CALIFORNIA STATE COASTAL CONSERVANCY

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

DRAFT INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION

Prepared for

California State Coastal Conservancy
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February 16, 2016

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PROPOSED MITIGATED NEGATIVE DECLARATION

Project: San Francisco Bay Creosote Removal and Pacific Herring Habitat Restoration Project

Lead Agency: California State Coastal Conservancy

PROJECT DESCRIPTION

The proposed project is considered to be a pilot project which will be undertaken to further the objectives of and to achieve consistency with requirements of many environmental laws and regulations while also addressing the goals set forth in The San Francisco Bay Subtidal Habitat Goals Project. The proposed project would remove artificial structures such as creosote-treated piles and collapsed decking in combination with a living shoreline restoration design that will use natural bioengineering techniques (such as eelgrass plantings and reef structures for native oysters) to replace lost habitat structure in order to improve the overall ecological health of the San Francisco Bay and improve the spawning and development success of Pacific herring and other species.

FINDINGS

An Initial Study has been prepared by the California State Coastal Conservancy in accordance with the California Environmental Quality Act to ascertain whether the proposed project would have a significant effect on the environment. On the basis of this study, it is determined that the proposed action will have:

No impact or a *less-than significant impact* on aesthetics, agriculture and forestry resources, air quality, cultural resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, land use and planning, mineral resources, noise, population and housing, public services, recreation, transportation and traffic, and utilities and service systems.

Impacts would be l*ess-than significant* or *less-than-significant after incorporating mitigation* on biological resources and on hydrology and water quality.

INITIAL STUDY

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

1. Project Title	San Francisco Bay Creosote Removal and Pacific Herring Habitat Restoration Project
2. Lead Agency Name and Address	California State Coastal Conservancy 1330 Broadway; 13th floor Oakland, CA 94612-2530
3. Contact Person and Phone Number	Marilyn Latta Project Manager California State Coastal Conservancy 1330 Broadway; 13th floor Oakland, CA 94612-2530
4. Project Location	Central San Francisco Bay
5. Project Sponsor's Name	California State Coastal Conservancy
6. General Plan Designation	Open Space, Community and Regional Recreational District, and Marine Industrial
7. Description of Project	Creosote Removal and Habitat Restoration
8. Surrounding Land Uses and Setting	See *Environmental Setting* section in Chapter 3
9. Other Public Agencies Whose Approval Is Required	National Marine Fisheries Service, U.S. Army Corps of Engineers, San Francisco Bay Regional Water Quality Control Board, California State Lands Commission, San Francisco Bay Conservation and Development Commission, California Department of Fish and Wildlife

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

San Francisco Bay is the largest estuary on the west coast and is a dynamic estuarine environment surrounded by urban areas and developed lands. Since the Gold Rush, San Francisco Bay has lost more than 90% of historic tidal wetlands and the Bay itself is one-third smaller in area due to sedimentation and fill projects along the bay shoreline and in the bay itself, which has caused a substantial amount of subtidal habitat loss. There is reduced three-dimensional structure in the bay, and featureless mud bottoms predominate in many areas due both to increased siltation and dredging, and to removal of existing natural hard substrates because they presented navigational hazards. A large percentage of San Francisco Bay shorelines have been stabilized with hardened structures, such as creosote-treated piles, riprap, breakwaters, seawalls, and bulkheads to create dry lands for development or evaporation ponds for salt production, and to prevent or minimize coastal erosion. San Francisco Bay now has reduced biomass of wetland vegetation, seagrass, and shellfish beds that once provided copious food resources to multiple species in the food chain.

Treated wood piles were historically used to support piers, wharfs, bridges, and navigational aids. Many of these wooden piles were injected with creosote, a substance used from the mid-1800s into the 1950s to preserve wooden marine structures from decay. Creosote is a complex mixture of chemicals, many of which are toxic to fish and other marine organisms. Within San Francisco Bay, creosote-treated piles were the dominant pile material until the use of concrete piles became common in the early 1900's (Werme et al. 2010). Creosote-treated piles continued to be used in the Bay until 1993, when the California Department of Fish and Wildlife (CDFW) stopped approving its use in state waters, although use of the material after 1970 was limited (Werme et al. 2010). A 2010 study prepared for the California State Coastal Conservancy (SCC) identified over 33,000 derelict piles within the Bay (Werme et al. 2010). The study identified four areas where derelict creosote-treated piles were concentrated: Carquinez Strait, Napa River, Point Richmond, and the San Francisco waterfront. In these four locations, derelict pile concentrations ranged from 61 to 384 piles per mile of shoreline.

In recent years, many organizations, including the SCC has a successful history of working with multiple stakeholders to acquire, restore, enhance, and manage subtidal and tidal wetland habitat in San Francisco Bay. To date, over 50,000 acres have been protected, restored, and enhanced in San Francisco Bay, placing these efforts among the most aggressive wetland habitat conservation programs in the nation. The San Francisco Bay Creosote Removal and Pacific Herring Restoration Project will leverage multiple ongoing coastal wetland conservation efforts in San Francisco Bay.

The SCC acquired a grant from the National Fish and Wildlife Foundation (NFWF) to support a creosote-treated pile removal and Pacific herring restoration pilot project in the San Francisco Bay (the "project"). This collaborative, innovative project includes final site selection and project design; permitting; creosote-treated pile removal; native rockweed, eelgrass bed, and oyster reef habitat restoration; pre- and post-construction monitoring; public information sharing; and documenting lessons learned with Bay

Area resource agencies and environmental groups. Figure 1 shows the locations of the two project sites that are discussed at length in Chapter 2, the Project Description.

1.2 PURPOSE OF THIS DOCUMENT

The primary purpose of this document is to present decision makers and the public with the environmental consequences of implementing the project. Information contained in this document will be used to determine whether the proposed project being advanced by the SCC would have significant environmental impacts. Should the SCC determine, through the use of the Initial Study (IS) checklist process, that there would be no potential significant environmental impacts associated with the project, it would approve a Negative Declaration (ND). These findings would then enable the SCC to move forward with the proposed project. If the SCC determines that the project may have potentially significant impacts on the environment but those impacts can be reduced, avoided or mitigated to a less than significant level, through the incorporation of specified mitigation measures, a mitigated negative declaration (MND) would be prepared. On the other hand, if it is determined that there is substantial evidence that supports a fair argument that significant effects on the environment may occur through implementation of the project, then an Environmental Impact Report (EIR) would be prepared..

An Initial Study (IS) is prepared by a lead agency to determine whether a project may have a significant effect on the environment (State CEQA Guidelines, Section 15063) and thus to determine which environmental document should ultimately be prepared. In accordance with State CEQA Guidelines Section 15070:

> *A public agency shall prepare…a proposed negative declaration or mitigated negative declaration…when:*
>
> *(a) The initial study shows that there is no substantial evidence…that the project may have a significant impact on the environment, or*
>
> *(b) The initial study identifies potentially significant effects, but*
>
> > *(1) Revisions in the project plans or proposals [are] made by, or agreed to by the applicant…[and such revisions] would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur…*

If these provisions are satisfied, the lead agency would prepare a written statement describing its reasons for concluding that implementing the proposed project would not have a significant effect on the environment and, therefore, does not require the preparation of an EIR.

As described in Chapter 3, “Environmental Checklist,” of this IS, implementing the proposed project could result in significant environmental impacts. However, they would be kept below or reduced to less-than-significant levels through implementation of conditions and modifications to the project designs and plans and by a number of general and specific mitigation measures that have been agreed to and would be

implemented by the SCC. All of these are described in the project description and in the impact analysis sections of this document

Therefore, an IS and a MND are the appropriate documents for compliance with CEQA requirements. This IS and the proposed MND conform to these requirements and to the content requirements of Section 15071 of the State CEQA Guidelines.

This document is being made available to the public for a 30-day public review period from February 16, 2016 through March 17, 2016. After comments are received from the public and reviewing agencies, the SCC may: 1) adopt the MND and approve the project; 2) undertake additional environmental studies; or (3) abandon the project. If the project is approved, the SCC could proceed to implement all or part of the project.

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Coastal Conservancy

California State Coastal Conservancy
SF Bay Creosote Removal and Herring Habitat Restoration Project

FIGURE 1

Regional Location of Project Sites

2 PROJECT DESCRIPTION

2.1 PROJECT PURPOSE, NEED, AND OBJECTIVES

The proposed project is considered to be a pilot project which would be undertaken to further the objectives of or to achieve consistency with requirements of many environmental laws and regulations, including McAteer-Petris Act, which formed the San Francisco Bay Conservation and Development Commission (BCDC) and its adopted Bay Plan; federal and state Endangered Species Acts; Clean Water Act; Magnuson Stevens Fishery Conservation and Management Act; California Fish and Game Code; Fish and Wildlife Coordination Act, and others. This would be achieved by removing sources of contamination from San Francisco Bay and by enhancing subtidal and intertidal habitat for the benefit of spawning herring and other wildlife.

The proposed project would also address the goals set forth in The San Francisco Bay Subtidal Habitat Goals Project. That project is a collaborative effort involving the SCC, the BCDC, the National Oceanic and Atmospheric Administration (NOAA), and the San Francisco Estuary Partnership (SFEP). Lead staff from these agencies worked with more than 75 people and organizations in the broader scientific community, resource managers, restoration practitioners, and stakeholders over several years to develop the goals set forth in the San Francisco Subtidal Habitat Goals Report (Subtidal Goals Report; SCC 2010). The Subtidal Goals Report is a non-regulatory, 50-year conservation plan that provides guidance and recommendations on how to move forward with science-based subtidal research, protection, and restoration of subtidal habitats in the San Francisco Bay.

One of the recommendations in the Subtidal Habitat Goals Project Report is to use a pilot project approach to remove artificial structures, creosote-treated piles, and other marine debris at targeted sites in combination with a living shoreline restoration design that will use natural bioengineering techniques (such as native oyster reefs and eelgrass [*Zostera marina*] plantings) to replace lost habitat structure. The report also states that one large-scale, long-term strategy for the Central Bay and the Richmond shoreline might be to restore eelgrass near sites where creosote-treated piles are being removed, to provide eelgrass as a natural substrate to attract spawning herring. Pacific herring (*Clupea pallasi*) have also spawned on restored oyster reefs in the bay, and are being included as part of an innovative, multi-habitat restoration approach to benefit Pacific herring in the region.

Creosote is an oily product distilled from crude coal tar and contains hundreds of chemical compounds. The primary constituents of creosote are polycyclic aromatic hydrocarbons (PAHs) and alkylated PAHs which account for up to 90% of creosote mixtures (WHO 2004). Many of the PAHs present in creosote mixtures are identified as priority pollutants. While creosote has a relatively low solubility in water, some of its components are highly soluble. Most leaching likely occurs during the first few years after a pile is installed, but leaching may continue for many years (Werme et al. 2010). The decreased level of creosote migration from older piles is largely thought to be due to decreased surface availability. Creosote near the surface of the pile undergoes a “weathering” process, in which individual chemical constituents are adsorbed, evaporated, photo-oxidized, or dissolved (reviewed in Sved et al. 1997). However, the field

mapping team during a 2010 study found visible apparent slicks from piles in San Francisco Bay, all of which were installed more than 15 years ago (Werme et al 2010).

PAHs that leach out of creosote-treated piles persist in the environment and are toxic to some organisms. Circulation of water around creosote-treated wood likely disperses PAHs to low enough concentrations that organisms moving through the bay are unaffected (SCC 2010). However, organisms that come into direct, extended contact with creosote-treated piles may be adversely affected. Harmful levels of contact may occur if organisms feed on prey species inhabiting the surface of the piles or if organisms lay eggs directly on piles, as is the case with Pacific herring.

Creosote-treated wood has been shown to negatively impact the early life stages of Pacific herring. Exposure to creosote-treated wood caused developmental delays, embryo degeneration, edema (accumulation of fluid), changes in movement, and alterations to cardiac function in Pacific herring embryos from the San Francisco Bay (Vines et al. 1998). Creosote exposure led to a significantly lower rate of hatching success, and exposure of 7 micrograms per liter, which typically occur within 10 centimeters of creosote-treated piles, caused skeletal defects and negatively impacted swimming ability in hatched Pacific herring larvae (Vines et al. 1998; Duncan 2014). Over one-third of the piles observed by the San Francisco Estuary Institute (SFEI) and NOAA were located within critical spawning areas and herring in the San Francisco Bay sometimes spawn directly on creosote-treated wood. It is likely that embryos laid directly on creosote-treated piles experience higher rates of mortality. Embryos that survive to hatch are likely to have higher rates of skeletal deformation during development, preventing them from successfully foraging and avoiding predators.

The proposed project would remove artificial structures such as creosote-treated piles and collapsed decking in combination with a living shoreline restoration design that will use natural bioengineering techniques (such as eelgrass plantings and reef structures for native oysters) to replace lost habitat structure. Creating or expanding eelgrass beds would provide substrate on which Pacific herring and other organisms could attach their eggs and food resources for species such as herring and salmon. Fabricated reef structures would not only provide a secondary spawning substrate for herring but would also provide the necessary hard substrate for native Olympia oyster (*Ostrea lurida*) settlement and growth and for other species, and help trap and stabilize sediments in the areas formerly occupied by creosote-treated pilings. Finally, extending the range of rockweed (*Fucus gardneri*) in the intertidal zone would further provide an additional spawning substrate for herring and enhance the overall habitat complexity and diversity at the restoration sites. More background on these aspects of the restoration project is provided in the following paragraphs.

Several functions of eelgrass beds, oyster beds, and rockweed are considered helpful in moving the estuary toward a more natural, less uniform state with local heterogeneity benefiting native species and biodiversity. Consistent with the recommendations in the Subtidal Goals Report, the proposed project would implement a pilot creosote-treated pile removal and native herring habitat restoration project in the San Francisco Bay. The project has the support of multiple key partners in the bay.

In summary, the purposes of the project are as follows:

- Increase the overall ecological health of portions of San Francisco Bay by removing derelict creosote-treated wooden pilings,
- Improve spawning and development success of Pacific herring through removal of creosote-treated piles, which have been shown to have detrimental effects on early life history stages of Pacific herring;
- Improve spawning success of Pacific herring by providing necessary subtidal structures, including eelgrass beds, rockweed, and oyster reef habitat, on which they can lay eggs;
- Obtain knowledge and experience to share with others and to inform future planning, management, restoration design practices, and permit procedures for creosote-treated pile removal and subtidal habitat restoration projects bay-wide, and
- Provide additional habitat enhancements that not only result in the herring-related benefits described above but also benefit other species and increase the overall habitat complexity of the bay.

The need for the project is most effectively demonstrated by examining the case in which the project was not implemented. In such a situation, Pacific herring continue to spawn on derelict creosote-treated piles and be adversely affected by the effects of creosote and PAH. The piles themselves would remain in place and continue to pose a marine debris problem and a navigation hazard and also continue to degrade and impair water quality. The spatial extent of eelgrass and rockweed would not be increased, and the associated benefits that those species bring to the overall ecology of the bay would not be realized. The benefits of the increased three-dimensional habitat complexity would not be realized. The population size of Olympia oysters in the bay would remain limited by the lack of hard substrate for oyster settlement and growth, and the ancillary gains of reducing localized scour and stabilizing sediment for eelgrass beds would not be achieved. Finally, this is a pilot project, intended to develop methods for the design, planning, and environmental clearance and permitting of similar pile removal and subtidal habitat restoration efforts in the future, and to test and monitor the successes of these actions and share results with other entities involved in managing and improving conditions in San Francisco Bay. In the absence of this project, these beneficial impacts of this pilot project would not occur.

The project purpose and objectives would be achieved through the following project actions:

- Removing approximately 700 individual piles that collectively comprise more than 180 tons of creosote-treated wood;
- Removing several thousand square feet of collapsed concrete decking and other types of marine debris; and
- Establishing at least 1 acre of beneficially affected habitat including eelgrass, rockweed, and reef structures for oysters.

2.2 SITE SELECTION PROCESS

To select a site or sites for this pilot project, a site screening process was used. The screening process identified pile clusters that best fit objectives of (1) removing large amounts (up to 1,200 individual

pilings or 180 tons) of creosote-treated piles – as specified by the grant from the NFWF that funded the project) from herring spawning habitat and (2) locating the project where restoration of eelgrass and other native habitats could be accomplished to replace the lost physical structure of the piles which may have been utilized by spawning herring.

From this screening process, two sites were chosen for the proposed project. **Figure 1**, above, shows the locations in San Francisco Bay of those two sites: the Red Rock Warehouse site (**Figure 2**) and the El Campo Marina site (**Figure 3**).

- **The Red Rock Warehouse site** is in San Pablo Bay on the northeastern side of Point San Pablo in Contra Costa County, on parcels owned by the City of Richmond.
- **The El Campo Marina site** is located along the Tiburon Peninsula north of Paradise Beach Park in Marin County, on privately owned parcels.

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San Quentin Quadrangle, USGS, 2009.

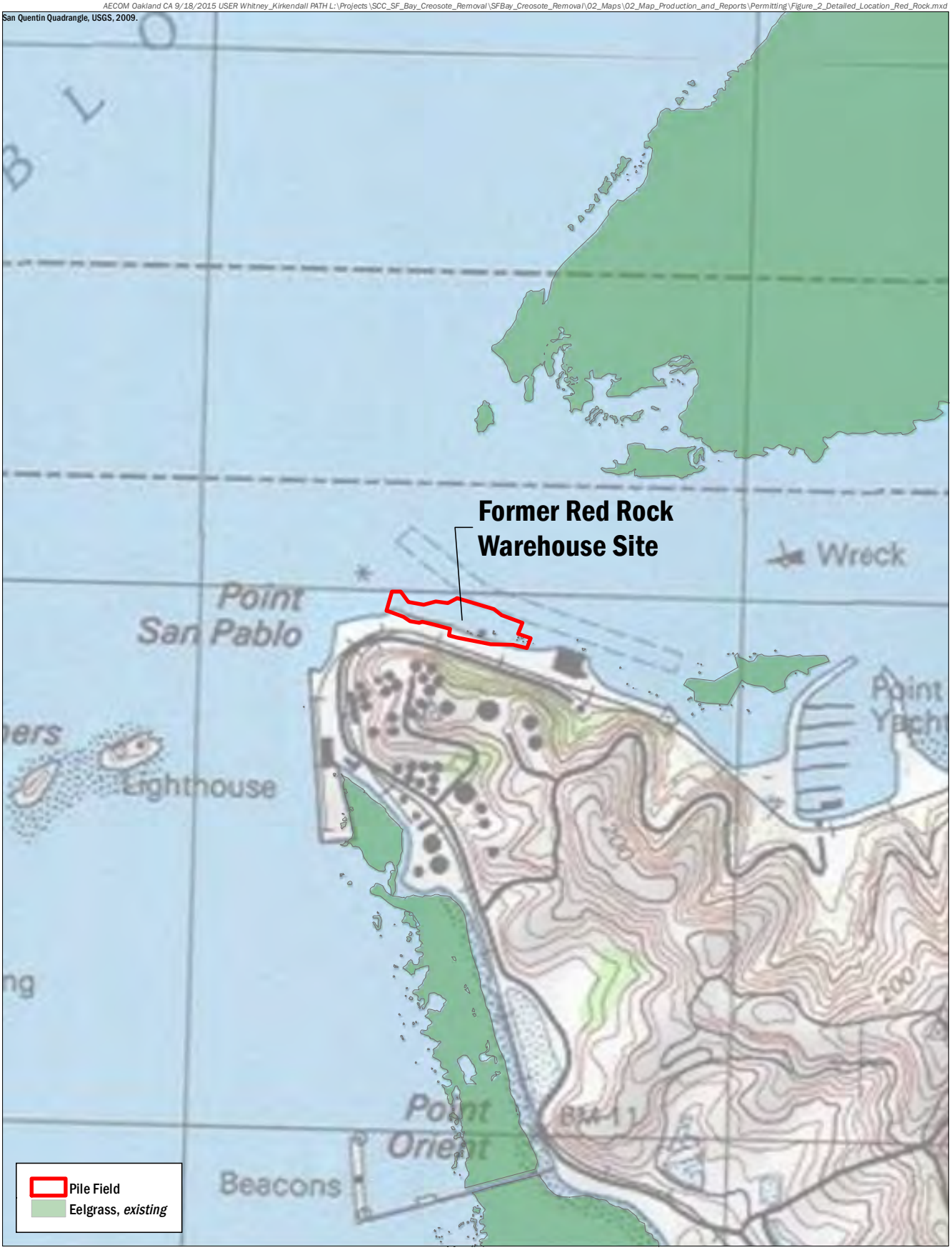

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FIGURE 2

Red Rock Warehouse Site Detail Location

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San Quentin Quadrangle, USGS, 2009.

California State Coastal Conservancy
SF Bay Creosote Removal and Herring Habitat Restoration Project

FIGURE 3

El Campo Marina Site Detail Location

The main reason for choosing two sites instead of one for the pilot project is that there was no single site that had a large enough number of creosote-treated piles to meet the criteria of the NFWF grant or the overall objectives of the project. It was decided that the removal of derelict creosote-treated piles and habitat restoration at the combination of these two sites would best meet those project objectives and also provide comparisons of restoration efforts on two different sides (west and east) of San Francisco Bay.

The details of the proposed pile removal and subsequent habitat restoration at these two sites are presented in the following sections.

2.3 SITE LOCATION AND OVERVIEWS

The Red Rock Warehouse and El Campo Marina sites are generally located within the Central and San Pablo Bay portions of San Francisco Bay (**Figure 1**), as described in detail below.

There are also several portions of City of Richmond-owned land around the tip of Point San Pablo that could be used for staging areas and for drying removed piles. It is unclear yet which of them would be used, but the total acreage of those areas is almost 1.25 acres. These staging areas are all on paved or hard-packed dirt areas that have been used by the landowner and its tenants for similar short- and medium-term stockpiling of similar construction materials. No environmental impacts from use of these staging/stockpiling areas are anticipated, and they are not included in the project footprint areas below.

The project design incorporates certain “environmental protection measures”, such as timing and location of project work and standardized best management practices, which will avoid some of the environmental impacts of the project. These environmental protection measures, including those which will avoid impacts in the staging areas, are described and discussed in Section 2.11.

2.3.1 RED ROCK WAREHOUSE

Red Rock Warehouse is located on the northeastern tip of Point San Pablo in the City of Richmond (**Figure 2**). This site is in Contra Costa County, and the coordinates of the central point of the site are 37.965507, -122.426429. There are approximately 350 creosote-treated piles and a small amount of collapsing creosote-treated decking that is likely to eventually drop into the bay. While the heavier portions of the decking are expected to settle in place, much of it is likely to be exported from the site by bay currents. Red Rock Warehouse contains no known piles made of or wrapped in concrete or steel. Other debris near the site includes a large steel lattice structure in the center of the warehouse site, a submerged vessel hull at the northeastern margin of the pile field, and large portions (approximately 10,000 square feet) of the original concrete decking.

There are remnants of the former Del Monte Richmond Whaling Station to the east of the Red Rock Warehouse site itself. The whaling station burnt down and was dismantled in 1989, but the lower portion of the hoisting ramp that was used to slide whales into the building was spared. The station lies far enough east of the piles that it will not interfere with pile removal. The nearest navigational channel is the North Ship Channel, located approximately 0.25 miles northwest of Red Rock Warehouse. Nearby

waterfront facilities include the Point San Pablo Yacht Harbor to the southeast and the Richmond-owned Terminal 4 Wharf site around the tip of Point San Pablo on its western side.

The on-land portions of the Red Rock Warehouse site are owned by the City of Richmond. The warehouse was constructed after 1938 and may have integrated some of the pile support structures from existing overwater warehouses and piers. Fill was placed in several areas near the site, resulting in shoreline expansion. Most of the in-water portions of the site are also on parcels owned by the City of Richmond, but some of the parcels are owned by the California State Lands Commission (CSLC).

There is significant scenic value at Red Rock Warehouse, and the City of Richmond has expressed interest in expanding public shoreline park access. There is currently no land-based recreational or other public use of the site, though boating and fishing does take place in the portions of the bay near the site. The road leading to Red Rock Warehouse is closed to the public, and derelict structures in the area pose safety risks. The nearest historical site is the East Brother Island Light Station, located approximately 0.3 miles southwest of Red Rock Warehouse. The nearest recreational sites include the Point San Pablo Yacht Harbor, located approximately 0.4 miles east of Red Rock Warehouse, and Point Molate Beach Park, located approximately 1.7 miles south of the site. The Point San Pablo area is relatively undeveloped compared to most areas in the City of Richmond. The nearest restoration project is the completed Wildcat Creek Restoration, located approximately 3.7 miles east of Red Rock Warehouse.

2.3.2 EL CAMPO MARINA

The El Campo Marina site is located in Central San Francisco Bay west of Paradise Beach County Park along the northeastern side of the Tiburon Peninsula in Marin County (**Figure 3**). The coordinates of the central point of the site are 37.898439, -122.464597. The piles are generally located in two distinct groups. The larger western group consists of several rows of piles that extend perpendicularly from the shoreline that once supported docks and also includes a bayward row of pile dolphins, (isolated groups of piles used for mooring or navigational guidance) that runs parallel to the shoreline on the outermost edge of the site. These piles likely supported a breakwater (Merkel & Associates, Inc. 2015). The smaller second group consists of an arcing row of pile dolphins on the southeast side of the site. These were likely the base of a buttress structure (Merkel & Associates, Inc. 2015). The property line between the two parcels cuts across the eastern arc of pile dolphins.

