ATTACHMENTS

Note 1: The figures were removed because of their large size and can be found in Box 7 of the Sears Point Joint Aquatic Resource Permit Application (JARPA) form submitted by the Sonoma Land Trust and dated August 16, 2012.

Note 2: The Order for the Sears Point Restoration Project covers only 1,944 acres of the 2,327 acre-project described below.

Attachment A – Project Description.

Site Overview and Location

The 2,327-acre Sears Point property (project area) is located in southern Sonoma County, just north of San Pablo Bay (Figure 1-1). The project area is near the intersection of Lakeville Highway-Reclamation Road and State Route 37 (Highway 37). A portion of the Northwestern Pacific Railroad (NWPRR) line, which is presently owned by Sonoma-Marin Area Rail Transit (SMART) District, traverses the project area from west to east and the alignment transitions north near the project's eastern boundary. Although the rail line was inactive for several years, the North Coast Railroad Authority (NCRA) resumed freight service in 2011 on the alignment as part of an existing Operating Agreement with SMART, though maintenance crews began upgrading the rail line in late 2007 (Kleinfelder 2007).

The project area is comprised of two large properties, the North Point Joint Venture (NPJV) parcel and the Dickson Ranch parcel, which are situated on the edge of San Pablo Bay between the mouth of the Petaluma River and Tolay Creek. Sonoma Land Trust acquired the Dickson Ranch and NPJV properties in late 2004 and early 2005. This land was purchased by SLT using funds from several sources with the requirement that the land would be used to protect and restore sensitive species habitat. Since 2004, SLT has held title to the Sears Point properties while it conducts restoration planning. SLT's wetland restoration planning has been guided in part by the requirements and management policies and objectives of the properties' future long-term landowners, California Department of Fish and Game (CDFG) and the US Fish and Wildlife Service (USFWS). Based on the each agency's respective management policies and the potential to achieve management efficiencies with adjacent properties, CDFG and USFWS have agreed to split future ownership and management.

The 1,679-acre NPJV parcel extends both north and south of Highway 37. It is bounded on the north by the Infineon Raceway property, on the east by Cougar Mountain (north of Highway 37) and Paradise Vineyards (south of Highway 37), on the south by the SMART rail line, and on the west by Lakeville Highway-Reclamation Road. The 648-acre Dickson Ranch parcel is located entirely south of Highway 37, and is bounded on the north by the SMART rail line, on the east by Tolay Creek, on the south by San Pablo Bay, and on the west by an existing levee at Sonoma Baylands, a restored tidal marsh held by the California State Coastal Conservancy.

Site topography ranges from below mean sea level in portions of the subsided diked baylands along the southern project boundary to approximately 400 feet above mean sea level (msl) in the uplands north of Highway 37. With the exception of a small number of barns, houses, and outbuildings scattered throughout the project site, the area is predominantly undeveloped diked agricultural baylands, comprising a mixture of, tidal marsh, seasonal wetlands, streams, and upland habitats.

Description of the Proposed Action

This section describes the components of the proposed action, the expected construction schedule, and equipment to be used. The proposed action includes dredging, breaches, and Bay Trail alignments.

Project History

Since 2004, SLT has conducted extensive, on-site data collection in support of a multi-stakeholder-driven wetlands and watershed restoration plan, culminating in the proposed action. The proposed action builds upon and refines information presented in the previously released Conceptual Restoration Plan (Wetlands and Water Resources 2005b), Draft Preliminary Restoration Plan (DPRP) (Wetlands and Water Resources 2006), Final Preliminary Restoration Plan (FPRP) (Wetlands and Water Resources 2007), and several other related planning efforts.

After developing the Conceptual Restoration Plan, DPRP, and FPRP, SLT selected one of several alternatives, the Partial-Tidal Alternative. This alternative will restore tidal marsh to the southern portion of the site (south of the rail line) and retain agriculture and pasture between the rail line and Highway 37 with improved practices to promote seasonal wetlands.

Components of the Proposed Action

The proposed action is based on the Partial Tidal Alternative presented in the Sears Point Wetlands and Watershed Restoration Project Final Preliminary Plan (Wetlands and Water Resources 2007).

The proposed action would:

- restore approximately 955 acres of tidal marsh;
- preserve and enhance a 106-acre area of non-tidal seasonal wetland while maintaining existing agriculture between the SMART line and Highway 37; and
- provide public recreation access south of Highway 37.

Figure 2-1 shows an overview of the proposed action for reference. Figure 2-2 shows a more detailed view of the components for the proposed action. Project design is being coordinated with Marin Sonoma Mosquito and Vector Control District (MSMVCD) to develop strategies to reduce site suitability for mosquito breeding; with Sonoma Marin Area Rail Transit (SMART), North Coast Rail Authority (NCRA), and Public Utilities Commission (PUC) for any project elements within the railroad right of way (ROW); with Sonoma County for elements associated with Reclamation Road; and with California Department of Transportation (Caltrans) for any construction adjacent to Highway 37 in the Caltrans ROW.

The following sections summarize the major restoration components of the Proposed Project. For convenience, these are separated by geographic segment (i.e., south of railroad and railroad to Highway 37).

South of Railroad – Tidal Marsh

New Levee

A levee with a design height of +12 feet (ft) North American vertical datum of 1988 (NAVD) and an initial top elevation of +12 to +15.8 feet NAVD, as described below, would be constructed south of and parallel to the SMART rail line to separate the nontidal and tidal habitats.(Note: the levee would be constructed to elevations above the design height to account for settlement, except in locations where projected settlement is minimal based on geotechnical analysis.) The levee structure would be constructed entirely outside of the SMART rail line right of way. The levee would consist of three parts: a "core" levee, geotechnical stability berms, and erosion protection/habitat slopes. These components are described in more detail below. Conceptual levee designs are shown in Figure 2-3.

The design height selected is equal to the design height of the adjacent Sonoma Baylands levee, with a more gentle outboard slope to dissipate wave energy and provide marsh/upland transition habitat. The dominant soil type, bay mud, is a weak and highly compressible material and varies in depth along the levee alignment. Levee construction will place a load on the foundation soils causing them to compress in relation to their depth. To account for settlement, the new levee would be constructed to initial elevations at or above the design height (approximately +12 to +15.8 NAVD),. The design height accounts for the current 100-year flood elevation combined with wave run-up and freeboard. At 50 years the new levee is expected to settle to an elevation equal to the 100-year flood level adjusted for sea level rise. During this time sediments would be expected to have accreted throughout the interior of the site to a height sufficient to support tidal marsh vegetation and limit wave run-up. There are a broad range of projections for rates of sea level rise in the future and a large degree of uncertainty surrounding the projections based on the current state of the science (U.S. National Research Council 2010). In order to address this uncertainty, the new levee has been designed to facilitate any potential future maintenance activities to raise the crest elevation.

A stormwater pollution prevention plan (SWPPP) would be prepared for the project during the construction phase in order to comply with requirements of applicable permits under the NPDES program. Compliance with permit conditions is designed to prevent unacceptable erosion during construction and accelerated erosion following construction.

Core Levee
The proposed core levee would be comprised of bay muds and alluvial soils, and would be designed to greatly reduce the potential for cracking. It would have 2:1-3:1(horizontal:vertical) side slopes and would serve as the primary impervious layer for seepage control. The top width of this levee would be 12 feet to allow for construction of a combined Bay Trail/maintenance roadway, provide flood protection, and serve as a wide foundation to allow potential future levee improvements.

The construction of the approximately 13,000-foot long core levee would require placing approximately 500,000 cubic yards (CY) of approved alluvial/Bay Mud fill. This fill would primarily be provided from the near surface excavation of on-site pilot tidal channels. Adjacent project areas may also serve as borrow areas to obtain the needed quality and quantity of levee fill and construct other tidal features detailed below.

Prior to constructing the levee, the footprint would be cleared and grubbed and a seepage cutoff trench approximately four feet wide and deep would be excavated along its length. The material from this trench would be removed and then recompacted to backfill the trench. The purpose of the cut-off trench is to intersect any fissures in the foundation soils that may allow water seepage through the core. The

equipment used to construct these levee features would typically include bulldozers, excavators, off-road trucks, scrapers, loaders, compacting rollers, and water trucks. The long term levee management plan would include periodic levee inspections, no less frequently than annually, by qualified personnel to inspect for erosion and other potential failures.

Geotechnical Stability Berms with Erosion Protection/Habitat Slope

Geotechnical stability berms would be located on the inboard (landward) and outboard (bayward) sides of the flood control levee core to stabilize the core levee weight and foundation material. Fill for stability berms would consist of on-site material, including Bay Mud material too wet to be used for the core levee. The width of the inboard stability berm would be 40 feet and would vary from 1 to 7 feet in height depending on the depth of the underlying Bay Mud. Soils required for long-term levee maintenance could be borrowed from the inboard geotechnical stability berm in the future. The equipment used to construct these levee features would likely be the same equipment used for the core levee discussed above. However, these features could use wetter material and have lower compaction requirements than the core levee, therefore requiring less compaction equipment and water trucks. The material for the stability berms and erosion protection/habitat slopes could be taken from the lower portions of the pilot channels and/or adjacent project areas.

An erosion protection/habitat slope would be constructed on the outboard (bay side) of the levee. The equipment used to construct this levee feature would likely be the same equipment used for the core levee. This levee feature would also not be compacted as densely as material in the levee core and would not require specific moisture-conditioned fill. Potential levee configurations are described below.

- The "erosion slope" would have a 5:1 slope from the top of the levee to the existing ground surface to protect the raised tracks from erosion and wind-waves. Construction of the geotechnical stability and erosion berms would require placement of approximately 110,000 CY of material excavated from the deeper portions of the pilot tidal channels. This configuration minimizes fill placement while still allowing for a gradual transition between the tidal marsh and the upland edge of the levee.
- The habitat slope would have a 5:1 slope from the levee top down to an approximate elevation of +8 feet NAVD. Below +8 feet NAVD, the levee slopes would range from 10:1 to 20:1. If sufficient material is available and funding allows, the 10:1 to 20:1 levee slopes would be continued to the levee crest. Construction of the geotechnical stability berms with erosion/habitat slopes would require placement of approximately 205,000 CY of material excavated from the deeper portions of the pilot tidal channels. In selected wide areas of the habitat slope, as designated during final design, depressions would be created at elevations ranging from mean higher high water (MHHW) to elevations that would be flooded during extreme high tides. These depressions would be scraped to depths of 0.5-1 foot and may be enclosed with a low berm less than 1 foot in height. The depressions would be flooded by tides and by rainfall, forming high marsh pannes. The long axes of pannes would be roughly aligned with west winds, if feasible, and/or the pannes themselves would be of sufficient size to ensure they experience sufficient wind-wave turbulence to inhibit mosquito production.

Stockpiled Soil for Future Levee Maintenance

Approximately 30,000 CY of soil may be needed for future levee maintenance (i.e., capping or crowning) due primarily to foundation settlement. This material would likely be excavated as part of pilot tidal channel excavation or other on-site borrow and would likely be stockpiled on the inboard geotechnical stability berm near the levee crest for ease of future levee maintenance and to reduce potential future habitat disturbance. Another potential source for this material would be stockpiled materials obtained from the lowered perimeter levees, as discussed below.

Lead Contaminated Soil
Approximately 12,000 CY of lead contaminated surface soils are located on the eastern portion of the tidal restoration site at the Black Point Sports Club. Consistent with a Corrective Acton Plan approved by the San Francisco Regional Water Quality Control Board (SFRWQCB), this material would be remediated by being encapsulated in geotextile fabric and covered by at least 3 feet of clean on-site soils within the habitat slope to prevent migration of contaminants. Because the soil must be encapsulated in geotextile fabric, it would not be placed into the core levee. Dust control methods would be utilized during construction to prevent soil migration and standard SWPPP Best Management Practices would be implemented to prevent runoff. The new levee would be designed to minimize the potential for erosion and the resulting risk of exposing the encapsulated material.

Lowering of the Existing Outboard (Perimeter) Levee

Up to 6,850 feet of the existing perimeter levee along San Pablo Bay would be lowered to elevations between MHHW and 1 foot above MHHW from existing heights of about 10 to 11 feet NAVD (Figure 2-4a) to create additional habitat for high marsh plants such as gumplant, coyote bush, and other native species that are dependent upon infrequent tidal inundation. To the extent feasible, invasive upland weed species that currently exist on the levee tops such as *Lepidium* would be eliminated. Grading the levee to this elevation would create conditions suitable for native vegetation colonization which would provide high-tide habitat (refuge) for wildlife such as salt marsh harvest mouse and California clapper rail. An additional 19,150 feet of the existing perimeter levee along San Pablo Bay and Tolay Creek will be graded. The levee will be slightly lowered to elevation 10 NAVD or less and be left with a 3 ft top width.

Some of the soil may be used for onsite construction activities; the majority of the soil would likely be pushed into the drainage ditch at the inboard toe of the perimeter levee being lowered or sidecast into the project site to create topographic diversity. Levee lowering could be conducted with tracked excavators and off-road trucks or scrapers and bull dozers. Approximately 40,000 CY of soil would be generated by lowering the perimeter levee. Any excess material generated from levee lowering (i.e., material not required to fill the drainage ditch) or other onsite construction activities may be added to the inboard slope of the lowered perimeter levee to create additional habitat and provide further erosion protection.

Levee Breaches

Up to four breaches would be utilized in the existing outboard levee to restore the area to full tidal marsh. Breaches 1 and 2 would be excavated during the initial restoration phase (see Figure 2-2). These breaches are included in the proposed action. This option was studied by Moffatt & Nichol in the supplemental hydrodynamic analysis as Scenario 9b (M&N 2011). Up to two additional breaches (Breaches 3 and 4), as described by Moffatt & Nichol Scenario 7 (M&N 2008) may be installed in the future as adaptive management if it is deemed that connectivity with Tolay Creek would be beneficial, and/or to improve circulation within Sears Point. Breaches 3 and 4 are not included as part of the proposed project being evaluated at this time but described here for completeness. Excavated materials from Breaches 1 and 2 would be used to fill the adjacent drainage ditch or placed on the inboard side of the perimeter levee to create additional habitat. Breach 1 would be located on the southernmost part of the tidal restoration area and would connect the site to San Pablo Bay through a connector channel excavated through the perimeter marsh and mudflats. Breach 1 would require approximately 74,000 CY of excavation, and would have an approximate top width of 285 feet at MHHW elevation, a 2 horizontal (H):1 vertical (V) side slope and a bottom elevation of -5 feet NAVD. Breach 2 would be located near the southwestern corner of the Dickson Ranch complex and connect to Tolay Creek. Breach 2 would require approximately 14,000 CY of excavation. The dimensions of Breach 2 would be identical to Breach 1 (Figure 2-4b).

Breaches 3 and 4 would be added at a later date as needed to meet habitat and species goals in coordination with the Technical Advisory Committee. Breach 3 would likely be located east of the current hunt club location and would connect to Tolay Creek. Breach 4 would likely be located on the northernmost portion of the tidal restoration area and would connect to Tolay Creek just south of the northern lagoon. Breaches 3 and 4 would most likely be smaller than Breaches 1 and 2, and would require less excavation (not more than 60,000 CY). If Breaches 3 and/or 4 are required, they would either be constructed once Caltrans has implemented improvements to protect Highway 37 from flooding at the Upper Lagoon of Tolay Creek (as a separate and independent project), or would require hardening a small portion of Tolay Creek just south of the Upper Lagoon to mute the tidal range reaching Highway 37. In the case of the latter, the narrowest point of the channel south of the Upper Lagoon in Tolay Creek would be hardened using riprap, gravel, cobble, articulated mats, or similar armoring. This would require up to approximately 2,000 CY of material, placed along the side slopes and bottom of Tolay Creek, and cover a footprint of up to approximately 30,000 square feet.

