Proposed

Mitigated Negative Declaration

and Draft Initial Study

Bay Delta Conservation Plan

Engineering Geotechnical Activities In Water

June 24, 2009

Prepared by:
Department of Water Resources
Division of Environmental Services
Mitigation and Monitoring Branch
3500 Industrial Boulevard
Sacramento, CA 95691

Proposed

Draft Mitigated Negative Declaration

Project: Engineering Geotechnical Activities in Water

Lead Agency: California Department of Water Resources (DWR)

Availability of Documents:

The Initial Study and Proposed Mitigated Negative Declaration are available for review at the State Clearinghouse, 1400 Tenth Street, Sacramento, California. Copies of these documents may be obtained by contacting DWR's Division of Environmental Services Office at 916-376-9826. This document may also be accessed online at www.water.ca.gov.

Project Location

The Department of Water Resources (DWR) is planning in-water geotechnical borings in the Sacramento-San Joaquin Delta at the following locations: six borings are located on the Sacramento River between Clarksburg and the Pocket area of Sacramento, two borings are located on the Sacramento River near Walnut Grove, one boring is located on Steamboat Slough near its confluence with the Sacramento River, one boring is located on Dutch Slough near its confluence with Taylor Slough, one boring is located on Columbia Cut near its confluence with Middle River, one boring is located in Potato Slough off Venice Island, one boring is located in San Joaquin River off Venice Island, two locations are located in the north Fork of Mokelumne River between Tyler Island and Staten Island, and one boring is located on the San Joaquin River near Fourteen Mile Slough (see Figures 1 to 11 in the Initial Study). Sixteen sites have been identified; however, DWR may add additional locations as needed, but not to exceed 20 total. If additional drill locations are added, DWR Environmental Scientists will review each site to determine the potential impact to environmental resources. Drill locations will be moved as necessary to avoid any identified impacts to environmental resources or to bring impacts to a less than significant level.

Project Description

DWR is planning approximately 16 in-water geotechnical borings in the Sacramento-San Joaquin Delta to obtain information for proposed intake structures and tunnels for proposed alignments of the water conveyance facilities associated with Bay Delta Conservation Plan. The exploratory drilling is planned to take place between August 1 and September 30 (in either 2009 or 2010) because this is the recognized opportunity window for best avoidance measures for sensitive environmental resources. The drilling at each location will be completed in approximately one 12-hour day for a total of approximately 30 days. Project activities for geotechnical exploratory drilling are minor and short in duration (approximately 1 minute each, 10 to 15 times each day, for approximately 30 days). The drilling will be conducted with a Mud Rotary Boring rig mounted on a shallow draft barge or ship. The barge or ship may be anchored into the

bottom of the channel with spuds at each corner of the barge while the work is being performed to prevent the barge from drifting. The spuds are steel rods driven into the channel bottom. The barge or ship will enter through established marinas and will be secured at a dock overnight.

Samples will be obtained using both Standard Penetration Tests and Shelby tube samples. Standard Penetration Tests will be taken in the sandy soils, and Shelby tube (push) samples will be taken in soft clay soils. Standard Penetration Tests are performed by dropping a 140 pound automatic hammer on the drill string to drive a sampler about 1.5 feet. This is a test conducted in short durations (a few minutes for each test) using a relatively small energy source. Vibrations from the test are minimal. The Shelby tube tests are conducted by pushing on the drill string with the weight of the drill rig. No vibrations are produced from pushing Shelby tubes.

The borings will be advanced using mud rotary method and will be drilled and sampled to a maximum depth of about 140 to 200 feet below the bottom of the slough or river. Initially, the hole will be advanced by pushing an approximate 6-inch diameter conductor casing to a depth of at least 15 feet below the bottom of the slough or river channel. The conductor casing extends from the top of the barge or ship deck to at least 15 feet below the bottom of the slough or river. Soil samples can be collected from within the conductor casing. The drill hole below the conductor casing will be approximately 4.5 to 5.5 inches in diameter.

With the conductor casing in place to a minimum of 15 feet below the channel bottom to provide a reliable seal, bentonite powder will be added to the circulating water to create drilling fluid. The pushed conductor casing will provide a reliable seal to contain the drilling fluid within the closed system. The drilling fluids will be kept in a closed system to prevent fluids from escaping. Only water will be circulated through the pumps and drill string while drilling and sampling in the conductor casing and within 15 feet of the slough or river bottom. 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 drilled hole 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. Breaking drill rod and sample rod connections will be conducted either directly over the conductor casing or the recirculation tank.

Drill cuttings that settle out in the recirculation tank will be shoveled into 55-gallon drums. Good work practices are important and will be used in containing the drilling fluid, including taking care when shoveling 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 materials spill onto the barge deck while shoveling (or during any other operation), they shall be immediately picked up with a flat blade shovel and placed either into the tank or a drum. Discarded samples shall be placed in the cutting drums.

Upon completion of each hole, the full depth of the borings will be grouted with 5 percent by weight bentonite and 95 percent by weight cement grout. Water will then be circulated in the portion of the conductor casing above the channel bottom to clear out any remaining drilling mud. The conductor casing may then be pulled out of the channel bottom. Personnel on the barge or ship will observe the water for colored plumes when drilling, grouting, and pulling casing. Colored plumes are an indication that material may be leaking into the water. If colored plumes are discovered, activities shall cease until appropriate corrective measures have been completed or it has been determined that the environment will not be harmed. Cuttings and excess drilling fluid will be contained in drums or bins and disposed of at an appropriate landfill. The borings will be advanced by a licensed drilling contractor under the direction of DWR personnel or its Contractor. A DWR or Contractor Engineering Geologist or Engineer will be on site at the drill rig at all times during the operation.

Findings

The Initial Study has been prepared to assess the proposed activity's potential effects on the environment and significance of those effects. Based on this study, it has been determined that the proposed project would not have any significant environmental effects. In part, this is because construction impacts are minor and short term. Short-term impacts resulting from the project include increased noise levels and small vibrations created primarily from the drill rig engine and short durations from the Standard Penetration Tests. No long-term impacts are anticipated.

Mitigation and conservation measures will be implemented to bring environmental impacts of the proposed activities to less than significant levels within the project area. Specifically, potential impacts to biological resources, geology and soil (erosion), hazardous materials, and hydrology (flow patterns) and water quality will be mitigated to less than significant levels.

Mitigation Measures

The following mitigation measures will be implemented by DWR to avoid, minimize, and mitigate environmental impacts. Implementation of these mitigation measures will reduce the environmental impacts of the proposed project to less than significant levels.

A. General. General mitigation measures proposed to minimize impacts due to the project include:

1. Borings, backfilling, waste management, and excavation of test pits will occur within an active stream channel or open water. Stockpiling materials, such as portable equipment, vehicles, and supplies, including chemicals, will be restricted to docks or within the drill ship, exclusive of any riparian and wetlands areas.

2. All litter, debris, unused materials, rubbish, supplies, or other material will be removed daily from all project sites and deposited at an appropriate disposal or storage site.

3. In the event of a contaminant spill, work will stop immediately and DWR's environmental scientist shall be notified (Michelle Beachley, 916-376-9826). The environmental scientist will contact the necessary resource agencies, including but not limited to, the Office of Spill Prevention, Department of Fish and Game (DFG), National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (USFWS). If DWR staff cannot be notified immediately, the aforementioned agencies shall be contacted by the contractor. In the case of a spill on-water containment or recovery, equipment shall be available and the shoreline protected. Any spills of hazardous materials will be cleaned immediately and reported to the resource agencies within 24 hours. Any such spills, and the success of the efforts to clean them up, will be reported in post-exploration compliance reports.

4. Contracts will require contractors to prepare and make available to DWR, for review and acceptance prior to formal signing, an environmental plan. All personnel involved in use of hazardous materials will be trained in emergency response and spill control.

5. All site access and staging shall limit disturbance to the riverbank or levee as much as possible. When possible, existing ingress and egress points shall be used.

6. Equipment shall be refueled, maintained and serviced at designated staging areas away from the riverbank, levee, or habitat designated as critical by an approved biologist.

B. Air Quality. The generation of direct onsite and offsite air quality impacts or greenhouse gas emissions would be intermittent and would terminate following completion of drilling activities. Additionally, in order to minimize emissions to the extent feasible, construction contractors would be required to implement the following measures:

1. On-road and off-road vehicle tire pressures shall be maintained to manufacturer specifications. Tires shall be checked and re-inflated at regular intervals.

2. Construction equipment engines shall be maintained to manufacturer's specifications.

3. Using properly tuned equipment that meets current emissions standards.

C. Biology. General mitigation measures proposed to minimize biological impacts due to the project include:

1. Construction personnel will receive worker environmental awareness training. This will include descriptions of sensitive species and procedures to follow in the event a sensitive species is encountered.

2. An Environmental Scientist will be available as a biological monitor to assist the construction crew as necessary. If a sensitive species is encountered by a biological monitor during construction, activities shall cease until appropriate corrective measures have been completed or it has been determined that the species will not be harmed.

3. Work windows (August 1 to September 30) are established for activities to take place when species are at their lowest abundance in the area; exclusion zones and other protections designed to avoid impacts to sensitive species and habitats will be included. These measures ensure that work will not adversely affect fish and wildlife resources. See specific sections of Biology in the Initial Study for further information (page 34).

4. No vegetation clearing will be conducted during the geotechnical activities.

5. The project has followed a deliberate process to avoid and minimize environmental effects. Project activities will be completed within the in-water construction window established by the USFWS, NMFS, and DFG to avoid impacts to sensitive species. Any additional avoidance or conservation measures established by these agencies will be followed.

Conservation and mitigation measures specifically addressing sensitive species are described below and thoroughly discussed in the Biological Section (page 34) of the Initial Study. The following mitigation measures are proposed to mitigate effects on listed species and their potential habitats in the project area.

Delta Smelt: Delta smelt could be affected by activities that degrade water quality. The implementation of best management practices discussed in the Initial Study will prevent any water quality degradation that could affect delta smelt. The project will not cause any changes to delta smelt habitat. There would be no effect on this species. Project activities will take place when fish are at lowest abundance (August 1 to September 30). See page 43 of the Initial Study for more information.

Salmonids: Chinook salmon and steelhead require similar habitat components and are analyzed together. Actions that have no effect on listed salmonids or their habitat are defined as having no measurable or discernable effect to the species of their habitat. As described in the Initial Study, the project activities would not disturb soil structure, riparian vegetation, divert water or degrade water quality. Project activities will take place when fish are at lowest abundance (August 1 to September 30). See page 46 of the Initial Study for more information.

Green Sturgeon: Geotechnical drilling activities will not have any significant impact on water flow, water quality, or food resources in the Delta or the affected waterways. The narrow construction windows (August 1 to September 30) will minimize any incidental take due to disturbance, displacement, and impairment of feeding on juvenile fish near the project sites. The in-water geotechnical drilling construction window will avoid adult green sturgeon spawning (February to July)

(Moyle et al. 1995; Emmett et al. 1991). Green sturgeon embryos have poor swimming ability and exhibit a strong drive to remain in contact with structure, preferring cover and dark habitats to open bottom and illuminated habitats (Kynard et al. 2005); therefore, geotechnical drilling will take place mid-stream in the river and sloughs to avoid impacts to embryos. Larvae and early juveniles exhibit nocturnal behavior in all activities, actively swimming and initiating downstream migration at night (Van Eenennaam et al. 2001; Deng et al. 2002; Kynard et al. 2005); therefore drilling activities will take place during the day. See page 49 of the Initial Study for more information.

Swainson's Hawk: The following measure will minimize construction related impacts to Swainson's hawk:

1. Construction activities near available nesting habitat are anticipated to be conducted following the active nesting season of Swainson's hawks (March to August 15).

2. If construction takes place during the nesting season, construction will be restricted to areas more than ¼ mile from active nests until August 15. A biologist will conduct preconstruction surveys prior to the start of construction to locate all active nest sites within ½ mile of construction and staging areas. If necessary, DWR will establish a ¼-mile buffer zone, marked with identifiable flags, around all known and suspected Swainson's hawk nests. The ¼-mile buffer is an acceptable buffer established by the California Department of Fish and Game to prevent disturbance to nesting birds. See page 52 of the Initial Study for more information.

D. Cultural Resources. Cultural resources include prehistoric and historic archaeological resources, buildings and structures, ship wrecks, and traditional cultural properties. Numerous federal and State laws and regulations provide for the protection and management of cultural resources. The most prominent of these statutes include the following:

- National Environmental Policy Act
- California Environmental Quality Act, Section 21083
- State CEQA Guidelines, Section 15064
- Section 106 of the National Historic Preservation Act and 36 CFR Part 800, as amended.

DWR archaeologists have reviewed the California State Lands Commission records for ship wrecks in the vicinity of the geotechnical borings. No known ship wrecks were found in these areas. Should any archaeological resources be unearthed during the course of construction, all work will stop in the immediate vicinity of the finds until they 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.

Should human remains be unearthed during the course of construction, all work will immediately stop in the vicinity of the finds until they can be verified and the requirements of Public Resource Code Section 5097.98 are met. See page 55 of the Initial Study for more information.

E. Hazards and Hazardous Materials. Diesel fuel and oil as well as bentonite clay and cement will be used for geotechnical exploratory drilling. These materials will be stored and disposed of in accordance with standard protocols for handling of hazardous materials. All personnel involved in use of hazardous materials will be trained in emergency response and spill control. See page 59 of the Initial Study for more information. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum products
- Asphalt products
- Concrete
- Pesticides
- Acids
- Paints
- Stains
- Solvents
- Wood Preservatives
- Roofing Tar
- Any material deemed hazardous waste in California, title 22, Division 4.5, or listed in 40 CFR parts 110, 117,261, OR 302.

1. Storage Procedures

    a. Waste shall be stored in sealed containers constructed of suitable material and shall be labeled as required by title 22 CCR, division 4.5 and 49 CFR Parts 172,173,178, and 179.

    b. All hazardous waste shall be stored, transported, and disposed of as required in title 22 CCR, Division 4.5 and 49 CFR 261-263

    c. Waste containers shall be stored in a temporary containment facility that shall comply with the following requirements:

        i. Temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10 percent of the aggregate volume of all containers or 100 percent of the capacity of the largest tank within its boundary, whichever is greater.

        ii Temporary containment facility shall be impervious to the material stored there for a minimum contact time of 72 hours.

iii. Temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spill or leak, accumulated rainwater and spill shall be placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.

iv. Sufficient space shall be provided between stored containers to allow for spill cleanup and emergency response.

v. Incompatible materials, such a chlorine and ammonia, shall not be stored in the same temporary containment facility.

vi. Throughout the rainy season, temporary containment facilities shall be covered during the non-working days and prior to rain events.

d. Drums shall not be overfilled and waste shall not be mixed.

e. All hazardous waste containers will be labeled with the waste being stored and the date of accumulation.

f. Waste disposal

i. Waste storage shall not exceed requirements in title 22 CCR, Section 66262.34

ii. Waste disposal shall be disposed of by a licensed waste transporter at an authorized licensed disposal facility or recycling facility.

iii. Uniform Hazardous Waste Manifest shall comply with title 22 CCR Division 4.5

F. Hydrology and Water Quality. No impacts to water quality are anticipated. Best management practices will be used to reduce impacts to less than significant levels. See page 63 of the Initial Study for more information.

G. Noise. Equipment will be properly tuned and will utilize appropriate mufflers. Short-term impacts resulting from the project include increased noise level and small vibrations created primarily from the drill rig engine and short durations from the Standard Penetration Tests. These noises will last approximately 1 minute each for a total of 10 to 15 times throughout the day. See page 68 of the Initial Study for more information.

Permits

This project will require the following permits and authorizations:

- California Fish and Game Code Section 1600, Streambed Alteration Agreement
- Central Valley Flood Protection Board Encroachment Permit
- U.S. Army Corps of Engineers, Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, Nationwide Permit 6
- Regional Water Quality Control Board Clean Water Act Section 401
- State Lands Commission Survey Permit
- Letter of Concurrence from U.S. Fish and Wildlife Service for federal species under the Endangered Species Act under their jurisdiction
- Letter of Concurrence from National Oceanic and Atmospheric Agency Fisheries Unit for federal species under the Endangered Species Act under their jurisdiction

Statement of No Significant Effect

The Department of Water Resources prepared a Draft Initial Study in support of this Mitigated Negative Declaration. Copies of the Draft Initial Study/Mitigated Negative Declaration were provided to the State Clearinghouse on June 26, 2009, initiating the 30-day public review period, which will end July 26, 2009.

Pursuant to Section 21082 of the California Environmental Quality Act, DWR has independently reviewed and analyzed the Initial Study/Mitigated Negative Declaration for the proposed project and finds that this study reflects the independent judgment of DWR. As the lead agency for the project, DWR further finds that the project mitigation and conservation measures will be implemented as stated in the Mitigated Negative Declaration. With implementation of these mitigation and conservation measures, the proposed project as modified would have no significant effect on the environment.

I hereby approve these project activities for geotechnical exploratory drilling.

Barbara McDonnell

Barbara McDonnell, Chief
Division of Environmental Services

6/24/09

Date

Draft Initial Study

for the

Bay Delta Conservation Plan

Engineering Geotechnical Activities In Water

Prepared by:

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Tables

Figures

The California Department of Water Resources (DWR) proposes to conduct in-water geotechnical drilling as part of the Bay Delta Conservation Plan environmental assessment and preliminary design. DWR is the State Lead Agency under California Environmental Quality Act (CEQA) and has prepared this Initial Study to assess the activity's effects on the environment. Part I of this Initial Study is a description of the project and the environmental setting. Part II is the Initial Study Checklist form and an evaluation of potential impacts.

Part I. Project Description

Project Location

The Department of Water Resources is planning in-water geotechnical borings in the Sacramento-San Joaquin Delta (Figure 1). Six borings are located on the Sacramento River between Clarksburg and the Pocket area of Sacramento, two borings are located in the Sacramento River near Walnut Grove, one boring is located on Steamboat Slough near its confluence with the Sacramento River, one boring is located on Dutch Slough near its confluence with Taylor Slough, one boring is located on Columbia Cut near its confluence with Middle River, one boring is located in Potato Slough off Venice Island, one boring is located in San Joaquin River off Venice Island, one boring is located on the San Joaquin River near Fourteen Mile Slough, and two borings are located in the north Fork of Mokelumne River between Tyler Island and Staten Island (Figures 2 – 11). Sixteen sites have been identified; however, DWR may add additional locations as needed, but not to exceed 20 total. If additional drill locations are added, DWR Environmental Scientists will review each site to determine the potential impact to environmental resources. Drill locations will be moved as necessary to avoid any identified impacts to environmental resources or to bring impacts to a less than significant level.

Background

The Bay Delta Conservation Plan will contribute to enhancing and restoring the ecosystem processes and functions of the Delta, including seasonal flood plain habitat, subtidal and intertidal habitat, hydrologic conditions, and salinity within the Delta estuary, as well as to reduce direct losses of fish and other aquatic organisms. Because it is a permitting vehicle, the Bay Delta Conservation Plan is in a unique position to implement restoration while simultaneously securing a reliable freshwater source for human use.

The Delta was once a vast marsh and floodplain dissected by meandering channels and sloughs that provided a dynamic habitat for a rich diversity of fish, wildlife and plants. The Delta of today has been altered by a system of artificial levees and dredged waterways constructed to support farming and urban development on islands as well as to provide flood control. These waterways also provide transportation corridors for ships and convey water for urban and agricultural uses inside and outside the Delta.

To meet both ecosystem and water supply goals, DWR is focusing on potential habitat benefits that could be realized by implementing what is known as dual conveyance. This consists of improving the existing system for moving water through the Delta using existing points of diversion in the southern Delta and new points of diversion in the northern Delta with isolated conveyance approximately the Delta.

In December 2008, the Bay Delta Conservation Plan Steering Committee released *An Overview of the Draft Conservation Strategy for the Bay Delta Conservation Plan* to share key components of the draft Conservation Strategy as well as the approach and direction being taken by the Bay Delta Conservation Plan Steering Committee. Additional detail to this brief summary, including a discussion of assumptions, rationale, issues, concerns, and next steps, is available by reading *An Overview of the Draft Conservation Strategy for the Bay Delta Conservation Plan* dated January 12, 2009. For more information, go online to www.water.ca.gov/bdcp/docs.The Overview identified a number of elements that demonstrated the integrated nature of the draft Conservation Strategy. These elements were selected based on the following attributes:

A. Elements that shape the overall architecture of a new hydrodynamic system that would be developed as a result of the Bay Delta Conservation Plan.

B. Measures that would likely be included in any scenario to rehabilitate the Delta ecosystem and water supply system.

C. Elements that could be planned or constructed in the next 5 to 10 years.

Figure 1. Location Map for Geotechnical Drilling Boring In-Water Locations.

Figure 2. Geotechnical Drilling in-water borings DCR-DH-01 and DCR-DH-02 within the Sacramento River.

