Appendix H.

Section 404(b)(1) Clean Water Act Compliance Analysis

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Central Valley Regional Water Quality Control Board

3 July 2018

Mark T. Ziminske
United States Army Corps of Engineers
Sacramento District Headquarters
1325 J Street
Sacramento, CA 95814

LETTER OF SUPPORT: BIG BREAK DELTA ISLANDS HABITAT RESTORATION PROJECT, DELTA ISLANDS AND LEVEES FEASIBILITY STUDY

This letter is in response to your request for a letter supporting the Big Break Delta Islands Habitat Restoration Project, Delta Islands and Levees Feasibility Study (Project), which proposes to restore 340 acres of intertidal marsh habitat by placing dredged material at Big Break in the Sacramento-San Joaquin Delta (Delta). The Project proposes converting the open water habitat into a combination of freshwater intertidal marsh habitat and shallow water habitat by piping dredged material for direct placement at the Big Break site. Overall, I am supportive of the Project as it will work to restore ecological health within the Delta and look forward to working with you on addressing potential water quality concerns during the process of issuing a Water Quality Certification.

Water Quality Certification pursuant to Section 401 of the federal Clean Water Act will be required to authorize construction of the Project. The Central Valley Regional Water Quality Control Board (Central Valley Water Board) usually reviews applications for Certification during the detailed, final design process that occurs near the completion of a final environmental document. We plan to consider issuing Certification for the Project following completion of Project review in compliance with the requirements of the California Environmental Quality Act (CEQA) and after review of near-final Project designs. Water quality concerns for this project include the potential for temporary construction related impacts associated with pipeline installation and maintenance activities and the potential for significant short-term impacts on water quality conditions during direct placement of dredged material at Big Break.

The Sacramento-San Joaquin Delta, and the western portion of Delta Waterways (including Big Break) are identified under the Clean Water Act as impaired by mercury due to excessive levels of mercury in fish that are eaten by humans and wildlife species. The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) includes control programs and total maximum daily loads (TMDLs) to reduce the amounts of diazinon, chlorpyrifos, methylmercury and mercury throughout the Delta.

Project measures identified in the final environmental document will need to include practices that ensure the Project does not cause or contribute to an exceedance of water quality objectives and must ensure continued compliance with the TMDL control programs. My staff will work with you in addressing these concerns during the process of issuing a Water Quality Certification.

In summary, I am supportive of the Big Break Islands Habitat Restoration Project, Delta Islands and Levees Feasibility Study that will restore ecological health within the Delta. I look forward to continuing to work with you to complete the Water Quality Certification process as further design details are provided. If you have questions regarding the Water Quality Certification process, please contact Stephanie Tadlock at (916) 464-4644 or at Stephanie.Tadlock@waterboards.ca.gov.

Adam Laptuz
Assistant Executive Officer

Section 404(b)(1) Clean Water Act Compliance Analysis
Delta Islands and Levees Feasibility Study

I. Introduction

This appendix evaluates compliance of the recommended plan, Alternative 3, with the Guidelines established under the Federal Pollution Control Act (Clean Water Act) Amendments of 1972 (Public Law 92-500), as amended by the Clean Water Act of 1977 (Public Law 95-217), legislation collectively referred to as the Clean Water Act. The Clean Water Act sets national goals and policies to eliminate the discharge of water pollutants into navigable waters. Any discharge of dredged or fill material into waters of the U.S. (WOUS) by the U.S. Army Corps of Engineers (Corps) requires a written evaluation that demonstrates that a proposed action complies with the guidelines published at 40 CFR Part 230. These guidelines, referred to as the Section 404(b)(1) Guidelines or "Guidelines," are the substantive criteria used in evaluating discharges of dredged or fill material under Section 404 of the Clean Water Act.

Fundamental to the Guidelines is the precept that "dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated such a discharge would not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern."

The procedures for documenting compliance with the Guidelines include the following:

- Examining practicable alternatives to the proposed discharge that might have fewer adverse environmental impacts, including not discharging into a water of the U.S. or discharging into an alternative aquatic site.
- Evaluating the potential short- and long-term effects, including cumulative effects, of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment.
- Identifying appropriate and practicable measures to mitigate the unavoidable adverse environmental impacts of the proposed discharge.
- Making and documenting the Findings of Compliance required by §230.12 of the Guidelines.

This Clean Water Act, Section 404(b)(1) evaluation of compliance with the Guidelines is not intended to be a "stand alone" document; it relies heavily on information provided in the integrated feasibility report and Environmental Impact Statement (FR/EIS) to which it is attached.

II. Project Description

A. Project Purpose

Under the Selected Plan, the Corps of Engineers, Sacramento District (Corps), and the State of California, Department of Water Resources (DWR) propose to restore 340 acres of

intertidal marsh habitat using dredged material at Big Break in the Sacramento-San Joaquin Delta (Delta). This restoration of open water habitat would be converted to a combination of freshwater intertidal marsh habitat and shallow water habitat via the direct placement of dredged material. Placement of dredged material would create a variable topography that at times would be submerged below the tidal level and at other times might be exposed vegetated marsh.

The remaining ecosystems in the Delta no longer maintain the functions and richness that historically defined the pre-channelized system. The measures of ecological health continue to decline without preventive or restorative actions. The Delta Islands and Levees Feasibility Study (Delta Study) analyzes the feasibility of restoring intertidal habitat by subsidence reversal in the flooded area of Big Break.

B. Location

The project area is located approximately 2 miles east of the city of Antioch in the west central portion of the Delta (Figure 1). The area's approximate boundaries are the San Joaquin River and Threemile Slough on the north, Sacramento River and Sherman Lake on the west, south edge of Big Break and Dutch Slough on the south, and east edge of Big Break on the east. Big Break comprises of approximately 1,600 acres of subsided island that is now shallow open water habitat. The project area include parts of Big Break and Jersey Island (see Figure 2 and 3): the immediate project area where the 340 acre restoration project would be occurring is located in the northern direction of Big Break, meeting the southern end of Jersey Island.

C. General Description

An initial array of 12 alternatives (including the No-Action Alternative) was developed by the Corps and DWR during the alternatives formulation process. The alternatives represented varying combinations of measures. Alternatives were initially developed based on the Corps' federal planning objectives for water resource projects, specific planning objectives developed for the feasibility study, and opportunities and constraints for implementing flood risk management activities. After formulation and refinement of the project alternatives, alternatives were ranked and screened based on NER benefits and implementation costs. Chapter 3 of the FR/EIS addresses in greater detail the alternative formulation process.

The Delta Islands and Levees Feasibility Study plan formulation process resulted in two action alternatives in the final array:

- Alternative 2. This alternative includes using approximately 500,000 cubic yards (cy) of dredged material over a five year period to create approximately 160 acres of intertidal marsh habitat (see Figure 3). Of the approximately 160 acres, approximately 45 acres would be planted with aquatic vegetation, and the remaining 112 acres would be shallow water habitat for aquatic fauna species. Dredged material would come from O&M activities in the San Francisco Bay to Stockton DWSC between approximately station points 400+00 and 850+00. Dredged material would be directly pumped to the restoration site, rather than typical land-based dredged material placement sites. A

chemical and granular composition analysis of the materials would be conducted in advance of placement.