Constructing all four breaches and the connector channel (see below) could require removing up to approximately 145,000 CY of material and disturbing a total of up to approximately 2.6 acres of tidal marsh and 2.8 acres combined of tidal mudflat and subtidal aquatic habitat. Because these small volumes of excavated materials would be highly saturated and would be difficult to transport to other areas of the project site, they could be used to construct Marsh Mounds or side cast inside the site adjacent to the breaches. The typical equipment used for this work would be an excavator or a long reach excavator. If material was hauled to other areas of the site for reuse off-road trucks would likely be used.

Connector Channel

Dredging would be utilized to create a connector channel between Breach 1 and San Pablo Bay. The Connector Channel would be approximately 2,100 feet long, and consist of two segments. The segment through the marsh immediately outboard of the existing perimeter levee (perimeter marsh area) would be 500 feet long by 200 feet wide at the top, with a bottom elevation of -5 feet NAVD, and the second pilot channel segment through the mudflats would be 1,600 feet long by 50 feet wide at the top, also with a bottom elevation of -5 feet NAVD (Figure 2-2). The perimeter marsh could be excavated with low ground pressure land based equipment or by dredge. The pilot channel through the mudflats would require a dredge. Dredging could be conducted with either a hydraulic dredge or a clamshell dredge. An estimated total of 56,000CY of sediment would be removed from the Connector Channel. The dredged sediment is expected to be similar in quality to the material that would naturally be deposited within the site from San Pablo Bay. The preferred reuse of the material would be within the site to fill drainage ditches and construct other project elements. If the material fails to meet the criteria set by DMMO for surface placement within the site, it would be capped with a minimum of three feet of on-site material. Any decant water would be allowed to dissipate onsite.

The material would be dredged using either a clam shell or hydraulic dredge. The estimated production rate for dredging is 1,500 CY/day, resulting in a approximately 38 days of active dredging. If a hydraulic dredge is used, the pump would be limited to a maximum of a 10 inch pump (i.e. has a 10 inch outlet). Fish screens would be installed on any hydraulic offloader water intakes.

Internal Features

Two types of interior features, pilot channels and ditch blocks, are included in the project to enhance water circulation. These features are described below, followed by a discussion of topographic features.

Pilot Channels
Approximately 29,500 linear feet of pilot channels south of the SMART rail line would be excavated from the diked baylands area to facilitate tidal flow between the site and adjacent waterways. Finished channel geometry would consist of a two-tiered profile with the middle half of the channel being deeper (Figure 2-4c). Channels within the proposed network would conform to two size classes: smaller distribution channels and larger trunk channels. Distribution channels would be 75 feet wide and have an invert elevation of -3 feet NAVD. Trunk channels would be 150 feet wide with invert elevations of -5 feet NAVD. Trunk channels would widen as they near breach locations, eventually equaling the breach widths.

Pilot channels would have an irregular, sinuous planform layout that emulates the channel configuration of historic tidal sloughs of similar scale on and near the project site (Figure 2-2). The channel design would also take advantage of many pre-existing agricultural drainage channels, many of which are in the location of historic tidal sloughs. Agricultural ditches that are not part of the proposed channel network would be plugged with ditch blocks where necessary to discourage flow capture. Over time, tidal action and sedimentation would create a naturally-formed secondary network of intertidal channels extending out into the marsh plain from these pilot channels, guided by the marsh mounds and sidecast ridges

Construction of the new pilot channels would require excavation of approximately 1,100,000 CY of material. As discussed above, some of this material will be used in the new project levee; the remainder of the material would likely be used adjacent to the pilot channels to construct approximately 12 sidecast ridges and possibly marsh mounds (defined further below).

The equipment used to clear and grub the pilot channel footprint would likely be a bulldozer or scraper. Excavating the pilot channels could be done with a tracked excavator and/or scrapers. Off-road haul trucks or scrapers would be used to haul the excavated materials to the levee fill area and ridges and mounds.

Ditch blocks would consist of fills placed in existing agricultural ditches where they intersect the pilot channels and at other selected locations to prevent these existing features from becoming linear tidal channels (see Figure 2-2). Approximately 7,500 CY of material would be required for ditch blocks in the tidal wetlands area. This activity will be completed during excavation of the pilot channels.

Topographic Features

A series of graded topographic features—including marsh mounds, sidecast ridges, sidecast mounds, and gentle habitat slopes—would be included in project design to help dissipate wind and wave energy to reduce erosion. Habitat slopes were described previously. The other features are described below and shown in Figures 2-5 through 2-8. These features would be constructed using the initial surface layer clearing and grubbing materials, a portion of the lower wet soil materials generated during pilot channel construction, and other onsite material as needed. Many of these features would also provide areas at elevations suitable for immediate vegetation colonization, which would benefit endangered species such as the California clapper rail and salt marsh harvest mouse by providing high tide refuge.

Marsh Mounds
Marsh mounds would consist of un-engineered piles of soil measuring approximately 10 feet in diameter and having top elevations between mean tide level (MTL) and MHHW. The mound sides would consist of gentle, dissipative slopes (7:1) that would facilitate seed spread of low marsh vegetation, buffer natural wind-wave energy, and provide minor topographic relief to otherwise flat, open tidal expanses that initially lie below the intertidal range of marsh vegetation. As such, they would establish “nurseries” or topographic oases for marsh vegetation early in mudflat-marsh succession. Additionally, the mounds

would act as local seed sources and would effectively distribute vegetation throughout the marsh. The vegetation on the mounds as well as the lowered velocity of the water traveling over the mounds would enhance sediment deposition in the vicinity of the mounds. Vegetation on the higher mounds would provide important high tide refuges within the marsh. Mounds also would guide natural channel formation to some degree by promoting lateral variations in flow velocities.

As discussed above, excavated materials from the pilot channels would be used to construct marsh mounds located adjacent to these areas. Additionally, some mounds may be constructed using excavated materials from the breaches. Mounds located away from other work areas would typically be constructed by pushing adjacent soil into the desired shape with a bulldozer. Mounds near pilot channel excavations or levee lowering areas may be constructed with the soil and equipment from those operations. The number, size, and location of these mounds have not been specifically designed at this time, and would be determined during construction based on quantity of available material and project budget. The total number will not exceed 500.

Sidecast Ridges
As discussed above, excavated materials from the pilot channels would likely be used to construct approximately 12 sidecast ridges. These ridges would consist of 6-foot wide tops with crest elevations near MHHW that would emulate the topographic relief of natural tidal creek bank levees associated with historic or mature tidal marshes. The inner channel bank slopes would range from relatively gentle (approx. 5:1) to relatively steep (approx. 3:1 to 2:1), while outer mudflat-facing slopes would be more gentle (approx. 7:1 to 10:1).

The ridges would follow the contours of major outside bends of the pilot channels, and would support well-drained high marsh vegetation such as gumplant and pickleweed that trap tidal debris. The intertidal slopes of the ridges would be stabilized by wave-damping tidal marsh vegetation that would in turn provide important high tide flood refuges within the marsh. At maturity, these marsh patches would provide potential dispersal habitat for the clapper rail.

Habitat Levee Edges
Gently sloping habitat levee edges with gentle, wide, planted slopes ranging between 10:1 to 20:1 would be constructed along the marsh side of the new flood control levee to dissipate wave energy and minimize erosion potential while maximizing the width of high marsh transition zones. Incorporation of this feature into levee design would ensure rapidly forming fringing high marsh zones, which would serve as critical habitat for small mammals inhabiting the tidal marsh.

Specifics regarding construction of the erosion/habitat levees are discussed in the "Geotechnical Stability Berms with Erosion Protection/Habitat Slopes" section above.

Building and Infrastructure Demolition

Building demolition in the south of the railroad tidal wetland area would include removing all buildings and appurtenances associated with the Dickson Ranch and the Black Point Sports Club. In addition, approximately 12,000 CY of contaminated surface soils from the vicinity of the club's skeet shooting range would be placed next to the levee core within the geotechnical stability berms and/or erosion protection/habitat slopes, as described above (see Figure 2-9).

The Dickson Ranch structures include 3 large barns, 2 houses, an airplane hangar, and numerous shops, sheds, pumps, and related agricultural debris. The largest barn is a metal structure that is relatively new and in good condition. This structure has a high potential for disassembly and off-site reuse. All other

buildings are older wooden and wooden-framed sheet metal-clad structures in various conditions that would be demolished. Several pumps and wells are also located on the property and would require abandonment; the pumps would be removed from the wells as part of the abandonment process. All wells will be abandoned in accordance with applicable regulatory requirements. The Black Point Sports Club includes a clubhouse, a residence, numerous large kennels and bird pens, and various sheds. These structures are primarily wooden and wooden-framed and appear in good condition from the exterior. Several water and propane tanks, a drainage pump, and a well are also located on the property. All structures would likely be demolished. The tanks are associated with the BPSC and will be removed in accordance with all regulatory requirements. The well will be abandoned in accordance with applicable requirements. SLT will make every effort to sort and recycle demolition debris to the extent feasible; debris that cannot be recycled will be placed in local landfills.

Both the Dickson Ranch structures and the Black Point Sports Club have numerous large stands of trees near structures and several isolated groves. Tree removal would require felling and limited limbing and bucking to get the trees to near ground level. All trees within the railroad right of way would be removed. It is assumed that all felled trees would remain on site or be harvested by others for firewood without having impacts on the proposed action.

Concrete slabs and foundations would either remain in place or the concrete would be reused on-site and metal debris would be recycled in Vallejo or Richmond, or at another suitable location. Woody debris would be disposed of or reused at Redwood Landfill near Novato or another appropriate landfill.

The equipment used for building and infrastructure demolition would include excavators, dozers, loaders, and a water truck. The debris would be hauled off-site in dump trucks for disposal and recycling. Temporary stockpiling of debris may occur within the area of the former building complexes.

Utility Relocation

In order to accommodate tidal marsh restoration south of the railroad, existing above-ground utility infrastructure (the PG&E power line south of the SMART rail line) would have to be relocated. This would include the removal of approximately 36 PG&E power poles and related lines located within the tidal wetlands area that currently provide power to the Dickson Ranch complex and the Black Point Sports Club.

Power must still be provided to neighboring Tubbs Island and the vineyard, located east of Tolay Creek. The proposed alignment for the replacement power line is shown in Figure 2.2, and would be entirely outside the tidal restoration area. The project proposes a new route that would run parallel to to Highway 37, then along Tolay Creek to Tubbs Island. Power poles would also be located along the north side of the railroad tracks to provide power to the vineyard. The proposed alignment avoids the need to cross Tolay Creek with power lines. If the proposed alignment cannot be implemented, the alternate alignment initially presented in the Draft EIR/EIS would be used, in which poles would run parallel to the SMART line then along Tolay Creek to Tubbs Island. Further consultation with PG&E has indicated that this alignment would require construction of a substantial, tall tower to support the approximately 2,000 feet span required to cross Tolay Creek. It is anticipated that up to 60 new poles and 18 guys (wires used to strengthen the poles and keep them in position) will be required for either new alignment. To facilitate the relocation process, SLT initiated utility relocation consultation with PG&E in November 2008.

A water line running from Infineon Raceway to the BPSC supplies water to the BPSC. Three wells are also present at the site on the NPJV parcel. Two of these wells provide water to Paradise Vineyards, and

one supplies the USFWS Refuge Headquarters as well as numerous cattle troughs. Water lines that are no longer needed would be removed or capped as appropriate.

Stormwater Pump Removal and Relocation

To facilitate tidal restoration south of the railroad, three stormwater discharge pumps currently located on the outboard levee would be removed and replaced with pumps located on the north side of the railroad. The existing pumps include both manually activated and water-level automated activation, and are principally used by local farmers and landowners to drain storm water runoff for all lands within the watershed and to manage groundwater levels on the agricultural fields used for oat-hay dry farming (i.e., no applied irrigation). Currently, stormwater flows through culverts under Highway 37. The stormwater accumulates onsite until it is collected by ditches and conveyed under the railroad embankment to the three pumps located on the perimeter levee, where it is discharged into Tolay Creek and San Pablo Bay. Highway 37 is currently protected from localized stormwater flooding due to the storage capacity of the site. The tidal restoration south of the rail road tracks would significantly reduce the site's storage capacity.

To accommodate the tidal wetland restoration, the existing pump stations would be removed and two new ones constructed adjacent to the berm north of the railroad tracks (see discussion of features north of the rail line, below). The pump stations would convey water through the railroad embankment and into the tidal restoration area. Existing Pump 1 would be eliminated and the drainage ditches within the SMART rail line ROW would be graded to allow gravity flow from Culvert C-53 to the nearest pump station (SP-2) (Figure 2-2).

The existing pumps are also used by local farmers and SLT to manage groundwater levels on the agricultural fields used for oat-hay farming; the new stormwater pump station would provide the same or better groundwater management capability for the areas that will continue to be farmed.

Affected pumps that would be removed include:

- **Pump 1.** A single, small float-activated electric pump permanently installed that drains the eastern portion of Dickson Ranch and some runoff from the adjacent vineyard.
- **Pump 2.** A relatively large float-activated electric pump, permanently installed and two smaller mobile manual-start pumps operated by tractors or other external power sources as backup pumps. The Sonoma Land Trust has upgraded the electric pump due to its poor condition, and continues to maintain it. These three pumps drain the remainder of Dickson Ranch and the eastern portion of the NPJV Parcel.
- **Pump 3.** A single, large manual-start electric pump permanently installed that drains a significant portion of the NPJV parcel on both sides of Highway 37 plus drainage across a neighboring property (the Silva property) along Lakeville Highway.

See pages 2-13 and 2-14 for additional details regarding the modifications to the stormwater conveyance system. New stormwater pump stations would be established northward of either Culvert 15 or Culvert 3 (SP-3), and Culvert 17 (SP-2). It is anticipated that SP-2 and SP-3 would consist of new 50 cfs pumping stations. These pump stations would pump stormwater from lands in between Highway 37 and the SMART rail line across the new flood control levee south of the rail line and into the tidal restoration area.

Pre-Vegetation

Pre-vegetation of the tidal marsh area south of the SMART rail line would be implemented prior to tidal breaching, if feasible. The goals of pre-vegetation would be to:

- enhance surface roughness to reduce water velocity, increase sediment trapping, and enhance conditions for seedling colonization;
- develop root mass to stabilize the existing soil surface; and
- provide seed/nursery sources for tidal marsh vegetation.

Pre-vegetation is be expected to reduce the time required for restoration by five to ten years. The pre-vegetation process is expected to require at least one growing season of non-tidal water management before tidal action is reintroduced to the site. Depending on construction phasing, pre-vegetation may occur in part of the site while construction activities are being completed in the remaining areas. The type of vegetation that would be established has not been determined. While it would be preferable to establish salt-tolerant tidal marsh vegetation such as pickleweed, saltgrass, or alkali-bulrush, or submerged aquatic vegetation such as wigeongrass, it would be difficult to provide sufficient brackish water for irrigation to ensure the establishment of tidal marsh vegetation.

Instead, irrigation would be accomplished using water pumped from ditches and/or onsite wells. Because all types of vegetation would contribute to meeting the first two objectives, any pre-vegetation activities would be considered a benefit for the site.

Because the existing soil surface is subsided below sea level, much of the primary vegetation would be sacrificial after tides are restored. Marsh vegetation established at higher elevations (ridges, mounds, etc.) may persist as live plants, but the fibrous remains of submergence-killed vegetation would likely persist for years and contribute to sediment stability and trapping.

Some active transplanting of alkali-bulrush corms at low density may be undertaken to accelerate its establishment. This may be done by volunteer crews, using abundant local vegetative sources dredged from agricultural ditches on site. Additional mosquito control measures would be developed in coordination with MSMVCD, if needed.

Mosquito Abatement Adaptive Management

Tidal marshes are not generally a large source for mosquito production. However, several species of mosquitoes could potentially breed in the restored tidal habitat. MSMVCD has indicated that excavation of ditches may be required in the restored tidal marsh habitat in the future (once sediments have accreted to marsh plain elevation) to improve water circulation. MSMVCD would perform monitoring of mosquito populations, and, if trigger levels are reached, would determine whether enhanced water circulation may reduce mosquito breeding. Should enhanced water circulation be desirable, MSMVCD would obtain review and approval from USFWS and CDFG and other appropriate agencies to excavate small ditches to improve water circulation.