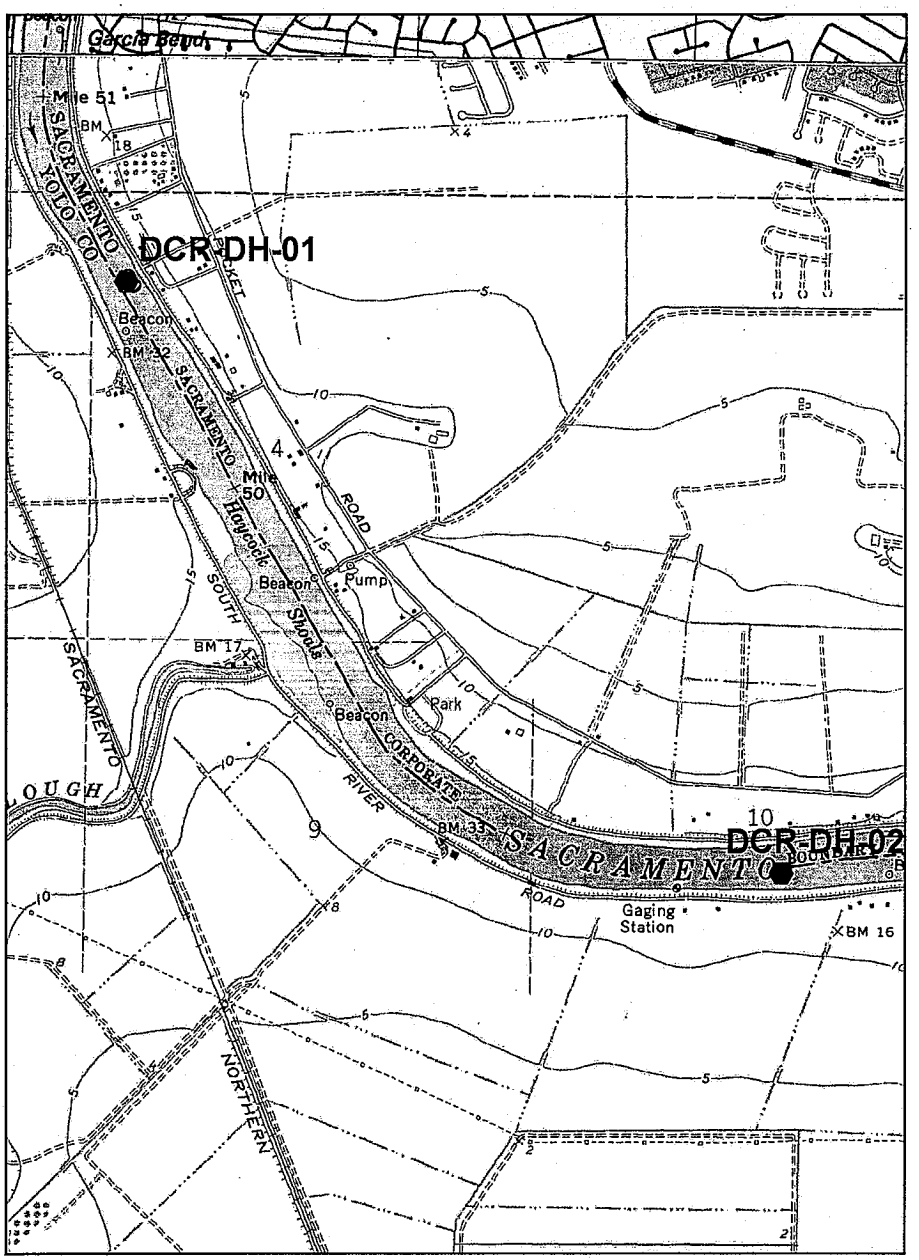
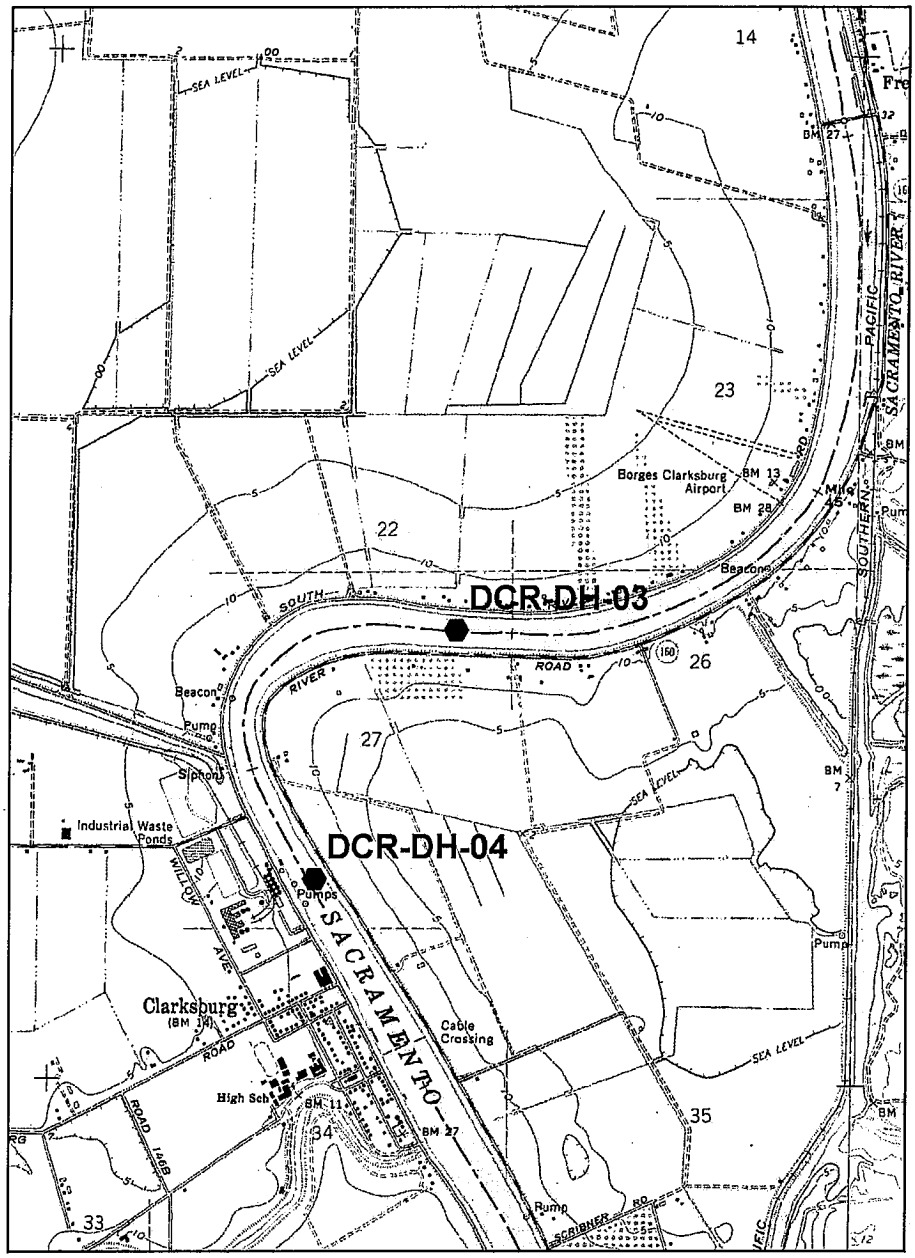
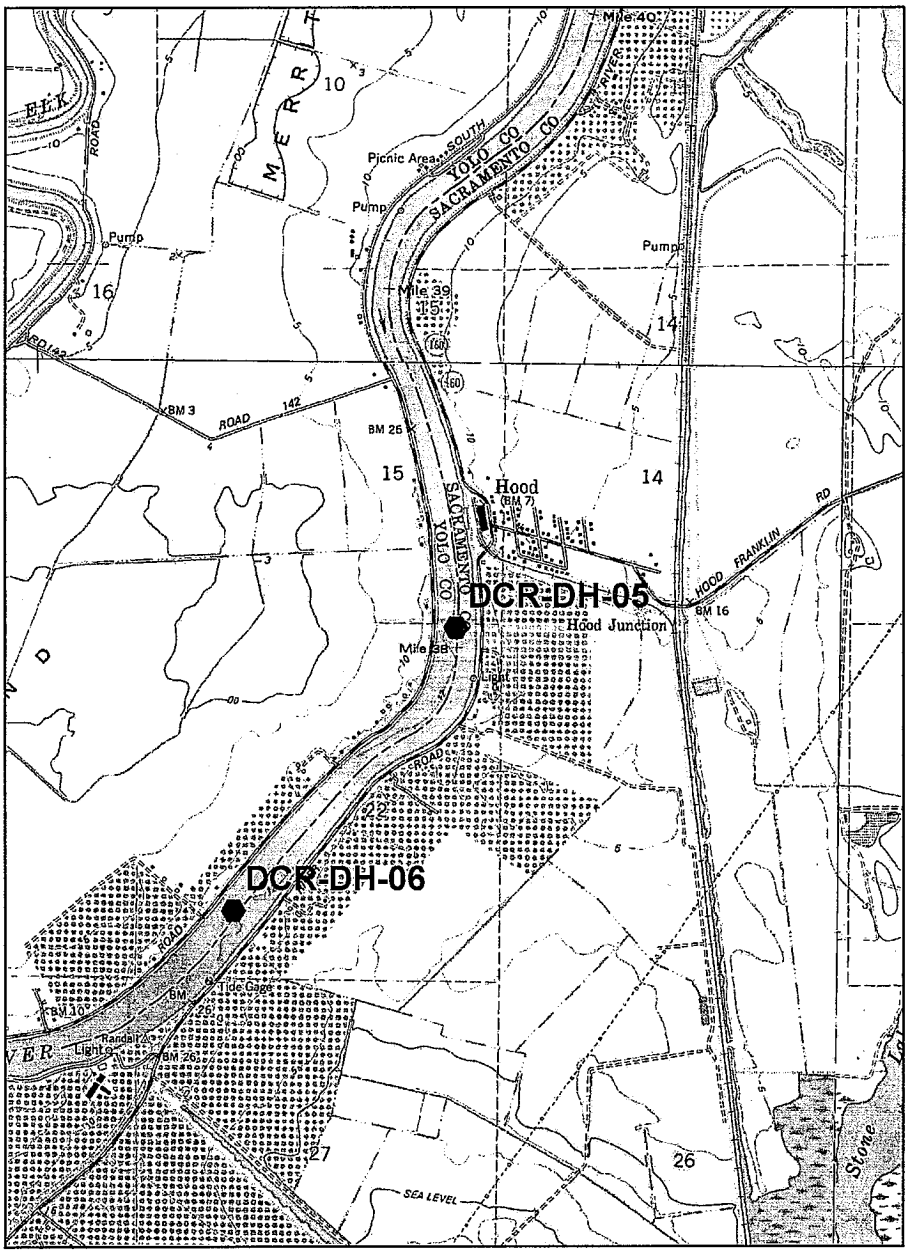


Figure 3. Geotechnical Drilling in-water borings DCR-DH-03 and DCR-DH-04 within the Sacramento River.



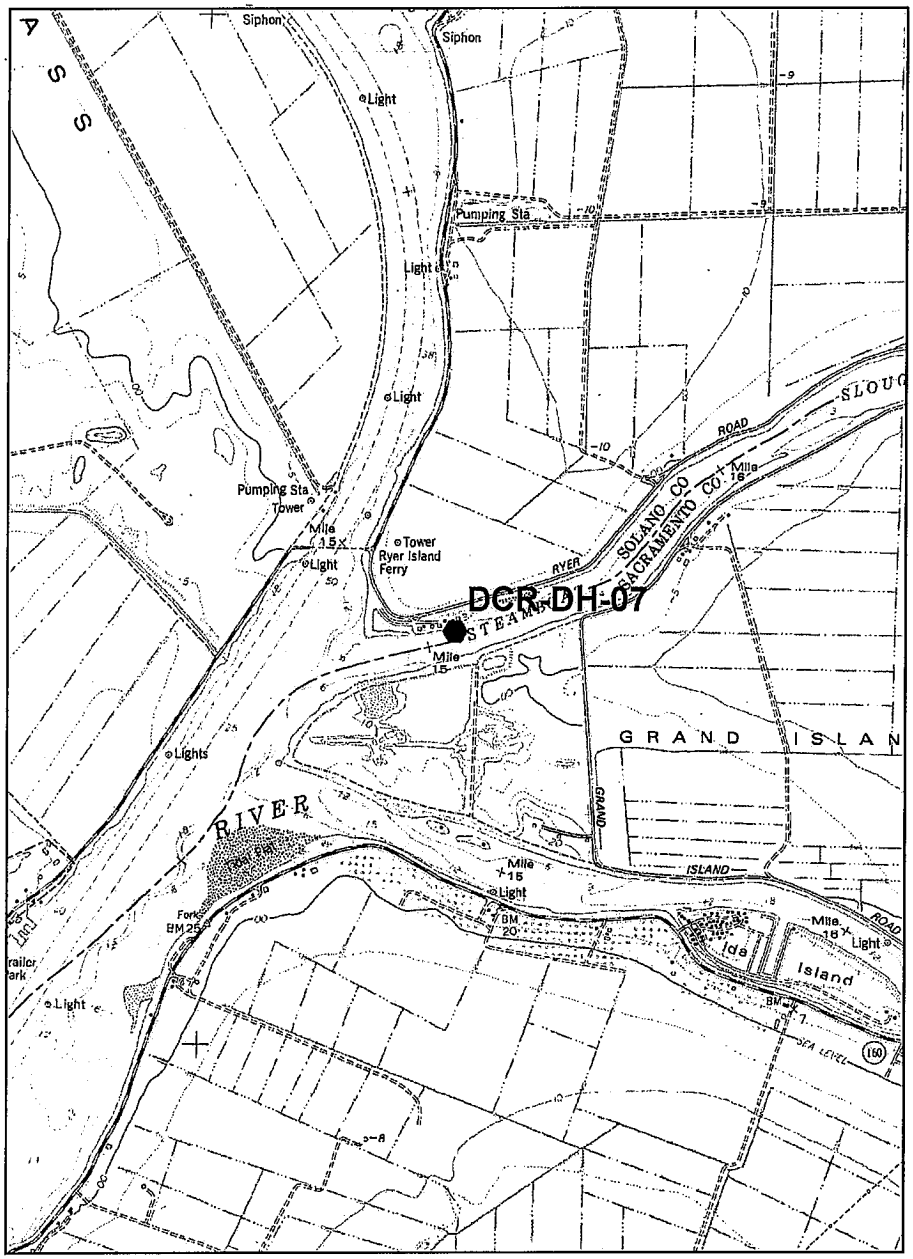
BDCP Overwater Drill Locations
DCR-DH-3 & 4
Sacramento and Yolo County (Border)
USGS Quad: Clarksburg, California

Figure 4. Geotechnical Drilling in-water borings DCR-DH-05 and DCR-DH-06 within the Sacramento River.



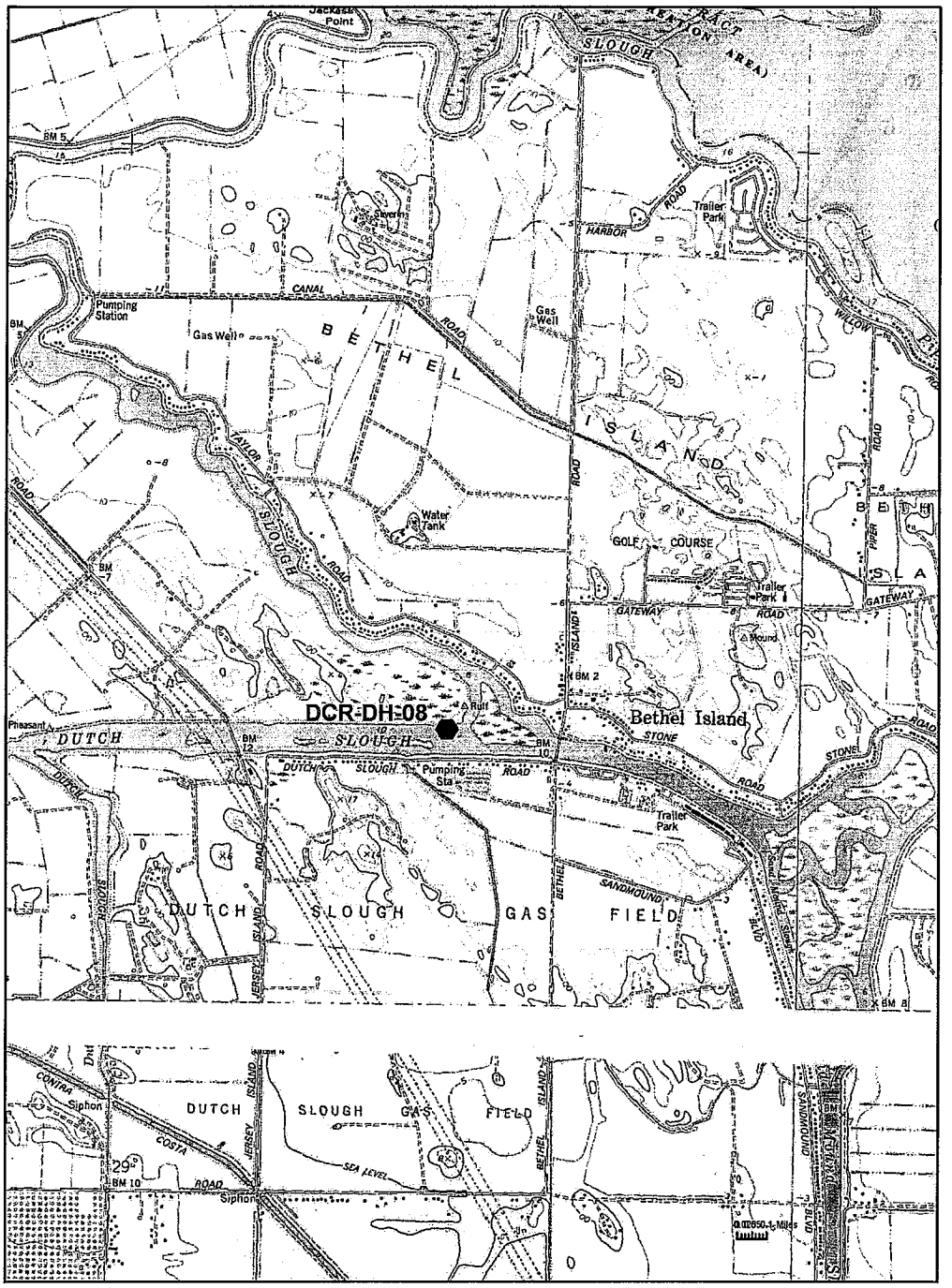
BDCP Overwater Drill Locations
DCR-DH-5 & 6
Sacramento and Yolo County (Border)
USGS Quad: Courtland, California

Figure 5. Geotechnical Drilling in-water boring DCR-DH-07 within Steamboat Slough.



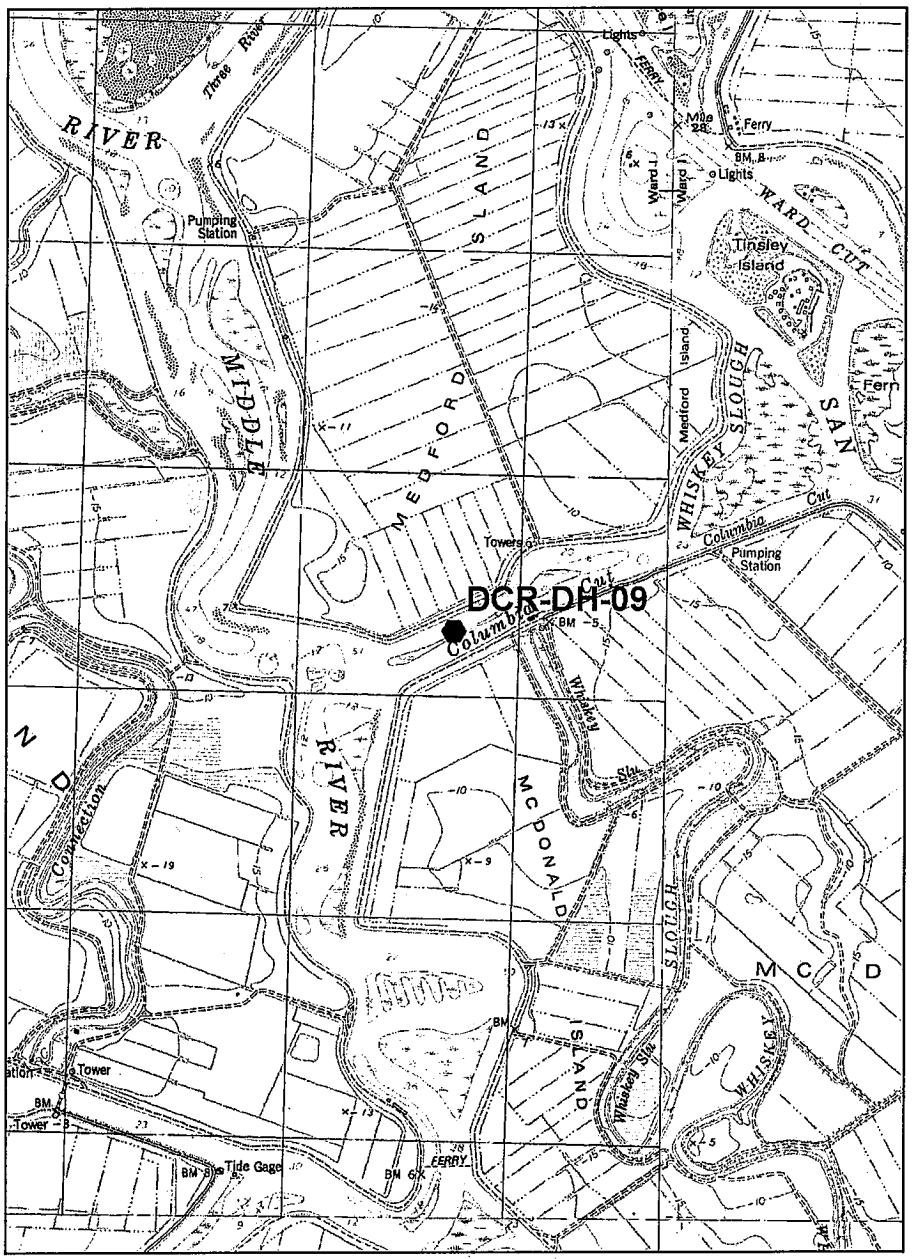
BDCP Overwater Drill Location
DCR-DH-7
Solano and Sacramento County (Border)
USGS Quad: Rio Vista, California

Figure 6. Geotechnical Drilling in-water boring DCR-DH-08 within Dutch Slough.



