations, and agriculture (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to spiny-sepaled button-celery to: *Less than Significant with Mitigation Incorporated*.

Diamond-petaled California poppy (*Eschscholzia rhombipetala*)

Diamond-petaled California poppy has a CRPR of 1B.1 but is not listed under FESA or CESA. This species is an annual herb in the poppy family, and it blooms from March to April (CNPS 2019). It is endemic to California, and its current range includes the western San Joaquin Valley and eastern San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Contra Costa, Colusa, and Stanislaus counties. It typically grows in valley and foothill grassland (CNPS 2019). The microhabitat for diamond-petaled California poppy includes alkaline clay slopes and flats (CDFW 2019). Threats to this species include agriculture and grazing (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to diamond-petaled California poppy to: *Less than Significant with Mitigation Incorporated*.

San Joaquin spearscale (*Extriplex joaquinana*)

San Joaquin spearscale has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is an annual herb in the goosefoot family, and it blooms from April to October (CNPS 2019). It is endemic to California, and its current range includes the Inner North Coast Ranges, Central Valley, San Francisco Bay Area, and Inner South Coast Ranges (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Santa Clara, San Joaquin, and Tulare counties. It typically grows in chenopod scrub, meadows and seeps, playas, and valley and foothill grassland (CNPS 2019). The microhabitat for San Joaquin spearscale includes seasonal alkali wetlands or alkali sink scrub (CDFW 2019). Threats to this species include grazing, agriculture, development, and non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to San Joaquin spearscale to: *Less than Significant with Mitigation Incorporated*.

Stinkbells (*Fritillaria agrestis*)

Stinkbells has a CRPR of 4.2 but is not listed under FESA or CESA. This species is a perennial bulbiferous herb in the lily family, and it blooms from March to June (CNPS 2019). It is endemic to California, and its current range includes the Inner North Coast Ranges, Sierra Nevada Foothills, Central Valley, and Central Western California (CNPS 2019, Jepson Flora Project 2019). It is

presumed extirpated from Santa Cruz and San Mateo counties. It typically grows in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland (CNPS 2019). The microhabitat for stinkbells includes non-native grasslands or grassy openings in clay soil, sometimes on serpentine (CDFW 2019). Threats to this species include development, grazing, vehicles, and non-native plants (CNPS 2019). Potentially suitable habitat for stinkbells is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range and contains no serpentine soils.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to stinkbells to: *Less than Significant with Mitigation Incorporated*.

Fragrant fritillary (*Fritillaria liliacea*)

Fragrant fritillary has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is a perennial bulbiferous herb in the lily family, and it blooms from February to April (CNPS 2019). It is endemic to California, and its current range includes the Sacramento Valley and Central Western California (CNPS 2019, Jepson Flora Project 2019). It typically grows in cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland (CNPS 2019). The microhabitat for fragrant fritillary includes grassland on various soils though usually on clay, and often on serpentine (CDFW 2019). Threats to this species include grazing, agriculture, urbanization, and non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to fragrant fritillary to: *Less than Significant with Mitigation Incorporated*.

Boggs Lake hedge-hyssop (*Gratiola heterosepala*)

Boggs Lake hedge-hyssop is listed as Endangered under CESA and has a CRPR of 1B.2 but is not listed under FESA. This species is an annual herb in the plantain family, and it blooms from April to August (CNPS 2019). The current range of this species in California includes the Inner North Coast Ranges, Cascade Ranges, northern and central Sierra Nevada Foothills, Central Valley, and the Modoc Plateau (CNPS 2019, Jepson Flora Project 2019). It typically grows in lake margins, marshes and swamps, and vernal pools (CNPS 2019). The microhabitat for Boggs Lake hedge-hyssop includes clay soils in vernal pools or lake margins (CDFW 2019). Threats to this species include agriculture, development, grazing, trampling, and vehicles (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Boggs Lake hedge-hyssop to: *Less than Significant with Mitigation Incorporated*.

Diablo helianthella (Helianthella castanea)

Diablo helianthella has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is a perennial herb in the sunflower family, and it blooms from March to June (CNPS 2019). It is endemic to California, and its current range includes the northern Central Coast and northern San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Marin and San Francisco counties. It typically grows in broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland (CNPS 2019). The microhabitat for Diablo helianthella includes interfaces between chaparral and oak woodland in rocky, azonal soils, often in partial shade (CDFW 2019). Threats to this species include urbanization, grazing, fire suppression, road maintenance, recreational activities, and non-native plants (CNPS 2019). This species has low potential to occur within the Study Area based on the presence of marginally suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Diablo helianthella to: *Less than Significant with Mitigation Incorporated*.

Brewer's western flax (*Hesperolinon breweri*)

Brewer's western flax has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is an annual herb in the flax family, and it blooms from May to July (CNPS 2019). It is endemic to California, and its current range includes the southern Inner North Coast Ranges, northwestern San Joaquin Valley, and northeastern San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019). It typically grows in chaparral, cismontane woodland, and valley and foothill grassland (CNPS 2019). The microhabitat for Brewer's western flax includes rocky serpentine soil within chaparral and grasslands (CDFW 2019). Threats to this species include development and the construction of Los Vaqueros Reservoir (CNPS 2019). This species has low potential to occur within the Study Area based on the presence of marginally suitable habitat so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to Brewer's western flax.

Hogwallow starfish (*Hesperevax caulescens*)

Hogwallow starfish has a CRPR of 4.2 but is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from March to June (CNPS 2019). It is endemic to California, and its current range includes

the Inner North Coast Ranges, Cascade Range Foothills, northern and southern Sierra Nevada Foothills, Central Valley, and Outer South Coast Ranges (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Napa and San Diego counties. It typically grows in valley and foothill grassland and vernal pools (CNPS 2019). The microhabitat for hogwallow starfish includes clay soils and mesic sites (CDFW 2019). Threats to this species include development, agriculture, and overgrazing (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to hogwallow starfish to: *Less than Significant with Mitigation Incorporated*.

Woolly rose-mallow (*Hibiscus lasiocarpos* var. *occidentalis*)

Woolly rose-mallow has a CRPR of 1B.1 but is not listed under FESA or CESA. This species is a perennial rhizomatous herb in the mallow family, and it blooms from June to September (CNPS 2019). It is endemic to California, and its current range includes the Cascade Range Foothills, central and southern Sacramento Valley, and the Sacramento-San Joaquin Delta region of the Central Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in marshes and swamps (CNPS 2019). The microhabitat for woolly rose-mallow includes moist, freshwater-soaked river banks and low peat islands in sloughs; it can also occur on riprap and levees (CDFW 2019). Threats to this species include habitat disturbance, development, agriculture, recreational activities, and channelization of the Sacramento River and its tributaries. It is also threatened by weed control measures and erosion (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to wooly rose-mallow to: *Less than Significant with Mitigation Incorporated*.

Carquinez goldenbush (*Isocoma arguta*)

Carquinez goldenbush has a CRPR of 1B.1 but is not listed under FESA or CESA. This species is a perennial shrub in the sunflower family, and it blooms from August to December (CNPS 2019). It is endemic to California, and its current range includes the southern Sacramento Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in alkaline valley and foothill grassland (CNPS 2019). The microhabitat for Carquinez goldenbush includes alkaline soils, flats, and lower hills, on low benches near drainages and on tops and sides of mounds in swale habitat (CDFW 2019). Threats to this species include grazing, trampling, development and agriculture (CNPS 2019). Potentially suitable habitat for Carquinez goldenbush is present within the Study Area.

However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to Carquinez goldenbush to: *Less than Significant with Mitigation Incorporated*.

Northern California black walnut (*Juglans hindsii*)

Northern California black walnut has a CRPR of 1B.1 but is not listed under FESA or CESA. This species is a perennial deciduous tree in the walnut family, and it blooms from April to May (CNPS 2019). It is endemic to California but has been used widely as rootstock for the English walnut (*J. regia*) with which it readily hybridizes, as well as in horticultural plantings, and is considered naturalized throughout much of its present range. Its historic range includes the southern Inner North Coast Ranges, southern Sacramento Valley, northern San Joaquin Valley, and San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019), but only three, possibly four extant occurrences in Contra Costa, Sacramento, and Napa counties have been confirmed to occur prior to extensive European settlement of California, and only these have generally been accepted as indigenous. Only one of these occurrences is considered a viable population (Potter, et al. 2018). It is presumed extirpated from Sacramento, Solano, and Yolo counties. It typically grows in riparian forest and riparian woodland (CNPS 2019). The microhabitat for Northern California black walnut includes deep alluvial soil associated with creeks or streams (CDFW 2019). Threats to this species include hybridization with orchard trees, urbanization, and conversion to agriculture (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to Northern California black walnut to: *Less than Significant with Mitigation Incorporated*.

Contra Costa goldfields (*Lasthenia conjugens*)

Contra Costa goldfields is listed as Endangered under FESA and has a CRPR of 1B.1, but is not listed under CESA. This species is an annual herb in the sunflower family, and it blooms from March to June (CNPS 2019). It is endemic to California, and its current range includes the southern Sacramento Valley, Central Coast, and San Francisco Bay Area. It was formerly found in the North Coast, Outer North Coast Ranges, and South Coast (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Mendocino, Santa Barbara, and Santa Clara counties. It typically grows in cismontane woodland, playas, valley and foothill grassland, and vernal pools (CNPS 2019). The microhabitat for Contra Costa goldfields includes vernal pools, swales, and low depressions in open grassy areas (CDFW 2019). Threats to this species include development, habitat alteration, hydrological alterations, overgrazing, and non-native plants

(CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Contra Costa goldfields to: *Less than Significant with Mitigation Incorporated*.

Ferris' goldfields (*Lasthenia ferrisiae*)

Ferris' goldfields has a CRPR of 4.2, but is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from February to May (CNPS 2019). It is endemic to California, and its current range includes the Sacramento Valley and San Joaquin Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in vernal pools (CNPS 2019). The microhabitat for Ferris' goldfields includes alkaline clay soils (CDFW 2019). Threats to this species include development, agriculture, vehicles, and foot traffic (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Ferris' goldfields to: *Less than Significant with Mitigation Incorporated*.

Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*)

Coulter's goldfields has a CRPR of 1B.1, but is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from February to June (CNPS 2019). The current range of this species in California includes the Inner North Coast Ranges, southern Sierra Nevada Foothills, Tehachapi Mountains Area, the Central Valley, Central Western California, the South Coast, northern Channel Islands, Peninsular Ranges, and western Mojave Desert (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Kern, Los Angeles, and San Bernardino counties. It typically grows in marshes and swamps, playas, and vernal pools (CNPS 2019). The microhabitat for Coulter's goldfields includes alkaline soils, playas, sinks, and grasslands (CDFW 2019). Threats to this species include urbanization, agricultural development, road maintenance, foot traffic, and drought (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Coulter's goldfields to: *Less than Significant with Mitigation Incorporated*.

Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*)

Delta tule pea has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is a perennial herb in the pea family, and it blooms from May to July

(CNPS 2019). It is endemic to California, and its current range includes the Sacramento Valley and San Joaquin Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in marshes and swamps (CNPS 2019). The microhabitat for Delta tule pea includes freshwater and brackish marshes, usually on marsh and slough edges (CDFW 2019). Threats to this species include agriculture, water diversions, and erosion (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to Delta tule pea to: *Less than Significant with Mitigation Incorporated*.

Legenere (*Legenere limosa*)

Legenere has a CRPR of 1B.1 but is not listed under FESA or CESA. This species is an annual herb in the bellflower family, and it blooms from April to June (CNPS 2019). It is endemic to California, and its current range includes the southern North Coast Ranges, southern Sacramento Valley, northern San Joaquin Valley, and San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Stanislaus County. It typically grows in vernal pools (CNPS 2019). The microhabitat for legenere includes beds of vernal pools (CDFW 2019). Threats to this species include grazing, road widening, non-native plants, and development (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to legenere to: *Less than Significant with Mitigation Incorporated*.

Heckard's pepper-grass (*Lepidium latipes* var*. heckardii*)

Heckard’s pepper-grass has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is an annual herb in the mustard family, and it blooms from March to May (CNPS 2019). It is endemic to California, and its current range includes the North Coast, North Coast Ranges, Central Valley, Central Coast, San Francisco Bay Area, Inner South Coast Ranges, and South Coast (CNPS 2019, Jepson Flora Project 2019). It typically grows in valley and foothill grassland (CNPS 2019). The microhabitat for Heckard’s pepper-grass includes alkaline soils in grassland and sometimes vernal pool edges (CDFW 2019). Threats to this species include disking for fire protection, trampling, and grazing (CDFW 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Heckard’s pepper-grass to: *Less than Significant with Mitigation Incorporated*.

Mason's lilaeopsis (*Lilaeopsis masonii*)

Mason's lilaeopsis has a CRPR of 1B.2 and is listed as Rare under CESA. It is not listed under FESA. This species is a perennial rhizomatous herb in the carrot family, and it blooms from April to November (CNPS 2019). It is endemic to California, and its current range includes the southern Sacramento Valley, northern San Joaquin Valley, Central Coast, and northeastern San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019). It typically grows in marshes and swamps and riparian scrub (CNPS 2019). The microhabitat for Mason's lilaeopsis includes tidal zones in muddy or silty soil formed through river deposition or river bank erosion. It can be found in both brackish or freshwater (CDFW 2019). Threats to this species include erosion, channel stabilization, development, flood control projects, recreation, agriculture, shading that results from marsh succession, and competition with non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, MM BIO-19 and MM BIO-20 would reduce potential impacts to Mason's lilaeopsis to: *Less than Significant with Mitigation Incorporated*.

MM BIO-20: Botanical Avoidance Zones

> Soil investigation activities will not be conducted within the intertidal zone of rivers or sloughs, as well as on in-channel islands, or shoals. If work in these areas is necessary, the Impact Area will be surveyed by a qualified botanist during tidal conditions that expose the intertidal area where Delta mudwort or Mason's lilaeopsis would occur. If Delta mudwort or Mason's lilaeopsis are identified, they will be flagged or mapped with a GPS for avoidance.

Delta mudwort (*Limosella australis*)

Delta mudwort has a CRPR of 2B.1 but is not listed under FESA or CESA. This species is a perennial stoloniferous herb in the figwort family, and it blooms from May to August (CNPS 2019). The current range of this species in California includes the Sacramento-San Joaquin Delta region of the Central Valley, and the Central Coast (CNPS 2019, Jepson Flora Project 2019). It typically grows in marshes and swamps and riparian scrub (CNPS 2019). The microhabitat for delta mudwort includes mud banks in marshy or scrubby riparian associations (CDFW 2019). Threats to this species include stream bank alteration, levee maintenance, erosion, recreational activities, and foot traffic (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, MM BIO-19 and MM BIO-20 would reduce potential impacts to Delta mudwort to: *Less than Significant with Mitigation Incorporated*.

Showy golden madia (*Madia radiata*)

Showy golden madia has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from March through May (CNPS 2019). It is endemic to California, and its current range includes the San Joaquin Valley, San Francisco Bay Area, and Inner South Coast Ranges (CNPS 2019; Jepson Flora Project 2019). It typically grows in cismontane woodland and valley and foothill grassland (CNPS 2019). The microhabitat for showy golden madia includes adobe clay soils in grassland and among shrubs (CDFW 2019). Threats to this species include grazing and non-native species (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would reduce potential impacts to showy golden madia to: *Less than Significant with Mitigation Incorporated*.

Little mousetail (*Myosurus minimus* ssp. *apus*)

Little mousetail has a CRPR of 3.1, but it is not listed under FESA or CESA. This species is an annual herb in the buttercup family, and it blooms from March through June (CNPS 2019). Its current range in California includes the South Coast, Peninsular Ranges, Mojave Desert, Tehachapi Mountains Area, Inner North Coast Ranges, and the Central Valley (CNPS 2019). It typically grows in valley and foothill grassland and vernal pools (CNPS 2019). The microhabitat for little mousetail includes alkaline soils (CDFW 2019). Threats to this species include vernal pool habitat loss, grazing, development, and agriculture (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to little mousetail to: *Less than Significant with Mitigation Incorporated*.

Hoary navarretia (*Navarretia eriocephala*)

Hoary navarretia has a CRPR of 4.3 but it is not listed under FESA or CESA. This species is an annual herb in the phlox family, and it blooms from May to June (CNPS 2019). It is found in the Sacramento Valley, the northern and central Sierra Nevada Foothills, Inner North Coast Ranges, and the eastern San Francisco Bay Area (CNPS 2019; Jepson Flora Project 2019). It typically grows in cismontane woodland and valley and foothill grassland (CNPS 2019). The microhabitat for hoary navarretia includes vernally mesic sites (CDFW 2019). Threats to this species have not been identified (CNPS 2019). Potentially suitable habitat for hoary navarretia is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-18 and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to hoary navarretia.

Tehama navarretia (*Navarretia heterandra*)

Tehema navarretia has a CRPR of 1B.1 but it is not listed under FESA or CESA. This species is an annual herb in the phlox family, and it blooms from April to June (CNPS 2019). It is found in the Sacramento Valley, the northern Sierra Foothills, and the North Coast Ranges (CNPS 2019; Jepson Flora Project 2019). It typically grows in valley and foothill grassland (CNPS 2019). The microhabitat for Tehema navarretia is mesic sites in grassland or vernal pools (Calflora 2018; CNPS 2018). There are no listed threats to this species (CNPS 2019). Potentially suitable habitat for Tehema navarretia is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range and vernal pools will be avoided so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 19 would further avoid, minimize and/or reduce the potential for impacts to Tehema navarretia.

Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*)

Baker’s navarretia has a CRPR of 1B.1 but it is not listed under FESA or CESA. This species is an annual herb in the phlox family, and it blooms from April to July (CNPS 2019). It is endemic to California, and its current range includes the Klamath Ranges, North Coast Ranges, High Cascades Range, western Sacramento Valley, and northern San Francisco Bay Area (CNPS 2019; Jepson Flora Project 2019). It typically grows in cismontane woodland, meadows and seeps, vernal pools, valley and foothill grassland, and lower montane coniferous forest (CNPS 2019). The microhabitat for Baker’s navarretia is vernal pools and swales with adobe or alkaline soils (CDFW 2019). Threats to this species include development, habitat alteration, road construction, agriculture, and potentially non-native plants (CNPS 2019). Potentially suitable habitat for Baker’s navarretia is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18 and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to Baker’s navarretia.

Adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*)

Adobe navarretia has a CRPR of 4.2 but is not listed under FESA or CESA. This species is an annual herb in the phlox family, and it blooms from April to June (CNPS 2019). It is endemic to California, and its current range includes the Inner North Coast Ranges, Sierra Nevada Foothills, Tehachapi Mountains Area, the

Central Valley, and South Coast Ranges (CNPS 2019, Jepson Flora Project 2019). It typically grows in valley and foothill grassland and vernal pools (CNPS 2019). The microhabitat for adobe navarretia includes clay soils and sometimes serpentine (CDFW 2019). Threats to this species include grazing (CNPS 2019). Potentially suitable habitat for adobe navarretia is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range and vernal pools will be avoided so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to adobe navarretia.

Shining navarretia (*Navarretia nigelliformis* ssp. *radians*)

Shining navarretia has a CRPR of 1B.2 but it is not listed under FESA or CESA. This species is an annual herb in the phlox family, and it blooms from April to July, and sometimes in March (CNPS 2019). It is endemic to California, and its current range includes the Central Valley, southern Sierra Nevada Foothills, and South Coast Ranges (CNPS 2019, Jepson Flora Project 2019). It typically grows in cismontane woodland, vernal pools, and valley and foothill grassland. Threats to this species include development, grazing, and competition from non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to shining navarretia to: *Less than Significant with Mitigation Incorporated*.

Prostrate vernal pool navarretia (*Navarretia prostrata*)

Prostrate vernal pool navarretia has a CRPR of 1B.1 but is not listed under FESA or CESA. This species is an annual herb in the phlox family, and it blooms from April to July (CNPS 2019). It is endemic to California, and its current range includes the western San Joaquin Valley, Central Coast, San Francisco Bay Area, South Coast Ranges, central South Coast, and Peninsular Ranges (CNPS 2019, Jepson Flora Project 2019). It typically grows in coastal scrub, meadows and seeps, valley and foothill grassland, and vernal pools (CNPS 2019). The microhabitat for prostrate vernal pool navarretia includes mesic sites with alkaline soils (CDFW 2019). Threats to this species include vehicles, road maintenance, and recreational activities (CNPS 2019). Potentially suitable habitat for prostrate vernal pool navarretia is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range and vernal pools will be avoided so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to prostrate vernal pool navarretia.

Colusa grass (*Neostapfia colusana*)

Colusa grass is listed as Threatened under FESA, Endangered under CESA, and has a CRPR of 1B.1. This species is an annual herb in the grass family, and it blooms from May through August (CNPS 2019). It is endemic to California, and its current range includes the Central Valley in Colusa, Merced, Solano, and Stanislaus counties (CNPS 2019; Jepson Flora Project 2019). However, it is presumed extirpated from Colusa County. It typically grows in large vernal pools with adobe soils (CNPS 2019). Colusa grass is threatened by agriculture, development, overgrazing, hydrological alterations, non-native plants, and habitat fragmentation and loss (CNPS 2019). Potentially suitable habitat for Colusa grass is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range .

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Colusa grass to: *Less than Significant with Mitigation Incorporated*.

Slender Orcutt grass (*Orcuttia tenuis*)

Slender Orcutt grass is listed as Threatened under FESA, Endangered under CESA, and has a CRPR of 1B.1. This species is an annual herb in the grass family, and it blooms from May to September (CNPS 2019). It is endemic to California, and its current range includes the Inner North Coast Ranges, Cascade Ranges, Sacramento Valley, and Modoc Plateau (CNPS 2019, Jepson Flora Project 2019). It typically grows in vernal pools (CNPS 2019). The microhabitat for slender Orcutt grass includes gravelly substrates (CDFW 2019). Threats to this species include agriculture, residential development, grazing, trampling, vehicles, recreational activities, logging, fire, and non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to slender Orcutt grass to: *Less than Significant with Mitigation Incorporated*.

Sacramento Orcutt grass (*Orcuttia viscida*)

Sacramento Orcutt grass is listed as Endangered under FESA and CESA, and has a CRPR of 1B.1. This species is an annual herb in the grass family, and it blooms from April to July (CNPS 2019). It is endemic to California, and its current range is limited to the Sacramento Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in vernal pools (CNPS 2019). Threats to this

species include agriculture, urbanization, overgrazing, vehicles, and non-native plants (CNPS 2019). Potentially suitable habitat for Sacramento Orcutt grass is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range and vernal pools will be avoided so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to Sacramento Orcutt grass.

Hairless popcornflower (*Plagiobothrys glaber*)

Hairless popcornflower has a CRPR of 1A but is not listed under FESA or CESA. This species is an annual herb in the forget-me-not family, and it blooms from March to May (CNPS 2019). It is endemic to California, and its current range includes the Central Coast and southern San Francisco Bay Area (CNPS 2019, Jepson Flora Project 2019); however, the last confirmed sighting of this species was in 1954 and it is presumed extirpated from all counties in which it was previously found (Alameda, Marin, San Benito, and Santa Clara). It typically grows in meadows and seeps and marshes and swamps (CNPS 2019). The microhabitat for hairless popcorn flower includes coastal salt marshes and alkaline meadows (CDFW 2019). Threats to this species have not been identified (CNPS 2019). Potentially suitable habitat for bearded popcornflower is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range and wetlands will be avoided so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to hairless popcornflower.

Bearded popcornflower (*Plagiobothrys hystriculus*)

Bearded popcornflower has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the borage family, and it blooms from April through May (CNPS 2019). It is endemic to California, and its current range includes the southwestern Sacramento Valley and the southeastern Inner North Coast Range (CNPS 2019; Jepson Flora Project 2019). It typically grows in vernal pools and mesic sites within valley and foothill grassland (CNPS 2019). Bearded popcornflower is threatened by disking, development, and non-native plants (CNPS 2019). Potentially suitable habitat for bearded popcornflower is present within the Study Area. However, this species has low potential to occur within the Study Area because the Study Area is located on the edge of its known range and vernal pools will be avoided so potential impacts would be *less than significant*.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would further avoid, minimize and/or reduce the potential for impacts to bearded popcornflower.

Eel-grass pondweed (*Potamogeton zosteriformis*)

Eel-grass pondweed has a CRPR of 2B.2, but it is not listed under FESA or CESA. This species is an annual aquatic herb in the pondweed family, and it blooms from June through July (CNPS 2019). The current range of this species in California includes the southern Inner North Coast Range, Central Valley, and Modoc Plateau (CNPS 2019; Jepson Flora Project 2019). It typically grows in freshwater marshes and swamps (CNPS 2019). The microhabitat for Eel-grass pondweed includes ponds, lakes, and streams (CDFW 2019). There are no listed threats to this species (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to eel-grass pondweed to: *Less than Significant with Mitigation Incorporated*.

California alkali grass (*Puccinellia simplex*)

California alkali grass has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is an annual herb in the grass family, and it blooms from March to May (CNPS 2019). The current range of this species in California includes the Tehachapi Mountains Area, the Central Valley, San Francisco Bay Area, and western Mojave Desert (CNPS 2019, Jepson Flora Project 2019). It is presumed extirpated from Kings County. It typically grows in chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools (CNPS 2019). The microhabitat for California alkali grass includes alkaline, vernally mesic sinks, flats, and lake margins (CDFW 2019). Threats to this species include hydrological alterations, urbanization, agricultural conversion, development, habitat fragmentation, and solar energy development (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to California alkali grass to: *Less than Significant with Mitigation Incorporated*.

Sanford's arrowhead (*Sagittaria sanfordii*)

Sanford’s arrowhead has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is a perennial rhizomatous herb in the water-plantain family, and it blooms from May through November (CNPS 2019). It is endemic to California, and its current range includes the northern North Coast, Klamath Ranges, Cascade Range Foothills, Central Valley, and northern South Coast (CNPS 2019; Jepson Flora Project 2019). However, it is presumed extirpated

from the South Coast region, including Orange and Ventura counties. It typically grows in shallow freshwater marshes and swamps (CNPS 2019). The microhabitat for Sanford's arrowhead includes standing or slow-moving freshwater ponds, marshes, and ditches (CDFW 2019). Sanford's arrowhead is threatened by grazing, development, recreational activities, non-native plants, road widening, and channel alteration and maintenance (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to Sanford's arrowhead to: *Less than Significant with Mitigation Incorporated*.

Marsh skullcap (*Scutellaria galericulata*)

Marsh skullcap has a CRPR of 2B.2, but it is not listed under FESA or CESA. This species is a perennial rhizomatous herb in the mint family, and it blooms from June through September (CNPS 2019). The current range of this species in California includes the northern High Sierra Nevada, Modoc Plateau, and the Sacramento-San Joaquin Delta region of the Central Valley (CNPS 2019; Jepson Flora Project 2019). It typically grows in lower montane coniferous forest, meadows and seeps, and marshes and swamps (CNPS 2019). The microhabitat for marsh skullcap includes swamps and wet places (CDFW 2019). Marsh skullcap is threatened by hydrological alterations, recreational activities, and non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to marsh skullcap to: *Less than Significant with Mitigation Incorporated*.

Side-flowering skullcap (*Scutellaria lateriflora*)

Side-flowering skullcap has a CRPR of 2B.2, but it is not listed under FESA or CESA. This species is a perennial rhizomatous herb in the mint family, and it blooms from July through September (CNPS 2019). The current range of this species in California includes the Sacramento-San Joaquin Delta region of the Central Valley, and Saline Valley in the Great Basin (CNPS 2019; Jepson Flora Project 2019). It typically grows in meadows and seeps, and marshes and swamps (CNPS 2019). The microhabitat for side-flowering skullcap includes wet meadows and marshes, and on logs in the Sacramento-San Joaquin Delta (CDFW 2019). There are no listed threats to this species (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to side-flowering skullcap to: *Less than Significant with Mitigation Incorporated*.

Keck's checkerbloom (*Sidalcea keckii*)

Keck's checkerbloom is listed as Endangered under FESA and it has a CRPR of 1B.1, but it is not listed under CESA. This species is an annual herb in the mallow family, and it blooms from April through June (CNPS 2019). It is endemic to California, and its current range includes the southern Inner North Coast Range, and the central and southern San Francisco Bay Area (CNPS 2019; Jepson Flora Project 2019). It typically grows in cismontane woodland and valley and foothill grasslands (CNPS 2019). The microhabitat for Keck's checkerbloom includes grassy slopes in blue oak woodland on serpentine-derived, clay soils (CDFW 2019). There are no listed threats to this species (CNPS 2019). This species has low potential to occur within the Study Area because there is limited appropriate habitat and it is on the edge of the species range.