Railroad to Highway 37—Diked Seasonal Wetlands and Ongoing Wetland-Compatible Agriculture

Agricultural Modifications

On the diked baylands portion of the site that extends from the SMART rail line to Highway 37, the project proposes to retain agriculture and pasture while at the same time enhancing seasonal wetland functions. A portion of these areas totaling 106 acres would be managed as a "wetland priority area", with timing of some agricultural activities optimized for seasonal wetland and wildlife values. The wetland priority area has the highest concentration and best quality of wetlands interior of the existing perimeter levees. Less than half of the wetland priority area actually consists of wetlands; the wetlands are scattered in patches throughout this area.

Areas managed as "agriculture priority areas" would be managed for crop production while maintaining agricultural activities favorable to seasonal wetland enhancement (such as disking).

Freshwater Habitat Enhancement and Stormwater Conveyance System Modifications

Riparian woodland would be established through vegetation planting at the downstream end of the existing culvert under Highway 37 that outfalls parallel to the existing Refuge entrance road (See Figure 2-2). No soil excavation will be conducted in this area.

The three pumps currently located on the perimeter levee would be removed as part of the tidal restoration and replaced by two pump stations (SP-2 and SP-3) located on the north side of the railroad tracks. These two storm water pump stations, located either at Culvert 3 (C-3) or Culvert 15 (C-15) and also at Culvert 17 (C-17), would be constructed at the southern side of the diked baylands segment north of the railroad embankment (Figure 2-2). It is estimated that these electrically-powered pumps would each discharge 35 cubic feet per second (cfs). A third pump station, SP-1, was proposed for placement at Culvert 53, however, based on subsequent discussions with the adjacent landowner, this pump would not be constructed, and the existing drainage system would instead be recontoured to the extent necessary to allow gravity flow of water from this area to the other two pump stations. Ditches within the SMART right-of-way would be improved to provide drainage within this area. An estimated total of 2,500 feet of conveyance ditches currently exist on the diked baylands between Highway 37 and the railroad tracks.

The two proposed pump stations would convey stormwater that previously flowed by gravity onto the Dickson property from lands in between Highway 37 and the SMART rail line through the existing, or if deemed necessary by SMART, upgraded culverts in the railroad embankment and through the new flood control levee south of the rail line and into the tidal restoration area. The equipment expected to construct these new pump stations and associated features would include service trucks, an excavator or backhoe, generators and welders, and concrete trucks.

Detention basins would be constructed at both pump stations to help compensate for reduced storage capacity within the project area, and facilitate water conveyance to the pumping facilities. The detention basins would be located to avoid or minimize potential impacts on delineated wetlands. Each pump station would be designed to accommodate a range of storm events. The system as a whole would be designed to provide protection equal to or greater than existing conditions as well as from a 24-hour, 100-year rainfall event.

The detention basins would have an invert (bottom) elevation equal to or lower than the ditches flowing into to them. The shape of the detention basins would be irregular and their side slopes would be gently

graded to encourage habitat development. However, the primary purpose for the detention basins would be stormwater detention and pumping, and routine maintenance of seasonal wetland vegetation within the basins would be performed as needed to maintain the capacity of the basins. Maintenance would also be performed on other parts of the stormwater conveyance system, and would include removal of debris and excessive sediment build-up that interferes with stormwater flow. All maintenance would be performed in accordance with applicable permits.

Excavation of the detention basins is estimated to generate 12,000 CY of excavated soil each. This soil would likely be used to build other project features such as levees and berms near this site. The equipment used to excavate these basins would include an excavator and off-road trucks or scrapers and bull dozers. At maturity, the bed of the detention basins could support wigeongrass, which is widespread and abundant in existing ditches. Thus, they would have the potential to support numerous wildlife species, including California red-legged frogs. The pond would also provide stormwater detention and would serve as the sump pond for the new pump P-2. Outside the wet season, this pond would not be pumped, and would likely incidentally create conditions suitable for California red-legged frog. Maintenance of the detention basins would be completed in September/October, which is outside of the breeding season and after larval metamorphosis, for California red-legged frogs. If maintenance were necessary at other times, a USFWS-approved biologist would conduct surveys for California red-legged frogs, and maintenance would be performed only if no red-legged frogs were detected.

Access Road

An access road would be constructed from Reclamation Road to the USFWS San Pablo Bay NWR headquarters (Figure 2-1). The access road would be constructed by raising a portion of Reclamation Road, and extending Reclamation Road. The primary purpose of the access road is to allow school and tour buses signalized site access, as visitor usage is expected to increase over the coming years.

Wet weather vehicular access would be provided to both pump locations to allow for maintenance. The access road would also serve maintenance vehicles for the portion of the alignment parallel to the SMART rail line. From the point where the access road diverges from the railroad tracks towards the Refuge headquarters, a maintenance access road would be constructed. The access road would continue parallel to the railroad tracks and extended east to the pump station at Culvert 17 (C-17) in order to allow access to both pump locations in wet weather, and a vehicle turnaround would be included at its eastern terminus at the C-17 pump station. Most construction activities would occur outside of the SMART ROW. A trail or berm would be built on the north side of approximately 4,450 feet of the existing roadway at an elevation of +3 feet NAVD extending beyond the existing private rail line crossing to protect low spots in the existing road. The new segment of the access road would then turn north/northeast for 3,700 feet, terminating at the Refuge Headquarters. A 4,500 foot maintenance road would extend from the turn in the access road to the eastern property boundary.

The improved roadway section would have an approximately 26-foot top width and 2:1 to 3:1 side slopes. Trail Segment 5a, discussed below, would parallel the new access road, and would be separated from the access road by a 2-foot vegetated buffer. The access road would require an estimated 9,000 CY of material to construct, and the maintenance road would require an estimated 9,000 CY of material. The equipment used to construct these roads would include dozers, compactors, and water trucks.

SLT may close two of the three existing private rail crossings and, with approval of the California Public Utilities Commission (CPUC), make the remaining rail crossing into a public rail crossing. SMART may also convey two parcels (approximately 1.86) acres to SLT.

Utility Relocation

As discussed previously, the existing above-ground utility infrastructure south of the SMART line would need to be relocated so as not to impede tidal restoration of that area. The project team in consultation with PG&E is proposing a route that would run parallel to the SMART line.

New poles would be located along the north side of the railroad tracks to provide power to the vineyard to the east of Sears Point. PG&E typically removes and/or improves any poles and lines they own. Pole relocation work within the project area would likely require two or three trucks and a crew of 6, and could take one week or less to complete. In addition, new poles would be located along the Vallejo Sanitation District access road to provide power to several buildings as well as a pump along Tolay Creek

Bay Trail System

Trail Segments

The discussion of proposed trail segments is based on information presented in the Final Bay Trail Feasibility Study, prepared for the Proposed Project by Questa Engineering in December 2008. As part of the restoration effort, SLT would attempt to partially bridge the gap between two disconnected segments of the San Francisco Bay Trail by constructing one or more trail alignments across the Sears Point property, as well as providing additional trails on the property if funding allows. Up to five trail segments are proposed for the project, and would be constructed if funding is available. The design features of each segment are summarized in Table 2-1, and proposed trail routes are shown in Figure 2-10a and 2-10c.

Segment 1 is the only segment that has been proposed and adopted as part of ABAG's Bay Trail Plan. All other segments are optional alternate alignments that are not part of the Bay Trail Plan or the Sonoma County Parks Sonoma Bay Trail Corridor Plan. Nonetheless, these alternate alignments achieve the primary purpose of the Bay Trail, in that they connect two existing segments of the Bay Trail, and are located in the vicinity of the Bay margin. Segments 1 and 5/5a would be prioritized based on available funding during construction.

A graded earthen pad adjacent on the north side of the rail line would provide parking for visitors utilizing Segment 1. The parking area would be located in the vicinity of the public crossing, and would provide a firm and stable surface and designated parking spaces consistent with ADA requirements. The exact location would be determined in coordination with SMART. The total number of parking spaces would not exceed 15.

Table 2-1. Summary of Trail Segment Design Features

Trail Segment	Segment Length (feet)	Trail Surface Types
1	13,340	12-foot wide, compacted aggregate base
2	6,400	10-12-foot wide, compacted aggregate base; boardwalk/bridge as needed to cross restored swale
3	7,000	10-12-foot wide, compacted aggregate base; boardwalk/bridge over wetlands
3A	1,920	10-12-foot wide, compacted aggregate base(emergency access road/spur trail)
4	6,000	10-12-foot wide, compacted aggregate base
5/5a*	10,000	10-12-foot wide, compacted aggregate base; boardwalk/bridge as needed over wetlands paralleling access road with 2-foot vegetated buffer between trail and road

Source: Questa Engineering 2007, as amended.

All Segments

All trails would conform to Bay Trail Design Guidelines for multi-use trails, if feasible, and would be fully compliant with the Americans with Disabilities Act (ADA) access guidelines wherever feasible (i.e., provide a firm, stable surface for trails). An exception would be that Bay Trail Design Guidelines for multi-use trails specify asphalt, and the trails proposed for the project would have a more natural surface of compacted aggregate base rather than asphalt. Trails would have a maximum gradient of 5% in most places, and would generally be elevated slightly above existing grade, with a cross slope of 2% to provide drainage.

In general, trail segments would be designed so as to provide sufficient width and clearance for emergency, patrol, and maintenance vehicles, as well as to accommodate pedestrians, bicycles, and other non-vehicular traffic moving in two directions. In places where the trail is located near an existing road, the trail would be flanked by a divider to separate trail users from vehicular travel, where feasible. Trails running parallel to the SMART rail line would be set back a minimum of 50 feet from the centerline of the track to be consistent with standard rail-compatible trail design and ensure that they remain outside the SMART right of way.

Construction materials for the Bay Trail segments would be similar to those used on the Sonoma Baylands trail to the west. These materials would typically be delivered to the Proposed Project by on-highway trucks.

The equipment used to grade and surface the Bay Trail segments would include dozers, road graders, compactors, smooth rollers, a backhoe and a water truck and possibly paving machines. In general, this equipment will be smaller in size and horsepower than the equipment used for other features of this project.

All crossings, signage, benches, and related features would likely be completed after paving. The schedule for modifications to the existing SMART railroad grade and Highway 37 crossings is dependent on review and approval from the responsible agencies.

Barrier posts at trail intersections and entrances would be necessary to restrict vehicle access. Removable bollards would be installed at trail locations to maintain access control and to accommodate entry by maintenance, law enforcement, or emergency services vehicles.

Segment 1
Segment 1 is the highest priority segment. It would be a 2.6-mile (13,340-foot) Bay Trail spine and would connect with the existing Sonoma Baylands trail to the west. This segment would also include an at-grade crossing of the SMART rail line at Reclamation Road. The trail would be constructed on top of the proposed new levee, and would be designed as an all-weather pathway, capable of accommodating pedestrians, bicycles, and emergency vehicles. Seasonal closures, if necessary to protect federal and state endangered species, would be at the discretion of the future property owners, USFWS and CDFG.

Because of the need to meet the above requirements, the alignment would consist of a 12-foot wide surfaced trail, with turnouts located in key areas. Construction of this segment would require approximately 3,000 CY of AB for the trail, shoulders, turnouts, and ramps. It is also expected that the trail would be designed with a vehicular load rating sufficient for access by maintenance and emergency services staff, with a minimum weight capacity of 10,000 pounds.

In order to provide a connection from the Bay Trail spine to the Sears Point Ranch Headquarters north of the SMART rail line, the project could potentially utilize the at-grade crossing currently located at the bend in Reclamation Road south of Highway 37, or another agreed upon location. Vehicular emergency response to the south of the SMART tracks would also utilize the existing at-grade crossing at Reclamation Road, or another agreed upon location.

The at-grade crossing would have safety signage, crossing improvements, and warning devices similar to the crossing at Sonoma Baylands, as required. Fencing and barriers would be installed to funnel trail users to the crossing location, to avoid unregulated crossings and entry into the agricultural fields on the north side of the railroad tracks. All signs, safety markings, and other improvements would conform to the Manual of Uniform Traffic Control Devices (Caltrans 2010).

Segment 2
Segment 2 is an optional segment that would be constructed if funding becomes available. It would consist of a 1.2-mile (6,400-foot) connector trail along Reclamation Road and Highway 37 to the Sears Point Ranch and would include a bridge or boardwalk to cross a restored swale area. The alignment would consist of a 10- to 12-foot wide trail (with a minimum 8-foot surfaced section), with turnouts located in key areas. Construction of Segment 2 would require approximately 800 CY of AB for the trail, shoulders, turnouts, and ramps. Additionally, to avoid trail user/habitat conflicts in the seasonal wetland area north of the SMART rail line, the project would provide elevated passage by means of a bridge, boardwalk, or culvert over seasonal wetlands and ditches, to the extent feasible, based on the wetland delineation (Ducks Unlimited 2010 and 2012) (Figure 2-10a and Figure 2-10c).

If implemented, the bridge would be approximately 8-10 feet wide, and would consist of a prefabricated steel clear-span design capable of providing pedestrian and bicycle access, while also supporting occasional emergency access by ATVs, or other light vehicle access. Bridge abutments would typically be constructed on concrete piles or piers driven or drilled to a minimum depth of 20 feet. All construction activities would occur outside of the swale, and after the seasonal wetlands have dried out and agricultural activities have resumed.

If a boardwalk is used, it would connect to the adjacent grade with approach ramps constructed of engineered fill at a maximum 5% slope.

Segment 3
Segment 3 is an optional segment that would be constructed if sufficient funding is available. Segment 3 would consist of a 1.3-mile (7,000-foot) connector trail from the eastern end of Segment 5 to the ranch headquarters. This segment would include a 0.4-mile (1,920-foot) spur trail (3A) to the highest lands south of Highway 37 (Figure 2-10a and Figure 2-10c). Segment 3 would require approximately 900 CY of AB for the trail, shoulders, turnouts and ramps. The design of Segment 3 and the boardwalk would be similar to that described above for Segment 2.

Segment 3A would provide an emergency access connection to the Paradise Vineyard parcel to the east. As such, it is expected that the trail would be designed with a vehicular load rating sufficient for access by emergency vehicles. Similar to the levee top Bay Trail (Segment 1), Segment 3A would consist of a 10- to 12-foot wide trail (with a minimum 8-foot surfaced section), with turnouts located in key areas. This segment would require approximately 210 CY of AB for the trail, shoulders, turnouts, and ramps.

Segment 4
Segment 4 is an optional segment that would be constructed if sufficient funding is available. Segment 4 would consist of a 1.1-mile (6,000-foot) loop trail north of Highway 37 that would originate at the ranch headquarters and utilize an existing/improved cattle crossing under Highway 37. The alignment would consist of a 10- to 12-foot wide trail (with a minimum 8-foot wide surfaced section), with turnouts located in key areas. Segment 4 would require approximately 750 CY of AB for the trail, shoulders, turnouts, and ramps.

In order to access northern portions of the site, the existing cattle crossing under Highway 37 would be retrofitted to provide pedestrian access. The undercrossing would require regrading of the existing 150-foot long approach ramps to ensure a maximum 5% slope. The trail extending between the approach ramps would be approximately 8 feet wide and would have 8.5 feet of vertical clearance to accommodate pedestrians and bicyclists; however, it would be too narrow for vehicle access. The floor of the undercrossing and the approach ramps below grade would consist of reinforced concrete with associated drainage facilities.

Segment 5
Segment 5 would be an approximately1.9-mile (10,000-foot) trail constructed north of and parallel to the SMART rail line, extending from the current terminus of Reclamation Road to the eastern project boundary. A 3,600-foot segment referred to as Segment 5a (Figure 2-10a and Figure 2-10c) would commence approximately 2,500 feet eastward along Segment 5, turning north/northeast, paralleling the access road and terminating at the Ranch Headquarters. Segment 5 would consist of a 10- to 12-foot wide trail (with a minimum 8-foot wide surfaced section), with turnouts located in key areas. This segment would require approximately 1,300 CY of AB for the trail, shoulders and ramps. A portion of the trail/roadway would also serve as an extension of Reclamation Road to serve the proposed pump stations.