The El Campo Marina site contains approximately 250 creosote-treated piles that are visible above the water’s surface. In addition to those piles, there are numerous subtidal piles lying on the bay floor in this location. Some of the horizontal subtidal piles are likely to be concrete-wrapped, but neither the total number of these downed piles, nor the proportion of them that are creosote-treated or made of or wrapped in concrete, steel, or other materials, has been estimated because the piles are stacked on top of one another. At least 65 piles were noted during the interferometric sidescan sonar surveys, but there are likely many more that were not detectable past the top pile layers. Therefore, throughout this document, the number of piles at the El Campo Marina site is conservatively assumed to be 315.

Other debris that may be encountered and removed from this site includes rusted I-beam piles, still vertical and upright, that are interspersed between the pile dolphins on the southeastern side of the site. The nearest navigational channel is the North Ship Channel, located approximately 1 mile northeast of the El Campo Marina site. Nearby waterfront facilities include several private docks located to the southeast and northwest of the site.

The El Campo Marina site is located principally within a private trust owned by the Traeger family with a small portion of the easterly end of the shoreline pile alignment being owned by another private residential landowner. SCC and the Traeger family are in the process of negotiating permission to undertake the project on that site. Efforts are also underway to contact and coordinate with the owner of the parcel east of the Traeger family property. If permission is not obtained, the project will be scaled down accordingly. Bayward of the marina pile field, the waters are owned by the CSLC.

The site was previously owned by the San Francisco & North Pacific Railroad, which established the El Campo Marina as a resort in 1891. The first wharf at El Campo was constructed around 1891 and was used on and off for ferrying passengers to El Campo. In the early 1960s, efforts were made to develop a small boat marina but it was defunct by 1968. It is unclear whether the marina ever went into full operation or when the docks were removed, but the gangways were present through at least 1987. While the history of the marina is somewhat short and unremarkable, the larger El Campo Marina site (i.e., the on-land portions) was a recreational area that contained band stands, a dance pavilion, and piers that were used to bring guests to the site by ferry. The upland structures associated with the El Campo Marina were removed and the area is now in private residential use. The piles presently provide no function and are a potential navigation and possible environmental liability for the property owner. The presence of eelgrass and shallow waters through the site suggest that the area is unlikely to be suitable for future marina development, thus minimizing the potential value of retaining any portions of the piles on the water. The site has no current land-based recreational use, but has high scenic values for those with access to the private properties along the shore. This portion of the bay is used by small boats for recreation, fishing, or other purposes. Nearby recreational sites include Paradise Beach County Park and the Tiburon Uplands Nature Preserve to the south. Nearby natural areas include the Tiburon Uplands Nature Preserve. The nearest restoration project is Richardson Bay Audubon Center and Sanctuary’s Aramburu Island Enhancement Project, located approximately 2 miles southwest of El Campo Marina.

2.4 PROJECT FOOTPRINTS

There are separate project footprints for each site. The project footprints include the creosote-treated pile fields and a 33-foot buffer distance around them, as well as the areas where the various restoration treatments would be placed. These are the types of areas that would be physically disturbed as a result of project activities and thus where impacts such as fill removal or fill placement would occur. But the project footprints also include some areas of the bay or the shoreline that would not be directly affected by project activities but through which the construction barges or the shore-based work may pass. Rather than produce several discontinuous footprints for different phases of the project, the project proponents have decided to present a large, all-encompassing footprint for each site and then describe the areas

within them that would be affected during the pile removal and the habitat restoration phases of the project.

Table 1. Project Footprints and Sub-Areas

Description	Areas (in acres) by Project Site	
	Red Rock Warehouse Site	El Campo Marina Site
Total Footprint	4.18	9.50
In-Bay Footprint (below high-tide line)	3.89	8.92
Upland Footprint (above high-tide line)	0.29	0.57
Pile Field	3.20	6.77
Restoration Areas – All	1.10	0.66
Eelgrass Planting	0.64	0.38
Reef Structures (all types)	0.38	0.17
Rockweed Relocation	0.25	0.35
Shoreline Access and Staging	1.23	0

Table 1 shows the breakdown of these project footprints into these various sub-areas. Note that the acreages presented include not only the existing or proposed features (such as piles or reef structures for oysters), but the areas between individual piles or restoration treatments and a buffer distance around them. The actual areas of fill added or removed, for example, would be less than the numbers shown here. These and other actual impacts are discussed elsewhere. As noted in the opening paragraphs of Section 2, the potential on-land staging areas adjacent to the Red Rock Warehouse site are not included in the project footprint totals presented here.

2.5 ACCESS AND STAGING

As described above, working from land has operational and safety advantages if structures can be accessed from the shoreline and are within the reach of specialized equipment. The Red Rock Warehouse site is owned by the City of Richmond and is easily accessed by land via Stenmark Drive. The City's property is currently fenced in and closed to the public behind a locked gate.

Some of the pilings at the Red Rock Warehouse site could be reached from land, and the design plans call for as much of the pile removal as possible to be done from shore by a long-reach excavator. The rubble-armored shoreline is at 0 feet MLLW, and the outer edge is at -6 feet mean lower low water (MLLW). This makes land-based removal of at least some of the pilings at this site a reasonable option assuming the terrestrial vegetation on the shore does not contain special-status plants or wildlife species that would need to be cleared to allow access. (See discussion in Section 2.11 for how this status would be determined and Section 3.4 for the impact analysis discussion). The Red Rock Warehouse site has a scoured channel immediately north of the edge of the pile complex. This channel meets the outer edge of the pilings at elevation -6, making barge access to the site practical.

There are suitable locations for staging and for stockpiling and drying removed piles immediately landward (south) of the pile fields. The exact location of the staging area will be determined in collaboration with the City of Richmond as the project proceeds through future design stages. However, as noted in Section 2, there are at least six distinct areas within the on-land, City of Richmond-owned portions of the site that could be used for staging and stockpiling, as well as for drying removed piles, decking, and other material prior to removal for landfill disposal. These areas are shown on **Figure 4.** The total footprint of the six distinct areas is 1.23 acres, though it is unclear which of them would be used for this project. All of these staging areas are either paved or are hard-packed dirt, and all have been or are being used by the City or its tenants on the land for similar storage and laydown of construction materials and equipment.

The El Campo Marina site has more challenging constraints for access and staging. There is no available land access for staging, drying, or haulout and all of the piles occur in waters shallower than -4 feet MLLW. This means that construction access will be tidally constrained, as shallow draft barges generally have 5 feet of draft. Many of the piles also occur within dense shallow eelgrass beds that have a high potential to be damaged if piles and decking are removed by barge and crane. In these shallower areas, during low tides, divers would hand cut piles and push them to a location where the barge-based construction equipment could remove them. An offsite staging area would be used for work at the El Campo Marina site; current plans include using the City of Richmond’s staging area for pile removal at the Red Rock Warehouse site to also be used for work at El Campo. Removed piles and other material would be pulled up onto a barge in any case, so the added distance across the bay is not prohibitively difficult or expensive.

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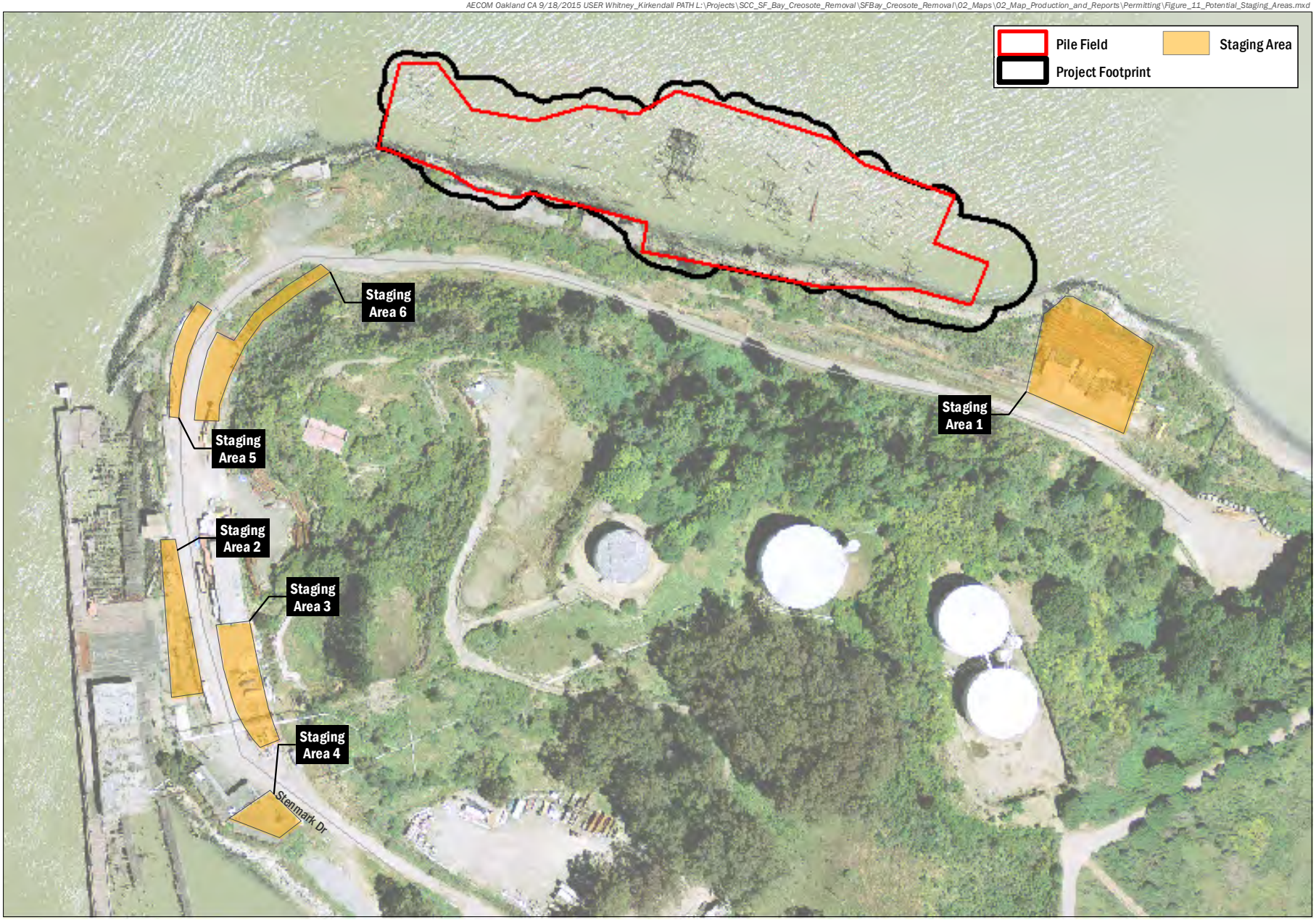

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FIGURE 4

Potential Staging Areas

2.6 CREOSOTE-TREATED PILE REMOVAL

The San Francisco Bay Regional Water Quality Control Board (RWQCB) and the BCDC have provided guidance for removing creosote-treated pilings in the bay. That guidance was adapted to San Francisco Bay by RWQCB a from creosote-removal projects in Puget Sound and elsewhere as part of the permitting for the construction related to America's Cup events. It was policy AC-34 for that project, and it has since become a part of RWQCB guidance and direction for creosote piling removal projects within the bay. Under the project designs and specifications for this project, enforced by contractual provisions, the construction contractor (contractor) is to attempt to remove the pilings using methods that would depend on the contamination of the surrounding sediments or muds and on the conditions of the piles.

Based on a thorough investigation of known contamination within or around the project area, to date there is no indication of any potential contamination at either of the two project sites The SCC has conducted due diligence on the sites, including researching the history of oil or other contaminant spills in the areas, discussions with the land owners, and visual assessments of the shoreline. It does not appear that the sediments or waters at the two project sites are contaminated by pollutants other than creosote in amounts or concentrations greater than those typically found in San Francisco Bay. Even though there currently is no indication of contamination, it is possible that new information may be presented during project implementation or may arise as a result of on-site activities that indicate to the contrary. Accordingly, two separate procedures will be utilized based on information related to local sediment condition, as follows:

- If there is reason to believe that the sediment is contaminated beyond the typical ambient levels of various in-bay pollutants, other than creosote, which is inferred to be present, the contractor will cut the piling at the mudline.
- If there is no reason to believe the sediment is contaminated beyond typical ambient levels, the contractor will attempt to remove the entirety of each piling by pulling the piling straight out.
- The decision as to method of removal also depends on the condition of the piling. Generally, the contractor is prohibited from using vibration or a back-and-forth, rocking movement intended to snap the piling because this generally increases turbidity. Moreover:
- If, prior to attempting to remove the entire piling, visual inspection of the pilings indicates that the pilings lack the necessary integrity to be pulled without splintering, crumbling, or otherwise disintegrating, the contractor will instead cut the remaining pile to a level 2-3 feet below the surrounding existing sediment or mudline.
- If, during attempts to use direct pulls on the piling to remove it, the piling breaks at a level higher than 2-feet below the mudline, the contractor will cut the remaining pile to a level 2-3 feet below the surrounding existing sediment or mudline.

Because the condition of the piles' structural integrity is not fully nor precisely known, the SCC plans to conduct an investigation of pile integrity following the submission of the various permitting documents to the regulatory agencies. A brief memorandum on that investigation would be delivered to the agencies to inform them of the pile conditions and the expectation about whether pilings can be removed by pulling without crumbling. Because of the severely degraded nature of all piles at both sites, it is likely that most,

if not all, of the piles at both sites will necessitate being cut off below the mud line using sawing attachments or by divers using hydraulic chainsaws or hydraulic shears.

The removed piles, decking, and other materials would be loaded onto a barge and transported back to the contractor's staging area where the concrete shall be separated from the other materials and recycled or disposed of offsite as appropriate at a permitted facility.

Pile removal can be carried out from land or water-based equipment. Much of the pile removal and structure demolition can be carried out from land at the Red Rock Warehouse site using long-reach excavators or cranes and a number of different of grabbing and cutting attachments. Typical long-reach excavators have a working limit of approximately 50 feet, but specialized equipment is available with a working reach of up to 100 feet. Use of this large and heavy equipment has limitations, including the need for stable ground to support excavator outriggers. Also, as the reach distance increases, the lift capacity deceases.

There is no land access to the El Campo Marina site and so all demolition must be performed using barge-mounted equipment or divers supported by a barge, with the pilings and other materials transported to either the Red Rock Warehouse site or some other site selected by the contractor, for drying and hauling. Once the removed debris are on land, the pilings and planks are cut to 5-foot lengths and dried out before hauling to a landfill for disposal.

Most pilings and other debris will require removal from the water using barge-mounted equipment. Removal of the pilings and other debris would be carried out using an excavator mounted on a shallow-draft barge equipped with both grappling and shearing attachments. Shallow-draft barges generally require at least 5 feet of water above the sea floor or any submerged debris. Depending on specific site conditions and the construction barge chosen, it may be possible to float the barge into position at high tides, let it settle on the intertidal mudflats to continue working at low tides, and then be lifted by the next high tide. In particular, existing eelgrass or oyster beds would be avoided, which would limit the extent to which this approach could be used at both the Red Rock Warehouse site and El Campo Marina site, which have patches of eelgrass and/or other benthic organisms interspersed with the piles.

When depths limit access to barges or sensitive resources are present, piles may be manually cut by divers using a pneumatic or hydraulic saw or shears. Once the piles are cut, they may be towed out to deeper water to a waiting barge or to a landside staging area for loading and removal.

The holes left after pile removal will not be actively filled. Attempting to fill the holes would lead to increased sediment disturbance and unnecessary increases in turbidity. It is expected that sediment deposition will rapidly fill in any holes that are left.

2.6.1 RED ROCK WAREHOUSE PILE REMOVAL SUMMARY

The project sequence for the Red Rock Warehouse site is relatively straightforward and includes the following tasks:

- Removal of wooden decking above the water.
- Removal and disposal of approximately 350 wooden pilings on the beach and in the water.
- Re-grading and stabilization of unstable embankment above the beach where needed.
- Selective removal and disposal of wooden and concrete decking and other debris from below the water.
- Trimming and debris removal of piles that have broken or break above the sea floor.

Figure 5 shows areas where pile removal would be performed at the Red Rock Warehouse site. The concrete foundation is on the shore and is assumed to remain in place. A BCDC permit application for the piling removal dated 1999 from the City of Richmond shows more decking than is currently visible. Parts of the missing decking have sunk in place, while other portions may have floated away. A large rubble field – approximately 10,360 square feet – containing both timbers and concrete flooring material occurs within the core of the old warehouse footprint. As noted earlier, up to three dozen pile butts extend above the seafloor but below the lowest low tide, and there are some large metal debris items that pose significant navigation hazards if the piles are removed and other debris are left.

Table 2 shows the number of piles that would be removed as well as the individual and combined pile footprint areas, and the area of the overall pile field that is expected to benefit from the removal of these piles. Further, a conservative estimate for the total volume of fill in the water column that would be removed is presented. The volume was calculated assuming that each pile would be an average of 4 feet tall, from the mudline to its top within the water column. Many or most of the piles are taller than this, and many others would be cut 2-3 feet below the mudline or removed entirely, so this estimate is conservative; the actual volume of creosote-treated piles is likely to be larger.

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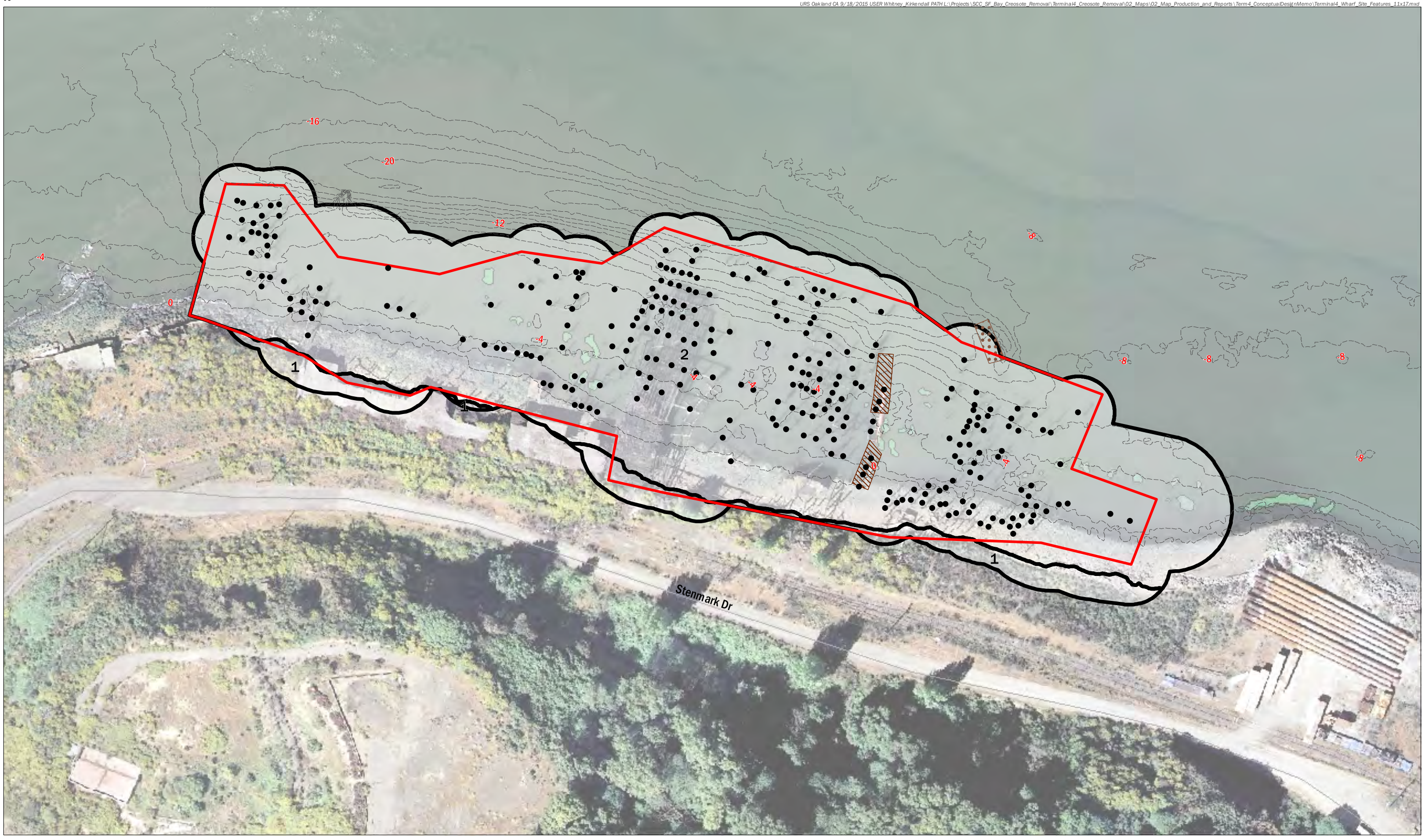

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Data Sources:
1. Eelgrass, Merkel Sonar Survey, October 2014
2. Bathymetry, Merkel Sonar Survey, October 2014

Notes:
1. Bathymetry (NAVD88), 0 Ft contour roughly equivalent to mean lower low water (MLLW), NGS, June 2015

- Creosote Piling
- 2ft Bathymetric Contour
- Sunken Vessel
- Steel Lattice
- Pile Field
- Land-Water Classification
  - 1: Upland
  - 2: Waters of the US
- Eelgrass Bed

FIGURE 5

Red Rock Warehouse Site
Pile Removal Approach

As noted elsewhere, within the pile field, between the standing piles, there are collapsed piles, decking, and other debris that would also be removed, thus adding an unknown amount to these estimates of the total area and volumes of fill removed.

Table 2. Impacted Area of Pile Removal at Red Rock Warehouse Site

Item	Value
No. piles (standing)	350
Typical pile diameter	1.25 feet
Typical pile area	1.23 square feet
Summed pile footprint area	429.5 square feet (0.010 acre)
Summed pile footprint volume*	1,718 cubic feet (64 cubic yards)
Pile field area	3.2 acres

*Assumes an average pile is 4 feet tall within the water column

2.6.2 EL CAMPO MARINA SITE PILE REMOVAL SUMMARY

The El Campo Marina site restoration project is more challenging than the Red Rock Warehouse site restoration due to shallow water depths, soft sediment, and the abundance of eelgrass beds in portions of the site. **Figure 6** shows areas where pile removal would be performed at the El Campo Marina site. Pile removal at the El Campo Marina site includes the following tasks:

- Removal of cross beams and hardware tying the dolphin piles together.
- Cutting or pulling and disposal of approximately 250 standing wooden pilings and standing I-beam piles in the water.
- Removal and disposal of at least 65 piles and other debris lying on the bay floor.
- Trimming and debris removal of piles that have broken or break above the sea floor.

As all of the piles occur in water shallower than -4 feet MLLW, and in some cases shallower than -2 feet MLLW, barge access will be tidally constrained. Many of the piles also occur within dense shallow eelgrass beds that have a high potential to be damaged if piles are removed by barge and crane. It may be necessary to hand cut piles at the mudline with a pneumatic or hydraulic saw and float them out of the eelgrass to deeper water for removal. If barges are used, the wide spacing of the marina piles and the shallow water will adversely impact the cost of removal due to limiting the time of operation and due to the many moves of the barge required.

Table 3 shows the number of piles that would be removed as well as the individual and combined pile footprint areas, and the area of the overall pile field that is expected to benefit from the removal of these piles. Further, a conservative estimate for the total volume of fill in the water column that would be removed is presented. The volume was calculated assuming that each pile would be an average of 4 feet tall, from the mudline to its top. Many or most of the piles are taller than this, and many others would be cut 2-3 feet below the mudline or

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Data Sources:
1. Eelgrass, Merkel Sonar Survey, October 2014
2. Bathymetry, Merkel Sonar Survey, October 2014

Notes:
1. Bathymetry (NAVD88), 0 Ft contour roughly equivalent to mean lower low water (MLLW), NGS, June 2015

Creosote Piling
2ft Bathymetric Contour
Pile Field

Land-Water Classification
1: Upland
2: Waters of the US
Eelgrass Bed

FIGURE 6

El Campo Marina Site
Pile Removal Approach

removed entirely. Further, in the volume calculations, the downed piles on the bay floor are assumed to be standing and of the same dimensions as the vertical piles. Thus, this estimate is quite conservative; the actual volume of creosote-treated piles is likely to be larger. As noted elsewhere, within the pile field, between the standing piles, there are collapsed piles, decking, and other debris that would also be removed, thus adding an unknown amount to these estimates of the total area and volumes of fill removed.

Table 3. Impacted Area of Pile Removal at El Campo Marina Site

Item	Value
No. piles (standing)	250
Typical pile diameter	1.25 feet
Typical pile area	1.23 square feet
Summed pile footprint area	386 square feet (0.009 acre)
Summed pile footprint volume*	1,933 cubic feet (72 cubic yards)
Pile field area	6.8 acres

*Assumes an average pile is 4 feet tall within the water column

2.6.3 MATERIAL DISPOSAL

As noted above, the removed creosote-treated piles, decking, and other material would be transported by barge to an on-land drying area. They would be placed into containment basins that would collect the water, residual creosote, and other materials that may drain off of them. The collected water would eventually evaporate, and the residual creosote and other materials would be placed into barrels for disposal at an appropriate Class 2 landfill as described below.