Implementation of Mitigation Measures MM BIO-18, and MM BIO-19 would reduce potential impacts to Keck's checkerbloom to: *Less than Significant with Mitigation Incorporated*.

Long-styled sand-spurrey (*Spergularia macrotheca* var. *longistyla*)

Long-styled sand-spurrey has a CRPR of 1B.2 but is not listed under FESA or CESA. This species is an annual herb in the pink family, and it blooms from February to May (CNPS 2019). It is endemic to California, and its current range includes the Inner North Coast Ranges and the Central Valley (CNPS 2019, Jepson Flora Project 2019). It typically grows in meadows and seeps and marshes and swamps (CNPS 2019). The microhabitat for long-styled sand-spurry includes alkaline soil (CDFW 2019). Threats to this species include development, habitat alteration, agriculture, and hydrological alterations (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to long-styled sand-spurrey to: *Less than Significant with Mitigation Incorporated*.

Suisun Marsh aster (*Symphyotrichum lentum*)

Suisun Marsh aster has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is a perennial rhizomatous herb in the sunflower family, and it blooms from April through November (CNPS 2019). It is endemic to California, and its current range includes the southern Sacramento Valley, Central Coast, and San Francisco Bay Area (CNPS 2019; Jepson Flora Project 2019). It typically grows in brackish and freshwater marshes and swamps (CNPS 2019). Suisun Marsh aster is most often seen along sloughs with Phragmites, Scirpus, Rubus, and Typha (CDFW 2019). Suisun Marsh aster is threatened by marsh habitat alteration and loss, erosion, herbicide application, and non-native plants. (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-18, and MM BIO-19 would reduce potential impacts to Suisun marsh aster to: *Less than Significant with Mitigation Incorporated*.

Wright's trichocoronis (*Trichocoronis wrightii* var. *wrightii*)

Wright's trichocoronis has a CRPR of 2B.1, but it is not listed under FESA or CESA. This species is an annual herb in the sunflower family, and it blooms from May through September (CNPS 2019). The current range of this species in California includes the Central Valley and San Jacinto Valley (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from Colusa, San Joaquin, and Sutter counties. It typically grows in alkaline soils within meadows and seeps, marshes and swamps, riparian forest, and vernal pools (CNPS 2019). The microhabitat for Wright's trichocoronis includes mud flats of vernal lakes, drying river beds, and alkali meadows (CDFW 2019). Wright's trichocoronis is threatened by agriculture and urbanization (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to Wright's trichocoronis to: *Less than Significant with Mitigation Incorporated*.

Saline clover (*Trifolium hydrophilum*)

Saline clover has a CRPR of 1B.2, but it is not listed under FESA or CESA. This species is an annual herb in the legume family, and it blooms from April through June (CNPS 2019). It is endemic to California, and its current range includes the Sacramento Valley, northwestern San Joaquin Valley, Central Coast, San Francisco Bay Area, and South Coast Ranges (CNPS 2019; Jepson Flora Project 2019). It typically grows in marshes and swamps, vernal pools, and mesic, alkaline sites within valley and foothill grassland (CNPS 2019). Saline clover is threatened by development, trampling, road construction, and vehicles (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-1b, MM BIO-12, MM BIO-18, and MM BIO-19 would reduce potential impacts to saline clover to: *Less than Significant with Mitigation Incorporated*.

Caper-fruited tropidocarpum (*Tropidocarpum capparideum*)

Caper-fruited tropidocarpum has a CRPR of 1B.1, but it is not listed under FESA or CESA. This species is an annual herb in the mustard family, and it blooms from March through April (CNPS 2019). It is endemic to California, and its current range includes the northwestern San Joaquin Valley and Outer South Coast Ranges (CNPS 2019; Jepson Flora Project 2019). It is presumed extirpated from Alameda, Contra Costa, Glenn, Santa Clara, and San Joaquin counties. It

typically grows in valley and foothill grassland (CNPS 2019). The microhabitat for caper-fruited tropidocarpum includes alkaline clay soils (CDFW 2019). Caper-fruited tropidocarpum is threatened by grazing, military activities, trampling, and non-native plants (CNPS 2019). This species has moderate potential to occur within the Study Area based on the presence of potentially suitable habitat.

Implementation of Mitigation Measures MM BIO-18, and MM BIO-19 would reduce potential impacts to caper-fruited tropidocarpum to: *Less than Significant with Mitigation Incorporated*.

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

Less than Significant with Mitigation Incorporated. Fifteen sensitive natural communities were identified as having the potential to occur within the Study Area based on review of the CNDDB (CDFW 2019). These include: alkali meadow, alkali seep, northern claypan vernal pool, northern hardpan vernal pool, valley needlegrass grassland, cismontane alkali marsh, coastal and valley freshwater marsh, coastal brackish marsh, elderberry savanna, Great Valley cottonwood riparian forest, Great Valley mixed riparian forest, Great Valley valley oak riparian forest, sycamore alluvial woodland, valley sink scrub, and valley oak woodland. Further discussion of these habitat types as they relate to potential Impact Areas can be found in the species specific discussions above.

Implementation of Mitigation Measures MM BIO-12, for mitigation of potential impacts to vernal pool invertebrates, and MM BIO-1b, for mitigation of potential impacts to wetlands, would reduce potential impacts to alkali meadow, alkali seep, northern claypan vernal pool, northern hardpan vernal pool, cismontane alkali marsh, coastal and valley freshwater marsh, coastal brackish marsh, and valley sink scrub habitats to: *Less than Significant with Mitigation Incorporated*.

Implementation of Mitigation Measure MM BIO-13, for mitigation of potential impacts to Valley Elderberry Longhorn Beetle, would reduce potential impacts to elderberry savanna to: *Less than Significant with Mitigation Incorporated*.

Implementation of Mitigation Measure MM BIO-19, for mitigation of potential impacts to special-status plants as a result of minor vegetation removal, would reduce potential impacts to Great Valley cottonwood riparian forest, Great Valley mixed riparian forest, Great Valley oak riparian forest, sycamore alluvial woodland, and valley oak woodland to: *Less than Significant with Mitigation Incorporated*.

The Proposed Project would have the potential to minimally impact valley needlegrass grassland. Given the small and temporary footprint of each Impact Area, potential impacts to valley needlegrass grassland would be *Less than Significant*.

Therefore, the Proposed Project is not expected to have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations or by CDFW or the USFWS.

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?

No impact. The Proposed Project would not have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act because the Proposed Project would not subject wetlands to filling, removal, hydrological interruption or other means. Previously verified pre-jurisdictional determinations will be utilized during mapping and field visits to ensure that the Proposed Project would avoid any areas that, as determined by a wetland specialist, may require a Wetland Delineation. While there would be no impact to federally protected wetlands, implementation of Mitigation Measures MM BIO-1b and MM BIO-12 would further avoid, minimize and/or reduce the potential for impacts.

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?

Less than Significant with Mitigation Incorporated. The Proposed Project would not be expected to substantially interfere with the movement of any native or resident fish species, because the activities conducted overwater would be isolated in area and duration, and would not block, alter or degrade any of the waterways that these species are using for movement or migrations. Implementation of Mitigation Measure MM HYD-1 would reduce potential impacts to water quality to *Less than Significant with Mitigation Incorporated* (see Section 3.10, Hydrology and Water Quality). Additionally, implementation of Mitigation Measure MM BIO-14 would limit overwater work to only within the appropriate fish work window (August 1-October 31) when sensitive life stages of migratory fish would be less likely to occur in the Study Area.

The Proposed Project would not be expected to substantially interfere with established native resident or migratory corridors or interfere with the use of wildlife nursery sites, because of the limited duration and scope of each Impact Area. Additionally, the implementation of Mitigation Measures MM AES-2 and MM BIO-1 would ensure that migrating animals do not become entrapped or harmed and that no work be conducted outside of daylight hours and no artificial light sources, which could disturb nocturnal wildlife, would be used.

With the implementation of Mitigation Measures MM HYD-1, MM AES-2, MM BIO-14, and MM BIO-1 potential impacts to the movement of native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or native wildlife nursery sites would be reduced to: *Less than Significant with Mitigation Incorporated.*

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

No Impact. The Study Area overlaps six counties, each of which has a county general plan outlining goals and strategies for conservation of ecologically significant lands, wetlands, plant and wildlife habitat; protection of rare, threatened and endangered species of fish, wildlife and plants, significant plant communities, and other resources which stand out as unique because of their scarcity, scientific value, aesthetic quality or cultural significance; and encouragement of the preservation and restoration of the natural characteristics of each county.

The Proposed Project would not conflict with the policies and strategies outlined in the 2030 County Wide General Plan for Yolo County (Yolo County 2009), the Contra Costa County General Plan 2005-2020 (CCCDCD 2005), the San Joaquin County General Plan Policy Document (Mintierharnish Planning Consultants 2016), the East County Area Plan: A Portion of the Alameda County General Plan (ACCDAPD 1994), the Solano County General Plan (Solano County 2008) and the Sacramento County General Plan of 2005 – 2030 (Sacramento County 2011).

While there would be no impact regarding local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinances, implementation of Mitigation Measure MM AES-1, MM AES-2, MM BIO-1 through 20, MM HYD-1 and MM HAZ-1 through 4 would further avoid, minimize and/or reduce the potential for impacts.

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?

Less than Significant Impact. The Study Area overlaps four Habitat Conservation Plans (HCP) and one Habitat Conservation Strategy:

- San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) (San Joaquin County 2000),
- Yolo County NHP (ICF 2018),
- East Alameda County Conservation Strategy (ICF 2010),
- East Contra Costa County Habitat Conservation Plan (East Contra Costa County Habitat Conservancy 2006), and

- Solano Multispecies Habitat Conservation Plan (LSA 2012).

The portion of the Study Area that overlaps the SJMSCP is the Primary Zone for the Delta section. The goal of the Plan is to balance the conservation of open space and the need to convert open space to other uses while providing long-term management for biological resources, preserving land-owner rights, protecting the agricultural economy and accommodating population growth. The plan does not consider geotechnical or soil surveys to be site disturbing activities (San Joaquin County 2000) provided the sampling does not alter the hydrology of any wetland or alter the continuing occupation by any species of fish, wildlife or plant. The Proposed Project would be a series of discreet soil investigations, would fully avoid any wetland resources and would not alter species site occupations, therefore it would not conflict with the SJMSCP.

The portion of the Study area that overlaps with the Yolo County NHP would be in the eastern edge and includes planning units 21 (West Sacramento) and 15 (South Yolo Basin). The goal of the Yolo County HCP is to provide ESA permits and associate mitigation for development and infrastructure projects for the 50-year life of the document. Covered activities as defined by the HCP include urban or rural development, infrastructure, utilities, agricultural development, open space, aggregate mining, operations and maintenance, conservation strategy implementation and neighboring landowner protection. These activities are generally understood to have ground-disturbing effects, require vegetation management or have indirect effects on listed species. The Proposed Project would not conflict with the Yolo County HCP because ground-disturbing effects would be limited and temporary in nature, and vegetation management would be minimal.

The portion of the Study Area that overlaps with the East Alameda County Conservation Strategy is the northeastern tip and includes Conservation Zone 7. The goal of the East Alameda County Conservation Strategy is to provide baseline biological resource and conservation priority inventories that can be used during project planning and permitting. As an informational program that seeks to help project proponents with permitting processes, the Proposed Project would not conflict with the goals outlined.

The portion of the Study Area that overlaps with the East Contra Costa County HCP would be in the southeast edge and includes Acquisition Analysis Zones 6d and 6e. The purpose of the East Contra Costa HCP is to protect and enhance the functions and ecological diversity of eastern Contra Costa County, by establishing guidelines to avoid, minimize, and mitigate, impacts on covered species and their habitats and wetlands within the region, while addressing the needs for urban expansion, infrastructure construction and ongoing operations and maintenance activities. The HCP seeks to obtain authorizations for take of covered species for covered activities. Geotechnical or soil investigation activities are not within the defined covered activities for the HCP. The Proposed Project would not conflict with the East

Contra Costa County HCP because ground-disturbing effects would be limited and temporary in nature, and vegetation management would be minimal.

The portion of the Study Area that overlaps with the Solano Multispecies Habitat Conservation Plan is in the southeastern edge of the Plan area north of Rio Vista and is encompassed by Covered Activity Zone 3. The goals of the Solano Multispecies HCP are to preserve endangered species and habitats, maintain biodiversity, and allow for a healthy economy, private property rights and ongoing maintenance and operations. The activities planned within the Study Area are not included within the covered activities listed for Zone 3 within the HCP. The Proposed Project would not conflict with the Solano Multispecies Habitat Conservation Plan because ground-disturbing effects would be limited and temporary in nature, and vegetation management would be minimal.

While the Proposed Project would have a less than significant impact in regards to conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan, implementation of Mitigation Measures AES-1, MM AES-2, MM BIO-1 through 20, MM HYD-1 and MM HAZ-1 through 4 would further avoid, minimize and/or reduce the potential for impacts.

3.5 Cultural Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
a) Would the project cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☒	☐	☐
b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☐	☒	☐	☐
c) Would the project disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐

3.5.1 Environmental Setting

The archaeological record in the region of this Study Area is part of the established chronology of the Central Valley region of California, which includes the Sacramento Valley, San Joaquin Valley, and the Sacramento-San Joaquin Delta. Prehistoric resources that have been identified and located thus far in the Delta sub-region date back to as early as 8550 calibrated (cal) years Before Christ (B.C.). While there is potential for resources to exist dating to 11550 cal B.C. or earlier, archaeological deposits having these dates would be associated with landforms that have either been destroyed by natural processes or are deposited under more recent alluvial deposits (Rosenthal et al. 2007; Rosenthal and Meyer 2004). More frequently uncovered in the Study Area sub region are deposits associated with the Middle and Upper Archaic through the Emergent Period (5550 cal B.C. – European Contact).

Areas along waterways, especially rivers, floodplains, and alluvial fans, and high-elevation points near these features, are highly sensitive for cultural deposits due to a long-standing tendency to rely on waterways as a water source, food source, and as a convenient transportation route (be it travel on land or water). High elevation points along these waterways are common locations of prehistoric mounds and middens, which are complex deposits of cultural materials and organic matter, sometimes including human burials and occupation features that can be found subsurface as deep as 3.5 meters depending on the age, soil deposition pattern, and length of occupation (Rosenthal et al. 2007). This is particularly important to note as mounds were densely located along major waterways according to early-twentieth century documentation (one mound every 2-3 miles) (Schenck and Dawson 1929). Many of these were disturbed or obscured by agricultural development, levee construction, and erosion (Rosenthal et al. 2007), but this does not mean the cultural material is not still present within these areas.

Historical-to-modern aged artificial fills and cuts (including levees, sloughs, canals, and dredge spoils) are not easy to predict for buried deposits as prehistoric material was frequently ignored before federal regulations were established to protect archaeological material. During construction of these features, archaeological sites of any age, including prehistoric mounds, were frequently disturbed via cuts, used as artificial fill for structures such as levees, or were completely buried underneath artificial fill. There is little way to predict the likelihood of encountering deposits within these features without some form of explicit geoarchaeological testing, as they cannot be predicted for with currently available process-based models (Meyer and Rosenthal 2007).

There is a moderate to high potential for encountering surface and buried deposits from the historic era (post-European contact, but especially since circa. 1850) throughout the Study Area (Rosenthal and Meyer 2004; Meyer and Rosenthal 2007; Meyer and Rosenthal 2008; Reynolds 2012). This material is the most likely to be well preserved and closest to the surface, though sometimes can extend quite deep due to features such as historically sealed wells and privies. Historic-era resources are likely to be encountered no matter the geological age, especially in the Study Area, as historical maps for these areas indicate structures, trails/wagon roads, and properties dating back to at least 1850 (BLM 2019; USGS 2019). Historic era cultural resources also include levees, railroads, roads, and other built environment structures older than 50 years that are within the Study Area for this Proposed Project, such as Levee Unit 115.

This Proposed Project also requires consideration of the underwater archaeological record due to overwater boring activity. The rivers were used for transportation both prehistorically and historically within the region, and the Sacramento River has one of the better researched histories for maritime activity. Tule balsa boats, dugout canoes, and reed balsa boats were used for activities such as fishing along the lower Sacramento River by Patwin, Nisenan, and Miwok tribes respectively (CSLC 1988). European ships started exploring up the Sacramento River as early as 1772, and regular traffic along the river became established in 1839 with the founding of Sacramento by John Sutter and the development of surrounding settlements and ranches (CSLC 1988). There are at least 100 historic shipwrecks known from archival

research that occurred in the Sacramento River between Sacramento City and Sherman Island alone. Many of these have not been relocated, with only rough estimations as to their locations established by the Shipwreck Database and previous research by the California State Lands Commission (CSLC 1988; CSLC 2019); however, some historical shipwrecks have been encountered during previous projects, and locations of these have been recorded in the California Historical Resources Information System (CHRIS). The potential for encountering historical material is higher than for prehistoric within submerged contexts due to a tendency of poor preservation of organic material in water.

3.5.1.1 Regulatory Setting

Cultural resources include any artifact, object, building, structure, site, shipwreck, area, or place that is historical and/or archaeological in nature. State laws and regulations providing the definitions, protections, and management of cultural resources relevant to this Proposed Project include:

- California Environmental Quality Act, Pub. Resources Code, sections 21083.2 and 21084.1
- California Environmental Quality Act, CEQA Guidelines section 15064.5
- California Public Resources Code sections 5020.1, 5024 et seq. and 5097.98
- California Health and Safety Code sections 7050.5(b)and 7050.5(c)

3.5.1.2 Methods and Cultural Resource Inventory Findings

For the purposes of the Cultural Resources Review, each individual Impact Area was assessed with a 60-foot radius buffer (i.e. 120-foot diameter buffer) for equipment staging and accessibility. Geophysical Lines were assessed using a 20-foot buffer for the same purposes. Previous studies and recorded cultural resources within a 0.25-mile radius buffer were searched for and examined in addition to the Impact Area to help evaluate the potential sensitivity for cultural resources within the proposed Study Area.

CHRIS record searches from the Northwest Information Center (NWIC), North Central Information Center (NCIC), and the Central California Information Center (CCaIC) were conducted to identify all previously recorded cultural resources and any resources listed in or eligible for listing in the California Register of Historical Resources and/or the National Register of Historic Places. A Native American Heritage Commission (NAHC) Sacred Lands File search request for the Study Area was also made and found 3 of the quadrangles within the Study Area as having Sacred Lands on file. A search of the Office of Coast Survey’s Automated Wreck and Obstruction Information System (AWOIS) was additionally conducted to locate any potential underwater cultural resources as part of the survey effort (Office of Coast Survey 2018). Previously conducted geoarchaeological sensitivity studies covering the Study Area (Rosenthal and Meyer 2004; Meyer and Rosenthal 2007; Meyer and Rosenthal 2008; Reynolds 2012), producing maps and data on the likelihood of encountering buried deposits based on local geology, soil deposition processes, landforms, and radiocarbon data

were reviewed. Also examined were historical maps (BLM 2019; USGS 2019) and aerial photography (NETR 2019). Finally, information on previous pedestrian surveys within the Study Area was examined from CHRIS data and DWR projects recorded in the Cultural Resources Section's Geodatabase.

Only approximately 22% of the Impact Areas have previous field studies (including survey coverage, subsurface testing, and/or excavations) reported that we know of at this time. Of the areas previously studied, there are nine previously recorded cultural resources within the Study Area, three of which have not been previously evaluated for eligibility as a historical resource for the California Register of Historic Resources (CRHR). Two of these have been provided recommendations for ineligibility based on an examination of past studies and information about the resource. No previously identified cultural resources, including those potentially eligible as historic properties, are located within the Impact Areas for the overwater boring locations. In addition, no locations from the AWOIS are located within those Impact Areas. Table 5 summarizes all previously recorded cultural resources within the study area.

P-39-004492 is the only previously recorded resource that has both built environment and archaeological components. The resource was not officially evaluated but was suggested to have potential eligibility for the CRHR under Criteria 1, 2, and 4 in 2003 (Kelley and Huster 2003). The report suggested that the potential for data under criteria 3 would have been located near the farmhouse structures, outside of this project's Study Area. Unfortunately, all built environment components of the site, except for the levees along the borders of the site, were removed as part of preparation for housing development by 2006 according to the site record. This was confirmed by examining aerial photography from 2005 and 2009 (NETR 2019). The site record additionally noted that test trenches had been excavated by LSA Associates, Inc., in 2006, and that only recent materials had been found. Based on this information, the site is lacking in the necessary integrity that could make it eligible under Criteria 1-4 for both the built environment and archaeological components. Therefore, this site is recommended ineligible for CRHR.

P-07-004730 was previously evaluated as ineligible for the NRHP (Germano 2005) and the evaluation was concurred on by the Office of Historic Preservation in 2006. The ineligibility evaluation for the NRHP for P-07-004730 provides enough information to justify a recommendation that the resource should also be evaluated as ineligible for CRHR.

P-57-000132 is previously unevaluated because, in studies where it has been within the project area, cultural resource specialists tend to concur that the oak tree groves and associated natural habitat are not possible to define as either an archaeological or historical resource (Peirce 2017; Scher et al. 2018). Though the valley oaks may technically be old enough to count as historic in age, they are naturally occurring groves. Thus, this resource is considered ineligible for CRHR. However, this does not preclude this resource from being considered a Tribal Cultural Resource as valley oaks

were considered important resources, including for food and for construction, by various tribes (Anderson 2005).

For the purposes of this study, P-57-000596, which is located within the Study Area and has not been evaluated, is assumed to be eligible for the California Register of Historic Resources (CRHR) and a historical resource under CEQA. Those resources that have either been previously recommended as historical resources or listed as historical resources for CRHR are also treated as historical resources within this study. Thus, there are five previously recorded historical resources within the study area: P-07-004698, P-34-001497, P-34-002102, P-34-002143, and P-57-000596.

Table 6: Cultural Resources within Study Area

Resource Number	Resource Type	Resource Description	Eligibility for California Register of Historic Resources
P-07-004698	Historic	DFD Facilities - Forebay, Levee, Gates, etc.	Recommended eligible under Criteria 1 and 3 (ICF 2013)
P-07-004730	Historic	Canal	Recommended ineligible
P-34-001497 (CA-SAC-1092H)	Historic	Railroad (Walnut Grove Branch - So. Pacific Railroad)	Listed eligible under Criteria 1 and 3
P-34-002102	Historic	vegetation/ landscaping/ ranch	Listed eligible by keeper of property under Criteria 2 and 3
P-34-002143	Historic	Levee Unit 115	Recommended ineligible as stand-alone resource, eligible under Criterion 1 as district component (Prince-Buitenhuys et al. 2019)
P-39-004492	Historic	Farmhouse, associated structures, and levee	Unevaluated, recommended ineligible (NETR 2019; site record; Kelley and Huster 2003)
P-48-000787	Historic	Levee	Recommended ineligible (Sikes and Arrington 2012)
P-57-000132	N/A	Naturally occurring valley	Unevaluated (Recommended ineligible)

		oak groves and riparian habitat	(Peirce 2017; Scher et al. 2018)
P-57-000596	Historic	Tree Rows	Unevaluated

3.5.2 Discussion

a) Would this project cause a substantial adverse change in the significance of a historical resource pursuant to section 15064.5?

Less than Significant with Mitigation Incorporated. The Proposed Project as designed would not cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5 of the CEQA guidelines. Of the locations in the Study Area previously studied, amounting to approximately 22% of the Study Area, the majority of the locations have no known historical resources. There are five previously recorded historical resources (P-07-004698, P-34-001497, P-34-002102, P-34-002143, P-57-000596) that overlap with 34 Impact Areas. Of these 34 Impact Areas, 31 are boring units and three are CPT units. The CPT units overlap with P-34-001497 and P-39-004492 exclusively.

Impact Areas that would be located on top of or near a levee feature would have no substantial adverse change the resource, and due to the limited nature of the Proposed Project activities, important aspects of a levee's or railroad alignment's integrity or characteristics that depends on environmental factors around the feature (specifically categories of setting, feeling, location, and design) would not be significantly damaged.

No soil exploration would occur on top of recorded structures/features or in a spot that would impact structural integrity of those resources, and incorporation of mitigation measure MM BIO-1 ensures that no trees would be damaged. For known recorded historical resources, as well as the remaining 78% of the Study Area that has not undergone previous field studies, incorporation of mitigation measures MM CUL-1, CUL-2, CUL-3, and CUL-4 (below) would further reduce potential effects to previously unidentified historical resources to a less than significant level.

MM CUL-1:

a. All soil investigation locations would be reviewed by a qualified archaeologist to evaluate the potential for impacts, if any, to cultural resources.

b. Locations that have no previous survey coverage must be surveyed by, or under the direct supervision of a qualified archaeologist prior to the start of any ground disturbing activities.

c. If the archaeologist observes cultural or potential tribal cultural resources within the Impact Area or associated resource buffer as identified by a qualified archaeologist, the location will be shifted the minimum distance necessary to reduce the potential for significant cultural resource impacts without significantly increasing potential impacts to other resources.

d. A tribal representative from the consulting tribes will be invited to participate in the pre-activity field visits and archaeological surveys in Impact Areas specified as an area of interest/concern during consultation by that consulting tribe/tribes.

e. Consulting tribes will be informed of any potential tribal cultural resources located within the study area specified as an area of interest/concern by a consulting tribe/tribes.

f. If a suitable location cannot be determined within adjacent areas, then the soil investigation at that location would not be conducted.

MM CUL-2:

a. Should any unexpected cultural resources be exposed during project activities, all work would immediately stop in the immediate vicinity (e.g. 100 feet) of the find until it can be evaluated by a qualified archaeologist and an appropriate plan of action can be determined in consultation with the State Office of Historic Preservation, as necessary.

b. If the resource is associated with Native American contexts or is a potential Tribal Cultural Resource and is within a region specified as an area of interest/concern by a consulting tribe/tribes, the appropriate consulting tribal entity/entities will be contacted and consulted with to produce an appropriate plan of action.

MM CUL-3:

Should human remains be discovered during the course of project activities, all work would stop immediately in the vicinity (e.g. 100 feet) of the finds until they can be verified. The coroner would be contacted in accordance with Health and Safety Code section 7050.5(b). Protocol and requirements outlined in Health and Safety Code sections 7050.5(b) and 7050.5(c) as well as Public Resources Code section 5097.98 would be followed.

MM CUL-4:

Cultural sensitivity training will be provided for the environmental monitors and individuals conducting the field activities and geological analysis to

ensure awareness about cultural resources, including identification of and proper protocol for handling any unexpected finds.

Most overwater boring locations have not been previously surveyed (only two of 57 have been subject to underwater remote sensing survey; ICF 2012; Panamerican Consultants 2010). As the boring locations are underwater, a pedestrian survey of the Area of Potential Effect (APE) is unfeasible, but pre-activity site visits as discussed in MM-CUL-1 will still be conducted near the water on land to evaluate possibilities based on what is visible from the land. This, along with underwater hazard surveys planned as part of the project description, will provide sufficient field coverage for cultural resources avoidance for overwater areas that have not been previously examined. This is because they will identify any signs of structures, shipwrecks, objects, or other forms of obstructions underwater and allow the boring location to be adjusted within the APE to avoid hitting the obstruction.

For previously undiscovered historical resources that may be located subsurface, MM CUL-2 through MM CUL-4 will provide training to those that will be present during the soil investigations activities at the locations that have been cleared by MM-CUL-1 and will aid in identification and prevention of substantial impacts to any sub-surface previously undiscovered resources that may appear during boring and CPT activities. Geophysical studies that do not involve any soil penetration would not be at risk of damaging any sub-surface deposits.

b) Would this project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

Less than Significant with Mitigation Incorporated. The Proposed Project as designed would not cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines section 15064.5. There are no known previously recorded archaeological resources within the Study Area. Incorporation of mitigation measure MM CUL-1 would further reduce potential impacts to less than significant for any unique archeological resources not currently recorded. MM CUL-2 through MM CUL-4 will provide training to those that will be present during the soil investigations activities at the locations that have been cleared by MM-CUL-1 and will aid in identification and prevention of substantial impacts to any previously undiscovered unique archaeological resources that may appear during boring and CPT activities. Geophysical studies that do not involve any soil penetration will not be at risk of damaging any sub-surface deposits.

c) Would this project disturb any human remains, including those interred outside of formal cemeteries?