Construction Schedule

All construction is expected to occur over a two-to three-year period with a construction window between April and December, or as feasible based on weather. Construction activities would be implemented to ensure compliance with regulatory requirements.

The first year of construction would include the initial stage of construction for the new levee, excavation of contaminated soil, the removal of the existing buildings, stormwater conveyance system, and excavation for the tidal marsh features south of the rail line. The second year would include completing the new levee construction, completing the storm water conveyance system, constructing tidal marsh

features, and road and trail features. Prevegetation of the site is anticipated during the third year, at the end of which perimeter levees would be lowered, the Connector Channel to San Pablo Bay would be excavated, and Breaches 1 and 2 would be excavated. Depending on the rate and location of construction activities, pre-vegetation may also be accomplished in portions of the property during years 1 and 2, potentially allowing completion of restoration construction in Year 2.

Operation and Maintenance

Operations and maintenance activities will be limited in scope and effect.

South of Highway 37—Tidal Marsh

The primary operations and maintenance activities related to tidal restoration south of the rail line are levee maintenance, vegetation management, and mosquito control. Minor levee repairs using stockpiled soil may be performed if necessary; however, the levee will not be raised further to accommodate sea level rise. Weed inspections and interim weed control via spot-spray herbicide and/or mowing may be conducted primarily along the levee shoreline. A mosquito abatement program would be established by CDFG in coordination with MSMVCD as needed.

During tidal marsh succession, maintenance would focus on invasive weed inspection, detection and removal, through the summer and fall, focusing on June and October, during peak flowering of principal weeds, as funding allows. Annual shoreline inspections for hazardous or nuisance debris, such as flotsam including boat docks, creosote-treated pilings or lumber, oil-contaminated debris, and plastic refuse, would be conducted.

Railroad to Highway 37—Diked Seasonal Wetlands and Ongoing Wetland-Compatible Agriculture

Operation and maintenance activities within the remaining diked baylands would primarily involve vegetation management within restoration areas, maintenance of the stormwater conveyance system including culverts and ditches, maintenance of the stormwater pumping stations, and mosquito control. Maintenance of the agricultural wetlands will include yearly discing of the soils to control invasive non-native plants. Vegetation management and mosquito abatement in the area owned by USFWS would be conducted in accordance with the Comprehensive Conservation Plan. Mosquito abatement would be subject to the Mosquito Management Plan.

Stormwater Conveyance System
In order to assure that existing levels of flood protection are provided, the stormwater conveyance system would require the following regular maintenance activities.

- Maintenance of the Stormwater Pumping Stations – The stormwater pumps would be serviced as necessary and as funding allows.
- Maintenance of the Culvert and Ditches – The various culverts and ditches that comprise the Sears Point stormwater conveyance system would require regular maintenance to remove debris and excessive sediment build-up that interferes with stormwater flow. Maintenance of culverts and ditches would be performed as necessary as funding allows.

Trails
Trail operations and maintenance would be performed as necessary and as funding allows.

Attachment B: SWPPP; Mercury Monitoring; and Avoidance and Conservation Measures to Mitigate for Project Impacts for the Sears Point Restoration Project, San Pablo Bay.

In cooperation with California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS), the Sonoma Land Trust (SLT) is seeking to restore tidal wetlands and rehabilitate diked wetlands and upland habitats for a wide range of species, to protect open space, and to develop public access and educational opportunities, including extending the San Francisco Bay Trail. The Sears Point Project has been designed to minimize impacts to wetlands and waters of the State, with a tremendous net increase in the surface area of wetlands and waters of the State after project implementation of more than 38,200,000 sq. ft. (877 acres).

An Environmental Impact Statement/Report was prepared for the Sears Point Wetland and Watershed Restoration. Avoidance of impacts will be completed through a combination of adaptive management and mitigation measures. A copy of the Final Environmental Impact Statement/Report is also available on the Project website (http://sonomalandtrust.org).

Potential for Accidental Pollutant Discharge into the Waters of the State

This project could have the potential for accidental fuel and lubricant discharges into the Bay associated with the use of construction equipment and potentially maintenance equipment long-term. A Storm Water Pollution Prevention Plan (SWPPP) would be prepared for this project. The SWPPP would be prepared prior to beginning construction activities and detail the structural and procedural control measures that would be implemented by the contractor during construction activities to address soil stabilization, sediment control, sediment tracking control, wind erosion control, non-storm water discharge management, and waste management and disposal control practices. The SWPPP would specify soil and material storage locations and the control measures to be implemented at those locations to prevent conveyance of material into water bodies. The SWPPP would be consistent with Caltrans' stormwater permit for any work near Highway 37.

The SWPPP would also outline measures to be taken and Best Management Practices (BMPs) to be implemented to control and prevent, to the maximum extent practicable, non-storm water discharge of pollutants to surface waters and ground water. In addition, the SWPPP would have a plan for responding to and managing accidental spills during construction. The SWPPP would address overall management of the construction project such as designating areas for material storage, equipment fueling, and stockpiles.

Construction contractors working on the project would be contractually required to provide their employees with enhanced spill prevention and response training, to have spill response equipment available at the job site, to provide double containment for any hazardous materials or wastes at the job site, to be prepared to respond to any spill immediately, and to fully contain spills at the Site, including any open-water areas. The project sponsors would ensure that a site-specific health and safety plan is developed and implemented by the contractor as part of contract specifications.

Potential for Methylation of Mercury

Methylation of mercury is a potential effect resulting from wetland restoration projects. Mercury can be introduced to wetland projects through atmospheric deposition and through transport of mercury-laden sediments from upstream. Through a process that is not completely understood, sulfate-reducing and

iron-reducing bacteria in wetland sediments can transform elemental mercury into toxic methyl mercury, which can accumulate at higher levels in the food web. The mobility of mercury in the aquatic environment positively correlates with high acidity (low pH) and high dissolved organic carbon levels (USGS 2000). Methyl mercury is also subject to degradation into less toxic forms by microbial action and sunlight (USGS 2000). As discussed below, methylation of mercury is unlikely to be a concern at the site in the long-term; however, there may be a short-term, initial increase in methyl mercury production when the site is first opened to tidal action.

Recent work by Slotton et al. (Slotton 2008) has shown that episodically-flooded wetlands can give rise to short-duration (dissipating within one season) increases in methyl mercury production. However, any increase in methyl mercury production associated with the restoration of the Sears Point site would occur as the site is initially flooded and would be a one-time occurrence (i.e., the conditions during this one-time event would be the same as for an episodic flood in episodically-flooded wetlands). As shown by Slotton's work conducted in the Napa-Sonoma Marshes, opening ponds to tidal action in this area has in fact resulted in a small decrease in methyl mercury concentrations in biota. Consequently, it is possible that there will be an initial, short-term spike in methyl mercury in biota; however, this would be temporary. The potential spike, if any, would be an unavoidable consequence of flooding the former farmland.

Available information suggests that the long-term mercury methylation impacts of the restoration project would not pose a concern. In a study of the Hamilton Wetland Restoration Project, the U.S. Army Corps of Engineers (USACE 2007) tentatively concluded that "marsh restoration does not provide evidence for increased bioavailability." Preliminary information suggests that methylation is less likely to occur in permanently flooded environments, and more likely to occur under sequential drying and flooding conditions (Best et al. 2005). This finding is supported by the work done by Slotton et al. studying methyl mercury concentrations in biota (biosentinel fish). Methyl mercury concentrations in the Napa Sonoma Marshes, including the fully-restored Pond 2A were among the lowest in the entire study area. The study area extended from the Petaluma River east to the upper watersheds of the Sacramento/San Joaquin Delta (Slotton 2008). These findings suggest that during the development of the site to tidal marsh, production of methyl mercury would be low. Furthermore, in the study of restored marshes around San Pablo Bay, researchers found that methyl mercury production was lower in vegetated sediments than in bare sediments (Best et al. 2005), which is consistent with Slotton's findings regarding methyl mercury effects from brackish to salty tidal marshes.

Due to the uncertainties regarding mercury methylation and bioaccumulation processes, potential methyl mercury production in the action area is best managed adaptively. SLT and/or its successors in interest, CDFG and USFWS, will develop a methyl mercury adaptive management plan. The methyl mercury adaptive management plan will be developed in collaboration with other agencies with jurisdiction over contaminants in the Bay, and will include review by a Technical Advisory Committee or Group; preferably an existing group that includes representatives from multiple agencies and projects, such as the South Bay Salt Pond Project Technical Advisory Committee.

The methyl mercury adaptive management plan will include a methyl mercury monitoring plan as well as triggers for further action. To evaluate the potential effects of the proposed action on mercury in biota, methyl mercury monitoring will focus on biota, with an emphasis on resident sentinel species, preferably biosentinel fish. The monitoring will be coordinated with other methyl mercury biological monitoring conducted as part of the Regional Monitoring Program (RMP), and any other methyl mercury monitoring efforts that may be implemented in the North Bay during the designated monitoring period for the proposed action.

The plan will be developed by USFWS, CDFG and/or SLT in consultation with the responsible regulatory agencies implementing and permitting other wetland restoration projects in the Bay (such as RWQCB, BCDC, Corps, NMFS, and U.S. EPA). Staff of these agencies will be invited to be part of the

adaptive management team to guide development of the plan; determine the duration, frequency of monitoring, constituents to be monitored, and monitoring protocols; and develop corrective actions as needed to minimize potential adverse effects of methyl mercury.

The methyl mercury adaptive management plan will be modified as necessary to reflect increased understanding of mercury cycling in San Francisco Bay.

Effects to Plant and Wildlife Species

Proposed Mitigation Incorporated into the Project Design

Many of the mitigation measures from the *Sears Point Wetland and Watershed Restoration Project Final Environmental Impact Report/Environmental Impact Statement* (Sonoma Land Trust 2012) have been modified and incorporated into the Biological Assessment submitted to the U.S. Fish and Wildlife Service as conservation measures. Each of these measures has been given a unique and sequential reference number. The conservation measures were divided into site-wide and specific conservation measures. Site-wide measures are described first, followed by specific measures for tidal marsh and tidal marsh-dependent species, CRLF, and special-status fish. These measures will be incorporated into the project design when finalized in the Biological Opinion that is currently in process with USFWS. Draft measures are presented below.

Site-wide Conservation Measures

Conservation Measure 1: Conduct a Biological Resources Education Program for Construction Crews and Provide an On-site Biological Monitor, if Necessary

Before any work occurs in designated construction areas, a qualified biologist will conduct mandatory environmental education program for construction personnel regarding state and/or federally listed species that could potentially occur on-site or within the action area (e.g., California red-legged frog, California clapper rail, Western snowy plover, salt marsh harvest mouse, steelhead, Chinook salmon, and green sturgeon). The environmental education program will include a description, representative photographs, and legal status of each of federally listed species; terms and conditions of the; and the penalties for not complying with biological conservation measures.

The program will cover the restrictions and guidelines that must be followed by all construction personnel to avoid or reduce effects on federally-listed species during project implementation. SLT will ensure that the contractor and its personnel adhere to the guidelines and restrictions. All construction workers will be required to receive the training. When new workers are added to the crew, they will receive the training before being allowed to work on-site. Restrictions and guidelines that must be followed by construction personnel are listed below.

- Construction personnel will adhere to designated work zones and will not go outside these boundaries. All construction work areas will be marked to ensure that activities are confined to work zones and sensitive habitat areas are avoided.

- Project-related vehicles will observe the posted speed limit on hard-surfaced roads and a 15-mile-per-hour speed limit on unpaved roads in the action area. Off-road vehicle traffic outside designated construction areas will be prohibited.

- The contractor will provide closed garbage containers for the disposal of all food-related trash items (e.g., wrappers, cans, bottles, food scraps). All garbage will be removed daily from the project site. Construction personnel will not feed or otherwise attract wildlife to the project area.

- No pets or firearms will be allowed in the project area.

- To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service vehicles or construction equipment outside designated areas.

- Any worker who inadvertently injures or kills a federally-listed species or finds one dead, injured, or entrapped will immediately report the incident to the resident inspector or on-site biological monitor. The resident inspector or monitor will immediately notify the SLT, who will provide appropriate notifications to the USFWS Endangered Species Office in Sacramento, California, and CDFG. SLT will also notify USFWS of any unanticipated harm to any federally listed species associated with the proposed action.

- All construction equipment and materials that are stored at a construction site will be inspected before being used or moved. If wildlife species are present, they will be allowed to exit on their own without being handled.

- Once the Project is completed, all unused material and equipment will be removed from the action area.

- All hazardous materials, such as fuels, oils, solvents, etc., will be stored in sealable containers in designated locations that are at least 100 feet away from drainages or other aquatic habitats. All fueling and maintenance of vehicles and other equipment will occur within designated areas or at least 100 feet away from drainages or other aquatic habitats. In situations where this is not physically possible (e.g. the marine environment), refueling will be conducted in accordance with existing marine refueling standards to prevent potential fuel or chemicals from entering water bodies.

- Construction that must use lighting will minimize glare and focus the lights downward to reduce the potential effects to wildlife from light and glare.

In addition to the education program for construction workers, personnel from USFWS and CDFG, or their designee, will be present as necessary to conduct sensitive species surveys, ensure compliance with biological protection measures, and provide general biological oversight of the project construction activities.

Conservation Measure 2: Implement Water Quality Control Measures during Project Construction
SLT and its contractors will comply with conditions of construction permits from regulatory agencies, including the SFRWQCB, to protect beneficial uses of water resources. The project will comply with permit conditions to prevent degradation of water and sediment quality due to release of construction-related pollutants.

Conservation Measure 3: Implement a Hazardous Waste Spill Prevention and Control Plan
To minimize the potential for, and the effects of, spills of hazardous, toxic, or petroleum substances during construction in the project area, a Hazardous Materials Spill Prevention, Control, and Countermeasure Plan will be prepared. The plan will describe storage procedures and construction site housekeeping practices and will identify the parties responsible for monitoring and spill response. The measures and monitoring procedures required under the General Construction Permit will minimize the potential for release of hazardous materials to the environment. SLT, CDFG, and/or USFWS will routinely inspect the action area to verify that the BMPs specified in the plan are properly implemented and maintained.

Conservation Measure 4: Storm Water Management
A Storm Water Pollution Prevention Plan (SWPPP) and a Stormwater Monitoring Program will be developed and implemented as part of the construction effort. The SWPPP would specify appropriate BMPs to prevent potential run-off of soils and chemicals from the construction areas into sensitive areas within the action area. No fueling or refueling will be allowed within the interior of the existing perimeter levee within 100 feet of water bodies and the contractor would designate specific area(s) to be used, typically in a previously disturbed area. Refueling located outside of the perimeter levee would be conducted in accordance with existing marine refueling standards to prevent potential fuel or chemicals from entering water bodies.

Conservation Measure 5: Noise Avoidance and Minimization Measures
Noise avoidance and minimization measures would be implemented as necessary to avoid adverse effects on wildlife. Where feasible, construction activity will be scheduled to avoid the breeding seasons for species whose mating is dependent on vocalization. Other measures that may be implemented if appropriate and where feasible include:

- Locating construction equipment staging area, material-handling areas, and stationary construction equipment as far away as possible from sensitive species foraging, nesting, or breeding habitats
- Selecting or contractually specifying the use of lower noise equipment
- Adding mufflers on construction equipment, generators, and vehicles
- Installing temporary barriers (shielding) around stationary construction noise sources
- Scheduling construction activities to start before nesting season and discouraging use of the property by nesters that may abandon their nests after construction starts
- Scheduling activities after nesting season is over to avoid nest abandonment

Conservation Measure 6: Use Local Soil or Sediment or Comply with SFRWQCB Wetland Surface/Foundation Criteria for Placement of Soil or Sediment within Future Tidal Areas
Soil or sediment to be used in project features that are within three feet of the surface within the future tidal area shall be from locations within or adjacent to the action area, or if imported, will meet the standards for wetland surface material in the SFRWQCB Draft Guidelines (RWQCB 2000). Table 2-2 identifies screening criteria required for acceptability of imported dredge material to be used as wetland surface and wetland foundation material. Material used in constructing features within future tidal areas deeper than three feet below the surface shall be from locations within or adjacent to the action area, or shall meet the standards for wetland foundation material if imported.