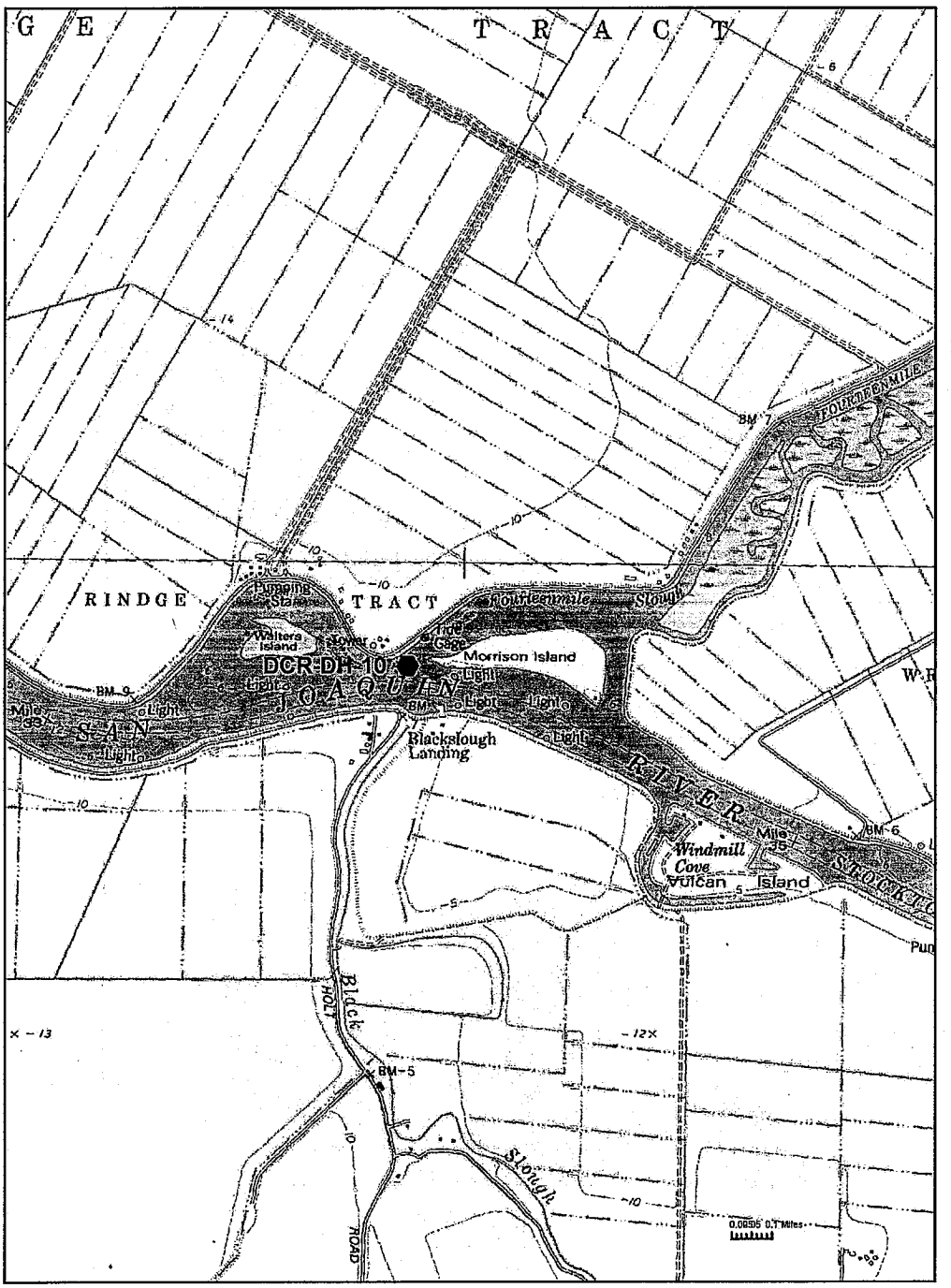
BDCP Overwater Drill Locations
DCR-DH-08
Contra Costa County
USGS Quad: Jersey Island, California

Figure 7. Geotechnical Drilling in-water boring DCR-DH-09 within Columbia Cut.



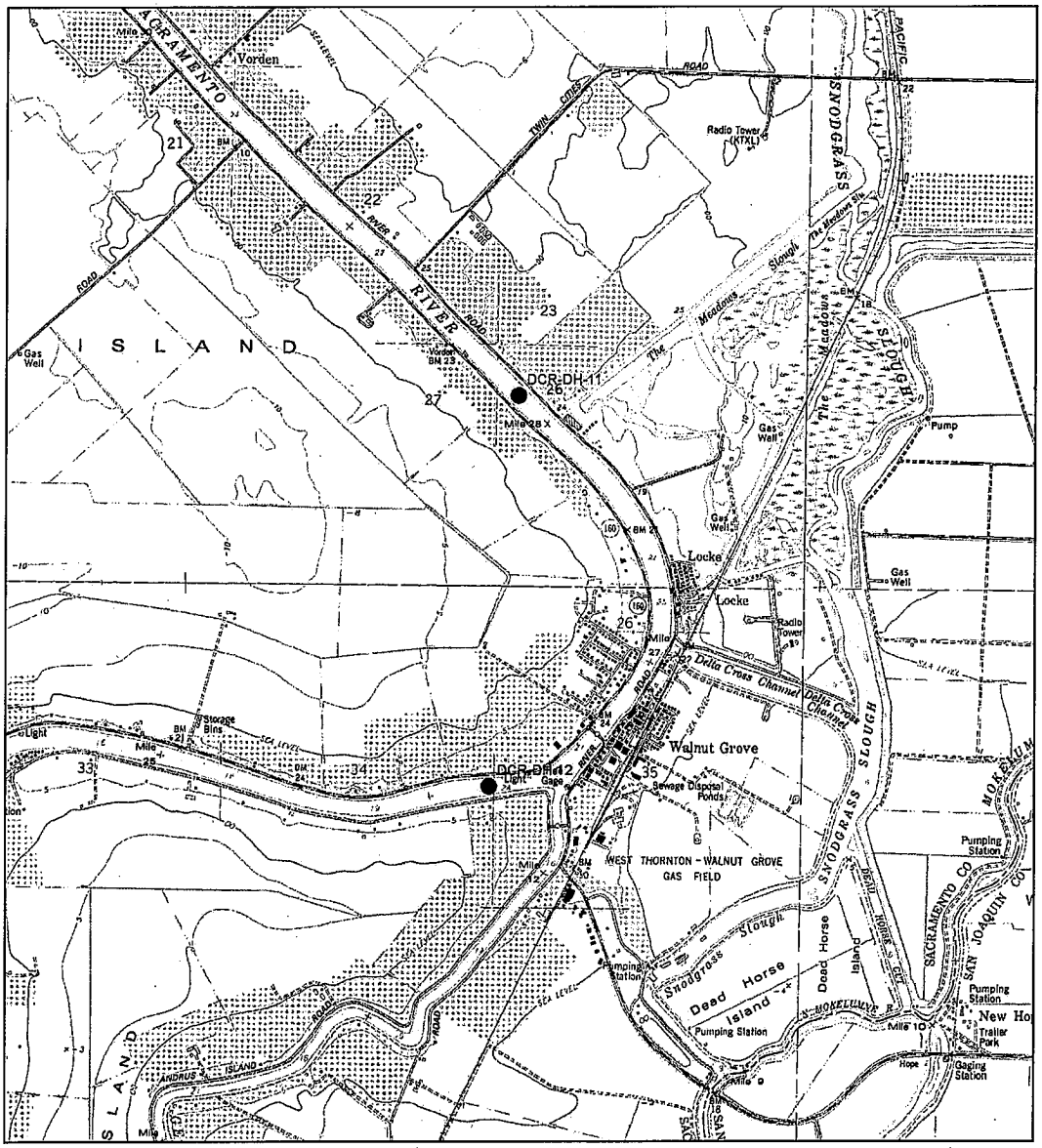
BDCP Overwater Drill Location
DCR-DH-9
San Joaquin County
USGS Quad: Bouldin Island, California

Figure 8. Geotechnical Drilling in-water boring DCR-DH-10 within the San Joaquin River near Fourteen Mile Slough.



BDCP Overwater Drill Locations
DCR-DH-10
San Joaquin County
USGS Quad: Holt, California

Figure 9. Geotechnical Drilling in-water boring DCR-DH-11 and 12 within the Sacramento River near Walnut Grove.



BDCP Overwater Drill Locations
DCR-DH-11 & 12
Sacramento County
USGS Quad: Isleton, CA

Figure 10. Geotechnical Drilling in-water boring DCR-DH-13 and 14 within the Mokelumne River.

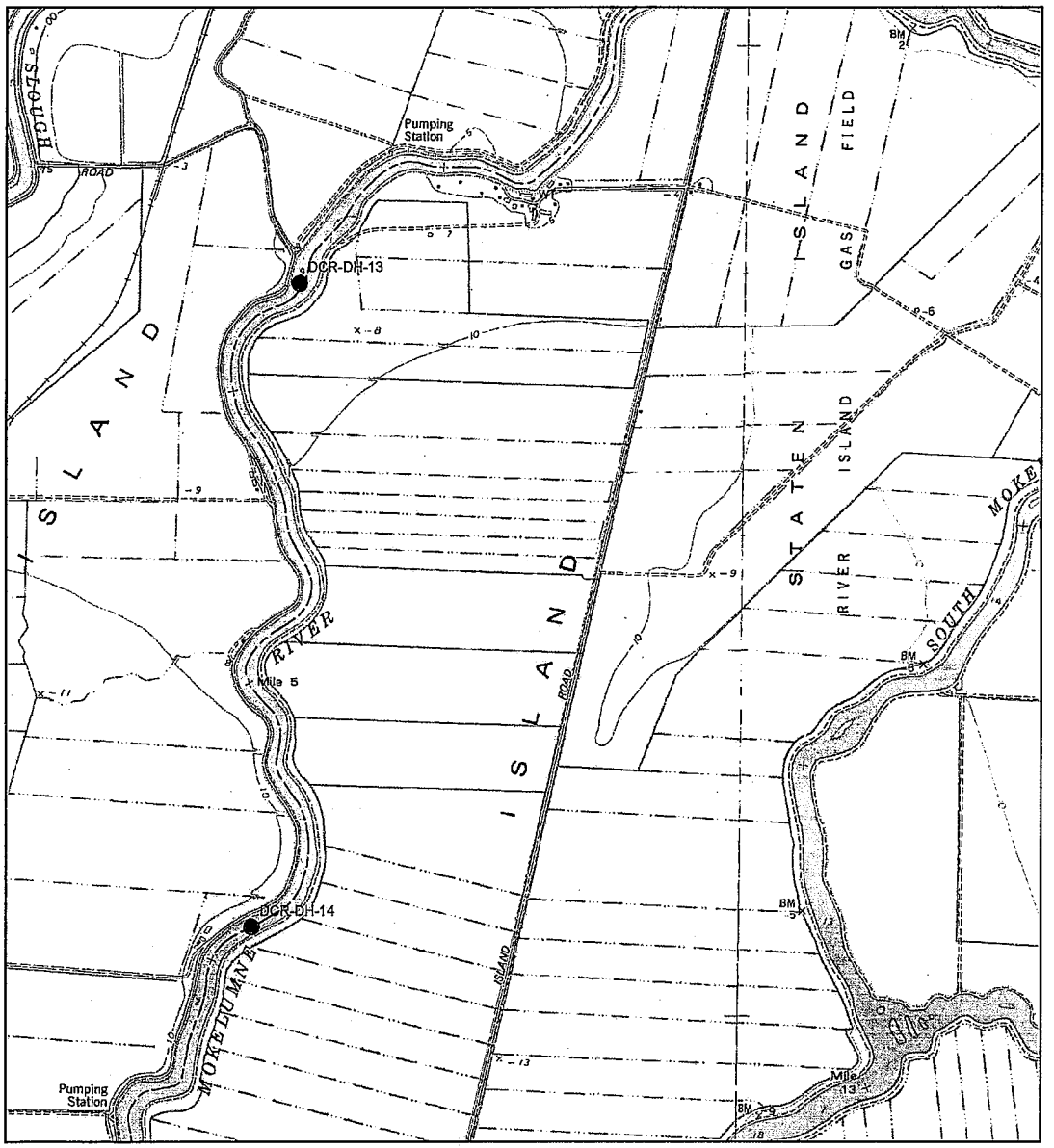
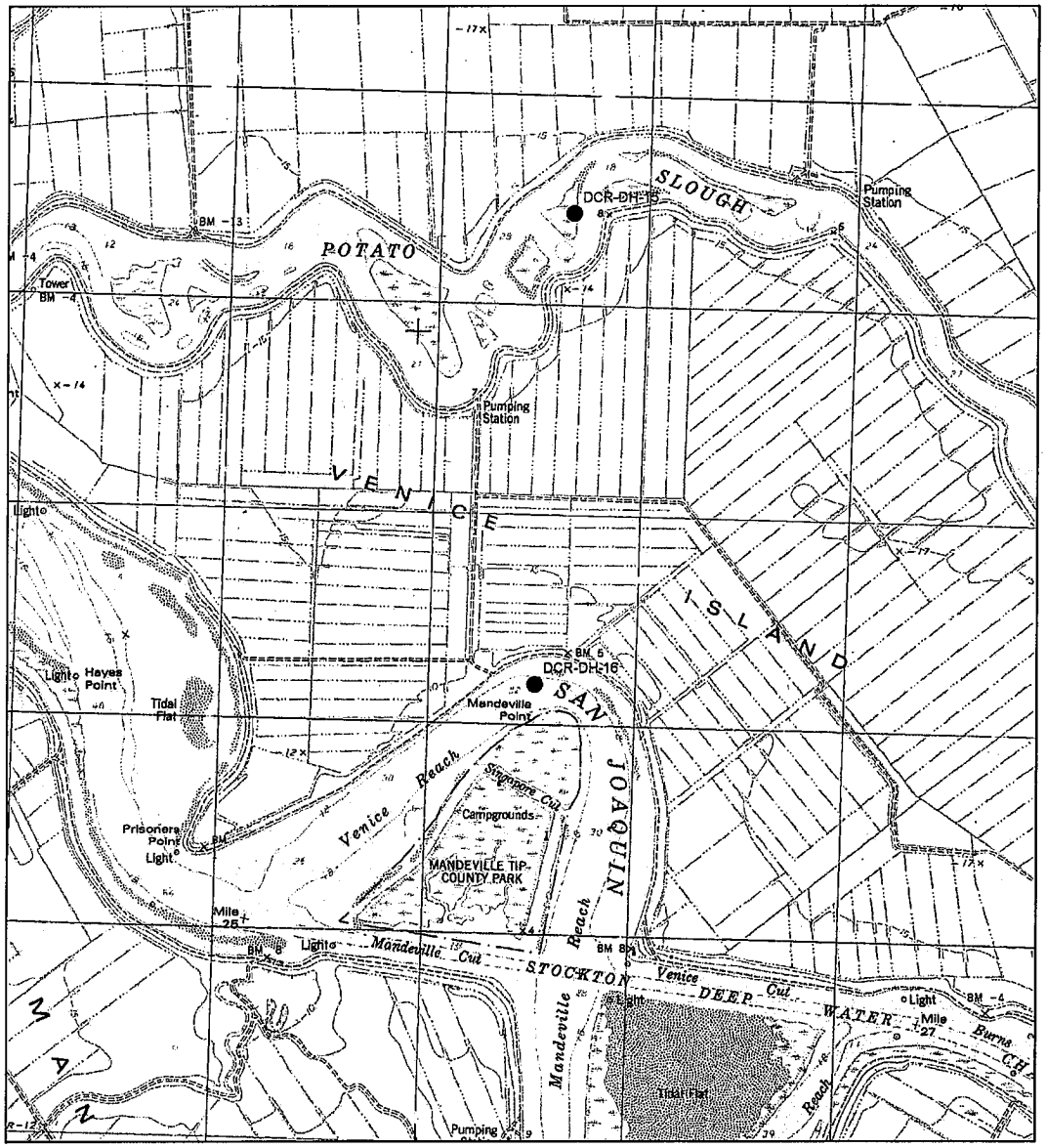


Figure 11. Geotechnical Drilling in-water boring DCR-DH-15 and 16 within Potato Slough and the San Joaquin River near Venice Island.



BDCP Overwater Drill Locations
DCR-DH-15 & 16
Sacramento & San Joaquin County
USGS Quad: Isleton, CA

Project Description

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Samples will be obtained using both Standard Penetration Tests and Shelby tube samples. Standard penetration tests will be taken in the sandy soils, and Shelby tube (push) samples will be taken in soft clay soils. Standard Penetration Tests are performed by dropping a 140 pound automatic hammer on the drill string to drive a sampler about 1.5 feet. This is a test conducted in short durations (a few minutes for each test) using a relatively small energy source. Vibrations from the test are minimal. The Shelby tube tests are conducted by pushing on the drill string with the weight of the drill rig. No vibrations are produced from pushing Shelby tubes.

The borings will be advanced using mud rotary method and will be drilled and sampled to a maximum depth of about 140 to 200 feet below the bottom of the slough or river. Initially, the hole will be advanced by pushing an approximate 6- to 8-inch diameter conductor casing to a depth of at least 15 feet below the bottom of the slough or river channel. The conductor casing extends from the top of the barge or ship deck to at least 15 feet below the bottom of the slough or river. Soil samples can be collected from within the conductor casing. The drill hole below the conductor casing will be approximately 4.5 to 7.0 inches in diameter.

With the conductor casing in place to a minimum of 15 feet below the channel bottom to provide a reliable seal, bentonite powder will be added to the circulating water to create drilling fluid. The pushed conductor casing will provide a reliable seal to contain the drilling fluid within the closed system. The drilling fluids will be kept in a closed system to prevent fluids from escaping. Only water will be circulated through the pumps and drill string while drilling and sampling in the conductor casing and within 15 feet of the slough or river bottom. 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 are confined by the drilled hole 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. Breaking drill rod and sample rod connections will be conducted either directly over the conductor casing or the recirculation tank.

Drill cuttings that settle out in the recirculation tank will be shoveled into drums. Good work practices are important and will be used in containing the drilling fluid, including taking care when shoveling 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 materials spill onto the barge deck while shoveling (or during any other operation), they shall be immediately picked up with a flat blade shovel and placed either into the tank or a drum. Discarded samples shall be placed in the cutting drums.

Upon completion of each hole, the full depth of the borings will be grouted with 5 percent by weight bentonite and 95 percent by weight cement grout. Water will then be circulated in the portion of the conductor casing above the channel bottom to clear out any remaining drilling mud. The conductor casing may then be pulled out of the channel bottom. Personnel on the barge or ship will watch for colored plumes in the water when drilling, grouting, and pulling casing. Colored plumes are an indication that material may be leaking into the water. If colored plumes are discovered, activities shall cease until appropriate corrective measures have been completed or it has been determined that the environment will not be harmed. Cuttings and excess drilling fluid will be contained in drums or bins and disposed of at an appropriate landfill. The borings will be advanced by a licensed drilling contractor under the direction of DWR personnel or its Contractor. A DWR or Contractor Engineering Geologist or Engineer will be on site at the drill rig at all times during the operation.

Environmental Setting

Existing Conditions. The project area consists of open water of the Sacramento, Mokelumne, and San Joaquin rivers, Dutch Slough, Steamboat Slough, Potato Slough, and Columbia Cut. The project locations within Sacramento, Yolo, and Solano Counties lie within the northeastern Sacramento Valley geographic subdivision of the Great Central Valley of the California Floristic Province; the project locations found in San Joaquin County lie within the San Joaquin Valley geographic subdivision of the Great Central Valley; and the project locations found in Contra Costa County lie within the San Francisco Bay Area geographic subdivision of the Central Western Coast of the California Floristic Province (Hickman 1993). The climate of the project locations found in the valley is characterized by hot, dry summers and cool, moist winters; while the climate of the project locations found in the San Francisco Bay area is slightly milder with cooler summer and winter temperatures. The average annual precipitation is 36 inches (NOAA 2009). The elevation is approximately 35 feet above mean sea level and the topography is generally a naturally flat valley bottom.

Project activities for geotechnical exploratory drilling will take place within the channel of the Sacramento, San Joaquin, and Mokelumne rivers and various sloughs as previously described. The riparian forest, marsh habitat, and scrub vegetation at the outboard toe of the slope occurs down to the approximate summer water surface location. The

Sacramento River and various sloughs included in this project are a part of the Sacramento-San Joaquin River Watersheds and the Sacramento-San Joaquin Delta. Vegetation at specific drilling locations within the open water channel of the Sacramento River (DCR DH 1 to DH 6 and DH11 and 12) and the Steamboat Slough (DCR DH 7) is non-existent; however, the levee slopes in these areas are dominated by riparian species including willows (*Salix* spp.), cottonwood (*Populus* spp.), alders (*Alnus* spp.), and oaks (*Quercus* spp.) near the river's edge (Keeler-Wolf 1995). The habitat at Dutch Slough (DCR DH 8), Columbia Cut (DCR DH 9), Mokelumne River (DCR DH 13, 14, and 16), Potato Slough (DCR DH 15), and San Joaquin River (DCR DH 10) is open water, while vegetation near the edges includes marsh species such as rushes *(Juncus spp.)*, sedges *(Carex spp.)*, bulrush (*Scirpus spp.)*, cattail *(Typha spp.)*, and spike rush *(Heleocharis spp.)* in large clusters.

An assessment of the presence of sensitive species that may inhabit the project area has been carried out and is discussed in the Biological section of this Initial Study (page 34).

Hydrologic Conditions. The study area is located in the Lower Sacramento Hydrologic Unit Number 18020109 and the San Joaquin Hydrologic Unit Number 1804003. Hydrologic units correspond to the natural division between watershed boundaries and are based on the U.S. Geological Survey Hydrologic Unit Maps (USGS 2008).