Less than Significant with Mitigation Incorporated. No known locations of human remains are located within the Study Area. The Proposed Project would not disturb any human remains with known locations, including those interred outside of formal cemeteries. Incorporation of MM CUL-1 through AMM CUL-4 would ensure that any

potential impacts to known and previously undiscovered human remains would be reduced to less than significant.

3.6 Energy

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation?	☐	☐	☒	☐
b) Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

3.6.1 Environmental Setting

Energy systems in California include electricity from renewable and non-renewable sources, natural gas, petroleum, and other fuels. The production of electricity requires the consumption or conversion of energy resources, including natural gas, coal, hydropower, nuclear, and renewable sources such as wind, solar, geothermal, and biomass/ cogeneration, into energy. Energy production and energy use both result in the depletion of nonrenewable resources (e.g., oil, natural gas, coal, etc.) and emission of pollutants.

According to the California Energy Commission, gasoline remains the dominant fuel within the transportation sector, with diesel fuel and aviation fuels following. In 2016, California consumed approximately 15 billion gallons of gasoline and approximately 3.35 billion gallons of diesel fuel. An increasing amount of electricity is being used for transportation energy, which is chiefly attributed to the acceleration of light-duty plug-in electric vehicles. In 2016, transportation in California consisting of light-duty vehicles, medium/heavy-duty vehicles, trolleys, and rail transit consumed approximately 1.53 million megawatt hours (CEC 2017).

The California Air Resources Board's (CARB) On-Road Heavy-Duty Diesel Vehicles (Truck and Bus) Regulation requires diesel trucks that operate in California to be upgraded to reduce emissions. Lighter and older heavier trucks must be replaced starting in 2015. By 2023 nearly all trucks would have 2010 model year engines or

equivalent. In 2020, only vehicles compliant with the Truck and Bus regulation will be eligible for registration in California (CARB 2019). The In-Use Off-Road Diesel Vehicle Regulation is intended to reduce emissions from in-use, off-road, heavy-duty diesel vehicles in California by impose limits on idling, requiring all vehicles to be reported to CARB, restrict the addition of older vehicles into fleets, and require fleets to reduce emissions by retiring, replacing, or repowering older engines, or installing exhaust retrofits. The In-Use Off-Road Diesel Vehicle Regulation would subsequently help to improve fuel efficiency and reduce GHG emissions.

3.6.2 Discussion

a) Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Less than Significant Impact. The Proposed Project involves soil investigations and would consume energy in the form of gasoline and diesel fuel through the operation of drill rigs, heavy off-road equipment, trucks, worker traffic, and barge or drill ship usage during project activities. There is no operational energy use associated with the Proposed Project. Consumption of energy resources would be temporary, localized, and would cease upon the completion of activities. Additionally, vehicles used for Proposed Project activities would be required to comply with all federal and state efficiency standards. The temporary nature of the Proposed Project ensures project activities would not result in wasteful, inefficient, or unnecessary energy consumption. While there would be a less than significant impact regarding wasteful, inefficient, or unnecessary consumption of energy resources, implementation of Mitigation Measure MM GHG-1 would further avoid, minimize and/or reduce the potential for impacts.

b) Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

No impact. The Proposed Project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. Proposed Project activities would employ efficient vehicles in compliance with CARB standards, is temporary in nature, and would not include generating or altering an existing energy source. Therefore, the Proposed Project would have no impact as it would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

3.7 Geology and Soils

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
c) Would the project result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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 Proposed Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geological feature?	☐	☐	☐	☒

3.7.1 Environmental Setting

The Study Area consists of on-land and overwater Impact Areas distributed across six counties: Alameda, Contra Costa, Sacramento, San Joaquin, Solano and Yolo Counties. The California Geologic Survey of California Department of Conservation has determined the Impact Areas within Contra Costa, Sacramento, San Joaquin, Solano and Yolo Counties to be mostly composed of quaternary deposits of alluvium, lake,

playa and terrace deposits that are both consolidated and semi-consolidated throughout the Central Valley. In Alameda County, we can expect the soil to both have characteristics of quaternary deposits listed above and Mesozoic sedimentary and metasedimentary rocks, specifically, upper cretaceous sandstone, shale and conglomerate rock material (CDC 2010a).

Based on available web soil surveys and the vast distribution of the Impact Areas we can generalize that the surface soils will likely consist of alternating layers of silts, clays, loams and sand with some gravels which are underlain by either sedimentary rock or quaternary deposits (USDA 2019).

An “active” fault is one that shows displacement within the last 11,000 years and, therefore, is considered more likely to generate a future earthquake than a fault that shows no sign of recent rupture. The California Geologic Survey has mapped various active and inactive faults in the region. There are several active faults located within or surrounding all six counties overlapping the Study Area: Antioch, Calaveras, Cleveland Hills, Concord, Greenville-Marsh Creek, Hayward, San Andreas, San Joaquin and Sierra Nevada Faults. There is a generally low to moderate liquefaction potential at and around several Impact Areas.

3.7.2 Discussion

a) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)

Less than Significant Impact. As with the entire San Francisco Bay Area, the southern Impact Areas are subject to strong ground motion resulting from earthquakes on nearby faults. No Impact Areas are within a currently designated Alquist-Priolo Earthquake Fault Zone (CDC 2015a). Additionally, the footprint of each Impact Area is small and temporary. Additionally, the limited nature of the Proposed Project minimizes potential adverse impacts related to ruptures of known earthquake faults. While there would be a less than significant impact, implementation of Mitigation Measures MM AES-1 and MM AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

ii) Strong seismic ground shaking?

Less than Significant Impact. The Impact Areas are in a seismically active region that has historically been affected by strong seismic ground shaking. Ground shaking is a general term referring to all aspects of motion of the earth’s surface resulting from an earthquake and is normally the major cause of damage in

seismic events. The extent of ground shaking associated with an earthquake depends on the magnitude and intensity of the earthquake, distance from the epicenter, and local geologic conditions. Major active faults in the region that could cause ground shaking at the Impact Areas include Antioch, Calaveras, Cleveland Hills, Concord, Greenville-Marsh Creek, Hayward, San Andreas, San Joaquin and Sierra Nevada Faults. The closest active fault is the Greenville-Marsh Creek Fault, which is located 9 miles southwest of the most southern Impact Area. The most recent seismic event occurred in January of 1980 when two earthquakes of Richter magnitude 5.5 and 5.8 occurred along this fault (McJunkin and Ragsdale 1980). The Impact Areas are small, work would be temporary, and not anticipated to cause enough ground disturbance to result in strong seismic shaking. While there would be a less than significant impact, implementation of Mitigation Measures MM AES-1 and AGR-1 would further avoid, minimize and/or reduce the potential for impacts..

iii) Seismic-related ground failure, including liquefaction?

No Impact. Liquefaction is the transformation of saturated, loose, fine-grained sediment to a fluid-like state because of earthquake shaking or other rapid loading. Soils most susceptible to liquefaction are loose to medium dense, saturated sands, silty sands, sandy silts, non-plastic silts and gravels with poor drainage, or those capped by or containing seams of impermeable sediment. According to the USGS Susceptibility Map of the San Francisco Bay Area, the proposed activities are in regions designated as a low to moderate risk of liquefaction (ABAG 2018, CDC 2010b). However, due to recent earthquake activity in 1980 on the Greenville-Marsh Creek Fault which resulted in no liquefaction, and the limited footprint of each soil exploration, ground failure including liquefaction is not expected to occur. While there would be no impact, implementation of Mitigation Measures MM AES-1 and AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

iv) Landslides?

No impact. Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes in areas with significant ground slopes. Geotechnical investigation record information did not identify landslides as a potential hazard in the Impact Areas. The Impact Areas are not located in areas susceptible to landslide risk and there are no mapped areas of landslide deposits larger than 200 feet (CDC 2015b). The criteria used to delineate the relative hazard areas included the nature of the geologic materials underlying the surface, the steepness of slopes, the presence or absence of visible slope failures, and the presence or absence of active forces that could cause failures. The Impact Areas are in relatively flat areas, which do not have a potential for landslide. Therefore, the Proposed Project would have no impact.

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

Less than Significant Impact. The footprint of each Impact Area is small (only includes the soil investigation site itself and the area required for parking for field personnel), temporary, and would not involve significant alterations to the topsoil (only the soil borehole/CPT hole itself would affect topsoil). While there would be a less than significant impact to soil erosion or the loss of top soil, implementation of Mitigation Measures MM AES-1 and AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

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?

No Impact. DWR geologists considered the suitability of the geologic units for soil investigation in their siting of proposed Impact Areas. If the soil is deemed unstable by a geologist during the reconnaissance site visits required as part of the Proposed Project, or at any time thereafter, the Impact Area will be moved to decrease potential of on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Because the Proposed Project requires avoidance of these types of risks/impacts, no impact is anticipated as a result of the Proposed Project.

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

No Impact. Expansion and contraction of volume can occur when expansive soils undergo alternating cycles of wetting (swelling) and drying (shrinking). During these cycles, the volume of the soil changes. Expansive soils are common throughout California and can cause damage to foundations and slabs unless properly treated during construction. The Proposed Project does not include the construction of any structures that, when built on expansive soils, may result in direct or indirect risk to life or property. While there would be no impact, implementation of Mitigation Measures MM AES-1 and AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No impact. Septic tanks and alternative wastewater disposal systems would not be installed on the Impact Areas. Therefore, no impact is anticipated as a result of the Proposed Project.

f) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No impact. There are no known unique paleontological resources or sites or unique geologic features within the Impact Areas that would be directly or indirectly destroyed during work or from work completed. While there are no current maps that

can be referenced to confirm the presence or absence of unique paleontological resources or sites or unique geologic features, based upon the small footprint of the rigs, including that these rigs are typically deployed on existing anthropological features (roads, levees, barges, etc), no impact is anticipated (Pers Comm. Margaret Janes 2019). Therefore, no impact is anticipated as a result of the Proposed Project.

3.8 Greenhouse Gas Emissions

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☒	☐	☐

3.8.1 Environmental Setting

In May 2012, DWR adopted the DWR Climate Action Plan-Phase I: Greenhouse Gas Emissions Reduction Plan (GGERP), which details DWR's efforts to reduce its greenhouse gas (GHG) emissions consistent with Executive Order S-3-05 and the Global Warming Solutions Act of 2006 (Assembly Bill 32). DWR also adopted the Initial Study/Negative Declaration prepared for the GGERP in accordance with the CEQA Guidelines review and public process. The GGERP (DWR 2012) provides estimates of historical (back to 1990), current, and future GHG emissions related to operations, construction, maintenance, and business practices (e.g. building-related energy use). The GGERP specifies aggressive 2020 and 2050 emission reduction goals and identifies a list of GHG emissions reduction measures to achieve these goals.

DWR specifically prepared its GGERP as a "Plan for the Reduction of Greenhouse Gas Emissions" to meet the requirements of CEQA Guidelines section 15183.5. That section provides that such a document, which must meet certain specified requirements, "may be used in the cumulative impacts analysis of later projects." Because global climate change, by its very nature, is a global cumulative impact, an individual project's compliance with a qualifying GHG Reduction Plan may suffice to mitigate the project's incremental contribution to that cumulative impact to a level that is not "cumulatively considerable." (See CEQA Guidelines, § 15064, subd. (h)(3). More specifically, "later project-specific environmental documents may tier from and/or incorporate by

reference" the "programmatic review" conducted for the GHG emissions reduction plan. "An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project." (CEQA Guidelines § 15183.5, subd. (b)(2).)

Section 12 of the GGERP outlines the steps that each DWR project will take to demonstrate consistency with the GGERP. These steps include:

a. Analysis of GHG emissions from construction of the Proposed Project,

b. Determination that the construction emissions from the Proposed Project do not exceed the levels of construction emissions analyzed in the GGERP,

c. Incorporation of DWR's project level GHG emissions reduction strategies into the design of the Proposed Project,

d. Determination that the Proposed Project does not conflict with DWR's ability to implement any of the "Specific Action" GHG emissions reduction measures identified in the GGERP, and

e. Determination that the Proposed Project would not add electricity demands to the State Water Project system that could alter DWR's emissions reduction trajectory in such a way as to impede its ability to meet its emissions reduction goals.

Consistent with these requirements, a GGERP Consistency Determination Checklist is attached as Appendix B, documenting that the Proposed Project has met each of the required elements.

3.8.2 Discussion

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

Less than Significant. GHG emissions for the Proposed Project have been calculated to be 6,203.2 $mtCO_{2e}$ (Appendix B). Based on the analysis provided in the GGERP and the demonstration that the Proposed Project is consistent with the GGERP (as shown in the attached Consistency Determination Checklist), DWR as the lead agency has determined that the Proposed Project's incremental contribution to the cumulative impact of increasing atmospheric levels of GHGs is less than cumulatively considerable; therefore, impacts due to Proposed Project activities would be less than significant.

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

Less than Significant with Mitigation Incorporated. The State CEQA Guidelines require environmental analyses to evaluate both the level of GHG emissions associated with a project and the project's consistency with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions.

DWR has developed a GGERP (DWR 2012) to guide its efforts in reducing GHG emissions. The GHG emissions reduction measures proposed in the GGERP were developed for the purpose of reducing emissions of GHGs in California as directed by Executive Order S-3-05 and Assembly Bill 32. DWR has established the following GHG Emissions Reduction Goals:

- Reduce GHG emissions from DWR activities by 50% below 1990 levels by 2020; and

- Reduce GHG emissions from DWR activities by 80% below 1990 levels by 2050.

Pre-construction and Final Design BMPs from the GGERP are designed to ensure that individual projects are evaluated, and their unique characteristics taken into consideration when determining if specific equipment, procedures, or material requirements are feasible and efficacious for reducing GHG emissions from the project. By incorporating the Pre-construction and Final Design BMPs, the Proposed Project conforms to, and would not conflict with, applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions; therefore, there would be no impact. All variances from the GGERP were approved by the DWR CEQA Climate Change Committee (Appendix B).

All applicable pre-construction and final design BMPs from the GGERP, with variances as noted above, were incorporated as mitigation measures into this document. Mitigation Measure MM GHG-1 would ensure that any impacts would be reduced to less than significant with mitigation incorporation.

MM GHG-1:

a. Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high efficiency technologies are appropriate and feasible for the project or specific elements of the project.

b. Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by the State airborne toxics control

measure [Title 13, section 2485 of the California Code of Regulations]). This requirement will be enforced by the environmental monitor.

c. Maintain all soil investigation equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition.

d. Implement tire inflation program on jobsite to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation.

e. Encourage carpools or shuttle vans for worker commutes as feasible.

3.9 Hazards and Hazardous Materials

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☒	☐	☐
b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?	☐	☒	☐	☐
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?	☐	☐	☐	☒
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?	☐	☐	☐	☒

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	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 Proposed Project result in a safety hazard or excessive noise for people residing or working in the Proposed Project area?	☐	☐	☒	☐
f) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☒	☐

3.9.1 Environmental Setting

This section addresses issues related to environmental hazards and hazardous materials in the Study Area. The Proposed Project activities require the use of minor amounts of hazardous materials, typically in the form of fuel, oil, and lubricants for equipment. Hazards include accidental spills of hazardous materials, the presence of existing subsurface contamination, the risk of wildfire, and aircraft safety. If encountered, contaminated soil can pose a health and safety threat to workers or the public.

3.9.2 Discussion

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

Less than Significant Impact with Mitigation Incorporated. The Proposed Project would not require extensive or on-going use of acutely hazardous materials or substances. Proposed Project activities would require limited transport, storage, and use of equipment and materials, and routine transport of vehicles that use hazardous materials (e.g. motor oil, gasoline, diesel), as well as limited disposal of hazardous materials. In addition, contractors that handle hazardous materials are required to have a Hazardous Materials Plan that describes the hazardous materials they use, and how the materials will be properly stored, used, transported, and disposed of. All hazardous materials would be stored and used in accordance with applicable federal, state, and local regulations, and disposed of at a properly licensed disposal facility. In addition, proper spill management, including response plans and spill kits, would be implemented and maintained onsite, as is currently required by DWR. None of the Proposed Project components would generate new sources of hazardous materials.

The potential for impacts due to hazards and hazardous materials will be reduced to less than significant with the incorporation of Mitigation Measures BIO-1, regarding removal of refuse, MM-HAZ 1 and BMM-HAZ 2 regarding development of a Hazardous Materials Plan and a Spill Prevention and Response Plan.

MM HAZ-1:

a. A Plan(s) (often a contractor's safety plan) with a section on Hazardous Materials shall be written and kept on site that describes the hazardous materials used during project activities, and how the materials will be properly stored, used, transported, and disposed of. All hazardous materials shall be properly labeled and be recycled properly or disposed of at a properly licensed disposal facility.

b. The contractor shall contact the local fire agency and the local CUPA for any site-specific requirements regarding hazardous materials or hazardous waste containment or handling.

c. If hazardous materials, such as oil, batteries or paint cans, are encountered in the Impact Area, the contractor(s) shall carefully remove and dispose of them according to the Safety Plan and Spill Prevention and Response Plan. All hazardous materials will be disposed of at a properly licensed disposal facility.

d. Contact of chemicals with precipitation shall be minimized by storing chemicals in watertight containers or in a storage shed (completely enclosed), with appropriate secondary containment to prevent any spillage or leakage.

e. Quantities of toxic materials, such as equipment fuels and lubricants, shall be stored with secondary containment that is capable of containing 110% of the primary container(s).

f. Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials shall not contact soil and not be allowed to enter surface waters or the storm drainage system.

g. All toxic materials, including waste disposal containers, shall be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water.

h. Sanitation facilities (e.g., portable toilets) shall be sited in a manner that avoids any direct connection to the storm drainage system or receiving water.

i. Sanitation facilities shall be regularly cleaned and/or replaced and inspected daily for leaks and spills.

MM HAZ-2:

A Plan(s) (often a contractor's safety plan) with a section on Spill Prevention and Response Plan shall be developed by the Contractor and submitted to DWR before any ground-disturbing activities in order to prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water (including untreated wastewater) into channels the following measures shall be included in the Plan:

a. All field personnel shall be appropriately trained in spill prevention, hazardous material control, and cleanup of accidental spills.

b. Equipment and materials for cleanup of spills will be available on site and spills and leaks shall be cleaned up immediately and disposed of according to guidelines stated in the Spill Prevention and Response Plan.

c. Field personnel shall ensure that hazardous materials are properly handled, and natural resources are protected by all reasonable means.

d. Spill prevention kits shall always be in close proximity when using hazardous materials (e.g., at crew trucks and other logical locations). All field personnel shall be advised of these locations.

e. Field personnel shall routinely inspect the work site to verify that spill prevention and response measures are properly implemented and maintained.

f. Field personnel will routinely inspect the work site to verify that the Spill Prevention and Response Plan is properly implemented and maintained. Staff will notify contractors immediately if there is a noncompliance issue and will require immediate correction of any noncompliant behavior.

g. Absorbent materials will be used on small spills located on impervious surface rather than hosing down the spill; wash waters shall not discharge to the storm drainage system or surface waters. For small spills on pervious surfaces such as soils, wet materials will be excavated and properly disposed rather than burying it. The absorbent materials will be collected and disposed of properly and promptly.

   As defined in 40 CFR 110, a federal reportable spill of petroleum products is the spilled quantity that:

   a) Violates applicable water quality standards;

   b) Causes a film or sheen on, or discoloration of, the water surface or adjoining shoreline; or

   c) Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

h. If a spill is reportable, the contractor will notify the DWR staff, and the DWR staff will take action to contact the appropriate safety and cleanup crews to ensure that the Spill Prevention and Response Plan is followed. A written description of reportable releases must be submitted to the Regional Board and the California Department of Toxic Substances Control (DTSC). This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases will be documented on a spill report form.

i. If a significant spill has occurred, and results determine that project activities have adversely affected surface water or groundwater quality, a detailed analysis will be performed to the specifications of DTSC to identify the likely cause of contamination. This analysis will include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, the DWR or contractors will select and implement measures to control contamination, with a performance standard that surface, and groundwater quality must be returned to baseline conditions. These measures will be subject to approval by the DWR, DTSC, and the Regional Board.

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

Less than Significant Impact with Mitigation Incorporated. The Proposed Project would require the use of vehicles and equipment that may have a slight potential for accidentally spilling oil or fuel. The previously noted Hazardous Materials Plan would include procedures for responding to accidental releases. To reduce potential impacts to less than significant, Proposed Project activities would incorporate Mitigation Measures MM HAZ-1, MM HAZ-2 and MM HAZ-3 which would be employed to prevent stockpiling and an accidental release or spill from occurring and containing an accidental release or spill if it did occur.

MM HAZ-3:

a. Stockpiling materials, portable equipment, vehicles, and supplies, including chemicals, will be restricted to areas adjacent to the drill or CPT rig, and not adjacent or within riparian and wetlands areas or other sensitive habitats

b. Stockpiling materials, portable equipment, vehicles, and supplies, including chemicals, will be restricted to docks or within the drill barge or ship.

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

No Impact. There are no schools within one-quarter mile of an Impact Area and only one school, Oak Ridge National Laboratory, Geographic Information Sciences and Technology Group, within one half mile of any Impact Area. Since significant quantities of hazardous materials would not be used during Proposed Project activities, no impacts to existing or proposed schools are anticipated to occur. While there would be no impact, implementation of Mitigation Measures MM HAZ-1, MM HAZ-2, and PUB-1 would further avoid, minimize and/or reduce the potential for impacts.

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

No Impact. The Impact Areas are not included on any lists of hazardous materials sites maintained by the State Water Resources Control Board or the Department of Toxic Substances Control that are compiled pursuant to Government Code Section 65962.5. Thus, Proposed Project activities would not create a significant hazard to the public or the environment and therefore no impacts would occur.

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

Less Than Significant Impact. The Study Area is within two miles of the Byron Airport. The Byron Airport is a public-use airport located approximately one-half mile west of the nearest Impact Area. The Proposed Project's temporary features are largely below the ground surface and would not pose a safety hazard to airport use. The Contra Costa County Airport Land Use Compatibility Plan (Schutt Moen Associates 2000) describes all Byron Airport compatibility polices that will be adhered to, to ensure safety hazards are addressed within the plan area. In addition, the Proposed Project would not involve any aircraft or helicopter uses for soil investigation activities or operations.

Proposed Project activities are expected to create minor noise of brief duration from the operation of vehicles and drill rigs associated with Proposed Project activities, that will combine with ongoing regional activities, such as traffic along State Route 4 and Byron Highway, possible rail operations of the Union Pacific Mococo line, existing air traffic from the Byron Airport, and distant industrial operations. The maximum noise from truck-mounted drill rigs and CPT rigs is 120 dba at the rig. The maximum noise from seismic geophysical surveys is 70 dba at 7 meters. While equipment is working, ambient noise levels will increase slightly. Existing activities in the area currently generate the same or more noise than would be expected from the activities of the Proposed Project. While there would be a less than significant impact, implementation of Mitigation Measures MM NOI-1, AES-2, and MM PUB 1 would further avoid, minimize and/or reduce the potential for impacts.

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

Less Than Significant Impact. During the Proposed Project period, emergency response routes and plans would not be impacted by Proposed Project activities at the Impact Areas. Proposed Project activities conducted would be of limited size and duration. While there would be a less than significant impact on the implementation of or physically interfering with an adopted emergency response plan or evacuation plan, implementation of Mitigation Measure MM PUB-1 would further avoid, minimize and/or reduce the potential for impacts.

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

Less Than Significant Impact. The California Department of Forestry and Fire Protection (CalFire) has created a severity system to rank fire hazards and examine wildland fire potential across the state. These zones found on CalFire maps account for the speed and intensity of potential fire, ability of embers to spread and multiply,

loading of fuel, topographic conditions, and local climate (e.g. temperature and likelihood of strong winds). In total, there are three CalFire designations for fire hazards, which are moderate, high, and very high. Typically, homes that are located within high or very high CalFire severity zones are considered lacking in adequate wildland or structural fire protection. CalFire has designated the Study Area as being near a moderate or high threat of fire (CalFire 2017), however, the Proposed Project itself is not likely to cause any risk of fire due to the nature of the activity. While this would be a less than significant impact, implementation of Mitigation Measures MM BIO-1 and MM HAZ-4 would further avoid, minimize and/or reduce the potential for impacts.

MM HAZ-4:

a. The contractor would develop a fire protection and prevention plan which incorporates fire safety measures on all equipment with the potential to create a fire hazard.

b. The plan would ensure that fire suppression equipment is onsite and that all employees have received appropriate fire safety training.

3.10 Hydrology and Water Quality

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☐	☐	☒
b) Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Proposed Project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
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, or through the addition of impervious surfaces, in a manner which would: a. result in substantial erosion or siltation on- or off-site? b. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite? c. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☐	☒

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Would the project in flood hazard, tsunami, or seiche zones, risk release of pollutants due to Proposed Project inundation?	☐	☐	☐	☒
e) Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

3.10.1 Environmental Setting

The Proposed Project will have on-land as well as over-water soil explorations. The Study Area stretches over a large area spanning Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties, with most of the borings being along rivers, such as the False River, Old River, Sacramento River, San Joaquin River, and a few sloughs and canals. All the Impact Areas are in or near agricultural lands with a few Impact Areas that have suburban areas nearby within the Study Area.

All the proposed Impact Areas are in the Sacramento and San Joaquin River Basins, which are under the jurisdiction of the Regional Central Valley Water Board. DWR Bulletin 118-80 identifies 63 groundwater basins in the Sacramento watershed area and 39 groundwater basins in the San Joaquin watershed area. There are additional areas not identified in the DWR Bulletin with groundwaters that have beneficial uses in the Sacramento and San Joaquin watershed areas. Groundwater levels vary from 20 feet at Grand Island to 200 feet at Hood near Merritt Island (DWR 2019).

3.10.2 Discussion

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

No Impact. The Proposed Project would not violate water quality standards, waste discharge requirements, or degrade surface and groundwater quality. Bentonite drilling fluids are considered to have very little toxicity and are the industry standard used in accordance with California regulations (Water Well Standards, DWR 74-81 and 74-90). The casing of the drill apparatus is smaller than most piers and would not impede water flow. The drilling rods, samplers, and other down-hole equipment pass through the inside of the casing, which separates them from the water. While

there would be no impact regarding violation of water quality standards or waste discharge requirements or degrading surface or groundwater quality, implementation of Mitigation Measures MM HYD-1, MM BIO-2, MM AES-1, and MM AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

MM HYD-1:

a. All fueling and maintenance of vehicles or other equipment for on-land soil investigation activities shall occur on established roads, or in designated staging areas at least 50 feet away from any on-site water feature. Secondary containment for fuel and gas tanks will be used to prevent spills from entering any water features.

b. Absorbent materials will be available on-site. Any accidental leaks or spills will be immediately cleaned up per the procedures identified in the contractors Spill Prevention and Response Plan, and the equipment will not be able to return to the project area until it has been repaired sufficiently to prevent further leaks or spills.

c. For overwater soil investigations positive barriers consisting of hay waddles and/or other suitable type of spill-stoppage materials will be placed around the work area on the barge and ship decks.

d. Discarded soil samples, cuttings, and excess drilling fluids will be kept in a closed system, to prevent spillage of the drilling fluid and will be disposed of off-site at an appropriate landfill.

e. All over-water work will include the use of conductor casings to confine the drill fluid and cuttings to the drill hole and the operating deck of the barge or drill ship and prevent any inadvertent spillage into the water. Soil samples will be collected from within the conductor casing. The casing will remain in place until the bore hole is complete and has been filled in, to minimize sediment disturbance of the slough or river bottom.

f. During overwater soil investigations a qualified environmental monitor will watch for colored plumes (an indication that drilling fluid or other material is entering the water and may affect water quality). If found, activities will cease until appropriate corrective measures have been completed or it has been determined that the environment will not be harmed.