- Alternative 3 includes using approximately 1 million cubic yards (cy) of dredged material over a 10 year period to create approximately 340 acres of intertidal marsh habitat. Of the approximately 340 acres, approximately 95 acres would be planted with riparian and aquatic vegetation, and the remaining 245 acres would be shallow water habitat for aquatic fauna species with the placement of dredge material. The O&M dredging, material placement, and plantings would all be conducted consistent with the description for Alternative 2, above, except that it would occur over a 10 year period rather than a 5 year period. Alternative 3 is the Recommended Plan and is also the Environmentally Preferred Alternative.

D. Background

The Delta was named an Ecosystem of National Significance through the Environment Protection and Biodiversity Conservation (EPBC) Act in 2011. It is a critical link in the Pacific Flyway, a major north-south route of travel for migratory birds in America, and is protected through the Migratory Bird Treaty Act of 1918. Natural resource specialists agree that the remaining ecosystems in the Delta no longer maintain the functions and richness that defined the pre-channelized system, and that the measures of ecological health would continue to decline without preventive action. Not only is it certain that these natural systems would not recover their defining attributes under current conditions, it is unlikely that even the current, degraded ecological conditions can be sustained into the future. For example, delta smelt, key indicators of ecosystem health continue to decline in number throughout the watershed. Another example is the decline in populations of salmonids; commercially, recreationally, and culturally important fish species in the Delta.

There are numerous contributors to the ecological decline of Delta species and habitats, each of which has the capability to produce adverse impacts independently and/or in combination with other stressors. For example, pesticides, channelization, exotic and non-native invasive species, water supply diversions, agricultural and urban runoff, and wastewater discharges have all been identified as contributors of adverse impacts to the ecological health of the Delta ecosystem. Specifically, channelization of rivers and streams through the construction of levees has resulted in the widespread loss of tidal marsh, shaded riverine aquatic habitat, and the disconnection of floodplains from waterways. If this loss of Delta habitats and disconnection from floodplains continues, the current substantial declines in the Delta's fisheries could result in the extinction of culturally and economically critical species. Many of the defining characteristics of the pre-channelized ecosystem (spatial extent, habitat heterogeneity, and dynamic storage) have either been lost or substantially altered as a result of land use and water management practices during the past 100 years in California. Nearly 95 percent of the historic wetland habitat in the Delta has been converted to agricultural and urban uses (The Bay Institute 1998).

E. Authority and Purpose

The Corps ensures that the project complies with the Clean Water Act, including Sections 404, 401, and 402. Placement of fill within jurisdictional wetlands and WOUS States is required for the project. A Section 401 State Water Quality Certification for activities associated with implementation of the proposed project is required as a condition of Section 404, and the Corps would submit a 401 certification application to the Central Valley Regional Water Quality Control Board (CVWQCB) prior to construction. The project would also require an NPDES permit, through the development of a SWPPP because the project would disturb more than 1 acre of project area.

The purpose of the Delta Study is to determine if there is a Federal interest in providing Flood Risk Management (FRM) and Ecosystem Restoration (ER) improvements in the Delta. Since each multipurpose measure has a FRM negative net benefit, which indicates FRM specific benefits are less than the FRM separable costs, these multipurpose measures cannot be economically justified as ecosystem restoration benefits and costs are added. For this reason, FRM measures have not been pursued.

A recommendation for plan selection was made by identifying the plan that reasonably maximizes environmental outputs relative to costs while meeting planning objectives and avoiding planning constraints. As all alternatives are cost effective, every alternative achieves the greatest number of outputs for a given cost; therefore, incremental costs per output were used to identify the NER Plan.

The O&M dredging actions are analyzed in the 'Sacramento River - San Francisco Bay to Stockton, California (John F. Baldwin and Stockton Ship Channels), Deep Water Ship Channel Maintenance Dredging and Bank Protection Project, California 10-Year Draft Programmatic Biological Assessment'. The process of transporting the dredge materials from the ship to the project sites is analyzed in the Delta Islands and Levees FS/EIS.

III. Final Array of Alternatives

A. Guidelines

Section 230.10 of the Guidelines dictates that, except as provided under §404(b)(2), "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have significant adverse environmental considerations." While the NEPA process, through the EIS, extensively examines alternatives and discloses all of their environmental impacts, the 404(b)(1) Analysis focuses on the impacts of alternatives to the aquatic ecosystem. The Guidelines require choosing for implementation the practicable alternative that has the least damage to the aquatic ecosystem, assuming that this alternative has no significant adverse environmental impacts to other components of the environment, such as endangered species that occupy upland habitat. A "practicable alternative" is defined as "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."

The Guidelines also require that "where the activity associated with a discharge which is proposed for a special aquatic site does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise." The basic purpose of this project—ecosystem restoration in the California Delta at Big Break—is water dependent, since the project purpose cannot be fulfilled outside of open water in the Delta.

B. Practical Alternative

The Guidelines further specify that where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge that do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless otherwise clearly demonstrated. The placement of dredge material at Big Break is the special aquatic site type in the project area. Section III, parts E and F describe the proposed activities for each reach.

For the purpose of a 404(b) (1) alternatives analysis, practicable alternatives include:

- Offsite alternatives—i.e., discharges of dredged or fill material at other locations in WOUS
- On-site alternatives—these include project designs that do not involve a discharge of dredged or fill material into WOUS as well as project designs that have different impacts to WOUS

C. Off-Site Alternatives

The location of this project was selected based upon the need to restore emergent marsh habitat using dredged material within a sunken Delta Island. Other sunken Delta Islands that were considered includes Frank's Tract and Little Frank's Tract. Out of these three alternatives, Big Break has the shallowest open water condition, and is the closest site to the Stockton DWSC, making it the most cost effective and practicable restoration option.

D. On-Site Alternatives

The two construction alternatives analyzed in detail through the NEPA process would each accomplish the identified project purpose. However, they would accomplish the project purpose to varying extents, with varying levels of benefits and varying adverse impacts to the aquatic ecosystem.

The following is a summary of project elements for each alternative. In general, the two alternatives are the same, however, Alternative 3 entails the greatest amount of intertidal marsh habitat restoration (340 acres) and Alternative 2 a lesser amount (160 acres). These alternatives are described in greater detail in Chapter 3 of the FR/EIS.

Alternative 2. The size of the potential placement site would be 160 acres. The dredge materials would be placed within the functional floodplain inside the open water area. The potential placement area is a sunken island comprised of peat soils. Native floating aquatic species include duckweed *(Lemna spp.*), water-meal (*Wolffia* spp.), and algae. Large expanses of the open water habitat within the study area are dominated by the invasive nonnative species water hyacinth (*Eichhornia crassipes*). Submerged aquatic vegetation within the open water habitat in the study area is dominated by the nonnative species Egeria (*Egeria densa*). Placement would occur over a five year period in the timeframe of August 1 to November 30, consistent with current and anticipated avoidance work windows for Delta smelt and salmonids.