Soil Characteristics. Soils within the open water portion of the Sacramento, Mokelumne, and San Joaquin rivers and sloughs (Dutch Slough, Potato Slough, Steamboat Slough, and Columbia Cut) are unclassified (U.S. Soil Conservation Service 1993, USDA 2009). Outside of the open water portions, the study area contains Lang sandy loam, deep, flooded (Lc)—a deep soil subject to flooding at least 1 out of 3 years with a clay or heavy silty clay loam layer at a depth of 40 to 60 inches. This soil has rapid permeability, with a water holding capacity of 5 to 6 inches. This soil is adversely affected by flooding and deposition.

Watershed Context. The project activities are located near the center of California's Central Valley, which is drained by the Sacramento River from the north, the American River from the east, and the San Joaquin River from the south. The Mokelumne River drains to the San Joaquin River. The Sacramento and San Joaquin rivers drain to the Sacramento-San Joaquin Delta. The Sacramento-San Joaquin River Delta is an example of an inverted river delta, one of only a few worldwide. It is the largest estuary on the Pacific Coast. The fan-shaped area of the Delta converges downstream, rather than diverging, as the two rivers are forced to exit the Central Valley through the Coast Range via the narrow channel known as the Carquinez Strait, which leads to the San Francisco Bay and ultimately the Pacific Ocean through the Golden Gate.

The Delta consists of a myriad of small natural and man-made channels (locally called sloughs), creating a system of isolated lowland islands and wetlands defined by dikes or levees. The Delta's so-called "islands" are not really islands in the classic sense, but they are referred to as such because they are completely surrounded by water.

The Delta was once a vast marsh and floodplain dissected by meandering channels and sloughs that provided a dynamic habitat for a rich diversity of fish, wildlife and plants. The Delta of today has been altered by a system of artificial levees and dredged waterways constructed to support farming and urban development on islands as well as to provide flood control. These waterways also provide transportation corridors for ships and boats and convey water for urban and agricultural uses inside and outside the Delta.

Waters of the United States. The Ordinary High Water Mark typically corresponds to the scour line, a change in vegetation, or water marks that define the bed and bank portions of the channel that flood under normal conditions. All geotechnical boring locations are within the open water channel of a river or slough and are within the Ordinary High Water Mark. Therefore, the project falls within jurisdictional waters under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. DWR will obtain required permits under these regulations.

List of Permits Required for the Project

This project will require the following permits and authorizations:

- California Fish and Game Code Section 1600, Streambed Alteration Agreement
- Central Valley Flood Protection Board Encroachment Permit
- U.S. Army Corps of Engineers, Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, Nationwide Permit 6
- Regional Water Quality Control Board Clean Water Act Section 401
- State Lands Commission Survey Permit
- Letter of Concurrence from U.S. Fish and Wildlife Service for federal species under the Endangered Species Act under their jurisdiction
- Letter of Concurrence from National Marine Fisheries Service for federal species under the Endangered Species Act under their jurisdiction

Part II. Initial Study Checklist

This checklist identifies environmental and other factors that might be affected by the proposed project. Please refer to the checklist table in each section for the corresponding discussion.

Project activities for geotechnical exploratory drilling will occur in the open water channel of the Sacramento, Mokelumne, and San Joaquin rivers and the following sloughs (Steamboat, Dutch, Potato, and Columbia Cut). These are established waterways within the Sacramento-San Joaquin Delta surrounded by small rural towns and productive agricultural lands. The drilling at each location will be completed in approximately one 12-hour day for a total of approximately 30 days. Project activities for geotechnical exploratory drilling are minor and short in duration (approximately 1 minute each, 10 to 15 times each day, approximately 30 days).

I. Aesthetics

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect on a scenic vista?				X
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?				X
c) Substantially degrade existing visual character or quality of the site and its surroundings?				X
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				X

The scenic character of the project area is defined by the rivers and sloughs, including riparian or marsh habitat along the banks. The general public would view these areas mostly from boats or along levee roads adjacent to the boring locations. No vegetation will be removed nor will the visual nature of the channels be changed by project activities.

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

No impact. Project activities are short term in duration and will not have an adverse effect on a scenic vista.

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

No impact. The project area is not eligible or designated as a State scenic highway, scenic corridor, or scenic river. No trees or large rocks or buildings will be removed.

c) Substantially degrade existing visual character or quality of the site and its surroundings?

No impact. The visual character is mostly defined by the channel and the corridors of trees or marsh habitats along the edges of the waterways. This project will not remove existing vegetation or change the nature of the channels and therefore, will not have a significant impact on the visual character of the area.

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

No impact. The project will not create new sources of light. All work will be conducted during the day.

II. Agricultural Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as a model in assessing impacts on agriculture and farmland. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				X

Agricultural lands can be found throughout the Sacramento-San Joaquin Delta. The construction activities will take place within the open water channel of the Sacramento, Mokelumne, and San Joaquin rivers and various sloughs. The proposed project will not take place on any agricultural lands nor will it convert prime or unique farmland or farmland of Statewide importance. The project activities will not conflict with any existing zoning or involve changes in the existing environment.

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, 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.

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

No impact.

c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?

No impact.

IIIa. Air Quality

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Where available, significance criteria established by applicable air quality management or air pollution control district may be relied on to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?				X[a]
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?			X	
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?				X
d) Expose sensitive receptors to substantial pollutant concentrations?				X
e) Create objectionable odors affecting a substantial number of people?				X

[a]See page 28 for discussion.

Air pollutants are regulated at the national, state, and air basin level; each agency has a different degree of responsibility. The U.S. Environmental Protection Agency (EPA) regulates at the national level. The California Air Resources Board (CARB) regulates at the state level. The Air Quality Management Districts or Air Pollution Control Districts regulate at the air basin level.

Federal Regulations

The Federal Clean Air Act (FCAA) of 1963 and its amendments in 1970, 1977, and 1990 are major federal laws regulating air quality issues at the national level. The Federal Clean Air Act defines Environment Protection Agency's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The contents of the Federal Clean Air Act include Air Pollution Prevention and Control, Emission Standards for Moving Sources, Acid Deposition Control, Stratospheric Ozone Protection, and Permits. The Environmental Protection Agency handles global, international, national, and interstate air pollution issues and policies. The Environmental Protection Agency sets national vehicle and stationary source emission standards and National Ambient Air Quality Standards (NAAQS). The National Ambient Air Quality Standards are also called Federal Standards, and include six common air pollutants, called criteria air pollutants. The six criteria pollutants are ozone, particulate matter (PM10 and PM2.5), nitrogen dioxide (NOx), carbon monoxide (CO), lead, and sulfur dioxide. The National Ambient Air Quality Standards were set to protect the health of sensitive individuals; thus, the standards continue to change as more medical

research is available regarding the health effects of the criteria pollutants. Pursuant to the 1990 Federal Clean Air Act Amendments, the Environmental Protection Agency classifies air basins (or portions thereof) as "attainment" or "nonattainment" for each criteria air pollutant based on whether or not the National Ambient Air Quality Standards have been achieved.

The Environmental Protection Agency also oversees approval of all State Implementation Plans (SIP), which are documents prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain National Ambient Air Quality Standards in their state.

State and Local Regulations

The California Clean Air Act and AB 1807, Air Toxics Contaminants Act are major state laws that regulate air quality issues in the state of California. California has adopted ambient standards that are more stringent than the federal standards for the criteria air pollutants. In addition to the six federal criteria air pollutants, California's Ambient Air Quality Standards, or state standards, also include visibility-reducing particulates, hydrogen sulfide, sulfates, and vinyl chloride.

The California Air Resources Board (CARB) has overall responsibility for statewide air quality maintenance and air pollution prevention. The California Air Resources Board manages air quality, regulates mobile emissions sources, and establishes state ambient air quality standards and vehicle emissions standards. The California Air Resources Board is also responsible for the administration of the California State Improvement Plan.

Regional air-quality management agencies, such as Air Quality Management Districts (AQMD) and Air Pollution Control Districts (APCD), manage air quality or air pollution issues in air basins. The California Air Resources Board oversees the activities of regional Air Quality Management Districts and Air Pollution Control Districts. Air Quality Management Districts and Air Pollution Control Districts are responsible for controlling emissions primarily from stationary sources inside their jurisdictional area. They also maintain air quality monitoring stations throughout the Air Basin and set up California Environmental Quality Act thresholds for pollutants for evaluation of project impacts to air quality in their jurisdictional area.

Air Quality Management Districts and Air Pollution Control Districts are also responsible for developing, updating, and implementing the Air Quality Management Plan (AQMP) for the Air Basins under their jurisdiction. An Air Quality Management Plan is a plan prepared by an air pollution control district for a county or region designated as a nonattainment area for bringing the area into compliance with the requirements of the national and/or California ambient air quality standards.

The proposed project sites are located in different air basins. Sites 1 to 7 and 11 to 12 are in the Sacramento Valley Air Basin on the jurisdictional border of Sacramento Metro Air Quality Management District and Yolo/Solano Air Quality Management District; Site

8 is in the San Francisco Bay Area Air Basin under the jurisdiction of Bay Area Air Quality Management District, and Sites 9 to 10 and 13 to 16 are located in the San Joaquin Valley Air Basin under the jurisdiction of San Joaquin Valley Air Pollution Control District. The air quality analysis was conducted based on the following equipment proposed for the project (Table 1).

Table 1. Project Equipment

	Schedule	Equipment	Horsepower	Hours per day
Option A	First two days	1 drillship	2 x 160 HP	10 hours
	Subsequent days	1 drillship	2 x 160 HP	10 hours
		1 drill rig	250 HP	12 hours
	Last two days	1 drillship	2 x 160 HP	10 hours
Option B	First day	1 crane	320 HP	8 hours
	Subsequent days	1 drill rig	250 HP	12 hours
		1 barge/boat	135 HP	2 hours
	Last day	1 crane	320 HP	8 hours

Environmental Setting and Existing Air Quality

The proposed project includes drilling sites located in three air basins that are under jurisdiction of four regional air-quality management agencies. Air basins are designated as "attainment," "non-attainment," or "unclassified" for a criteria-pollutant based on whether the national or state ambient air quality standards for that pollutant are met. If ambient air quality standards are exceeded in an area, it is designated as "non-attainment;" otherwise, it is designated as "attainment." If there is inadequate or inconclusive data in an area to make a definitive attainment designation, it is considered "unclassified."

Ozone and PM10 (fine particulate matter) are the primary criteria pollutants that exceed national or state ambient air quality standards across these air basins. The attainment status for the jurisdictional area of Air Quality Management District/Air Pollution Control District is summarized in Table 2.

Table 2. Attainment Status for Regional Air Quality Management Districts and Air Pollution Control District

		Sacramento Metropolitan Air Quality Management District		Yolo/Solano Air Quality Management District		Bay Area Air Quality Management District		San Joaquin Valley Air Pollution Control District	
		State	Federal	State	Federal	State	Federal	State	Federal
O_3	1-hr	N	N/A	N	N/A	N	N/A	N	N/A
	8-hr	N	N	N	N	N	N	N	N
PM10	24-hr	N	N	N	U	N	U	N	U
	Annual	N	N/A	N	N/A	N	N/A	N	N/A
PM2.5	24-hr	N/A	A	N/A	U	N/A	N	N/A	N
	Annual	N	U	N/A	U	N	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.

Threshold of Significance

According to the California Environmental Quality Act Guidelines' Appendix G Environmental Checklist, to determine whether impacts to air quality are significant environmental effects, the following questions are analyzed and evaluated. Would the project:

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

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?

d) Expose sensitive receptors to substantial pollutant concentrations?

e) Create objectionable odors affecting a substantial number of people?

Regional air quality management agencies set up thresholds to determine whether environmental effects from the project are considered as "significant" or "not significant"

in their jurisdictional area. A project may have both short-term and long-term emissions. The short-term emissions are mainly related to the construction phase of a project and are recognized to be short in duration; while the long-term emissions are related to the activities that will occur indefinitely as a result of project operations.

Because the proposed project will not have operational emissions, the following discussions are focused on short-term construction emissions. The impact assessment methodology and procedure, as well as thresholds of significance adopted by each of the agencies are presented in the following sections.

Yolo-Solano Air Quality Management District

Yolo/Solano Air Quality Management District sets project-level thresholds for pollutants of concern in the district. The thresholds are listed in Table 3, which apply to both construction and operational impacts. Besides setting thresholds for criteria pollutants, the Yolo/Solano Air Quality Management District has adopted several other thresholds for toxics, odors and cumulative impacts.

Table 3. Yolo-Solano Air Quality Management District Thresholds of Significance for Criteria Pollutants

Pollutant	Thresholds of Significance
reactive organic gases	10 tons/year
nitrogen oxides	10 tons/year
PM10	80 lbs/day
carbon monoxide	Violation of a state ambient air quality standard for carbon monoxide

Yolo/Solano Air Quality Management District encourages using URBEMIS (URBan EMISsions model 2007, Version 9.2.4) emissions model to perform quantified, screening-level air quality analyses, and it requires implementing mitigation measures to reduce emissions even if a project would not exceed district thresholds.

Sacramento Air Quality Management District

Sacramento Metropolitan Air Quality Management District requires assessment of the emissions from construction. The construction air quality impacts level of significance should be determined, and if necessary, the appropriate mitigation strategy should be implemented. The emissions generated from common construction activities include fuel combustion from mobile heavy-duty diesel- and gasoline-powered equipment, portable auxiliary equipment, and worker commute trips, as well as fugitive dust from soil disturbance. The pollutants of concern include reactive organic gases, nitrogen oxides, particulate matter (PM10 and PM2.5), carbon monoxide and possible air toxics, especially diesel exhaust particulate emissions from internal combustion engines. Due to the non-attainment designation for ozone in the area, nitrogen oxides, which are considered a precursor of ozone, are of greatest concern. Sacramento Metropolitan Air

Quality Management District has adopted a construction emissions threshold of 85 pounds per day of nitrogen oxides.

Sacramento Metropolitan Air Quality Management District also adopts significant thresholds based on pollutant concentration. 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.

Sacramento Metropolitan Air Quality Management District recommends the application of mitigation measures to reduce emissions to the extent feasible.

Bay Area Air Quality Management District

Bay Area Air Quality Management District considers PM10 (fine particulate matter) as the pollutant of greatest concern with respect to construction activities. Bay Area Air Quality Management District's approach to California Environmental Quality Act analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions. The determination of significance with respect to construction emissions should be based on a consideration of the control measures to be implemented. Bay Area Air Quality Management District does not require quantification of construction emissions, although a Lead Agency may elect to do so.

San Joaquin Valley Air Pollution Control District

PM10 (fine particulate matter) is the pollutant of greatest concern at San Joaquin Valley Air Pollution Control District. San Joaquin Valley Air Pollution Control District does not set up quantitative thresholds for criteria pollutants, and the San Joaquin Valley Air Pollution Control District's approach to California Environmental Quality Act analyses of construction PM10 (fine particulate matter) impacts is to require implementation of effective and comprehensive control measures rather than to require detailed quantification of emissions. San Joaquin Valley Air Pollution Control District 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 for mitigating air quality impacts (San Joaquin Valley Air Pollution Control District 2009) (as appropriate, depending on the size and location of the project site) will constitute sufficient mitigation to reduce PM10 (fine particulate matter) impacts to a level considered less-than-significant.

In addition, San Joaquin Valley Air Pollution Control District adopted the following rules to address cumulative impacts: Any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact.

Impacts of local pollutants (carbon monoxide, hazardous air pollutants) are cumulatively significant when modeling shows that the combined emissions from the project and other existing and planned projects will exceed air quality standards.

Impact Assessment

The proposed project will be approximately 30 days in duration. The project will not create any stationary source; therefore, it will not have long-term operational emissions. All emissions would be generated during the short-term construction period.

The pollutants of greatest concern at regional air quality management agencies include ozone precursors (such as reactive organic gases and nitrogen oxides) and particular matters (PM10 and PM2.5). The proposed project would conduct geotechnical boring in water. Due to the small scale of the project, the number and type of construction equipment required to complete project phase will be limited. In addition, unlike typical land use projects, the proposed project will not have earth-moving operations such as cut and fill, trenching, soil compaction and grading, nor will it involve transporting construction materials on dirt road; therefore, no fugitive dust will be generated from soil disturbance. The project would not involve demolition of old buildings; therefore, it will not generate such hazardous materials as asbestos. The project will not use chemical substances, and it will not generate substantial amount of air toxics except particulate matters from combustion of diesel engines of construction equipment. The project will not generate odors. In addition, the project sites are located in water, and they are not in the close vicinity of sensitive receptors; therefore, it will not expose sensitive receptors to any pollutant concentration exceeding any limits set by any health agencies.

The emissions of criteria pollutant of concern would be nitrogen oxides and reactive organic gases as well as particulate matters from diesel-powered construction equipment, such as drill rig, crane, and drillship or barge. Table 4 summarizes the quantitative estimates of pollutant emission levels (in pounds per day) for this project using latest version of URBEMIS software (2007, version 9.2.4). Two options were evaluated, and the worst-case scenario was studied by assuming all equipment would be operating on a workday for maximum hours. In reality, not all equipment will be operating on the same workday for the specified hours.

Table 4. Pollutant Emissions for the Project (pounds per day)

	Nitrogen oxides	Reactive organic gases	PM10	PM2.5	Carbon monoxide
Option A: using drillship	30.18	3.00	1.28	1.18	13.36
Option B: using boat/crane	28.75	2.72	1.11	1.02	11.48

The emission level of the criteria pollutants of concern are well below the most stringent significant thresholds of among the Air Quality Management Districts and Air Pollution Control District.

a) Would the project conflict with or obstruct implementation of the applicable air quality plan Consistency with Air Quality Management Plan

No impact. The project area falls within a non-attainment area for ozone levels and for PM10 (fine particulate matter). A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan. Therefore, the proposed project needs to be evaluated to determine whether it would generate population and employment growth. The proposed project is not a population or growth-inducing project and is of a temporary nature. Therefore, no significant local or regional air quality impacts are anticipated.

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

Less than significant impact. Construction activities for the proposed project are anticipated to take approximately 30 days and would result in short-term impacts on ambient air quality in the area. However, project activities would not contribute substantially to an existing or projected air quality violation. The proposed project will involve the use of diesel and gasoline burning equipment. The proposed project may result in the generation of short-term construction-related air emissions. Using the latest version of URBEMIS model (2007, version 9.2.4), the emissions levels of criteria pollutants of greatest concern would not exceed the most stringent significant thresholds among the regional air quality management agencies. Localized concentration of air pollutants would not exceed National and State Ambient Air Quality Standards. To minimize the temporary construction related emission impacts to the extent feasible, construction contractors would be required to implement best management practices including:

- On-road and off-road vehicle tire pressures shall be maintained to manufacturer specifications. Tires shall be checked and re-inflated at regular intervals.
- Construction equipment engines shall be maintained to manufacturer's specifications.
- Use properly tuned equipment that meets current emissions standards.

c) Would the project expose result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors)?

No impact. The project is short in duration and scope and will not have cumulative effects on air quality.

d) Would the project expose sensitive receptors to substantial pollutant concentrations?

No impact. The project will not expose sensitive receptors to substantial pollutant concentrations nor would the project create objectionable odors. There are no hospitals or schools within close proximity to the project.

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

No impact. Implementation of the proposed project would not involve activities that would generate objectionable odors that could adversely affect sensitive receptors.

IIIb. Greenhouse Gas Emissions

At the time of this analysis, no state or local air quality regulatory agency in California has adopted a significance threshold for greenhouse gas (greenhouse gas) emissions generated by any non-industrial project. By adopting Assembly Bill (AB) 32 (2006) and Senate Bill (SB) 97 (2007); however, the State of California has established greenhouse gas reduction targets and has determined that greenhouse gas emissions, as they relate to global climate change, are a source of adverse environmental impacts in California that should be addressed under CEQA (also refer to the discussion of AB 32 below).

CEQA requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects they are considering for approval. Greenhouse gases have the potential to adversely affect the environment because such emissions contribute, on a cumulative basis, to global climate change. In turn, global climate change has the potential to result in rising sea levels, which can inundate low-lying areas; to reduce snowpack, leading to less overall water storage in the Sierra Nevada; to affect rainfall, leading to changes in water supply, increased frequency and severity of droughts, and increased wildfire risk. Greenhouse gases can also affect habitat and agricultural land, leading to adverse affects on biological and agricultural resources.

Cumulative impacts are the collective impacts of one or more past, present, and future projects that, when combined, result in adverse changes to the environment. When the adverse change is substantial and the project's contribution to the impact is considerable, the cumulative impact would be significant. The cumulative project list for this issue (global climate change) comprises anthropogenic (i.e., human-made) greenhouse gas emission sources across the entire planet. No project alone would contribute to a noticeable incremental change to the global climate. However, legislation and executive orders on the subject of climate change in California have established a statewide context for greenhouse gas emissions, and an enforceable statewide cap on greenhouse gas emissions. Given the nature of environmental consequences from greenhouse gas and global climate change, CEQA requires that the cumulative impacts of greenhouse gas, even additions that are relatively small on a global basis, need to be

considered. Because of the cumulative nature of the climate change problem, even relatively small contributions may be potentially considerable and therefore, significant.

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006 (Chapter 488, Statutes of 2006, enacting Health and Safety Code Sections 38500–38599). AB 32 establishes regulation and reporting requirements, as well as mechanisms to achieve quantifiable reductions in greenhouse gas emissions and establishes a cap on statewide greenhouse gas emissions. AB 32 requires that statewide greenhouse gas emissions be reduced to 1990 levels by 2020. In October 2008, the California Air Resources Board published its *Climate Change AB 32 Scoping Plan*, which is the state's plan to achieve greenhouse gas reductions in California required by AB 32 (ARB 2008a). The scoping plan was approved by the California Air Resources Board on December 11, 2008.