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

No impact. The Proposed Project would not decrease groundwater supplies or interfere substantially with groundwater recharge because no water would be

pumped from any on- or off-site groundwater sources for the Proposed Project, and no changes would be made to the permeability of surfaces as a result of the work. Although the Proposed Project could bore up to 200 feet below the slough or river bottom and into the groundwater basin, the boreholes would be backfilled with cement-bentonite grout in accordance with California regulations and industry standards (Water Well Standards, DWR 74-81 and 74-90), therefore no impact on groundwater supplies, recharge or sustainable management, would occur from the Proposed Project.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces in a manner which would:

a. result in substantial on- or off-site erosion or siltation?

No Impact. Ground disturbance due to the Proposed Project only includes the boreholes or CPT holes, and is temporary. Over-water borings would be separated from the water, fully contained within the casing. Therefore, it would not result in substantial on- or off-site erosion or siltation. While there would be no impact, implementation of Mitigation Measure MM AES-1 and MM AGR-1 would further avoid, minimize and/or reduce the potential for impacts.

b. substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding?

No impact. The Proposed Project would not substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding because soil investigation activities are minimal in ground disturbance area and are temporary in nature. Soil investigation activities would not require the addition of significant areas of impervious surface therefore no impacts to rates or amount of runoff would occur.

c. 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?

No impact. The Proposed Project would not create or contribute to runoff water or provide additional sources of polluted runoff because no additional sources runoff would be generated by the Proposed Project. Bentonite drilling fluids are considered to have very little toxicity and are the industry standard used in accordance with California regulations (Water Well Standards, DWR 74-81 and 74-90), and would be fully contained within the casing. While there would be no impact, implementation of Mitigation Measures MM HYD-1, MM HAZ-1, and MM HAZ-2 would further avoid, minimize and/or reduce the potential for impacts.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Proposed Project inundation?

No impact. The Proposed Project is not located within a tsunami or seiche zone and would not affect the existing risk of flood hazard, seiche, tsunami or release of pollutants and would not increase populations located with an area subject to these risks.

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

Less than Significant Impact. The Proposed Project would not conflict with or obstruct implementation of a water quality control plan, including the Bay-Delta Water Quality Control Plan or a sustainable groundwater management plan because Proposed Project activities are limited in scope and duration. Additionally, DWR will obtain and comply with a 401 Water Quality Certification from the State Water Resources Control Board to ensure compliance with all applicable water quality standards, limitations, and restrictions. While there would be a less than significant impact, implementation of Mitigation Measures MM HYD-1, MM HAZ-1, and MM HAZ-2 would further avoid, minimize and/or reduce the potential for impacts.

3.11 Land Use and Planning

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project physically divide an established community?	☐	☐	☐	☒
b) Would the project cause significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

3.11.1 Environmental Setting

The Study Area includes portions of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo counties. Land use zoning codes in the Study Area allow a variety of uses including agriculture, outdoor recreation, wildlife habitat, public facilities, and limited areas for commercial, industrial, and rural residential development (Delta Protection Commission 2010).

3.11.2 Discussion

a) Physically divide an established community?

No impact. The Proposed Project work would be temporary in nature and limited to soil investigations which would not alter or change the existing land use and would not divide an established community. Therefore, there would be no impact.

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

No impact. Consistent with our project description, the Proposed Project work would be temporary in nature and limited to soil exploration which would not alter or change the existing land use and would not conflict with any land use plan, policy or regulation. Therefore, there would be no impact.

3.12 Mineral Resources

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☒	☐
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☒	☐

3.12.1 Environmental Setting

In order to protect valuable mineral resources, present in California, State Legislature adopted the Surface Mining and Reclamation Act (SMARA). This Act implements the "classification-designation" process that is intended to inform local agencies of mineral resource significance, their locations within County jurisdiction and to potentially aide in local land-use decisions. The Proposed Project footprint extends through six counties, general plans from these counties were used to determine mineral resource locations and correlated policies under local agency jurisdiction.

The Yolo, Sacramento and San Joaquin County General Plans indicate no known mineral resource deposits within Proposed Project Impact Areas of the three counties; however, there is potential overlap with natural gas fields. The proposed soil investigation locations may also overlap with mineral deposits in Solano County; however, limited available data makes the mineral resource significance unknown. Review of the Contra Costa and Alameda County General Plans indicates that locations of proposed soil investigations would be outside areas of known mineral resource deposits or natural gas fields in these counties.

3.12.2 Discussion

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?

Less Than Significant. According to the California Department of Conservation Division of Mines; no mining operations are known to be present within the project area. However, due to lack of data in Solano County, there is potential for the Impact Areas of the project footprint to be located over significant mineral resource deposits. Natural gas is also a potential occurrence under Impact Areas located in regions of Yolo, Sacramento and San Joaquin County. Soil investigations are the best way to gain complete understanding of subsurface geology and mineral resource deposits; the geotechnical studies for the Proposed Project will provide incidental benefits in the form of increased data collection and geological understanding. Due to there being no interruptions of existing mining operations or potential future mining opportunities in the Impact Areas, the Proposed Project will not result in loss of available known significant mineral resources.

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?

Less Than Significant. As explained in the environmental setting and answer (a) above there is potential for significant mineral deposits in Solano County, but this is uncertain due to lack of historical investigations in the area. Additionally, there are known natural gas regions in Yolo, Sacramento and San Joaquin County that have the potential to overlap with the Impact Areas for the Proposed Project. However, the activities of the Proposed Project consist of soil investigations that would result in a minimal disturbance area for each soil investigation site and site would be returned to as close to pre-activity conditions as possible. Therefore, no impact to locally important mineral resources are anticipated due to the Proposed Project.

3.13 Noise

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?	☐	☐	☒	☐
b) Would the project result in generation of excessive ground borne vibration or ground borne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☒	☐

3.13.1 Environmental Setting

The Study Area includes portions of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties. The following section describes noise sources for each county, compiled from the Delta Plan Amendments Program Environmental Impact Report. (Delta Stewardship Council 2017)

3.13.1.1 Alameda County

Stationary noise sources include agricultural operations, a school, and the C.W. “Bill” Jones Pumping Plant. Mobile sources include the following:

- Traffic noise along the corridors of Byron-Bethany Road and Interstate 580
- Aircraft from the Byron Airport
- Motorized boats in the Bethany Reservoir

Vibration sources include construction equipment and traffic on rough roads.

3.13.1.2 Contra Costa County

Stationary noise sources include agricultural operations, parks and school playing fields, landscape maintenance, marinas and boat harbors, and commercial and industrial sources. Commercial and industrial sources include heating and cooling equipment, natural gas compression stations, and heavy equipment use. Mobile sources include the following:

- Traffic noise along the corridors of SR-4 and SR-160
- Rail operations for freight and passenger traffic
- Aircraft from the Byron Airport and Buchanan Field
- Motorized boats along the San Joaquin River

Vibration sources include construction equipment, steel-wheeled trains, heavy industrial facilities, and traffic on rough roads.

3.13.1.3 Sacramento County

Mobile noise sources include agricultural operations, parks and school playing fields, landscape maintenance, and commercial and industrial sources. Commercial and industrial sources include heating and cooling equipment, natural gas compression stations, and heavy equipment use. Transportation noise sources include the following:

- Traffic along the corridors of Interstate 5 (I-5) and Interstate 80 (I-80), U.S. Highway 50 (US 50), and State Route (SR) 160
- Rail operations for freight and passenger traffic
- Aircraft associated with the Sacramento International Airport, Sacramento Executive Airport, Franklin Field Airport, and Borges-Clarksburg Airport
- Motorized boats along the Sacramento River

Vibration sources include construction equipment, steel-wheeled trains, and traffic on rough roads.

3.13.1.4 San Joaquin County

Stationary noise sources include agricultural operations, parks and school playing fields, landscape maintenance, marinas and boat harbors, and commercial and industrial sources. Commercial and industrial sources include heating and cooling equipment, natural gas compression stations, and heavy equipment use. Transportation noise sources include the following:

- Traffic along the corridors of I-5, SR-4, and SR-12
- Rail operations for freight and passenger traffic
- Aircraft from the Stockton Metropolitan Airport, Kingdon Airpark, Lodi Airport, Lodi Airpark, Tracy Municipal Airport, and New Jerusalem Airport
- Motorized boats along the San Joaquin River
- Port of Stockton shipping and good distribution activities

Vibration sources include construction equipment, steel-wheeled trains, and traffic on rough roads.

3.13.1.5 Solano County

Stationary noise sources in the county include agricultural operations, parks and school playing fields, landscape maintenance, marinas and boat harbors, and commercial and industrial sources. Commercial and industrial sources include heating and cooling equipment, natural gas compression stations, and heavy on-site equipment use. Transportation noise sources include the following:

- Traffic noise along the corridors of Interstate 680, SR-84, SR-113, SR-160, and SR-12
- Rail operations for freight and passenger traffic
- Aircraft from the Rio Vista Municipal Airport, Travis Air Force Base, and Nut Tree Airport
- Motorized boats along the Sacramento River

Vibration sources include construction equipment, steel-wheeled trains, and traffic on rough roads.

3.13.1.6 Yolo County

Stationary noise sources include agricultural operations, parks and school playing fields, landscape maintenance, marinas and boat harbors, and commercial and industrial sources. Commercial and industrial sources include heating and cooling equipment, natural gas compression stations, and heavy equipment use. Transportation noise sources include the following:

- Traffic noise along the corridors of I-5, I-80, and SR-84
- Rail operations for freight and passenger traffic

- Aircraft from the Sacramento International Airport and Bourges-Clarksburg Airport
- Motorized boats along the Sacramento River

Vibration sources include construction equipment, steel-wheeled trains, and traffic on rough roads.

3.13.2 Discussion

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

Less than Significant Impact. Noise from the geotechnical drilling equipment is generally comparable to the noise produced by diesel trucks. The maximum noise from truck-mounted drill rigs and CPT rigs is 120 dba at the rig. The maximum noise from seismic geophysical surveys is 70 dba at 7 meters. While equipment is working, ambient noise levels will increase slightly. Short-term impacts resulting from the Proposed Project include increased localized noise level and small vibrations created primarily from the drill rig engine and short durations from the Standard Penetration Tests. While impacts to noise would be less than significant, implementation of Mitigation Measures MM AES-1b and NOI-1 would further avoid, minimize and/or reduce the potential for impacts.

MM NOI-1:

All equipment will be properly tuned and shall utilize appropriate mufflers.

b) Generation of excessive ground borne vibration or ground borne noise levels?

Less than Significant Impact. The vibrations from on-land truck mounted drill rigs and CPT rigs are minimal and vibrations are typically not detectable by people outside of the immediate area. Vibrations from the EnviroVibe Minibuggy vehicle are relatively small, but mild vibrations can typically be felt by people within approximately 50 feet of the EnviroVibe Minibuggy; at 100 feet, vibrations are typically not detectible by people. The levels of vibration are much smaller than vibrations required to induce damage in buildings and infrastructure.

Vibrations from over-water soil boring explorations are minimal. The Shelby tube and piston samplers are collected by hydraulic pressure. No vibrations are produced from pushing tube samples. The Pitcher Barrel samples drills into the ground using rotary techniques (soil coring) producing no more vibrations than boring drilling. Therefore, potential impacts from the generation of ground borne vibration or noise levels would be less than significant.

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

Less Than Significant Impact. There are 20 soil investigation sites within two miles of the Byron Airport. The Byron Airport is a public-use airport located approximately one-half mile west of nearest Impact Area. The maximum noise from the closest soil investigation site which is located adjacent to Byron highway is 120 dba at the rig. The landscape surrounding the Impact Areas is considered open space with physical barriers such as hills that would dampen the noise level as it travels away from its source. Additionally, the noise would not be considerably different than that of the vehicle traffic at Byron highway. Therefore, the Proposed Project would not expose people residing or working in the vicinity of the Impact Areas to excessive noise levels, resulting in less than significant impacts.

3.14 Population and Housing

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

3.14.1 Environmental Setting

The Proposed Project locations are found within Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties.

3.14.1.1 Alameda County

The California Department of Finance estimated that the population for Alameda County is approximately 1,669,301 people, with approximately 605,977 housing units (Department of Finance 2019) throughout the 14 incorporated cities as well as the six unincorporated communities and rural areas throughout the 813 square miles of the County (Alameda County 2018).

3.14.1.2 Contra Costa County

The western and northern communities of Contra Costa County are highly industrialized, while the inland areas contain a variety of urban, suburban/residential, commercial, light industrial and agricultural uses (CCCDCD 2005). The 2019 population

estimate by the California Department of Finance indicates that Contra Costa County is home to approximately 1,155,879 residents, with approximately 416,062 housing units (Department of Finance 2019).

3.14.1.3 Sacramento County

Sacramento County covers approximately 990 square miles and has seven incorporated cities: Sacramento, Elk Grove, Citrus Heights, Folsom, Galt, Isleton, and Rancho Cordova. Sacramento County also contains a number of mature communities in the unincorporated area. Sacramento County is unique in that they have a large percentage of residents who live in the county, but not within the boundary of any of the seven incorporated cities (Sacramento County 2011). The California Department of Finance 2019 population estimate for Sacramento County is approximately 1,546,174 people, with approximately 574,449 housing units (Department of Finance 2019).

3.14.1.4 San Joaquin County

The California Department of Finance estimates that the 2019 population for San Joaquin County is approximately 770,385 people, with approximately 246,521 housing units (Department of Finance 2019). Approximately 80 percent of the San Joaquin County's population resides in the cities, and of this number, almost 54 percent are in Stockton (San Joaquin County 2015).

3.14.1.5 Solano County

Solano County encompasses approximately 910 square miles (830 square miles of land and 80 square miles of water). Approximately 128 square miles of the county, or 14 percent of the total land area, lies within seven incorporated cities: Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo (Solano County 2008). The 2019 population estimate by the California Department of Finance indicates that Solano County is home to approximately 441,307 residents, with approximately 159,586 housing units (Department of Finance 2019).

3.14.1.6 Yolo County

Yolo County includes the cities of Davis, West Sacramento, Winters and Woodland and 621,224 acres of unincorporated area. The unincorporated area contains several communities, including Capay, Clarksburg, Dunnigan, Esparto, Guinda, Knights Landing, Madison, Monument Hills, Rumsey, Yolo and Zamora (Yolo County 2009). The California Department of Finance estimates that the 2019 population of Yolo County is approximately 222,581 people, with approximately 77,679 housing units (Department of Finance 2019).

3.14.2 Discussion

a) Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No impact. The Proposed Project does not include proposing new homes or businesses, nor would it require adding roads or other infrastructure in association with the activities. Impact Areas are mostly located on or adjacent to roads and road shoulders in disturbed areas and the Proposed Project activities are minor and short in duration. For up to 15 days at each site, a limited amount of additional people and vehicles would be present in the Impact Area. Soil investigation crews would not be required to relocate to the Impact Area, and therefore would not require new homes or businesses in the area. The additional vehicles on each Impact Area would not require extensions of roads or other infrastructure. Therefore, the Proposed Project activities would not induce population growth in the area, either directly or indirectly.

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

No impact. The Proposed Project activities would be temporary, discreet work that has a small footprint at each Impact Area and would not require infrastructure. Occasionally there may need to have additional people at the Impact Areas but for standard CPT and boring field practices there would likely be six or fewer people on site regularly. Not all vehicles would be necessary for every site. Drilling locations are mostly located on or adjacent to roads and road shoulders in disturbed areas, which would not require the displacement of existing people or housing. Therefore, the Proposed Project activities do not have the potential to displace existing people or housing.

3.15 Public Services

ENVIRONMENTAL 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, or the 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 including:				
Fire protection?	☐	☐	☒	☐
Police Protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

3.15.1 Environmental Setting

The Proposed Project locations are found within Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties.

3.15.1.1 Law Enforcement

Law enforcement services in unincorporated areas are provided by county sheriff's offices. The county sheriff's offices typically administer county jails, the coroner's office, and the Office of Emergency Services. Incorporated cities have their own police departments that provide law enforcement. Services provided by police departments typically include response to calls, investigations, surveillance, and routine patrols. The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. Services provided by the CHP include law enforcement, traffic control, accident investigation, and the management of hazardous materials spills. The California Department of Fish and Wildlife is responsible for enforcing laws related to hunting and fishing (Delta Stewardship Council 2017).

3.15.1.2 Fire Protection and Emergency Medical Services

Cities, counties, and special districts provide emergency medical rescue and fire protection services. Some agencies provide advanced life support via fire department ambulances, paramedic squads, and/or by the placement of firefighter/paramedics on fire engines. Many fire districts, fire departments, and county sheriff's offices also maintain special squads or response units for handling water rescues. Medical-related emergencies constitute the majority of calls to which fire districts receive and respond, and fire suppression makes up the minority. Portions of outlying areas may also be protected by the State Department of Forestry and Fire Protection. Fire facilities are located strategically to achieve targeted response times. Factors that affect response times include circulation, development, geographic distance, and population growth. Response time goals are shorter in urban locations compared to rural areas (Delta Stewardship Council 2017).

Emergency medical services include emergency dispatch (911), ambulances, and hospitals and medical care services. Dispatch for fire and medical response is becoming increasingly regionalized and specialized, and some fire departments are involved in regional fire dispatch. Chance of survival is related to how quickly a patient receives medical attention, particularly in situations where a patient has stopped breathing or is having a heart attack. The Center for Public Safety Excellence, formerly named the Commission on Fire Accreditation International, recommends a 50-second dispatch time at least 90 percent of the time. Additional time is factored in for response once dispatch communicates the emergency to the responder. Ambulance response time standards in individual communities are based on the urban or rural character. Ambulance response times typically allow several additional minutes in rural areas compared to urban areas. Ambulance services are provided by the local fire districts or are contracted through private companies. Fire departments are equipped to provide

first responder services, including basic life support and, in some cases, advanced life support, until an ambulance service arrives. Private ambulance companies obtain operating permits to provide advanced life support and ambulance transport services within a region (Delta Stewardship Council 2017).

3.15.1.3 Hospitals

Hospitals located within the Delta counties include St. Joseph's Medical Center, Dameron Hospital, San Joaquin General Hospital, Sutter Delta Medical Center, Sutter Tracy Community Hospital, Lodi Memorial Hospital, Kaiser Foundation Hospitals, Methodist Hospital of Sacramento, Sutter Davis Hospital, Sutter Memorial Hospital, and Mercy General Hospital.

3.15.1.4 Public Schools

Services within the public-school districts range from preschool through high school levels, including traditional, alternative, and charter schools (Delta Stewardship Council 2017). Proposed Project activities will occur within or in close proximity to multiple school districts in the Delta counties, including Washington Unified School District, River Delta Joint Unified School District, Elk Grove Unified School District, Dixon Unified School District, Davis Joint Unified School District, New Hope Elementary School District, Galt Joint Union High School District, Lodi Unified School District, Tracy Unified School District, Oakley Union Elementary School District, Byron Union Elementary School District, Knightsen Elementary School District, Liberty Union High School District, Lincoln Unified School District, Mountain House Elementary School District, and Lammersville Joint Unified School District.

3.15.1.5 Libraries

Each county provides public library services to its residents, often in coordination with cities. Public libraries typically are funded by local property taxes, state funds, library fines and fees, grants, and donations. In addition to traditional services, county libraries increasingly provide additional community services such as adult literacy programs, mobile book services, children's programs, and internet access. Demand for library services is affected by population growth and demographic changes (Delta Stewardship Council 2017).

3.15.1.6 Parks

The Delta contains numerous parks, wildlife areas, ecological reserves, and open spaces. Some of these areas within or in close proximity to the Proposed Project area includes Delta Meadows, Stone Lakes National Wildlife Refuge, Cosumnes River Preserve, Brannon Island State Recreation Area, Franks Tract State Recreation Area, Vic Fazio Yolo Wildlife Area, and small public parks located within communities.

3.15.2 Discussion

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the 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?

Less than Significant Impact. Proposed Project activities are minor (requiring limited amounts of additional people and vehicles on site) and short in duration (up to 15 days per site). Proposed Project activities would not increase the demand on fire protection services, either due to an increased worker population or due to Proposed Project-related hazards. During the Proposed Project period, emergency response routes and plans would not be impacted by Proposed Project activities at each site. While a small subset of proposed soil investigation sites along Highway 160 may require flaggers or temporary lane closures, the Proposed Project would not require any road \closures. The Proposed Project would not significantly impair or interfere with emergency access, including any emergency response or evacuation routes. Service ratios, response times, and other performance objectives will not be significantly impacted during Proposed Project activities as it relates to fire protection. While there would be a Less Than Significant impact to fire protection, implementation of Mitigation Measures MM PUB-1 and TRANS-1 would further avoid, minimize and/or reduce the potential for impacts.

MM PUB-1

a. A Plan(s) (often Contractor's safety plan) with a section on Fire Protection and Prevention will be submitted to DWR for review and approval which incorporates fire safety measures on all equipment with the potential to create a fire hazard.

b. The contractor will prepare a Safety Plan in accordance with the DWR protocols.

Police protection?

No Impact. Proposed Project activities are minor (requiring limited amounts of additional people and vehicles on site) and short in duration (up to 15 days per site). During the Proposed Project period, emergency response routes and plans would not be impacted by Proposed Project activities at the site. While a small subset of proposed soil investigation sites along Highway 160 may require flaggers or temporary lane closures, the Proposed Project would not require any road or land closures. The Proposed Project would not significantly impair or interfere with

emergency access, including any emergency response or evacuation routes. Service ratios, response times, and other performance objectives will not be significantly impacted during Proposed Project activities as it relates to police protection.

Proposed Project activities would not increase the demand on police protection services, either due to an increased worker population or due to Proposed Project-related hazards and would therefore not result in impacts which would require new or additional police protection. While there would be no impact to police protection, implementation of Mitigation Measures MM PUB-1 and TRANS-1 would further avoid, minimize and/or reduce the potential for impacts.

Schools?

No impact. Proposed Project activities are minor and short in duration and will not impact service ratios or any other performance objective for schools within the Proposed Project area. Additionally, as discussed above in the Population and Housing Section, Proposed Project activities will not induce any population growth that would necessitate building new schools. Therefore, the Proposed Project activities would not result in impacts which would require new or additional schools.

Parks?

No impact. While some Proposed Project activities will occur within or in close proximity to parks, wildlife areas, ecological reserves, and open spaces, drilling locations are mostly located on or adjacent to roads and road shoulders in disturbed areas, and will only require limited amounts of additional people and vehicles at each site. Because Proposed Project activities are minor and short in duration (up to 15 days per site), disturbances to these areas will be minimal and the Proposed Project activities would not result in impacts which would require new or additional parks.

Other public facilities?

No impact. Due to the nature of Proposed Project activities (minor and occurring over a short duration of time), service ratios and other performance objectives will not be impacted during Proposed Project activities as it relates to other public facilities, including those such as hospitals and libraries. Proposed Project activities would not increase the demand on public facilities, either due to an increased worker population or due to Proposed Project-related hazards. The Proposed Project activities would not result in impacts which would require new or additional public facilities.

3.16 Recreation

ENVIRONMENTAL 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) Would the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

3.16.1 Environmental Setting

The Delta and Suisun Marsh region is a one-of-a-kind place whose mix of land and water offers diverse and authentic recreation opportunities. While privately-owned farmland is off-limits to the public, publicly-managed lands and waterways, including parks, boating facilities, some levees, and some road rights-of-way, support diverse recreation activities. Recreation opportunities include fishing, boating along miles of navigable waterways; bird watching, other nature activities, and hunting; enjoying region restaurants, campgrounds, picnic areas, and historic buildings; and events that draw visitors to taste local produce and wine and learn about this unique place (California State Parks 2011).

3.16.2 Discussion

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

No impact. The Proposed Project area is currently used for recreational activities such as boating, water skiing, fishing and other land-based activities as described

above. However, Proposed Project impacts are minor in scope and short term in duration so soil investigation activities will not significantly impair public access to these waterways or recreational facilities. Barge operations will be coordinated with the United States Coast Guard and will not impede boat traffic. The Proposed Project work would not increase the use of use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. Therefore, the Proposed Project would have no impact on use of existing parks and recreational facilities.

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

No impact. The Proposed Project is limited to soil investigations which would be limited in scope and temporary in nature. Proposed Project activities do not include construction or expansion of recreational facilities; therefore, Proposed Project activities would not require the construction or expansion of recreational facilities.

3.17 Transportation

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3 subdivision (b)?	☐	☐	☐	☒
c) Would the project substantially increase hazards due to geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Would the project result in inadequate emergency access?	☐	☐	☒	☐

3.17.1 Environmental Setting

The Study Area includes parts of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties within the Right-of-Way on local farm roads, county roads, and Caltrans highways. Alameda County, Contra Costa County, Sacramento County, San Joaquin County, Solano County, Yolo County, and Caltrans have regulatory authority over the transportation network in the Study Area. The counties establish regulations for unincorporated areas of the county and Caltrans has jurisdiction over the state highway system. The Impact Areas in the Study Area include the Right-of-Way of local farm roads on private property, county roads, and Caltrans highways.

Local traffic is subject to the policies and regulations of each county. Under Streets and Highways Code Section 1460-1470 County Road Commissioners may issue written permits authorizing making an opening or excavation for any purpose in any county

highway, place, change, or renew an encroachment. The road commissioner may also require a satisfactory bond be paid. In the Study Area, Impact Areas associated with transportation under county jurisdiction that could be affected by the Proposed Project include:

- Contra Costa County Road – Byron Highway;
- Sacramento County Road – Lambert Road;
- San Joaquin County Roads - W Walnut Grove Road, and N Staten Island Road; and.
- Yolo County Roads – Clarksburg Road, and N Courtland Road.

Caltrans is responsible for planning, designing, constructing, operating, and maintaining all state-owned roadways throughout the state. Federal highway standards are implemented in California by Caltrans. Caltrans has jurisdiction over State highways and sets maximum load limits for trucks and safety requirements for oversized vehicles that operate on highways. Caltrans requires a traffic analysis be conducted depending on the number of trips conducted at different levels of service conditions. In the Study Area, Impact Areas under Caltrans jurisdiction that could be affected by the Proposed Project include: State Route 160, State Route 4, State Route 104 - Twin Cities Road, State Route 220, and State Route 84.

CEQA Guidelines Section 15064.3 establishes a new method for analyzing certain transportation impacts created by a project. Under the new requirements, circulation impacts must be analyzed based on vehicle miles traveled ("VMT"). VMT "refers to the amount and distance of automobile travel attributable to a Proposed Project. Other relevant considerations may include the effects of the Proposed Project on transit and non-motorized travel." (CEQA Guidelines, section 15064.3, subd. (a).) With this update to the CEQA guidelines, the Proposed Project's potential "effect on automobile delay shall not constitute a significant environmental impact." Each Lead Agency is responsible for establishing their own thresholds of significance and may elect to be governed by the provisions of this section immediately or wait until the July 1, 2020 deadline.

While the General Plans for Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties outline goals and policies that include reduction of VMTs, they have not yet adopted VMT standards pursuant to Section 15064.3 of the CEQA guidelines.

3.17.2 Discussion

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

Less than Significant Impact. The Proposed Project consists of soil ingestions, which are temporary in nature and would not permanently alter the circulation system, including transit, roadway, bicycle, and pedestrian facilities, or alter the use of these facilities. The Proposed Project does not conflict with local VMT standards, as the counties which the Study Area is located have not yet adopted these standards.

During operation of the drilling equipment there will be multiple vehicles on site which may delay traffic or cause traffic congestion. However, temporary congestion and/or lane closures would not conflict with any applicable plans, programs, ordinances, or policies. While this would be a less than significant impact, implementation of MM BIO-1, MM GHG-1, and MM TRANS-1 would further avoid, minimize and/or reduce the potential for impacts.

MM TRANS-1

e. Where it is necessary, traffic controls (e.g. flaggers) will be put in place. Lanes may be closed off by traffic cones with flaggers posted to ensure the flow of traffic continues while maintaining safety measures for the crew. Traffic controls and lane closures will consider access for emergency services and be coordinated through the encroachment permit processes implemented by Caltrans and counties, with CHP coordination as required.

f. Parking on public roads and thoroughfares by crew vehicles will be avoided to the maximum extent practicable to allow for the flow of traffic to continue.

g. No public roads, waterways or land access will be closed.

h. For overwater sites, the project area shall be a no-wake zone, with boats not exceeding 5 mph within 500 feet of the work area.

b) Would the Proposed Project conflict or be inconsistent with CEQA Guidelines section 15064.3 subdivision (b)?