Alternative 3. The size of the potential placement site would be 340 acres. The dredge materials would be placed within the functional floodplain inside the open water area. The potential placement area is a sunken island comprised of peat soils. The proposed placement site is devoid of terrestrial vegetation. Native floating aquatic species include duckweed (*Lemna* spp.), water-meal (*Wolffia* spp.), and algae. Large expanses of the open-water habitat within the study area are dominated by the invasive nonnative species water hyacinth (*Eichhornia crassipes*). Submerged aquatic vegetation within the open water habitat in the study area is dominated by the nonnative species Egeria (*Egeria densa*). Placement would occur over a ten year period in the timeframe of August 1 to November 30, consistent with current and anticipated avoidance work windows for Delta smelt and salmonids.

E. General Description and Quantity of Dredged or Fill Material

Analysis of over 10 years of grain size distribution data for the 400+00 to 850+00 dredging reaches shows the material to be virtually completely fine sand which annually accumulates within the Stockton Deep Water Ship Channel. Maintenance operations remove the materials to maintain deep draft commercial ship passage. The dredged material would be tested prior to placement for chemicals such as mercury, ammonia, arsenic, and lead. If the material does not pass the chemical tests then it would not be used for restoration and would be disposed of in accordance with current O&M dredging practices.

F. Description of the Proposed Discharge Site(s)

Big Break was historically tidal marsh before levees were constructed to reclaim the land for agriculture. Big Break's lands then became submerged when the levees failed. Before land reclamation for agriculture and flood control activities around the turn of the 20th century, the Delta supported a complex network of rivers and sloughs with in-channel islands and vast expanses of tidal marsh. Much of the vegetation of the Delta (approximately 380,000 acres; 1,538 square kilometers) was dominated by tidal marshes (Atwater 1980; Institute 1998). By 1930, island reclamation was complete, and by 1980, only about 16,000 acres (65 square kilometers) of marshes remained (Atwater 1980; The Bay Institute 1998). Today, these areas of former tidal marshes consist primarily of channelized waterways surrounding highly productive row-cropped agricultural islands that are protected from flooding by over 1,300 miles (2,093 kilometers) of levees. Approximately 95 percent of the historic tidal marsh habitat in the Delta has been lost (The Bay Institute 1998).

Big Break is currently characterized by vast expanses of open water habitat. Although Big Break has been flooded for a number of years, it has not accumulated enough sediment to support the reestablishment and expansion of tidal marsh vegetation. Big Break is subject to daily tidal fluctuations and is at a sufficient distance from the Bay that the tidal waters inundating this area have minimal salinity levels. A remnant levee runs along the northern border of the area. Riparian scrub vegetation dominated by arroyo willow (*Salix lasiolepis*) and Himalayan blackberry (*Rubus armeniacus*) grows along the upper portions of this levee, but the lower elevations of the remnant levee support a low cover of tidal marsh vegetation. Common plant species occupying the tidal marsh include cattails (*Typha spp.*), sedges (*Cyperaceae spp.*), and California bulrush (*Schoenoplectus californicus*).

G. Timing and Duration of Discharge

The construction activities that would affect WOUS would occur over approximately 2 weeks per year during the timeframe from August 1 to November 30, depending on the annual dredging schedule. Under Alternative 2 this would occur for 5 years. Under Alternative 3 this would occur for 10 years.

H. Description of Disposal Method

The disposal method would be the same for both alternatives. The only difference between the alternatives is the duration and acreages being used for dredge placement, as described above.

A pipeline hydraulic suction dredge would be used to acquire material under the existing Stockton O&M Dredging Project. Dredging rates vary depending on the type of material being dredged, but production rates of 300 to 600 cubic yards per operational hour are typical. It is estimated that approximately 100,000 cubic yards of material would be available to the Delta Study each year.

Dredged material would be pumped from the dredge directly to Big Break. Materials would be pumped to the proposed project areas through a floating 18 inch double wall high density plastic extrusion (HDPE) pipe. The piping system would be placed along the shoreline of the Stockton DWSC in the San Joaquin River. The pipeline would be submerged and anchored to the bottom when necessary to avoid navigation hazards. A floating diesel repeater pump station would be positioned every 3 miles as necessary to aid slurry flow; pump(s) would be installed on a floating platform with stakes to secure its position. Work boats would install and maintain the floating pipeline. An additional work boat and crew would tender the position of the outfall slurry pipe during pumping operations to ensure correct placement of materials.

The pipeline would likely access Big Break from the DWSC via a land-based crossing at Jersey Island. There is one dirt farm road running north/south on Jersey Island; the pipeline would be placed adjacent to the road above ground. The pipeline would cross one farm road running east/west, in addition to two levee roads on the north and south shore of the island. Culvert-style crossings would be installed at these intersections in order to avoid impacts to the farm fields. The proposed crossing location is shown on Figure 2 below. The Jersey Island

crossing is not anticipated to need a booster pump on the island; however, a floating booster pump station would likely be installed adjacent to the north shore of Jersey Island.

The pipe would be above water at the time of release. A baffle-plate on the end of the pipe would cause the material to spray out and would dissipate energy and help to direct the material downward. The hydraulic slurry would be discharged at the restoration sites at an assumed average rate of 450 cubic yards per hour or 8,100 cubic yards per day. Since this sand would be falling in a hydraulic slurry, it is assumed to settle to a 1 on 20 slope below the mean tide level (MTL, which is 2 feet higher than the mean lower low water [MLLW] level) and to a 1 on 10 slope above the MTL. This placement process is similar enough to sand depositing in the navigation channel that no bulking of the placed dredged material is assumed and no consolidation of the placed material is assumed (i.e. one cubic yard taken from the channel is equal in volume to one cubic yard of a placed sand mound).

Sand mounds would be placed so that the mound toes do not overlap, leaving channels of varying sizes between the mounds. The intent is to ensure that the channel centerlines are never shallower than the existing condition (-3 to -4 feet MLLW). The goal of this placement plan is to create a diverse habitat that provides value to both shallow water aquatic fauna that require varying depths of soft bottom habitat, as well as terrestrial marsh species such as shore birds. In addition, based on lessons learned from Donlon Island, this design is intended to provide sufficient flow through the site to maintain water quality.

The bed material at Big Break is former agricultural land that was prone to subsidence upon drying, thus the material is assumed to be highly compressible. Table 3-19 lists assumptions that are thought to be reasonable but conservative for the compression of Big Break bed materials beneath hydraulically placed sand.

Table 3-19. Assumed Consolidation of Big Break Bed Sediments and Other Assumed Sand Mound Losses.

Depth Interval		Assumed Placement Slope	Consolidation of Big Break Floor	Erosional/ Consolidation/ SLR losses
above MHHW		1 on 10	0 ft	1 ft
MTL	MHHW	1 on 10	2 ft	none
MLLW	MTL	1 on 20	1 ft	none
bottom	MLLW	1 on 20	none	none

In addition to "losses" of placed dredged material by the compression of underlying sediments (as a greater volume of sand is necessary to construct a mound of a given height above the sediment bed), other potential losses that could occur include:

- Wave wash erosion during storms;
- Unpredicted consolidation in excess of assumed amounts; and,
- Ineffective elevations due to sea level rise (SLR).