In addition to the scoping plan, the California Air Resources Board has also released the *Preliminary Draft Staff Proposal: Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act.* The proposal recommends adhering to interim performance standards for project types and emissions sources including construction, energy, water use, waste, transportation, and total mass greenhouse gas emissions (the California Air Resources Board 2008b). Specific thresholds and performance criteria for these categories have yet to be developed.

On April 13, 2009, the California Office of Planning and Research submitted to the Secretary for Natural Resources its proposed amendments to the state CEQA Guidelines for greenhouse gas emissions, as required by SB 97. These proposed CEQA Guideline amendments would provide guidance to public agencies regarding the analysis and mitigation of the effects of greenhouse gas emissions in draft CEQA documents. The Natural Resources Agency will conduct formal rulemaking in 2009, prior to certifying and adopting the amendments, as required by SB 97.

Because construction-related emissions would be finite and below the minimum standard for reporting requirements under AB 32, the proposed project's greenhouse gas emissions are not considered a significant contribution to the cumulative global impact. Therefore, this impact would be less than significant. For the purposes of this analysis, if the proposed project would substantially conflict with the greenhouse gas reduction goals mandated in AB 32, this impact would be significant.

Greenhouse gas emissions generated by the proposed project would be primarily in the form of carbon dioxide (CO_2) from construction equipment exhaust. Although emissions of other greenhouse gas such as methane and nitrous oxide are important with respect to global climate change, the emissions levels of these greenhouse gases for the sources associated with project construction are nominal compared with CO_2 emissions, even considering their higher global warming potential. Therefore, all greenhouse gas emissions for construction activities are reported as CO_2.

Emissions factors and calculation methods for estimating greenhouse gas emissions associated with infrastructure projects have not been formally adopted for use by the state or any other air district. The construction-related greenhouse gas emissions associated with project implementation were calculated using URBEMIS 2007, Version 9.2.4.

The most recent greenhouse gas analysis recommendations call for quantifying greenhouse gas emissions related to electricity generation and water conveyance resulting from project implementation. However, no additional electricity, water, or long-term emission sources would be related to the proposed project, therefore no long-term effect on greenhouse gas levels would result from project implementation. Construction activities associated with the proposed project would occur for approximately 30 days over an approximate 2 month period in either 2009 or 2010. During this time, a net increase in greenhouse gas emissions would result from various construction activities. Construction-related greenhouse gas emissions would be associated with engine exhaust from semi-trucks used to transport the barge and drill rigs to the site, barges and drill rigs used to conduct the geotechnical drilling, and worker commute trips. Although any increase in greenhouse gas emissions would add to the quantity of emissions that contribute to global climate change, emissions associated with construction of the proposed project would occur over a finite period of time (i.e., two months). After project completion, all construction emissions would cease.

To establish additional context in which to consider the order of magnitude of project-generated construction greenhouse gas emissions, facilities (i.e., stationary, continuous sources of greenhouse gas emissions) that generate greater than 25,000 metric tons of CO_2 per year are mandated to report their greenhouse gas emissions to the California Air Resources Board pursuant to AB 32. In addition, the California Air Resources Board has released a preliminary draft staff proposal that recommends 7,000 metric tons of CO_2 per year be used as the baseline threshold for impacts. As shown in Table 5, estimated greenhouse gas emissions associated with construction of the entire project would be 14.52 metric tons of CO_2 over a 2-month period. Absent any air quality regulatory agency–adopted threshold for greenhouse gas emissions, the proposed project would generate substantially fewer emissions than baseline amount of CO_2 per year. This information is presented for informational purposes only, and it is not the intention of the lead agency to adopt 25,000 or 7,000 metric tons of CO_2 per year as a numeric threshold. Rather, the intention is to put project-generated greenhouse gas emissions in the appropriate statewide context in order to evaluate whether the proposed project's contribution to the global impact of climate change would be substantial.

Table 5. Bay Delta Conservation Plan Geotechnical Boring – Greenhouse Gas Emissions Inventory and Calculation

CONSTRUCTION EQUIPMENT EMISSIONS							
Type of Equipment	**Maximum Number per Day**	**Total Operation Days**	**Total Operation hours[1]**	**Fuel Consumption Per Hour[2]**	**Total Fuel Consumption (gal. diesel)**	**CO_2e/gal Diesel[3]**	**Total CO_2 Equivalent Emissions (metric tons)**
Barge	1	15	180	3	540	0.0103914	5.61
Drill Rig	1	15	150	4	600	0.0103914	6.23
Push Boat	1	15	30	7	210	0.0103914	2.18
TOTAL					**1,350**		**14.02**

[1] A 12-hour work day is assumed, with 2 hours each day required for travel to and from drill site and 10 hours for drilling each day, barge equipment (includes generators and compressors) operates entire 12 hour day.

[2]Contractor Estimation (Gregg Drilling, Inc.- Tim Boyd 5/28/09).

[3] World Resources Institute-Mobile combustion CO2 emissions tool. June 2003 Version 1.2.

(Alternative Drilling methods using a vessel mounted drill rig yield similar results for greenhouse gas emissions).

CONSTRUCTION WORKFORCE TRANSPORTATION EMISSIONS							
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)**
4	15	20	1200	20.8	**57.7**	0.00901	**0.5**

[4] United States Environmental Protection Agency. 2008. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2008. [EPA420-R-08-015].

CONSTRUCTION MATERIALS TRANSPORTATION EMISSIONS

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)
Delivery	0					0.0103914	0
Spoils	0					0.0103914	0
TOTAL							**0**

OPERATIONAL EMISSIONS

Average Annual Electricity Needed	NA
Average Annual Production Emissions	NA
TOTAL	**0**

TOTAL GREENHOUSE GAS EMISSIONS

Construction Equipment Emissions	14.0
Workforce Transportation Emissions	0.5
Construction Materials Emissions	-
Operational Emissions	-
Total Greenhouse Gas Emissions	**14.5** **MT CO_2 equivalents**

IV. Biological Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG or FWS?		X		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations or by the CDFG or FWS?				X
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?				X
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X	
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?				X

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG or FWS?

Less than significant impacts with mitigation. A list of sensitive species with the potential to occur in the area was compiled from United States Fish and Wildlife Service (USFWS) and California Department of Fish and Game (DFG) resources (Table 6). Habitat requirements for each species were compared with habitat features in the project area to determine if the species has potential to be found in the area. If potential habitat is present or the species was actually found during surveys, potential impacts due to the project were assessed and mitigation measures provided.

Research to Determine Impacts of Geotechnical Activities

DWR Environmental Scientists reviewed the following existing resource information to evaluate whether special-status species or other sensitive biological resources (e.g., wetlands) could occur in the proposed project area and to develop a list of special-status species and other sensitive biological resources that could be present in the project area:

A. Records in the California Natural Diversity Database (CNDDB) for U.S. Geological Survey (USGS) 7.5-minute Quadrangles Clarksburg, Courtland, Isleton, Rio Vista, Jersey Island, Bouldin Island, and Holt; and Sacramento, San Joaquin, Solano, Contra Costa and Yolo counties (CNDDB 2009). Table 6 summarizes the listing status, habitat requirements, presence or absence of suitable habitat within or adjacent to the project area, and the potential for the presence of special status plant and animal species occurring in the general vicinity of the project limits based on suitable habitat. Habitat requirements for each species were compared with habitat features in the project area to determine if the species has potential to be found in the area. If potential habitat is present or the species was actually found in surveys, potential impacts due to the project were assessed and mitigation measures proposed.

B. USFWS list of endangered, threatened, and proposed species for the 7.5-minute Quadrangles Clarksburg, Courtland, Rio Vista, Jersey Island, Bouldin Island, and Holt; and Sacramento, San Joaquin, Solano, Contra Costa and Yolo counties were obtained from the USFWS web site (USFWS 2008);

C. The California Native Plant Society's (CNPS's) 2007 online *Inventory of Rare and Endangered Plants of California* (California Native Plant Society 2007); and

D. DWR file information.

Field Surveys

Field surveys were performed between April and June 2009. A reconnaissance-level habitat-based assessment was conducted within the study area to document habitat types. The assessment was conducted either by boat or truck of the project area. The general purposes of the site visits were to:

A. Characterize and map biological communities and their associated wildlife habitat values.

B. Determine whether suitable habitat is present for special-status plant and wildlife species that have the potential to occur in the project vicinity.

C. Conduct focused surveys for raptors, including Swainson's hawk and white-tailed kites.

D. Identify potential waters of the United States (including wetlands).

Table 6. Listed species with the potential to occur within the Project action area from the USFWS and CNDDB Lists

Common Name *Species Name*	Status[1] (F/S/X/CNPS)	Habitat	Potential to Occur in Action Area	Potential for Project Impacts
INVERTEBRATES				
Conservancy fairy shrimp *Branchinecta conservation*	E/--/--/--	Large, cool-water vernal pools with moderately turbid water	**Unlikely** – no suitable habitat within project site or immediate area.	**Unlikely** – no suitable habitat in project area.
Vernal pool fairy shrimp *Branchinecta lynchi*	T/--/X/--	Vernal pools; also sandstone rock outcrop pools	**Unlikely** – no suitable habitat within project site or immediate area.	**Unlikely** – no suitable habitat in project area.
Vernal pool tadpole shrimp *Lepidurus packardi*	E/--/X/--	Vernal pools containing clear to highly turbid water in a wide range of sizes	**Unlikely** – no suitable habitat within project site or immediate area.	**Unlikely** – no suitable habitat in project area.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T/--/X/--	Riparian and oak savanna habitats with blue elderberry shrubs; elderberries are the host plant	**Unlikely** – no host plants identified within 100 ft of project area.	**Unlikely** – no suitable habitat in project area.
Delta green ground beetle *Elaphrus viridis*	E/--/X/--	Species associated with vernal pool habitats throughout the Central Valley. Dry in the summer, these pools fill with onset of winter rains.	**Unlikely** – no host plants or habitat available. Project activities in-water.	**Unlikely** – no suitable habitat in project area.
Vernal pool tadpole shrimp *Lepidurus packardi*	E/--/--/--	These aquatic creatures inhabit seasonal wetlands known as vernal pools, which form in shallow depressions or terraces, and experience various flooding and drying periods annually.	**Unlikely** – no host plants or habitats available. Project activities in-water.	**Unlikely** – no suitable habitat in project area.
Lange's mormo langei *Apodemia mormo langei*	E/--/--/--	Lange's metalmark is known almost exclusively from what is now the Antioch Dunes National Wildlife Refuge. It has a close relationship with the food plant of its larvae, in this case naked-stemmed buckwheat (*Eriogonum nudum*).	**Unlikely** – no host plants or habitats available. Project activities in-water.	**Unlikely** – no suitable habitat in project area.
Callippe silverspot butterfly *Speyeria callippe callippe*	E/--/--/--	Following the winter rains, the larvae emerge to begin feeding on their host plant, a Violet (*Viola pedunculata).*	**Unlikely** – no host plants or habitats available. Project activities in-water.	**Unlikely** – no suitable habitat in project area.

Common Name *Species Name*	Status[1] (F/S/X/CNPS)	Habitat	Potential to Occur in Action Area	Potential for Project Impacts
FISH				
Green sturgeon *Acipenser medirostris*	T/--/--/--	Large, main stem rivers with cool water and cobble, clean sand, or bedrock for spawning.	**High –** within Southern Distinct Population Segment.	**Low** – project activities are minor in scope and in stream work will occur when fish are at lowest abundance (August 1 to September 30)
Delta smelt *Hypomesus transpacificus*	T/T/X/--	Estuarine or brackish water up to 18 ppt; spawn in shallow brackish water upstream of the mixing zone where salinity is approximately 2 ppt.	**Medium** – within known range of Delta smelt. However, in stream work will occur when fish are at lowest abundance (August 1 to September 30).	**Unlikely** – within known range but in stream borings will occur when outside known fish range and before potential spawning migration.
Longfin smelt *Spirinchus thaleichthys*	--/SE/--/--	Euryhaline (capable of tolerating a wide range of salinities), pelagic and anadromous species found in scattered bays and estuaries from California to Alaska.	**Medium –** within know range of longfin smelt. However, in stream work will occur when fish are at lowest abundance (August 1 to September 30)	**Unlikely –** within know range of longfin smelt. However, in stream work will occur when fish are at lowest abundance (August 1 to September 30)
Central Valley steelhead, Central Valley Coast steelhead *Oncorhynchus mykiss*	T/--/X/--	Rivers and streams with cold water, clean gravel of appropriate size for spawning, and suitable rearing habitat; rear in freshwater ≥1 years.	**Medium** – within known range of steelhead. However, in stream work will occur when fish are at lowest abundance (August 1 to September 30).	**Unlikely** – in stream work will occur when fish are at lowest abundance (August 1 to September 30).
Winter-run Chinook salmon *Oncorhynchus tshawytscha*	E/E/X/--	Main stem river reaches with cool water and available spawning; rear 5 to 10 month in the river and estuary; migrate to the ocean to feed and grow until sexually mature.	**Low** – within known range of winter-run chinook. However, in stream work will occur when fish are at lowest abundance (August 1 to September 30).	**Unlikely** – in stream work will occur when fish are at lowest abundance (August 1 to September 30).
Central Valley spring-run chinook salmon *Oncorhynchus tshawytscha*	T/T/X/--	Low- to mid-elevation rivers and streams with cold water, clean gravel of appropriate size for spawning, and suitable rearing habitat; typically rear in freshwater for one or more years before migrating to the ocean	**Low** – within known range of spring-run Chinook. However, in stream work will occur when fish are at lowest abundance (August 1 to September 30).	**Unlikely** – in stream work will occur when fish are at lowest abundance (August 1 to September 30).

Common Name *Species Name*	Status[1] (F/S/X/CNPS)	Habitat	Potential to Occur in Action Area	Potential for Project Impacts
FISH				
Central Valley fall and late fall-run Chinook salmon *Oncorhynchus tshawytscha*	SC/SC/--/--	Low elevation main stem rivers with cool water, deep pools and suitable spawning gravel; migrate to the ocean to feed and grow until sexually mature	**Low** – within known range of fall run Chinook. However, in stream work will occur when fish are at lowest abundance (August 1 to September 30).	**Unlikely** – in stream work will occur when fish are at lowest abundance (August 1 to September 30).
River lamprey *Lampetra ayresi*	SC/SC/--/--	Natural range is from southern Alaska to San Francisco Bay, including the Delta and adjacent rivers	**High –** within known range of project area.	**Unlikely –** in stream work willoccur when fish are at lowest abundance (August 1 to September 30).
Pacific lamprey *Lampetra tridentata*	SC/SC/--/--	Natural range is from southern Alaska to San Francisco Bay, including the Delta and adjacent rivers	**High –** within known range of project area.	**Unlikely –** in stream work willoccur when fish are at lowest abundance (August 1 to September 30).
Sacramento splittail	SC/--/--/--	Endemic fish is a large minnow with a tolerance for saline waters occurs in the lower reaches of the Sacramento and San Joaquin rivers and tributaries, the Delta, Suisun and Napa marshes, Sutter and Yolo bypasses, and tributaries of north San Pablo Bay.	**High –** within known range of project area.	**Unlikely –** in stream work willoccur when fish are at lowest abundance (August 1 to September 30).
AMPHIBIANS				
California tiger salamander, central population *Ambystoma californiense*	T/SC/X/--	Natural vernal pools or seasonal ponds in grasslands and low foothill regions	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
California red-legged frog *Rana aurora draytonii*	T/SC/X/--	Permanent and semi permanent aquatic habitats such as creeks and cold-water ponds, with emergent and submergent vegetation.	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.

Common Name *Species Name*	Status[1] (F/S/X/CNPS)	Habitat	Potential to Occur in Action Area	Potential for Project Impacts
REPTILES				
Giant garter snake *Thamnophis gigas*	T/T/--/--	Sloughs, canals, low-gradient streams and marsh habitats; irrigation ditches and rice fields; grassy banks and emergent vegetation for basking; high ground protected from flooding.	**Unlikely** – lack of suitable habitat within project site or immediate area.	**Unlikely** –Project activities will take place in large sloughs and river with fast moving waters.
Alameda whipsnake [=striped racer] *Masticophis lateralis euryxanthus*	T/T/X/--	Chaparral, northern coastal sage scrub, coastal sage and adjacent habitats, including grassland, oak savanna, and occasionally oak-bay woodland with rock outcrops.	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
MAMMALS				
Riparian (San Joaquin Valley) woodrat *Neotoma fuscipes riparia*	E/--/--/--	Riparian forest	**Unlikely** – supporting habitat not expected to occur within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Salt marsh harvest mouse *Reithrodontomys raviventris*	E/--/--/--	Salt marsh with dense plant cover of pickleweed and fat hen adjacent to upland site.	**Unlikely** – supporting habitat not expected to occur within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Riparian brush rabbit Sylvilagus bachmani riparius	E/--/--/--	Riparian forest	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
San Joaquin kit fox Vulpes macrotis mutica	E/--/--/--	Chaparral, grasslands, and scrubland communities	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.

Common Name *Species Name*	Status[1] (F/S/X/CNPS)	Habitat	Potential to Occur in Action Area	Potential for Project Impacts
BIRDS				
Western snowy plover *Charadrius alexandrinus nivosus*	T/SC/--/--	Coastal beaches above the normal high tide limit with wood or other debris for cover. Inland shores of salt ponds and alkali or brackish inland lakes.	**Unlikely** – supporting nesting habitat not found within project area.	**Unlikely** – support habitat not found within project area.
California brown pelican *Pelecanus occidentalis californicus*	E/E/--/--	Coastline, typically in littoral ocean zones, just outside the surf line; nests on offshore lines.	**Unlikely** – supporting nesting habitat not found within project area.	**Unlikely** – support habitat not found within project area.
California clapper rail *Rallus longirostris obsoletus*	E/E/--/--	Salt marshes and tidal sloughs in the San Francisco Bay, east through the Delta and Suisun Marsh; associated with heavy growth of pickleweed.	**Unlikely** – supporting nesting habitat not found at mid-water channel locations of drilling activities.	**Unlikely** – support habitat not found within project area.
California black rail *Laterallus jamaicensis coturniculus*	--/T/--/--	Tidal salt marshes; associated with heavy growth of pickleweed; may occur in brackish or freshwater marshes at low elevations.	**Unlikely** – supporting nesting habitat not found at mid-water channel locations of drilling activities.	**Unlikely** – supporting nesting habitat not found at mid-water channel locations of drilling activities.
California least tern *Sternula antillarum (=Sterna, + albifrons) browni*	E/E/--/--	Nests on sandy, upper ocean beaches, and uses mudflats; forages on surf line, estuaries, and open ocean.	**Unlikely** – supporting nesting habitat not found within project area.	**Unlikely** – support habitat not found within project area.
Northern spotted owl *Strix occidentalis caurina*	T/SC/--/--	Dense, old-growth or mature forests dominated by conifers with topped trees or oaks for nesting crevices.	**Unlikely** – supporting nesting habitat not found within project area.	**Unlikely** – support habitat not found within project area.
Swainson's hawk *Buteo swainsoni*	--/T/--/--	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain fields.	**High** – supporting habitat is present on the edges of the channels and species has been observed in project area.	**Low** –activities wont take place within ¼ mile of a known nest site and biological monitors will be onsite during construction.
Western Yellow Billed Cuckoo *Coccyzus americanus occidentalis*	C/E/--/--	Nests in wide, dense riparian forests with a thick understory of willows; sites with a dominant cottonwood overstory are preferred for foraging.	**Unlikely** – supporting nesting habitat not found within project area.	**Unlikely** – supporting nesting habitat not found within project area.
Bank swallow *Riparia riparia*	--/T/--/--	Nests in bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam.	**Unlikely** – supporting nesting habitat not found within project area.	**Unlikely** – supporting nesting habitat not found within project area.
Bald eagle *Haliaeetus leucocephalus*	D/E/--/--	Nests and roosts in coniferous forests in proximity to a large body of water.	**Unlikely** – nesting habitat not found within project area.	**Unlikely** – nesting habitat not found within project area.

Common Name *Species Name*	Status[1] (F/S/X/CNPS)	Habitat	Potential to Occur in Action Area	Potential for Project Impacts
PLANTS				
Large-flowered fiddleneck *Amsinckia grandiflora*	E/E/--/1B	Annual grassland, cismontane woodland, on open grassy slopes below 1200 feet	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Pallid Manzanita *Arctostaphylos pallida*	PT/E/--/1B	Chaparral, on dry stony ridges	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Succulent owl's clover *Castilleja campestris* ssp. *succulenta*	T/E/--/1B	Vernal pools (often acidic)	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Suisun thistle *Cirsium hydrophilum* var. *hydrophilum*	E/--/--/1B	Suisun Marsh, salt marsh	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Soft birds' beak *Cordylanthus mollis* ssp. *mollis*	E/--/--/1B	Sam Francisco Bay Suisun Marsh, salt marsh	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Palmate bracted bird's beak *Cordylanthus palmatus*	E/E/--/1B	Alkali meadow and scrub	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Contra Costa wallflower *Erysimum capitatus* ssp. *angustatus*	E/E/--/1B	Inland dunes of Contra Costa	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Santa Cruz tarplant *Holocarpha macradenia*	T/E/--/1B	Coastal prairie and annual grasslands, on sandy clay soils	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.

Common Name *Species Name*	Status[1] (F/S/X/CNPS)	Habitat	Potential to Occur in Action Area	Potential for Project Impacts
PLANTS				
Contra Costa goldfields *Lasthenia conjugens*	E/--/--/1B	Vernal pools	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Colusa grass *Neostapfia colusana*	T/E/--/1B	Vernal pools	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Antioch Dunes evening primrose *Oenothera deltoids* ssp. *howellii*	E/E/--/1B	Inland dunes	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Slender Orcutt grass *Orcuttia tenuis*	T/E/--/1B	Bottom of vernal pools, mostly at sites underlain by volcanic substrates	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.
Crampton's tuctoria *Tuctoria mucrtonata*	E/E/--/1B	Vernal pools	**Unlikely** – supporting habitat not found within active water channel where project activities will occur.	**Unlikely** – supporting habitat not found within project area.