Following drying, the piles themselves would be disposed of at a Class 2 (non-hazardous) landfill, with clean demolition debris disposed of at a Class 3 (inert) landfill. The Keller Canyon Landfill in Pittsburg, California, is the closest landfill to the Red Rock Warehouse site, and accepts both Class 2 and Class 3 waste. Clean wood, metal, and concrete debris will be recycled by the contractor to the extent possible, which should result in cost savings. The closest landfill to the El Campo Marina Site is the Redwood Landfill and Recycling Center in Novato, which only accepts Class 3 waste but has the capacity to recycle concrete, wood and metal debris. Materials disposal options and cost estimates will be further developed in a future memorandum.

To streamline the disposal process, debris and piling removed from the El Campo Marina site are expected to be transported by barge to the Red Rock Warehouse for drying and disposal, where waterside staging areas area available.

2.7 HABITAT RESTORATION

This section described the three methods of habitat restoration/enhancement efforts planned for this project. They are eelgrass beds, reef structures for oysters (three types of reefs, as described below) and rockweed (two types).

2.7.1 EELGRASS RESTORATION

HARVEST AND TRANSPLANT METHODS

The eelgrass portion of the habitat restoration project will involve harvesting eelgrass shoots and roots from existing healthy eelgrass donor beds, tying several of them to a light anchor to form a planting unit, and then planting them in a new location. This approach is called a bare-root transplant, and the fabricated planning units themselves are called bare-root planting units.

Harvesting of the eelgrass shoots would done by hand by trained divers who selectively extract shoots from moderate to dense eelgrass beds. The collection would be done by using a gentle vibrating motion while lifting the shoots and stems (formally called rhizomes) from the sediments. This liquefies and softens the sediments and allows extraction of healthy and viable plant material without substantially disturbing the substrate or the remaining shoots. Thick rhizomes, a minimum of 2 to 3 inches long, rather than thinner rhizomes, would be selected. Each harvested shoot would have a minimum of four nodes and internodes on the rhizome. The shoots would be placed in appropriate containers where separation and counting of individual shoots shall occur before placing them in totes for transport.

To reduce overall impact on the source location(s), harvest of donor material from the donor beds would be restricted to 10% or less of total rhizome count per square meter. Extraction density is managed on an area (square footage) basis and not in aggregate.

To fabricate the bare-root planting units, several individual shoots would be aggregated into groups of four shoots and their full rhizome structures, and hand-tied into planting units of shoot bundles attached to a paper-stick anchor. These paper-stick anchors are typically called confectioner sticks or sucker sticks, such as those seen on commercial candy items. They are made of tightly rolled paper and are thus biodegradable, though they are expected to persist in the sediments long enough for the eelgrass itself to become established. The dimensions of the stick anchors would be approximately 3.5 inches long and 1/8-inch in diameter.

The twine used to attach the eelgrass to the anchor sticks would 100 percent cotton twine. The twine would be knotted onto the paper stick anchor firmly and around the top of the rhizome bundle just below the meristem of the plants. The length of twine between the anchor and the shoots would be 3 inches (+/- 0.5 inch). There would be four shoots per planting unit. Following anchor attachment, the leaves of each planting unit would be cut to a length of approximately 30 inches to facilitate handling and planting. Preparation of planting units would be performed in flowing seawater baths to prevent the plants from drying out.

The source material for the eelgrass transplants would be harvested from existing eelgrass beds at Paradise Beach and Pt. Molate/Pt. Orient for the El Campo Marina site and from Pt. San Pablo-Pt. Pinole and Pt. Molate/Pt. Orient for the Red Rock Warehouse site. **Figure 7** shows the general locations of these sources. These are large and healthy beds with sufficient density and extent of eelgrass to provide the numbers of eelgrass shoots necessary for this project. The time from harvest to planting would be less than 72 hours.

Figure 8 and **Figure 9** illustrate the restoration design plans for the Red Rock and El Campo sites, respectively, including locations of eelgrass transplanting zones. The eelgrass planting units would be hand-planted into these eelgrass zones but only into areas of suitable substrate (i.e., sand or mud) within those zones. The planting units would be planted with the anchors located horizontally about 3 inches (+/- 0.5 inch) below the rhizome bundles,

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FIGURE 7

Potential Locations of Source Eelgrass Material

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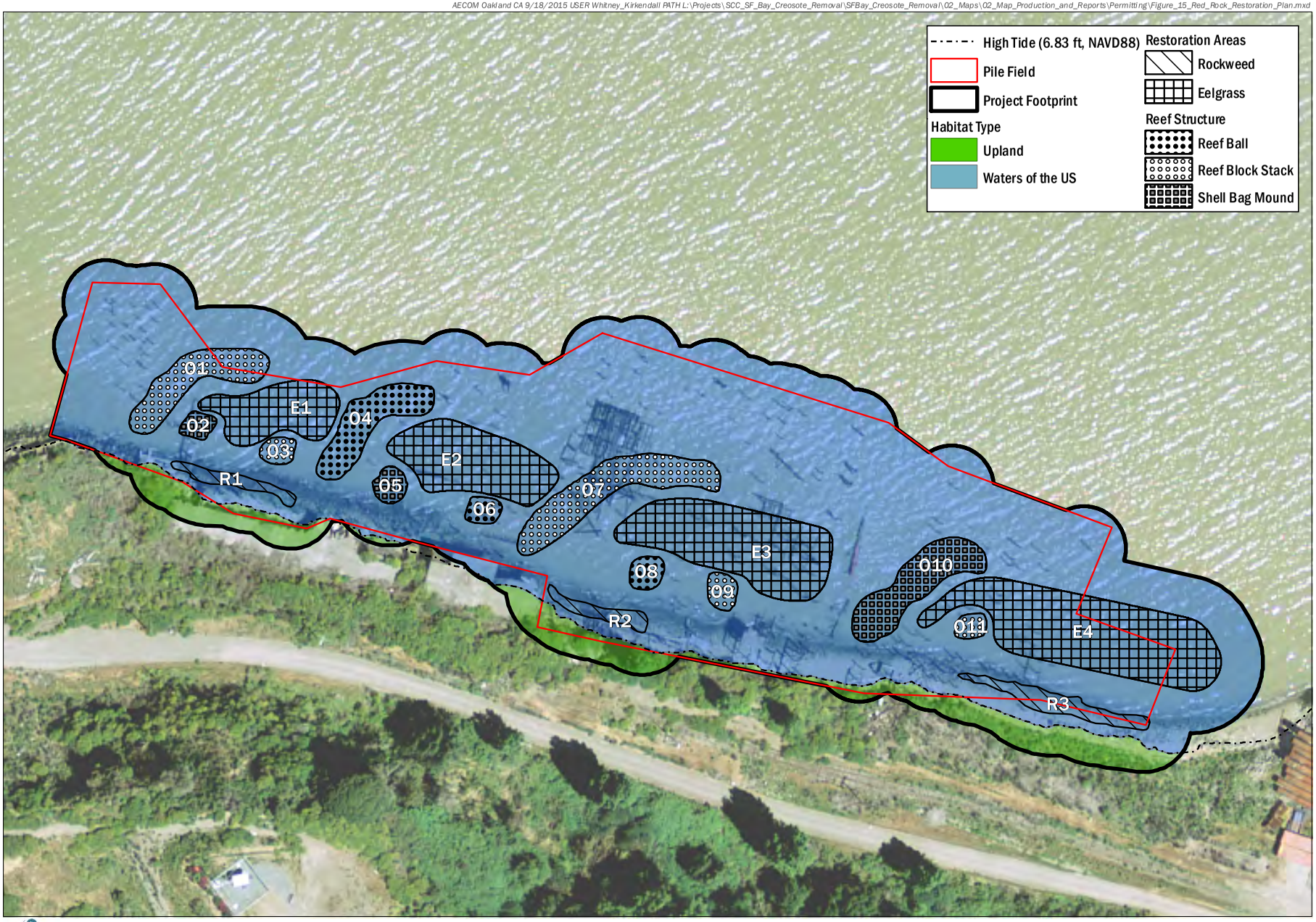

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FIGURE 8

Red Rock Warehouse Site Restoration Plan

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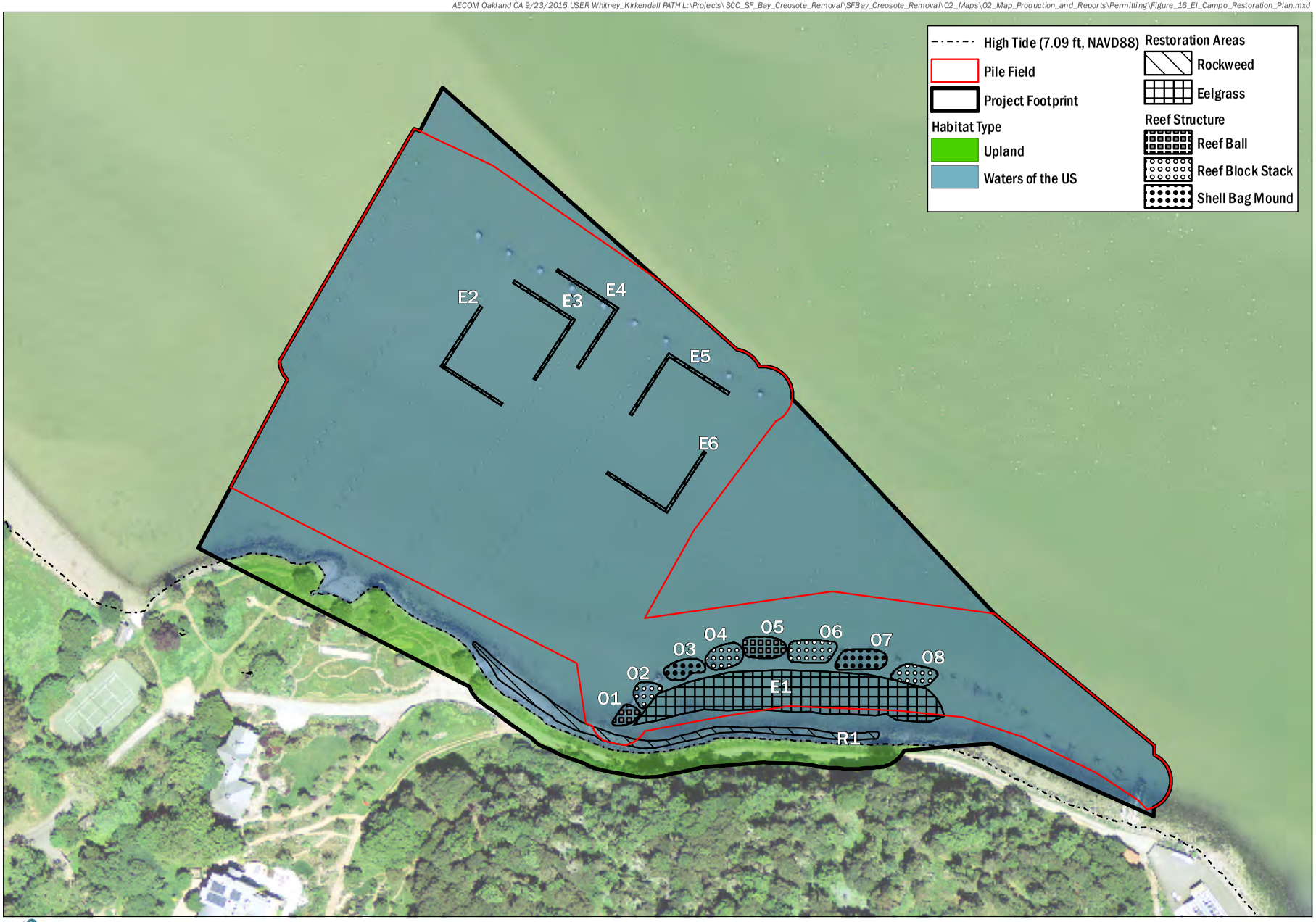

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FIGURE 9

El Campo Marina Site Restoration Plan

which in turn would be set 1 inch below the sediment surface. The initial density of plantings is intended to be 1 planting unit per square meter throughout each planting zone.

Table 4 shows those planting zones as well as the maximum number of planting units that would be needed to achieve that density at each of the two sites. However, planting efforts would skip over areas where substrate is not suitable for eelgrass (see below). The planting units that were left over after the initial pass-through would be used to increase the planting density in areas of suitable substrate character.

Table 4. Eelgrass Planting Areas

Item	Red Rock Warehouse Site	El Campo Marina Site
Total Eelgrass Planting Area	0.64 acres	0.38 acres
Maximum Number of Planting Units	2,597 units	1,539 units

The eelgrass zone elevations are from 0 feet to -2.5 feet MLLW at El Campo and from -2 feet to -6 feet MLLW at Red Rock. At the Red Rock Warehouse site, approximately half of the bottom in the eelgrass zones is likely unsuited to support eelgrass because of the hard bottom habitat or because of downed concrete decking that still remains. However, gaps between hard bottom areas do exist where soft sediment has accumulated and areas could be successfully planted. As shown on **Figure 8**, the eelgrass zones at this site are arrayed to alternate with oyster reef structure zones across a generally west-to-east transect. As discussed in Section 3.3.2, these reef structures would not only provide hard substrate for oysters and other benthic organisms but would also slow the tidal flows and waves along and within the restoration site as a whole. This would reduce scour and help sediment accretion in and around the project footprint. This is important because some initial increase in scour is expected after pile removal; stopping or reversing that initial loss would benefit eelgrass recruitment. The eelgrass zones are separated from the oyster reef zones by about 20 feet to allow for ongoing monitoring access and to prevent scour immediately adjacent to the reef treatments.

At the El Campo Marina site, as shown on **Figure 9**, the bulk of the eelgrass planting would be in a zone on the eastern edge of the site, shoreward of the existing row of dolphin piles that would be removed. The elevation range and substrate are appropriate for eelgrass in the marked area; however, bayward of the eelgrass zone, the restoration design calls for reef structures instead because the substrate is too hard for eelgrass (a mix of rubble and downed concrete piles).

In addition to this main treatment area, there is unvegetated bottom just below (i.e., on the bayward side of) the existing eelgrass beds within the pile field. This area of the site is generally deeper than areas supporting eelgrass both within and adjacent to the pile removal area. In this area, as shown on **Figure 9**, small, L-shaped eelgrass restoration plots (25 meters by 1 meter on each arm of the L) would be planted to further expand the extent of eelgrass habitat by pushing the lower margin of beds slightly deeper.

Finally, in addition to the eelgrass transplant zones, there are portions of the larger pile field in the center of the site where collapsed piles cover portions of the bottom that abut existing eelgrass beds and are within suitable depth ranges to support eelgrass. Following pile removal, eelgrass is expected to spread

naturally into those areas and beyond them. Active transplanting is not proposed within existing eelgrass beds.

2.7.2 REEF STRUCTURES FOR NATIVE OLYMPIA OYSTERS

There are three different reef structure types that would be placed at the Red Rock Warehouse and El Campo Marina sites, as described below. These reef structure installations would provide hard substrate on which oysters, algae, and other benthic organisms could establish and grow. While oysters are the primary species for which these structures are intended, other species would be ancillary beneficiaries, including Dungeness and rock crab; fish such as steelhead and sturgeon; shrimp; and birds, including American black oyster catchers, egrets, and herons. The organisms and algae that establish on these structures provide a complex surface that would be suitable as a secondary herring spawning substrate. The reef structures themselves would also benefit nearby eelgrass by slowing tidal flows through former pile fields and thus increasing the sediment deposition and reducing scour. The layouts of the reef structures at the two sites are shown on the plans depicted in **Figure 8** and **Figure 9.**

As shown at the El Campo Marina site, the oyster reef structures are arranged in an arc just bayward of the proposed eelgrass transplant zone near the eastern edge of the site. There are a total of 92 reef structures planned for this site. At the Red Rock Warehouse site, the reef structures are arrayed to alternate with eelgrass zones across a generally west-to-east transect. There are a total of 196 reef structures planned for this site. Other details of the reef structure areas are presented in **Table 5** below.

The spacing of the reef structures would be 9 feet on-center (which would leave about 5 feet between the outer edges of adjacent units) within the oyster zones shown on those map figures. The location of each type of reef structure is shown with a different symbol on the maps. The elevations of the oyster zones range between -2 feet and -3 feet MLLW at El Campo and between 0 feet and -6 feet at Red Rock. The spacing between each oyster zone and the nearest eelgrass zone would be 20 feet to protect the planted eelgrass beds from any localized scour or undue sediment accretion around the bases of the oyster reef structures.

Each unit of the three structure types would be placed on a base prior to placement into the sites. A base is advantageous not only for increasing stability but also to raise the reef structures above the bottom elevation so that they are not adversely affected either by scour or sediment deposition. Each structure would be assembled on land and loaded onto the construction barge where it would be lowered into position on the bay floor with a crane or similar piece of equipment. The reef structures would be placed on 4-foot square bases that would be approximately 8 inches thick. The bases would be made of Baycrete or may be pallet-like wooden frames.

Baycrete is a specialized concrete mix that was used to create reef structures for the State Coastal Conservancy’s Living Shorelines Project and several other projects. It is a mixture of 20% Portland cement and almost 80% native bay mined sand and fossilized Olympia oyster shell. There are also small amounts of admixtures and other substances to produce the desired structural and chemical properties for this project (details of the Baycrete composition and fabrication are provided in the design specifications, included as Appendix A). The resultant Baycrete provides a stiff and hardened but pH-neutral and

somewhat erodible surface of primarily native bay substrate. Allowing some post-placement erosion is beneficial from a habitat restoration perspective because the rougher texture is more conducive to settlement by oysters, algae, and other benthic organisms.

Table 5. Reef Structure Details

Item Description	Red Rock Warehouse Site	El Campo Marina Site	Units
Number of reef structures	196	92	units
Reef balls (Style 1)	*49*	*23*	*units*
Reef block stacks (Style 2)	*98*	*46*	*units*
Shell bag mounds (Style 3)	*49*	*23*	*units*
Base area - Reef balls (Style 1)	*16*	*16*	*ft^2/unit*
Base area - Reef block stacks (Style 2)	*16*	*16*	*ft^2/unit*
Base area - Shell bag mounds (Style 3)	*16*	*16*	*ft^2/unit*
Footprint - Reef balls (Style 1)	*784*	*368*	*ft^2*
Footprint - Reef block stacks (Style 2)	*1568*	*736*	*ft^2*
Footprint - Shell bag mounds (Style 3)	*784*	*368*	*ft^2*
Total footprint area of reef structures	3,136	1,472	ft^2
Total footprint area of reef structures	0.07	0.03	acre

The specifics of three types of reef structures planned are described in the three subsections that follow.

Reef Balls

Reef balls (see **Figure 10**) are hollow and roughly hemispherical structures cast from Baycrete, as described above. The reef balls proposed for this project weigh up to 200 pounds and are 2.5 feet in diameter and 1.75 feet high. As shown in the figure, reef balls have holes on the sides and top to increase flow through them and to enhance the three-dimensional complexity of the habitats they provide. The Baycrete bases for the reef balls would be 4 feet on a side.

Reef balls would be approximately 25% of the total number of reef structures installed for this project. **Table 5** above lists the number of reef balls planned for each of the two sites.

Figure 10. Reef Structure Examples

Figure 10a. Reef Balls **Figure 10b. Reef Block Stack**

Figure 10c. Shell Bag Mound

Shell Bag Mounds

Shell bag mounds (see **Figure 10**) are the most successful and widely used method to create oyster reefs in San Francisco Bay. To construct these, clean Pacific oyster half shells are placed in plastic mesh bags and stacked directly on the substrate or on a base. The stacked bags are placed in a pyramidal mound and affixed to the base with nylon cords or other ropes. The individual shell bags weigh approximately 12 pounds and are roughly 2.5 feet long, 1 foot wide and 6 inches high. Thus, they can be placed on the bases by hand. The height, width, and length of shell bag mounds are can be adapted to particular site conditions. The mounds proposed for this project would be up to 3 feet in diameter and up to 3 feet high. It would take an estimated 12 bags to create mounds of this size.

Shell bag mounds would be approximately 25% of the total number of reef structures installed for this project. **Table 5** above lists the number of shell bag mounds planned for each of the two sites.

Reef Block Stacks

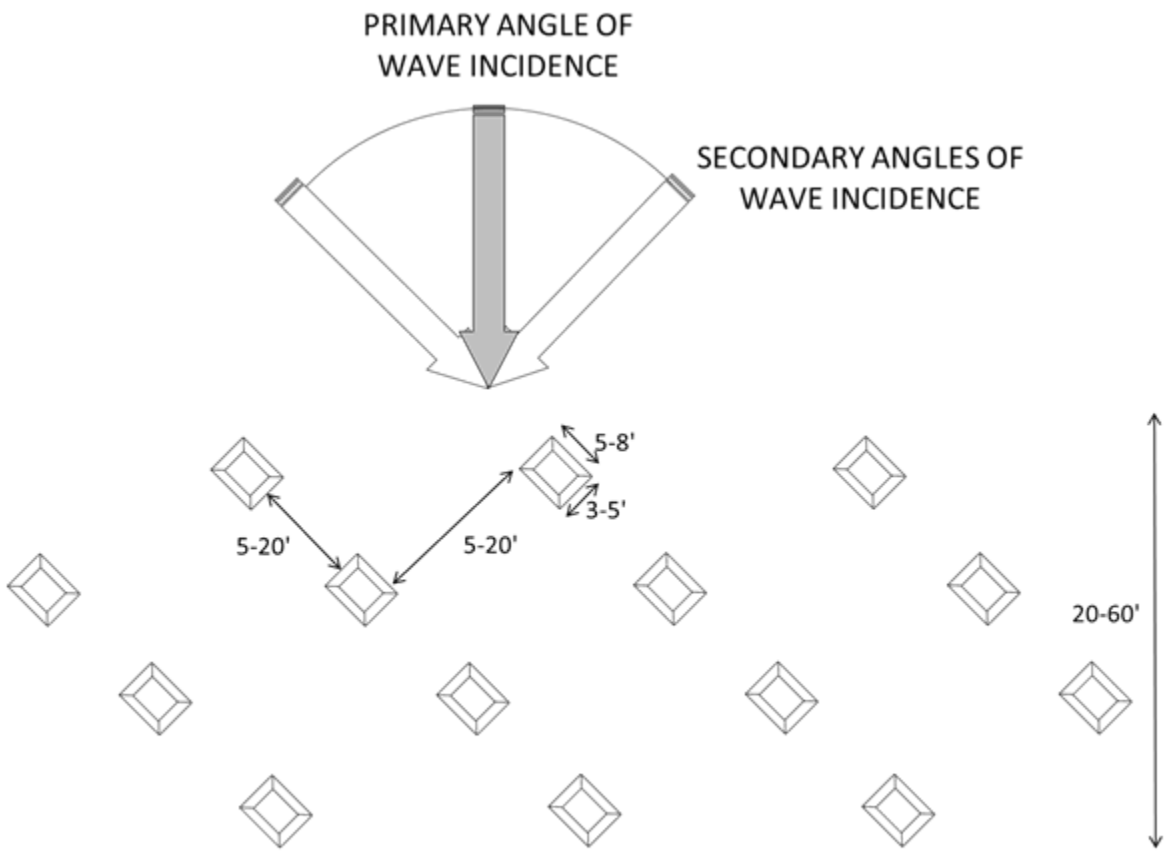
Reef block stacks consist of interlocking blocks cast from Baycrete that can be stacked in a variety of configurations. Each of the interlocking blocks (shown in **Figure 10**) is one foot on a side and eight inches high with cutouts and cavities on two sides and a hole in the middle. This varies shape allows them to be fitted together and also increases the 3-dimensional complexity of the habitat structure. Each block weighs approximately 25 pounds and thus can be easily moved and stacked by hand. The height, width, and length of reef block stacks installations can be varied to meet site-specific considerations. Here, they are expected to be arranged in pyramid shapes that are three levels tall, as shown in **Figure 10**, which would put them at about 3.5 feet on a side and 2 feet tall. This would require 14 individual blocks, though taller stacks requiring more individual blocks could be assembled in deeper water. Reef block stacks would be built on Baycrete bases that are 4 feet on a side.

Reef block stacks would be approximately 50% of the total number of reef structures installed for this project. **Table 5** above lists the number of reef blocks stacks planned for each of the two sites.

Position, Orientation, and Spacing of Reef Structures

As noted in earlier sections, the layout of the restoration reef structures would influence the hydrodynamic and sedimentation regimes around the structures. The placement of reef structures is strategic to promote sediment deposition and/or energy reduction to allow the development of other habitats or reduce erosion. This has been the case for the San Francisco Living Shorelines project and many similar projects conducted outside of the bay. At the two restoration sites, reef structure placement would be expected to influence sediment deposition in a manner dependent upon reef placement configuration and prevailing wave and current energies. To dissipate energy from both short-period wind waves as well as longer period boat wakes that differ between high-speed ferries and larger shipping vessels and barges, a reef array is proposed instead of a single narrow band of reefs (**Figure 11**). This provides greater potential for wave attenuation of a broad spectrum of wave forms. It also facilitates greater dissipation benefits across more variable wave approach vectors. Providing porosity of the reef (gaps between reef units) is important to ensure wave energy dissipation rather than reflection.

Figure 11: Reef Array Alignment



Example layout for segment of oyster reef array with a primary intent to serve as an energy disappation system from vessel wakes or wind waves. To trap sediment, the reef should be densified along leaward edge.