Table 2-2 also includes criteria provided by USFWS for dioxins and furans. San Francisco Bay is considered impaired due to dioxins and furans in several fish species. Sediments in the Bay have not been systematically analyzed for dioxins and furans, so the locations of hotspots for these constituents have not been determined. Due to these circumstances, any dredged materials brought to the site from outside the action area may be screened for dioxins.

Chemical concentrations and associated sampling plans for dredged material or soils from outside the action area planned for use on-site will be reviewed and approved by CDFG and USFWS.

Table 2-2
Dredged Material Screening Criteria (RWQCB 2000)

Constituent	Wetland Surface	Wetland Foundation

Inorganics	(mg/kg)	(mg/kg)
Arsenic	15.3	70
Cadmium	0.33	9.6
Chromium	112	370
Copper	68.1	270
Lead	43.2	218
Mercury	0.43	0.7
Nickel	112	120
Selenium	0.64	
Silver	0.58	3.7
Zinc	158	410
Organics	(µg/kg)	(µg/kg)
PAHs, total	3,390	44,792
Chlordanes, total	2.3	4.8
DDTs, total	7.0	46.1
Dieldrin	0.72	4.3
PCBs, total	22.7	180
Dioxins (total TCDD TEQ)	0.02	0.02

Conservation Measure 7: Avoid or Minimize the Introduction or Spread of Noxious Weeds
To avoid or minimize the introduction or spread of noxious weeds, the following measures will be incorporated into the proposed project plans and specifications for the project construction sites:

- Certified, weed-free, imported erosion-control materials (or rice straw in upland areas) will be used.
- Construction supervisors and managers will be educated by the biological monitor about noxious weed identification and the importance of controlling and preventing their spread. The biological monitor will conduct a tailgate meeting before construction at which handouts identifying noxious weeds will be distributed and workers will be briefed on the techniques used to prevent their spread.
- To reduce the movement of noxious weeds into uninfested areas, the contractor will stockpile and cover topsoil removed during excavation.

Conservation Measure 8: Survey for Special-Status Plants
Special-status plant surveys will be conducted prior to initiating construction. Locations of special-status plants in proposed construction areas will be recorded using a global positioning system (GPS) unit and flagged. Surveys shall be timed so that plant surveys occur during the flowering periods of the potential species of interest.

If initial screening by a qualified biologist identifies the potential for special-status plant species to be directly or indirectly affected by work in a specific project area, the biologist will determine appropriate protective measures to minimize the impact to the plant species. These measures may include, among others, establishing an adequate buffer area to exclude activities that would directly remove or alter an identified special-status plant population or result in indirect adverse effects on the species' habitat, gathering seed, or relocating individual specimens. Any established buffer areas will be clearly marked by a qualified biologist to prevent encroachment by construction vehicles and personnel.

Conservation Measure 9: Replace Special-Status Plants.
If direct impact or loss of special-status plants is unavoidable, SLT or USFWS and CDFG as successor property owners will replace lost species to the extent practicable, following an agreed-upon revegetation

plan designed by USFWS and CDFG. SLT or USFWS and CDFG will monitor revegetation efforts as deemed appropriate.

Conservation Measure 10: Signage
The Bay Trail spine would be located on the new levee, and could therefore result in individuals straying off the trail into sensitive habitat. In addition, one segment of additional trail, south of Highway 37 and north of the railroad tracks, would be located near wildflower fields that may contain a limited number of individuals of *Viola pedunculata*, the host plant for the federally endangered Callippe silverspot butterfly. There is the potential for trampling of host plants by hikers that walk off the trail. In addition, trail users may bring dogs to the trail. To avoid or minimize the likelihood of effects on sensitive habitat, signs will be placed along the Bay Trail and other trail segments informing users of the need to remain on trails, maintain their dogs on leash and use trash receptacles. Signs will include information describing the sensitive habitat and the importance of remaining on the trail and observing other requirements of trail use.

Specific Conservation Measures for Existing and Future Tidal Marsh Areas and Tidal Marsh Species

Conservation Measure 11: Prevent the Introduction of Non-Native Tidal Vegetation During Construction and Restoration Activities.
To prevent the introduction of non-native, invasive tidal vegetation including cordgrass (*Spartina alterniflora and hybrids*), perennial pepperweed (*Lepidium latifolium*) and stinkwort (*Dittrichia graveolens*), during construction and restoration activities, the following measures will be implemented:

- A qualified botanist will conduct a non-native plant assessment of areas subject to construction activities and will recommend specific measures to minimize spread of non-native species. Measures may include the establishment of wash stations for construction vehicles and equipment to clean tires of weed seeds and other propagules before they are moved offsite, and the development of an herbicide spray program to control perennial pepperweed or other invasive weed infestations prior to construction.

- Restoration areas will be monitored for infestation of invasive plants, such as non-native cordgrasses, perennial pepperweed, stinkwort, and/or other potentially invasive species. All infestations occurring within wetland habitats will be controlled and removed to the extent feasible. A long-term monitoring plan will be developed and implemented by USFWS and CDFG.

Conservation Measure 12: Ensure Establishment of Tidal Salt Marsh Habitat within 5 Years of Project Completion.
SLT or USFWS and CDFG as successor property owners shall monitor the restoration site following completion of restoration construction to ensure that, at minimum, impacted tidal salt marsh habitat is replaced at a 3:1 ratio within 5 years of completion of the proposed action. If SLT conducts the monitoring, SLT will report to USFWS and CDFG on the status of monitoring once a year during the 5 years following project completion. Once the target acreage of tidal marsh habitat has developed, SLT will notify USFWS and CDFG that the compensation ratio has been satisfied. If the required ratio is not achieved within the first 5 years following project completion, SLT will consult with USFWS and CDFG to determine the causes for the delay in tidal marsh development, and will work with USFWS and CDFG to develop and implement appropriate adaptive management activities.

Conservation Measure 13: Avoid Operation of Equipment in the Outboard Tidal Coastal Marsh during the Breeding Period of the California Clapper Rail (February 1 to August 31)
California clapper rails are known to occur adjacent to the project site and restoration activities will occur in suitable habitat areas. Measures to avoid and minimize impacts to California clapper rails include the following:

- To minimize or avoid the loss of individual rails, activities within or immediately adjacent to tidal marsh areas will be avoided during the rail breeding season from February 1 through August 31 each year unless surveys are conducted to determine that rail locations and rail territories can be avoided, or that the proposed work area is determined to be unsuitable rail breeding habitat by a qualified biologist.
- If breeding rails are determined to be present, activities will not occur within 700 feet of an identified calling center. If the intervening distance across a major slough channel or across a substantial barrier between the clapper rail calling center and any activity area is greater than 200 feet, then the activity may proceed at that location within the breeding season. If rails are located, SLT will consult with USFWS and CDFG to determine what, if any, additional conservation measures may be required to allow construction to proceed.

Conservation Measure 14: Time Levee Lowering to Avoid Extreme High Tides
Approximately 6,850 ft of the levee bordering Tolay Creek and San Pablo Bay will be lowered to between MHHW and one foot above MHHW. This portion of the levee top and flanks currently supports upland vegetation dominated by weedy species such as mustard (*Brassica* spp.) but may be used as upland refugia by California clapper rails and salt marsh harvest mice during extreme high tides. In order to avoid the direct injury and mortality of individual clapper rails and salt marsh harvest mice, and reduce harassment, levee lowering activities adjacent to tidal marsh habitat will not occur within two hours before or after extreme high tides (6.5 feet NAVD or above, as measured at the Golden Gate Bridge), or when the marsh plain is inundated.

Conservation Measure 15: Remove Salt Marsh Harvest Mouse Habitat and Place Barrier Fencing in the Immediate Vicinity of Operating Equipment.
SLT will consult with USFWS and CDFG to evaluate appropriate methods for avoiding construction-related mortality of salt marsh harvest mice. Measures to avoid impacts to salt marsh harvest mice will include the following:

- systemic removal of pickleweed habitat to eliminate any potential habitat and to aid visual location of the species if they have not already passively relocated out of the construction zone; and
- subsequent placement of a 3-foot or greater barrier fence in which the bottom will be buried 4 inches or more below grade. The fence will be placed 20 feet outside the boundaries of the construction areas in and adjacent to coastal salt marsh habitat to prevent salt marsh harvest mice from entering the construction area.

Conservation Measure 16: Timing of Levee Breaching, Pilot Channel Construction, and Sod Removal
To minimize or avoid the loss of individual harvest mice, levee breaching or sod removal activities will only be conducted when tidal marsh vegetation targeted for removal is completely inundated. During these conditions, harvest mice are presumed absent from the inundated portion of the marsh. A USFWS-approved biologist will be present to ensure appropriate tides have been achieved prior to construction.

To minimize or avoid the loss of individual harvest mice during breach construction, pilot channel construction, and sod removal activities that occur when tidal marsh vegetation targeted for removal is exposed or vegetation that may harbor harvest mice will be removed exclusionary fencing will be placed around the perimeter of these areas during high tide events, when natural inundation has already forced harvest mice from the area, prior to construction. Pickleweed and other tidal marsh plants will be removed at levee breach locations within one month prior to start of construction activities to avoid vegetation re-growth prior to construction. Vegetation removal will likely occur at low tides. A biologist will oversee the removal of marsh vegetation to avoid impacts during plant removal. This measure does not apply to areas with low marsh vegetation (i.e., cordgrass-dominated) where harvest mice are not likely to occur.

When no exclusionary fencing has been put into place, the removal will be performed as follows: 1) biologists familiar with harvest mice will walk through and inspect vegetation prior to vegetation removal and search for sign of harvest mice or other sensitive wildlife and plants; 2) following inspection, personnel will disturb (e.g., brush) vegetation to force movement of harvest mice into adjacent tidal marsh areas on either side of the construction location; flushing of vegetation will first occur in the center, then progress toward the two sides of the construction area; 3) personnel will immediately follow vegetation flushing with manual removal of vegetation (e.g., using hand-held stringline weed trimmers), which will also be performed beginning in the center and continuing toward the two sides of the construction area; 4) a barrier (silt fence) will be placed along the perimeter of the vegetation removal area (following plant removal) to further reduce the likelihood of harvest mice returning to the mowed area prior to construction.

When exclusionary fencing has been put into place, the removal will be performed as follows: 1) exclusionary fencing will be placed around the perimeter of the work area during a high tide event when the natural inundation has already forced harvest mice from the area, 2) vegetation removal can occur utilizing either mechanical, hand-held string trimmers, or a combination thereof, and 3) in some cases vegetation removal may not occur within the excluded areas as the existing marsh vegetation may help provide construction equipment with important support.

Conservation Measure 17: Develop and Implement a Methyl Mercury Adaptive Management Plan
Due to the uncertainties regarding mercury methylation and bioaccumulation processes, potential methyl mercury production in the action area is best managed adaptively. SLT and/or its successors in interest, CDFG and USFWS, will develop a methyl mercury adaptive management plan. The methyl mercury adaptive management plan will be developed in collaboration with other agencies with jurisdiction over contaminants in the Bay, and will include review by a Technical Advisory Committee or Group; preferably an existing group that includes representatives from multiple agencies and projects, such as the South Bay Salt Pond Project Technical Advisory Committee.

The methyl mercury adaptive management plan will include a methyl mercury monitoring plan as well as triggers for further action. To evaluate the potential effects of the proposed action on mercury in biota, methyl mercury monitoring will focus on biota, with an emphasis on resident sentinel species, preferably biosentinel fish. The monitoring will be coordinated with other methyl mercury biological monitoring conducted as part of the Regional Monitoring Program (RMP), and any other methyl mercury monitoring efforts that may be implemented in the North Bay during the designated monitoring period for the proposed action.

If necessary based on monitoring results, SLT or its successors in interest, CDFG and USFWS, will develop and implement an adaptive management plan to address methyl mercury production associated with the restoration site. The plan will create a framework to review monitoring results and to develop corrective actions, in coordination with a technical advisory committee, based both on the best available science and physical and financial feasibility. Physical changes that could be made to reduce methyl

mercury production, if needed, could include change in water inundation management and vegetation conditions (Brostoff 2007 and Best, Ely and Team 2010).

The plan will be developed by USFWS, CDFG and/or SLT in consultation with the responsible regulatory agencies implementing and permitting other wetland restoration projects in the Bay (such as RWQCB, BCDC, Corps, NMFS, and U.S. EPA). Staff of these agencies will be invited to be part of the adaptive management team to guide development of the plan; determine the duration, frequency of monitoring, constituents to be monitored, and monitoring protocols; and develop corrective actions as needed to minimize potential adverse effects of methyl mercury.

The methyl mercury adaptive management plan will be modified as necessary to reflect increased understanding of mercury cycling in San Francisco Bay.

Specific Conservation Measures for California Red-Legged Frog

Conservation Measure 18: Restrict Construction Activity in Suitable Aquatic and Upland Habitat for California Red-Legged Frog to the Dry Season (April 1–November 1).

All grading activity within suitable aquatic and associated upland habitat (within 300 feet of aquatic habitat) will be conducted during the dry season, between April 1 and November 1, or before the onset of the rainy season, whichever occurs first unless exclusion fencing is utilized. Construction that commences in the dry season may continue into the rainy season if exclusion fencing is placed between the construction area and the suitable habitat to keep frogs from entering the construction area. The footprint of all ground-disturbing activities within suitable habitat will be the minimum area necessary for construction.

Conservation Measure 19: Conduct Pre-construction Surveys for California Red-Legged Frog and Monitor Construction Activities.

A qualified biologist will conduct preconstruction clearance surveys no more than 14 days before ground disturbance in aquatic and upland habitats potentially suitable for CRLF, and conduct ongoing monitoring of construction within suitable aquatic and upland habitats during construction. A USFWS-approved biological monitor will remain onsite during all activities within suitable aquatic and associated upland habitat. If a California red-legged frog is encountered during any project activity, activities will cease until the frog is removed by a USFWS-approved biologist and relocated to nearby suitable aquatic habitat outside the construction area. USFWS and CDFG will be notified within 5 working days of any California red-legged frog relocation.

Specific Conservation Measures for Special-Status Fish Species

Conservation Measure 20: Avoid Construction/Dredging in Tidal Aquatic Habitats when Rearing Federally-listed Fish Could Be Present.

To the extent feasible, avoid construction activities that could affect tidal aquatic habitats (e.g., construction associated with lowering the perimeter levee and excavating tidal channels through the outboard salt marsh) during periods when rearing juvenile salmonids, and juvenile longfin smelt could be present (typically November thru June). If construction activities must occur during periods when these species could be present, SLT shall consult with NMFS and CDFG to determine what, if any, additional conservation measures may be required to allow construction to proceed. Any dredging associated with the breaches to Tolay Creek may be done within silt curtains to minimize the potential entrainment of green sturgeon. If hydraulic dredging is utilized to excavate the Connector Channel and Breach 1, then the associated pump size would be limited to no more than 10 inches in order to restrict the approach velocity to a level unlikely to entrain green sturgeon in the area. To minimize the potential of taking longfin smelt, the following minimization measures shall be implemented: dredging may proceed anywhere when water temperature exceeds 22 degrees Celsius, and if water temperature is less than 22 degrees Celsius, no

dredging shall occur in water less than 2 parts per thousand between December 1 and June 30; downstream of the 2 parts per thousand salinity contour the dredge shall be primed and cleared within 3 feet of the bottom between December 1 and June 30 and within three feet of the surface between July 1 and November 30, and dredge operation in the water column above the substrate shall be minimized.