STATUS[1]
E = listed as endangered under the federal or State Endangered Species Act
T = listed as threatened under the federal or State Endangered Species Act
SC = species of concern
X = critical habitat designation
C = candidate species
D = delisted
CNPS = California Native Plant Society Listing

DETERMINATION[2]
The "likelihood for Project to Impact" is defined as follows:
"Unlikely" - The project site and/or immediate area do not support suitable habitat for a particular species or outside of the species known range. These species are not discussed further.
"Low Potential" The project site and/or immediate area only provide limited habitat for a particular species. In addition, the known range for a particular species may be outside the project area.
"Medium Potential" - The project site and/or immediate area provide suitable habitat of a particular species, although there may be no known sightings in the area.

The following species have potential habitat in the project area. Potential impacts and proposed avoidance and mitigation measures are listed below each species.

- Delta smelt
- Central Valley steelhead
- Winter run Chinook salmon
- Central Valley spring-run Chinook salmon
- Central Valley fall and late fall-run Chinook salmon
- Green sturgeon
- Swainson's hawk

Delta Smelt

Listing Status and Designated Critical Habitat

The U.S. Fish and Wildlife Service (USFWS) listed the delta smelt (*Hypomesus transpacificus*) as threatened under the federal Endangered Species Act on March 5, 1993, based upon its dramatically reduced abundance, threats to its habitat, and the inadequacy of regulatory mechanisms then in effect (58 FR 12854). In 2004, a 5-year status review reaffirmed the need to retain the delta smelt as a threatened species (USFWS 2004). In February 2007, the USFWS and the California Fish and Game Commission were jointly petitioned to list the species as endangered under ESA and California Endangered Species Act, respectively (Center for Biological Diversity et al. 2006 and 2007). This re-listing was requested because of a substantial decline in the abundance of this species beginning in 2002 from an already depressed population status, with no recovery in subsequent years, in spite of favorable hydrologic conditions. The USFWS is currently considering information to determine if the listing status of delta smelt should be upgraded from threatened to endangered. On March 4, 2009, the State of California listed the delta smelt as a State endangered species.

The USFWS designated critical habitat on December 19, 1994 (59 FR 65256). Critical habitat encompasses essentially all waters of the legal Delta extending downstream to western Suisun Marsh and Suisun Bay (USFWS 1994).

Life History

Delta smelt are slender-bodied fish, about 2 to 3 inches long, in the Osmeridae family (smelts). The species is endemic to the Sacramento-San Joaquin Delta. Delta smelt are euryhaline fish that typically rear in shallow (<10 feet), open waters of the estuary (Moyle 2002). They are mostly found within the salinity range of 2-7 parts per thousand (ppt) and have been collected from estuarine waters up to 14 ppt (Moyle 2002, USFWS 2007a). The species generally lives about one year, although a small proportion of the population may live to spawn in its second year (Moyle 2002, Bennett 2005).

In general, delta smelt habitat quality and surface area are greater when 2 psu isohaline is located in Suisun Bay (DWR 2009). The 2 psu isohaline is located within the low salinity zone and is an indicator of the low salinity zone, which varies seasonally.

Beginning in September and October delta smelt slowly but actively migrate from the 2 psu isohaline region of the estuary to upper Delta spawning areas. The upstream migration of delta smelt seems to be triggered or cued by abrupt changes in flow and turbidity associated with the first flush of winter precipitation (Grimaldo et al., accepted manuscript cited in USFWS 2008) but can also occur after very high flood flows have receded. Grimaldo et al. (accepted manuscript) noted salvage often occurred when total inflows exceeded over 25,000 cubic feet per second (cubic feet per second) or when turbidity was elevated above 12 Nephelometric Turbidity Units.

Spawning has been reported as occurring primarily from late February through June (Moyle 2002, Bennett 2005), with a peak in April and May. Delta smelt spawn widely throughout the Delta, but their specific spawning distribution varies from year to year depending on flow conditions. Spawning cannot be easily observed and specific spawning locations are unknown, although the relative importance of spawning areas can be inferred from the catch of larval delta smelt in 20 mm (0.787 inches) townets. The majority of spawning activity occurs in the northern (Sacramento River) side of the delta in the vicinity of Cache Slough and Liberty Island. A minority of adults spawn in the south delta in the vicinity of Franks Tract and the lower San Joaquin River.

Eggs are demersal and adhere to the substrate or plants over which they are spawned. They hatch after 9 to 14 days. Fish absorb their yolk sac and develop jaws over the next 4 to 5 days, then begin to feed on small planktonic organisms. Once this stage of their life begins, they are expected to drift with the predominant currents, perhaps exercising some control through vertical migrations in the water column (Bennett 2005). They become post-larvae about a month later, and juveniles about one month after that (Bennett 2005).

Delta smelt live together in loose aggregations, but they are not strongly schooling (Moyle 2002). They feed on zooplankton throughout their lives, mainly copepods, cladocerans, amphipods and some larval fish (Moyle et al. 1992, Bennett 2005). Primary productivity and the resulting zooplankton biomass are important factors determining growth and survival in the summer and fall (Kimmerer 2008).

Distribution

The delta smelt is endemic to the Sacramento-San Joaquin Delta, including Suisun Bay, but is generally most abundant in the western Delta and eastern Suisun Bay (Honker Bay) (Moyle et al. 1992). Distribution varies seasonally with freshwater outflow. Generally, the species inhabits areas of the San Francisco Estuary upstream of the 2-ppt isohaline. This biologically productive area meets specific requirements for freshwater inflow, salinity, water temperature, and shallow open water habitat.

Delta smelt spawn widely throughout the Delta, but their specific spawning distribution varies from year to year depending on flow conditions. The majority of spawning activity occurs in the northern (Sacramento River) side of the delta in the vicinity of Cache Slough and Liberty Island, with some spawning in the vicinity of Franks Tract and the

lower San Joaquin River. In wetter years spawning occurs in Napa River, Suisun Bay and Suisun Marsh (Sweetnam 1991, Wang 1991, Hobbs et al. 2006).

Spawning Habitat

Delta smelt adults seek shallow, fresh, or slightly brackish backwater sloughs and edge-waters for spawning. Specific areas identified as important delta smelt spawning habitat include Barker, Lindsey, Cache, Prospect, Georgiana, Beaver, Hog, and Sycamore Sloughs; the Sacramento River in the Delta; and tributaries of northern Suisun Bay.

Primary constituent units are those areas that have the physical and biological habitat features that species need to survive and reproduce. Primary constituent units can include: cover or shelter; sites for reproduction and rearing of offspring; space for individual and population growth and normal behavior; migration corridors; and food, water and other nutritional or physiological requirements. Spawning delta smelt require all four primary constituent units, but spawners and embryos are the only life stages of delta smelt that are known to require specific structural components of habitat. Spawning delta smelt require sandy or small gravel substrates for egg deposition. Migrating, staging, and spawning delta smelt also require low-salinity and freshwater habitats, turbidity, and water temperatures less than 20°C (68°F) (Bennett 2005).

Spawning occurs primarily late February through early June, peaking in April through mid-may (Moyle 2002). Historically, delta smelt ranged as far up the San Joaquin River as Mossdale, indicating that areas of the lower San Joaquin and its tributaries support conditions appropriate for spawning. Little data exists on delta smelt spawning activity in the lower San Joaquin region. Larval and young juvenile delta smelt collected at South delta stations in the Department of Fish and Game's 20-mm Survey, indicate that appropriate spawning conditions exist there. However, the few delta smelt that are collected in the lower San Joaquin region are a likely indicator that changes in flow patterns entrain spawning adults and newly hatched larvae into water diversions (Moyle et al. 1992).

Adult Migration

Adult delta smelt must be provided unrestricted access to suitable spawning habitat in a period that may extend from December to July. Adequate flow and suitable water quality may need to be maintained to attract migrating adults in the Sacramento and San Joaquin river channels and their associated tributaries, including Cache and Montezuma Sloughs and their tributaries. These areas also should be protected from physical disturbance and flow disruption during migratory periods (USFWS 1994).

Potential for Impacts in the Project Area

All life stages of delta smelt as well as some designated critical habitat can be found in the Project Area. However, the proposed project activities are not likely to adversely affect the delta smelt as project activities are minor in scope and duration and all project activities will be conducted between August 1 and September 30 when fish are at their lowest abundance in the waterways (USFWS 2008).

Chinook Salmon and Steelhead

Listing Status and Designated Critical Habitat

The National Marine Fisheries Service (NMFS) has recently completed an updated status review of 16 salmon Environmental Sensitive Units that includes the Sacramento River winter-run Chinook salmon ("winter-run Chinook") and Central Valley spring-run Chinook salmon ("spring-run Chinook"). The review concluded that the species' status should remain as previously listed (June 28, 2005, 70 FR 37160). In addition, NMFS published a final listing determination for 10 steelhead distinct population segments, and concluded that Central Valley steelhead will remain listed as threatened (January 5, 2006, 71 FR 834).

The following federally listed anadromous species Environmental Sensitive Units or Distinct Population Segments and designated critical habitats occur in the Action Area.

Sacramento River winter-run Chinook salmon. Winter-run Chinook salmon (*Oncorhynchus tshawytscha*) were listed as threatened in August 1989 under emergency provisions of the Endangered Species Act, and listed as threatened in November 1990 (55 FR 46515). The Environmental Sensitive Unit consists of only one population that is confined to the upper Sacramento River. The Livingston Stone National Fish Hatchery population has been included in the listed winter-run Chinook population as of June 28, 2005 (70 FR 37160). The Environmental Sensitive Unit was reclassified as endangered on January 4, 1994 (59 FR 440), due to increased variability of run sizes, expected weak returns as a result of two small year classes in 1991 and 1993, and a 99 percent decline between 1966 and 1991. NMFS reaffirmed the listing as endangered on June 28, 2005 (70 FR 37160) and included the Livingston Stone National Fish Hatchery population in this listed Environmental Sensitive Unit.

NMFS designated critical habitat on June 16, 1993 (58 FR 33212). Critical habitat is delineated as the Sacramento River from Keswick Dam at river mile (RM) 302 to Chipps Island (RM 0) at the westward margin of the Sacramento-San Joaquin Delta (Delta), including Kimball Island, Winter Island, and Brown's Island; all waters from Chipps Island westward to the Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and the Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay north of the San Francisco-Oakland Bay Bridge.

Central Valley spring-run Chinook salmon. Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) were listed as threatened on September 16, 1999 (64 FR 50394). NMFS released a five-year status review in June 2004 and proposed that this species remain listed as threatened (69 FR 33102). Although spring-run Chinook productivity trends were positive at the time, the Environmental Sensitive Unit continued to face risks from: (1) a limited number of remaining populations (three, down from an estimated 17 historical populations); (2) a limited geographic distribution; and (3) potential hybridization with Feather River Fish Hatchery spring-run Chinook salmon, which are genetically divergent from populations in Mill, Deer, and Butte Creeks. The

NMFS final decision on June 28, 2005 retained this species as threatened (70 FR 37160). The Environmental Sensitive Unit currently consists of spring-run Chinook salmon occurring in the Sacramento River basin, including the Feather River Fish Hatchery spring-run Chinook salmon population.

Critical habitat for Central Valley spring-run Chinook salmon was designated on September 2, 2005 (70 FR 52488). Spring-run critical habitat includes the stream channels within numerous streams throughout the Central Valley, including the Sacramento, Feather and Yuba rivers, and Deer, Mill, Battle, Antelope, and Clear creeks in the Sacramento River basin. Critical habitat is also designated within the Sacramento-San Joaquin Delta and the San Francisco-San Pablo-Suisun Bay complex.

Central Valley steelhead. Central Valley steelhead (Oncorhynchus mykiss) are listed as threatened (January 5, 2006, 71 FR 834). The Central Valley steelhead Distinct Population Segment consists of naturally spawned anadromous populations of *O. mykiss* downstream of natural and manmade impassable barriers in the Sacramento and San Joaquin rivers and their tributaries. Excluded are steelhead from San Francisco and San Pablo bays and their tributaries, as well as two artificial propagation programs: the Coleman Fish Hatchery, and Feather River Fish Hatchery steelhead hatchery programs.

NMFS designated critical habitat on September 2, 2005 (70 FR 52488). Central Valley steelhead critical habitat encompasses 2,308 miles of stream habitat in the Central Valley including the Sacramento River and tributaries and the San Joaquin River and tributaries upstream to the Merced River. An additional 254 square miles of estuary habitat in the San Francisco-San Pablo-Suisun Bay complex is also designated critical habitat.

Life History

Chinook salmon and steelhead are anadromous salmonids of the genus *Oncorhynchus.* This section provides an overview of key life history attributes (reviewed by Myers et al. 1998, Moyle 2002, NMFS 2008a).

Sacramento River winter-run Chinook and Central Valley spring-run Chinook salmon. Chinook salmon are the largest member of *Oncorhynchus*. Runs are designated on the basis of adult migration timing. However, distinct runs also differ in the degree of maturation at the time of river entry, thermal regime and flow characteristics of their spawning site, and the actual time of spawning (Myers et al. 1998). Both spring-run and winter-run Chinook tend to enter freshwater as immature fish, migrate far upriver, and delay spawning for weeks or months. In comparison, fall-run Chinook enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of the rivers, and spawn within a few days or weeks of freshwater entry. Adequate instream flows and cool water temperatures are more critical for the survival of winter-run and spring-run Chinook salmon due to over-summering by adults and/or juveniles.

This section presents life history attributes common to winter- and spring-run Chinook salmon (reviewed by Myers et al. 1998, Moyle 2002). Chinook salmon typically mature between 2 and 6 years of age (Myers et al. 1998). Freshwater entry of migrating adults and spawning timing are generally thought to be related to local water temperature and flow regimes. Adults migrate to spawning habitat in streams well upstream of the Delta. Adults spawn in clean, loose gravel in swift, relatively shallow riffles or along the margins of deeper runs.

Upon emergence, fry (young salmon) swim or are displaced downstream. As juvenile Chinook salmon grow, they move into deeper water with higher current velocities, but still seek shelter and velocity refugia to minimize energy expenditures. Catches of juvenile salmon in the Sacramento River near West Sacramento by the USFWS (1997) exhibited larger juvenile captures in the main channel and smaller sized fry along the margins. When the channel of the river is greater than 9 to 10 feet in depth, juvenile salmon tend to inhabit the surface waters.

As Chinook salmon begin the smoltification (adaptation to salt water) stage, they prefer to rear further downstream where ambient salinity is up to 1.5 to 2.5 parts per thousand. Within the Delta, juveniles forage in shallow areas with protective cover, such as tidally-influenced sandy beaches and vegetated zones. Cladocerans, copepods, amphipods, and diptera larvae, as well as small arachnids and ants, are common prey items (Kjelson et al. 1982, Sommer et al. 2001).

Within the estuarine habitat, juvenile Chinook salmon movements are dictated by the tidal cycles, following the rising tide into shallow water habitats from the deeper main channels, and returning to the main channels as the tide recedes. Kjelson et al. (1982) reported that juvenile Chinook salmon demonstrated a diel (involving a 24-hour period including day and night) migration pattern, orienting themselves to nearshore cover and structure during the day, but moving into more open, offshore waters at night. During the night, juveniles were distributed randomly in the water column, but during the day would school up into the upper 9.8 feet of the water column. Juvenile Chinook salmon were found to spend about 40 days migrating through the Sacramento-San Joaquin Delta to the mouth of San Francisco Bay.

Central Valley steelhead. Steelhead can be divided into two life history types, winter (ocean-maturing) and summer (stream-maturing), based on their state of sexual maturity at the time of river entry and the duration of their spawning migration. Only winter steelhead are currently found in Central Valley rivers and streams (McEwan and Jackson 1996). Ocean-maturing steelhead enter freshwater with well-developed gonads and spawn shortly after river entry. A brief description of general life history follows, although variations in period of habitat use can occur. Further details are provided in Busby et al. (1996), McEwan and Jackson (1996), Moyle (2002), Reclamation (2008) and NMFS (2008a).

Central Valley steelhead generally leave the ocean from August through April and migrate through the estuary to spawning habitat in streams. Spawning takes place from December through April, with peaks from January through March (McEwan and

Jackson 1996, Busby et al. 1996). Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (Busby et al. 1996). Steelhead spend the first year or two of life in cool, clear, fast-flowing permanent streams and rivers with ample riffles, cover, and invertebrate prey (Moyle 2002). Juvenile steelhead emigrate from natal streams volitionally or during fall through spring freshets. Sacramento River juveniles migrate downstream most of the year, predominantly in spring (Hallock et al. 1961).

Rearing and ocean-emigrating juvenile steelhead use the lower reaches of the Sacramento River and the Delta including tidal marsh areas, non-tidal freshwater marshes, and other shallow water areas. Central Valley steelhead migrate to the ocean after spending one to three years in freshwater (McEwan and Jackson 1996). They remain in the ocean for one to four years, growing before returning to their natal streams to spawn.

Potential for Impacts in the Project Area

The Sacramento-San Joaquin Delta serves as the gateway through which all listed anadromous species in the Central Valley must pass through on their way to spawning grounds as adults or returning to the ocean as juveniles or post-spawn adults (for steelhead). However, the proposed project activities are not likely to adversely affect salmonids as all project activities will be conducted between August 1 and September 30 when fish are at their lowest abundance in the waterways (Moyle 2002, Lindley et al. 2007, Yoshiyama et al. 1998, Hallock et al. 1961, Busby et al. 1996, McEwan and Jackson 1996, NMFS 2008a, Nobriga and Cadrett 2001, Hallock and Fisher 1985, NMFS 1997, Vogel and Marine 1991). The project is minor in scope and duration and has followed a deliberate process to avoid and minimize environmental effects. Installation and removal of all project equipment will be completed within the 'in-water construction window' established by the USFWS, NMFS, and DFG to avoid impacts to sensitive species.

Southern Distinct Population Segment of North American Green Sturgeon

Listing Status and Designated Critical Habitat

The Southern Distinct Population Segment of North American green sturgeon (green sturgeon) was listed as threatened on April 7, 2006 (71 FR 17757) and consists of coastal and Central Valley populations south of the Eel River in California. The Southern Distinct Population Segment presently contains only a single known population that spawns and rears in the Sacramento River system, including the Sacramento, Feather and Yuba Rivers, Sacramento-San Joaquin Delta and Suisun, San Pablo and San Francisco bays.

Critical habitat for the Southern Distinct Population Segment was proposed on September 8, 2008 (NMFS 2008b; 73 FR 52084). Proposed critical habitat includes freshwater riverine habitats (stream channel defined by the ordinary high water line),

bay and estuarine habitat (lateral extent of the mean higher high water line), and coastal marine habitat (to the 110 m [361 foot] depth contour).

Life History

Green sturgeon are among the largest of the bony fish (Moyle 2002). Green sturgeon are an anadromous, slow-growing, late-maturing and long-lived species (Nakamoto et al. 1995, Farr et al. 2002). Maximum age is likely 60 to 70 years or more (Moyle 2002). Little is known about the life history of green sturgeon because of its low abundance, low sportfishing value, and limited spawning distribution, but spawning and larval ecology are assumed to be similar to that of white sturgeon (Moyle 2002; Beamsderfer and Webb 2002).

Green sturgeon spend most of their lives in the ocean and their distribution and activities in the marine environment are poorly understood (Moyle et al. 1992b, Beamesderfer et al. 2007). Green sturgeon migrate considerable distances northward along the Pacific Coast and into other estuaries, particularly the Columbia (Adams et al. 2002). Green sturgeon are mostly marine fish. Adults and subadults enter the San Francisco Estuary during the spring and remain until autumn (Kelly et al. 2007). Recent telemetry studies of fish captured in San Pablo Bay found that movements were not related to salinity, current, or temperature, leading Kelly et al. (2007) to surmise that movements are related to resource availability. Green sturgeon were most often found at depths greater than 16.4 feet with low or no current during summer and autumn months, presumably conserving energy (Erickson et al. 2002). Adults may utilize a variety of freshwater and brackish water habitats for up to nine months of the year. The life stages that use freshwater habitats include adult migration, holding and spawning; egg incubation; larval development and growth; and juvenile rearing and downstream migration.

Southern DPS green sturgeon currently spawn well upstream of the Action Area in the Sacramento River upstream of Hamilton City and perhaps as far upstream as Keswick Dam (DFG 2002 in Adams et al. 2002). Spawning occurs in the upper river, particularly approximately the Red Bluff Diversion Dam (Brown 2007). Spawning in the San Joaquin River system has not been recorded, but it is likely that sturgeon historically utilized this basin. Spawning occurs in deep pools in large, turbulent river mainstreams from March to July, with a peak in mid-April to mid-June (Moyle et al. 1992).

Green sturgeon larvae disperse downstream from Sacramento River spawning areas soon after hatching and rear as juveniles and subadults for several years throughout the Sacramento-San Joaquin Delta before migrating into the ocean (Beamesderfer et al. 2007). Little is known about larval rearing habitat requirements (NMFS 2008a). In the Klamath River, juvenile green sturgeon are reported to grow rapidly to 1 foot in one year and to over 2 feet within 2-3 years (Nakomoto et al. 1995).

Green sturgeon feed on benthic invertebrates including shrimp, mollusks and amphipods, and occasionally small fish (Moyle et al. 1992). The non-native overbite

clam (*Potamocorbula amurensis*) has also been found in green sturgeon stomachs (Adams et al. 2002).