No impact. The Proposed Project is temporary in nature and is not considered a "land use project" or "transportation project", and therefore will not alter the land use and subsequently generate additional sustained amounts of VMT. Section 15064.3, subdivision (a), states, "For the purposes of this section, 'vehicle miles traveled' refers to the amount and distance of automobile travel attributable to a project." The term "automobile" refers to on-road passenger vehicles, specifically cars and light trucks (Office of Planning and Research 2018).

Proposed Project activities equate to only a limited number of trips per day at any specific soil investigation location while field activities are occurring. Because of this small number of trips and the temporary nature of the activity, the Proposed Project would not result in a significant increase in VMT. Both DWR and the counties in which the Proposed Project is located have not yet elected to be governed by the VMT provision of Section 15064.3, so there is currently no VMT standards to compare VMTs of the Proposed Project. The Proposed Project does not conflict with CEQA Guidelines section 15064.3 subdivision (b); therefore, there is no impact due to the Proposed Project.

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

No impact: The Proposed Project does not include any changes to the existing roadway. No sharp curves, dangerous intersection, or incompatible uses will result from this Proposed Project; therefore, there will be no impact.

d) Result in inadequate emergency access?

Less than Significant Impact. Traffic delays may occur due to soil investigation related activities. In case of an emergency, or if an emergency vehicle needs to pass, easily moved equipment will be moved immediately to maintain emergency vehicle access. On major roads, one full lane will be available at all times for emergency vehicles. Emergency service providers will be notified of soil investigation activities along roads that may cause delays. The Proposed Project would not close access to any access roads and would not result in the redesign or alteration of any public roadways, nor would emergency access be blocked. While there would be a less than significant impact to emergency access, implementation of Mitigation Measures MM HAZ-3, MM GHG-1, MM TRANS-1 and MM TRANS-2 would further avoid, minimize and/or reduce the potential for impacts.

3.18 Tribal Cultural Resources

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

3.18.1 Environmental Setting

The Study Area includes regions inhabited traditionally by multiple California Native American Tribes. Ethnographic literature from the late nineteenth and early twentieth century writes that the Nisenan, Miwok, Northern Valley Yokuts, and Patwin/Wintun occupied territories within the Study Area (Kroeber 1925; Kroeber 1929; Wilson and Towne 1978; Johnson 1978; Levy 1978b; Wallace 1978). The Ohlone/Costanoan were reported in the ethnographic literature as originally residing nearby to the west and southwest of the Study Area region (Kroeber 1925; Levy 1978a) but are also relevant to the Study Area. Modern descendants of tribes connected to the Study Area are members of various tribal organizations and were reached out to for the initial study for this Proposed Project (see methodology below).

Fundamental limitations to the ethnographic record highlight the importance of tribal consultation in identifying tribal cultural resources. Ethnographically reported boundaries between tribes are one version of territories, and many areas had multiple claimants, such as parts of the Sacramento River Delta where different Miwok and Yokuts groups laid claim in different interviews (Latta 1977:80). It is also important to remember that groups had multiple tribes belonging to them (Kroeber 1925; Latta 1977), and that divisions between groups weren't as clear cut as presented in published studies, as many tribes shared different practices, including rituals (such as the Kuksu Cult), trade networks, and food ways (Kroeber 1925; Heizer 1978). The categories as laid out are heavily based on linguistic relationships, who was available and willing to be interviewed, and the ethnographer's individual discretion and understanding. These interviews occurred at a time after Missionization, Mexican occupation, and decades of United States occupation, all of which impacted many California Native Americans and tribes and changed the landscape and knowledge base (Heizer 1978; Field 1992). Archaeologically, people moved and interacted with other tribes regularly and tribal boundaries were not as firm or static as portrayed in the ethnographic studies from the late nineteenth/early twentieth century. Mobility and large spheres of interaction are evidenced by, among other things, traded artifactual material, cultural patterns crossing ethnographically defined boundaries, and ancient DNA studies (Monroe 2014; Milliken et al. 2007; Rosenthal et al. 2007). Many modern tribes have been working to preserve and revitalize their language and culture and teach it to the younger generations (e.g. Field 1992; Johnson 2019; Yoche Dehe Wintun Nation 2019). Thus, it is important to recognize the primacy of modern tribes in telling their own history and recognizing their own tribal cultural resources.

Cultural resources, as discussed in the Cultural Resources Section of this IS/MND, may be tribal cultural resources. This includes historical resources as defined in Public Resources Code Section 5024.1 and 15064.5, unique archaeological resources as defined by Public Resources Code 21083.2, and non-unique archaeological resources (e.g. isolated finds or common resource types). As is discussed in the Cultural Resources Section of this document, the Study Area is particularly sensitive for cultural resources because areas along waterways are a frequent location for archaeological sites, including prehistoric mounds, middens, occupation sites, and human burials. In

the ethnographic literature, villages were located along the major rivers and creeks within the Study Area, and the area around them were used for gathering, hunting, and fishing (Kroeber 1925; Kroeber 1929; Wilson and Towne 1978; Johnson 1978; Levy 1978b; Wallace 1978). Some villages also had ritual centers such as dance halls, and villages also were used for mourning and burial in some traditions (Kroeber 1925; Kroeber 1929; Wilson and Towne 1978; Johnson 1978; Levy 1978b; Wallace 1978). Artificial fill-and-cut structures such as levees commonly were built through and of materials from cultural sites because archaeological material was frequently ignored before federal regulations were developed to protect these resources (Rosenthal et al. 2007; Meyer and Rosenthal 2007). Therefore, the Study Area is generally highly sensitive for potential tribal cultural resources in the same way it is highly sensitive for cultural resources (refer to Section 3.5 Cultural Resources).

Tribal cultural resources can also refer to places or cultural landscapes. Mt. Diablo is an excellent example of a place and landscape of significance to multiple tribes within the Study Area. Multiple accounts refer to Mt. Diablo as the location where, among other things, figures from creation narratives were from, a spiritually significant location related to spirits and the land of the dead, and a place where dogs came from (Ortiz 1989). Multiple accounts refer to the mountain as a “powerful” or “sacred” location (Ortiz 1989). Given this, the mountain itself is a “sacred place” and tribal cultural resource. Viewsheds of the mountain can sometimes also be considered tribal cultural resources as Mt. Diablo is a prominent figure on the landscape.

3.18.1.1 Regulatory Setting

Tribal cultural resources include any site, feature, place, sacred place, object, or cultural landscape with cultural value to a California Native American Tribe. These must be listed or eligible for listing in the California Register of Historical Resources (CRHR) or in a local register of historical resources, or else be determined by the CEQA lead agency as a significant resource pursuant to state laws and regulations. Key state laws and regulations provide for the definition, protection, and management of tribal cultural resources. Those that are relevant to this Proposed Project include:

- California Assembly Bill No. 52 (AB-52)
- California Environmental Quality Act, Public Resources Code, sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21084.2, and 21084.3; CEQA Guidelines, section 15064.5
- Public Resources Code sections 5020.1, 5024.1, 5097.94, and 5097.98
- Health and Safety Code section 7050.5(b) and 7050.5(c)
- California Native American Graves Protection and Repatriation Act (Health and Safety Code Division 7, Part 2, Chapter 5; sections 8010-8030)

3.18.1.2 Methods and Consultation Results

A Native American Heritage Commission (NAHC) Sacred Lands File search request for the Study Area was made, resulting in 3 of the quadrangles within the Study Area being found to have Sacred Lands on file. A Native American Tribal Contact list was provided with 21 different individuals from tribes in the region. Tribes that have previously requested consultation under AB-52 with DWR with interest in the Study Area were additionally reached out to pursuant to AB-52. The tribes sent letters were the Amah Mutsun Tribal Band of Mission San Juan Bautista, Colfax-Todd Valley Consolidated Tribe, Buena Vista Rancheria of Me-Wuk Indians Cortina Rancheria – Kletsel Dehe Band of Wintun Indians, California Valley Miwok Tribe, Costanoan Rumsen Carmel Tribe, California Valley Miwok Tribe, Indian Canyon Mutsun Band of Costanoan, Ione Band of Miwok Indians, Muwekma Ohlone Indian Tribe of the SF Bay Area, The Ohlone Indian Tribe, Nashville Enterprise Miwok-Maidu-Nishinam Tribe, Tsi Akim Maidu, Shingle Springs Band of Miwok Indians, United Auburn Indian Community (UAIC), The Confederated Villages of Lisjan, Wilton Rancheria, and the Yoha Dehe Wintun Nation. Tribes sent letters under AB-52 were the Yocha Dehe Wintun Nation, UAIC, Wilton Rancheria, and the Ione Band of Miwok Indians. All finalized letters were sent August 29, 2019. Follow up communication by phone and/or email was sent on September 20th and 23rd for all individuals written to on the contact list. Written responses requesting consultation were received from 5 tribes, and 2 additional tribes provided comments over follow-up phone calls in September. Of the 5 tribes requesting consultation, 3 tribes were further consulted with under AB52 and the remaining 2 were consulted with under DWR's Tribal Engagement Policy.

California Historical Resources Information System (CHRIS) record searches from the Northwest Information Center (NWIC), North Central Information Center (NCIC), and the Central California Information Center (CCaIC) were conducted to identify all previously recorded cultural resources and any resources listed in or eligible for listing in the California Register of Historical Resources and/or the National Register of Historic Places. Previously conducted geoarchaeological sensitivity studies covering the Proposed Project region (Rosenthal and Meyer 2004; Meyer and Rosenthal 2007; Meyer and Rosenthal 2008; Reynolds 2012), producing maps and data on the likelihood of encountering buried deposits based on local geology, soil deposition processes, landforms, and radiocarbon data were reviewed. Also examined were historical maps (BLM 2019; USGS 2019) and aerial photography (NETR 2019). Finally, information on previous pedestrian surveys within the Study Area was examined from CHRIS data and DWR Proposed Projects recorded in the Cultural Resources Section's Geodatabase. Approximately 22% of the planned locations for soil explorations have previous field studies (including survey coverage, subsurface testing, and/or excavations) reported that are known at this time (refer to Section 3.5 Cultural Resources for summary of findings).

As a result, multiple tribal cultural resources were identified within the region of the Study Area, with two within the Study Area according to GIS maps and multiple being within a quarter mile. The tribe expressed that these locations need confirmation via survey work and requested that the pre-activity site visits and associated cultural survey as outlined in MM-CUL-1 be conducted and findings reported to them before activities start. In accordance with MM-CUL-1, should the resources be confirmed the locations of the soil investigations will be moved or not conducted in order to avoid any impacts to the resources. Information specifying the location, nature, or use of these areas is not provided in this IS/MND do to the confidential nature of tribal cultural resources submitted by the tribe through the consultation process (Public Resources Code Section 21082.3(c)(1)).

Multiple tribes expressed that they could not specify any particular tribal cultural resource locations due to the fact they have not had physical access to much of the Study Area previously and/or do not have the location of cultural resources that are potential tribal resources. Given this, some tribes requested to be able to coordinate visiting the soil exploration locations during the pre-activity field visits when the archaeological survey is occurring, or else be informed of the results of the surveys after they occur. Additionally, concerns were expressed related to soil explorations that occur within levees, and requests were made to be contacted in case resources were identified during survey, monitoring, or sampling. Cultural sensitivity training was also requested for the Proposed Project.

A request for tribal monitors to be present anytime an archaeological or environmental monitor is present was also made. This project would not, however, have archaeological or tribal monitors for the actual soil exploration activities. Monitoring for cultural and tribal cultural resources is only effective when the project is occurring adjacent or on the location of a resource that has been previously identified and the monitor is able to prevent the resource from being disturbed, and/or when it is possible for the monitor to effectively observe the soil being removed from the earth during an activity likely to produce a substantial impact to a previously unidentified cultural or tribal cultural resource in the subsurface. In this case, the existing project design and mitigation measures render monitoring ineffective for prevention of significant damage to resources. The reasons for this are as follows:

1. Resource identification efforts on the surface during pre-activity site visits would be guiding avoidance for any resources identifiable on the surface and will be moving or removing soil exploration units in order to prevent disturbances to cultural resources or potential cultural resources. This is in accordance with mitigation measure MM-CUL-1.

2. A CPT does not extract any soil, though it does penetrate the ground. A monitor monitoring for cultural material at a CPT location would not be able to identify any subsurface resources despite the soil disturbance. The diameter of a CPT (1” to

2”) is smaller in size than any soil disturbance archaeological testing methodology would create in testing for subsurface deposits, and therefore CPTs are less impact to a site than testing for the presence or absence of subsurface archaeological deposits. Given this, the soil disturbance from a CPT is would not produce a significant impact to previously unidentified subsurface deposits.

3. Boring units do extract soil, but the diameter of a bore-hole (maximum 8”) and a core sample is significantly smaller than what is created during subsurface archaeological testing for the presence or absence of resources. Standard sampling methods include Standard Penetration Tests which produce a core with an approximate diameter of 1.5”, Modified California Sampler produces a core with an approximate maximum diameter of 2.5”, Pitcher Barrel Samplers produce a core with an approximate maximum diameter of 3”, and Shelby tube style samplers (i.e. 101mm Geobarrel and 134mm Geobarrel shelly tubes) with an approximate range in core diameter between 2” to 5”.

    a. Many of these cores would not be processed in such a way that would allow the soil of the core to be examined immediately after soil extraction. As such, a monitor would be unlikely to have the opportunity to examine a core.

    b. These core sizes are not large enough to produce a notable disturbance to subsurface archaeological deposits. The risk of substantial impacts to a previously unknown subsurface deposit, given the size of the boreholes, is extremely low. Given the low risks of substantial subsurface impacts and small sizes of these cores, an archaeological monitor or tribal monitor during the boring activities would not be warranted.

    c. In the event a core is processed in such a way that the soil would be viewable while in the field, cultural sensitivity training for the environmental monitor and the field crew would be designed to aid in the identification of cultural material that could come out of the core (e.g., lithics and organic material less than 5” in maximum width within the geological time lens between the late Pleistocene and modern surface).

4. In the unlikely event a potential tribal cultural resource is identified through archaeological surveys or during field activities, the material would be reported to the consulting tribe with interest in the area and a plan would be made in consultation with the consulting tribe/tribes, in accordance with MM-CUL-2. In the case of human remains, MM-CUL-3 would be followed.

During consultation, discussion was also had about investigations, data on Delta geology may support a tribes understanding of historic landscapes, the depths of soils with potential to hold cultural and potential tribal cultural resources, and information on potential tribal cultural resources located throughout the Proposed Project Study Area. Providing data from the soil investigations would help tribes better identify tribal cultural resources for future projects within the study area region while causing non-significant

impacts to tribal cultural resources and potential tribal cultural resources within the study area.

3.18.2 Discussion

Would the Proposed Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is?

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code 5020.1 (k), or

b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Less than Significant with Mitigation Incorporated. The primary challenge for tribal cultural resources within the study area is that, though we have some information regarding the location of potential tribal cultural resources and know the study area is within a region highly sensitive for them, there has not been survey coverage to substantiate their locations. The subsurface footprint of the Impact Areas for CPTs and boring locations is minimal, but the potential for disturbances on the surface due to staging and activity related to set up on the surface for each location is higher. If possible, any impacts to any tribal cultural resources as defined above should be avoided. MM-CUL-1 has thus been designed to help avoid any project activities occurring on or in close proximity to any potential tribal cultural resources that are identifiable on the surface, with the goal of avoiding both the surface deposit and providing a buffer to help avoid areas with high likelihood of subsurface deposits.

MM-CUL-2 and MM-CUL-3 are established for the unlikely event that previously unidentified subsurface deposits are discovered. As discussed in section 3.18.1.2, the risk for significant impact to tribal cultural resources and potential tribal cultural resources is extremely low due to the size of the boreholes, core samples, and CPTs, and the way these activities are conducted. However, to ensure that in moments where resources from the subsurface soils with potential cultural sensitivity are analyzed or visually examinable, MM-CUL-4 (Cultural Sensitivity Training) is in place to ensure those with stop work authority or those conducting analysis will be able to stop and implement MM-CUL-2 and/or MM-CUL-3 as appropriate.

Mitigation Measures as discussed in Section 3.5 address concerns for Tribal cultural resources.

3.19 Utilities and Service Systems

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b) Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c) Would the project result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Would the project generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

3.19.1 Environmental Setting

3.19.1.1 Wastewater Collection and Treatment Systems

Wastewater collection and treatment services in the Study Area are provided by cities, counties, and special districts. Wastewater treatment facilities with collection systems typically are located in urban areas. In some rural areas where sewer service is unavailable, residents and businesses dispose of wastewater in on-site septic systems. Treatment plants for individual nonindustrial developments also exist in some areas to treat localized wastewater from mobile home parks, apartment complexes, and resorts. Municipal sewer systems consist of sewer collection pipelines, treatment facilities, and outfall structures or disposal systems. Secondary or tertiary treated effluents are typically discharged into rivers, streams, creeks, and sloughs. Methods of land disposal include evaporation/percolation ponds or application to irrigated agricultural lands. Recycled effluent is also used for industrial purposes or agricultural irrigation during the summer months. In some cases, municipalities may provide wastewater collection infrastructure and services that discharge to regional facilities owned and operated by another municipality (Delta Stewardship Council 2017).

Wastewater treatment facilities located near Impact Areas include the Discovery Bay Wastewater Treatment Facility, White Slough Wastewater Treatment Facility, Courtland Wastewater Treatment Facility, Isleton Wastewater Treatment Facility, and Rio Vista Wastewater Treatment Facility.

3.19.1.2 Water Supply and Distribution Systems

Water service providers in the Study Area include cities and counties, special districts, and private utilities. Water service providers range in size from those with a few service connections to those with thousands of connections. Most water service providers obtain their water from surface water, groundwater, or a combination of these sources. The amount of water available to these service providers is defined by water rights,

water contract agreements, groundwater pumping limitations, and the infrastructure required to treat, pump, and deliver water (Delta Stewardship Council 2017)

3.19.1.3 Solid Waste Management

Counties and cities are responsible for solid waste management planning, administration, and facility approval. Local enforcement agencies, authorized under the California Integrated Waste Management Act, are responsible for permitting of solid waste facilities. In locations that do not have an authorized local enforcement agency, solid waste facility permitting is under the jurisdiction of the state agency CalRecycle. Many municipalities enter into franchise agreements with private waste management businesses. Oversight of solid waste disposal facilities is conducted in cooperation with private collection and disposal businesses and other local and regional public agencies. The planning and operation of solid waste management facilities often is coordinated regionally because some communities do not have landfill sites within their boundaries, making it necessary to haul waste to an out-of-county/city facility for disposal. These communities utilize transfer stations and recycling facilities that are a component of local waste management solutions (Delta Stewardship Council 2017).

Resource recovery (recycling, composting, and waste-to-energy) is implemented to comply with state diversion regulations, to extend the life of landfills, to reduce environmental impacts of solid waste disposal, and to reuse resources. Resource recovery activities are commonly subject to performance measures and requirements in local Integrated Waste Management Plans (Delta Stewardship Council 2017).

Each county within the Proposed Project area contains solid waste facilities, including the Yolo County Central Landfill, Kiefer Landfill, Keller Canyon Landfill, Altamont Landfill & Resource Recovery Facility, Corral Hollow Landfill, and Lovelace Materials Recovery Facility and Transfer Station.

3.19.1.4 Electricity and Natural Gas

Energy providers within the Study Area include electric utility districts and natural gas companies. The existing energy utilities to the counties in the Study Area includes aboveground and underground electric transmission and distribution lines, power poles, and gas lines, including those from Pacific Gas and Electric Company (PG&E), Sacramento Municipal Utility District (SMUD), Transmission Agency of Northern California (TANC), and Western Area Power Administration (WAPA).

3.19.1.5 Communications

Regarding telecommunications, underground fiber trunk lines feed switching equipment, and overhead lines and poles supply individual service units. The communication lines typically are aligned parallel to the roadways and traverse roadways to supply the individual service units. Cable markers indicating underground cabling are located in some areas parallel to roadways. A network of telephone companies, cellular

communication companies, and cable companies also serves the region. New service to specific sites is provided on a case-by-case basis (United States Bureau of Reclamation 2009).

3.19.2 Discussion

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

No Impact. Proposed Project activities are minor and short in duration (up to 15 days per site), and do not require a change in utility or service systems. Wastewater services for soil investigation crews would be provided by temporary portable facilities, and the Proposed Project will not require relocation or construction of new water or wastewater treatment facilities. The Proposed Project will also not require the relocation or construction of new stormwater drainage facilities. The Proposed Project will not violate water discharge requirements or degrade surface water quality (see the Hydrology and Water Quality section, for more information on applicable MM-HYD-1 for water quality). Proposed Project activities will not interfere with any electric power, natural gas, or telecommunication facilities. While there would be no impact on the above utilities, implementation MM-UTI-1 would further avoid, minimize and/or reduce the potential for impacts.

MM UTI-1

A field reconnaissance, marking or staking the exploration site, and calling Underground Service Alert (USA) for utility clearance will be conducted by qualified personnel for each planned soil exploration location. Based upon the information gathered, sites will be adjusted to ensure no utilities are impacted.

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

No impact. Due to the minor and temporary nature of the soil exploration activities, the Proposed Project will not change the availability of existing water supplies. If needed, potable water supply needs are anticipated to be met with non-municipal water sources without any need for new water supply entitlements. Additionally, any potable water demand would be temporary and limited to the short duration of Proposed Project activities at each soil exploration site. Therefore, the Proposed Project activities would have no impact on existing water supplies available to serve the Proposed Project.

c) Result in a determination by the wastewater treatment provider that serves or may serve the Proposed Project that it has adequate capacity to serve the

Proposed Project's Proposed Projected demand, in addition to the provider's existing commitments?

No impact. The Proposed Project activities are minor and temporary and would not impact the service of wastewater treatment providers in the Study Area. Wastewater services for soil investigation crews would be provided by temporary portable facilities, and the Proposed Project will not require relocation or construction of new water or wastewater treatment facilities. The Proposed Project will not result in a determination by the wastewater treatment providers for inadequate capacity.

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

No impact. Proposed Project activities are minor and the small amount of solid waste that could be generated at each Impact Area would not adversely affect the capacity of available landfills in the Proposed Project area. Based on the capacity of the landfills in the region, and the waste diversion requirements set forth by the State of California, the Proposed Project would not generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.

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

No impact. All cuttings and excess drilling fluid will be contained in drums, large containers, or vacuum trucks, and disposed of offsite at an appropriate landfill. Recirculation tanks (55-gallon storage drums) will be used to settle drill cuttings from drilling fluid. Discarded soil samples will also be placed in the storage drums. Drums would be stored on site at designated staging areas outside of environmentally sensitive areas for up to 4 weeks for environmental testing prior to landfill disposal. See Hazards & Hazardous Materials section for more information. Additionally, Proposed Project activities are minor and the disposal of the small amount of solid waste that could be generated at each Impact Area would comply with federal, state, and local management and reduction statuses and regulations related to solid waste. Therefore, there would be no impact.

3.20 Wildfire

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b) Would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Proposed Project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☒	☐	☐
c) Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

3.20.1 Environmental Setting

In California wildfire protection jurisdictions are separated and overseen by three areas of government: Local, State and Federal. Majority of the Impact Areas in Contra Costa, Sacramento, San Joaquin, Solano and Yolo County are in portions of their respective county's that are considered to be Local Responsibility Areas (LRA). Some of the Southern Proposed Project sites located in Alameda County are in State Responsibility Areas (SRA). Lastly, a few Proposed Project sites located in small regions Sacramento County and others in the Northern West portion of Alameda County are in Federal Responsibility Areas (FRA), (CalFire 2008).

LRA, SRA and FRA have each determined Fire Hazard Severity Zones (FHSZ) within each county, the zone classification is based on a multitude of factors: fire behavior models using vegetation density, adjacent wildland areas, and distance to wildland areas, another factor being the probability of a fire threatening nearby structures. The Proposed Project locations in Contra Costa, Sacramento, San Joaquin, Solano and Yolo County Counties all have FHSZ of low to no severity zones in their LRA and FRA, where the Proposed Project sites are proposed to take place. However, in the SRA portions of Alameda County the FHSZ is of moderate severity and in LRA portions of the county the Proposed Project locations are in areas of no severity (CalFire 2008).

3.20.2 Discussion

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

Less than Significant Impact. Strategic Fire Protection Planning prioritizes areas called wildland urban interfaces (WUI) where fire risks are not only a threat to areas of natural resources but also to "at risk communities" where large scale wildland fires may occur, posing a significant threat to life and property, these areas are known as wildland urban interfaces (CalFire 2014, USFS 2007).

There are only a few Proposed Project sites within a wildland urban interface, these few sites reside in Contra Costa County and Sacramento County (ArcGIS 2010). These counties abide by Local and State Responsibility procedures to ensure a minimum of wildfire protection is met. Both Contra Costa and Sacramento counties have Community Wildfire Protection Plans (CWPPs) which include measures to reduce the risk of wildfire and reference emergency operations/evacuation planning.

The Proposed Project will not impact public roads or highways, no complete road closures will take place, and soil investigation activities will not result in emergency vehicles or law enforcement delays. Additionally, safety and emergency response services will be covered in the Proposed Project's Job Hazard Assessment daily to ensure safe mobility while on the Proposed Project site and evacuation if necessary. The Proposed Project work will not hinder Contra Costa or Sacramento counties' ability to implement their CWPPs. While there would be a less than significant

impact on an adopted emergency response plan or emergency evacuation plan, implementation of Mitigation Measures MM-PUB-1 and HAZ-2 would further avoid, minimize and/or reduce the potential for impacts.

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

Less than Significant with Mitigation Incorporated. There are tall, dry grasses surrounding some of the Impact Areas, the machinery and vehicles actively working on the Impact Areas have the potential to exacerbate wildfire risks. Mitigation Measure MM PUB-1 ensures that a plan will be prepared which incorporates fire safety measures, as well as a Safety Plan, and incorporation of these plans would include county specific emergency response considerations plans which would reduce the Proposed Project wildfire risk to less than significant.

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

No impact. The Proposed Project does not require the installation or maintenance of associated infrastructure (roads, fuel breaks, emergency water sources, powerlines or other utilities). Therefore, Proposed Project activities would have no impact on exacerbating wildfire risk or resulting in temporary or ongoing impacts to the environment.

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

No impact. This Proposed Project would not alter the current runoff regime and drainage of the Impact Areas, nor would it impact people or structures in a way that could pose significant risks through downslope or downstream flooding or landslides as a result of runoff, post-fire slope instability, or drainage changes. Therefore, no impact would occur as a result of the Proposed Project.

3.21 Mandatory Findings of Significance

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
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” meant that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of the 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?	☐	☒	☐	☐

3.21.1 Environmental Setting

This Initial Study was prepared to assess the potential effects of the Proposed Project on the environment and significance of those effects. Due to the short term and temporary nature of the activities that comprise the Proposed Project, many potential significant impacts would be avoided or mitigated to less than significant with mitigation incorporated.

With the implementation of Mitigation Measures and the Mitigation Monitoring and Reporting Program (MMRP), potential impacts to biological resources, cultural resources, greenhouse gas emissions, hazards and hazardous materials, tribal cultural resources, and wildfire resources from the Proposed Project would be avoided or reduced to less than significant with mitigation incorporated. The Proposed Project would result in no impacts to agricultural and forestry, land use and planning, population and housing, recreation, and utilities/service systems. Potential impacts to aesthetics, air quality, energy, geology and soils, hydrology and water quality, mineral resources, noise, public services, and transportation from the Proposed Project would be less than significant.

3.21.2 Discussion

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?

Less than Significant with Mitigation Incorporated. As discussed in this Initial Study, the Proposed Project has the potential to impact biological resources, cultural resources, and tribal cultural resources but with the implementation of Mitigation Measures and the MMRP, the Proposed Project would not 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" meant that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of the other current projects and the effects of probable future projects)?

Less than Significant with Mitigation Incorporated. Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the Study Area are considered in this study. Future federal actions that are

unrelated to the Project are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act (ESA).

Non-federal actions that are reasonably certain to occur in the Study Area include: (1) on-going non-Federal water diversions for irrigated agriculture and managed wetlands; (2) State and/or local levee maintenance activities; (3) stormwater and/or irrigation discharges; (4) point and non-point source pollution; (5) oil and gas produce discharges; (6) invasive species introductions; and, (7) climate change.