Table 3-19 also indicates a contingency amount of 1 foot of additional mound height losses due to some combination of these factors. Figures 4 and 5 display the initial placement (black line) and final geometry (red line, used for plantable area sizing calculations) of a sand mound placed at -3 feet MLLW and -4 feet MLLW, respectively. It is estimated that the sand mounds would require approximately 10 months for settlement following construction. Following the settlement period, aquatic vegetation would be planted

The bed level within the proposed footprint varies from -3 to -4 feet MLLW; mean tides within Big Break range from 0 feet MLLW to +4 feet MLLW. As a result, bed depths in the restoration area range from 3 feet during a mean lower low water tide to 8 feet during a mean higher high water tide. The proposed sand mounds would be constructed with a target elevation of +3 feet MLLW. Thus at high tide, sand mounds would be approximately 1 foot below the water surface level; and at low tide, the top of the vegetated sand mounds would be exposed.

IV. Factual Determinations (Section 230.11)

A. Physical Substrate Determinations (consider items in Section 230.11 and 230.20 Substrate)

(1) Substrate Elevation and Slope. The current bottom of channel elevations average -2.44 ft for Big Break. Alternative 2 and 3 finish grade elevations for the marsh restoration islands was calculated at an elevation between -3.0ft to -4.0ft relative to mean water level.

(2) Sediment Type. Soils and sediment type for both Alternatives 2 and 3 are composed primarily of sand.

(3) Dredged/ Fill Material Movement:

a) Fill: Alternatives 2 and 3 involve permanently filling open water habitat in order to restore the area to its historic marsh condition. Some migration of fill material is expected, due to wave wash action and flows through the marsh habitat. It should be noted that this is not expected to increase turbidity outside of the restoration site itself, and primarily would aid the restoration in natural development of channels and marsh habitat. Figure 3 displays a conceptual future appearance of the site after the movement of the material.

(4) Physical Effects on Benthos (burial, changes in sediment type, etc.).

a) Fill: There would be a temporary effect on benthic organisms in the placement footprint due to burying of the existing benthos, but other similar projects in the area have shown that the benthic organisms should repopulate very quickly, likely within a year (i.e., prior to the next season of construction). Additionally, there would be gaps between the rows of mounds that wouldn't be impacted by placement due to the progression of the placement. As a result, the impact would not be significant because it

would be limited to the newly placed material annually and would be expected to recover prior to the next construction season.

(5) Turbidity

a) Fill: There would be a short term effect on turbidity during the placement of dredged materials in Big Break annually. However, since grain analysis of the sediment has shown that it primarily consists of fine sand rather than silt, it is anticipated that the material would settle fairly quickly and would not result in a significant impact on turbidity. Additionally, as noted above, it is not anticipated that there would be any turbidity plume that would migrate off site.

(6) Actions Taken to Minimize Impacts. Sacrificial straw bales would be placed to provide barriers to the predominant flow paths to allow for sediment settling and sand mound stability. Straw bales are anticipated to persist 1 to 2 years, giving sufficient time for vegetative establishment, after which vegetation is assumed to provide adequate erosion resistance. Sacrificial straw bales would be used to aid in compliance with water quality requirements. Straw bale lines are not anticipated to be fully enclosing; however, should enclosure become a possibility, the top of the sacrificial straw bale line would be set at mean low tide level to allow fish an opportunity to escape the work area. If unanticipated quantities of fine-grained material are present in dredged sediments, turbidity curtains can be used in combination with sacrificial straw bales and would float slightly above the bottom allowing aquatic species to escape entrapment.

B. Water Circulation, Fluctuation, and Salinity Determinations

(1) Consider effects on (for both Alternatives 2 and 3):

a) Salinity. No significant effect.
b) Water Chemistry (pH, etc.). No significant effect.
c) Clarity. No significant effect.
d) Color. No significant effect.
e) Odor. No significant effect.
f) Taste. No significant effect.
g) Dissolved Gas Level. No significant effect.
h) Nutrients. No significant effect.
i) Eutrophication. No significant effect.
j) Others as Appropriate. No significant effect.

(2) Current Patterns and Circulation (for both Alternatives 2 and 3). No significant effect.

(3) Normal Water level Fluctuations (for both Alternatives 2 and 3): No significant effect.

(4) Salinity Gradients (for both Alternatives 2 and 3): No significant effect.

(5) Actions That Will Be Taken to Minimize Impacts (for both Alternatives 2 and 3). Since disturbance throughout the project is greater than 1 acre, the contractor would be required to file and adhere to a Stormwater Pollution Protection Plan and a National Pollutant Discharge Elimination System Permit. Additionally, the BMPs discussed above to reduce turbidity would also aid with other water quality impacts. Water quality monitoring would occur during both the construction and monitoring periods.

C. Suspended Particulate/ Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site (for both Alternatives 2 and 3). There would be a temporary increase in turbidity on site during placement of dredged material, but it is anticipated that the sand would settle out fairly quickly and that there would not be a long-term significant increase in suspended particulates in the project area.

(2) Effects, Degree, and Duration on Chemical and Physical Properties of the Water Column (for both Alternatives 2 and 3):

a) Light Penetration. Beneficial effect. The existing condition at Big Break is primarily open water with little-to-no vegetation. As a result, the water temperature is increased by excessive light penetration, making the area more suitable for invasive fish species rather than native fish species. The restoration of marsh habitat and installation of aquatic vegetation would create shaded areas that would reduce the water temperature and allow for more diverse species to use the area.

b) Dissolved Oxygen. No significant effect.

c) Toxic Metals and Organics. No significant effect. Dredge material from the deep water ship channels is collected and tested prior to removal. The Corps maintains records of all materials currently held in dry land stockpile sites. A chemical analysis of the existing project site channel bottom would be conducted prior to the filling with existing dredge materials. The project site channel bottom samples would serve as the baseline by which fill materials chemical analysis must be at or below the existing baseline threshold. Existing samples from sites surrounding the project areas indicate that the dry land stockpile dredge materials would meet baseline thresholds. Future dredge materials from O&M activities would be measured against the baseline thresholds. Materials not meeting the baseline would be stockpiled and not used as fill.

d) Pathogens. Not applicable.

e) Aesthetics. Beneficial effect. The restoration of native intertidal marsh habitat would create a more aesthetically pleasing visual character of the area than the current degraded condition of the sunken island.

f) Others as Appropriate. No significant adverse effects to the chemical and physical properties of the water column are anticipated.

(3) Effects on Biota (for both Alternatives 2 and 3): By restoring historic intertidal marsh habitat, both alternatives would create a more diverse and functional biota. The proposed marsh habitat would provide shade, cover, and a food source for most juvenile native fish species, as well as Delta smelt. The habitat would provide nesting habitat for avian marsh species. Photosynthesis processes would be more productive in the area due to the increase in vegetative cover. Impacts from both alternatives would be beneficial to the biota in the project area.

(4) Actions Taken to Minimize Impacts (for both Alternatives 2 and 3). See previous description of BMPs and work plans.