Green sturgeon were shown to range widely from San Pablo Bay through the San Francisco Estuary, from warm, shallow brackish areas in Suisun Bay to the colder, deeper, oceanic region near the Golden Gate Bridge in a telemetry study (Kelly et al. 2007). In general, they remained in shallow regions of the bay swimming over bottom depths less than 32 feet. Movements were either nondirectional or closely associated with the bottom (presumably foraging), or directional continuous swimming in the upper 20 percent of the water column. Nocturnal behavior has been observed in captive-reared larval and juvenile green sturgeon (9–10 months old). This may be an adaptation for avoiding predation during dispersal migration and first-year wintering in riverine habitat (Adams et al. 2002, Kynard et al. 2005).

Juveniles rear in fresh and estuarine waters for about 1 to 4 years (Nakamoto et al. 1995, NMFS 2008a). Juveniles seem to outmigrate in the summer and fall before the end of their second year (Moyle 2002). They disperse widely in the ocean after their outmigration from freshwater and before their return spawning migration (Moyle et al. 1992b).

Adults reach sexual maturity only after many years of growth: 9-13 years for males and 13-27 years for females (Nakomoto et al. 1995, Van Eenennaam et al. 2006). Spawning periodicity is once every 2-4 years (Erickson and Webb 2007).

Critical Habitat and Primary Constituent Elements

Critical habitat for the Southern Distinct Population Segment of North American Green sturgeon was proposed in 2008 (73 FR 52084) and generally has physical and biological features or primary constituent units similar to those described for listed salmonids. The National Marine Fisheries Service Critical Habitat Recovery Team defined the geographical area occupied to range from the California/Mexico border north to the Bering Sea, Alaska. Within the geographical area, 39 occupied specific areas and seven presently unoccupied areas were delineated within freshwater rivers, coastal bays and estuaries, and coastal marine waters.

Potential for Impacts in the Project Area

Adult green sturgeons enter the San Francisco Bay estuary in early winter (January/February) before initiating their upstream spawning migration into the Delta. Adults move through the Delta from February through April, arriving in the upper Sacramento River between April and June (Heublein 2006, Kelley et al. 2007). Following their initial spawning run upriver, adults may hold for a few weeks to months in the upper river or immediately migrate back down river to the Delta.

Adults and sub-adults may also reside for extended periods in the western Delta as well as in Suisun and San Pablo bays. Sub-adults are believed to reside year round in these estuaries prior to moving offshore as adults. Juveniles are believed to use the Delta for rearing for the first 1 to 3 years of their life before moving out to the ocean. Juveniles

are recovered at the State Water Project and Central Valley Project fish collection facilities year round (NMFS 2008b).

Geotechnical drilling activities will not have any significant impact on water flow, water quality, or food resources in the Delta or the Sacramento River. The narrow construction windows will minimize any incidental take due to disturbance, displacement, and impairment of feeding on juvenile fish near the Project sites. The in-water geotechnical drilling will be completed between August 1 to September 30 to avoid adult green sturgeon spawning (February to July) (Moyle et al. 1995, Emmett et al. 1991). Green sturgeon embryos have poor swimming ability and exhibit a strong drive to remain in contact with structure, preferring cover and dark habitats to open bottom and illuminated habitats (Kynard et al. 2005); therefore, geotechnical drilling will take place mid-stream in the river and sloughs to avoid impacts to embryos. Larvae and early juveniles exhibit nocturnal behavior in all activities, actively swimming and initiating downstream migration at night (Van Eenennaam et al. 2001, Deng et al. 2002, Kynard et al. 2005); therefore drilling activities will take place during the day.

Green sturgeon are found throughout the Delta during the construction period and are likely to occur at the Project locations but in low densities during the construction period. Underwater noise generated by drilling would be transient, occurring during the daytime for approximately 30 days. The hearing sensitivity of green sturgeon is unknown. Construction activities would not exceed the National Marine Fisheries Service 2008 interim thresholds for sound pressure levels of 206 decibels peak and 187 decibels accumulated sound. The effects of noise would be transient and localized, and would be less than significant. The project is minor in scope and duration and has followed a deliberate process to avoid and minimize environmental effects. Installation and removal of all project equipment would be completed within the 'in-water construction window' established by the USFWS, NMFS, and DFG to avoid impacts to sensitive species.

Swainson's Hawk

Suitable nesting habitat for Swainson's hawks occurs in riparian habitat adjacent to the project area in some of the project locations, including along the Sacramento River. Formal surveys in the spring of 2009 determined that this species was present and nesting in some locations within the project area and may nest or forage in the project area during the nesting season.

Potential for Impacts in the Project Area

The project has followed a deliberate process to avoid and minimize on-site effects. Noise and other construction-related disturbances may affect nesting Swainson's hawks in the vicinity of the construction corridor during the breeding season (March through August). This impact would be considered significant because construction disturbances of nest sites may contribute to continuing local decline of Swainson's hawks and would violate the Migratory Bird Treaty Act and Section 3503 of the California Fish and Game

Code, which protects bird's nests. These impacts would be reduced to less than significant with implementation of the following mitigation measures.

Construction activities are anticipated to be conducted following the active nesting season of Swainson's hawks (March to August 15). However, construction will be restricted to areas more than ¼ mile from active nests until August 15. A biologist will conduct preconstruction surveys prior to the start of construction to locate all active nest sites within ½ mile of construction and staging areas. If necessary, DWR will establish a ¼-mile buffer zone, marked with identifiable flags, around all known and suspected Swainson's hawk nests. The ¼-mile buffer is an acceptable buffer established by the California Department of Fish and Game to prevent disturbance to nesting birds.

Other Protected Species

Non-special-status migratory birds and raptors have the potential to nest in trees and shrubs adjacent to the proposed project area. Although these species are not considered special-status wildlife species, their occupied nests and eggs are protected by California Fish and Game Code Sections 3503 and 3503.5 and the Migratory Bird Treaty Act of 1918 (50 CFR 10 and 21).

Construction will be conducted outside the nesting season (March through August) and therefore impacts to this species are not anticipated. A qualified biologist will conduct preconstruction surveys to locate all active nest sites within 500 feet of the project area.

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 CDFG or FWS?

No impact. There is no riparian habitat or special status plant species within the project area. See the Environmental Setting section (page 15) for a more complete description of habitat.

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 project activities are within the Ordinary High Water Mark of the Sacramento River, which is a designated navigable river under Section 10 of the Rivers and Harbors Act. Therefore, these activities fall under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Project activities are minor in scope and short-term and will not have impacts on waterways. DWR will apply for applicable permits.

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 impacts with mitigation. DWR does not anticipate impacts to fish species. See response to question a) within this section for mitigation measures for protection of wildlife species and page 34 for further discussion of biological resources.

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

No impact. See page 34 for further discussion of biological resources.

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

No impact.

V. Cultural Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in '15064.5?				X
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to '15064.5?				X
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d) Disturb any human remains, including those interred outside of formal cemeteries?				X

Cultural resources include prehistoric and historic archaeological resources, buildings and structures, ship wrecks, and traditional cultural properties. Numerous federal and State laws and regulations provide for the protection and management of cultural resources. The most prominent of these statutes include the following:

- National Environmental Policy Act
- California Environmental Quality Act, Section 21083
- State CEQA Guidelines, Section 15064
- Section 106 of the National Historic Preservation Act and in 36 CFR Part 800, as amended

DWR archaeologists reviewed each location for cultural resources. No cultural resources were found during surveys. DWR archaeologists also reviewed the California State Lands Commission records for ship wrecks in the vicinity of the geotechnical borings. No known ship wrecks were found in these areas. Should any archaeological resources be unearthed during construction, all work will stop in the immediate vicinity of the finds until they 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. Should human remains be unearthed during construction, all work will immediately stop in the vicinity of the finds until they can be verified and the requirements of Public Resource Code Section 5097.98 are met.

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

No impact.

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

No impact. No archaeological resources or remains were identified within the proposed project area during the field investigation.

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

No impact. No paleontological resources or unique geologic features are known to exist within the project area.

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

No impact. No evidence of individual interments or a cemetery was identified during a site visit.

VI. Geology and Soils

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				X
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
ii) Strong seismic ground shaking?				X
iii) Seismic-related ground failure, including liquefaction?				X
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?				X
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
d) Located on expansive soil, defined in Table 18-1-B of the Uniform Building Code (94), create substantial risks to life or property?				X
e) 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?				X

Project activities for geotechnical exploratory drilling are minor and short in duration (approximately 1 minute each, 10 to 15 times each day, for approximately 30 days). Project activities will not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving any of the aforementioned issues, including, but not limited to, rupture of earthquake faults or change in soil stability.

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving i) through iv):

No impact.

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

No impact.

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

No impact.

d) Located on expansive soil, defined in Table 18-1-B of the Uniform Building Code (94), create substantial risks to life or property?

No impact.

e) Have soils incapable of adequately sup-porting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No impact.

VII. Hazards and Hazardous Materials

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			X	
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d) Be located on a site 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?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X

The construction equipment used for this project will use diesel fuel and oil. However, these materials will be used, stored and disposed of according to standard protocols for handling of hazardous materials. All personnel involved in use of hazardous materials will be trained in emergency response and spill containment.

In the event of a contaminant spill, work will stop immediately and DWR's Environmental Scientist (Michelle Beachley, 916-376-9826) shall be notified. The environmental scientist will contact the necessary resource agencies, including but not limited to, the Office of Spill Prevention, Department of Fish and Game, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. If DWR staff cannot be notified immediately, the aforementioned agencies shall be contacted by the contractor. In the case of a spill on-water containment or recovery, equipment shall be available and the shoreline protected. Any spills of hazardous materials will be cleaned immediately and reported to the resource agencies within 24 hours. Any such spills, and the success of the efforts to clean them up, will be reported in post-exploration compliance reports.

Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum products
- Asphalt products
- Concrete
- Pesticides
- Acids
- Paints
- Stains
- Solvents
- Wood Preservatives
- Roofing Tar
- Any material deemed hazardous waste in California, title 22, Division 4.5, or listed in 40 CFR PARTS 110, 117,261, OR 302.

1. Storage Procedures

    a. Waste shall be stored in sealed containers constructed of suitable material and shall be labeled as required by title 22 CCR, division 4.5 and 49 CFR parts 172,173,178, and 179.

    b. All hazardous waste shall be stored and transported, and disposed as required in title 22 CCR, division 4.5 and 49 CFR 261-263

    c. Waste containers shall be stored in a temporary containment facility that shall comply with the following requirements:

        i. Temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.

        ii Temporary containment facility shall be impervious to the material stored there for a minimum contact time of 72 hours.

iii. Temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spill or leak, accumulated rainwater and spill shall be placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.

iv. Sufficient space shall be provided between stored containers to allow for spill cleanup and emergency response.

v. Incompatible materials, such a chlorine and ammonia, shall not be stored in the same temporary containment facility.

vi. Throughout the rainy season, temporary containment facilities shall be covered during the non-working days and prior to rain events.

d. Drums shall not be overfilled and waste shall not be mixed.

e. All hazardous waste containers will be labeled with the waste being stored and the date of accumulation.

f. Waste disposal

i. Waste storage shall not exceed requirements in title 22 CCR, section 66262.34

ii. Waste disposal shall be disposed of by a licensed waste transporter at an authorized licensed disposal facility or recycling facility.

iii. Uniform Hazardous Waste Manifest shall comply with title 22 CCR division 4.5

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 from diesel fuel, oil, and hydraulic fluid used on the project site. There are no known hazardous materials within the project area. The contractor shall have an oil spill kits and booms on site.

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

Less than significant impact from diesel fuel, oil, and hydraulic fluid used on the project site. There are no known hazardous materials within the project area. The project will not create a significant hazard to people due to a reasonably foreseeable accidental release of hazardous materials.

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 known hazardous materials within the project area.

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

No impact. The project area is not a hazardous site.

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

No impact. The project area is not within an airport land use planning area.

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

No impact. The project activities will not result in a safety hazard as a result of materials used on site.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No impact. The project will not impair or physically interfere with an adopted emergency response or evacuation plan and construction personnel are required to be trained in emergency response and spill containment.

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

No impact. The project will not expose people or structures to a significant risk of loss, injury or death due to wildland fires. The Contractor will prepare a fire prevention and control plan and will provide fire extinguishers and other fire fighting equipment on site.

VIII. Hydrology and Water Quality

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

The geotechnical borings will be advanced using the mud rotary method and will be drilled and sampled to a maximum depth of about 140 to 200 feet below the bottom of the slough or river. Initially, the hole will be advanced by pushing an approximate 6- to 8-inch diameter conductor casing to a depth of at least 15 feet below the bottom of the slough or river channel. The conductor casing extends from the top of the barge or ship deck to at least 15 feet below the bottom of the slough or river. Soil samples can be collected from within the conductor casing. The drill hole below the conductor casing will be approximately 4.5 to 7.0 inches in diameter.

With the conductor casing in place to a minimum of 15 feet below the channel bottom to provide a reliable seal, bentonite powder will be added to the circulating water to create drilling fluid. The pushed conductor casing will provide a reliable seal to contain the drilling fluid within the closed system. The drilling fluids will be kept in a closed system to prevent fluids from escaping. Only water will be circulated through the pumps and drill string while drilling and sampling in the conductor casing and within 15 feet of the slough or river bottom. 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 are confined by the drilled hole 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. Breaking drill rod and sample rod connections will be conducted either directly over the conductor casing or the recirculation tank.

Drill cuttings that settle out in the recirculation tank will be shoveled into drums. Good work practices are important and will be used in containing the drilling fluid, including taking care when shoveling 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 materials spill onto the barge deck while shoveling (or during any other operation), they shall be immediately picked up with a flat blade shovel and placed either into the tank or a drum. Discarded samples shall be placed in the cutting drums.

A spill prevention and control plan will be prepared by the contractor prior to construction. Best management practices will be included to avoid impacts to water quality. The project will comply with requirements of permits from the Central Valley Regional Water Quality Control Board. Personnel on the barge or ship will watch for colored plumes in the water when drilling, grouting, and/or pulling casing. Colored plumes are an indication that drilling fluid or other material is entering the water and may affect water quality. If colored plumes are discovered, activities shall cease until appropriate corrective measures have been completed or it has been determined that the environment will not be harmed.

a) Violate any water quality standards or waste discharge requirements?

No impact.

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

No impact.

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

No impact.

d) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?

No impact.

e) Otherwise substantially degrade water quality?

No impact.

f) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

No impact.

g) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

No impact.

h) Inundation by seiche, tsunami, or mudflow?

No impact.

IX. Land Use and Planning

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				X
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

a) Physically divide an established community?

No impact. The project activities do not have the potential to divide an established community.

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

No impact. Project activities for geotechnical exploratory drilling will not conflict with any applicable land use plan, policy, or regulation.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

No impact. Project activities will not conflict with any applicable habitat conservation plan or natural community conservation plan.

X. Mineral Resources

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

Project activities for geotechnical exploratory drilling will occur in the open water channel of the Sacramento, Mokelumne, and San Joaquin rivers and the following sloughs (Steamboat, Dutch, Potato and Columbia Cut). The proposed boring locations may encounter peat soils which occur throughout the Sacramento-San Joaquin Delta. Peat soils have historically been mined in the Frank's Tract area of the Delta (USGS, 2009). There is no mining of Peat Soils occurring near the proposed boring sites based on the U.S. Geological Survey's (USGS) Mineral Resource Data System (USGS, 2009). The project will not result in the loss of any known or locally important mineral resource or recovery site.

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?

No impact.

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?

No impact.

XI. Noise

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				X
b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?				X
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?				X
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X

Project activities are minor and short in duration (approximately 1 minute each, 10 to 15 times each day, for approximately 30 days) using a relatively small energy source. While equipment is working, ambient noise levels will increase slightly. All equipment will be properly tuned and will utilize appropriate mufflers. Construction activities will occur at a distance greater than 100 feet from residences and small business operations. Further, work will generally be limited to daylight hours. Short-term impacts resulting from the project include increased noise level and small vibrations created primarily from the drill rig engine and short durations from the Standard Penetration Tests.

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

No impact.

b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

No impact.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

No impact.

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

No impact.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?

No impact. There are no nearby airports.

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

No impact. There are no private airstrips nearby.

XII. Population/Housing

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Induce substantial 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)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

a) Induce substantial 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 activities will not induce population growth or displace housing or people.

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No impact. Proposed project activities do not have the potential to displace housing.

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

No impact. Proposed project activities do not have the potential to displace people.

XIII. Public Services

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

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

No impact. The proposed project activities will not result in impacts which would require new or additional fire protection, police protection, schools, parks or other public services.

XIV. Recreation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	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?				X
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

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

No impact. No neighborhood or regional parks are found within the project area.

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

No impact. The project area is currently used for recreational activities such as boating, water skiing, and fishing. However, construction activities will not impair public access to these waterways. Therefore, project activities for geotechnical exploratory drilling would not have a direct impact on use of recreational facilities.

Boating traffic in the project area (Sacramento, Mokelumne, and San Joaquin rivers and adjacent sloughs where project activities are proposed to take place) will be minimal as August to October is the most optimal time of the year to drill in the waterways as summer recreation is winding down and fishing activities occur after this work window (Evangelist, 2009).

XV. Transportation/Traffic

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?				X
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, either by an increase in traffic levels or a change in location that results in substantial safety risks?				X
d) Substantially increase hazards due to a design feature (e.g., sharp curve, dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e) Result in inadequate emergency access?				X
f) Result in inadequate parking capacity?				X
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycles)?				X

a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?

No impact. Project activities are within the open channel of waterways and are minor and short in duration (approximately 1 minute each, 10 to 15 times each day, approximately 30 days). Construction staging will be from marinas or within the drill barge itself and will not impact transportation or traffic. The general Project area may be accessed by State Route 160 through Freeport; or by State Route 4, State Route 12, or Eight Mile Road, all west of Interstate 5 in Stockton. The project construction activities do not have the capacity to increase traffic or cause a substantial change in existing traffic patterns.

b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?

No impact.

c) Result in a change in air traffic patterns, either by an increase in traffic levels or a change in location that results in substantial safety risks?

No impact.

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

No impact.

e) Result in inadequate emergency access?

No impact.

f) Result in inadequate parking capacity?

No impact.

g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycles)?

No impact. The project will not conflict with adopted policies or plans.

XVI. Utilities and Service Systems

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Exceed wastewater treatment requirements of applicable RWQCB?				X
b) Require or result in construction of new water or wastewater treatment facilities or expansion of existing facilities, which could cause significant environmental effects?				X
c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, which could cause significant environmental effects?				X
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				X
e) Result in a determination by the waste-water treatment provider which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to providers existing commitments?				X
f) Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs?				X
g) Comply with federal, State, and local statutes and regulations related to solid waste?				X

There will be no change in utility or service systems.

a) Exceed wastewater treatment requirements of applicable RWQCB?

No impact.

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

No impact.

c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, which could cause significant environmental effects?

No impact.

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

No impact.

e) Result in a determination by the waste-water treatment provider which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to providers existing commitments?

No impact.

f) Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs?

No impact.

g) Comply with federal, State, and local statutes and regulations related to solid waste?

No impact. All solid waste will be contained in drums or bins and disposed of at an appropriate landfill in accordance with federal, State, and local statutes, and regulations. See Section on Hazardous Materials (page 59) of this Initial Study for more information.

XVII. Mandatory Findings of Significance

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	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?		X		
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			X	
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?				X

Project activities for geotechnical exploratory drilling will occur in the open water channel of the Sacramento, Mokelumne, and San Joaquin rivers and the following sloughs (Steamboat, Dutch, Potato and Columbia Cut). Project activities for geotechnical exploratory drilling are minor and short in duration (approximately 1 minute each, 10 to 15 times each day, for approximately 30 days).

This Initial Study was prepared to assess the proposed activity's potential effects on the environment and significance of those effects. Based on the Initial Study, it has been determined that the proposed project would not have any significant environmental effects. In part, this is because construction impacts are minor and short term. The proposed project will have less than significant cumulative impacts because impacts are short term and temporary. Short-term impacts resulting from the project include increased noise levels and small vibrations created primarily from the drill rig engine and short durations from the standard penetration tests. No long-term impacts are anticipated.

Sensitive resources and wetland and riparian habitats are not found at the drilling locations, but may occur nearby. Special status species may be found within the project area, but no special status species will likely be impacted during project construction. Mitigation and conservation measures will be implemented to bring environmental impacts of the proposed activities to less than significant levels within the project area.

Specifically, potential impacts to biological resources, geology and soil (erosion), hydrology (flow patterns) and water quality will be mitigated to less than significant levels.

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 impact with mitigation. The project does not have the potential to eliminate important examples of the major periods of California history or prehistory. General mitigation measures proposed to minimize biological impacts due to the project include:

1. Less than significant impacts with mitigation. Potential impacts to biological resources will be mitigated to less than significant levels. Construction personnel will receive worker environmental awareness training. This will include descriptions of sensitive species and procedures to follow in the event a sensitive species is encountered.

2. An Environmental Scientist will be available as a biological monitor to assist the construction crew as necessary. If a sensitive species is encountered by a biological monitor during construction, activities shall cease until appropriate corrective measures have been completed or it has been determined that the species will not be harmed.

3. Work windows (August 1 to September 30) are established for activities to take place when species are at their lowest abundance in the area; exclusion zones, and other protections designed to avoid impacts to sensitive species and habitats will be included. These measures ensure that work will not adversely affect fish and wildlife resources. See specific sections of Biology of this Initial Study for further information (page 34).

4. No vegetation clearing will be conducted during the geotechnical activities.

5. The project has followed a deliberate process to avoid and minimize on-site and operational effects. Installation and removal of all project equipment would be completed within the 'in-water construction window' established by the USFWS, NMFS, and DFG to avoid impacts to sensitive species. Any additional avoidance or conservation measures established by these agencies will be followed.