Related projects and cumulative impacts of those projects discussed below. In many instances, no impacts or less-than-significant cumulative impacts would occur because the impacts of the Proposed Project would be short-term and localized. In other cases, significant cumulative impacts would not occur because the Proposed Project with the implementation of the Mitigation Measures and the MMRP, those impacts would be avoided or reduced. In other cases, they would have beneficial impacts on resources because a number of projects are being proposed to improve aquatic resources in the Delta.

The Proposed Project would result in short-term temporary impacts that would mainly be limited to the Impact Area. While impacts to resource areas such as air quality and greenhouse gas emissions would contribute to more regional impacts, these impacts would not be cumulatively considerable because of the relative size of the proposed project.

Impacts to aesthetics, air quality, biological resources, cultural resources, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, mineral resources, noise, public services, transportation, tribal cultural resources, and wildfire have been determined to be less than significant or less than significant with mitigation incorporated and would not be cumulatively considerable. Therefore, cumulative impacts would be less than significant with mitigation incorporated.

3.21.2.1 Non-Federal Water Diversions

There are a number of unscreened non-Federal water diversions within the Study Area. Depending on the size, location, and period of operation, these unscreened diversions are believed to entrain various life stages of aquatic species, including listed salmonids and Delta Smelt. The results of a study conducted by Nobriga et al. (2008) suggest that entrainment of many Delta Smelt is not likely. In general, the littoral location and low-flow operational characteristics of these diversions are thought to reduce the risk of entraining Delta Smelt.

3.21.2.2 State and Local Levee Maintenance Activities

Levee maintenance activities by State and local entities within the Study Area are expected to continue and may include regular maintenance activities including mowing, disking, vegetation control, dredging of agricultural ditches and riprap repairs above the waterline. Additional anticipated State maintenance activities include:

Department of Water Resources- Routine Maintenance of Delta Levees Program Setback Levee Habitats
A Notice of Exemption (NOE) was filed on September 19, 2019 to cover routine maintenance of the southwest sides of Sherman (RD341) and Twitchell (RD 1601) Islands, located in Sacramento County. Anticipated work includes the control of non-native invasive plants and replanting with natives for fish, wildlife and recreation benefits.

Department of Water Resources- Environmental Permitting for Operations and Maintenance (EPOM)
DWR conducts operation and maintenance of multiple facilities of the federal flood control project within the Central Valley of CA. DWR conducts on-going maintenance activities on levees, channels, and appurtenant structures that are part of the Sacramento River Flood Control Project (SRFCP). DWR prepared the EIR to implement mandated maintenance activities associated with maintaining the proper functioning of flood control facilities in accordance with their original design. Maintenance work is sporadic and varies in location and timing. Most of the EPOM work is north of the proposed Study Area but it is possible that some work will occur in the northern portion of Study Area in Sacramento County.

The Environmental Impact Report (EIR) for EPOM was filed on September 19, 2017. The EIR was finalized and Notice of Determination (NOD) was filed on January 5, 2018.

3.21.2.3 Point and Non-Point Source Pollution

Adverse effects to designated critical habitat for Delta Smelt, Central Valley spring-run Chinook Salmon and Central Valley steelhead and proposed critical habitat for the Southern DPS Green Sturgeon may result from point and non-point source pollution (i.e. stormwater and/or irrigation discharges) which change the balance of important habitat constituents (i.e. salinity, turbidity, and water temperature, etc.) within the Study Area.

3.21.2.4 Oil and Gas Product Discharges

The introduction of contaminants from oil and gasoline product discharges as a result of on-going commercial and private shipping and boating within the Study Area is expected to continue. Implicated as potential stressors to aquatic species, these contaminants may adversely affect reproductive success and/or survival.

3.21.2.5 Invasive Species

Invasive species introductions are also expected to continue although it is difficult to predict the types of species introduced and the magnitude of the effects. Adverse effects from these introductions may include changes in water quality (i.e. turbidity), reductions in food supply, competition for space, and predation.

3.21.2.6 Climate Change

Global warming and climate change is an issue that has become more prominent over the past decade and one that certainly warrants consideration in the long-run. It has been predicted that global warming will increase Central Valley ambient air temperatures by 2°C to 7°C by the end of this century. Such an increase is anticipated to have a profound effect on Central Valley run-off and local hydrology. Within the Delta, anticipated effects are expected to include changes in seasonal flow patterns and increased water levels (as a result of general sea level rise). While difficult to predict, it is anticipated that such events will affect the distribution, and possibly even the abundance, of many aquatic species currently occupying the Delta seasonally or year-round.

3.21.2.7 Projects

Department of Water Resources- Lookout Slough
The Lookout Slough Tidal Habitat Restoration and Flood Improvement Project is proposed to help satisfy DWR's obligation to restore 8,000 acres of tidal marsh per the 2008 United States Fish and Wildlife Service (USFWS) Biological Opinion (BiOp) and the 2009 National Marine Fisheries Service (NMFS) BiOp, and to increase flood storage and conveyance, increase the resiliency of levees, and reduce flood risk within the Yolo Bypass. The proposed project site would be located in to the south of Duck Slough, to the west of Shag Slough, to the east of Cache Slough and to the south of Liberty Island Road. The propose project would be located near the Liberty Island Ecological Reserve, Liberty Island Conservation Bank, and Little Hastings Island Conservation Bank.

An Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for this project is currently under development.

Department of Water Resources- Prospect Island Tidal Habitat Restoration Project
This project proposes to restore tidal action to 1,528 acres on the currently flooded Prospect Island in the Sacramento River Delta to improve productivity for Delta Smelt and salmonid species. This tidal habitat restoration project is located in Solano County. Project activities include clearing and invasive species control; excavation of tidal slough channels; removal of a portion of an internal cross levee; placement of excavated soils into remnant agricultural ditches and newly constructed berms and benches; dredging of the spur channel between Miner Slough and the southern portion of the site; limited planting and revegetation; and excavation of two levee breaches to establish tidal connectivity with Miner Slough.

The EIR for this project was filed on March 1, 2019. A NOD was filed on August 19, 2019.

Department of Water Resources- 2017 Storm Damage DWR Rehabilitation (SDDR) - Phases 4 and 5 Repair Sites

The proposed project would address non-emergency levee erosion repair sites (Phases 4 and 5) identified for repair in 2019 and 2020. This work is a follow on to the 2017 Storm Damage DWR Emergency Rehabilitation Program that rehabilitated emergency levee erosion repair sites (Phases 1 through 3) in 2017 and 2018.

The proposed project includes a total of 30 repair sites located in Yolo, Sutter, Tehama, Butte, Colusa, Glenn, San Joaquin, and Sacramento counties. Some of the SDDR projects are located outside of the proposed Study Area but it is possible that some work will occur along the Sacramento River and tributaries and within Sacramento and San Joaquin counties. The proposed project would repair and rehabilitate levees at the 30 locations using a variety of construction equipment, requiring different design considerations based on levee conditions. Construction activities would take place at each site throughout the summer/fall of 2019 or 2020. Each levee repair would require approximately 2 to 4 weeks of active construction and at least three sites would be repaired concurrently, with up to nine sites being repaired at the same time, based on limitations of hauling, air quality permitting, and other potential permit restrictions by responsible agencies.

The IS/MND for this project was filed on April 24, 2019. A NOD was filed on August 19, 2019.

Department of Water Resources- Sherman and Twitchell Islands Fish Screen Project

DWR proposes to place five self-cleaning, retractable fish screen at the waterslide termini of five DWR-owned intake siphons located on Sherman Island and Twitchell Island in order to reduce potential entrainment of Delta Smelt and other fish species by agricultural diversions on state-owned lands. Each installation will require modification of the existing intake siphon to accommodate attachment of the self-cleaning fish screen, construction of a structural steel access walkway, generator-powered winch retrieval track, and additional steel piles to support the structure. This project is located south of Rio Vista along Highway 160 on Sherman and Twitchell Islands in Sacramento County.

The IS/MND for this project was filed on March 3, 2016. A NOD was filed on April 15, 2016.

Department of Water Resources- Long-Term Operations of the State Water Project (SWP)

Under the proposed project, the SWP would continue to be operated to provide flood control and water supply for agricultural, municipal, industrial, recreational, and environmental purposes consistent with applicable legal requirements. SWP operations also would continue to be closely coordinated with the federal Central Valley Project (CVP), including the Coordinated Operating Agreements (COAs) with the US Bureau of Reclamation, and operational requirements from the ongoing re-initiation of Endangered

Species Act (ESA) consultation on coordinated long-term CVP and SWP operations. This proposed project crosses multiple county lines, including, but not limited to, Sacramento, Solano, Yolo and San Joaquin counties.

A Notice of Preparation (NOP) for an EIR was filed on August 19, 2019.

Department of Water Resources- Temporary Barriers Project (TBP)
The TBP refers to the annual installation, maintenance, and removal of up to four rock barriers in the channels of the southern portion of the Sacramento-San Joaquin Delta near the cities of Tracy and Lathrop in San Joaquin County, California. These barriers have been installed annually (with the exception of a few years) since 1991, and are designed to act as flow control structures, “trapping” tidal waters behind them following a high tide in order to improve water levels and circulation for local south Delta farmers. The TBP is anticipated to continue through water year 2022 and potentially further into the future.

All of the barriers are typically installed during the period between March and November each year. Three of the barriers (one each at Old River near Tracy, Middle River and Grant Line Canal) facilitate pumping by agricultural water diversions for irrigation purposes. A fourth barrier, the Head of Old River barrier, blocks migratory movements through the Old River channel and directs juvenile and adult anadromous fish species migration through the San Joaquin River corridor. None of the barriers can be constructed when ambient flows in the San Joaquin River exceed 5,000 cubic feet per second (cfs) as measured at the Vernalis monitoring station, as high flows can displace the rock barriers and create extremely hazardous and unsafe working conditions.

Department of Water Resources- Salmon Protection Tech Study
The purpose of the proposed Salmon Protection Technology Study (SPTS) project would be to construct and operate barriers at Delta junctions with known lower survival salmonid migratory pathways, study other emerging salmonid barrier technologies and collect salmonid survival and behavioral data.

Locations under consideration would include Georgiana Slough, Steamboat Slough, and Sutter Slough within Sacramento, Solano and/or San Joaquin counties. Work would be expected to occur for five years, annually, between 2020 and 2025.

As a result of the 2009 NMFS BiOp, the SWP and CVP operations must comply with Reasonable and Prudent Alternative (RPA) Action IV.1.3 to reduce diversion of juvenile salmonids into the central and south Delta. Currently, the presence of endangered salmon species in the south Delta require significant SWP and CVP operations curtailments. The SPTS project would provide the best available science and engineering for the final implementation of Salmon Survival Engineering Solutions Phase III.

Department of Water Resources- Bethany Dams Improvement Project
To ensure the long-term safety and operations of the State Water Project, DWR will conduct additional vegetation removal in the drainage ditches at Dams 1 and 2, remove accumulated sediment blocking the culvert in the drainage ditch at Dam 3, repair existing rodent burrow damage on the dam faces, establish a long-term, sustainable program of effective rodent control to reduce or eliminate further burrowing within the dam embankments, and perform annual maintenance to repair new rodent burrow damage at the four Bethany Reservoir Dams. This project is located near Tracy, California in Alameda County.

The IS/MND for this project was filed on August 13, 2018. A NOD was filed on September 18, 2019.

Department of Water Resources- Old Banks Landfill Cap Project
DWR is proposing to conduct the Old Banks Landfill Cap Project to cap the Old Banks Landfill (also known as the Harvey O. Banks Pumping Plant Landfill) in order to address concerns related to Landfill debris exposure raised by the Contra Costa County Health Department (CCCHD). This proposed project is located approximately 9 miles northwest of the city of Tracy and 12 miles northeast of the city of Livermore in Contra Costa County.

Landfill debris concerns would be addressed by DWR by confining the Landfill materials and preventing the Landfill contents from being exposed by rodent activities, as well as improving surface drainage, and minimizing future maintenance. Project activities include clearing existing vegetation, removing the upper 2 to 4 inches of topsoil of the Landfill crown, grading the existing Landfill crown by adding fill soil materials in localized areas in order to bring the site to grade, placing a commercially available rodent control barrier material, placing a 1-foot thick surface layer on top of the rodent control fill fabric to protect it, and returning the project site to near pre-project conditions by hydroseeding.

A Notice of Completion (NOC) for an IS/MND was filed on October 25, 2019.

U.S. Bureau of Reclamation- Reinitiation of Consultation on the Coordinated Long-Term Operation of the Central Valley Project
Under the proposed project, the U.S. Bureau of Reclamation prepared an Environmental Impact Statement to analyze potential modifications to the continued long-term operation of the Central Valley Project (CVP), for its authorized purposes, in a coordinated manner with the SWP, for its authorized purposes. This EIS evaluates alternatives to maximize water supply deliveries and optimizes marketable power generation consistent with applicable laws, contractual obligations, and agreements and to augment operational flexibility by addressing the status of listed species. This proposed project crosses multiple county lines, including, but not limited to, Sacramento, Solano, Yolo, Contra Costa, Alameda, and San Joaquin counties.

Public review for the Draft EIS closed on August 26, 2019.

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

Less than Significant with Mitigation Incorporated. Potential impacts from the Proposed Project would be short-term, temporary and localized and with the implementation of Mitigation Measures and the MMRP, there would be no substantial direct or indirect adverse environmental impacts to humans.

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Appendix A:
Wildlife and Plant Species Lists

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
Amphibians							
California tiger salamander	*Ambystoma californiense*	FT/ST	CDFW_WL-Watch List | IUCN_VU-Vulnerable	Cismontane woodland | Meadow & seep | Riparian woodland | Valley & foothill grassland | Vernal pool | Wetland	Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	High	Suitable upland and aquatic habitat may be present and several of the Impact Areas in Contra Costa and Alameda Counties are within 5 miles of recorded occurrences.
foothill yellow-legged frog	*Rana boylii*	-/CT	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_NT-Near Threatened | USFS_S-Sensitive	Aquatic | Chaparral | Cismontane woodland | Coastal scrub | Klamath/North coast flowing waters | Lower montane coniferous forest | Meadow & seep | Riparian forest | Riparian woodland | Sacramento/San Joaquin flowing waters	Partly-shaded, shallow streams and riffles with a rocky substrate in a variety of habitats. Needs at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis.	None	No suitable habitat is present in the vicinity of the Study Area, and there are no reported occurrences within 5 miles.
California red-legged frog	*Rana draytonii*	FT/-	CDFW_SSC-Species of Special Concern | IUCN_VU-Vulnerable	Aquatic | Artificial flowing waters | Artificial standing waters | Freshwater marsh | Marsh & swamp | Riparian forest | Riparian scrub | Riparian woodland | Sacramento/San Joaquin flowing waters | Sacramento/San Joaquin standing waters | South coast flowing waters | South coast standing waters | Wetland	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	High	Suitable upland and aquatic habitat may be present, and several of the Impact Areas in Contra Costa and Alameda Counties are within 5 miles of recorded occurrences.
western spadefoot	*Spea hammondii*	-/-	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_NT-Near Threatened	Cismontane woodland | Coastal scrub | Valley & foothill grassland | Vernal pool | Wetland	Occurs primarily in grassland habitats but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	Moderate	Suitable habitat may be present, the Study Area is within the range of the species, and multiple recent documents occurrences are near the Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
Reptiles							
California legless lizard	*Anniella pulchra*	-/-	CDFW_SSC-Species of Special Concern | USFS_S-Sensitive	Chaparral | Coastal dunes | Coastal scrub	Sandy or loose loamy soils under sparse vegetation. Soil moisture is essential. They prefer soils with a high moisture content.	Low	Marginally suitable habitat may be present, the southern portion of the Study Area is within the range, and several of the Impact Areas in Contra Costa County are within 5 miles of recorded occurrences.
California glossy snake	*Arizona elegans occidentalis*	-/-	CDFW_SSC-Species of Special Concern	Open desert | Grasslands | Shrublands | Chaparral | Woodlands	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, the Coast, Transverse and Peninsular ranges, south to Baja California. Uses a range of scrub and grassland habitats, often with loose or sandy soils.	Moderate	The Study Area is within the range of the species, there is suitable habitat within the Study Area, and several occurrences nearby West and South of the Study Area.
western pond turtle	*Emys marmorata*	-/-	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_VU-Vulnerable | USFS_S-Sensitive	Aquatic | Artificial flowing waters | Klamath/North coast flowing waters | Klamath/North coast standing waters | Marsh & swamp | Sacramento/San Joaquin flowing waters | Sacramento/San Joaquin standing waters | | Wetland	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water.	High	There are many known occurrences within the Study Area.
San Joaquin coachwhip	*Masticophis flagellum ruddocki*	-/-	CDFW_SSC-Species of Special Concern	Chenopod scrub | Valley & foothill grassland	Open, dry habitats with little or no tree cover. Found in valley grassland and saltbush scrub in the San Joaquin Valley. Needs mammal burrows for refuge and oviposition sites.	Moderate	The Study Area is within the range of the species and there is potentially suitable habitat present, however the nearest known occurrences are over 5 miles away.
Alameda whipsnake	*Masticophis lateralis euryxanthus*	FT/ST		Chaparral | Cismontane woodland | Coastal scrub | Valley & foothill grassland	Typically found in chaparral and scrub habitats but will also use adjacent grassland, oak savanna and woodland habitats. Mostly south-facing slopes and ravines,	None	There is no suitable habitat in the Study Area, and the nearest known occurrences are over 3 miles away.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
					with rock outcrops, deep crevices or abundant rodent burrows, where shrubs form a vegetative mosaic with oak trees and grasses.		
coast horned lizard	*Phrynosoma blainvillii*	-/-	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern	Chaparral | Cismontane woodland | Coastal bluff scrub | Coastal scrub | Desert wash | Pinon & juniper woodlands | Riparian scrub | Riparian woodland | Valley & foothill grassland	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	Low	The Study Area is within the range of the species, marginally suitable habitat may be present, and several of the Impact Areas in Contra Costa County are within 2.5 miles of recorded occurrences.
giant garter snake	*Thamnophis gigas*	FT/ST	IUCN_VU-Vulnerable	Marsh & swamp | Riparian scrub | Wetland	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation ditches. This is the most aquatic of the garter snakes in California.	High	The project is within the range of the species, suitable habitat is present, and there are known occurrences within the footprint of the proposed activities.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
Birds							
Cooper's hawk	*Accipiter cooperii*	-/-	CDFW_WL-Watch List | IUCN_LC-Least Concern	Cismontane woodland | Riparian forest | Riparian woodland | Upper montane coniferous forest	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	Moderate	Suitable habitat exists throughout much of the Study Area.
tricolored blackbird	*Agelaius tricolor*	-/ST	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_EN-Endangered | NABCI_RWL-Red Watch List | USFWS_BCC-Birds of Conservation Concern	Freshwater marsh | Marsh & swamp | Swamp | Wetland	Highly colonial species, most numerous in Central Valley & vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	Moderate	Suitable habitat exists within the Study Area, and several recorded occurrences are located near the Study Area. Wintering birds and a few individuals have been observed during breeding season, but no nesting colonies have been identified within 1/4 mile of the Study Area.
grasshopper sparrow	*Ammodramus savannarum*	-/-	CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern	Valley & foothill grassland	Dense grasslands on rolling hills, lowland plains, in valleys and on hillsides on lower mountain slopes. Favors native grasslands with a mix of grasses, forbs and scattered shrubs. Loosely colonial when nesting.	Low	Minimal suitable nesting habitat is present within the Study Area. Species has been observed rarely in the winter, although the Study Area is not within 5 miles of the known occurrences.
Lesser sandhill crane	*Antigone canadensis canadensis*	-/-	CDFW_SSC-Species of Special Concern	Wetlands	Forages in harvested corn fields, winter wheat, irrigated pastures, alfalfa fields, and fallow fields. Roosts in open shallowly flooded fields and wetlands.	High	Suitable habitat present for foraging and roosting, and they have been observed regularly in the winter within the Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
Greater sandhill crane	*Antigone canadensis tabida*	-/-	CDFW_FP-Fully Protected	Wetlands	Forages in harvested corn fields, winter wheat, irrigated pastures, alfalfa fields, and fallow fields. Roosts in open shallowly flooded fields and wetlands.	High	Suitable habitat present for foraging and roosting, and they have been observed regularly in the winter within the Study Area.
golden eagle	*Aquila chrysaetos*	-/-	BLM_S-Sensitive | CDF_S-Sensitive | CDFW_FP-Fully Protected | CDFW_WL-Watch List | IUCN_LC-Least Concern | USFWS_BCC-Birds of Conservation Concern	Broadleaved upland forest | Cismontane woodland | Coastal prairie | Great Basin grassland | Great Basin scrub | Lower montane coniferous forest | Pinon & juniper woodlands | Upper montane coniferous forest | Valley & foothill grassland	Rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	Moderate	Suitable foraging habitat exists in the Study area and Golden Eagle are regularly observed foraging. Suitable nest trees are present, but no nesting has been recorded within 1 mile of the Study Area.
great egret	*Ardea alba*	-/-	CDF_S-Sensitive | IUCN_LC-Least Concern	Brackish marsh | Estuary | Freshwater marsh | Marsh & swamp | Riparian forest | Wetland	Colonial nester in large trees. Rookery sites located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes.	High	Suitable habitat exists within the Study Area, and several recorded occurrences are located nearby.
great blue heron	*Ardea herodias*	-/-	CDF_S-Sensitive | IUCN_LC-Least Concern	Brackish marsh | Estuary | Freshwater marsh | Marsh & swamp | Riparian forest | Wetland	Colonial nester in tall trees, cliffsides, and sequestered spots on marshes. Rookery sites close to foraging areas: marshes, lake margins, tide-flats, rivers, streams, wet meadows.	High	Suitable habitat exists within the Study Area, and several recorded occurrences are located nearby.
short-eared owl	*Asio flammeus*	-/-	CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern	Great Basin grassland | Marsh & swamp | Meadow & seep | Valley & foothill grassland | Wetland	Found in swamp lands, both fresh and salt; lowland meadows; irrigated alfalfa fields. Tule patches/tall grass needed for nesting/daytime seclusion. Nests on dry ground in	Moderate	Species has been observed at several locations throughout the Delta. If borings are located away from wetlands, no suitable

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
					depression concealed in vegetation.		nesting habitat in the Impact Areas.
burrowing owl	*Athene cunicularia*	-/-	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern | USFWS_BCC-Birds of Conservation Concern	Coastal prairie | Coastal scrub | Great Basin grassland | Great Basin scrub | Mojave Desert scrub | Sonoran desert scrub | Valley & foothill grassland	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, such as California ground squirrel.	High	Several recorded occurrences are located nearby, and suitable habitat exists within the Study Area.
ferruginous hawk	*Buteo regalis*	-/-	CDFW_WL-Watch List | IUCN_LC-Least Concern | USFWS_BCC-Birds of Conservation Concern	Great Basin grassland | Great Basin scrub | Pinon & juniper woodlands | Valley & foothill grassland	Open grasslands, sagebrush flats, desert scrub, low foothills and fringes of pinyon and juniper habitats. Eats mostly lagomorphs, ground squirrels, and mice. Population trends may follow lagomorph population cycles.	Moderate	Several documented occurrences of over-wintering birds occur within 0.5 to 3 miles of several of the Impact Areas, and they are observed regularly in the winter, but do not nest in CA
Swainson's hawk	*Buteo swainsoni*	-/ST	BLM_S-Sensitive | IUCN_LC-Least Concern | USFWS_BCC-Birds of Conservation Concern	Great Basin grassland | Riparian forest | Riparian woodland | Valley & foothill grassland	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, & agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas with rodent populations.	High	Suitable nesting and foraging habitat found throughout the Study Area. There are known occurrences within the Study Area.
western snowy plover	*Charadrius alexandrinus nivosus*	FT/-	CDFW_SSC-Species of Special Concern | NABCI_RWL-Red Watch List |	Great Basin standing waters | Sand shore | Wetland	Sandy beaches, salt pond levees & shores of large alkali lakes. Needs sandy, gravelly or friable soils for nesting.	None	The Study Area is not within 5 miles of the known occurrences, and no suitable habitat is located within Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
			USFWS_BCC -Birds of Conservatio n Concern				
mountain plover	*Charadrius montanus*	-/-	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_NT-Near Threatened | NABCI_RWL -Red Watch List | USFWS_BCC -Birds of Conservatio n Concern	Chenopod scrub | Valley & foothill grassland	Short grasslands, freshly plowed fields, newly sprouting grain fields, & sometimes sod farms. Short vegetation, bare ground, and flat topography. Prefers grazed areas and areas with burrowing rodents.	Low	Winter records are located within 4.6 miles of the Study Area and minimal suitable habitat is present in the footprint; Species does not breed in CA.
northern harrier	*Circus hudsonius*	-/-	CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern	Coastal scrub | Great Basin grassland | Marsh & swamp | Riparian scrub | Valley & foothill grassland | Wetland	Coastal salt & freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	High	There are known occurrences within the Study area. Suitable nesting and foraging habitat found throughout the Study Area.
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT/SE	BLM_S-Sensitive | NABCI_RWL -Red Watch List | USFS_S-Sensitive | USFWS_BCC	Riparian forest	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems. Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape.	Low	There are known occurrences within the Study Area, and there is minimal suitable migratory habitat is present and species has been observed during

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
			-Birds of Conservatio n Concern				migration. Minimal habitat of suitable patch size for nesting, and species has not been recorded breeding in the vicinity in recent history.
snowy egret	*Egretta thula*	-/-	IUCN_LC-Least Concern	Marsh & swamp | Meadow & seep | Riparian forest | Riparian woodland | Wetland	Colonial nester, with nest sites situated in protected beds of dense tules. Rookery sites situated close to foraging areas: marshes, tidal-flats, streams, wet meadows, and borders of lakes.	High	Several recorded occurrences are located near Impact Areas, and suitable habitat exists within the Study Area.
white-tailed kite	*Elanus leucurus*	-/-	BLM_S-Sensitive | CDFW_FP-Fully Protected | IUCN_LC-Least Concern	Cismontane woodland | Marsh & swamp | Riparian woodland | Valley & foothill grassland | Wetland	Rolling foothills and valley margins with scattered oaks & river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	Moderate	Several recorded occurrences are located near Impact Areas, and suitable habitat exists within the Study Area.
California horned lark	*Eremophila alpestris actia*	-/-	CDFW_WL-Watch List | IUCN_LC-Least Concern	Marine intertidal & splash zone communities | Meadow & seep	Coastal regions, chiefly from Sonoma County to San Diego County. Also, main part of San Joaquin Valley and east to foothills. Short-grass prairie, "bald" hills, mountain meadows, open coastal plains, fallow grain fields, alkali flats.	Moderate	Several of the proposed on-land Impact Areas in Contra Costa County are within 1-2 miles of recorded occurrences, and potentially suitable habitat may be present.
Yellow-Breasted Chat	*Icteria virens*	-/-	CDFW_SSC-Species of Special Concern| USFWS BCC- Bird of	Riparian woodland	San Joaquin Delta in dense riparian understory with willow, blackberry and wild grape.	High	Suitable habitat is present and has been observed in riparian thickets and in-channel islands throughout the Sacramento-San Joaquin Delta.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
			Conservation Concern				
merlin	*Falco columbarius*	-/-	CDFW_WL-Watch List | IUCN_LC-Least Concern	Estuary | Great Basin grassland | Valley & foothill grassland	Seacoast, tidal estuaries, open woodlands, savannahs, edges of grasslands & deserts, farms & ranches. Clumps of trees or windbreaks are required for roosting in open country.	Low	Suitable foraging habitat is present in the Study Area, but species has been observed foraging and several recorded occurrences are located near Impact Areas.
prairie falcon	*Falco mexicanus*	-/-	CDFW_WL-Watch List | IUCN_LC-Least Concern | USFWS_BCC-Birds of Conservation Concern	Great Basin grassland | Great Basin scrub | Mojave Desert scrub | Sonoran Desert scrub | Valley & foothill grassland	Inhabits dry, open terrain, either level or hilly. Breeding sites located on cliffs. Forages far afield, even to marshlands and ocean shores.	Low	No suitable nesting habitat is located in the Study Area, but species has been observed foraging.
American peregrine falcon	*Falco peregrinus anatum*	FD/SD	CDF_S-Sensitive | CDFW_FP-Fully Protected | USFWS_BCC-Birds of Conservation Concern		Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape or a depression or ledge in an open site.	Low	No suitable nesting habitat is located in the Study Area, but species has been observed foraging. One recorded occurrence is within 2.5 miles of Impact Areas, on the Rio Vista Bridge.
saltmarsh common yellowthroat	*Geothlypis trichas sinuosa*	-/-	CDFW_SSC-Species of Special Concern | USFWS_BCC-Birds of Conservation Concern	Marsh & swamp	Resident of the San Francisco Bay region, in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	None	The Study Area is not within the range of the species.
loggerhead shrike	*Lanius ludovicianus*	-/-	CDFW_SSC-Species of Special	Broadleaved upland forest | Desert wash | Joshua tree woodland | Mojave Desert	Broken woodlands, savannah, pinyon-juniper, Joshua tree, and riparian woodlands, desert	High	Several recorded occurrences are located near Impact Areas in