D. Contaminant Determinations. The proposed project Alternatives 2 and 3 would not add contaminants the river channel system. The dredged material would be tested prior to dredging consistent with current practices on the O&M dredging project. Any material containing contaminants would not be used for restoration and would instead be disposed of by the O&M dredging project consistent with current practices.

E. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton. The proposed project Alternatives 2 and 3 would have no affect on plankton communities.

(2) Effects on Benthos. There would be a temporary effect on benthic organisms in the placement footprint due to burying of the existing benthos, but the post-construction monitoring report for Donlon Island, the project's test site, indicates that historically the benthic organisms should repopulate very quickly, likely within a year (i.e., prior to the next season of construction) (USACE and USFWS 1990). Additionally, there would be gaps between the rows of mounds that wouldn't be impacted by placement due to the progression of the placement. As a result, the impact would not be significant because it would be limited to the newly placed material annually and would be expected to recover prior to the next construction season.

(3) Effects on Nekton. By restoring historic intertidal marsh habitat, both alternatives would create a more diverse and functional habitat for fish species. The proposed marsh habitat would provide shade, cover, and a food source for most juvenile native fish species, as well as Delta smelt.

(4) Effects on aquatic Food Web. The proposed project Alternatives 2 and 3 would have long term beneficial impacts to the aquatic food web, by creating vegetated marsh habitat that would act as a food source for most nekton and other native species.

(5) Effects on Special Aquatic Sites.

a) Sanctuaries and Refuges. None exist in the project area.
b) Wetlands. None exist in the project area.
c) Mud Flats. None exist in the project area.
d) Vegetated Shallows. None exist in the project area.
e) Coral Reefs. None exist in the project area.
f) Riffle and Pool Complexes. None exist in the project area.

(6) Threatened and Endangered Species**.**

a) Alternatives 3 and 2 are could potentially have short term effects on special status fish species during the placement of dredged material. However, long term the proposed restoration site would have beneficial effects on migrating adult and juvenile winter or spring run Chinook salmon, steelhead, green sturgeon, and Delta smelt and their critical habitat. Restriction of all work activities to the proposed construction footprints and work calendar (August 1 through November 30). The adherence to all turbidity, sediment, and chemistry control as dictated in the In Water Work Plan would further minimize the potential for project-related increases in turbidity and suspended sediment in the Big Break project area. Implementation of a spill prevention control and countermeasure plan and slurry spill/pipe breach contingency plan is anticipated to minimize the potential for toxic or hazardous spills or discharges into the project area. Based on the location and duration of tender boat activities and other noise-generating activities, potential noise and vibration impacts on fish are expected to be negligible.

b) Alternatives 2 and 3 are likely to result in beneficial modification of the Primary Constituent Elements (PCE) of critical habitat of on winter or spring run Chinook salmon, steelhead, green sturgeon, and Delta smelt. There would be a direct physical modification of sub-aquatic vegetation within the designated critical habitat of these species below the high water mark. Temporary and permanent increases of submerged aquatic vegetation would be result from both alternatives within the permanent and temporary footprints of the project below the OHWM. The majority of existing sub-aquatic plant species within the project area open water habitat is dominated by the nonnative species Egeria (*Egeria densa*). This introduced species is prevalent in the Delta, and it is currently targeted for abatement by the California Department of Boating and Waterways (DBW). The project would eradicate up to 160 acres (Alternative 2) and 340 acres (Alternative 3) of Egeria while provide long term primary productivity for aquatic species.

(7) Other Wildlife. The proposed project action would have no significant adverse effect on wildlife because the construction window is limited to two weeks per year for the duration of construction. Any wildlife using the remnant levee or Jersey Island near the restoration site is anticipated to be capable of relocating during construction. Any displaced wildlife would be expected to return to the area after the temporary construction period has ended annually. Following the completion of the restoration site, the project would provide long term benefits to wildlife species, by creating shallow water habitat through the channels in Big Break and creating riparian habitat along the remnant levee. These restoration activities would provide more diversity to the area such as creating more nesting habitat for avian marsh species and creating more spawning zones for fish.

(8) Actions to Minimize Impacts. Preconstruction surveys would occur on Jersey Island to ensure that there are no wildlife species nesting in the staging area or along the pipeline crossing. If species are present, coordination with the appropriate resource agencies would occur and avoidance and minimization measures would be developed.

F. Proposed Disposal Site Determinations

(1) Mixing Zone Determination (for both 2 and 3). The project is not anticipated to increase salinity levels within the Big Break area. The project would not alter the current X2 salinity demarcation line.

(2) Determination of Compliance with Applicable Water Quality Standards (for both Alternatives 2 and 3). No water quality or effluent standards would be violated during proposed project action. All project actions would be performed with strict adherence to the In Water Work Plan developed with Federal and State agency partners.

(3) Potential Effects on Human Use Characteristics (for both Alternatives 2 and 3). The proposed project would not have any significant adverse effects to municipal and private water supply, recreational and commercial fisheries, or water-related recreation. Any displacement of recreational activities would be temporary. The project is anticipated to increase long term recreational experiences and opportunities by increasing the habitat quality.

G. Determination of Cumulative Effects on the Aquatic Ecosystem

The potential cumulative impacts from implementation of the Recommended Plan (Alternative 3) considered with other relevant actions in the general vicinity of the Delta Islands and Levees FR/EIS, have been assessed and are discussed in Section 5.11 of the FR/EIS. Nearly all potentially significant impacts from Alternatives 2 and 3 could be reduced to less than significant levels by mitigation measures specified in this EIS. The alternatives would not have any significant cumulative effects on the aquatic ecosystem. Implementation of the either the Recommended Plan (Alternative 3) or Alternative 2 would provide sub-aquatic primary

productivity and terrestrial refugia for migratory species which results in ecosystem restoration benefits to the Delta.

H. Determination of Secondary Effects on the Aquatic Ecosystem

Secondary effects (or impacts) are "effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material" (40 CFR 230.11(h) (1)). Therefore, secondary effects are limited to other actions in the aquatic environment that are indirectly related to implementation of the action, such as erosion or downstream sedimentation, or compensatory mitigation.

Implementation of Alternative 2 or the Recommended Plan (Alternative 3) could result in the potential secondary impacts such as an increase in contaminants from construction vehicles and equipment. These actions could result in additional adverse impacts to water quality, accretion patterns, aquatic and other wildlife habitat, recreation, aesthetics and air quality. To help minimize impacts associated with the placement of fill material outside the proposed project area, Corps construction contracts require that the contractor delineate the project boundaries, and install proper BMP's within the project area such as turbidity and silt curtains. Additionally, the contractor would be required to adhere to the details of an In Water Work Plan which prevents or reduces adverse impacts to water quality from turbidity or chemical spills.

V. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

A. Adaptation of the Section 404(b) (1) Guidelines to this Evaluation: No significant adaptations of the guidelines were made relative to this evaluation of the Recommended Plan (Alternative 3) or Alternative 2.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Impact on the Aquatic Ecosystem:

Alternatives 2 and 3 create would permanently impact WOUS by conversion of open water habitat to intertidal marsh habitat, however the restored intertidal marsh would have a higher value habitat than the existing open water habitat. The total project area for Alternative 3 is 340 acres compared to Alternative 2, which is 160 acres. Therefore, Alternative 3 would convert more open water to intertidal marsh based upon the additional 180 acres of proposed work. Both alternatives would have the same annual effects during construction. Alternative 2 does not provide the range and extents of ecosystem benefits and study objectives as Alternative 3. No alternative exists that does not involve discharge of fill materials into WOUS.

The Recommended Plan (Alternative 3) meets the Corps' 404(b)(1) permit criteria of the least environmentally damaging practical alternative (LEDPA). The 404(b)(1) guidelines, § 230.3 Definitions (q) define practicable as 'a means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes'. Alternative 3 is the most reasonably efficient contribution to the California Delta ecosystem, restoring 340 acres of intertidal marsh habitat. Millions of Federal dollars have been spent in recent decades to study the Delta; yet very little restoration has occurred. This plan

would allow progress to be made toward significant, cost-effective ecosystem restoration, while beneficially using dredged material from USACE projects. The project creates several benefits:

- Creates 340 acres of long term high value habitat producing primary productivity benefiting migratory avian and aquatic species, and threatened and endangered species.
- Reduces future stockpiled dredge material inventory and creates additional storage space for future O&M actions.
- Increases recreation opportunities in an area with evident recreation by creating higher value habitat which attracts avian and aquatic species.

Appropriate conservation measures and BMP's to minimize potential adverse impacts of the discharge on WOUS and associated aquatic systems would be implemented. The proposed disposal sites for the discharge of dredge materials would meet construction and In Water Work Plan specifications and guidelines and comply with the requirements of practicable conditions and measures to minimize pollution or adverse effects to the aquatic ecosystem. No mitigation should be necessary (other than air quality). The project is designed to avoid affects to other habitat types and therefore no additional mitigation is necessary. Additionally, the Corps would not mitigate for the open water area that is filled because the habitat affected by the project is being converted to higher value habitat.

C. Compliance with Applicable State Water Quality Standards, and; Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act: State water quality standards would not be violated. Alternatives 2 and 3 would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act. A Section 401 Water Quality Certification would be sought prior to initiation of construction.

D. Compliance with Endangered Species Act (ESA) of 1973: The Corps has initiated consultation with USFWS and NMFS under Section 7 of the Endangered Species Act (16 U.S.C. 1536[c]) for potential effects to listed species and their critical habitats for Alternative 3. All terms and conditions of a subsequent Biological Opinion from the USFWS would be fully implemented, as appropriate.

E. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972: Not applicable to both Alternatives 2 and 3.

F. Compliance with Rivers and Harbors Act of 1899; 33 U.S.C. 403, *et seq.* The Rivers and Harbors Act of 1899, Section 10. Alternative 2 or 3 would not result in unauthorized obstruction or alteration of any navigable water of the U.S. Both alternatives would require work In Water Work Plans which require that no project action may interfere with river commerce or alter the navigable shipping lane. The dredge pipeline would be along the edge of the Stockton Deep Water Ship Channel and would not impede the flow of shipping traffic.

G. Evaluation of Extent of Degradation of the Waters of the United States: The placement of fill materials would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife would not be adversely affected. No significant adverse or long term effects on aquatic ecosystem diversity, productivity and stability, recreational, aesthetic, and economic values would occur.

(1) Significant Adverse Effects on Human Health and Welfare (Alternatives 2 and 3).

a) *Municipal and Private Water Supplies*. No significant effect.
b) *Recreation and Commercial Fisheries*. No significant effect.
c) *Plankton*. No significant effect.
d) *Fish*. Temporary construction-related disturbance would occur, but by restoring historic intertidal marsh habitat, both alternatives would create a more diverse and functional habitat for fish species. The proposed marsh habitat would provide shade, cover, and a food source for most juvenile native fish species, as well as Delta smelt.
e) *Shellfish*. No significant effect.
f) *Wildlife*. Temporary construction-related disturbance could occur, but long-term restoration would provide beneficial habitat for wildlife species, most notably avian marsh species.
g) *Special Aquatic Sites*. No significant effect.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems. Temporary construction-related disturbance, with long term benefits for aquatic ecosystems for both Alternatives 2 and 3.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity, and Stability. During construction there would be temporary disturbance to the aquatic ecosystem, but no significant adverse effects. Marsh restoration would result in long term beneficial effects to the aquatic ecosystem by creating diversity and a more productive habitat in the project area.

(4) Significant Adverse Effects on Recreational, Esthetic, and Economic Values. Temporary effects would occur during construction, primarily due to the pipeline across Dutch Slough between Jersey Island and the restoration area. Long-term benefits would occur to aesthetics in the area. Additionally, the restoration area should provide recreational benefits through increase wildlife viewing opportunities.