To attenuate forces associated with vessel wakes and wind waves, the reef structures are proposed to be no less than 5 feet apart. Placing the structures with less than 5 feet spacing would risk increasing the velocity of the flows between them and the concomitant scour in the adjacent areas behind them, which is intended for eelgrass. Spacing between 5 feet and 20 feet would bring about the kinds of wave energy-damping discussed above and direct much of the flows around the reef clusters, thus providing protection for the shoreline and the eelgrass planting areas. These distances would be a decrease in the spacing between the existing piles and would thus be expected to increase the amount of protection from high energy waves over the current situation. While a spacing of greater than 5 feet (but less than 20 feet) is still possible, this document conservatively assumes the least distance and thus the greatest number of reef units, and thus the greatest amount of additional fill in the bay.

The structures would be arranged in rows of three that are offset by 50% relative to the primary angle of wind wave and/or ferry wake incidence on the array. The reef structures themselves are largely symmetric around a central vertical axis, so their orientation is not critical but the bases are rectangular and should be

set to have one of their corner points facing into the primary angle of wave incidence, where possible, to maximize stability and reduce scour around the reefs.

This general array of reef structures are arrayed to promote sediment trapping and development of conditions suited to supporting greater amounts of eelgrass. The result of this alignment will be trapping and building of sediment elevations on the leeward side of the reef structures.

The design plans and specifications call for the reef structures to be placed in specific locations within each oyster zone (shown on the plans depicted in **Figure 8** and **Figure 9**), and this is likely to be practicable in most cases. However, some latitude must be given to the construction contractor to adjust the precise locations of the reef structures based on substrate conditions. Examples of this may include moving a structure's placement by 1 or 2 feet to take advantage of an existing piece of residual flat concrete or to avoid large rubble pieces that would make its placement unstable or negatively affect the hydrodynamics.

The outer perimeter of the reef structures will be marked with a marker buoy for boating safety, to provide signage noting that the area is a restoration zone, and to prohibit anchorage on or near the reef structures if/as required by the regulatory agencies in the permit conditions. There would be up to 10 buoys placed in total: up to four at the El Campo marina site and up to six at the Red Rock Warehouse site.

2.7.3 Rockweed Restoration

As noted in Section 1, rockweed is part of the overall plan for the proposed habitat restoration of this project. While populations are generally stable once established, rockweed's extent is often limited by its short dispersal distance; it has difficulty spreading to new locations. Therefore, two different types of rockweed enhancements are proposed: whole thallus transplant on existing rocks, and reproductive thalli tip translocation.

In the first of these, whole thalli attached to rock or riprap will be moved to allow colonization of new patches of intertidal shoreline and fill in voids that are too distant from existing plants for effective colonization. The transplant of whole thalli would involve identifying existing shorelines where abundant rockweed occurs to locate readily removable substrate that supports mature plants. The rocks or other substrate supporting mature thalli would be collected and relocated to restoration sites where they would be placed at the appropriate tidal elevations in a manner that wedges the substrate in to hold the transplant unit in place. Multiple transplant units would be aggregated together in an area where available substrate for recruitment of zygotes occurs. This would provide a source for sperm and eggs to be released. Under this method, the transplant aggregations would grow outward from the established nuclei as new rockweed is recruited from the sexual reproduction of donor material.

The second method involves translocation of reproductive material taken from the tips of mature thalli. Reproductive portions of adult Fucus individuals would be clipped and placed in mesh bags. The bags would be secured in the intertidal zone, allowing natural fertilization and zygote establishment processes to occur.

For whole thallus relocation, the rockweed would be harvested from existing rockweed beds on shorelines adjacent to each of the two sites. There are existing populations of readily accessible rockweed along shorelines adjacent to each site. Harvesting would not decrease the existing density of rockweed to below 1 mature thallus per 10 square feet. Individual thalli would be at least 6 inches in length, include at least 5 branching stalks, and carry multiple bladder tips on each stalk. The rocks supporting these transplants should be between 5 and 50 pounds.

Once harvested, rocks and thalli would be kept moist under saltwater-saturated burlap during transport and would be moved directly from the donor to receiver site within one tidal cycle. At the placement site, they would be hand-placed in a manner that locks rocks into existing shoreline rubble in an upright orientation. Transplanting density is one thallus per square meter. The rockweed zones are shown on the design plans and **Figure 8** and **Figure 9**. **Table 6** summarizes the areas of rockweed relocation efforts. The elevations of the rockweed zones are between +3 feet and +1.5 feet MLLW at both sites.

Table 6. Rockweed Relocation Areas

Item	Red Rock Warehouse Site	El Campo Marina Site
Total Rockweed Relocation Area	0.08 acre	0.11 acre
Maximum Number of Transplants	310 units	438 units

2.8 SUCCESS CRITERIA

The following success criteria have been adapted from those used in the Final Design documents for the SF Bay Living Shoreline: Near-shore Linkages Project (SCC 2012). The intent of this project is to remove sources of contamination from San Francisco Bay and enhance subtidal and intertidal habitat for the benefit of spawning herring and other wildlife. Because the project proponent expects there to be interannual variation in densities of desired organisms, the project will be deemed successful at each of the sites if one or more of the following criteria are met within the five-year period following construction:

- Eelgrass transplants establish and spread to at least 25% above initial planting densities;
- For each style of reef structure (reef balls, reef block stacks, and shell bag mounds), any of the below criteria apply:
    - native oysters recruit with densities of >10,000 oysters per acre of substrate **or** after 5 years
    - macroalgae and sessile invertebrates colonize the structures with at least 50% surficial coverage
    - Observation shows that the reef structures are providing the kinds of tidal and wave dampening that allows or enhances successful eelgrass establishment in the zones behind them and/or can be shown to protect the shoreline from undue erosion
- Rockweed transplants establish and spread to at least 25% above initial planting densities

- If herring spawning occurs within the project site, herring will utilize eelgrass, oyster reef structures, or rockweed as spawning substrate at an equal or greater rate compared to their historic use of the creosote-treated piles during at least one spawning event
- There is no indication of increased shoreline erosion due to removal of the creosote piles
- There is no indication of adverse sedimentation or scour resulting from installation of the reef structures.

The SCC will report the success or failure of the project to the permitting agencies. At each site, unsuccessful oyster reef structure types will be removed after five years. For example, if reef ball structures at Red Rock Warehouse do not recruit >10,000 oysters per acre of substrate during at least one year of the five years following construction **or** if after five years macroalgae and invertebrates do not colonize the structures with at least 50% surficial coverage, the structures will be removed via a clamshell lifter operated from a crane on a barge. Any successful oyster reef structure types will be left in place.

2.9 SUMMARY OF RESTORATION ACTIONS

The proposed project includes a mixed habitat restoration plan with the goal of improving subtidal and intertidal habitat for spawning herring as well as other wildlife. **Table 7** summarizes the quantities and areas associated with the proposed restoration actions at both the Red Rock Warehouse and El Campo Marina sites.

Table 7. Summary of Restoration Action Treatments

Restoration Component		Red Rock Warehouse Site		El Campo Marina Site	
		Number	Area (acre)	Number	Area (acre)
Eelgrass bare-root transplants		2,597	0.64	1,539	0.38
Reef structures	Reef balls	49	0.07 Total	23	0.03 Total
	Reef block stacks	98		46	
	Shell bag mounds	49		23	
Rockweed	Whole thallus transplants and Translocation of mature thalli tips	310	0.08	438	0.11

2.10 PROJECT IMPLEMENTATION SCHEDULE

The construction schedule for this project is subject to regulatory constraints, seasonal weather conditions, and the intent to avoid potential impacts to special-status species by not working during seasonal migrations. Thus, the pile and debris removal phase of the project is intended to take place in September-October of 2016 – to fit within the National Marine Fisheries Service (NMFS) work windows for projects that involve dredging within San Francisco Bay. Even though this project involves no dredging, that general work window reduces the potential for adverse impacts on marine or estuarine species in the bay. For example, the seasonal migration of salmonids through the bay would be avoided completely by doing all in-water work during the planned months.

Following that project construction phase, the placement of the reef structures and the transplanting of eelgrass and rockweed would occur the following spring and early summer, in April-June of 2017. During those months, the eelgrass and rockweed would be inflorescence and most obvious for the harvesting of transplant material. Other steps in the construction (e.g., mobilization and demobilization) would start earlier and end later than these listed dates.

Within that general framework, tides and day-to-day winds and weather conditions are an inevitable source of variability and possible changes to this planned project implementation schedule. The approximate schedules for each of the two project phases at each of the two sites are presented in **Figure 12** and **Figure 13**. Note that the pile removal schedule is based on the construction contractor(s) being able to remove 50 piles per day at each site, which is an assumption based on experience from a number of contractors in similar projects in the bay in recent years. Similarly, the restoration phase of the project is based on assumptions that 10 reef structures could be placed each day at each site and that one acre of eelgrass transplants could be conducted in a 5-day work week.

Figure 12. Estimated Construction Schedule for Pile Removal

Item	Description	Aug 2016		Sep 2016		Oct 2016		Nov 2016	
	RED ROCK WAREHOUSE SITE								
1	Submittals								
2	Mobilization								
3	Demo Remaining Wharf Decking								
4	Demo Pilings*								
5	Remove Bay Floor Debris								
6	Site Restoration								
7	Demobilization								
	EL CAMPO MARINA SITE								
1	Submittals								
2	Mobilization								
3	Demo Pilings*								
4	Remove Bay Floor Debris								
5	Site Restoration								
6	Demobilization								

Figure 13. Estimated Construction Schedule for Restoration Actions

Item	Description	Feb. 2017		Mar. 2017		Apr. 2017		May 2017		Jun. 2017		Jul. 2017	
	RED ROCK WAREHOUSE SITE												
1	Submittals												
2	Mobilization												
3	Fabricate Reef Structures												
4	Place Reef Structures												
5	Eelgrass Harvest and Transplant												
6	Rockweed Collection and Relocation												
7	Site Restoration												
8	Demobilization												
	EL CAMPO MARINA SITE												
1	Submittals												
2	Mobilization												
3	Fabricate Reef Structures												
4	Place Reef Structures												
5	Eelgrass Harvest and Transplant												
6	Rockweed Collection and Relocation												
7	Site Restoration												
8	Demobilization												

2.11 ENVIRONMENTAL PROTECTION MEASURES

The following environmental protection measures are included in the project design plans and specifications and would be implemented at both project sites. The sedimentation and erosion control measures provided would also be applied at the upland staging area near the Red Rock Warehouse site and would apply to any materials stored on barges at either site.

These protection measures are included in the project's 60% design plans and specifications and will be passed on to the construction contractor as a requirement. They include established best management practices (BMPs) for construction projects in marine environments and along shorelines. They include a number of regulatory agency-required processes and practices (such as the construction methods for pile removal discussed in Section 2.6, which were provided by the RWQCB), as well as common measures to avoid or reduce project effects on the environment, regardless of whether those effects would rise to the level of a significant impact in the absence of those measures. Given the nature of this project, many or most of these impacts would be not rise to the level of a significant impact, even without these protective measures. However, good project design and planning should seek to reduce all potential impacts to the lowest possible level, as has been done here to make the environmental impacts as low as possible. Where

those impacts could be significant in the absence of these protection measures, the impact and the specific mitigation measure are discussed in more detail in the relevant resource section of this document.

The text below makes reference to a construction contractor, a lead engineer, a biologist, and a contract owner. The SCC is the CEQA lead agency but may arrange for another entity to be the owner of the construction contract. The contract owner may be the lead engineer or may hire one for this project. One or more biologists will be used to perform preconstruction surveys, construction monitoring, and follow-up monitoring, as described below.

2.11.1 CONSTRUCTION BEST MANAGEMENT PRACTICES

The project designs include a number of construction BMPs to protect the natural environment and the species within it. They are as follows:

- Common construction BMPs will be applied to protect species and their habitat(s) from pollution due to fuels, oils, lubricants, and other harmful materials. Vehicles and equipment that are used during the course of the project will be fueled and serviced in a manner that will not affect federally protected species in the action area or their habitats.
- A Spill Prevention Control and Countermeasure (SPCC) plan will be prepared to address the emergency cleanup of any hazardous material and will be available on site. The SPCC plan will incorporate SPCC, hazardous waste, stormwater and other emergency planning requirements.
- Well-maintained equipment will be used to perform the work and, except in the case of a failure or breakdown, equipment maintenance will be performed off site. Equipment will be inspected daily by the operator for leaks or spills. If leaks or spills are encountered, the source of the leak will be identified, leaked material will be cleaned up, and the cleaning materials will be collected and properly disposed of.
- Fueling of land and marine-based equipment will be conducted in accordance with procedures to be developed in the SPCC.
- Precast concrete items will be allowed to fully cure before placement in San Francisco Bay. Construction waste will be collected and transported to an authorized upland disposal area, as appropriate, and per federal, state, and local laws and regulations.
- All hazardous materials will be stored upland in storage trailers and/or shipping containers designed to provide adequate containment. Short-term laydown of hazardous materials for immediate use will be permitted with the same anti-spill precautions.
- All construction materials, wastes, debris, sediment, rubbish, trash, fencing, etc., will be removed from the site once project construction is complete and transported to an authorized disposal area, as appropriate, in compliance with applicable federal, state, and local laws and regulations.
- The following BMPs will be implemented by the contractor for ballast water management and biofouling removal to reduce the potential for introducing aquatic invasive species to a less-than significant level:
    - Vessels over 300 gross tons in size will be regulated under the State’s Marine Invasive Species Program.

- Project vessels less than 300 gross tons in size will be inspected and biofouling will be removed from vessels less than 300 gross tons prior to travelling to the project area.

2.11.2 BIOLOGICAL MONITORING DURING CONSTRUCTION

A biologist will be present to monitor construction activities during pile removal and restoration activities and verify that contract conditions and regulatory requirements are implemented. Biologists monitoring construction are generally required as part of permit conditions and other regulatory requirements, and the regulatory agencies are expected to review and approve the contractor's proposed biological monitors in this case as well. Details of the biological monitoring during construction are included in Section 3.4 – Biological Resources.

2.11.3 SEASONAL AVOIDANCE

As noted in Section 2.10, project design plans include construction schedules to conduct work at times when the greatest amount of environmental protections can be provided. Pile removal activities will be conducted from June 1 to November 30 when migrating salmonids are not present in the bay. This work window also avoids the herring spawning season and the periods of eelgrass inflorescence.

2.11.4 CULTURAL RESOURCES

The project work footprints have been drawn to exclude known cultural resources. There are known submerged vessels at the Red Rock Warehouse site. The contractor will use the mapped locations of these vessels in the project design plans to mark the extent of sunken vessels with buoys and avoid causing them damage.

2.11.5 EROSION AND SEDIMENTATION CONTROL

A number of common general practices and procedures to prevent and control erosion or sedimentation have been included in the project's plans and specifications. They are as follows:

- All stockpiled materials will be covered prior to forecast storm events using polyethylene covers and/or other appropriate cover systems.
- Any disturbed areas will be treated prior to forecast storm events using geotextile blankets, straw rolls, and/or other appropriate blanket systems. Protect disturbed areas from overland sheet flow from adjacent areas prior to forecasted storm events using curbs, swales, dikes, berms, inlets, drains, and/or other appropriate stormwater diversion systems. Erosion control elements will be used to trap any loose sediment from disturbed areas before discharging any stormwater using silt fences, filter fabric, straw rolls, and/or other appropriate sediment trapping systems.
- The velocity of the discharged stormwater will be properly dissipated to prevent erosion using rock, grouted rip rap, rubble, and/or other appropriate stormwater velocity dissipation systems.
- Proper confinement will be provided for garbage and construction materials that have the potential to contribute pollutants to staging, storage, and handling areas. Provide adequate cover from the rain and wind to these storage areas using polyethylene covers and/or other appropriate cover systems.

Contain areas where liquids are stored and handled using geomembranes, sandbags, berms, dikes, and/or other liquid containment systems.

- Existing vegetation will be preserved to the extent feasible to minimize surface area of exposed soil and inactive disturbed areas will be stabilized as soon as feasible after the cessation of construction activities.
- Preserve condition of haul routes and access roads from tracked sediment using vehicle tire washers, street sweepers, and/or other appropriate sediment tracking control systems.
- Immediately notify the City representative of any situation requiring additional erosion control devices to prevent soil erosion or sedimentation into any area beyond the project limits.
- The contractor will immediately repair, restore, and/or replace any low performing BMP identified and will repair, restore, and/or replace any deficiencies noted in scheduled inspections prior to forecast storm events, including the following:

    - Inspect straw rolls after significant storms. Ensure straw rolls are in contact with the soil. Replace straw rolls after 1 year or sooner if required. Remove sediment from behind silt fences and straw rolls to prevent overtopping.
    - Seed and protect any areas that remain unworked for more than 30 days.
    - At no time will the contractor apply fertilizers, pesticides, or herbicides other than those specified to any of the planted or hydro seeded areas unless directed by the City representative.
    - Prevent sediments from being flushed to the downstream system during cleaning.
    - Sediment, trash, and debris will be removed from catch basin grate surfaces when blocking more than 20 percent of the grate surface.
    - Sediment, trash, and debris will be removed from catch basin interiors when debris exceeds 1/3 of the depth from bottom to pipe invert.
    - Sediment, trash, and debris will be removed from rock dams, ponds, and traps when more than 1 foot of sediment has accumulated.

- During dry weather conditions, take preventative measures to minimize the wind transport of soil. Use water sprinkling, temporary enclosures, and other methods to minimize dust and dirt migration.

2.11.6 PILE REMOVAL BEST MANAGEMENT PRACTICES

The piling removal approach in this project is drawn from guidance provided by the RWQCB. As is discussed in Section 2.6, the contractor will attempt to remove the pilings in a different way, depending on the contamination of the surrounding sediments or muds. Other pile removal BMPs include the following:

- The removal method(s) utilized for each site will be described in the Demolition and Bay Floor Debris Removal Plan.
- The removed piles will be loaded onto a barge and transported back to the contractor’s staging area where the concrete will be separated from the other materials and recycled or disposed of offsite as appropriate at a permitted facility.

- The barge will be designed in such a way as to prohibit sediment or debris from falling back into the water. The work surface on the barge deck will include a containment basin for piles, concrete, and any mud or sediment removed during pulling. Upon removal from substrate, the piles will be moved expeditiously from the water into the containment basin.
- Jetting away the sediments around the piles is not allowed. Where the method selected is expected to generate concrete chips or dust in the water, a special curtain will be deployed around the individual pile so the contractor may capture any concrete pieces for offsite disposal.
- Intentional breaking of timber piles above the mudline is prohibited.
- The piles will not be shaken, hosed-off, stripped or scraped off, left hanging to drip or any other action intended to clean or remove adhering material from the pile.
- Any sediment accumulated from the pile removal operations will be assumed to contain creosote and will be contained and eventually tested and disposed offsite in an appropriate landfill.
- Upon completion of wharf, decking, and piling demolition and removal, the contractor will perform a post-demolition diver survey within the project areas. The survey will document the quantity and type of pilings stubs above the mudline, the condition of the bay's floor and identify quantities and types of debris from previous operations and/or from the demolition activities remaining on the bay floor. The contractor will submit the results of the survey to the contract owner with descriptions of their approach to removal of the piling stubs and debris. The contract owner may elect to leave some debris in place if it has established eelgrass growing on it. After this submittal is approved by the contract owner, then the contractor can proceed with piling stub and debris removal.
- Identified piling stubs will be cut off at 2-3 feet below mudline if possible.

2.11.7 BAY FLOOR AND SHORELINE DEBRIS REMOVAL

In addition to removing standing creosote-treated piles, the demolition phase of the project would also include the removal of debris on the bay floor and shorelines. They are as follows:

- Bay floor debris including fallen timber piles, steel piping, concrete, and other miscellaneous items, as shown on the design plans (**Figure 8 and Figure 9**) or as encountered during demolition activities, will be removed.
- All bay floor debris within the project limits that is not treated with creosote will be removed unless it would involve the disturbance of eelgrass. Timber piles not shown on the design plans encountered during operations will be removed. Other items not shown on the design plans or mentioned in the specifications, which are encountered during the contractor's operations, will be brought to the attention of the lead engineer. The lead engineer will determine the disposition of the items.
- All removed debris will be transported to the contractor's staging area and recycled or disposed at a permitted landfill facility.
- The contractor owner will confirm bay floor debris removal by conducting a post-construction side-scan sonar study.
- Existing concrete slabs and concrete debris along the shoreline will be left in place to avoid destabilizing the embankment. All other timber and metal debris along shoreline will be removed and disposed.
- On-shore piping will be removed or left in-place as indicated in the design plans.

2.11.8 EELGRASS-SPECIFIC MEASURES

Restoring and improving eelgrass habitat and associated conditions for it are among the major goals of this project. The project work footprints have been drawn to exclude known large eelgrass beds outside the project areas. Further, the project design plans and specifications include required construction methods and practices to protect this species. They are as follows:

- The eelgrass already established in the project footprints at the Red Rock Warehouse and El Campo Marina sites, as shown in **Figure 2** and **Figure 3**, respectively, is subject to protection and will be avoided to the maximum extent feasible.
- Eelgrass beds will be surveyed and the boundary between the eelgrass beds and the work area will be marked with buoys before work begins. Work activities within the perimeter marked by the buoys are prohibited. The biologist will inspect the eelgrass bed prior to buoy installation to make sure it has not changed substantially from the 2014 survey shown on the drawings and to make adjustments as needed to update those survey results.
- The biologist will be onsite during all marine construction activities to monitor the eelgrass beds and ensure that they are not impacted by contractor activities.
- The contractor is required to perform turbidity monitoring during construction and to stop construction if the baseline conditions are substantially worsened. Section 3.9 – Hydrology and Water Quality includes more details on this protection measure.

2.11.9 STAFF TRAINING

It is common practice in most types of construction projects to conduct training sessions for the construction crews to orient them to the project work areas (footprint areas) and ensure that they are familiar with various environmental and regulatory requirements, including conservation measures, permit conditions, environmentally sensitive areas, and so on, as wells as pertinent safety measures. They are as follows:

- Before any work occurs, the contractor's field staff will attend a mandatory environmental-education program for construction personnel, designed and conducted in the field by the lead engineer. The training is to cover all of the special-status species that could potentially occur on-site (e.g., osprey, green sturgeon, longfin smelt, Chinook salmon, and steelhead). That program will include a description, representative photographs, and the legal status of each of species; terms and conditions of the permits; 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 comply with general environmental protection measures as well as measures for protection of special-status species and sensitive habitats during project implementation. The program will also cover cultural or archaeological resources that may be uncovered on-site and what to do in the unlikely event any such resources are found.
- All construction workers of the contractor or its subcontractors will be required to receive the training, and when new workers are added to the crew, they will receive the training before being allowed to work on-site.

1. The training will be up to 1 hour in duration and held at the meeting room in the contractor's or engineer's construction trailer.
2. After each training session is administered, the contractor will submit the sign-in sheets showing which employees and subcontractor employees received the training, when the training was conducted and who conducted the training. Construction workers identified onsite as not having had the training can be removed from the worksite by the lead engineer.

2.12 RESTORATION MONITORING

Restoration monitoring is not intended to avoid, minimize, or mitigate adverse project impacts. Rather, they are designed to establish baseline post-project conditions and then to track and measure the degree of success of the restoration treatments installed, and therefore the project in achieving its longer-term goals. These are discussed below.

2.12.1 MONITORING OF EELGRASS PLANTINGS

After planting of eelgrass is completed, monitoring will be conducted to determine the level of successful establishment and to determine if any remedial actions are necessary to improve establishment success. Three forms of monitoring will be conducted over a five-year monitoring period, as described below:

Intensive plant monitoring – Intensive monitoring is generally performed for research, or to evaluate plant establishment or failure in a manner that targets determination of factors leading to success or failure of the restoration effort. By close and frequent observation of restoration sites, insight is garnered into how subsequent restoration at the site or other sites may be enhanced. The concept of detailed monitoring often underpins restoration efforts that are designed as adaptive approaches. By close plant evaluation it is generally possible to determine if plants suffer from low light conditions, herbivory, disease, or poor sediment conditions. It is possible to evaluate reproductive development in plants and the establishment and maturation of new recruits through seed. For evaluation of early plant establishment, it is generally good to observe the plants with a diminishing frequency over the first and second growing season following planting. Plant survival counts, health and vigor observations, reproductive state, and growth and expansion observations are typically made at a schedule of 0 month (starting condition), and 1, 3, 6 and 12 months for the first year and once during the second season, typically 24 months post-planting.

Establishment monitoring – Where eelgrass restoration is initially completed or after initial successful establishment is met, monitoring would shift from an individual plant evaluation to a bed establishment monitoring program. As beds coalesce and seedling establishment occurs, it becomes difficult to track initial plantings. Further, it becomes much less relevant from restoration or an ecological perspective. For this reason, plantings would be evaluated based on bed area and density on an annual basis. Monitoring would be performed for a period of five years. For restoration conducted for mitigation purposes (not the case on this project), a monitoring schedule has been adopted within the California Eelgrass Mitigation Policy of 0, 6, 12, 24, 36, 48, and 60 months post-restoration, with flexibility for seasonal dormancy.

Functional monitoring – Functional monitoring would be completed to assess the influence of eelgrass restoration on the environment. This type of monitoring would include evaluation of physical and biological parameters within and outside of eelgrass beds over a long period – in this case, 5 years. For the current project, the primary objective is to provide suitable spawning habitat for Pacific herring. As such, it is proposed that eelgrass success be measured by the following:

- Herring spawning on restored eelgrass when herring spawn within the creosote removal site;
- Diversity and density of fish and invertebrates utilizing the restored area; and
- Expansion of eelgrass beds at the creosote removal site.