Conservation and mitigation measures specifically addressing sensitive species are described below and thoroughly discussed in the Biological Section of the Initial Study Checklist. The following mitigation measures are proposed to mitigate effects on listed species and their potential habitats in the project area.

Delta Smelt: Delta smelt could be affected by activities that degrade water quality. The implementation of best management practices will prevent any water quality degradation that could affect delta smelt. The project will not cause any changes to delta smelt habitat. There would be no effect on this species. Project activities will take place when fish are at lowest abundance (August 1 to September 30). See page 43 of this Initial Study for more information.

Salmonids: Chinook salmon and steelhead require similar habitat components and are analyzed together. Actions that have no effect on listed salmonids or their habitat are defined as having no measurable or discernable effect to the species of their habitat. As described previously, the project activities would not disturb soil structure, riparian vegetation, divert water or degrade water quality. Project activities will take place when fish are at lowest abundance (August 1 to September 30). See page 46 of this Initial Study for more information.

Green Sturgeon: Geotechnical drilling activities will not have any significant impact on water flow, water quality, or food resources in the Delta or the affected waterways. The narrow construction windows (August 1 to September 30) will minimize any incidental take due to disturbance, displacement, and impairment of feeding on juvenile fish near the project sites. The in-water geotechnical drilling will be completed early in the season to avoid adult green sturgeon spawning (February to July) (Moyle et al. 1995; Emmett et al. 1991). Green sturgeon embryos have poor swimming ability and exhibit a strong drive to remain in contact with structure, preferring cover and dark habitats to open bottom and illuminated habitats (Kynard et al. 2005); therefore, geotechnical drilling will take place mid-stream in the river and sloughs to avoid impacts to embryos. Larvae and early juveniles exhibit nocturnal behavior in all activities, actively swimming and initiating downstream migration at night (Van Eenennaam et al. 2001; Deng et al. 2002; Kynard et al. 2005); therefore drilling activities will take place during the day. See page 49 of this Initial Study for more information.

Swainson's Hawk: The following measure will minimize construction related impacts to Swainson's hawk:

1. Construction activities near available nesting habitat are anticipated to be conducted following the active nesting season of Swainson's hawks (March to August 15).

2. If construction takes place during the nesting season, construction will be restricted to areas more than ¼ mile from active nests until August 15. A biologist will conduct preconstruction surveys prior to the start of construction to locate all active nest sites within ½ mile of construction and staging areas. If necessary, DWR will establish a ¼-mile buffer zone, marked with identifiable flags, around all known and suspected Swainson's hawk nests. The ¼-mile buffer is an acceptable buffer established by the California Department of Fish and Game to prevent disturbance to nesting birds. See page 52 of this Initial Study for more information.

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

Less than significant impact. Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area 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 Action 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 in combination with the geotechnical drilling are discussed below. In many instances, no impacts or less-than-significant cumulative impacts would occur because the geotechnical drilling impacts would be short-term and localized. In other cases, they would be beneficial because a number of projects are being proposed to improve aquatic resources in the Delta. In other cases, significant cumulative impacts would not occur because the geotechnical drilling includes monitoring and sufficient operational flexibility to avoid such impacts.

Non-Federal Water Diversions

There are a number of unscreened non-Federal water diversions within the action 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. Although, the results of a study conducted by Nobriga et al. (2004) suggest that entrainment of very 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. Similar information is not currently available for salmonids.

State and Local Levee Maintenance Activities

Levee maintenance activities by State and local entities within the project area are expected to continue and may include the following. The study areas on Bacon Island and Mandeville Island are actively farmed, and land surrounding the agricultural fields is regularly disked. Portions of Holland Tract are under cultivation, while others are fallow. Maintenance dredging occurs in the agricultural ditches on all islands.

Levees have been constructed along both banks of Old River and Connection Slough. The roads on the Old River levees are private. The road on the Bacon Island side of Connection Slough is public, while the road on Mandeville Island is private. Periodic levee maintenance includes the control of vegetation and repairs of the riprap above the waterline.

Stormwater and Irrigation Discharges

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 Distinct Population Segments of North American Green Sturgeon may result from stormwater and/or irrigation discharges which change the balance of important habitat constituents (i.e. salinity, turbidity, water temperature, etc) within the project area.

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 Distinct Population Segments of North American Green Sturgeon may result from stormwater and/or irrigation discharges which change the balance of important habitat constituents (i.e. salinity, turbidity, and water temperature, etc.) within the action area.

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 project area is expected to continue. Implicated as potential stressors to aquatic species, these contaminants may adversely affect reproductive success and/or survival.

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.

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 possible even the abundance, of many aquatic species currently occupying the Delta seasonally or year round.

DWR and Reclamation – Franks Tract Project

The Franks Tract Project involves constructing a new flow control facility in the Franks Tract area of the Delta, approximately 3 miles north of the Old River site. The new facility would provide DWR and Reclamation with the operational flexibility to better manage hydrodynamic conditions and salinity concentration in the central and south Delta and thereby improve water quality and fish habitat conditions. The project involves installing and operating flow control gates on up to two Delta waterways (Three Mile Slough and West False River) to protect fish resources and reduce seawater salinity intrusion into the Delta. Four flow control gate locations on Three Mile Slough are under consideration: (1) approximately 700 feet east of the State Route 160 bridge; (2) approximately 4,100 feet from the bridge; (3) approximately 8,600 feet north of the southwestern corner of Twitchell Island along Three Mile Slough, and (4) approximately 1,600 feet north of the southwestern corner of Twitchell Island along Three Mile Slough. On West False River, only one flow control gate location is being considered, approximately 1,800 feet east of the confluence with the San Joaquin River.

The EIS/EIR for this project is currently under development. A Notice of Preparation was published September 18, 2008. Potential environmental effects of the project include direct effects to the hydrodynamic characteristics and circulation of Delta waterways which would affect the movement and habitat of delta fish species of concern, including delta smelt, longfin smelt, and Chinook salmon. The project could also result in temporary and/or permanent loss of habitat supporting special-status plant or wildlife species, wetlands, or aquatic species residing in the project area. Vessel passage and navigation also could be impeded by the gates, although the control structure would include a boat passage facility for commercial and recreation boats.

DWR and Reclamation – South Delta Improvements Program

The South Delta Improvements Program is a series of interrelated actions to manage water levels and water quality, protect fish and provide increased flexibility for operations of the Central Valley Project and the State Water Project. The specific actions include the following: (1) replace four seasonal rock gates with permanent operable flow gates on Middle River, Grantline Canal, Old River (near the city of Tracy), and at the head of Old River, (2) improve flow conditions in south Delta channels with limited dredging in Middle River, Old River, and West Canal, (3) extend 24 existing local agricultural diversions in the south Delta to deeper water to limit the necessity for more frequent gate operations, and (4) increase the permitted diversion capacity at the State Water Project Clifton Court Forebay to allow more operational flexibility to increase diversion rates when the increase will not harm the Delta's fisheries or local agricultural users. Prior to obtaining the required permits the U.S. Fish and Wildlife Service and the National

Marine Fisheries Service must issue biological opinions. The 2009 National Marine Fisheries Service Operations Criteria and Plan biological opinion includes in the Reasonable and Prudent Alternatives an Action IV.6 that prohibits implementation of the South Delta Improvements Program Permanent Operable Gates. Until DWR has completed certain studies related to the operation of the temporary barriers, the South Delta Improvement Program may not proceed.

The South Delta Improvements Program has three objectives:

- Reduce the movement of San Joaquin River watershed Central Valley fall-/late fall–run juvenile Chinook salmon into the south Delta via Old River;
- Maintain adequate water levels and water quality available for agricultural diversions in the south Delta, downstream of the head of Old River; and
- Increase water deliveries and delivery reliability for State Water Project and Central Valley Project water contractors south of the Delta and provide opportunities to convey water for fish and wildlife purposes by increasing the maximum diversion through the existing intake gates at Clifton Court Forebay to 8,500 cubic feet per second.

The South Delta Improvements Program will meet these objectives by providing increased operational flexibility and the ability to respond to real-time fish conditions while improving water supply reliability. The four gates will be operated from April through November on an as-needed basis to protect water levels and water quality for local agricultural diversions. The gates on Middle River, Old River near Tracy and Grantline Canal will increase circulation in local south Delta channels, thereby improving water quality and dissolved oxygen levels beyond the existing conditions provided by the rock gates. The gate at the head of Old River will normally be closed from September through October, as needed, to improve dissolved oxygen content on the stretch of the San Joaquin River from Old River to the Stockton Deep Water Ship Channel for in-migrating adult salmon during the pre-spawning period. Also, the gate at the head of Old River will be closed from mid-April through mid-May during the out-migration period for San Joaquin River salmon smelts to impede the fish from migrating into the interior south Delta, where they could be exposed to further loss from the effects of local agricultural diversions and the operation of Central Valley Project and State Water Project export facilities.

Operation of the gates outside of these "pre-set" periods will only be on an as-needed basis subject to prior approval by state and federal fish and wildlife agencies.

DWR and Reclamation will utilize specific protective measures during times when permanent south Delta gates are constructed and dredging/diversion relocations are conducted to ensure no harm is caused to Delta fisheries.

The permanent gates (except the Middle River gate) will feature boat locks to avoid any potential adverse effects to Delta boaters. This will be a net improvement to the existing rock gates, which have seasonal boat ramps at gate sites. No adverse effects to boating or recreation are expected from South Delta Improvements Project.

Detailed hydrodynamic and water quality studies of South Delta Improvements Project have concluded that there will not be any significant adverse effects to Bay-Delta water quality from South Delta Improvements Project implementation. In addition, DWR and Reclamation will work to identify and implement additional actions that may be needed to provide for the continuous improvement in water quality called for in the California Bay-Delta Program Authority Program.

South Delta Improvements Project has completed the final EIS/EIR and has entered into the permitting phase. Prior to obtaining the required permits, the USFWS and NMFS must issue biological opinions, which are currently expected to be completed by spring of 2009. After permits have been acquired, DWR will proceed with construction, expected to begin in 2010.

2-Gates Fish Protection Demonstration Project

The 2-Gates Fish Protection Demonstration Project (2-Gates Project) is intended to demonstrate and validate the value of proposed modifications to the flow patterns in the Sacramento-San Joaquin River Delta (Delta) with regard to the protection of sensitive species and management of water supply. The Delta provides habitat for several sensitive species, is a vital source of drinking water for over 23 million Californians, and supports more than 1.3 million acres of irrigated agricultural lands. The 2-Gates Project would install and operate removable gate structures in two key channels in the central Delta in order to control flows and thereby provide reduced entrainment of delta smelt and other sensitive aquatic species at the State Water Project and federal Central Valley Project export pumping facilities. The 2-Gates Project is designed to operate in conjunction and coordination with water management operation criteria established by State and federal water quality and environmental regulators.

DWR and the U.S. Bureau of Reclamation (Reclamation) are co-leads in the development of the Mitigated Negative Declaration/Environmental Assessment. Reclamation has also prepared a Biological Assessment of the 2-Gates Project in compliance with the federal Endangered Species Act. The two agencies intend to apply for all applicable permits and enter into required coordination and consultations.

The project has followed a deliberate process to avoid and minimize environmental effects. Installation and removal of all project equipment would be completed within the 'in-water construction window' established by the USFWS and NMFS to avoid impacts to sensitive species. The project would include temporary facilities to be removed after 5 years. These facilities include sheet

pile dikes extending from each channel bank to the gates in lieu of rock barriers, a pile-supported boat ramp to reduce impacts to recreational boating and limited dredging and ground disturbance to minimize other biological effects. Barge-mounted gates will be fabricated at an off-site location, floated to the site, and sunk (ballasted) down directly over the peat removal area. On-site preparatory work to receive the barge-gates would be done over about a month within the in-water construction window, followed by installation of the barge-mounted gates. As a demonstration project, Project operations can be readily modified in the event of forecasted fish concerns and residual, but unanticipated impacts, would be avoided.

The concept of the 2-Gates Project evolved from information developed by several research efforts documenting relationships between high entrainment events and population declines and high salvage of pre-spawning adult delta smelt and occurrence of high turbidity in the south Delta. An idea evolved to install gates that would allow operations to influence the turbidity plume (preferred by pre-spawning delta smelt) and therefore the distribution of adults, and a similar approach could be used with larval and juvenile smelt. Development of the 2-Gates Project employed a deliberate, iterative process of modeling and model improvement, starting with a conceptual framework and baseline assumptions, then progressing through initial site selection, development of project operational parameters and eventually through the analysis of potential effects on sensitive fish and wildlife species and water supply.

Early in the analytical process, it was anticipated that complex delta smelt behavioral models would be needed to predict distribution, abundance and fate of delta smelt under the published USFWS Operations Criteria and Plan Biological Opinion, which restricts Central Valley Project and State Water Project pumping from December through June and in the fall and 2-Gates Project operational conditions. Because the development of such behavioral models would be time-consuming and its success could not be accurately predicted, a decision was made to initially use the One-Dimensional (1D) DSM2 model formulation for hydrodynamic, water quality and particle tracking to determine the most favorable location of gates, their region of control and their effects on baseline flow conditions. Concurrent with this effort a delta smelt behavioral model was developed by Resource Management Associates, which recognized that delta smelt do not react simply as neutrally buoyant passive particles floating in the water column, and that larvae/juvenile delta smelt distributions should address hatching and mortality rates. Using a Two-Dimensional (2D) formulation, computer simulation methods were developed to characterize both adult and larvae/juvenile dealt smelt behavior. The 2D behavioral models were used to determine effects of the 2-Gates Project for environmental documentation purposes under several hydrodynamic conditions within the Delta. Subsequent model runs and refinements in modeling capabilities helped enhance an understanding of the likely effects of project operations on Delta hydrodynamics, water quality, and delta smelt entrainment. Iterative analyses over a period of

time improved the evaluation process and helped formulate the project. A summary of the technical formulation process for the Project is shown in Appendix M of the Mitigated Negative Declaration prepared for the 2-Gates Project. .

Project Operations: To protect migrating and pre-spawning adult delta smelt from December through February, both gates would be operated about an hour per day in the closed position to manage the movement of adult delta smelt habitat (turbidity plume). To provide added protection to larvae/juvenile delta smelt from March through June, the predominate mode of gate operations would be with the Old River gate closed about 10 hours per day on flood-tide and open on ebb-tides (including slack-tides), during which the Connection Slough gate would be open about 4 hours per day on slack-tides. Gate would be in a fully open position during Vernalis Adaptive Management Plan period and the Memorial Day weekend. The gates would not be operated, and would remain in a fully open position, from July through November. The gate opening periods would provide ample opportunity for commercial and recreational vessel passage. A boat ramp and vehicles would be provided for portage of recreational vessels up to 24-feet in length.

Project Results: Adult delta smelt entrainment at the State Water Project and Central Valley Project export facilities was evaluated under varied hydrologic conditions using the Resource Management Associates adult delta smelt behavioral model from December through February. These simulations considered historic conditions, flow restrictions established by the 2008 USFWS Operations Criteria and Plan Biological Opinion and the addition of the 2-Gate Project. These project operations were found to maintain adult delta smelt generally in the region of influence of the Project in the central and western Delta, where subsequent gate and Operations Criteria and Plan Biological Opinion flow control operations during larvae/juvenile stages have also been shown to significantly reduce entrainment.

Larvae/juvenile delta smelt entrainment at the State Water Project and Central Valley Project export facilities was evaluated under varied hydrologic conditions using Resource Management Associates 2D particle tracking model from March through June. Given predicted adult delta smelt distributions following adult stage control by the Project, these springtime operations were found to significantly reduce entrainment when applied to the discretionary range of flow restrictions under the Operations Criteria and Plan Biological Opinion.

Contra Costa Water District – Water Quality Improvement Projects

The Alternative Intake Project is a drinking water quality improvement project that would protect and improve delivered water quality for Contra Costa Water District customers by enabling the Contra Costa Water District to relocate some of its existing diversions to Victoria Canal, a Delta location with better source water quality than is currently available at its Old River and Rock Slough intakes. The

alternative intake would divert up to 250 cubic feet per second from a new intake on Victoria Canal; however, the project would not increase Contra Costa Water District's total Delta diversion capacity and would not change demands or the quantity of water delivered to its service area each year.

The project includes a new, screened water intake and pump station located along the lower third of Victoria Canal, on Victoria Island in the central Delta, and a buried pipeline that would extend 12,000 to 14,000 feet from the new intake directly across Victoria Island and beneath Old River and tie into Contra Costa Water District's existing Old River conveyance system on Byron Tract. The project would also involve adding a new point of diversion to certain existing water rights held by Contra Costa Water District and Reclamation. The EIR/EIS for this project was completed and record of decision signed in May 2008. This project is currently under construction and is expected to be operational in 2010.

Contra Costa Canal Replacement Project

The project involves replacing the unlined portion of the Contra Costa Canal, approximately 3.97 miles in length, with a buried pipeline within Reclamation's existing right-of-way. The project site is located in the south Delta in eastern Contra Costa County, in the city of Oakley or its sphere of influence. The purpose of this project is to eliminate shallow groundwater from entering the Canal, eliminate non-engineered berms and improve safety and security in a growing urban area.

An Initial Study/Mitigated Negative Declaration was adopted by the Contra Costa Water District Board of Directors in November 2006 and Reclamation completed an Environmental Assessment and Finding of No Significant Impact for this project in July 2007. No significant impacts are anticipated from this project. In addition the USFWS issued a non-jeopardy biological opinion on the delta smelt and determined that the project will not result in the adverse modification or destruction of delta smelt critical habitat. Contra Costa Water District is planning to construct the first 2,000 feet of the Canal Replacement Project from Pumping Plant No. 1 to Marsh Creek in 2009. Ultimately, Contra Costa Water District will replace the entire 21,000 feet of the unlined canal.

Contra Costa Water District and Reclamation – Los Vaqueros Reservoir Expansion Project

Expansion of the Los Vaqueros Reservoir from 100,000 acre-feet to as large as 275,000 acre-feet is being evaluated for the ability to protect and restore Delta fisheries and improve Bay Area water quality and reliability. The Draft EIS/EIR was issued in February 2009, and a Final EIS/EIR is expected to be issued in September 2010.

With an expanded reservoir, the Bay Area would have a more reliable supply of higher quality water when faced with water shortages caused by drought,

emergencies in the Delta, or regulatory restrictions on Delta pumping. An expanded reservoir could also provide water supplies for environmental water management in the Delta to support fish protection, habitat management and other environmental water needs. In 2007, key decision-makers became increasingly convinced of the need to expand the reservoir as one of many timely actions needed to protect the Delta and the Bay Area's water supplies, and Governor Schwarzenegger specifically named the reservoir expansion in his proposals to upgrade the state's water infrastructure.

The environmental effects of the expansion project have been evaluated in an EIS/EIR. The expansion project is being designed to create environmental and water supply reliability benefits without creating any associated impacts on the Delta ecosystem or water quality. General effects of the reservoir expansion may include a net shift in timing of Delta export pumping to periods of less fishery sensitivity and from drier years to wetter years. These effects would help reduce or mitigate for other cumulative impacts on the Delta ecosystem and water quality. Project construction is expected to commence as early as 2012.

Central Valley Project Improvement Act Required Program

The Central Valley Project Improvement Act includes a requirement for Reclamation to develop and implement a program to mitigate fishery impacts resulting from the operation of Pumping Plant No. 1. The program may include a fish screen at Rock Slough (just south of the Old River site), modified operations, or other measures to mitigate fishery impacts. Reclamation is required to develop a fish mitigation program (including the possible installation of a fish screen at the headworks) by December 31, 2008. Contra Costa Water District and Reclamation are in the process of seeking an extension of the December 31, 2008 requirement. Construction and operation of the 2-Gates Project would provide further justification for this extension.

Sacramento County Water Agency and East Bay Municipal Utilities District – Freeport Regional Water Project

The Freeport Regional Water Project is a cooperative effort of Sacramento County Water Agency and East Bay Municipal Utilities District to supply surface water from the Sacramento River to customers in central Sacramento County and in Alameda and Contra Costa counties. The project will provide SCWA with up to 85 million gallons of water per day which will in turn be supplied to customers in central Sacramento County to supplement groundwater use in the central part of the county. Sacramento will begin receiving water from this project in 2011 after construction of the Vineyard Surface Water Treatment Plant is completed. East Bay Municipal Utilities District will use up to 100 million gallons per day of water during dry years only, estimated to be three out of every 10 years, as a supplemental water source to complement existing conservation programs. East Bay Municipal Utilities District will be able to receive water from the Project by the end of 2009. An EIR/EIS was completed for this project in July

2005. Significant, unavoidable impacts of the project were determined to be short-term increases in construction noise in the project area during the day, an exposure of noise-sensitive land uses to general construction noise at night, and an increase in ambient noise levels in the project area due to facility operations. Construction for this project is currently underway and is expected to be completed in July 2009. The project is expected to be operational beginning December 2009.

Other Potential Projects

Reclamation has considered constructing a barrier-gate near the head of Georgiana Slough to block highly turbid waters from entering the central Delta. If pursued and implemented, this could be tested as a complementary action to the 2-Gates Project at a future date.

While not currently a part of the proposed Project, and not evaluated in this study, the Old River gate could be operated in conjunction with potentially modified Delta Cross Channel gate operations or upstream reservoir releases to provide additional flow to the San Joaquin River, and help push conditions favorable to smelt in a seaward direction.

Other construction projects in Contra Costa County include Dutch Slough Wetland Restoration Project (DWR), in the planning stage; Holland Tract Wetlands Project (Wildlands Inc.), construction expected to start in 2009; and Ironhouse Sanitary District Wastewater Expansion project Tertiary Treatment Plant, construction to begin in 2009. No related projects were identified for San Joaquin County.

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

No impact.

Document Preparation

This document was prepared by several individuals with experience in various disciplines. The following people assisted in the preparation of this document.

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