End of Evaluation

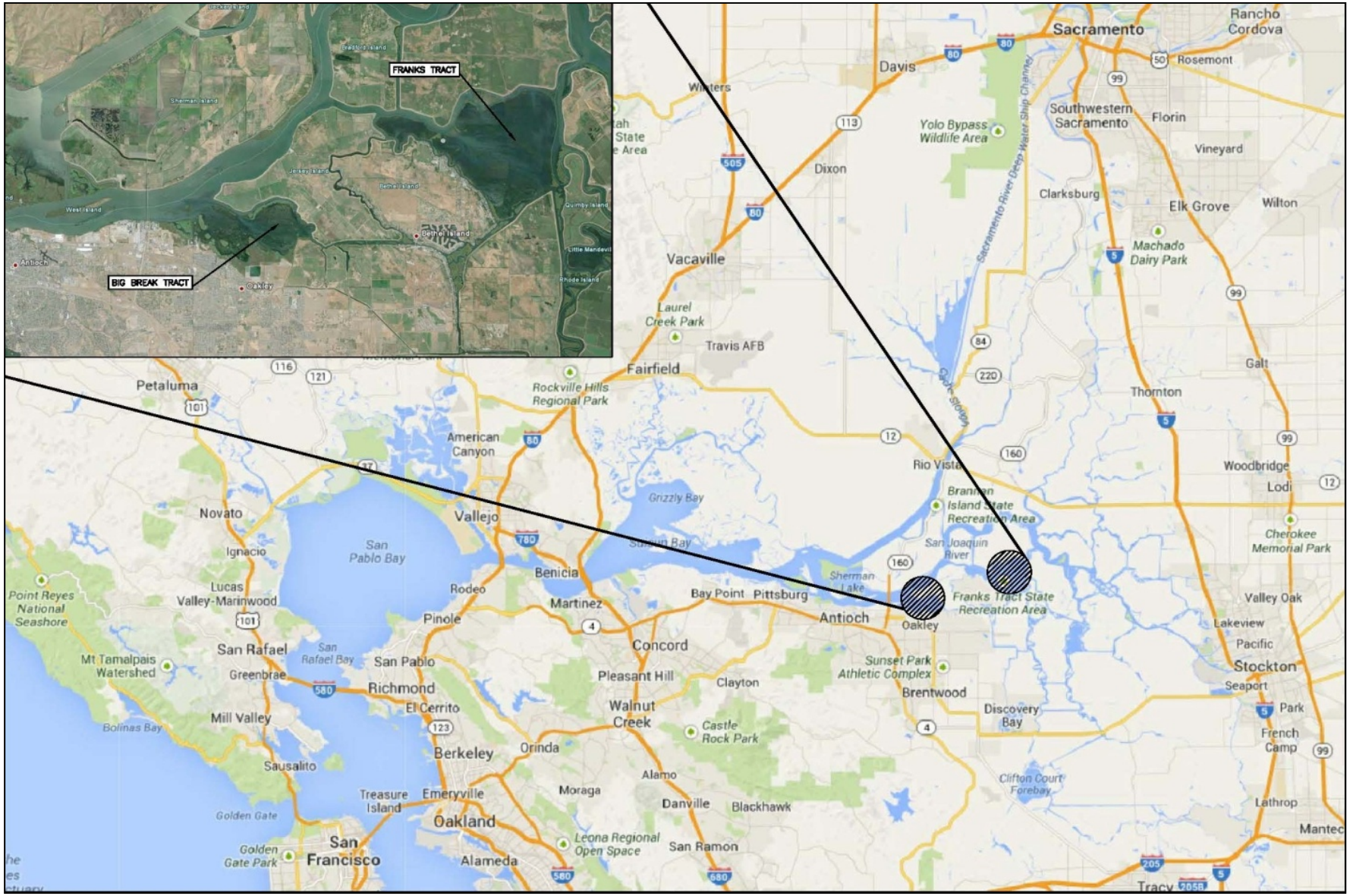

Figure 1. Project Area Locations

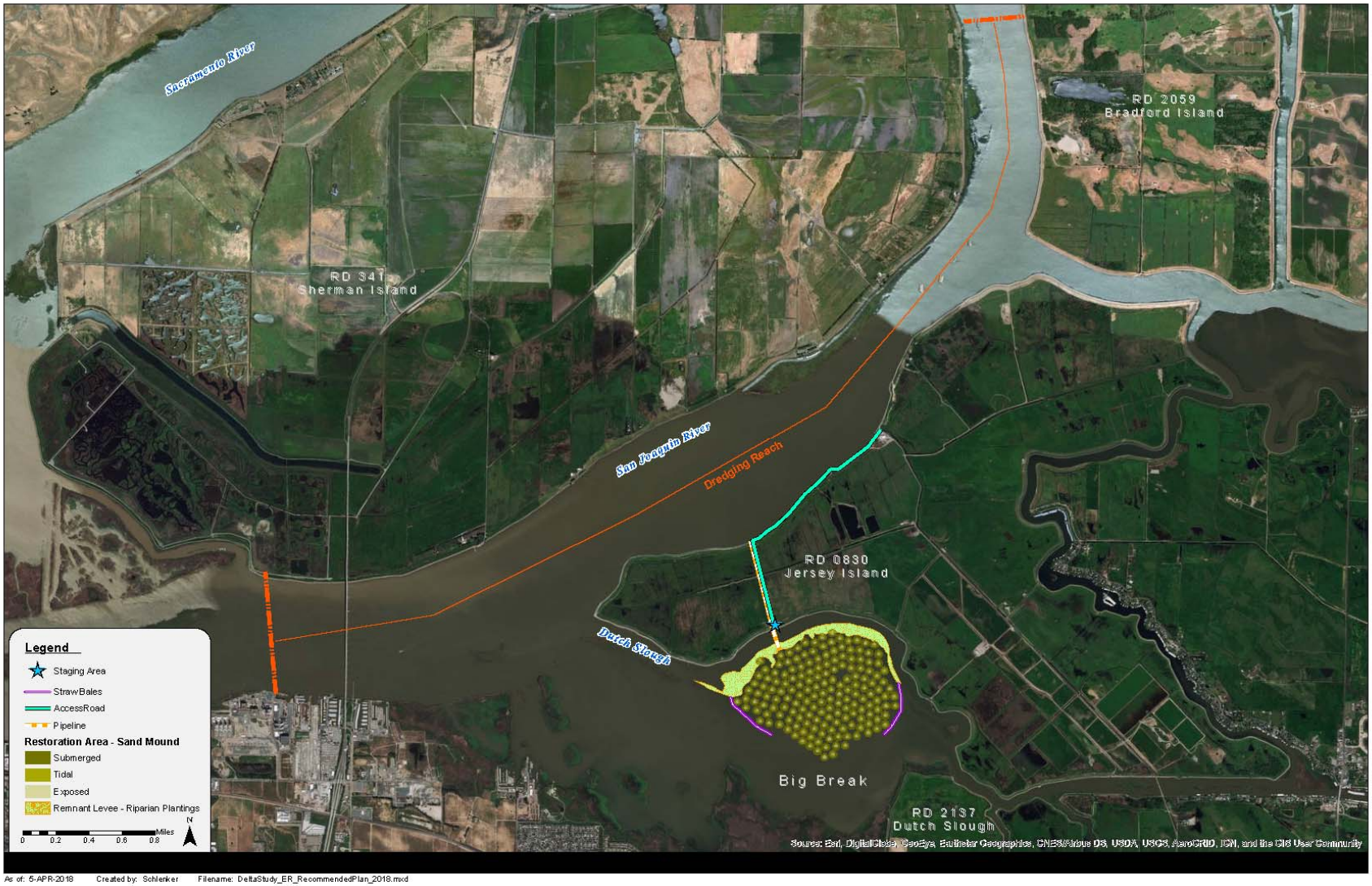

Figure 2. Recommended Plan (Alternative 3)