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
			Concern | IUCN_LC-Least Concern | USFWS_BCC-Birds of Conservation Concern	scrub | Pinon & juniper woodlands | Riparian woodland | Sonoran Desert scrub	oases, scrub & washes. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.		Contra Costa and Alameda Counties, and suitable habitat exists within the Study Area.
California black rail	*Laterallus jamaicensis coturniculus*	-/ST	BLM_S-Sensitive | CDFW_FP-Fully Protected | IUCN_NT-Near Threatened | NABCI_RWL-Red Watch List | USFWS_BCC-Birds of Conservation Concern	Brackish marsh | Freshwater marsh | Marsh & swamp | Salt marsh | Wetland	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	Moderate	Several recorded occurrences are located near Impact Areas, and suitable habitat exists within the Study Area.
song sparrow ("Modesto" population)	*Melospiza melodia*	-/-	CDFW_SSC-Species of Special Concern	Open Woodlands | Tidal marshes | Grasslands | Chaparral | Agricultural fields	Inhabits a wide variety of habitats, nests from on the ground to 15 feet, often near water.	High	Several recorded occurrences are located near Impact Areas, and suitable habitat exists within the Study Area.
Suisun song sparrow	*Melospiza melodia maxillaris*	-/-	CDFW_SSC-Species of Special Concern | USFWS_BCC-Birds of Conservation Concern	Marsh & swamp | Wetland	Resident of brackish-water marshes surrounding Suisun Bay. Inhabits cattails, tules and other sedges, and Salicornia; also known to frequent tangles bordering sloughs.	None	The Study Area is not within the range of the species.
black-crowned night heron	*Nycticorax nycticorax*	-/-	IUCN_LC-Least Concern	Marsh & swamp | Riparian forest | Riparian woodland | Wetland	Colonial nester, usually in trees, occasionally in tule patches. Rookery sites located adjacent	High	Suitable habitat exists within the Study Area, and several recorded

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
					to foraging areas: lake margins, mud-bordered bays, marshy spots.		occurrences are located near Impact Areas.
Osprey	Pandion haliatus	-/-	CDFW_WL-Watch List	Riparian forest | Lakes	Nest in snags, man-made structures or trees in open areas near water.	High	Suitable habitat is present, and the species has been observed foraging in the Study Area.
double-crested cormorant	*Phalacrocorax auritus*	-/-	CDFW_WL-Watch List | IUCN_LC-Least Concern	Riparian forest | Riparian scrub | Riparian woodland	Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. Nests along coast on sequestered islets, usually on ground with sloping surface, or in tall trees along lake margins.	High	Suitable habitat exists within the Study Area, and several recorded occurrences are located near Impact Areas.
white-faced ibis	*Plegadis chihi*	-/-	CDFW_WL-Watch List | IUCN_LC-Least Concern	Marsh & swamp | Wetland	Shallow freshwater marsh. Dense tule thickets for nesting, interspersed with areas of shallow water for foraging.	Moderate	The species is regularly observed in the Delta year-round. Limited nesting habitat present and borings will be located outside of wetlands where nesting might occur.
purple martin	*Progne subis*	-/-	CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern	Broadleaved upland forest | Lower montane coniferous forest	Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine, and Monterey pine. Nests in old woodpecker cavities mostly; also, in human-made structures. Nest often located in tall, isolated tree/snag.	Low	Species has been observed rarely in the area, and minimal suitable nesting habitat is present within the Study Area.
California Ridgway's Rail	*Rallus obsoletus obsoletus*	FE/SE	CDFW_FP-Fully Protected	Brackish marsh | Marsh & swamp | Salt marsh | Wetland	Salt water and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay.	None	The Study Area is not within the range of the species.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
					Associated with abundant growths of pickleweed but feeds away from cover on invertebrates from mud-bottomed sloughs.		
bank swallow	*Riparia riparia*	-/ST	BLM_S-Sensitive | IUCN_LC-Least Concern	Riparian scrub | Riparian woodland	Colonial nester; primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	Low	No suitable nesting habitat is present in the Study Area, but species has been observed foraging, especially during migration.
Yellow Warbler	*Setophaga petechia*	-/-	CDFW_SSC-Species of Special Concern | USFWS_BCC-Birds of Conservation Concern	Riparian forest | Riparian scrub | Riparian woodland	Riparian obligate uses willow and shrub thickets, and other riparian plant species.	Moderate	Suitable habitat is present, and species has been observed during migration in the vicinity of the Study Area.
California Least Tern	*Sternula antillarum browni*	FE/SE	CDFW_FP-Fully Protected	Alkali playa	Nests along the coast from San Francisco Bay south to northern Baja California.	Low	No suitable nesting habitat and no known colonies, foraging birds are rarely observed.
Least Bell's vireo	*Vireo bellii pusillus*	FE/SE	IUCN_NT-Near Threatened | NABCI_YWL-Yellow Watch List	Riparian forest | Riparian scrub | Riparian woodland	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	Moderate	Suitable habitat is present in the Study Area. Species formerly extirpated from the Central Valley, but recently species has been observed vocalizing during nesting season at Yolo Bypass WA, and Bradford Island . Breeding unconfirmed.
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	-/-	CDFW_SSC-Species of Special Concern |	Marsh & swamp | Wetland	Nests in freshwater emergent wetlands with dense vegetation and deep water. Often along borders of lakes or ponds. Nests	Moderate	Suitable foraging habitat exists in the Study Area and the species is regularly observed

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
			IUCN_LC-Least Concern		only where large insects such as Odonata are abundant, nesting timed with maximum emergence of aquatic insects.		foraging in the winter. Minimal suitable nesting habitat is present in the Study Area, and nesting records are over 5 miles away.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
Fish							
Green sturgeon (southern DPS)	*Acipenser medirostris*	FT/-		Aquatic | Sacramento/San Joaquin flowing waters |Estuary	Anadromous. Spawns in Sacramento River, moves to estuary as juvenile, and out to ocean as adult.	High	Found within the waterways of the Study Area.
Sacramento perch	*Archoplites interruptus*	-/-	AFS_TH-Threatened | CDFW_SSC-Species of Special Concern	Aquatic | Sacramento/San Joaquin flowing waters | Sacramento/San Joaquin standing waters	Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley. Prefers warm water. Aquatic vegetation is essential for young. Tolerates wide range of physio-chemical water conditions.	Low	Potentially found within waterways of the Study Area.
Delta smelt	*Hypomesus transpacificus*	FT/SE	AFS_TH-Threatened | IUCN_EN-Endangered	Aquatic | Estuary	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait & San Pablo Bay. Seldom found at salinities > 10 ppt. Most often at salinities < 2ppt.	High	Found within the waterways of the Study Area.
steelhead - Central Valley DPS	*Oncorhynchus mykiss irideus pop. 11*	FT/-	AFS_TH-Threatened	Aquatic | Sacramento/San Joaquin flowing waters		High	Found within the waterways of the Study Area.
chinook salmon - Central Valley spring-run ESU	*Oncorhynchus tshawytscha pop. 6*	FT/ST	AFS_TH-Threatened	Aquatic | Sacramento/San Joaquin flowing waters	Adult numbers depend on pool depth and volume, amount of cover, and proximity to gravel. Water temps >27 C are lethal to adults. Federal listing refers to populations spawning in Sacramento River and tributaries.	High	Found within the waterways of the Study Area.
chinook salmon - Sacramento River winter-run ESU	*Oncorhynchus tshawytscha pop. 7*	FE/SE	AFS_EN-Endangered	Aquatic | Sacramento/San Joaquin flowing waters	Sacramento River below Keswick Dam. Spawns in the Sacramento River, but not in tributary streams. Requires clean, cold water, between 6 and 14 C, over gravel beds for spawning.	High	Found within the waterways of the Study Area.
Sacramento splittail	*Pogonichthys macrolepidotus*	-/-	AFS_VU-Vulnerable | CDFW_SSC-	Aquatic | Estuary | Freshwater marsh | Sacramento/San Joaquin flowing waters	Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun	High	Found within the waterways of the Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
			Species of Special Concern | IUCN_EN-Endangered		Bay and associated marshes. Slow moving river sections, dead end sloughs. Requires flooded vegetation for spawning and foraging for young.		
longfin smelt	*Spirinchus thaleichthys*	FC/ST		Aquatic | Estuary	Euryhaline, nektonic & anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15-30 ppt but can be found in completely freshwater to almost pure seawater.	High	Found within the waterways of the Study Area.
eulachon	*Thaleichthys pacificus*	FT/-		Aquatic | Klamath/North coast flowing waters	Found in Klamath and Mad Rivers, Redwood Creek, and Smith River and Humboldt Bay tributaries. Spawn in lower reaches of coastal rivers with moderate water velocities and bottom of pea-sized gravel, sand, and woody debris.	Low	Potentially could migrate through waterways of the Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
Invertebrates							
Blennosperma vernal pool andrenid bee	*Andrena blennospermatis*	-/-		Vernal pool	This bee is oligolectic on vernal pool blennosperma. Bees nest in the uplands around vernal pools.	Low	Suitable habitat may be present, and the Study Area is within the range of the species, however the Study Area is not within 5 miles of recent known occurrences.
Antioch Dunes anthicid beetle	*Anthicus antiochensis*	-/-		Interior dunes	Usually found in bare unvegetated sand. Extirpated from Antioch Dunes, but found along the Sacramento River in Glenn, Tehema, Shasta, and Solono Counties and along the Feather River in Sutter County.	Low	Suitable habitat may be present within the Study Area, the project area is within the range and one reported occurrence is within 2 miles and a second is within 5 miles of the Study Area.
Sacramento anthicid beetle	*Anthicus sacramento*	-/-	IUCN_EN-Endangered	Interior dunes	Restricted to sand dune areas. Inhabit sand slipfaces among bamboo and willow but may not depend on presence of these plant species.	Low	Suitable habitat may be present within the Study Area, the project area is within the range and two reported occurrences are within 2 miles of Study Area.
Lange's metalmark butterfly	*Apodemia mormo langei*	FE/-	XERCES_CI-Critically Imperiled	Interior dunes	Inhabits stabilized dunes along the San Joaquin River. Endemic to Antioch Dunes, Contra Costa County. Primary host plant is *Eriogonum nudum var auriculatum*; feeds on nectar of other wildflowers, as well as host plant.	None	There is potential for some suitable habitat to be within the Study Area, however the Study Area is outside of the current known range, which is limited to the Antioch Dunes.
Crotch bumble bee	*Bombus crotchii*	-/-	IUCN_EN-Endangered		Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include *Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia*, and *Eriogonum.*	Moderate	Suitable habitat may be present within the project area, and the Study Area is within the range, although the nearest known

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
							occurrence s are over 5 miles away.
western bumble bee	*Bombus occidentalis*	-/-	USFS_S-Sensitive | XERCES_IM-Imperiled		Found from Pacific Coast to the Colorado Rockies. Select food plant genera: *Melilotus, Cirsium, Trifolium, Centaurea, Chrysothamnus, Eriogonum*	High	Potentially suitable habitat may be present, and the Study Area is within the species range, and two reported occurrences are within 2 miles and a third is within 5 miles of Impact Areas.
Conservancy fairy shrimp	*Branchinecta conservatio*	FE/-	IUCN_EN-Endangered	Valley & foothill grassland | Vernal pool | Wetland	Endemic to the grasslands of the northern two-thirds of the Central Valley; found in large, turbid pools. Inhabit astatic pools located in swales formed by old, braided alluvium; filled by winter/spring rains, last until June.	Moderate	Some suitable habitat could be present within the Study Area, and one reported occurrence is within 5 miles of the Study Area.
longhorn fairy shrimp	*Branchinecta longiantenna*	FE/-	IUCN_EN-Endangered	Valley & foothill grassland | Vernal pool | Wetland	Endemic to the eastern margin of the Central Coast mountains in seasonally astatic grassland vernal pools. Inhabit small, clear-water depressions in sandstone and clear-to-turbid clay/grass-bottomed pools in shallow swales.	Moderate	Some suitable habitat could be present within the Study Area, and two reported occurrences are within 5 miles of the Study Area.
vernal pool fairy shrimp	*Branchinecta lynchi*	FT/-	IUCN_VU-Vulnerable	Valley & foothill grassland | Vernal pool | Wetland	Endemic to the grasslands of the Central Valley, Central Coast mountains, and South Coast mountains, in astatic rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	Moderate	Some suitable habitat could be present within the Study Area, and multiple occurrences have been reported within 0.5 miles of several of the Impact Areas.
midvalley fairy shrimp	*Branchinecta mesovallensis*	-/-		Vernal pool | Wetland	Found in vernal pools in Southeastern Sacramento, the southern Sierra foothills, San Joaquin Vernal pool region, and	Moderate	Some suitable habitat could be present within the Study Area, and one reported occurrence is

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
					San Joaquin, Madera, Merced and Fresno Counties.		within 0.5 miles of Impact Areas.
Sacramento Valley tiger beetle	*Cicindela hirticollis abrupta*	-/-		Sand shore	Sandy floodplain habitat in the Sacramento Valley. No beetles located during intensive 2001-2004 surveys. Requires fine to medium sand, terraced floodplains or low sandy water edge flats.	None	Thought to be extirpated. No suitable habitat could be present within the Study Area, and nearest occurrence is within 5 miles of the northern edge of the Study Area.
San Joaquin dune beetle	*Coelus gracilis*	-/-	BLM_S-Sensitive | IUCN_VU-Vulnerable	Interior dunes	Inhabits fossil dunes along the western edge of San Joaquin Valley; extirpated from Antioch Dunes (type locality) and is limited in current distribution of the western edge of the San Joaquin Valley. Inhabits sites containing sandy substrates.	None	The Study Area is outside to the known range of the species and there is no suitable habitat on site.
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT/-		Riparian scrub	Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus mexicana*). Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	High	Suitable elderberry bushes may be present within the Study Area, and several reported occurrences are within 2 miles of the Study Area.
Antioch efferian robberfly	*Efferia antiochi*	-/-		Interior dunes	Known only from Antioch, Fresno and Scout Island in the San Joaquin River.	None	The Study Area is outside of the known range of this species.
Delta green ground beetle	*Elaphrus viridis*	FT/-	IUCN_CR-Critically Endangered	Vernal pool | Wetland	Restricted to the margins of vernal pools in the grassland area between Jepson Prairie and Travis AFB. Prefers the sandy mud substrate where it slopes gently into the water, with low-growing vegetation, 25-100% cover.	None	The Study Area is outside of the known range of this species.
redheaded sphecid wasp	*Eucerceris ruficeps*	-/-		Interior dunes	Central California interior dunes. Nest in hard-packed sand utilizing abandoned halictine bee burrows.	None	While there are two reported occurrences from the 1950's, presumed extirpated, in

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
							the vicinity of the Study Area.
Bridges' coast range shoulderband	*Helminthoglypta nickliniana bridgesi*	-/-	IUCN_DD-Data Deficient	Valley & foothill grassland	Inhabits open hillsides of Alameda and Contra Costa counties. Tends to colonize under tall grasses and weeds.	None	Outside of known range.
Ricksecker's water scavenger beetle	*Hydrochara ricksecker*i	-/-		Aquatic | Sacramento/San Joaquin flowing waters | Sacramento/San Joaquin standing waters		Moderate	Suitable habitat is present in the Sacramento River, and there is a reported occurrence within 2 miles of the Study Area.
curved-foot hygrotus diving beetle	*Hygrotus curvipes*	-/-		Aquatic		Moderate	Suitable habitat may be present within the Study Area, and multiple reported occurrences are present within 2 miles of the Study Area.
Middlekauff's shieldback katydid	*Idiostatus middlekauffi*	-/-	IUCN_CR-Critically Endangered	Interior dunes	Only known from Contra Costa County and may be extirpated.	None	The Study Area is outside of the known range, and no suitable habitat is present.
vernal pool tadpole shrimp	*Lepidurus packardi*	FE/-	IUCN_EN-Endangered	Valley & foothill grassland | Vernal pool | Wetland	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water. Pools commonly found in grass-bottomed swales of unplowed grasslands. Some pools are mud-bottomed and highly turbid.	Moderate	Suitable habitat may be present within the Study Area, and multiple reported occurrences are present within 2 miles of the Study Area.
California linderiella	*Linderiella occidentalis*	-/-	IUCN_NT-Near Threatened	Vernal pool	Seasonal pools in unplowed grasslands with old alluvial soils underlain by hardpan or in sandstone depressions. Water in the pools has very low alkalinity, conductivity, and total dissolved solids.	Moderate	Suitable habitat may be present within the Study Area, and multiple reported occurrences are present within 2 miles of the Study Area.
molestan blister beetle	*Lytta molesta*	-/-		Vernal pool | Wetland		Low	Suitable habitat may be present within the Study Area, and one reported