Conservation Measure 21: Additional Measures for Hydraulic Dredging

Green surgeon may be present in the action area any time of year. If hydraulic dredging is performed, the following additional measures will be implemented to avoid potential entrainment of green sturgeon during dredging.

- Limit the dredge pump to a maximum outlet diameter of 10 inches.

- Install fish screens or other appropriate fish exclusion devices to prevent entrainment of fish into the water intakes of the hydraulic off-loader pumps where necessary.

Conservation Measure 22: Implement Water Quality Control Measures for Project Construction and Dredging

SLT, USFWS or CDFG as successor property owners, and its contractors will comply with conditions of construction permits from regulatory agencies, including the RWQCB, to protect beneficial uses of water resources. Compliance with permit conditions would adequately prevent degradation of water and sediment quality due to project construction and dredging.

ATTACHMENT C: Monitoring and Adaptive Management Plan (MAMP) for the proposed Sears Point Unit of the Napa-Sonoma Marshes Wildlife Area.

MONITORING

This document details the monitoring plan for construction and habitat evolution at the proposed Sears Point Unit (Sears Point) of the Napa-Sonoma Marshes Wildlife Area. The monitoring plan includes both biotic and abiotic parameters that will be monitored, performance standards, habitat targets, protocols, and sampling frequencies for the entire unit. This plan also identifies potential adaptive management triggers. The monitoring methods, schedule, and reporting system are also described in the Sears Point Monitoring and Reporting Plan Table (Table 1), which summarizes parameters to be monitored, performance objectives, protocols, and monitoring frequency. The Discharger for the Sears Point Project is currently the Sonoma Land Trust.

1.0 Background

A monitoring plan was developed in 2006 to track the progress of the Napa Plant Site project with input from the Water Board staff and the Bay Area Monitoring Review Team (MRT), which met on May 15, 2006 to discuss monitoring of the Napa Plant Site project. Because Sears Point is located adjacent to the Napa Sonoma Marshes and is a similar tidal restoration project we suggest not requiring the same long term monitoring because funding is not available. However, will use a similar monitoring approach as developed for the Napa Sonoma Marshes and approved by the Water Board and the MRT, with changes, as appropriate, to adapt the plan for the Sears Point site. In addition, we have reviewed and incorporated adaptive elements of the South Bay Salt Pond monitoring plan where feasible (e.g., see Table 2, Adaptive Management Strategy).

1.1 Monitoring Components and Performance Objectives

Over a 5-year period, chemical, physical, and biological project components will be monitored for the restoration project to determine if the short-term goal of 30 acres of predominantly native tidal marsh develops. Thereafter, the Project will be assessed to determine if the long-term goal of approximately 940 acres of predominantly native tidal marsh develops. That assessment can be quick, inexpensive, and based on best professional judgment of the Discharger, volunteers, or paid consultants; or, the assessment can be quantitative. The site can be assessed by free web-based aerial or satellite photography; paid web-based aerial or satellite photography; walking or boating around the site perimeter; putting a transect through the restored area, or any other reasonable method to determine if the long-term goal is met. In addition, the Technical Advisory Committee (TAC) will determine whether aerial or satellite photos should continue for a specified period, as defined by the TAC, until both the short and long-term goals target habitats are achieved, or whether the Project has successfully provided adequate wetland habitat benefits to justify discontinuing monitoring.

1.2 Chronology

Project construction will be completed when tidal action has been restored. After construction but before the levee breaches, baseline data will be collected for later comparison to immediately post-breach data. After construction has been completed the Sonoma Land Trust will submit a construction completion report (with as-built drawings) to the Water Board. Upon approval of these reports (or after 45 days from submission), the monitoring period will commence.

2.0 Monitoring Methods and Schedule

This section presents monitoring protocols for water quality, biota, and geomorphic evolution. The monitoring schedule is also discussed and summarized in Table 1.

2.1 Water Quality

General Water Quality Parameters: Water quality monitoring is specifically associated with project construction to assess the effects of breaching on the receiving water quality; the receiving waters for the Sears Point Project are Tolay Creek, San Pablo Bay, and the Petaluma River. General water quality parameters to be monitored include salinity, temperature, pH, dissolved oxygen (DO), and turbidity. Water quality parameters will be monitored either by a deployed continuous monitoring station device (e.g. Sonde) or *in situ* by collecting a grab sample and using a multi-parameter probe and flow cell (e.g., YSI 6820 or equivalent). Monitoring stations will be associated with Breaches 1 and 2 (Figure C-1). In addition there will be a monitoring station within the newly flooded area. The sampling station locations will assess interior water quality, site effluent and receiving water quality, and provide the means for estimation of the attenuation of any water quality conditions related to levee breaches that may exist (e.g., low DO concentrations).

For grab sampling water quality data will be collected at one foot below the surface during an ebbing tide and will be collected at the following frequency:

- within 3 days prior to breaching of the levees;
- within 3 days after breaching of the levees;
- weekly for the first month after breaching; and
- monthly until water quality performance objectives have been met for two consecutive months, or the Discharger shows that beneficial uses of water are not being adversely impacted by the Project.

If a continuous monitoring station is deployed, data collection will occur at a higher frequency and at a fixed position in the water column. Water quality monitoring data will be evaluated for trends and compared to the performance objectives established for each parameter.

Mercury: The mercury objective in the Water Quality Control Plan for the San Francisco Bay is based on fish tissue mercury concentrations. Fish tissue can be used to determine if mercury levels are elevated at the Project, or sediment/water can be used. At the request of the Discharger, a final mercury monitoring plan will not be required until mercury biosentinel data is analyzed from adjacent tidal marsh restoration sites. The Project will be prepared to monitor methyl mercury.

2.2 Biota

This section discusses biological monitoring, including avian monitoring, fish as used for biosentinel mercury monitoring, small mammals, and vegetation. Some components in Table 1 have been placed under Level 1 and are required; others are placed under Level 2 and will be carried out only if funding is available. Due to the limited biological value the existing conditions provide, and the immediate increase in biological value after breaching, biological monitoring, as described below, will only be conducted as funding allows.

Birds

Avian surveys will be conducted up to four times a year in years 1-3 (focused on migratory and winter periods). Surveys will occur during migratory periods and in conjunction with winter waterfowl surveys conducted by the United States Fish and Wildlife Service.

Data could be compared to United States Geological Survey (USGS) bird surveys conducted at the Napa Sonoma Marshes project site between April 2003 and March 2006, estuary-wide shorebird surveys coordinated by Point Reyes Bird Observatory, and/or the winter waterfowl surveys conducted by the United States Fish and Wildlife Service (USFWS), depending on availability and applicability to Sears Point. Data analysis will include an evaluation of species composition, abundance and trends in bird use relative to San Pablo Bay and the larger San Francisco Estuary. The Discharger will coordinate with the Napa Solano Audubon Society to add a Christmas Bird Count Station at the Sears Point Site.

Small mammals

Tidal marsh habitats can support populations of special-status small mammals, including salt marsh harvest mouse (*Reithrodontomys raviventris*) (SMHM) and Suisun ornate shrew (*Sorex ornatus sinuosus*). If at least 30 acres of contiguous suitable habitat (tidal marsh with at least 75% cover) are present adjacent to known source populations, surveys will begin in year 3 following construction, or as soon thereafter as suitable habitat is present, and will continue once every year until year 5 of the monitoring plan. Survey will be done in coordination with regional programs.

Vegetation

Vegetation colonization in wetland areas will be monitored using free or purchased web-based aerial or satellite photography supported by ground-truthing. If funding is available, aerial images will be interpreted with a Geographic Information System (GIS) to estimate percent cover in the wetland areas for the first 5 years. Ground-truthing will be performed to verify vegetation signatures on the aerial photos, and to make qualitative assessments habitat composition.

A minimum of 30 acres of habitat suitable for colonization by native marsh vegetation is expected along the interior edge of the site, specifically along the perimeter levee (after lowering) and along the interior slope of the new levee constructed. Vegetation colonization in these two areas is expected to be fairly rapid, beginning within one year of project completion, and achieving substantial native tidal marsh vegetation cover within 3 to 5 years. The remainder of the site is expected to take up to 30 years to reach 75% cover of native tidal marsh vegetation.

The vegetation assessment will include recording the dominant pioneer species colonizing the marsh plain.

The Discharger will follow an invasive plant management program to prevent and control non-native invasive plant species, including those listed under Tier I (and to a lesser extent Tier II) of the Water Board's "Invasive Non-Native Plant Species to Avoid in Wetland Projects in the San Francisco Bay Region"[1], that threaten sensitive native tidal marsh communities. (Other updated appropriate lists of highly invasive plant species to keep out of tidal marsh restoration sites in the Region, can be substituted for the Water Board's list.) The Discharger will review this list and determine which species will be feasible to keep off the wetland restoration site, and which will not. No invasive cordgrass species (e.g., *S. alterniflora*, *S. densiflora*) should be tolerated, and *Lepidium latifolium* (perennial pepperweed) is also a high priority species for control or eradication on Discharger lands. The Discharger will coordinate with the Invasive Spartina Project to control invasive *Spartina* species in San Pablo Bay.

2.3 Geomorphic Evolution

Protocols developed by the San Francisco Estuary Institute for habitat mapping using aerial and satellite photos will be reviewed and followed if feasible[2]. Alternatively, some form of habitat mapping including vegetation types and channel evolution will be conducted using aerial or satellite photos or other sources such as Google Maps, if those provide sufficient detail to assess the development of habitats including channels.

2.3.1 Tidal Channel Evolution

Evolution of tidal channels will be evaluated using readily available aerial imagery. To the extent feasible depending on available imagery, the aerial images will be captured in the first year following the levee breach during a low tide to increase visibility of channel network development and again in five years during a low tide to increase visibility of channel network development. Aerial images will be interpreted with GIS to calculate: 1) overall channel density in the drainage basin associated with each breach; 2) channel width at each breach and at locations along the alignment of the restored historic channels. Density will be calculated as square feet of channel per square feet of marsh plain.

2.3.2 Sedimentation

If it can be safely measured at the Project, sedimentation in restored tidal areas will be monitored using sedimentation plates, pins, erosion tables or LiDAR; if more feasible, sediment deposition can be measured by mapping vegetation. If sedimentation plates are used, each plate will be constructed of a square sheet of non-corrosive material. Sedimentation plates will be set flush with the marsh surface prior to restoration of tidal action. A rod will be placed through the center to anchor the plate and facilitate relocation for sampling purposes. Sediment

[1] (www.waterboards.ca.gov/sanfranciscobay/certs.htm under "Fact Sheet for Wetland Projects, Appendix I).

[2] In addition to protocols for tidal marsh vegetation mapping from aerial and satellite imagery, this site also has protocols for monitoring tidal marsh plants and animals, as well as sedimentation rates. (see www.wrmp.org/documents.html; under "Protocols".

accumulation on the plates will be measured in years 1 and 5. A total of 6 plates will be placed on the site before tidal action is restored, but only 3 of those need to be measured regularly; the remaining 3 will be kept in reserve for measuring, in case the predicted deposition fails to produce elevations at which vegetation develops. Initial elevations will be recorded for all plates.

2.4 Functional or Conditional Assessment

A functional or conditional assessment (e.g. California Rapid Assessment Method (CRAM)) will be conducted on a subset of the passive enhanced seasonal wetland features preserved north of the SMART rail line, and the preserved vernal pool. A baseline assessment will be conducted in year 1 and again in years 3 and 5. This will provide information on the status and trends of those features.

3.0 Reports

As-built plans will be submitted to the Corps, BCDC, and the Water Board within 90 days of the completion of construction. The plans will note changes from the final bid set of plans and will be accompanied by notes from the construction manager and monitor.

Reports will be submitted for Years 1, 3, and 5, within 90 days after the end of each respective year describing the data collected pursuant to the approved restoration plan. All reports will evaluate and discuss biotic and abiotic elements of the monitoring program. The monitoring report will include the Corps, BCDC, and Water Board permit numbers, a list of the names of the persons who conducted the monitoring and prepared the report, a brief description of the restoration project, dates monitoring was conducted, photographs and figures identifying monitoring station locations and photo points. Monitoring reports will include details of any adaptive management actions that have been implemented in the preceding year, if applicable. Monitoring reports will be submitted to the Water Board.

4.0 Notification of Completion

The Discharger will notify the Water Board at the end of the 5-year monitoring period, or when the performance objectives have been met. A site visit to confirm completion status will be scheduled. The short-term goal of 30 acres of native tidal marsh may be met in the first 5 years, and the hypothesized target of approximately 940 acres with 75% cover of native tidal marsh plant species may not occur for 30 years or longer. After the first 5 years, a Final Report can be submitted.

Following the short-term 5-year monitoring period, the Discharger will use best professional judgment or quantitative assessment to assess habitat development every 5 years until the final target is met. If performance criteria are not met, the Discharger will make recommendations to the TAC to either continue waiting for tidal marsh, or revise the target habitat. The TAC may also need to revise habitat goals and associated project assessments to reflect changes occurring throughout the Estuary (e.g., declining sediment inputs, excessive erosion, sea level rise, evolution of surrounding tidelands, invasive species) that could limit the ability of the Project to evolve as originally predicted. The determination of whether to implement additional measures to meet existing goals, or to revise habitat goals to reflect regional changes in the estuary will be

made in consultation with the restoration community at a forum such as the Napa Sonoma Marshes Restoration Group or the San Francisco Bay Joint Venture which includes scientists, practitioners, and regulators including BCDC and the Water Board that are directly involved in tidal marsh restoration and monitoring.

5.0 Contingency Measures

Corrective actions, if necessary, will be suggested in monitoring reports for performance objectives that are not being met. The responsible parties for implementing and monitoring required contingency measures are the following people and their respective agencies:

Sonoma Land Trust

Attn: Julian Meisler

966 Sonoma Avenue

Santa Rosa, CA 95404

(707) 526-6930 Ext. 109

julian@sonomalandtrust.org

6.0 Maintenance

The proposed project design minimizes operations and maintenance requirements since it is a tidal restoration project. Tidal habitats should be self-sustaining and, once levees are breached, will evolve to a dynamic equilibrium state without intervention, if no unforeseen problems arise. The project would require operation and/or maintenance of the following:

- new flood control levee – weed control, mowing, visual inspection
- Public access features
- Invasive plant control and native plant restoration of the marsh-upland ecotone

The pump station outfalls and the new levee will be inspected for erosion, settlement, excessive burrowing animal activity, and/or presence of deep-rooted woody plants. Routine mowing and maintenance should forestall these problems. Trash receptacles would also require regular maintenance.

7.0 Adaptive Management

The ability to react to changing circumstances is the basis for adaptive management. The adaptive management premise is to address issues as they arise; developing solutions based on contemporary circumstances and available resources. Issues that may require adaptive management include mosquito abatement, invasive species, erosion, flooding, and others. The Discharger will develop solutions to management needs as they arise. The Discharger has developed a set of restoration targets and triggers for potential management action (Table 2). An evaluation of tidal marsh evolution relative to stated projects targets and triggers will be presented in the monitoring reports.

Table 1. Sears Point Monitoring and Reporting Plan: a summary of the initial 5-Year monitoring program parameters, performance standards, targets, protocols, and frequencies. The 5-year monitoring period will begin after construction is completed but before levees are breached. At 5 year intervals after the first 30 acres of tidal marsh emerges, the Project will be assessed using best professional judgment or quantitative analysis, until the final goal of over 700 acres is met or changed. In addition to the monitoring elements below, the use of best management practices and site monitoring to ensure that pollutants are not discharged to the Bay or Tolay Creek or the Petaluma River will also be conducted during construction periods. Parameters are considered to be required Level 1 features, unless a pound sign (#) denotes Level 2 which should be carried out only if funding is available.