2.12.2 MONITORING OF OYSTER REEF INSTALLATIONS

Monitoring of oyster restoration will be completed at multiple stages to serve differing assessment functions. These are briefly identified as follows:

- **Physical integrity** – Assess settlement of the unit and degradation of physical structure over time
- **Sedimentation/scour** - Assess the accumulation and purging of sediment on the surfaces of the structure as a controlling factor in the settlement and growth of oysters and other sessile organisms
- **Benthic community development** – Directly evaluate settlement and growth of oysters, kelp, mussels, and other organisms as a self-propagating habitat feature, assessment of mortality and causative agents
- **Pacific herring spawning** – Evaluate use of reef installations by Pacific herring as spawning substrate
- **Associated community development** – Evaluate the development of associated fish, invertebrate, and algal communities around the reef structures relative to reference conditions.

The frequency and timing of monitoring for these various functions differs. Physical integrity monitoring will start upon initial construction and will be completed at a diminishing schedule as early stability of the units is achieved. It is recommended that this monitoring be performed at a frequency of 0, 1, 3, 6, 12, and 24 months. Sedimentation/scour, benthic community development, and oyster recruitment and survival may be effectively evaluated during the same schedule. Long-term benthic community development should be evaluated annually for several years, while Pacific herring spawning use of the reefs should similarly be evaluated during winter months for multiple years. It is proposed that the same long-term monitoring over 5 years be applied to oyster reefs as to eelgrass habitats.

2.12.3 ROCKWEED ENHANCEMENT MONITORING

The monitoring of rockweed restoration and enhancement would be focused on these elements:

- **Transplant Unit Survival** – Experimental transplant monitoring to determine the level of success achieved in moving different planting units and planting at different elevation ranges. Monitoring should be conducted early in the restoration period to capture short-term recruitment and young thalli mortality events associated with the restoration methods (quarterly sampling)

- **Long-term Establishment** – Establishment monitoring to determine which units survive and expand over multiple growing seasons and develop increased algal cover on the shoreline at elevations suitable to support Pacific herring spawning
- **Pacific herring spawning** – Pacific herring spawning use of the rockweed relative to spawning in the area and on other substrates. Monitoring for expansion and densification of algal habitat within spawning zones and for Pacific herring spawning use should be extended over a 5-year period to match that of other habitat monitoring recommendations

2.13 PROJECT REQUIRED PERMITS AND APPROVALS

As the lead agency, SCC has principal responsibility for approving and carrying out the proposed project and for ensuring the requirements of CEQA and all other applicable regulations are met. Other federal, state, and regional agencies that will have permitting approval or review authority over portions of the project are listed below.

- **U.S. Army Corps of Engineers** – Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act. Because the project will get its National Environmental Policy Act (NEPA) clearance through the Section 404 permit process, the U.S. Army Corps of Engineers would also be the NEPA lead agency.
- **National Marine Fisheries Service** – Section 7 of the Endangered Species Act and Essential Fish Habitat consultation under the Magnuson Stevens Fishery Conservation and Management Act .
- **Regional Water Quality Control Board** – Section 401 of the Clean Water Act.
- **California State Lands Commission** – Letter of Non Objection or Lease.
- San Francisco Bay Conservation and Development Commission – Minor Permit.

Exhibit 3: Initial Study and Mitigated Negative Declaration

3 EVALUATION OF ENVIRONMENTAL IMPACTS

ENVIRONMENTAL SETTING

San Francisco Bay is the largest estuary on the west coast and is a dynamic, urban, estuarine environment. Since the Gold Rush, San Francisco Bay has lost more than 90% of historic tidal wetlands and the Bay itself is one third smaller in area, which has caused a substantial amount of subtidal habitat loss (SCC 2010). Historical events that have drastically altered the physical and ecological characteristics of the Bay include sediment deposition from hydraulic mining and the diking off of intertidal areas to create ponds for salt extraction, both of which have greatly reduced the three-dimensional structure in the bay (SCC 2010; SFEI 2009). A large percentage of San Francisco Bay shorelines have been stabilized with hardened structures, such as creosote-treated piles, riprap, breakwaters, seawalls, and bulkheads to create dry lands for development, and to prevent or minimize coastal erosion in the estuarine environment (SCC 2010). Additionally, the Bay has been colonized by numerous species of invasive organisms, such as mitten crabs and the overbite clam, which has altered communities and food chains throughout the Bay (SCC 2010; Dittel and Epifanio 2009).

Despite these factors, the Bay still supports a diverse and regionally important ecological system, and provides key habitat for a number of special-status plants and animals.

HISTORICAL AND CURRENT DISTRIBUTION OF EELGRASS, OYSTER BEDS, AND ROCKWEED IN SAN FRANCISCO BAY

Eelgrass is the primary seagrass in the soft sediments of San Francisco Bay and provides valuable ecological services. The extent of eelgrass within the Bay has been increasing in recent years: the first survey in 1987 reported only 316 acres of eelgrass, while surveys in 2003 and 2009 found 2,900 and 3,700 acres of eelgrass beds respectively (SCC 2010) (**Figure 14**). These more recent surveys suggest not only an increase in overall acreage but also expansion into new areas that may have recently become habitable. Further, biophysical modeling indicates that nearly 30,000 acres of bottom area may now be suitable habitat (Merkel & Associates, Inc. 2004) (**Figure 15**).

The distribution of eelgrass is limited by a variety of physical factors, including substrate suitability, water depth and turbidity, salinity, and current velocities. Seagrasses perform a wide variety of functions, including altering local hydrodynamics, reducing the speed of currents. In doing so, they trap and stabilize fine sediment, reducing the average grain size in the bottom sediments and altering the local sediment chemistry. Globally, they are much more productive per unit area than phytoplankton (SCC 2010). Seagrasses in general, and eelgrass in particular, can transform unstructured shallow-water areas into physically structured habitat that can support a wider variety of organisms. Eelgrass beds also provide a food source, either directly to grazers on the eelgrass (amphipods, snails, etc.) or indirectly, to grazers on epiphytes (plants such as diatoms growing on grass blades) or predators consuming invertebrate grazers, or through detritus formed of dead plant material that supports the estuarine food web. The invertebrate fauna of eelgrass beds may be important resources to both resident and transient fish. Amphipods, a prey item for many species of fish, are the most abundant invertebrates on eelgrass at several sites

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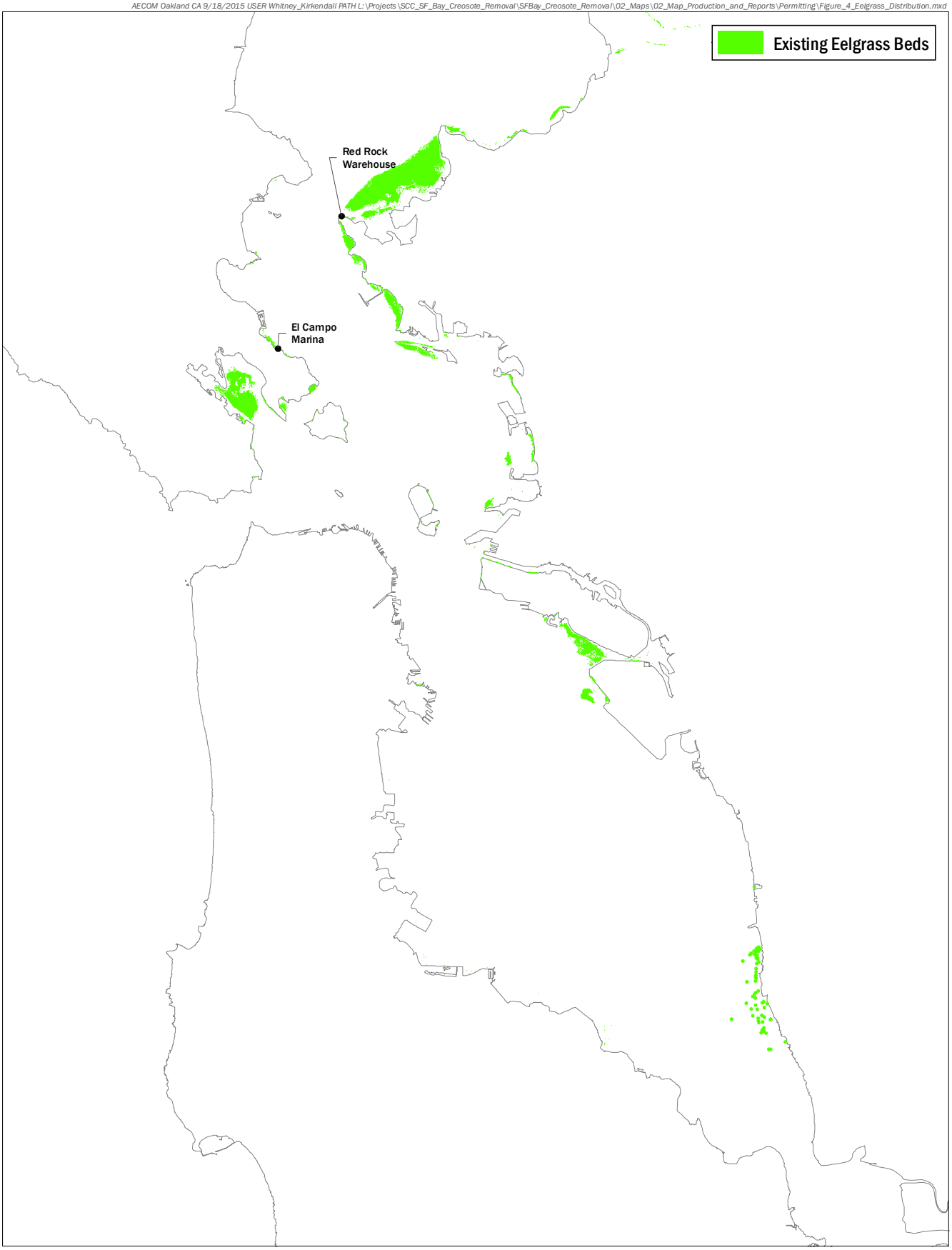

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FIGURE 14

Current Distribution of Eelgrass Beds in San Francisco Bay

Figure 15. Areas Suitable for Eelgrass Restoration in San Francisco Bay

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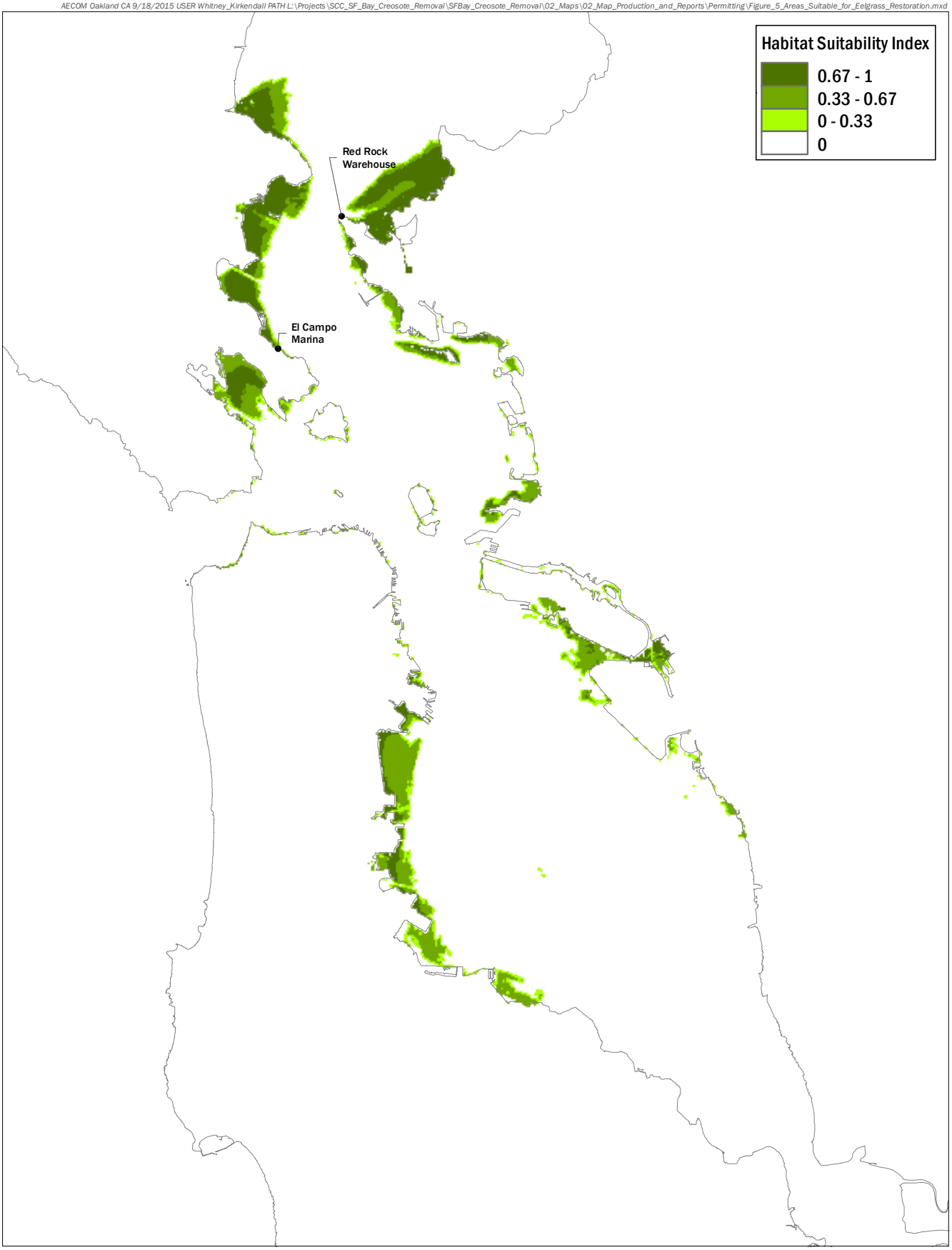

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FIGURE 15

Areas Suitable for Eelgrass Restoration in San Francisco Bay

in San Francisco Bay (SCC 2010). In addition, eelgrass is used as a substrate for spawning by Pacific herring, which lay their sticky eggs on the plant's blades.

Historically, native Olympia oysters were an abundant and ecologically important part of the fauna in West Coast estuaries and an important fishery. However, the popularity of the fishery that began in the 1850s, combined with ecological degradation from hydraulic mining, resulted in the almost complete collapse of native oyster populations in San Francisco Bay during the late 19th and early 20th centuries (Baker 1995; Barrett 1963). Like eelgrass beds, oyster beds provide important ecological functions. Oysters settle on natural hard substrate such as rocky outcrops and some artificial structures, creating complex habitat for invertebrates and small fish. The filter feeding activity of oysters may clarify waters, improving light penetration. Removal of oyster reefs in the bay for vessel traffic safety and the large amount of sediment that washed down from hydraulic mining during the Gold Rush may have depleted and/or smothered the hard substrate needed for oyster reef re-establishment (SCC 2010).

Rockweed of the genus *Fucus* is a widely distributed species along the Pacific coast of North America. The most common Fucoid alga in San Francisco Bay is *Fucus gardneri*. Rockweed occurs within the middle intertidal zone of protected and semiprotected rocky shores where it can grow into dense bands of robust plants. Rockweed occupies intertidal areas across wide ranging slopes, aspects, and marine and estuarine salinities. It can occur on large rock and textured concrete surfaces, or small rock and concrete rubble. However, rockweed on small loose rubble typically does not persist to mature size due to the mobility of rubble as the thalli expand and increase hydrodynamic drag. Rockweed consists of a holdfast which anchors it to substrate, a stipe which is analogous to a stem, and the blades, which are flattened leaf-like appendages. The entirety of the organism is referred to as a thallus (thalli plural).

While the normal range of rockweed varies across its range, in San Francisco Bay there is little documentation of the vertical range of rockweed. However, from the Albany Neck to Albany Point, it was determined to occur across a vertical elevation range from +2.1 feet to an extreme of +5.8 feet mean lower low water (MLLW). The majority was found below +4.8 feet MLLW and above +2.5 feet MLLW (Merkel & Associates, Inc. 2012, unpublished data). Rockweed creates a complex intertidal habitat providing shade, evaporative cooling, and vertical structure and complexity to organisms living within the algal beds or in trapped silts and sediments that sometimes accumulate around the dense thalli. While established beds of *Fucus* are relatively stable and persistent, settling zygotes do not travel far from parent plants limiting the ability of *Fucus* to establish in areas currently devoid of the species.

A 1991 study found that eelgrass was limited to depths shallower than -6.5 feet MLLW at five sites studied in the central San Francisco Bay, including Paradise Cove and Keil Cove in Marin County, and Point Molate, Chevron Pier, and Richmond Harbor in Contra Costa County (Zimmerman et al. 1991). The Ecological Limits, Viability, and Sustainability (ELVS) model, developed by Merkel & Associates, Inc. to predict suitability of habitat for eelgrass, estimated a depth range of 1 to -17.7 feet for eelgrass (SCC 2010). The model also predicted that 94 percent of eelgrass occurs between 0.6 to 3.3 feet MLLW. The ELVS model also takes turbidity into consideration, as eelgrass is most successful in habitats with low levels of fluvial sediment suspension (15 to 55 percent). The Subtidal Habitat Goals Report recommends

that oyster restoration occur between 0 and -6.5 feet MLLW, and studies in the San Francisco Bay have found that oyster recruitment is higher between -2 to -3 foot depths compared to 0 feet (SCC 2010).

General Biological Setting for San Francisco Bay

Aquatic habitat conditions in the San Francisco Bay vary widely depending on location in the Bay. Water temperatures fluctuate annually between 50°F and 70°F in the Sacramento-San Joaquin Delta and between 50°F and 61°F near the Golden Gate Bridge (SCC 2010). Salinities vary from ocean levels (around 35 parts per thousand [ppt]) at the entrance to the San Francisco Bay to freshwater levels (0 ppt) in the northern estuary. The salinity gradient in the northern estuary is highly variable on a temporal scale, with the "X2" point, the point where near-bottom salinity is 2 ppt, ranging from San Pablo Bay to the Delta depending on freshwater flow (SCC 2010). The San Francisco Bay has high turbidity due to fine suspended sediments consisting primarily of clay particles (~1 micrometer in diameter). However, turbidity may be decreasing as the pulse of sediment from hydraulic mining dissipates and because dams have cut off the supply of fine sediment to the Bay (Schoellhamer 2009).

Habitats types in the San Francisco Bay include rocky intertidal areas, sand beds, macroalgal beds, and eelgrass beds, which have historically supported populations of Pacific herring, various rockfishes (*Sebastes* spp. including brown rockfish (*S. auriculatus*) and lingcod (*Ophiodon elongatus*)), flatfishes (including California halibut (*Paralichthys californicus*) and speckled sanddab (*Citharichthys stigmaeus*)), sharks (including leopard shark (*Triakis semifasciata*) and brown smoothhound (*Mustelus henlei*)), northern anchovy (*Engraulis mordax*), Pacific sardines (*Sardinops sagax*), and Chinook salmon (*Oncorhynchus tshawytscha*) (PFMC 1997; PFMC 2011a; PFMC 2011b; PFMC 2014). These habitats, which provide essential fish habitat (EFH) as defined under the Magnuson-Stevens Fishery Conservation and Management Act, have been reduced or degraded due to development and anthropogenic activities.

The degradation and loss of eelgrass, as well as native oyster beds affects the waters and substrate necessary for fish to spawn, breed, feed, and grow; are likely a factor in declines in fish populations within the San Francisco Estuary. Abundant commercial and recreational fisheries used to exist in San Francisco Bay, including Pacific herring, sardines, anchovy, salmon and steelhead (*Onchrhynchus* spp.), Dungeness crab (*Cancer magister*), shrimp (*Crangon franciscorum*), and others. The remaining fisheries in San Francisco Bay focus on the native Pacific herring and recreational charter fishing for halibut, striped bass (*Morone saxatilis*), and salmon.

Pacific Herring Biology and Use of the San Francisco Bay

Pacific herring are an important component of the San Francisco Bay ecosystem and support one of the few remaining urban fisheries on the Pacific Coast. There are two fisheries that take herring; adult fish are captured using nets, and herring eggs attached to kelp are harvested for consumption. Although the Pacific herring is neither a protected species under the Federal Endangered Species Act (ESA) or California Endangered Species Act (CESA) nor a managed fish species under the Magnuson-Stevens Act, as a state fishery it is regulated under Sections 8550 and 8559 of the California Fish and Game Code. Pacific herring spawn within San Francisco Bay, broadcasting their adhesive eggs over eelgrass, kelp,

rocks, or other structures. In San Francisco Bay, spawning typically occurs November through March, with adults typically entering the Bay and holding in deep water areas for several weeks before spawning (Watters et al. 2004).

Herring spawning occurs on marine vegetation or rocky intertidal areas. The optimal herring spawning habitats are eelgrass beds, but other options include red algae (*Graciliaria pacifica*), rockweed, rocky shore, oyster beds, and coastal salt marsh. Herring also spawn on manmade structures like pier piles, riprap, etc., although these are less ideal due to chemical contaminants which may reduce larval survival rates.

Herring may spawn within a bathymetric range of +3 to -10 feet MLLW, but the ideal range is +3 to -3 feet, which is more than twice as likely to support spawning compared to their deeper range (Site Selection Memo). Herring utilize more saline portions of the estuary for spawning, as the salinity range for fertilization is 8-28 ppt, with an optimal range of 12-24 ppt (Griffin et al. 1998). The San Francisco Estuary is a relatively turbid environment, which is of concern to herring spawning activity. High suspended sediment (250 and 500 milligrams/liter) has been shown to cause lethal and sublethal effects in herring eggs during their first 2 hours in water (Griffin et al. 2009).

In the San Francisco Estuary, adult Pacific herring spawn once annually between November and March, with a peak in spawning from December through February (Watters et al. 2004). The majority of Pacific herring spawning has historically occurred in the North-Central Bay region (Point Bonita to the Richmond-San Rafael Bridge, Angel Island, Point San Pablo, and Berkeley Flats) and the San Francisco region (Golden Gate Bridge to Candlestick Point) (Watters et al. 2004) **(Figure 16)**. Adults typically enter the San Francisco Estuary and spend several days in deep waters (>18 meters) preparing to spawn (Watters et al. 2004). Spawning occurs in intertidal and shallow subtidal areas (90% of eggs are deposited between -5 and +2 meters MLLW), where adhesive eggs are laid on complex, silt-free substrates including subtidal vegetation (red algae (*Gracilaria* spp.) and eelgrass), rocks, shell mounds, and man-made structures like pier piles, riprap, and boat hulls (Brown and Carls 1998; Watters et al. 2004). Adults leave the Bay after spawning, eggs hatch after 6 to 10 days, and young of the year remain in the Bay for several months before emigrating to the ocean in August (Watters et al. 2004).

The CDFW maintains data on annual herring spawning locations within San Francisco Bay, and estimated tonnage of spawn dating back to the 1973-1974 (CDFW 2014). The spawning biomass estimate for the 2013-14 season was 60,600 tons, exceeding the historical average (1979 to 2014) of 52,300 tons (CDFW 2014). The 2013-14 season represents the fifth consecutive year of improved spawning biomass estimates since the historic low of 4,800 tons calculated for the 2008-09 season, which resulted in temporary closure of the fishery (CDFW 2014).

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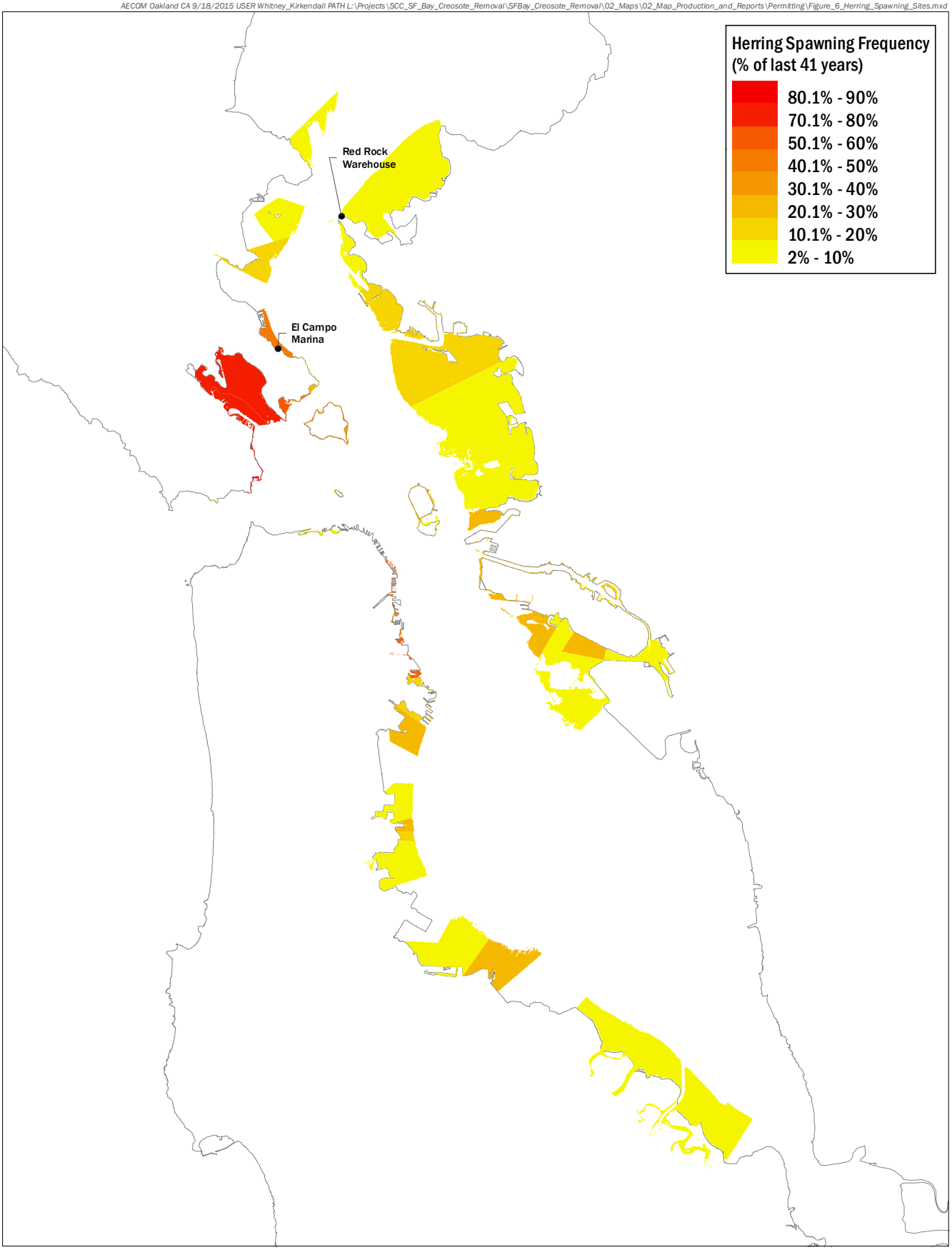

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FIGURE 16

Herring Spawning Sites in Northern San Francisco Bay

PHYSICAL AND BIOLOGICAL CONDITIONS OF RED ROCK WAREHOUSE

Water depths at Red Rock Warehouse range from the mean higher high water (MHHW) line to -20 feet MLLW, with an average depth of about -6 feet MLLW. The majority of Red Rock Warehouse is located within the depth range of -2 to -6 feet MLLW, which is a depth at which eelgrass beds are known to occur in San Francisco Bay, but is deeper than ideal conditions (SCC 2010). This depth range is suitable for oysters in San Francisco Bay. Tidal range data for the tide gage station most representative of the site is presented in **Table 8**. The location of the tide gage is shown on **Figure 1**.