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
							occurrence is 5 miles from the Study Area.
Hurd's metapogon robberfly	*Metapogon hurdi*	-/-		Interior dunes		None	The Study Area is outside of the known range, and no suitable habitat is present.
Antioch multilid wasp	*Myrmosula pacifica*	-/-		Interior dunes		None	The Study Area is outside of the known range, and no suitable habitat is present.
Antioch andrenid bee	*Perdita scitula antiochensis*	-/-		Interior dunes	Known only from Antioch Dunes and Oakley. Visits flowers of *Eriogonum, Gutierrezia californica, Heterotheca grandiflora, Lessingia glandulifera*.	None	The Study Area is outside of the known range, and no suitable habitat is present.
Antioch specid wasp	*Philanthus nasalis*	-/-		Interior dunes		None	The Study Area is outside of the known range, and no suitable habitat is present.
Antioch Dunes halcitid bee	*Sphecodogastra antiochensis*	-/-	XERCES_CI-Critically Imperiled	Interior dunes	Restricted to Antioch Dunes. Host plant is *Oenothera deltoides howellii*. This bee nests in the ground in stabilized sand dunes in open, xeric areas.	None	The Study Area is outside of the known range, and no suitable habitat is present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
Mammals							
pallid bat	*Antrozous pallidus*	-/-	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern | USFS_S-Sensitive | WBWG_H-High Priority	Chaparral | Coastal scrub | Desert wash | Great Basin grassland | Great Basin scrub | Mojave Desert scrub | Riparian woodland | Sonoran Desert scrub | Upper montane coniferous forest | Valley & foothill grassland	Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	None	No suitable roosting and foraging habitat present within the Study Area, and nearest occurrences over 8 miles from Study Area.
Townsend's big-eared bat	*Corynorhinus townsendii*	-/-	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern | USFS_S-Sensitive | WBWG_H-High Priority	Broadleaved upland forest | Chaparral | Chenopod scrub | Great Basin grassland | Great Basin scrub | Joshua tree woodland | Lower montane coniferous forest | Meadow & seep | Mojave Desert scrub | Riparian forest | Riparian woodland | Sonoran desert scrub | Sonoran thorn woodland | Upper montane coniferous forest | Valley & foothill grassland	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	None	No suitable habitat, nearest occurrences over 10 miles from Study Area.
western mastiff bat	*Eumops perotis californicus*	-/-	BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | WBWG_H-High Priority	Chaparral | Cismontane woodland | Coastal scrub | Valley & foothill grassland	Many open, semi-arid to arid habitats, including conifer & deciduous woodlands, coastal scrub, grasslands, chaparral, etc. Roosts in crevices in cliff faces, high buildings, trees and tunnels.	None	No suitable habitat, nearest occurrences over 25 miles from Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
silver-haired bat	*Lasionycteris noctivagans*	-/-	IUCN_LC-Least Concern | WBWG_M-Medium Priority	Lower montane coniferous forest | Old growth | Riparian forest	Primarily a coastal and montane forest dweller, feeding over streams, ponds & open brushy areas. Roosts in hollow trees, beneath exfoliating bark, abandoned woodpecker holes, and rarely under rocks.	None	No suitable habitat, nearest occurrences over 10 miles from Study Area.
western red bat	*Lasiurus blossevillii*	-/-	CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern | WBWG_H-High Priority	Cismontane woodland | Lower montane coniferous forest | Riparian forest | Riparian woodland	Roosts primarily in trees, 2-40 ft above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	Moderate	Suitable habitat present, and several occurrences within 2 miles of the Study Area.
hoary bat	*Lasiurus cinereus*	-/-	IUCN_LC-Least Concern | WBWG_M-Medium Priority	Broadleaved upland forest | Cismontane woodland | Lower montane coniferous forest | North coast coniferous forest	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths.	Moderate	Suitable habitat present and reported occurrences within 2 and 5 miles of the Study Area.
San Francisco dusky-footed woodrat	*Neotoma fuscipes annectens*	-/-	CDFW_SSC-Species of Special Concern	Chaparral | Redwood	Forest habitats of moderate canopy & moderate to dense understory. May prefer chaparral & redwood habitats. Constructs nests of shredded grass, leaves & other material. May be limited by availability of nest-building materials.	None	No suitable habitat is present for this species and the Study Area is outside of the known range of this subspecies.
Riparian (=San Joaquin Valley) woodrat	*Neotoma fuscipes riparia*	FE/-	CDFW_SSC-Species of Special Concern	Chaparral | Redwood	Forest habitats of moderate canopy & moderate to dense understory. May prefer chaparral & redwood habitats. Constructs nests of shredded grass, leaves & other material.	None	No suitable habitat is present for this species and the Study Area is outside of the known range of this subspecies.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
					May be limited by availability of nest-building materials.		
San Joaquin Pocket Mouse	*Perognathus inornatus*	-/-	BLM_S-Sensitive | IUCN_LC-Least Concern	Cismontane woodland | Mojave Desert scrub | Valley & foothill grassland	Grassland, oak savanna and arid scrubland in the southern Sacramento Valley, Salinas Valley, San Joaquin Valley and adjacent foothills, south to the Mojave Desert. Associated with fine-textured, sandy, friable soils.	Moderate	Suitable habitat present and reported occurrences within 2 and 5 miles of the Study Area.
salt-marsh harvest mouse	*Reithrodontomys raviventris*	FE/SE	CDFW_FP-Fully Protected | IUCN_EN-Endangered	Marsh & swamp | Wetland	Only in the saline emergent wetlands of San Francisco Bay and its tributaries. Pickleweed is primary habitat but may occur in other marsh vegetation types and in adjacent upland areas. Does not burrow; builds loosely organized nests. Requires higher areas for flood escape.	None	Study Area is outside of the range for this species.
riparian brush rabbit	*Sylvilagus bachmani riparius*	FE/SE		Riparian forest	Riparian areas on the San Joaquin River in northern Stanislaus County. Dense thickets of wild rose, willows, and blackberries.	None	Study Area is outside of the range for this species.
American badger	*Taxidea taxus*	-/-	CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern	Alkali marsh | Alkali playa | Alpine | Alpine dwarf scrub | Bog & fen | Brackish marsh | Broadleaved upland forest | Chaparral | Chenopod scrub | Cismontane woodland | Closed-cone coniferous forest | Coastal bluff scrub | Coastal dunes | Coastal prairie | Coastal scrub | Desert dunes | Desert wash |	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	Moderate	Suitable habitat present and reported occurrences within 2 and 5 miles of the Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Determination
				Freshwater marsh | Great Basin grassland | Great Basin scrub | Interior dunes | Ione formation | Lower montane coniferous forest | Marsh & swamp | Meadow & seep | Mojave desert scrub | Montane dwarf scrub | North coast coniferous forest Redwood | Riparian forest | Riparian scrub | Riparian woodland | Salt marsh | Sonoran desert scrub | Sonoran thorn woodland | Ultramafic | Upper montane coniferous forest | Upper Sonoran scrub | Valley & foothill grassland			
San Joaquin kit fox	*Vulpes macrotis mutica*	FE/ST		Chenopod scrub | Valley & foothill grassland	Annual grasslands or grassy open stages with scattered shrubby vegetation. Need loose-textured sandy soils for burrowing, and suitable prey base.	Moderate	Suitable habitat present and reported occurrences within 2 and 5 miles of the Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
Santa Clara thorn-mint	*Acanthomintha lanceolata*	-/-/4.2		Chaparral (often serpentinite), Cismontane woodland, Coastal scrub	rocky. 80-1200m.	none	No habitat present, out of range.
large-flowered fiddleneck	*Amsinckia grandiflora*	FE/SE/1B.1		Cismontane woodland, Valley and foothill grassland	270-550m	moderate	Potentially suitable habitat present.
bent-flowered fiddleneck	*Amsinckia lunaris*	-/-/1B.2		Coastal bluff scrub, Cismontane woodland, Valley and foothill grassland	3-500m	low	Potentially suitable habitat present, however out of known range.
California androsace	*Androsace elongata ssp. acuta*	-/-/4.2		Chaparral, Cismontane woodland, Coastal scrub, Meadows and seeps, Pinyon and juniper woodland, Valley and foothill grassland	150-1305m	moderate	Potentially suitable habitat.
Mt. Diablo manzanita	*Arctostaphylos auriculata*	-/-/1B.3		Chaparral (sandstone), Cismontane woodland	135-650m	none	No habitat present.
Contra Costa manzanita	*Arctostaphylos manzanita ssp. laevigata*	-/-/1B.2		Chaparral (rocky)	430-1100m	none	No habitat present.
depauperate milk-vetch	*Astragalus pauperculus*	-/-/4.3		Chaparral, Cismontane woodland, Valley and foothill grassland	vernally mesic, volcanic. 60-1215m	low	Potentially suitable habitat present, Study Area is on edge of known range.
Ferris' milk-vetch	*Astragalus tener var. ferrisiae*	-/-/1B.1		Meadows and seeps (vernally mesic), Valley and foothill grassland (subalkaline flats)	2-75m	moderate	Potentially suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
alkali milk-vetch	*Astragalus tener var. tener*	-/-/1B.2		Playas, Valley and foothill grassland (adobe clay), Vernal pools	alkaline. 1-60m	moderate	Potentially suitable habitat present.
heartscale	*Atriplex cordulata var. cordulata*	-/-/1B.2		Chenopod scrub, Meadows and seeps, Valley and foothill grassland (sandy)	saline or alkaline. 0-560m	moderate	Potentially suitable habitat present.
crownscale	*Atriplex coronata var. coronata*	-/-/4.2		Chenopod scrub, Valley and foothill grassland, Vernal pools	alkaline, often clay. 1-590m	moderate	Potentially suitable habitat present.
Lost Hills crownscale	*Atriplex coronata var. vallicola*	-/-/1B.2		Chenopod scrub, Valley and foothill grassland, Vernal pools	alkaline. 50-635m	moderate	Potentially suitable habitat present.
brittlescale	*Atriplex depressa*	-/-/1B.2		Chenopod scrub, Meadows and seeps, Playas, Valley and foothill grassland, Vernal pools	alkaline, clay. 1-320m	moderate	Potentially suitable habitat present.
lesser saltscale	*Atriplex minuscula*	-/-/1B.1		Chenopod scrub, Playas, Valley and foothill grassland	alkaline, sandy. 15-200m	moderate	Potentially suitable habitat present.
vernal pool smallscale	*Atriplex persistens*	-/-/1B.2		Vernal pools (alkaline)	10-115m	low	Potentially suitable habitat present, however Study Area located on edge of range
big-scale balsamroot	*Balsamorhiza macrolepis*	-/-/1B.2		Chaparral, Cismontane woodland, Valley and foothill grassland	sometimes serpentinite. 45-1555m	moderate	Potentially suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
big tarplant	*Blepharizonia plumosa*	-/-/1B.1		Valley and foothill grassland	Usually clay. 30-505m	moderate	Potentially suitable habitat present.
watershield	*Brasenia schreberi*	-/-/2B.3		Marshes and swamps (freshwater)	30-2200m	moderate	Potentially suitable habitat present.
valley brodiaea	*Brodiaea rosea ssp. vallicola*	-/-/4.2		Valley and foothill grassland (swales), Vernal pools	Old alluvial terraces; silty, sandy, and gravelly loam. 10-335m	moderate	Potentially suitable habitat present.
Brewer's calandrinia	*Calandrinia breweri*	-/-/4.2		Chaparral, Coastal scrub	sandy or loamy, disturbed sites and burns. 10-1220m	none	No habitat
Mt. Diablo fairy-lantern	*Calochortus pulchellus*	-/-/1B.2		Chaparral, Cismontane woodland, Riparian woodland, Valley and foothill grassland	30-840m	low	Suitable habitat present, however Study Area located on edge of range.
chaparral harebell	*Campanula exigua*	-/-/1B.2		Chaparral (rocky, usually serpentinite)	275 1250m	none	No habitat
bristly sedge	*Carex comosa*	-/-/2B.1		Coastal prairie, Marshes and swamps (lake margins), Valley and foothill grassland	0-625m	moderate	Potentially suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
Lemmon's jewelflower	*Caulanthus lemmonii*	-/-/1B.2		Pinyon and juniper woodland, Valley and foothill grassland	80-1580m	moderate	Potentially suitable habitat present.
Congdon's tarplant	*Centromadia parryi ssp. congdonii*	-/-/1B.1		Valley and foothill grassland (alkaline)	0-230m	moderate	Potentially suitable habitat present.
pappose tarplant	*Centromadia parryi ssp. parryi*	-/-/1B.2		Chaparral, Coastal prairie, Meadows and seeps, Marshes and swamps (coastal salt), Valley and foothill grassland (vernally mesic)	often alkaline. 0-420m	moderate	Potentially suitable habitat present.
Parry's rough tarplant	*Centromadia parryi ssp. rudis*	-/-/4.2		Valley and foothill grassland, Vernal pools	alkaline, vernally mesic, seeps, sometimes roadsides. 0-100m	moderate	Potentially suitable habitat present.
Hispid salty bird's-beak	*Chloropyron molle ssp. hispidum*	-/-/1B.1		Meadows and seeps, Playas, Valley and foothill grassland	alkaline. 1-155m	moderate	Potentially suitable habitat present.
Soft salty bird's-beak	*Chloropyron molle ssp. molle*	FE/CR/1B.2		Marshes and swamps (coastal salt)	0-3m	low	Limited salt-marsh habitat present and the Study Area is located on the edge of the known range.
palmate-bracted salty bird's-beak	*Chloropyron palmatum*	FE/CE/1B.1		Chenopod scrub, Valley and foothill grassland	alkaline.05-155m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
Bolander's water-hemlock	*Cicuta maculata var. bolanderi*	-/-/2B.1		Marshes and swamps Coastal, fresh or brackish water	0-200m	moderate	Potentially suitable habitat present.
slough thistle	*Cirsium crassicaule*	-/-/1B.1		Chenopod scrub, Marshes and swamps (sloughs), Riparian scrub	3-100m	moderate	Potentially suitable habitat present.
small-flowered morning-glory	*Convolvulus simulans*	-/-/4.2		Chaparral (openings), Coastal scrub, Valley and foothill grassland	clay, serpentinite seeps.30-740m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
Hoover's cryptantha	*Cryptantha hooveri*	-/-/1A		Inland dunes, Valley and foothill grassland (sandy)	9-150m	moderate	Potentially suitable habitat present.
Peruvian dodder	*Cuscuta obtusiflora var. glandulosa*	-/-/2B.2		Marshes and swamps (freshwater)	15-280m	low	Potentially suitable habitat, however the Study Area is outside of the known range.
Livermore tarplant	*Deinandra bacigalupii*	-/CE/1B.1		Meadows and seeps (alkaline)	150-185m	moderate	Potentially suitable habitat present, within 100 m of Study Area.
Hospital Canyon larkspur	*Delphinium californicum ssp. interius*	-/-/1B.2		Chaparral (openings), Cismontane woodland (mesic), Coastal scrub	195-1095m	none	No habitat
recurved larkspur	*Delphinium recurvatum*	-/-/1B.2		Chenopod scrub, Cismontane woodland, Valley and foothill grassland	alkaline. 3-790m	moderate	Potentially suitable habitat present.
dwarf downingia	*Downingia pusilla*	-/-/2B.2		Valley and foothill grassland (mesic), Vernal pools	1-445m	moderate	Potentially suitable habitat present, within 100 m of Study Area.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
Antioch Dunes buckwheat	*Eriogonum nudum var. psychicola*	-/-/1B.1		Inland dunes	0-20m	none	No habitat
Mt. Diablo buckwheat	*Eriogonum truncatum*	-/-/1B.1		Chaparral, Coastal scrub, Valley and foothill grassland	sandy. 3-350m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
Jepson's coyote thistle	*Eryngium jepsonii*	-/-/1B.2		Valley and foothill grassland, Vernal pools	clay. 3-300m	moderate	Potentially suitable habitat present.
Delta button-celery	*Eryngium racemosum*	-/CE/1B.1		Riparian scrub (vernally mesic clay depressions)	3-30m	moderate	Potentially suitable habitat present, within 100 m of Study Area.
spiny-sepaled button-celery	*Eryngium spinosepalum*	-/-/1B.2		Valley and foothill grassland, Vernal pools	80-975m	moderate	Potentially suitable habitat present.
Contra Costa wallflower	*Erysimum capitatum var. angustatum*	FE/CE/1B.1		Inland dunes	3-20m	none	No habitat
diamond-petaled California poppy	*Eschscholzia rhombipetala*	-/-/1B.1		Valley and foothill grassland (alkaline, clay)	0-975m	moderate	Potentially suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
San Joaquin spearscale	*Extriplex joaquinana*	-/-/1B.2		Chenopod scrub, Meadows and seeps, Playas, Valley and foothill grassland	alkaline. 1-835m	moderate	Potentially suitable habitat present.
stinkbells	*Fritillaria agrestis*	-/-/4.2		Chaparral, Cismontane woodland, Pinyon and juniper woodland, Valley and foothill grassland	Clay, sometimes serpentinite. 10-1555	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
fragrant fritillary	*Fritillaria liliacea*	-/-/1B.2		Cismontane woodland, Coastal prairie, Coastal scrub, Valley and foothill grassland	Often serpentinite. 3-410m	moderate	Potentially suitable habitat present.
adobe-lily	*Fritillaria pluriflora*	-/-/1B.2		Chaparral, Cismontane woodland, Valley and foothill grassland	often adobe. 60-705m	none	No habitat
phlox-leaf serpentine bedstraw	*Galium andrewsii ssp. gatense*	-/-/4.2		Chaparral, Cismontane woodland, Lower montane coniferous forest	serpentinite, rocky. 150-1450m	none	No habitat
Boggs Lake hedge-hyssop	*Gratiola heterosepala*	-/CE/1B.2		Marshes and swamps (lake margins), Vernal pools	clay. 10-2375m	moderate	Potentially suitable habitat present.
Diablo helianthella	*Helianthella castanea*	-/-/1B.2		Broadleafed upland forest, Chaparral, Cismontane woodland, Coastal scrub, Riparian woodland, Valley and foothill grassland	Usually rocky, axonal soils. Often in partial shade. 60-1300m	low	Marginally suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
hogwallow starfish	*Hesperevax caulescens*	-/-/4.2		Valley and foothill grassland (mesic, clay), Vernal pools (shallow)	sometimes alkaline. 0-505m	moderate	Potentially suitable habitat present.
Brewer's western flax	*Hesperolinon breweri*	-/-/1B.2		Chaparral, Cismontane woodland, Valley and foothill grassland	usually serpentinite. 30-945m	low	Marginally suitable habitat present.
woolly rose-mallow	*Hibiscus lasiocarpos var. occidentalis*	-/-/1B.2		Marshes and swamps (freshwater)	Often in riprap on sides of levees. 0-120m	moderate	Potentially suitable habitat present.
Carquinez goldenbush	*Isocoma arguta*	-/-/1B.1		Valley and foothill grassland (alkaline)	1-20m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
Northern California black walnut	*Juglans hindsii*	-/-/1B.1		Riparian forest, Riparian woodland	0-440m	moderate	Potentially suitable habitat present.
Contra Costa goldfields	*Lasthenia conjugens*	FE/-/1B.1		Cismontane woodland, Playas (alkaline), Valley and foothill grassland, Vernal pools	mesic. 0-470m	moderate	Potentially suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
Ferris' goldfields	*Lasthenia ferrisiae*	-/-/4.2		Vernal pools (alkaline, clay)	20-700m	moderate	Potentially suitable habitat present.
Coulter's goldfields	*Lasthenia glabrata ssp. coulteri*	-/-/1B.1		Marshes and swamps (coastal salt), Playas, Vernal pools	1-1220m	moderate	Potentially suitable habitat present.
Delta tule pea	*Lathyrus jepsonii var. jepsonii*	-/-/1B.2		Marshes and swamps (freshwater and brackish)	0-5m	high	Potentially suitable habitat present.
legenere	*Legenere limosa*	-/-/1B.1		Vernal pools	1-880m	moderate	Potentially suitable habitat present.
Heckard's pepper-grass	*Lepidium latipes var. heckardii*	-/-/1B.2		Valley and foothill grassland (alkaline flats)	2-200m	moderate	Potentially suitable habitat present.
Mason's lilaeopsis	*Lilaeopsis masonii*	-/CR/1B.1		Marshes and swamps (brackish or freshwater), Riparian scrub	0-10m	moderate	Potentially suitable habitat present.
Delta mudwort	*Limosella australis*	-/-/2B.1		Marshes and swamps (freshwater or brackish), Riparian scrub	Usually mud banks. 0-3m	moderate	Potentially suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
showy golden madia	*Madia radiata*	-/-/1B.1		Cismontane woodland, Valley and foothill grassland	25-1215m	moderate	Potentially suitable habitat present.
Hall's bush-mallow	*Malacothamnus hallii*	-/-/1B.2		Chaparral, Coastal scrub	10-760m	none	No habitat
San Antonio Hills monardella	*Monardella antonina ssp. antonina*	-/-/3		Chaparral, Cismontane woodland	320-1000m	none	No habitat
little mousetail	*Myosurus minimus ssp. apus*	-/-/3.1		Valley and foothill grassland, Vernal pools (alkaline)	20-640m	moderate	Potentially suitable habitat present.
hoary navarretia	*Navarretia eriocephala*	-/-/4.3		Cismontane woodland, Valley and foothill grassland	vernally mesic. 105-400m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
Tehama navarretia	*Navarretia heterandra*	-/-/4.3		Valley and foothill grassland (mesic), Vernal pools	30-1010m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
Baker's navarretia	*Navarretia leucocephala ssp. bakeri*	-/-/1B.1		Cismontane woodland, Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland, Vernal pools	Mesic. 5-1740m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
adobe navarretia	*Navarretia nigelliformis ssp. nigelliformis*	-/-/4.2		Valley and foothill grassland vernally mesic, Vernal pools sometimes	clay, sometimes serpentinite. 100-1000m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
shining navarretia	*Navarretia nigelliformis ssp. radians*	-/-/1B.2		Cismontane woodland, Valley and foothill grassland, Vernal pools	Sometimes clay. 65-1000m	moderate	Potentially suitable habitat present.
prostrate vernal pool navarretia	*Navarretia prostrata*	-/-/1B.1		Coastal scrub, Meadows and seeps, Valley and foothill grassland (alkaline), Vernal pools	Mesic. 3-1210m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
Colusa grass	*Neostapfia colusana*	FT/CE/1B.1		Vernal pools (adobe, large)	5-200m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
Antioch Dunes evening-primrose	*Oenothera deltoides ssp. howellii*	FE/CE/1B.1		Inland dunes	0-30m	none	No habitat

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
slender Orcutt grass	*Orcuttia tenuis*	FT/CE/1B.1		Vernal pools	Often gravelly. 35-1760m	moderate	Potentially suitable habitat present.
Sacramento Orcutt grass	*Orcuttia viscida*	FE/CE/1B.1		Vernal pools	30-100m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
bearded popcornflower	*Plagiobothrys hystriculus*	-/-/1B.1		Valley and foothill grassland (mesic), Vernal pools margins	often vernal swales. 0-274m	low	Potentially suitable habitat present, however the Study Area is located on the edge of the known range.
eel-grass pondweed	*Potamogeton zosteriformis*	-/-/2B.2		Marshes and swamps (assorted freshwater)	0-1860m	moderate	Potentially suitable habitat present.
California alkali grass	*Puccinellia simplex*	-/-/1B.2		Chenopod scrub, Meadows and seeps, Valley and foothill grassland, Vernal pools	Alkaline, vernally mesic; sinks, flats, and lake margins. 2-930m	moderate	Potentially suitable habitat present.
Sanford's arrowhead	*Sagittaria sanfordii*	-/-/1B.2		Marshes and swamps (assorted shallow freshwater)	0-650m	moderate	Potentially suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
marsh skullcap	*Scutellaria galericulata*	-/-/2B.2		Lower montane coniferous forest, Meadows and seeps (mesic), Marshes and swamps	0-2100m	moderate	Potentially suitable habitat present.
side-flowering skullcap	*Scutellaria lateriflora*	-/-/2B.2		Meadows and seeps (mesic), Marshes and swamps	0-500m	moderate	Potentially suitable habitat present.
chaparral ragwort	*Senecio aphanactis*	-/-/2B.2		Chaparral, Cismontane woodland, Coastal scrub	sometimes alkaline.15-800m	none	No habitat
sweet marsh ragwort	*Senecio hydrophiloides*	-/-/4.2		Lower montane coniferous forest, Meadows and seeps	Mesic. 0-2800m	none	No habitat
Keck's checkerbloom	*Sidalcea keckii*	FE/-/1B.1		Cismontane woodland, Valley and foothill grassland	serpentinite, clay. 75-650m	low	Limited potentially suitable habitat present, and the Study Area is located on the edge of the known range.
long-styled sand-spurrey	*Spergularia macrotheca var. longistyla*	-/-/1B.2		Meadows and seeps, Marshes and swamps	Alkaline. 0-225	moderate	Potentially suitable habitat present.
Suisun Marsh aster	*Symphyotrichum lentum*	-/-/1B.2		Marshes and swamps (brackish and freshwater)	0-3m	moderate	Potentially suitable habitat present.
Wright's trichocoronis	*Trichocoronis wrightii var. wrightii*	-/-/2B.1		Meadows and seeps, Marshes and swamps, Riparian forest, Vernal pools	alkaline. 5-435m	moderate	Potentially suitable habitat present.

Common Name	Scientific Name	Fed/ State/ CNPS	Other Status	Habitat	Micro Habitat	Potential to Occur	Justification for Potential to Occur
saline clover	*Trifolium hydrophilum*	-/-/1B.2		Marshes and swamps, Valley and foothill grassland (mesic, alkaline), Vernal pools	0-300m	moderate	Potentially suitable habitat present.
caper-fruited tropidocarpum	*Tropidocarpum capparideum*	-/-/1B.1		Valley and foothill grassland (alkaline hills)	1-455m	moderate	Potentially suitable habitat present.
Crampton's tuctoria or Solano grass	*Tuctoria mucronata*	FE/CE/1B.1		Valley and foothill grassland (mesic), Vernal pools	5-10m	none	No habitat
oval-leaved viburnum	*Viburnum ellipticum*	-/-/2B.3		Chaparral, Cismontane woodland, Lower montane coniferous forest	215-1400m	none	No habitat

Appendix B:

Greenhouse Gas (GHG) Analyses

GHG Consistency Determination (CD), GHG Emissions Inventory and Calculation worksheet, and GGERP Pre-construction and Final Design BMPs

Greenhouse Gas(GHG) Emissions Reduction Plan Consistency Determination

For Projects Using Contractors or Other Outside Labor

This form is to be used by DWR project managers to document a DWR CEQA project's consistency with the DWR Greenhouse Gas Emissions Reduction Plan. This form is to be used only when DWR is the Lead Agency and when contractors or outside labor and equipment are used to implement the project.

Additional Guidance on filling out this form can be found at:
http://dwrclimatechange.water.ca.gov/guidance_resources.cfm

The DWR Greenhouse Gas Emissions Reduction Plan can be accessed at:
https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-Action-Plan

Project Name:	Soil Investigations for Data Collection in the Delta
Environmental Document Type:	IS/MND
Manager's Name:	Carolyn Buckman
Manager's E-mail:	Carolyn.Buckman@water.ca.gov
Division:	Executive
Office, Branch, or Field Division:	Delta Conveyance

Short Project Description:

The proposed project consists of on-land and over water soil investigations, including167 soil borings from 50 to 200 feet below ground surface, 103 cone-penetration tests from 50 to 200 feet below ground surface, and up to 5 geophysical survey investigation arrays. Soil investigation locations are spread throughout the area that has been identified as the potential study area for the Delta Conveyance. No ongoing operation or maintenance or emissions will be required post-project.

Project GHG Emissions Summary:

Total Construction Emissions	6,203.2	$mtCO_2e$
Maximum Annual Construction Emissions	4,135.5	$mtCO_2e$

☒ All other emissions from the project not accounted for above will occur as ongoing operational, maintenance, or business activity emissions and therefore have already been accounted for and analyzed in the GGERP.

Extraordinary Construction Project Determination:

Do total project construction emissions exceed 25,000 $mtCO_2e$ for the entire construction phase or exceed 12,500 $mtCO_2e$ in any single year of construction?

☒ No- Additional analysis not required ☐ Yes - Project specific emissions mitigation measures have been included in the environmental analysis document for the project

Project GHG Reduction Plan Checklist:
☐ All Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project. (Project Level GHG Emissions Reduction Measures) Or ☒ All feasible Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project and Measures not incorporated have been listed and determined not to apply to the proposed project (include as an attachment)
☒ Project does not conflict with any of the Specific Action GHG Emissions Reduction Measures (Specific Action GHG Emissions Reduction Measures)
Would implementation of the project result in additional energy demands on the SWP system of 15 GWh/yr or greater? ☐ Yes ☒ No If you answered Yes, attach a letter documenting that the project has consulted with the DWR SWP Power and Risk Office regarding the additional power requirements of the project.
Is there substantial evidence that the effects of the proposed project may be cumulatively considerable notwithstanding the proposed project's compliance with the requirements of the DWR GHG Reduction Plan? ☐ Yes ☒ No If you answered Yes, the project is not eligible for streamlined analysis of GHG emissions using the DWR GHG Emissions Reduction Plan. (See CEQA Guidelines, section 15183.5, subdivision (b)(2).)

Based on the information provided above and information provided in associated environmental documentation completed pursuant to the above referenced project, the DWR CEQA Climate Change Committee has determined that:

☒ The entire proposed project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gases emitted by the project are covered by the plan's analysis.

☐ The operational and maintenance phase of the project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gases emitted by the project are covered by the plan's analysis. Emissions from the construction phase of the project are not covered by the DWR Greenhouse Gas Emissions Reduction Plan and will be mitigated as part of the project.

Project Manager Signature: Carolyn Mu Date: 11/13/19

C4 Approval Signature: Jennifer Morales Date: 11/14/2019

Attachments:

☒ GHG Emissions Inventory ☒ List and Explanation of excluded Project level GHG Emissions Reduction Measures ☐ SWP Power and Risk Office Consultation Letter

Links:
https://current.water.ca.gov/programs/icc/SitePages/Home.aspx
https://water.ca.gov/Programs/All-Programs/Climate-Change-Program

Project Activities for Soil Explorations - Inventory and Calculation of Greenhouse Gas Emissions

Emissions from Construction Equipment

Line	Type of Equipment	Maximum Number per Day	Total Operation Days	Average Hours Per Day	Total Operation Hours[1]	Fuel Consumption Per Hour (gal/hour)[2]	Total Fuel Consumption (gal. diesel)	CO_2e/gal diesel[3]	Total CO_2 Equivalent Emissions (metric tons)
1									
2	**On-Land 50' Borings**								
3	Drill Rigs - 50-foot deep borings	1	44	10	440	14.07	6,191	0.010	64
4	Water Truck	1	44	10	440	7.55	3,323	0.010	35
5	Liftgate Truck	1	44	4	176	7.55	1,329	0.010	14
6	**7.553081794**								
7	Drill Rigs - 125- to 150-foot deep borings	1	104	10	1040	14.07	14,634	0.010	152
8	Water Truck	1	104	10	1040	7.55	7,855	0.010	82
9	Liftgate Truck	1	104	4	416	7.55	3,142	0.010	33
10	**On-Land 175-200' Borings**								
11	Drill Rigs - 175- to 200-foot deep borings	1	917	10	9170	14.07	129,033	0.010	1,341
12	Water Truck	1	917	10	9170	7.55	69,262	0.010	720
13	Tractor-Trailer Lowboy Truck	1	262	2	524	12.35	6,472	0.010	67
14	Liftgate Truck	1	917	4	3668	7.55	27,705	0.010	288
15	**CPT Soundings**								
16	CPT Truck	1	220	10	2200		-	0.010	-
17	Grout Truck	1	220	2	440	7.55	3,323	0.010	35
18	Tractor-Trailer Lowboy Truck	1	220	2	440	12.35	5,434	0.010	56
19	**Geophysical Survey**								
20	Envirovibe Rig	1	35	10	350	12.35	4,323	0.010	45
21	Tractor-Trailer Lowboy Truck	1	2	2	4	12.35	49	0.010	1
22	**Over Water Borings**								
23	Hazard Survey Boat (<50 HP)	1	171	10	1710	19.86	33,961	0.010	353
24	Drill Rig Barge/Tugboat or Ship	1	456	10	4560	43.50	198,360	0.010	2,061
25	Worker Transport Boat	1	456	4	1824	19.86	36,225	0.010	376
26	TOTAL						**550,622**		**5,722**

27 [1] An 8-hour work day is assumed, unless otherwise indicated

28 [2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors for on-land estimates; California Air Resource Board 1999 Source Inventor

29 [3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2

30

Emissions from Transportation of Construction Workforce

32	Average Number of Workers per Day	Total Number of Workdays	Average Distance Travelled (round trip)	Total Miles Travelled	Average Passenger Vehicle Fuel Efficiency[4]	Total Fuel Consumption (gal. gasoline)	CO_2e/gal Gasoline[3]	Total CO_2 Equivalent Emissions (metric tons)
33	**On-Land 50' Borings**							
34	10	198	60	118800	20.8	**5711.5**	0.009	**51**
35	**On-Land 125-150' Borings**							
36	15	442	60	397800	20.8	**19125.0**	0.009	**172**
37	**On-Land 175-200' Borings**							
38	17	4002	60	4082040	20.8	**196251.9**	0.009	**1768**
39	**CPT Soundings**							
40	15	800	60	720000	20.8	**34615.4**	0.009	**312**
41	**Geophysical Survey**							
42	14	255	60	214200	20.8	**10298.1**	0.009	**93**
43	**Over Water Borings**							
44	13	1425	60	1111500	20.8	**53437.5**	0.009	**481**

45 [4] United States Environmental Protection Agency. 2008. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2008. [EPA420-R-08-015]

46

47 **Emissions from Transportation of Construction Materials**

48 Trip Type	Total Number of Trips	Average Trip Distance	Total Miles Travelled	Average Semi-truck Fuel Efficiency	Total Fuel Consumption (gal. diesel)	CO_2e/gal Diesel [3]	Total CO_2 Equivalent Emissions (metric tons)
49 Delivery			0	6	0	0.010	0
50 Spoils			0	6	0	0.010	0
51 TOTAL							**0**

52

53 **Construction Electricity Emissions**

54	MWh of electricity	$mtCO2_e$/ MWh[5]	CO_2 e emissions
55 Electricity Needed		0.277	0

56 [5] eGRID2010 Version 1.0 *CAMX-WECC sub-region*.

57

58 **Total Construction Activity Emissions** 6,203.2 (from lines 26, 44, 51, and 55)

59 **Total Years of Construction** 1.5

60 **Expected Start Date of Construction**

50

51 **Estimated Project Useful life** 1.5 Years

52 **Average Annual Total GHG Emissions**[7] 4,135.5 **MT CO_2 equivalents**

53 **Max. Year Construction GHG Emissions**[8] **MT CO2 equivalents**

54 [7]short-term construction emissions amortized over life of project

55 [8]Emissions total from single year of construction when emissions peak (for multi-year construction projects)

NOTE: the Average Annual Total GHG Emissions is NOT the same value as the "Maximum Annual Emissions" (MAE) value that is required on the DWR GGERP Consistency Form for Projects Using Outside Labor and Equipment; The MAE is calculated to ensure that the project does not emit more than 12,500 mtCO2e in any given year

DWR Project Level GHG Emissions Reduction Measures

The following list of Best Management Practices (BMPs) for DWR construction and maintenance activities are recommended to reduce GHG emissions from construction projects. All projects that rely on the GGERP must implement the BMPs as part of the project or explain why the measures that have not been incorporated do not apply to the project. Variances from the standard BMPs that have been requested for this project are described below.

BMP 1. Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high efficiency technologies are appropriate and feasible for the project or specific elements of the project.

BMP 2. Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.

> Variance requested: Material hauling is not required for the proposed soil investigations; therefore, this BMP does not apply.

BMP 3. Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane or solar, to power generators to the maximum extent feasible.

> Variance requested: Electrical service drops are not feasible for this project as work willbe conducted at each site for no more than 15 days; therefore, this BMP does not apply.

BMP 4. Evaluate the feasibility and efficacy of producing concrete on-site and specify that batch plants be set up on-site or as close to the site as possible.

> Variance requested: Concrete production is not required for the proposed soil investigations; therefore, this BMP does not apply.

BMP 5. Evaluate the performance requirements for concrete used on the project and specify concrete mix designs that minimize GHG emissions from cement production and curing while preserving all required performance characteristics.

> Variance requested: Concrete is not required for the proposed soil investigations. Cement-bentonite mixture used to grout boreholes conforms to industry standards.

BMP 6. Limit deliveries of materials and equipment to the site to off peak traffic congestion hours.

Variance requested: Proposed soil investigations do not require substantial deliveries of materials and equipment and all vehicles will be removed at the end of each workday; therefore, it is not feasible to limit deliveries to off peak hours.

BMP 7. Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by the State airborne toxics control measure [Title 13, Section 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.

Variance requested: This BMP shall be provided as part of the contract, but posting at each site is not feasible as the project activities will take place over diverse locations.

BMP 8. Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an Air Quality Control Plan prior to commencement of construction.

Variance requested: Because this is not a construction project, an Air Quality Control Plan is not required. All equipment will be maintained in proper working condition and preventative maintenance will be conducted as recommended.

BMP 9. Implement tire inflation program on jobsite to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an Air Quality Management Plan prior to commencement of construction.

Variance requested: Because this is not a construction project, an Air Quality Control Plan is not required. Tire inflation will be checked and corrected as needed.

BMP 10. Develop a project specific ride share program to encourage carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.

Variance requested: The proposed project locations are remote and spread over a wide geographic area; therefore, providing transit passes and bicycle parking would not be beneficial. Use of carpools and shuttle vans will be encouraged to the extent feasible.

BMP 11. Reduce electricity use in temporary construction offices by using high efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

> Variance requested: Temporary construction offices will not be used for the proposed soil investigations; therefore, this BMP does not apply.

BMP 12. For deliveries to project sites where the haul distance exceeds 100 miles and a heavy duty class 7 or class 8 semi-truck or 53-foot or longer box type trailer is used for hauling, a SmartWay[27] certified truck will be used to the maximum extent feasible.

> Variance requested: Vehicles of the type described above will not be needed for the proposed soil investigations; therefore, this BMP does not apply.

BMP 13. Minimize the amount of cement in concrete by specifying higher levels of cementitious material alternatives, larger aggregate, longer final set times, or lower maximum strength where appropriate.

> Variance requested: Concrete is not required for the proposed soil investigations; therefore, this BMP does not apply.

BMP 14. Develop a project specific construction debris recycling and diversion program to achieve a documented 50% diversion of construction waste.

> Variance requested: The proposed soil investigations are not expected to generate construction debris other than soil cuttings which must be disposed of at a landfill per environmental permitting requirements; therefore, this BMP does not apply.

BMP 15. Evaluate the feasibility of restricting all material hauling on public roadways to off-peak traffic congestion hours. During construction scheduling and execution minimize, to the extent possible, uses of public roadways that would increase traffic congestion.

> Variance requested: The proposed project will not require substantial material hauling and as the project location will change frequently, impacts to a particular public roadway will be insignificant and unlikely to increase traffic congestion; therefore, this BMP does not apply.