Parameter	Performance Standard	Target*	Protocol	Frequency
Field Photo Monitoring	None, purpose is documentation of tidal marsh evolution	Establishment of native tidal marsh plant communities	Establish photo monitoring points for ground images	• Within 1 yr pre-construction • Post-construction yrs 1, 3, 5; Field photos can be used with best professional judgment to determine when long-term target tidal marsh is met.
Aerial or Satellite Photo Monitoring #	Purpose is documentation of tidal marsh evolution and will only be conducted as funding allows	Establishment of native tidal marsh plant communities	Obtain aerial images from sources explained in SFEI's** vegetation mapping protocol for aerial/satellite photos, or readily-available public source such as Google Maps®	Years 1, 3, and 5; continue thereafter as funding allows. Free aerial or satellite photos can be used with best professional judgment to determine when long-term target tidal marsh met .
Dissolved oxygen (DO)	Outflow of water from the site will not decrease DO concentrations in the receiving waters during any tide cycle to a concentration lower than 5.0 mg/L (Basin Plan water quality objective downstream of Carquinez Bridge) or below the ambient concentration if the ambient concentration is less than 5.0 mg/L. The median DO concentration for any two consecutive months shall not be less than 80 percent of the DO content at saturation.	Maintain water quality in Tolay Creek, Petaluma River, and San Pablo Bay	Water quality parameters will be monitored either by a deployed continuous monitoring station device (e.g. Sonde) or in situ by collecting a grab sample and using a multi-parameter probe and flow cell (e.g., YSI 6820 or equivalent) at monitoring stations associated with the breach 1 and 2 locations and an ambient in San Pablo Bay as shown in Figure 1.	• Within 3 days prior to breaching the levees • Within 3 days after breaching the levees • Weekly for the first month after breaching • Until water quality performance objectives have been met for two consecutive months or the Discharger shows that beneficial uses are not being adversely impacted. (The latter requires EO approval.)

pH	Outflow of water from the site will not cause changes greater than 0.5 units of pH in the receiving waters during any tide cycle. The pH shall not be depressed below 6.5 nor raised above 8.5, or below ambient pH if the ambient pH is less than 6.5, or above the ambient pH if the ambient pH is greater than 8.5	Maintain water quality in Tolay Creek, Petaluma River, and San Pablo Bay	Same protocol as for dissolved oxygen	See dissolved oxygen
Temperature	Outflow of water from the site will not increase temperature by more than 5°F (2.8°C) in the receiving waters during any tide cycle in the wet season, and 10°F in the dry season	Maintain water quality in Tolay Creek, Petaluma River, and San Pablo Bay	Same protocol as for dissolved oxygen	See dissolved oxygen
Turbidity	Outflow of water from the site will not increase turbidity in the receiving waters during any tide cycle by more than 5 NTU if the ambient turbidity is less than 50 NTU, or by more than 10% if the ambient turbidity is greater than 50 NTU (or as close to these targets as practicable given the likelihood of turbidity immediately post-breach and following heavy rainfall events)	Maintain water quality in Tolay Creek, Petaluma River, and San Pablo Bay	Same protocol as for dissolved oxygen	See dissolved oxygen
Methyl mercury#	Mercury concentrations in biota tissue samples over time are less than concentrations in samples collected from comparable habitats in the San Pablo Bay watershed. Otherwise results from Napa Plant site will serve as a surrogate.	Maintain water quality in Tolay Creek, Petaluma River and San Pablo Bay	Protocol acceptable to RWQCB, e.g. regional biosentinel fish tissue monitoring such as the one developed by UC Davis	1 location, annually or biennially (once every other year) if required by the Water Board after biosentinel data from adjacent projects is analyzed; must be coordinated with other biosentinel fish monitoring in the region (e.g., Napa Marsh, Napa Plant Site, or Cullinan Ranch) to result in meaningful data
Birds#	None, purpose is documentation of tidal marsh evolution and will only be conducted as funding allows	Bird use will increase, particularly among diving and dabbling ducks over the shorter term; and among shorebirds, songbirds, and rails over the longer term	Area bird surveys using WRMP wetland bird protocols, regional shorebird surveys (PRBO), winter waterfowl surveys (USFWS).	For shorebirds and waterfowl: Years 1-3: up to four times a year, if funding allows

Vegetation	30 acres of habitat at marsh plain elevation within 3-5 years	Short-term: minimum of 30 acres of native tidal marsh plant community cover Long-term: 700+ acres of predominantly native tidal marsh within 20-30 years	On-going observations (as part of routine site maintenance and control) to detect non-native invasive species; to the extent feasible control highly invasive species on the RWQCB's Tier 1 list of species to keep out of wetland sites, or other updated list. ***; Aerial photography or Google Maps® images and GIS to define extent of vegetation communities and total percent cover; ground-truth to identify dominant species, and define communities. Long-term goal can be assessed with free web-based aerial or satellite photos, walking or boating around the Project; a transect through the restoration site; or other means of determining if the site has evolved into tidal marsh. Assessments can be made with best professional judgment or analytically.	Annual observations of colonizing species Ground observations in conjunction with aerial imagery analysis once 20% plant cover is attained Every 5 years until long-term project goal is met or changed.
Salt Marsh Harvest Mice and the ornate shrew#	None, purpose is documentation of tidal marsh evolution and will only be conducted as funding allows	Site will support and provide habitat for small mammals, including salt marsh harvest mice	Monitor or document the presence or absence of federally listed salt marsh harvest mouse at the project site in accordance with the established USFWS protocols and recovery plan. Salt marsh harvest mouse surveys will be completed in years 4 and 5 if suitable habitat is present.	As determined by USFWS, see also Table 2.
Tidal channel evolution	None, purpose is documentation of tidal marsh evolution	Density and size of tidal channels will increase throughout the duration of the monitoring period	Aerial photograph; SFEI's recommended protocol**; or free web-based Google Maps® image interpreted with GIS to calculate overall channel density in the drainage basin associated with each breach (sq. ft. channel per sq. ft. of marsh plain). Top width of each breach measured in GIS from aerial images	Years 1 and 5

Sedimentation #	None, purpose is documentation of tidal marsh evolution	The site will fill in with enough sediment within 30 years to support native tidal marsh vegetation through most of the site; some deeper areas may persist longer as open water	Deposition resulting in marsh plain accretion to the MHW elevation will be mapped as vegetation germinates and colonizes the site. Sediment plates, pins, erosion tables LiDAR, or sediment deposition maps of vegetation will be used to monitor deposition. If sediment plates or pins are used, 6 monitoring locations will be established in appropriate areas throughout the site, and the 3 in the lowest areas will be measured	Years 1 and 5 (if it can be measured safely)

*No penalties for failure to achieve the targets in this column are expected since that would discourage important restoration projects. However, failure to achieve targets should prompt the Discharger to investigate the causes for failure, recommend management measures to protect beneficial uses, and report those recommendations to the resource agencies and the public.

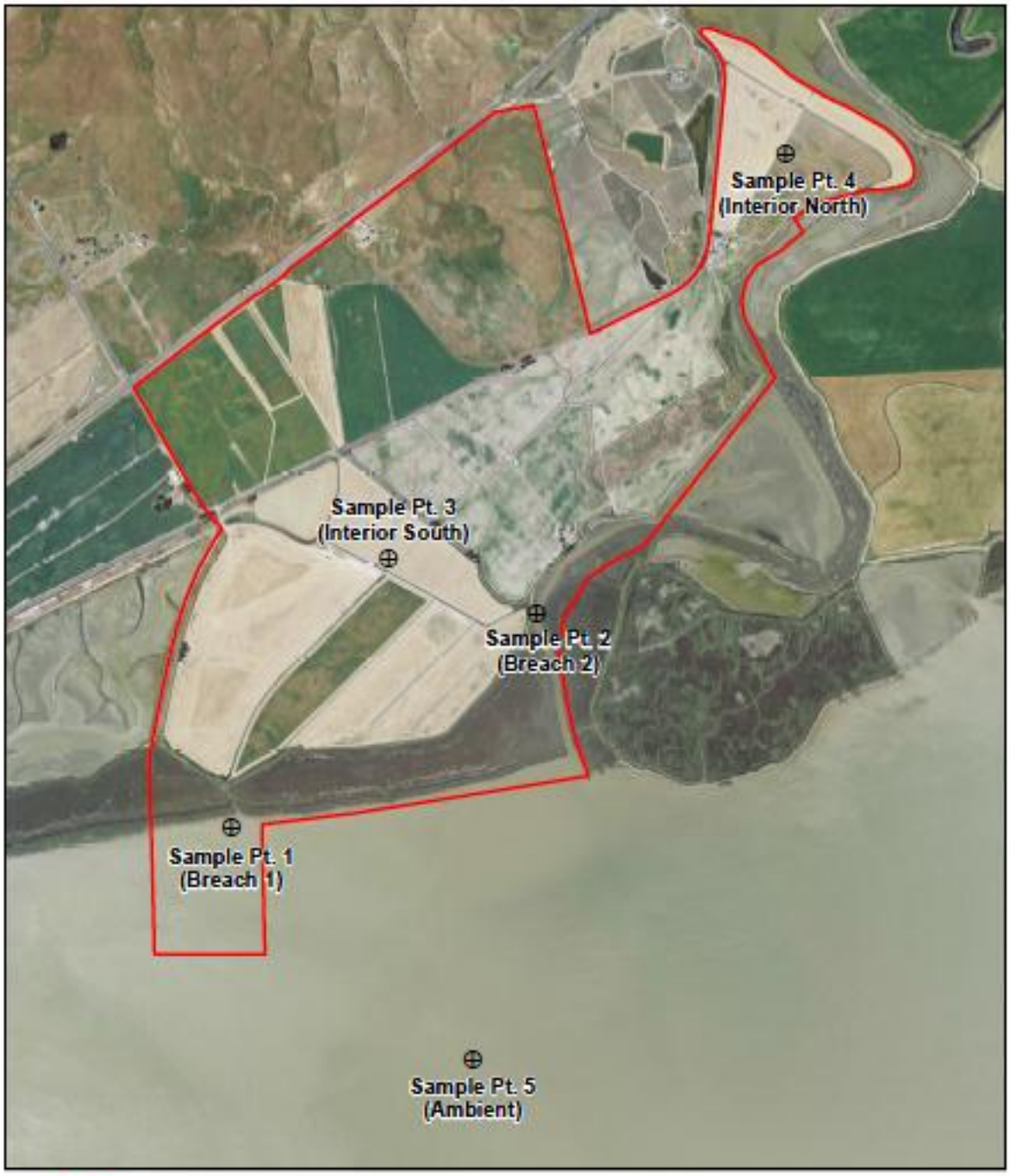
**San Francisco Estuary Institute: http://www.wrmp.org/documents.html; under Protocols, "Tidal Marsh Vegetation Mapping"

***http://www.waterboards.ca.gov/sanfranciscobay/certs.htm under “Fact Sheet for Wetland Projects” (Appendix 1).

Table 2. Sears Point Restoration: Adaptive Management Strategy.

Category	Project Purpose	Restoration Target	Expected Timeframe	Monitoring Parameters and Methods	Management Threshold for Action	Potential Management Action
Sediment Deposition#	Sediment accreting at rates along a trajectory sufficient to support tidal marsh plant colonization	Project elevations capable of supporting tidal marsh vegetation over 75% of the project area (approx. 715 ac)	30 years	Sedimentation rates, total accumulation, vegetation maps to show sediment deposition, or bathymetry using sedimentation plates, pins, erosion tables or LiDAR; assessments at year 1 and 5, and 5-yr intervals thereafter if funding allows #	Projections based on data gathered in the first 5 years suggest elevations required for vegetation colonization are not likely to be achieved	Re-evaluate projections/timelines and likelihood of achieving tidal marsh elevation and associated habitat development relative to regional changes in sediment dynamics and sea level rise
Predominantly native Tidal Plant Community Development	• Restore habitat for the recovery of federally- and state-listed special status species • Provide habitat for a broad range of marsh-dependent birds, mammals, fish and other aquatic organisms, and migratory shorebirds and waterfowl	• Development of predominantly native tidal marsh plant communities (e.g., channel edge, low/middle/upper marsh, pan, marsh-upland ecotone): evolution of native plant composition and structure similar to successful tidal marsh restoration projects of the North Bay or reference tidal marsh sites once appropriate elevations have been achieved • Short-term: 30 acres of habitat at marsh plain elevation with 80% cover • Long-term: achieve 75% cover of native tidal marsh plant communities (approx. 715 ac)	• 3-5 years (30 acres) • 30 years: 75% cover of native tidal marsh plant communities	• Qualitative assessment of pioneering species and dominance prior to attaining 20% cover of tidal marsh plants • Acres of tidal marsh plant communities: aerial photo interpretation, ground-truthing, and GIS when vegetation cover is ≥ 20% (10-yr intervals as funding allows) • Ground surveys (annual or biennial) for high priority[4] invasive plant species (e.g., *Spartina alterniflora*, *Lepidium latifolium*); priority species and timeframe for monitoring will be adapted through time as conditions change	• Invasive plant colonization and spread by high priority invasive species • Lack of colonization by native halophytes once appropriate elevations have been reached	• Active revegetation from local plant sources • Increased invasive plant management

Salt Marsh Harvest Mice and ornate shrew	Restore habitat for the recovery of federally- and state-listed special status species	• SMHM colonizes new SMHM habitat from surrounding source populations (e.g., adjacent tidal marsh habitats) • Acres of high quality SMHM habitat increase through time (see 'Tidal Plant Community Development')	20-30 years (habitat acres increase relative to baseline)	• Acres and quality of SMHM habitat developed (See 'Tidal Marsh Plant Community Development' monitoring parameters and methods) • Assessment of SMHM habitat quality based on current literature • Small mammal surveys (Year 3, 4 and 5 post-construction	• See triggers for 'Tidal Marsh Plant Community Development' • Lack of colonization by SMHM when appropriate habitat is present	• Active revegetation • Increased invasive plant management • Study of adjacent source populations and potential barriers to movement
Water Quality	Water quality parameters in receiving waters meet RWQCB performance standards (e.g., DO).	• Maintain water quality in Tolay Creek, Petaluma River and Sand Pablo Bay • Water quality parameters in receiving waters meet RWQCB performance standards (e.g., DO).	< 1year	• Continuous sample/data collection using a multi-parameter probe at monitoring stations associated with breach 1 and 2 and one an ambient in San Pablo Bay • Minimum of 1 days prior to breaching, and 30 days after breaching, until RWQCB objectives have been met for two consecutive months	Water quality parameters in receiving waters do not meet RWQCB performance standards)	Consider active management (e.g., re-aeration mechanisms to improve DO)
Mercury#	Hg levels in sentinel species of the project area are less than or equal to what is found in existing habitats of San Pablo Bay	Mercury concentrations over time less than or equal to concentrations in samples collected from comparable habitats of San Pablo Bay		Bio-sentinel fish tissue monitoring	Sentinel species show higher than ambient levels of Hg in the project area relative to comparable habitats of San Pablo Bay	Work collaboratively with regulators and restoration community to determine next steps



DUCKS UNLIMITED

Figure C-1. Sears Point Wetlands and Watershed Project Sampling Point Location Map

Base map: Sears Point CA USGS 7.5 minute togographic quadrangle
Unsectiond portion of the Petaluma Land Grant

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR

SEARS POINT RESTORATION PROJECT

TENTATIVE ORDER

A. GENERAL

1. Reporting responsibilities of waste dischargers are specified in Sections 13225(a), 13267(b), 13383 and 13387(b) of the California Water Code, and in this Water Board's Resolution No. 73-16.

2. The principal purposes of a monitoring program by a waste discharger, also referred to as self-monitoring program, are: (1) to document compliance with waste discharge requirements and prohibitions established by this Water Board, (2) to facilitate self-policing by the waste discharger in the prevention and abatement of pollution arising from waste discharge.

B. SAMPLING AND ANALYTICAL METHODS

1. Sample collection, storage, and analyses shall be performed according to Code of Federal Regulations Title 40, Section 136 (40 CFR S136), or other methods approved and specified by the Executive Officer of this Water Board.