Table 8. Tidal Data for the NOAA Point San Pedro Tide Gage #9415009

Tidal Elevations, Point San Pablo Gage (NAVD88)	NAVD88 datum	Local MLLW
Mean Higher High Water (MHHW)	5.70 feet	5.87
Mean High Water (MHW)	5.10 feet	5.27
Mean Sea Level (MSL)	2.90 feet	3.07
Mean Low Water (MLW)	0.88 feet	1.05
Mean Lower Low Water (MLLW)	-0.17 feet	0

Red Rock Warehouse is located at the tip of Point San Pablo where water flowing past the point is accelerated and has maintained a moderately deep scoured channel just north of the warehouse site (**Figure 17**). Historically, this channel allowed short piers to reach depths suited to navigation by moderate draft vessels. Within the pile field, the Site slopes gently to the north from an elevation of 0 feet MLLW at the toe of a rubble-armored bank down to an elevation of -6 feet MLLW at the edge of the scoured channel cut (**Figure 17**). The slope through the pile site is relatively even and gradual at approximately 1:25 (rise:run).

The location of Red Rock Warehouse on the north-facing side of Point San Pablo (**Figure 2**) protects the site from most of the prevailing storms from the west and northwest. However the site is exposed to a 10-mile fetch from the north and longer fetches to the northeast. During strong northerly winds, significant waves impact the rubble armored shoreline at Red Rock Warehouse. The site is also exposed to wakes from vessels traveling along the channel, most specifically in a southward direction past Point San Pablo. The remaining piles at the site have a moderate influence on wave energy passing through the area. This is evidenced by observing the morphing and dampening of ferry wakes as they pass through the pile field (Merkel & Associates, Inc. 2015).

While the majority of the current flows that pass the site travel within the scoured channel located off the edge of the site, there is evidence of high flow velocities through portions of the pile field. This evidence includes scour around the bases of piles at the northern tip of the Site and even at the channel edge piles further to the south. There are an estimated 350 wooden pilings at the site, as counted by SFEI geographic information systems (GIS) Department in 2009 (Werme et al. 2010). Counts of piles from interferometric sidescan sonar surveys conducted by Merkel & Associates, Inc. (2014) documented approximately 335 to 350 piles; however access limitations and debris interference precluded a precise count. Independent surface counts of piles visible on aerial imagery completed by URS confirmed approximately 350 piles. Many of the piles are large diameter piles suited to the use in supporting the warehouse structures. The average diameter of the piles is approximated to be 16 inches (1.25 feet). In the central core of the warehouse, timber and warehouse debris cover approximately 10,360 square feet of the Bay bottom where the warehouse floor collapsed into the water. Approximately, 16 to 26 broken,

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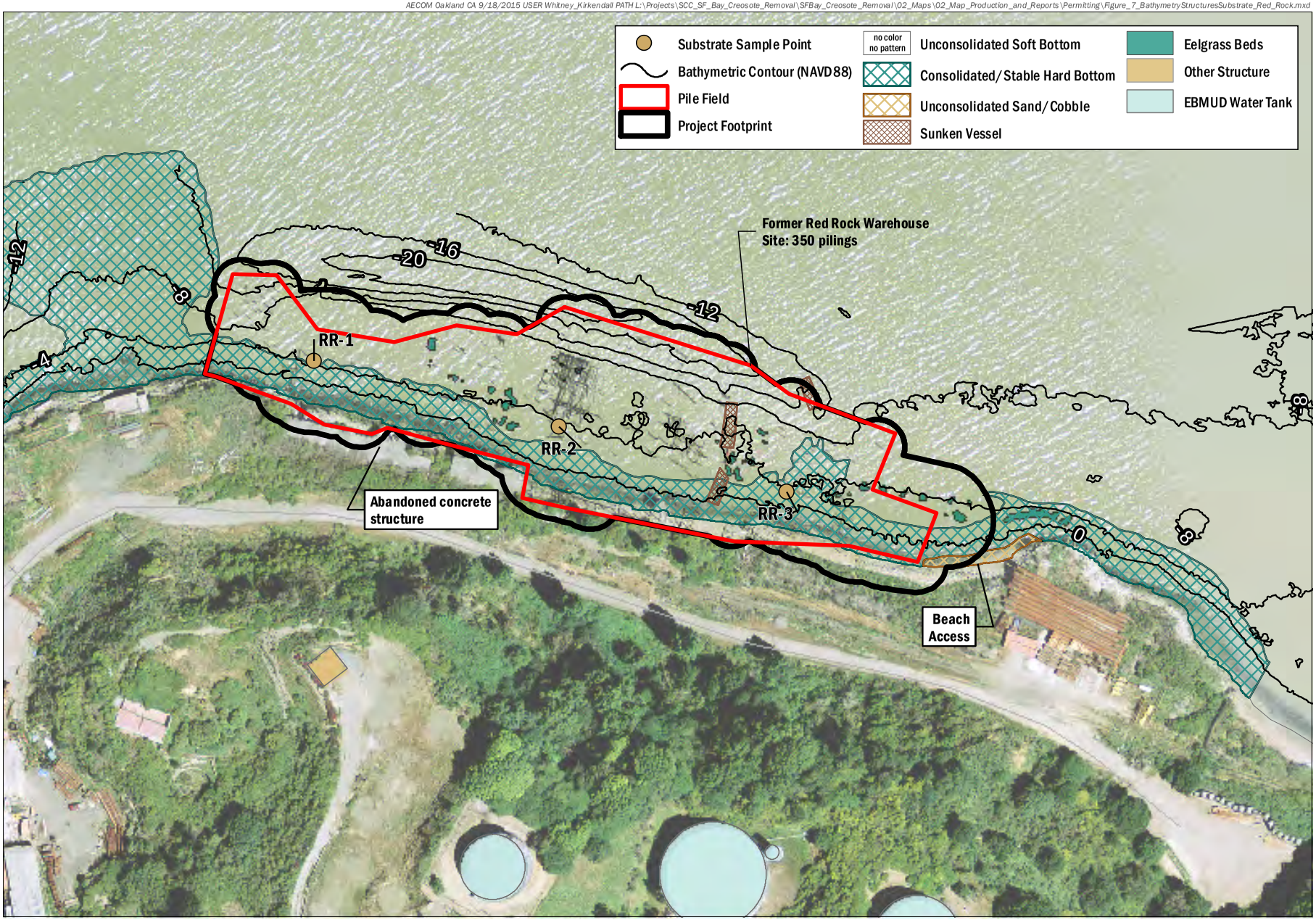

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FIGURE 17

Red Rock Warehouse Site Bathymetry, Structures, and Subtrate

submerged pile butts were noted within the original footprint of the larger warehouse complex and outside of the warehouse debris field where individual pile elements were not distinguished. **Figure 17** shows the features of the Red Rock Warehouse site. Other debris near the site includes a large steel lattice structure in the center of the warehouse site and a submerged vessel hull at the northeastern margin of the pile field.

The sediment and benthic habitats present at Red Rock Warehouse have been characterized by Merkel & Associates, Inc. Core and grab samples collected at Red Rock Warehouse have determined that surface sediments are generally composed of shell hash, underlain with stiff clay at depth of 10 to 20 centimeters. Sediment cores were sampled at three locations identified as RR-1 to RR-3 located within Red Rock Warehouse (**Figure 17)**, with additional sediment probing being performed throughout the Site at areas close to the shoreline, mid-distance to the channel, and near the channel edge. Surface sediments throughout the Site were characterized as shell hash, sandy silt, and silty gravel. In general, the surface sediment collections and probing indicates that mollusk shell rubble and gravels are common constituents of the surface sediment within a cementing matrix of silt in some instances exposed silty sand surface substrate was identified on the surface through probing. Subsurface sediments consisted of narrow distinct strata of primarily silts and clays with some areas exhibiting layers of shell hash (**Figure 18**). Probe refusal was met at very shallow sediment depths (20 to 30 centimeters) throughout the site, suggesting that the Point San Pablo formation extends out into the bay just below the sloping bench that extends to the channel. The refusal was met by a dampened resonance rather than a sharp ping, suggesting the underlying resistant layer is not hard rock.

The Point San Pablo-Point Pinole eelgrass bed supports approximately half of the eelgrass present within San Francisco Bay. This bed occurs approximately a quarter mile to the north of Red Rock Warehouse. Within the Red Rock Warehouse site, eelgrass is found in scattered patches at depths from -1 foot MLLW to -6 feet MLLW. Eelgrass in this site may be restricted by the lack of availability of suitable soft sediment at suitable depth ranges given the abundance of shell hash, cobble and gravels within the depth range occupied by eelgrass at Red Rock Warehouse. In addition to eelgrass, the site supports an abundance of hard substrate including bank armoring comprised of rubble and hard bottom consisting of consolidated or semi-stable rubble, cobble, shell hash and debris. The shoreline includes a moderately sloping low intertidal and shallow subtidal rubble revetment slope that supports macroalgae as well as a well-developed community of encrusting invertebrates including Olympia oysters. There is a sunken vessel within the pile field along with a large broken steel lattice structure and fine gravelly rubble that may be the remnants of an asphalt floor that collapsed when the warehouses burned. These hard features provide additional shallow surfaces suitable to support herring spawning. In addition to the horizontal substrate, Red Rock Warehouse has extensive vertical pile surface. These piles have considerable exposed surface creosote in areas above the mean high tide line and less obvious surface creosote below the mean high tide line. The piles support a good coverage of ephemeral algae, but very little in the way of encrusting invertebrates. None of the piles at this site are wrapped and given the anticipated age, condition of piles, and lack of marine fouling community development, it is believed that these piles likely are leaching creosote derivatives at a moderately toxic level and the piles pose a moderate risk to herring spawning.

Figure 18. Surface and Subsurface Sediment Characteristics at Red Rock Warehouse

Site	Richmond Red Rock Warehouse					
Station	RR-1		RR-2		RR-3	
Latitude: Longitude	37.96569	-122.42746	37.96549	-122.42644	37.96529	-122.42549
Surface Characteristics	sandy silt		shell hash		silty gravel	
(USCS)	shell hash		silt interbedded		shell hash	
Shear Strength (kPA)	Shear was sampled at 15 cm below sediment surface					
1	11.23		NA	shell hash	10.875	
2	9.22		NA	precluded	9.435	
3	11.57		NA	clear vane	7.492	
Mean	**10.67**		**NA**	rotation	**9.27**	
Sediment Depth (cm)						
0	shell hash		shell hash		graded gravel	
5	silty clay		silt		stiff	
10	stiff		shell hash		clay	
15	clay		stiff		silt	
20	refusal		clay		refusal	
25			refusal			
30						

Source: Merkel & Associates, Inc. 2015.

The region in which Red Rock Warehouse is located is infrequently used by Pacific herring for spawning. The region has a 4.9 percent spawning occurrence over the past 41 years. However, spawning has recently increased in the region, with a 33.3 percent spawning occurrence over the last 6 years. This increase may be due to low delta outflows, in which case the rate of herring spawning will likely decrease following the return of more typical delta outflows.

The piles at Red Rock Warehouse provide undisturbed overwater structures suitable for roosting use by a number of avian species that are commonly associated with such structures. These include double-crested cormorant and a number of gulls. However, during the multiple visits made to the site, a surprisingly low level of avian activity was observed, and guano deposits on piles and remaining decking materials suggest the site receives limited roosting use. Two cormorants were observed on the piles during one of the visits made to the site. The areas provide no suitable loafing or haul out areas for marine mammals and none were observed at Red Rock Warehouse during the Tier 3 investigation.

Physical and Biological Conditions of the El Campo Marina Site

Water depths at El Campo Marina range from the mean higher high water line to -4 feet mean lower low water, with an average depth of about -2 feet MLLW. The majority of El Campo Marina is located within the depth range of -2 to -3 feet MLLW, which is an ideal depth for eelgrass growth in San Francisco Bay (SCC 2010). This depth range would also be suitable for oysters. Tidal range data for the tide gage station most representative of the Site is presented in **Table 9**. The location of the tide gage is shown on **Figure 1**.

Table 9. Tidal Data for the NOAA Point Chauncey Tide Gage #9414837

Tidal Elevations, Point Chauncey Gage (NAVD88)	NAVD88 datum	Local MLLW
Mean Higher High Water (MHHW)	6.04 feet	5.75
Mean High Water (MHW)	5.45 feet	5.16
Mean Sea Level (MSL)	3.35 feet	3.06
Mean Low Water (MLW)	1.38 feet	1.09
Mean Lower Low Water (MLLW)	0.29 feet	0

The shoreline orientation of El Campo Marina faces northeast (**Figure 3**). The site is tucked into mainland coves far from deeper waters of the bay, and it is not subject to high current velocities. The lack of significant scour at pile bases even though the upper sediment is comprised of soft silts is indicative of the low current and wave environment at the site.

The location of El Campo Marina is generally well protected against the prevailing wind wave patterns. Wakes generated by passing vessels are typically low due to the nearly half mile separation between the site and the closest navigation channel that is used principally by high speed ferries and not by deep draft vessels.

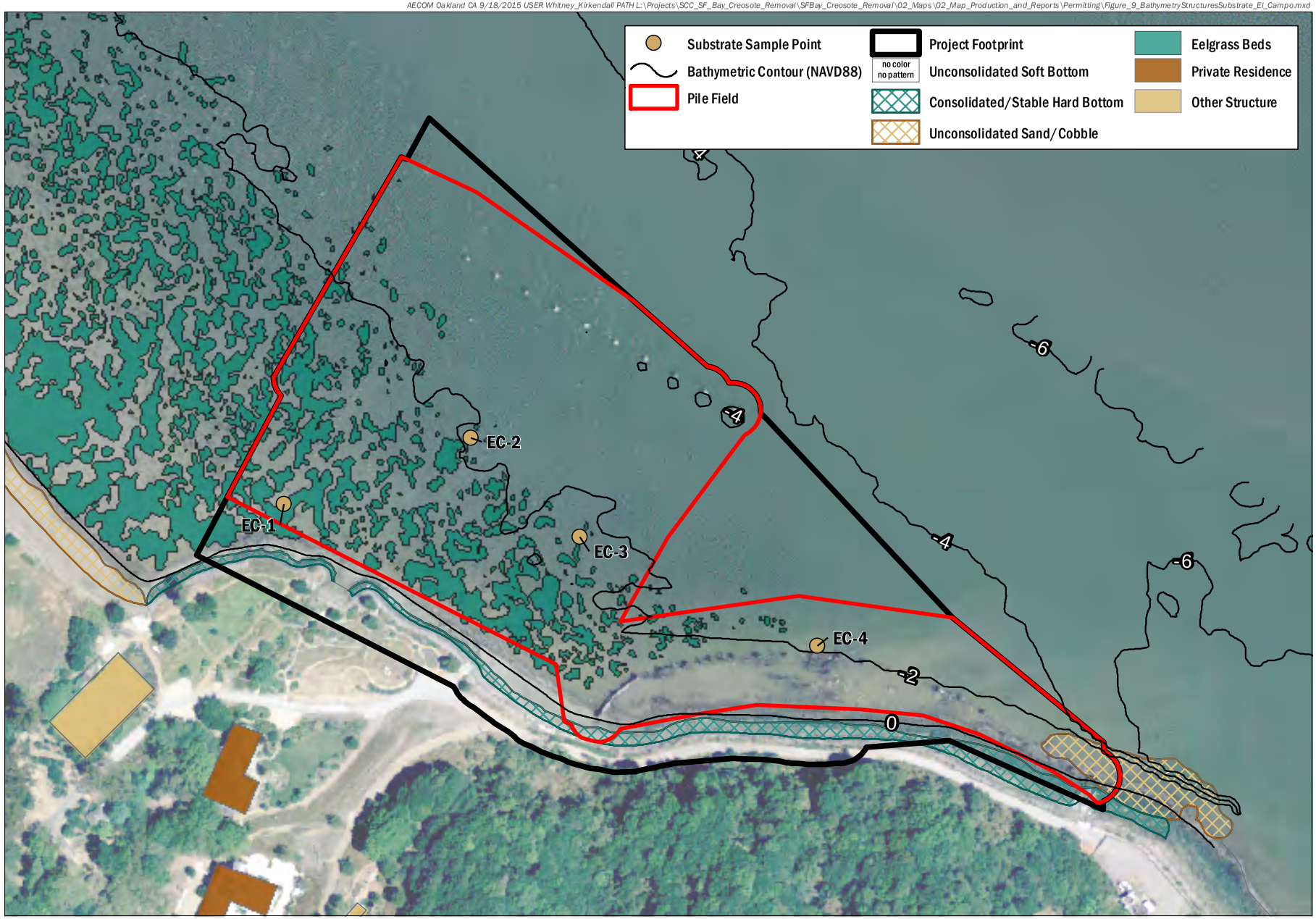
El Campo Marina ranges from intertidal to slightly subtidal elevations with a gradual gradient sloping downward to the northeast at a 1:125 slope. The marina piles occur in waters from near 0 feet MLLW down to a shallow depth of approximately -3 feet MLLW (**Figure 19**). At the water's edge the site abuts a generally well-constructed rock-revetted slope that rises up to a bench that was notched into the hillside during the 1891 construction of the original El Campo facilities. The rock is thought to have been added much later.

The site contains an estimated 315 creosote piles (from 250 vertical piles visible above the water line plus at least 65 downed piles on the bay floor, as described above), with an approximated average diameter of 16 inches (1.25 feet), that are arranged in rows to support marina docks (Merkel & Associates, Inc. 2014a). Along the northeastern edge of the site, piles are cabled together with a division between piles that suggest that breakwater panels of some type were held in place by this line of pile dolphins. A similar arrangement of pile dolphins extends to the south along the shoreline in what appears to have been a buttress structure that retains many horizontal and vertical piles. Between these pile dolphins there are vertical rusted I-beam piles that also suggest that a buttress wall historically existed at this location. This buttress may have been designed to extend the shoreline outward, but other than the pile structure itself there is no indication of a prior fill. Subtidally, there are numerous piles amassed in a parallel alignment to the vertical pile dolphin arrangement. The horizontal subtidal piles include concrete wrapped and non-wrapped piles with a few piles being visible on the shoreline. The piles scattered along the base of the shoreline dolphin alignment are not visible from the surface and should add significantly to the pile count at this site. However, the relative proportion of these piles that are wrapped and unwrapped and the total number are not known or easily estimated at this time do to their being piled on top of each other.

DRAFT

N 0 100 Feet

AECOM Oakland CA 9/18/2015 USER Whitney_Kirkendall PATH L:\Projects\SCC_SF_Bay_Creosote_Removal\SFBay_Creosote_Removal\02_Maps\02_Map_Production_and_Reports\Permitting\Figure_9_BathymetryStructuresSubstrate_El_Campo.mxd



Coastal Conservancy

California State Coastal Conservancy
SF Bay Creosote Removal and Herring Habitat Restoration Project

FIGURE 19

El Campo Marina Site
Bathymetry, Structures, and Substrate

The sediment and benthic habitats present at El Campo Marina have been characterized by Merkel & Associates, Inc. Sediment cores were sampled at four locations identified as EC-1 to EC-4 located within pile field (**Figure 19**) with additional sediment probing being performed throughout the Site at areas close to the shoreline, mid-distance to the channel, and near the channel edge.

Surface sediments throughout El Campo Marina were characterized as silts with only one site (EC-4) supporting a grittier sandy silt (**Figure 20**). Eelgrass was found at EC-1 through EC-3. Shear strengths in near surface sediments were very low in all cases falling below the measurable shear of 2.64 kilopascals (kPA) at two stations, slightly above this limit at one station and was not measurable due to shell hash at one station. Broad ranging surface probing suggested similar conditions occur throughout the Site.

Subsurface sediments to 200 centimeters (79 inches) consisted of similar deep silt deposits at three of the stations with occasional layers of limited shell hash. At the EC4 site near the shoreline parallel pile wall, sediments supported stiffer materials classified as stiff and soft clay with a layer beginning at 155 centimeters (61 inches) of depth that was classified as sandy clay (**Figure 20**). None of the probes ever met refusal, but were limited at approximately 175-200 centimeters (69-79 inches) of penetration depth by the equipment and tidal elevations during sampling. From the perspective of placing reefs or other enhancement features on the site, there does not appear to be a suitable foundation to support a heavy structure without considerable evaluation and design of a floating foundation.

The pile field at El Campo Marina includes both vertical and horizontal piles. Within the marina proper, all of the piles stand vertically; however, horizontal piles are present within the shoreline-oriented dolphins in a mix of wooden and some concrete piles that exist within subtidal portions of this feature. The presence of horizontal plies within this well flushed but low energy environment provide good conditions for herring spawning, but substrate is limited to creosote impregnated structures.

The piles at El Campo Marina are the youngest of any of the sites investigated dating back to approximately 51 years of age. The piles above the high tide line all show heavy creosote presence at the surface, while piles below the high tide line are more weathered but continue to show creosote on the surface and within the cracks in the wood. The piles themselves are in generally good shape suggesting continued protection against borers by the creosote treatment.

The piles at El Campo Marina support night roosting and loafing use by a number of bird species. Most of the pile tops were observed to be coated in guano and several birds were present roosting on the piles both at night and during daylight visits to the site. Birds observed roosting on the piles included double-crested and pelagic cormorants (*Phalacrocorax auritus* and *P. pelagicus*), brown pelicans (*Pelecanus occidentalis*), elegant terns (*Thalasseus elegans*), and western gulls (*Larus occidentalis*). There are no areas suitable for nesting and the

Figure 20. Surface and Subsurface Sediment Characteristics at El Campo Marina

Site	El Campo Site Marina							
Station	**EC-1**		**EC-2**		**EC-3**		**EC-4**	
Latitude: Longitude	37.89846	-122.46588	37.89869	-122.46511	37.89838	-122.46465	37.89803	-122.46365
Surface Characteristics (USCS)	silt		silts silt in eelgrass mat		silt		sandy silt	
Shear Strength (kPA)	Shear was sampled at 15 cm below sediment surface							
1	<2.64		<2.64		NA	shell hash	5.23	
2	<2.64		<2.64		NA	interference	3.35	
3	<2.64		<2.64		Na		<2.64	
Mean	**<2.64**		**<2.64**		**NA**		**3.74**	
Sediment Depth (cm)								
0	silt		silt		silt		silt	
5					shell hash			
10					silt			
15								
20								
25								
30								
35								
40							stiff clay	
45			shell hash				soft clay	
50			silt					
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								
105								
110								
115								
120								
125								
130								
135							stiff clay	
140								
145								
150								
155							sandy clay	
160					stiff clay			
165								
170								
175								
180								
185								
190								
195								
200								

Source: Merkel & Associates, Inc. 2015.

limited pile top space limits the available roosting space to a relatively few number of birds. There are no suitable areas for marine mammals to haul out at the site.

El Campo Marina supports a healthy eelgrass bed and a stable shoreline revetment suitable for use by spawning herring. There is some limited potential for eelgrass habitat expansion at this site following removal of the shoreline parallel piles, which presently isolate waters of suitable depth to support eelgrass from full flushing and cover potential eelgrass restoration areas with horizontal piles.

Unconsolidated sand and gravel beach areas may also receive some use by herring but success in these areas may be low due to sediment mobility with increased drag caused by herring roe.

The region in which El Campo Marina is located is currently utilized by Pacific herring as a spawning site. The stretch of shoreline in which El Campo Marina is located has a 41.5 percent spawning occurrence over the past 41 years and spawning has occurred during 13 of the last 14 years. Spawning has occurred 100 percent of the time over the last 6 years in this region of the Bay.