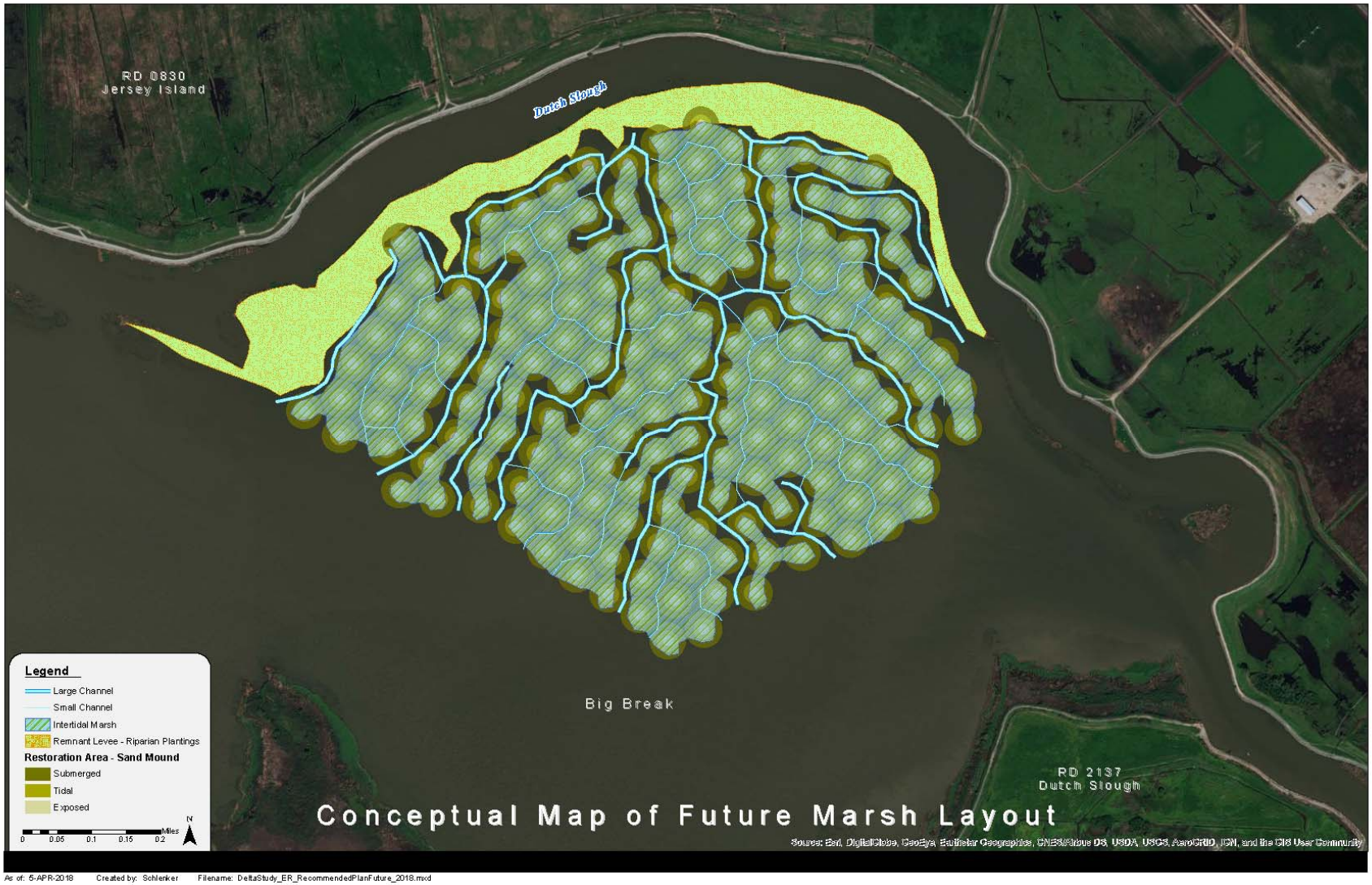

Figure 3. Conceptual Future Marsh Condition.

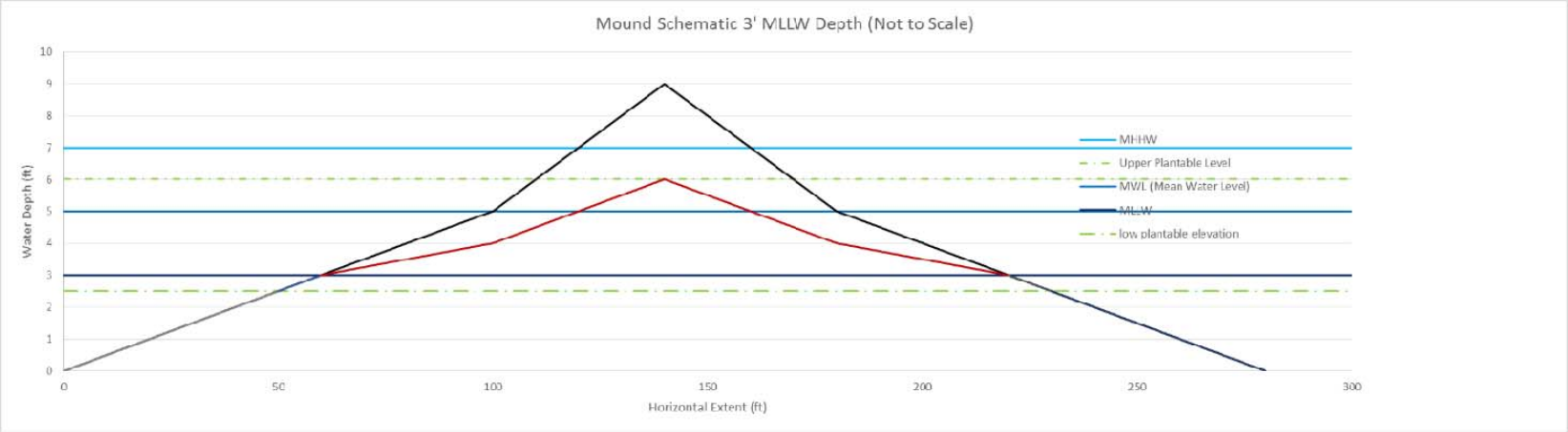

Figure 4. Initial and Final Assumed Sand Mound Geometry at -3 feet MLLW.

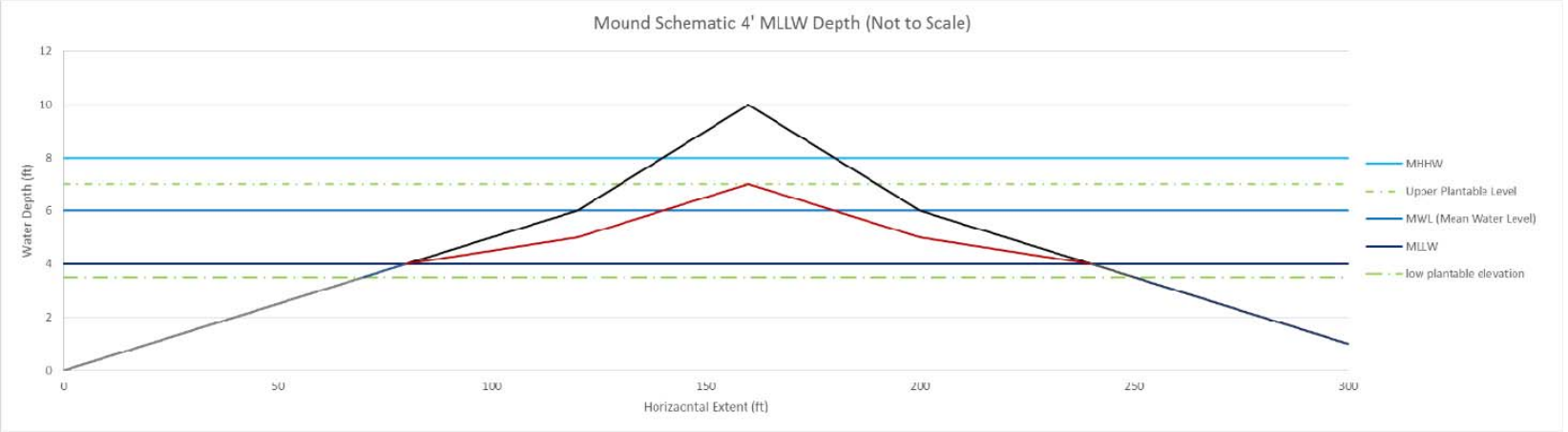

Figure 5. Initial and Final Assumed Sand Mound Geometry at -4 feet MLLW.