2. Water and soil analyses shall be performed by a laboratory approved for these analyses by the State Department of Public Health (DPH), or a laboratory waived by the Executive Officer from obtaining a DPH certification for these analyses, or by properly calibrated field equipment when approved by the Executive Officer of this Water Board.

3. The director of the laboratory whose name appears on the certification, or his/her laboratory supervisor who is directly responsible for the analytical work performed shall supervise all analytical work including appropriate quality assurance/quality control procedures in his/her laboratory and shall sign all reports of such work submitted to the Water Board.

4. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

C. DEFINITION OF TERMS

1. Grab sample is defined as an individual sample collected in a short period of time not exceeding 15 minutes. It is used primarily in determining compliance with daily maximum limits and instantaneous maximum limits. Grab samples represent only the condition that exists at the time the wastewater is collected.
2. Continuous Monitoring Station is defined as a sampling location with a deployed sampling device (e.g. Sonde) that monitors specific parameters at a specified frequency.

3. Duly authorized representative is one whose:

    a. Authorization is made in writing by a principal executive officer or ranking elected official;

    b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such chief engineer, project manager, or field supervisor.

4. Instantaneous maximum is defined as the highest measurement obtained for the calendar day.

5. Median of an ordered set of values is that value below and above which there is an equal number of values, or which is the arithmetic mean of the two middle levels, if there is no one middle value.

6. Receiving waters refers to any water that actually or potentially receives surface water discharged from the Sears Point Restoration Project Area. The receiving waters in this case are Tolay Creek, Petaluma River, and San Pablo Bay.

7. Construction phase is defined as that period of time when the site is prepared for marsh restoration and includes all activities leading up to the restoration of tidal action.

8. Construction phase activities are defined as all site activities including the movement of soil or sediment, such as placement of dredged material via slurry techniques, excavation of trenches and toe drains, and all other soil handling such as detention basin, connector channel, pilot channel, breach, ditch block, berm and levee construction.

9. Post-construction phase is defined as the period of time beginning when site construction is substantially completed, and tidal action has been restored to the Sears Point site.

10. Post-construction phase activities are defined as all monitoring, site maintenance, and adaptive management activities which take place after construction is completed and tidal action has been restored to the Sears Point site.

11. Project boundary is defined in Figure 2.

12. Monitoring period for purposes of reporting for receiving water quality shall be defined as that period of time beginning on the day the levees are breached, and ending when the water quality objectives have been met for two consecutive months. If water quality objectives are not met, the Dischargers can present evidence that beneficial uses are not being adversely affected by the Project and, if the case is acceptable to the Executive Officer, receiving water quality monitoring can cease. Habitat and geomorphic assessment monitoring period ends 5 years after breaching for each breach. Avian monitoring period ends at three years post breach. After the initial 5-year monitoring period, best professional judgment or quantitative analysis will be used at 5-year intervals to determine if and when the final tidal marsh habitat target is met. In addition to assessing target tidal marsh vegetation, the Discharger will look for invasive species that might disrupt desirable biological populations, excessive sediment erosion or deposition, or other features that may prevent the desired predominantly native tidal marsh goal. The Project Technical Advisory Committee should assist with final decisions.

13. Ambient Water Quality shall be defined as the water quality (salinity, dissolved oxygen, temperature, turbidity, and pH) measured in Tolay Creek, Petaluma River, San Pablo Bay, or other appropriate reference site. The current ambient sampling point location is located south of the project area within San Pablo Bay, along the edge of the Petaluma Navigation Channel. Due to the unique environment that will exist post breach, it may be necessary to relocate the ambient sampling location or present data from a currently unidentified location to provide comparable readings to the other monitoring locations.

D. SPECIFICATIONS FOR SAMPLING AND ANALYSES

The Discharger is required to perform sampling and analyses according to the schedule in **Table D-1** in accordance with the following conditions:

1. Tidal Restoration Area

    a. If continuous monitoring stations are not deployed, then grab samples of water shall be collected during periods of maximum peak discharge flows, and shall coincide with receiving waters sample days.

    b. If analytical results are received showing any instantaneous maximum limit is exceeded for any organic constituent, a confirmation sample shall be taken within 24 hours and results known within 24 hours of the sampling.

    c. If any instantaneous maximum limit for a constituent is exceeded in the confirmation sample(s), then the discharge shall be restricted to the extent practical, until the cause of the violation can be found and corrected.

    d. For other violations, the discharger shall implement procedures that are acceptable to the Executive Officer on a case by case basis.

2. Receiving Waters

a. Receiving water sampling shall be conducted on days coincident with tidal restoration effluent (water is actively leaving the site).

b. In tidally-influenced receiving waters, samples shall be collected at each station on each sampling day during the period within 1 hour following low slack water. Where sampling at lower slack water period is not practical, sampling shall be performed during higher slack water period.

c. Samples of downstream receiving water shall be collected within the discharge plume and down current of the discharge point so as to be representative, unless otherwise stipulated.

d. Due to the inability to collect samples of Ambient Water Quality upcurrent of the discharge point, an ambient sampling point has been identified in San Pablo Bay.

e. If feasible, samples shall be collected within one foot below the surface of the receiving water body and one foot above the channel or pond bottom.

3. Seasonal and Vernal Pool Wetland Area

a. A functional or conditional assessment (e.g. California Rapid Assessment Method) will be conducted on a subset of the passive enhanced seasonal wetland features and the vernal pools preserved north of the SMART rail line.
b. A baseline assessment will be conducted in year one and then again in years three and five.

E. DESCRIPTION OF SAMPLING STATIONS

1. A site plan drawing showing the location of all sampling points is included as Figure C-1 in Attachment C. A site plan drawing showing the location of all sampling points shall be submitted with all monitoring reports submitted under this Plan.

2. Receiving water sampling point SP-1 and SP-2 shall be established outside of the breach locations within 250 feet of the point of discharge into the receiving water.

3. Receiving water sampling points SP-3 and SP-4 shall be established within the tidal restoration area.

4. Ambient water sampling point SP-5 shall be established within San Pablo Bay near the edge of the Petaluma Navigation Channel.

F. STANDARD OBSERVATIONS

5. Receiving Water

a. Floating and suspended materials of waste origin (to include oil, grease, algae, and

other macroscopic particulate matter): presence or absence, source, and size of affected area.

b. Discoloration and turbidity: description of color, source, and size of affected area.

c. Odor: presence or absence, characterization, source, distance of travel, and wind direction.

d. Evidence of beneficial water use: presence of waterfowl or wildlife, fishermen, and other recreational activities in the vicinity of the sampling stations.

e. Hydrographic condition, if relevant:

1) Time and height of corrected high and low tides (corrected to nearest NOAA location for the sampling date and time of sample and collection).

2) Depth of water columns and sampling depths.

f. Weather condition:

1) Air temperature.

2) Wind - direction and estimated velocity.

3) Precipitation - total precipitation during the previous five days and on the day of observation.

6. Tidal Restoration Area

a. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence, source, and size of affected area.

b. Discoloration and turbidity: description of color, source, and size of affected area.

c. Odor: presence or absence, characterization, source, distance of travel, and wind direction.

d. Evidence of beneficial water use: presence of waterfowl or wildlife, fishermen, and other recreational activities in the vicinity of the sampling stations.

e. Hydrographic condition, if relevant:

1) Time and height of corrected high and low tides (corrected to nearest NOAA location for the sampling date and time of sample and collection).

2) Depth of water columns and sampling depths.

f. Weather condition:

1) Air temperature.

2) Wind - direction and estimated velocity.

3) Precipitation - total precipitation during the previous five days and on the day of observation.

G. REPORTS TO BE FILED WITH THE WATER BOARD

1. **Notifications and Reports:** The Water Board will be notified by email when construction starts and ends and when levee breaching occurs. The following reports will also be required:

(i) a startup (or construction completion) report analyzing the first 30 days of data collected after levees are breached; it should include the same elements stipulated in G. 3. below; and

(ii) an as-built report to note any changes that have occurred from the original design.

The startup report is due no more than 45 days after levees are breached. The as-built report is due 90 days after construction is completed.

2. **Self-Monitoring Reports**: The Discharger shall submit technical monitoring reports every other year (i.e., Year 1 and Year 3). Written technical reports are due on March 31st. The reporting shall begin the first year following the completion of construction activities. The reports and memos will summarize the data collected and analyzed. The reports shall be comprised of the following: water quality data analysis and geomorphic and habitat assessments over the previously undocumented monitoring period. Results should be shared with the Technical Advisory Committee by email or at meetings.

The monitoring elements, schedule, performance criteria, and general protocols are contained in the attached MAMP (Attachment C) for the Project.

a. Letter of Transmittal: A letter transmitting self-monitoring reports should accompany each report. Such a letter shall include identification of changes to the project design, and any unplanned releases or failures that may have occurred since the preparation of the previous self-monitoring report. If unplanned releases are noted, then a discussion of the corrective actions taken or planned, and a time schedule for completion, shall be included.

b. Map or Aerial Photograph: A map or aerial photograph shall accompany the report showing sampling and observation station locations.

c. Results of Analyses and Observations: The report format shall be a format that is acceptable to the Executive Officer.

1) If the Discharger monitors any pollutant more frequently than required by this permit using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Self-Monitoring Report.

2) Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this Order.

3) The report shall also include a table identifying by method number the analytical procedures used for analyses. Any special methods shall be identified and should have prior approval of the Water Board's Executive Officer.

4) Lab results shall be summarized in tabular form, but do not need to be included in the report.

7. **Final Report**: Reporting requirements under this Order will end a) for water quality when the water quality objectives have been met for two consecutive months; b) for habitat and geomorphic assessment the monitoring period ends 5 years after breaching; c) for avian monitoring period ends at 3 years post breach. The Final Report will be submitted to the Water Board that contains both tabular and graphical summaries of the monitoring data obtained during the Project. In addition, the Final Report shall contain a comprehensive discussion of the compliance record and the corrective actions taken. The Final 5-Year Report need not contain the subsequent 5-year habitat assessments, which can be based on best professional judgment or quantitative analysis, until the tidal marsh habitat goal is met or changed by the Technical Advisory Group.

8. **Spill Reports**: If any hazardous substance is discharged in or on any waters of the State, or discharged and deposited where it is, or probably will be discharged in or on any waters of the State, the discharger shall report such a discharge to the Water Board, at (510) 622-2369 and to the Office of Emergency Management Agency at (800) 852-7550 during non-office hours. A written report shall be filed with the Water Board within five (5) working days and shall contain information relative to:

   a. nature of waste or pollutant,
   b. quantity involved,
   c. duration of incident,
   d. cause of spilling,
   e. Spill Prevention, Control, and Countermeasure Plan (SPCC) in effect, if any,
   f. estimated size of affected area,
   g. nature of effects (i.e., fish kill, discoloration of receiving water, etc.),
   h. corrective measures that have been taken or planned, and a schedule of these activities, and
   i. persons/agencies notified.

9. Monitoring reports, and letters transmitting monitoring reports, shall be signed by a principal executive officer or ranking elected official of the Discharger, or by a duly

authorized representative of that person. The letter shall contain the following certification: "I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

H. RECORDS TO BE MAINTAINED

1. Written reports, laboratory analytical reports, maintenance records, and other records shall be maintained by the Discharger and retained for a minimum of five years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Water Board or Regional Administrator of the U.S. EPA, Region IX. Such records shall show the following for each sample:

    a. Identity of sampling and observation stations by number.

    b. Date and time of sampling and/or observations.

    c. Method of sampling (See Section C - Definition of Terms).

    d. Complete procedure used, including method of preserving sample and identity and volumes of reagents used. A reference to a specific section of Standard Methods is satisfactory.

    e. Calculations of results.

    f. Results of analyses and/or observations.

I, Bruce H. Wolfe, Executive Officer do hereby certify the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedure set forth in the Water Board's Resolution No. 73-16 in order to obtain data and document compliance with waste discharge requirements established in Water Board Order No. R2-2013-xxxx.

2. Was adopted by the Water Board on _____.

3. May be revised by the Executive Officer pursuant to U.S. EPA regulations (40 CFR 122.36); other revisions may be ordered by the Water Board.

_____
Bruce H. Wolfe
Executive Officer

Attachments: Table E-1
Figure C-1 (see Attachment C, the Monitoring and Adaptive Management Plan.)

TABLE D-1 - SCHEDULE FOR SAMPLING, MEASUREMENTS, AND ANALYSIS FOR SEARS POINT RESTORATION PROJECT*						
SAMPLE POINT:		Sample Pt. 1: Breach 1 - San Pablo Bay	Sample Pt. 2: Breach 2 - Tolay Creek	Sample Pt. 3: Restored Tidal Habitat South	Sample Pt. 4: Restored Tidal Habitat North	Sample Pt. 5: Ambient
	METHOD					
MATRIX: WATER						
Salinity [1]	multiparameter probe	D/M	D/M	D/M	D/M	D/M
pH [1]	multiparameter probe	D/M	D/M	D/M	D/M	D/M
Temperature [1]	multiparameter probe	D/M	D/M	D/M	D/M	D/M
Turbidity [1]	multiparameter probe	D/M	D/M	D/M	D/M	D/M
Dissolved oxygen [1]	multiparameter probe	D/M	D/M	D/M	D/M	D/M
Methyl mercury[2] if biosentinels are not chosen	EPA 1630 or other appropriate method			A/B	A/B	
MATRIX: Biosentinels		Sears Point Restored Tidal Habitat	Seasonal Wetland Passive Enhancement Area and Vernal Pools			
Methyl mercury [2]	UC Davis method for biosentinel fish preferred; FGS 045 or other appropriate method for sediment and water; Annual preferred; Biennial acceptable.	Mercury monirtoring plan submittal awaiting mercury data from nearby projects. If funding allows, annualy or bienially (every other year) for 5 Years. (A/B)				
BIOTA		Sears Point				
Birds#	area surveys as funding allows	up to four times annually in Years 1-3;				
Vegetation	1) Observations; 2) Mapping with aerial/satelite photos; 3) field observations	1) Annual Observations of colonizing species (qualitative); 2) ground observations in conjunction with aerial imagery analysis once 20% attained; In years 3-5. Thereafter, best professional judgment every 5 years until target met or				
salt marsh harvest mice#	area surveys as funding allows	In yrs. 4 and 5 if suitable habitat is present				
Geomorphic Evolution						

Tidal Channels	measure top width of channel at breach	Yrs 1 and 5. Thereafter best professional judgment until target met or changed.				
Sedimentation#	a) deposition mapped as vegetation germinates; b) sediment plates, pins, erosion tables, or LIDAR.	Yrs 1 and 5				
Field Photo Documentation	area surveys	pre-construction (baseline); post-construction Yrs 1 and 5				
Habitat Development	Rough comparison of aerial or easily accessible free satellite photos	pre-construction (baseline); B in yrs 1-5. Thereafter, best professional judgment every 5 years until target met or changed.				
Conditional or Functional Assessment						
			Collect a baseline in year 1 and conduct assessment again in year 3 and year 5			
Notes:						
*** This schedule can be changed with Water Board approval, if funding or staff become limited. If feasible, baselines should be conducted in cases where data does not exist. Where data does exist, pre- and post- restoration should be**						
[1] Field test only						
[2] Methyl mercury	Monitoring can include water, sediment, and/or biosentinels. If biosentinels are used, the fish protocol developed					
	by U.C. Davis (Slotton) is preferred, but not required, based on previous sampling. If biosentinels are infeasible, then					
	mercury and methyl-mercury can be sampled in water and sediment. Mercury monitoring is preferred annually, but can be conducted biennially.					
	Implementation of mercury monitoring plan can await ananlysis of nearby projects, unless Water Board requires it sooner.					
A	Once per year					
B	Biennially (once every 2 years)					
D/M	Once within 3 days prior to breach; Once within 3 days following breach; and weekly during the first month. Alternatively, continous monitoring will be performed in some or all of the sample points for 7 days prior to breach and 30 days following breach.					
#	should be carried out if funding is available					
yrs	years					