Given the high frequency of herring spawning in this area, combined with the abundance and condition of creosote-treated piles at the site, it is anticipated that creosote-treated piles and associated PAHs pose a high threat to spawning herring at El Campo Marina.

The restoration projects at El Campo Marina and Red Rock Warehouse will consist of two distinct phases. Creosote-treated piles will be removed during the first phase (fall of 2016) and habitat will be restored for the purpose of improving habitat for herring spawning and other wildlife during the second phase (spring/early summer of 2017). The following sections provide details about these two phases at the El Campo Marina and Red Rock Warehouse sites.

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Exhibit 3: Initial Study and Mitigated Negative Declaration

3.1 AESTHETICS

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

As described in the Chapter 2 - Project Description, this project involves removal of derelict creosote-treated wood piles, an existing source of pollution and navigational hazards in the subtidal and low intertidal portions at two different sites in San Francisco Bay, and the subsequent addition of three different types of habitat enhancements for herring and other fish species as well as for native Olympia oysters and other invertebrates. The upland portions of the project footprints would primarily be small areas of paved or hard-packed dirt that would be used for staging and stockpiling and for drying. A small amount of roadside vegetation would be cleared to allow construction access to the shoreline at one of the two sites; this cleared area would be replanted with native vegetation following project activities. Finally, a section of crumbling derelict decking that remains in place over the waters of the bay would also be removed.

None of these project activities would introduce or require the erection of structures with the ability to block views of any kind. Designated scenic vistas, state highways, and changes in light or glare would not be changed or affected by project activities. Thus, as detailed below, for items (a), (b) and (d), there are no impacts expected from the proposed project.

3.1.1 DISCUSSION

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

No Impact. No state or federally designated scenic resource, such as a Wild and Scenic River, scenic vista, or other scenic resource area, is located within or near either proposed project area. The closest designated Wild and Scenic River is the American (Lower) River, approximately 70 miles northeast from the project locations.

The City of Richmond's General Plan does not specifically designate scenic resources, but includes in Goal CN-2 that the city will continue to protect surrounding hills and viewsheds as character-defining features that provide scenic backdrops. Tiburon's General Plan also does not name specific scenic

resources but prioritizes maintaining open space views, ridgeline views, and views of the San Francisco Bay in policies OSC-28 through OSC 32.

As described above, project activities at both sites would not require the erection of structures with the ability to block views of any kind. The only new structures would be reef structures for oyster settlement, which would be in the subtidal and low intertidal portions of San Francisco Bay. Additionally, project locations are not near state designated scenic resources, federally designated scenic resources, or views referenced in either city's General Plan. Therefore, no impact would occur.

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

No Impact. The State Scenic Highway System includes highways that either are eligible for designation as scenic highways or that have been designated as such. The closest highways to the Red Rock Warehouse site that are part of the State Scenic Highway System are State Route (SR) 1 and portions of SR-37 and SR-101 in Marin County. All three are designated as Eligible State Scenic Highways. The Red Rock Warehouse site is located approximately 10 miles southeast of the portions of SR-37 and SR-101 that are Eligible State Scenic Highways and approximately 7.5 miles north of SR-1. The El Campo Marina site is located approximately 13 miles south of the portions of SR-37 and SR-101 that are Eligible State Scenic Highways and approximately 3 miles northeast of SR-1. The project area is not visible from any of these Eligible State Scenic Highway segments.

Since project activities would not introduce components with the ability to block views of any kind and are not located within or near any eligible or designated State Scenic Highway segment, no impact to scenic resources within a scenic highway would occur.

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

Less-than-Significant Impact. Both the Red Rock Warehouse and El Campo Marina sites are located primarily within the San Francisco Bay. Each site has a range of tidal habitats with a distribution of rock revetments and beaches in the shoreline area. The upland portions of each project site are different, as discussed below.

The Red Rock Warehouse site is a former marine industrial area that is leased to a private company that uses the road and its shoulders and parking areas for material storage and stockpiling. The vegetation community at the Red Rock site is not maintained or manicured and is thus a mix of native upland plants and invasive ruderal species. The site has some remnant abandoned structures and crumbling concrete decking along the shoreline. The project would attempt to conduct as many piling removals from land along the shoreline, but the majority of the piling removal will be done from the bay using a barge. Construction activities, staging, and stockpiling the removed pilings for drying would not have a significant impact on the visual character of the site since the project location is industrial in nature and the proposed piling storage locations have been or are being used by the City of Richmond or its tenants for similar storage. Although a small section of roadside vegetation would be cleared for shoreline access,

the area would be replanted with native vegetation following project activities. Also, the materials and construction equipment would not be permanently stored on site, making any potential visual effects temporary.

The El Campo Marina site is almost entirely private residential parcels, the onshore portion of which have landscaping and a range of cultivated vegetation. Due to the lack of accessibility to the piles from land at this site, pile removal will be tidally constrained and occur exclusively via shallow draft barge. Project designs call for the use of the City of Richmond's land at the Red Rock site for staging and stockpiling for both project sites. No staging or stockpiling is planned at the El Campo Marina site.

Neither site is readily visible from land, except by the adjacent property owners. At the El Campo Marina site, the property owners are advocates for the project. The Red Rock Warehouse site is closed to the public for safety reasons and is not accessible or visible from many nearby land-based viewpoints, though it is partly visible from the San Pablo Yacht Harbor to the east. Both sites are visible from boats on San Francisco Bay, however, and viewers from these vessels would be able to note the loss of the tops of the derelict piles. At low tides, the tops of some reef structures may be briefly visible if the boats were close enough. These are the only permanent changes to the visual character of the sites. Construction activities at either site may have a slight impact to the visual character of the project area from the barge and crane or excavator, but these impacts would be temporary (limited to a few months).

Thus, the visual and aesthetic impacts from the project are largely limited to the removal of derelict creosote-treated piles. This would be considered by some to positively affect the visual character of both site locations because it would return the area to a more natural state. To these viewers, their removal would enhance views of the bay. Other viewers may have an appreciation for derelict piles and/or enjoy seeing birds roosting on them; the removal of the piles may thus be viewed by these people as a negative aesthetic change. However, the combined total of 700 piles out of the over 33,000 derelict creosote-treated piles in San Francisco Bay as a whole would be relatively minor. Finally, the habitat restoration aspects of the project would increase the visual character of the project locations by reintroducing and expanding habitat for native fish and birds to the area; bird watchers and other users of the bay are expected to appreciate these efforts and value them as an improvement.

Regardless of personal preferences, the overall project outcomes would include relatively minor changes to the visual character of the sites. Therefore, the aesthetic impacts would be less than significant.

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

No Impact. Project activities would not introduce new sources of light or glare. The project also would not create a new source of substantial light during the construction phase because construction activities would take place during daylight hours only. No impact would occur.

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3.2 AGRICULTURE AND FORESTRY RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.				
Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

This project would have two distinct sites, the Red Rock Warehouse site and the El Campo Marina site, as described in the Project Description (Chapter 2). These sites are almost entirely in San Francisco Bay itself and are thus not used for agriculture or forestry. A small section (< 0.1 acre) of roadside vegetation would be temporarily cleared at the Red Rock Warehouse site for shoreline access, and there would be a small staging area that is already cleared of vegetation. This land was formerly used for industrial shipping. Otherwise, the project footprint at each site is in the bay itself. Further, the project does not involve any land conversion, but rather is limited to removing derelict structures and enhancing the subtidal and intertidal habitat in the bay.

3.2.1 DISCUSSION

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

No Impact. As mentioned above, the project is primarily located within the San Francisco Bay and the small portion of land within the project location would only incur a small amount of vegetation clearing. Additionally, this land has historically been used for industrial shipping purposes.

The Red Rock Warehouse site is located on land that is classified by the California Farmland Mapping and Monitoring Program (California Department of Conservation 2012) as "Other" land. The land adjacent to the El Campo Marina site is classified by the California Farmland Mapping and Monitoring Program (California Department of Conservation 2014) as partially "Urban and Built-up" land and partially "Other" land.

As project activities would not involve the conversion of land and the project locations are not within land designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, no impact would occur.

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

No Impact. The Red Rock Warehouse site is located on land that is classified by the California Farmland Mapping and Monitoring Program (California Department of Conservation 2012) as partially "Urban and Built-up" land and partially "Non-Enrolled" land. There are no active agricultural operations in or around the project area, and there are no active Williamson Act contract lands in the area. The Richmond General Plan 2030 (City of Richmond 2012) designates some land to be used for agricultural uses, but that land is located approximately 6 miles east of the project site.

The land adjacent to the El Campo Marina site is classified by the California Farmland Mapping and Monitoring Program as "Urban and Built-up" land (California Department of Conservation 2014). There are no active Williamson Act contract lands in the area and the Tiburon 2020 General Plan zoned the area as low density residential.

As neither project location is within existing land zoned for agricultural uses or conflicts with a Williamson Act contract, no impacts would occur.

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

No Impact. A review of the City of Richmond's zoning map (City of Richmond 2012) indicates that the Red Rock Warehouse site is not located within any land zoned as forest land, timberland, or land zoned Timberland Production by the City of Richmond or any other jurisdiction. As mentioned above, the El

Campo Marina site is located entirely within the San Francisco Bay and the land adjacent is zoned for low density residential. Therefore, the project would not conflict with existing zoning for forest land, timber land, or timberland zoned Timberland Production. No impact would occur.

d) Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. The California Department of Forestry and Fire Protection's (CAL FIRE's) Fire and Resource Assessment Program (FRAP) provides forestry and timber maps for the State of California. Review of the Land Cover Map compiled under the FRAP (CAL FIRE 2006) verifies that neither project site has upland areas located on forestland. Also, the project would not convert any forested land or change land used. Therefore, the proposed project would not result in the loss or conversion of forestland. No impact would occur.

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

No Impact. As discussed above, the two project sites are located in the bay and on a small portion of developed land formerly used for shipping. No agricultural or forestry operations or resources are present in or around the project areas, and no land conversion would take place. Therefore, no impact would occur.

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3.3 AIR QUALITY

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

3.3.1 DISCUSSION

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

Less-than-Significant Impact. Air pollutant emissions associated with the proposed project would only occur during pile removal and restoration activities. Once completed and operational, the restored habitats would not generate any air pollutants. Therefore, this impact analysis only assesses construction-related air quality impacts from pile removal and restoration activities.

The Bay Area Air Quality Management District's (BAAQMD) most recently adopted clean air plan is the 2010 Clean Air Plan, which was adopted by BAAQMD on September 15, 2010. The 2010 Clean Air Plan updates the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California Clean Air Act (CCAA) to implement all feasible measures to reduce ozone; provide a control strategy to reduce ozone, particulate matter, air toxics, and greenhouse gases in a single, integrated plan; and establish emission control measures to be adopted or implemented. The 2010 Clean Air Plan contains the following primary goals:

- Attain air quality standards;
- Reduce population exposure and protect public health in the San Francisco Bay Area; and
- Reduce greenhouse gas emissions and protect the climate.

The 2010 Clean Air Plan represents the most current applicable air quality plan for the San Francisco Bay Area Air Basin (SFBAAB). Consistency with this plan is the basis for determining whether the proposed project would conflict with or obstruct implementation of air quality plans.

The thresholds of significance in the BAAQMD 2011 CEQA Air Quality Guidelines were established to be consistent with the air quality attainment plans. As described in discussion (b), emissions from project construction would not exceed the thresholds of significance, and would therefore be consistent with the applicable plans. The project would not conflict with or obstruct the implementation of the applicable air quality plans, and the impact would be less than significant.

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

Less-than-Significant Impact. Construction activities typically result in emissions of ozone precursors and criteria pollutants from construction equipment and vehicle exhaust. Pile removal and habitat restoration activities would involve the use of construction equipment, marine equipment, and on-road vehicle trips. This analysis assumes that pile removal at each site would involve the use of one crane/excavator, one tug boat for barge positioning, and one generator set to power hand tools (including hydraulic saws). Based on conservative estimates of potential fill volumes that may need to be removed from the sites, this analysis assumes that pile removal would require up to 150 haul truck trips from the staging area(s) at the Red Rock Warehouse site to the planned disposal site at the Keller Canyon Landfill (~36 miles away, which is 72 miles round trip; this analysis assumed 100 miles round trip). The two project sites are not equal sources of the material: approximately 85 haul truck trips would be needed for material from work at the Red Rock Warehouse site, and up to 65 trips would be needed for material from work at the El Campo Marina site. Habitat restoration is assumed to involve the use of one crane/excavator and one tug boat for barge positioning at each site.

Criteria pollutant and ozone precursor emissions from these activities were calculated using California Emissions Estimator Model (CalEEMod) and emission factors from the California Air Resources Board (CARB) OFFROAD model. These methods were also used for calculation of greenhouse gas emissions, as discussed in Section 3.7. Details of the calculations, including equipment list, number of working days, etc., are presented in Appendix B. The summed emissions from each of these activities are presented in **Table 10**.

For the purposes of this analysis, the project was evaluated against the thresholds of significance included in the BAAQMD's 2011 CEQA Air Quality Guidelines. As shown in **Table 10**, average daily emissions from project pile removal and restoration activities would not exceed the BAAQMD significance thresholds. BAAQMD has not developed quantitative mass emissions thresholds for fugitive dust emissions of particulate matter from earthmoving activities, but instead recommends implementation of Best Management Practices (BMPs), such as those listed as Basic Construction Mitigation Measures Recommended for All Proposed Projects in BAAQMD's 2011 CEQA Air Guidelines, to reduce fugitive dust emissions.

Project activities would primarily occur along portions of the San Francisco Bay shoreline and would not involve intense earthmoving activities. As such, fugitive dust emissions would not be assumed to be significant. A small area (<0.25 acre) of vegetation would be removed at the Red Rock Warehouse site to allow shoreline access, and removed piles would be dried in the on-land staging areas there as well. The project includes measures such as water sprinkling and temporary enclosures to minimize dust emissions from these activities. Because emissions would not exceed BAAQMD significance thresholds and adequate fugitive dust emissions reduction measures would be implemented consistent with BAAQMD's BMPs, emissions from the project would be less than significant.

Table 10. Pile Removal and Habitat Restoration Emissions

Project Component	ROG	NOx	Exhaust PM_{10}	Exhaust $PM_{2.5}$
Red Rock Warehouse Site (tons)	0.24	0.31	0.05	0.05
El Campo Marina Site (tons)	0.36	0.46	0.08	0.08
Total Emissions (tons)	0.60	0.76	0.13	0.13
Average Daily Emissions (lbs)	**20.0**	**25.5**	**4.5**	**4.4**
BAAQMD Average Daily Significance Thresholds (lbs)	54	54	82	54

Notes:
Emissions assumed to occur over a total of 3 months during pile removal (October 2016) and habitat restoration (April-May 2017). Work was assumed to occur 20 days per month.
ROG = reactive organic gases
NOx = oxides of nitrogen
PM_{10} = particulate matter 10 micrometers in diameter or smaller
$PM_{2.5}$ = particulate matter 2.5 micrometers in diameter or smaller

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

Less-than-Significant Impact. In developing the thresholds of significance for air pollutants, the BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts on the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts is unnecessary. As described above in discussion (b), project construction emissions would not be anticipated to exceed BAAQMD significance thresholds. Therefore, the project would result in a less than significant cumulative impact.

d) Expose sensitive receptors to substantial pollutant concentrations?

Less-than-Significant Impact. The Red Rock Warehouse site is located in an area that mostly consists of former industrial structures, and there are no residences or other sensitive receptors located within the

project vicinity. In the vicinity of the El Campo Marina site, several private residences are located at various locations along the shoreline of the Tiburon Peninsula. Pile removal and restoration activities would result in on-site emissions of toxic air contaminants (TACs), specifically diesel particulate matter (DPM), from heavy duty diesel equipment exhaust. Due to the variable nature of construction activity, the generation of TAC emissions would be temporary, especially considering the short amount of time such equipment is typically within an influential distance that would result in the exposure of sensitive receptors to substantial concentrations. Because construction activities would be sporadic, transitory, and short-term in nature, and construction TAC emissions would cease after the completion of the proposed project construction, health impacts from these emissions would be less than significant.

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

Less-than-Significant Impact. Typical odor sources of concern include wastewater treatment plants, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, auto body shops, rendering plants, and coffee roasting facilities. The project would not include these types of facilities or operations, and would not result in a new source of substantial odors.

During construction, diesel exhaust from construction equipment would generate some odors. However, construction-related odors would be temporary and would not persist upon project completion. They would also be at a large distance (at least a few hundred feet) from human receptors. Therefore, the project would not create a significant source of new odors, and odor impacts would be less than significant.

3.4 BIOLOGICAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

The San Francisco Bay Subtidal Habitat Goals Report (State Coastal Conservancy (SCC) 2010) states that one large-scale, long-term conservation strategy for the Central Bay and the Richmond shoreline might be to restore eelgrass near sites where creosote-treated piles are being removed, to provide eelgrass (*Zostera marina*) as a natural substrate to attract spawning herring. Pacific herring (*Clupea pallasi*) have also spawned on restored oyster reefs in the bay, and such reefs are being included as part of an innovative, multi-habitat restoration approach to benefit Pacific herring in the region.

Creosote is an oily product distilled from crude coal tar and contains hundreds of chemical compounds. It was added to wood used in marine construction to slow the decay that would otherwise occur. The primary constituents of creosote are polycyclic aromatic hydrocarbons (PAHs) and alkylated PAHs which account for up to 90% of creosote mixtures (World Health Organization 2004). Many of the PAHs

present in creosote mixtures are identified as priority pollutants. As described in Chapter 1, many organisms that come into direct, extended contact with creosote-treated piles may be adversely affected. Harmful levels of contact may occur if organisms feed on prey species inhabiting the surface of the piles or if organisms lay eggs directly on piles, as is the case with Pacific herring. Creosote-treated wood has been shown to negatively impact the early life stages of Pacific herring. Exposure to creosote-treated wood caused developmental delays, embryo degeneration, edema (accumulation of fluid), changes in movement, and alterations to cardiac function in Pacific herring embryos from the San Francisco Bay (Vines et al. 1998).

The proposed project would remove creosote-treated piles and collapsed decking in combination with a living shoreline restoration design that will use natural bioengineering techniques to enhance habitat complexity and replace lost spawning habitat by removing the piles. Creating or expanding eelgrass beds would provide substrate for Pacific herring and other organisms to attach their eggs to and food resources for species such as herring and salmon. Fabricated reef structures would not only provide a secondary spawning substrate for herring but would also provide the necessary hard substrate for native Olympia oyster (*Ostrea lurida*) settlement and growth and other species, help trap and stabilize sediments in the areas formerly occupied by creosote-treated pilings, and attenuate wave energy to prevent shoreline erosion. Finally, extending the range of rockweed (*Fucus gardneri*) in the intertidal zone would further provide an additional spawning substrate for herring and further enhance the overall habitat complexity and diversity at the restoration sites. Several ecological functions of eelgrass beds, oyster beds, and rockweed are considered helpful in moving the estuary toward a more natural, less uniform state with local heterogeneity benefiting native species and biodiversity. Consistent with the recommendations in the Subtidal Goals Report (SCC 2010, the proposed project would implement a pilot creosote-treated pile removal and native herring habitat restoration project in the San Francisco Bay).

In summary, the purposes of the project are as follows:

- Increase the overall ecological health of portions of San Francisco Bay by removing derelict creosote-treated wooden pilings,
- Improve spawning and development success of Pacific herring through removal of creosote-treated piles, which have been shown to have detrimental effects on early life history stages of Pacific herring;
- Improve spawning success of Pacific herring by providing necessary subtidal structures, including eelgrass beds, rockweed, and oyster reef habitat, on which they can lay eggs;
- Share lessons learned to further inform future planning, management, restoration design practices, and permit procedures for creosote-treated pile removal and subtidal habitat restoration projects bay-wide, and
- Provide additional habitat enhancements that not only bring the herring-related benefits described above but also benefit other species and increase the overall habitat complexity of the Bay.

This project is a restoration project which would have long-term benefits for a variety of species and habitats in and around the project footprints, and it would also provide ancillary benefits to water quality and other environmental resources (discussed in other sections of this Initial Study [IS]).

Existing Conditions

The existing conditions and environmental setting are presented in an introductory section at the beginning of Chapter 3. The site locations, overviews, and project footprints are presented there. The general biological setting of San Francisco Bay and the common species and habitat types within it are also presented; the historical and current distributions of eelgrass, rockweed, and native Olympia oysters; and the use of the bay by Pacific herring, which are one of the primary targeted species for this restoration project. Also described are the physical and biological conditions of each of the two project sites – the Red Rock Warehouse site and the El Campo Marina site – including substrate, tidal elevations, and dominant patterns of winds and waves.

3.4.1 DISCUSSION

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, or the National Marine Fisheries Service?

Less-than-Significant with Mitigation Incorporated. As described in the following text, the project is likely to cause minor and brief temporary impacts to habitats used by special-status species. In the bay itself, these impacts would primarily be from increases in turbidity or from direct disturbance during parts of the two construction phases (pile removal and restoration). There is also a small chance that terrestrial special-status species or their habitats would be disturbed by vegetation clearing for site access or by the in-water work that is closest to shore. Because the specifics of the type and timing of these impacts and the relevant mitigation measures associated with them will vary, the following discussion is separated into the following subsections:

- Federal and State Endangered Species Act (ESA)-listed species
- State Species of Special Concern
- Migratory Bird Treaty Act species
- Special Aquatic Sites
- Essential Fish Habitat

With the implementation of the environmental protections measures detailed in Section 2.11 above (seasonal avoidance, construction best management practices [BMPs], and other standard precautions), most of the potential disturbances or adverse impacts would be very minor and would not rise to the level of a significant impact. However, there are a few measures that will be required to protect biological resources and avoid and minimize impacts that might otherwise be significant. Those measures are therefore listed here as Mitigation Measures for Biological Resources (MM-BR) and enumerated as “MM-BR-#” following the specific resources and associated impact they are intended to avoid.

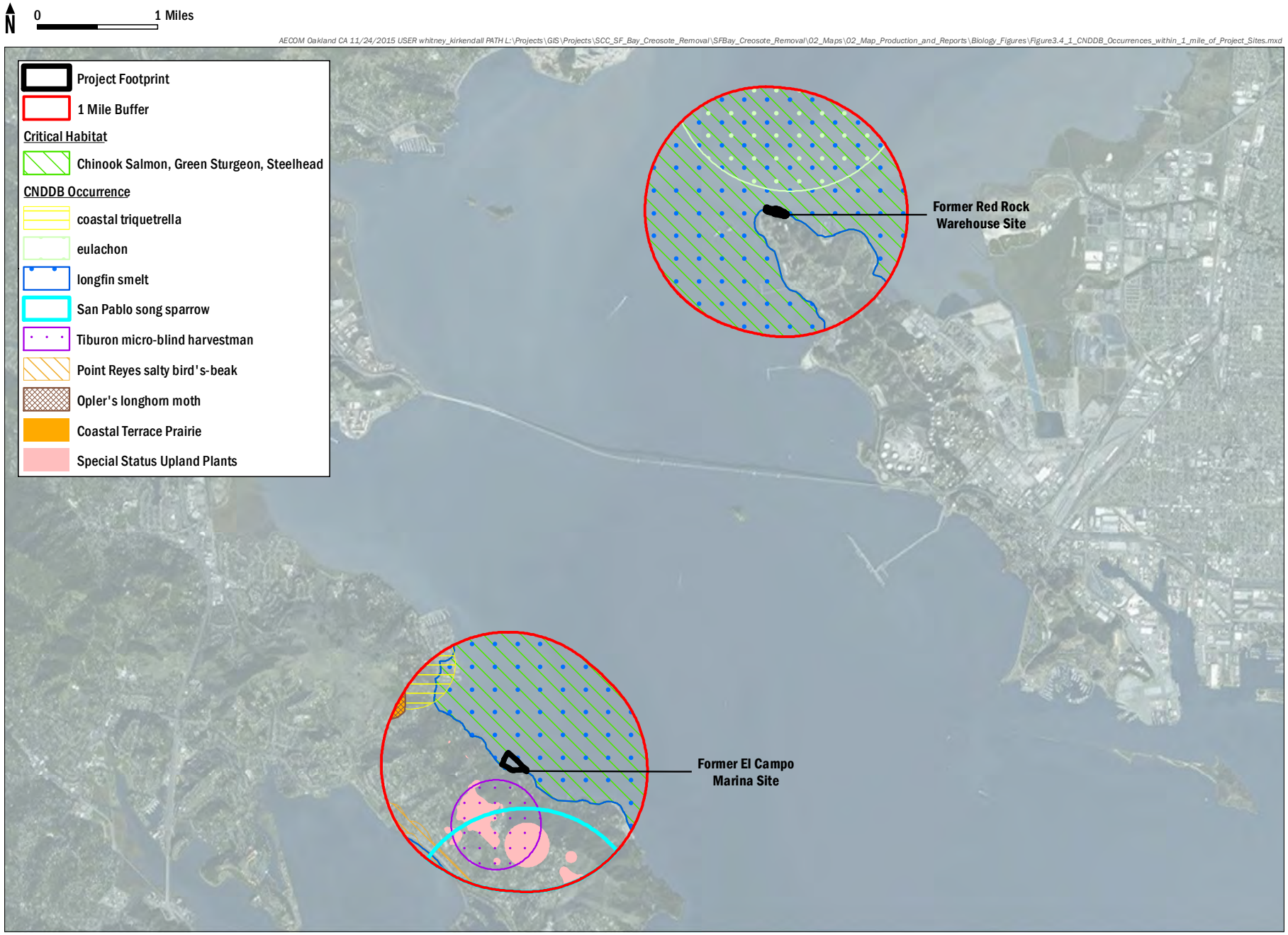
Federal and State Endangered Species Act-listed Species

Table 11 lists the special-status plant, fish, and wildlife species that were evaluated for their potential to occur in the project areas. The table includes special-status species within the U.S. Geological Survey 7.5-minute San Quentin and Mare Island quadrangles and those shown in the California Natural Diversity Database (CNDDB) as having occurred within one mile of the two project footprints. The special-status species that were evaluated as having potential to occur in the project area are shown in bold text. The results of the CNDDB query are displayed on **Figure 21**, along with designated critical habitat occurring within that area.

Of the seven species with potential to occur in the project footprints, only the California least tern is a terrestrial species. The breeding and nesting season for California least terns begins in April and typically lasts through the end of August. This species nests on barren to sparsely vegetated places near water, normally on sandy or gravelly substrates. In the San Francisco Bay region, breeding typically takes place on abandoned salt flats found in many locations in southern San Francisco Bay and Suisun Bay. None of these salt flats are near the project area, and the CNDDB does not show California least tern occurrences nearby. While this suggests that the presence of this species in the project areas is unlikely; it cannot be completely ruled out. Disturbing individuals of this species would be a potentially significant impact. Therefore, preconstruction surveys along the shorelines at each site will be conducted, and approved biological monitors will be present during construction activities to verify that individuals of this species would not be present in the limited land-based portions of the project area. This effort is only relevant at the Red Rock Warehouse site, where the project staging and stockpiling areas would be and where there would likely be a small portion of vegetation cleared to allow shoreline access for construction equipment.

The preconstruction surveys would guide the selection of a biologically appropriate access route to clear and to verify that no least terns are in the immediate vicinity. The biological monitoring during construction would be sufficient to ensure that the construction contractors follow the approved route and to notice if an individual of this species enters the project's work area. In that case, the monitor would stop work as needed to protect individuals of the species. The preconstruction surveys and biological monitoring are described below as Mitigation Measure Biological Resources-1 (**MM-BR-1: Preconstruction Surveys Construction Monitoring**).

The other listed species are all either fish that occupy San Francisco Bay year-round or are anadromous fish that move through it as part of seasonal migrations to upstream, freshwater spawning areas. All of these fish species could be temporarily affected by construction activities, such as noise, temporary exclusion from small portions of their habitat, and brief increases in turbidity.



Coastal Conservancy

California State Coastal Conservancy
SF Bay Creosote Removal and Herring Habitat Restoration Project

FIGURE 21

CNDDB Occurrences and Critical Habitat within 1 Mile of Project Sites

The project designs also include construction BMPs and other environmental protection measures to protect and reduce impacts on these fish species. Even though the project would not involve dredging, the project schedule was developed with the intent of fitting into the National Marine Fisheries Service's (NMFS) work windows for dredging. Those work windows were developed in part with the intent to avoid seasonal impacts to migrating fish. The timing of the in-water work would avoid most of the seasonal migration of the various salmonids (*Oncorhynchus* spp.) listed below, which would keep the risk of these fish being present and affected by construction activities to less than significant.

While fish that are present year-round, such as the green sturgeon (*Acipenser medirostris*) and the longfin smelt (*Spirinchus thaleichthys*) cannot be completely avoided by the seasonal timing of construction actions, the mitigation measures described below (those above and beyond the general environmental protection measures) would protect these fish species and designated critical habitat that is present in the project area (**Figure 21**).These fish species are mobile and would generally move away from construction barges, divers, and other equipment that would be used, avoiding direct interaction with equipment. Project activities, including cutting or pulling piles and slowly lowering reef structures, are not sufficiently loud to damage the hearing or otherwise adversely affect fish or other marine species (unlike pile driving, for example).

The pile removal and reef structure placement would briefly increase suspended sediments and thus temporarily increase turbidity. To a lesser extent, the harvesting and transplant placement of eelgrass by divers or waders would similarly increase turbidity. The duration of the increases in turbidity would range from a few minutes to a few hours, depending on the tides, weather conditions, and the triggering activity. Section 3.9 – Hydrology and Water Quality describes the potential for turbidity and other water quality changes as well as Mitigation Measure Water Quality -1 (**MM-WQ-1**), which includes required turbidity monitoring and response actions. The details behind MM-WQ-1 are taken from guidance provided by the San Francisco Bay Regional Water Quality Control Board

The SCC has worked with the U.S. Army Corps of Engineers (USACE), the federal lead agency for compliance with the National Environmental Policy Act (NEPA), to undertake informal consultation with NMFS under the Federal Endangered Species Act (ESA). Under this consultation, NMFS has concurred with a preliminary determination that the project is Not Likely to Adversely Affect the ESA-listed fish species that may use the project area.

The long-term project results would include improved habitat for these species by creating reef structures and enhancing eelgrass, which would increase spawning success and forage quality and would more than offset the brief, local, and minor disturbances associated with project construction.

Therefore, in considering the implementation of **MM-BR-1**, the project design requirements, and the environmental protection measures, the impacts on Federal or State ESA-listed species would be less than significant.

State Species of Special Concern and Fully Protected Species

A Species of Special Concern (SSC) is a species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria:

- Is extirpated from the State or, in the case of birds, in its primary seasonal or breeding role;
- Is listed as Federally-, but not State-, threatened or endangered; meets the State definition of threatened or endangered but has not formally been listed;
- Is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status;
- Has naturally small populations exhibiting high susceptibility to risk from any factor(s) that, if realized, could lead to declines that would qualify it for State threatened or endangered status.

The California Environmental Quality Act (CEQA) requires State agencies, local governments, and special districts to evaluate and disclose impacts from "projects" in the State. Section 15380 of the CEQA Guidelines clearly indicates that species of special concern should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined therein (Comrack et al. 2008). With the exception of the green sturgeon, there are no SSC with potential to occur in the project area (**Table 11**). Potential impacts to green sturgeon are described in the above section entitled “Federal and State Endangered Species Act-listed Species.”

The classification of Fully Protected Species was California’s initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction (California Department of Fish and Wildlife [CDFW] 2015a). This initial effort resulted in the creation of lists for protected fish, amphibians, reptiles, birds, and mammals. Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for the purpose of collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock (CDFW 2015a).

As noted in **Table 11**, there are two fully protected bird species with potential to occur in the project area. They are the California least tern, which is state and federally listed as endangered, and the brown pelican, which had been a federally listed as threatened but is now delisted due to recovery of populations. Please refer to the above section entitled “Federal and State Endangered Species Act-listed Species” for a discussion of potential

Table 11: Special-Status Species Evaluated for Potential to Occur in the Project Area

Scientific Name	Common Name	Potential to Occur?	Explanation	Status (Federal/ State/SSC/Rare Plant)
Plants				
Amsinckia grandiflora	Large-flowered fiddleneck	N	Grassland plant, suitable habitat is not present in the project area.	E/E/1B.1
Amorpha californica var. napensis	Napa false indigo	N	Occurs in broadleaved upland forest, chaparral, cismontane woodland, suitable habitat is not present in the project area.	-/-/1B.2
Arctostaphylos pallida	Pallid manzanita	N	Chaparral plant, suitable habitat is not present in the project area.	T/E/1B.1
Calochortus tiburonensis	Tiburon mariposa lily	N	Serpentine grassland, suitable habitat is not present in the project area.	T/ T/1B.1
Castilleja affinis var. neglecta	Tiburon paintbrush	N	Valley, serpentine and foothill grassland, suitable habitat is not present in the project area.	E/ T/1B.2
Chloropyron maritimum ssp. Palustre	Point Reyes salty bird's-beak	N	Coastal salt marsh, suitable habitat is not present in the project area.	-/-/1B.2
Cordylanthus mollis ssp. Mollis	Soft bird's-beak	N	Salt marsh plant, suitable habitat is not present in the project area.	E/-/1B.2
Cordylanthus palmatus	Palmate-bracted bird's-beak	N	Occurs in seasonally-flooded flats with saline soils, suitable habitat is not present in the project area.	E/-/1B.1
Clarkia franciscana	Presidio Clarkia	N	Occurs in serpentine soils, suitable habitat is not present in the project area.	E/-/ 1B.1
Chorizanthe robusta var. robusta	Robust spineflower	N	Coastal dune plant, suitable habitat is not present in the project area.	E/-/1B.1
Eriogonum luteolum var. caninum	Tiburon buckwheat	N	Chaparral, valley and foothill grassland, cismontane woodland, coastal prairie, suitable habitat is not present in the project area.	-/-/1B.2
Erysimum capitatum ssp. Angustatum	Contra Costa wallflower	N	Occurs in sand dune habitat, suitable habitat is not present in the project area.	E/-/ 1B.1
Fritillaria liliacea	Fragrant fritillary	N	Coastal scrub, valley and foothill grassland, coastal prairie, cismontane woodland, suitable habitat is not present in the project area.	-/-/1B.2
Hesperolinon congestum	Marin western flax	N	Chaparral, valley and foothill grassland, suitable habitat is not present in the project area.	T/ T/ 1B.1
Holocarpha macradenia	Santa Cruz tarplant	N	Coastal grassland plant, suitable habitat is not present in the project area.	T/ -/1B.1
Lasthenia conjugens	Contra Costa goldfields	N	Vernal pool plant, suitable habitat is not present in the project area.	E/-/1B.1

Table 11: Special-Status Species Evaluated for Potential to Occur in the Project Area

Scientific Name	Common Name	Potential to Occur?	Explanation	Status (Federal/ State/SSC/Rare Plant)
Neostapfia colusana	Colusa grass	N	Vernal pool plant, suitable habitat is not present in the project area.	T/-/1B.1
Oenothera deltoides ssp. Howellii	Antioch Dunes evening-primrose	N	Occurs in sand dune habitat, suitable habitat is not present in the project area.	E/ -/1B/1
Pentachaeta bellidiflora	white-rayed pentachaeta	N	Valley and foothill grassland, cismontane woodland, suitable habitat is not present in the project area.	E/ E/ 1B.1
Plagiobothrys glaber	hairless popcornflower	N	Meadows and seeps, marshes and swamps, suitable habitat is not present in the project area.	-/-/1A
Sidalcea keckii	Keck's checker-mallow	N	Occurs on grassy slopes of Sierra Nevada foothills, not in project area.	E/-/1B.1
Streptanthus niger	Tiburon jewelflower	N	Grassland plant, suitable habitat is not present in the project area.	E/ E/ 1B.1
Suaeda californica	California sea blite	N	Intertidal salt marsh plant, suitable habitat is not present in the project area.	E/-/1B.1
Symphyotrichum lentum	Suisun Marsh aster	N	Marshes and swamps (brackish and freshwater).	-/-/1B.2
Trifolium amoenum	Showy Indian clover	N	Valley and foothill grassland, coastal bluff scrub, suitable habitat is not present in the project area.	E/-/ 1B.1
Trifolium hydrophilum	Saline clover	N	Marshes and swamps, valley and foothill grassland, vernal pools.	-/-/1B.2
Triquetrella californica	Coastal triquetrella	N	Coastal bluff scrub, coastal scrub, suitable habitat is not present in the project area.	-/-/1B.2
Insects				
Apodemia mormo langei	Lange's metalmark butterfly	N	Occurs in sand dune habitat near larval food plant, buckwheat, suitable habitat is not present in the project area.	E/-/-
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	N	Occurs in riparian habitat, suitable habitat is not present in the project area.	T/-/-
Elaphrus viridis	Delta green ground beetle	N	Inhabits vernal pool areas, suitable habitat is not present in the project area.	T/-/-
Speyeria callippe callippe	Callippe silverspot butterfly	N	Grassland butterfly, suitable habitat is not present in the project area.	E/-/-

Table 11: Special-Status Species Evaluated for Potential to Occur in the Project Area

Scientific Name	Common Name	Potential to Occur?	Explanation	Status (Federal/ State/SSC/Rare Plant)
Fish				
Acipenser medirostris	**Green sturgeon, Southern Distinct Population Segment (DPS)**	**Y**	**Occupy the San Francisco Bay estuary year-round.**	**T, CH/SSC/-**
Branchinecta conservatio	Conservancy fairy shrimp	N	Inhabits vernal pools, suitable habitat is not present in the project area.	E/-/-
Branchinecta longiantenna	Longhorn fairy shrimp	N	Inhabits vernal pools, suitable habitat is not present in the project area.	E/-/-
Branchinecta lynchi	Vernal pool fairy shrimp	N	Inhabits vernal pools, suitable habitat is not present in the project area.	T/-/-
Eucyclogobius newberryi	Tidewater goby	N	Inhabits lagoons along the coast of California, suitable habitat is not present in the project area.	E/SSC/-
Lepidurus packardi	Vernal pool tadpole shrimp	N	Inhabits vernal pools, suitable habitat is not present in the project area.	E/-/-
Hypomesus transpacificus	Delta smelt	N	Range does not extend south of Suisun Bay, not found in project area.	T/E/-
Oncorhynchus kisutch	Coho salmon - central CA coast	N	Anadromous fish that inhabit streams and rivers as well as marine waters. However, they do not inhabit the San Pablo or Central Bay.	E/E/-
Oncorhynchus mykiss	**Steelhead - Central California Coastal DPS**	**Y**	**Adults and juveniles migrate through the San Francisco Bay. Critical habitat found in project area.**	**E, CH/E/-**
Oncorhynchus mykiss	**Steelhead - Central Valley DPS**	**Y**	**Adults and juveniles migrate through the San Francisco Bay. Critical habitat found in project area.**	**T, CH/-/-**
Oncorhynchus tshawytscha	**Chinook salmon, Central Valley spring-run**	**Y**	**Adults and juveniles migrate through the San Francisco Bay. Critical habitat found in project area.**	**T, CH/T/-**
Oncorhynchus tshawytscha	**Chinook salmon, Sacramento River winter-run**	**Y**	**Adults and juveniles migrate through the San Francisco Bay. Critical habitat found in project area**	**E, CH/E/-**
Spirinchus thaleichthys	**Longfin smelt**	**Y**	**Found in open waters of estuaries, mostly in middle or bottom of water column. Occupy the San Francisco Bay estuary year-round.**	**-/ T/-**
Syncaris pacifica	California freshwater shrimp	N	Inhabits fresh water bodies so suitable habitat is not present in the project area.	E/E/-

Table 11: Special-Status Species Evaluated for Potential to Occur in the Project Area

Scientific Name	Common Name	Potential to Occur?	Explanation	Status (Federal/ State/SSC/Rare Plant)
Thaleichthys pacificus	Eulachon	N	Found in Klamath River, Mad River, Redwood Creek & in small numbers in Smith River & Humboldt Bay tributaries, not in project area.	T/-/-
Amphibians				
Ambystoma californiense	California tiger salamander	N	Inhabits fresh water bodies and associated upland habitat, suitable habitat is not present in the project area.	T/ T, SSC/-
Rana draytonii	California red-legged frog	N	Inhabits fresh water bodies and associated upland habitat, suitable habitat is not present in the project area.	T/ SSC/-
Reptiles				
Masticophis lateralis euryxanthus	Alameda whipsnake	N	Terrestrial snake, suitable habitat is not present in the project area.	T/T/-
Thamnophis gigas	Giant garter snake	N	Terrestrial snake, suitable habitat is not present in the project area.	T/T/-
Birds				
Asio flammeus	Short-eared owl	N	Found in swamp lands, both fresh and salt; lowland meadows; irrigated alfalfa fields, suitable habitat is not present in the project area.	-/SSC/
Charadrius alexandrinus nivosus	Western snowy plover	N	Occupies sparsely vegetated coastal beaches, lagoons, and salt ponds of the South San Francisco Bay but suitable habitat is not present in the project area.	T/SSC/-
Circus cyaneus	Northern harrier	N	Found in coastal salt & fresh-water marsh. Nest & forage in grasslands, from salt grass in desert sink to hay fields, suitable habitat is not present in the project area.	-/SSC/-
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	N	Inhabit woodland habitat near streams and marshes, suitable habitat is not present in the project area.	T/E/-
Laterallus jamaicensis coturniculus	California black rail	N	Inhabits freshwater marshes, wet meadows & shallow margins of saltwater marshes bordering larger bays, suitable habitat is not present in the project area.	-/T/-
Melospiza melodia pusillula	Alameda song sparrow	N	Resident of salt marshes bordering south arm of San Francisco Bay.	-/SSC/-
Melospiza melodia samuelis	San Pablo song sparrow	N	Resident of salt marshes along the north side of San Francisco and San Pablo bays.	-/SSC/-
Pandion haliaetus	**Osprey**	**Y**	**Forages in the open waters of the Bay, roosts and nests in tall trees and isolated manmade structures.**	**MBTA/-/-**

Table 11: Special-Status Species Evaluated for Potential to Occur in the Project Area

Scientific Name	Common Name	Potential to Occur?	Explanation	Status (Federal/ State/SSC/Rare Plant)
Pelecanus occidentalis	**Brown pelican**	**Y**	**Forages in the open waters of the Bay, nests on isolated rocky islands.**	**MBTA/FP/-**
Phalacrocorax auritus	**Double-crested cormorant**	**Y**	**Forages in the open waters of the Bay, roosts on overwater structures such as piles and bridges.**	**MBTA/-/-**
Rallus longirostris obsoletus	California clapper rail	N	Salt-water & brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay.	E/E, FP/-
Sternula antillarum (=Sterna, =albifrons) browni	**California least tern**	**Y**	**Inhabit estuaries and coastal waters from Baja California, Mexico to the San Francisco Bay.**	**E/E, FP/-**
Strix occidentalis caurina	Northern spotted owl	N	Inhabits old-growth forests, suitable habitat is not present in the project area.	T/SSC/-
Mammals				
Antrozous pallidus	Pallid bat	N	Occurs in deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting, suitable habitat is not present in the project area.	-/ SSC/-
Microtus californicus sanpabloensis	San Pablo vole	N	Occurs in saltmarshes of San Pablo Creek, on the south shore of San Pablo Bay.	-/SSC/-
Reithrodontomys raviventris	Salt-marsh harvest mouse	N	Found only in the saline emergent wetlands of San Francisco Bay and its tributaries. Inhabits salt marsh habitat. After review of aerial imagery, it is unlikely that this habitat exists near the project area, but the presence or absence of salt marsh habitat will be confirmed during site visits.	E/E, FP/-
Sorex vagrans halicoetes	Salt-marsh wandering shrew	N	Found in Salt marshes of the south arm of San Francisco Bay, suitable habitat is not present in the project area.	-/SSC/-
Vulpes macrotis mutica	San Joaquin kit fox	N	Terrestrial mammal, suitable habitat is not present in the project area.	E/T/-

Sources: CDFW 2015a, CDFW 2015b, CNPS 2015.

Federal Status

E = listed as endangered under the Federal Endangered Species Act.

T = listed as threatened under the Federal Endangered Species Act.

CH =Critical habitat designated under the Federal Endangered Species Act is present in the project area.

MBTA = protected under the Migratory Bird Treaty Act

\- = no Federal status.

State Status

E	= listed as endangered under the California Endangered Species Act.
T	= listed as threatened under the California Endangered Species Act.
R	= listed as threatened under the California Endangered Species Act.
SSC	= listed as species of special status of concern under the California Endangered Species Act.
FP	= listed as fully protected under the California Endangered Species Act.
-	= no state status.

Rare Plant Status

1A	= Presumed extinct in California
1B.1	= Rare, threatened, or endangered in California and elsewhere; seriously endangered in California
1B.2	= Rare, threatened, or endangered in California and elsewhere; fairly endangered in California
1B.3	= Rare, threatened, or endangered in California and elsewhere; not very endangered in California
2.1	= Rare, threatened, or endangered in California but more common elsewhere; seriously endangered in California
2.2	= Rare, threatened, or endangered in California but more common elsewhere; fairly endangered in California
4.2	= Limited distribution but vulnerability low at this time; fairly threatened in California

impacts to California least tern. Brown pelicans nest on small, isolated islands and would not nest in the project area. Further, while individuals of the species do occasionally roost on piles, they are not dependent on piles for this ecological function, and generally prefer rocks or other, larger structures for roosting. Therefore, the removal of creosote treated piles and placement of the habitat enhancement structures would not result in take or appreciable impact to brown pelicans.

With the implementation of all design requirements, conservation measures, and BMPs, impacts on Federal or State ESA-listed species, State Species of Special Concern, and California's Fully Protected Species would be less than significant.

Migratory Bird Treaty Act Species

As the name implies, the Migratory Bird Species Act (MBTA) covers a range of bird species that migrate to regular and often recurring nesting sites. The MBTA prohibits the take or active disturbance of nests, eggs, or individual nesting birds. If an active nest is present, but the work is sufficiently far from the nest, the U.S. Fish and Wildlife Service (USFWS) generally allows projects to proceed as long as a buffer distance is maintained and monitored by an approved biologist. The buffer distances vary by species, and are discussed below.

Similar to the MBTA but at the state level is Fish and Game Code Section 3503, which prohibits taking, possessing, or needlessly destroying the nest or eggs of any bird. Birds of prey are included in Section 3503.5. Additionally, California's migratory birds are protected under Fish and Game Code Section 3513 by making it unlawful to take or possess any migratory nongame bird (or any part of such bird) as designated in the MBTA. Such a taking of a species covered by the MBTA, if it occurred, would constitute a significant impact.

Several migratory bird species may make use of the on-land portions of the two project footprints. Osprey (*Pandion haliaetus*) individuals have been known to build nests on derelict piles or pier structures and on the tops of on-land utility poles at sites similar to the Red Rock Warehouse site. However, there were no nests for osprey or other migratory birds at either of the project sites' piles during initial site visits and field surveys in summer and fall of 2014 or during subsequent follow-up visits in winter of 2015. Also, the project schedule largely avoids nesting migratory bird season.

There are USFWS- and CDFW-approved protocols for relocation of unoccupied nests between nesting seasons. Monitoring of project piles is ongoing so that any osprey or other nests that might be built during project planning and implementation can be identified and the nest relocated in accordance with protocols prior to project construction beginning. Finally, the preconstruction surveys would identify nests on land, and a buffer distance would be established, maintained, and monitored as required. In the absence of proper nest relocation practices (including timing, destination, and methods), it is possible, however unlikely, that a violation of the MBTA could occur. This would constitute a significant impact. Therefore, **MM-BR-2: Nest Relocation** (below) has been developed to ensure compliance with the MBTA and avoid this impact. The nest relocation itself, if done properly, would be a less-than-significant impact on the birds whose nests would be moved. The preconstruction surveys and construction monitoring are included as part of **MM-BR-1**, which is also discussed below.

Other birds regularly use the waters of the bay for foraging, such as gulls, double-breasted cormorants (*Phalacrocorax auritus*), and various species of ducks and waterfowl. Many of these species, cormorants in particular, are known to roost on existing piles at both sites. However, these piles are relatively recent and anthropogenic additions to the shorelines of the bay, and it is unlikely that these birds have so rapidly evolved as to become dependent on them as roost locations. On the contrary, some researchers have noted that the piles may be providing an artificially advantageous location for individual birds to target and prey on fish in the waters below them and that removing them would restore a more balanced ecosystem (De La Cruz 2016; Wilcox 2015). There are ample other natural and constructed roosting features around the margins of San Francisco Bay, and it is unlikely that pile removal would have appreciable adverse effects on individuals or on populations of these species.

For all of these reasons, the project impacts on MBTA- and California Fish and Game Code-covered species would be less than significant.

Marine Mammal Protection Act Species

The Marine Mammal Protection Act (MMPA), adopted in 1972, makes it unlawful to take or import any marine mammals and/or their products. The MMPA defines take as “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal". Under Section 101(a)(5)(D) of this act, an incidental harassment permit may be issued for activities other than commercial fishing that may impact small numbers of marine mammals. Amendments to this act in 1994 statutorily defined two levels of harassment: Level A harassment is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal in the wild; and Level B harassment is defined as harassment having potential to disturb marine mammals by causing disruption of behavioral patterns—including, but not limited to—migration, breathing, nursing, breeding, feeding, or sheltering.

There are no haul-out sites[1] for seals or sea-lions (Grigg et. al 2012) or other areas in the vicinity of the project footprints that are expected to be regularly occupied by groups of marine mammals. Marine mammals such as harbor seals may occasionally forage within the project footprint (Grigg et. al 2012), likely during periods of higher tides when water depths are greater. However, these individuals can easily avoid construction areas during the work and have ample other locations for forage during those brief periods. Moreover, the proposed project would not generate underwater noise or other disturbance that may torment, annoy, or potentially injure harbor seals or other marine mammals.

For all of these reasons, project impacts on marine mammals would be less than significant.

Special Aquatic Sites

Special Aquatic Sites are subsets of jurisdictional waters of the U.S. that are regulated under Section 404 of the Clean Water Act. In the project areas, tidal mudflats and eelgrass beds are forms of special aquatic sites. Tidal mudflats are a dominant habitat type in San Francisco Bay in general and in the project footprints in particular. Eelgrass beds are not as prevalent, which is one reason why this project would work toward expanding or enhancing existing eelgrass beds and establishing new ones.

[1] A haul-out site is a location where groups of pinnipeds, such as seals and sea lions, regularly rest out of the water.

As described in Chapter 2, most pilings and other debris will be removed from the water using an excavator mounted on a shallow-draft barge equipped with both grappling and shearing attachments. Shallow-draft barges generally require at least 5 feet of water above the sea floor or any submerged debris. Depending on specific site conditions and the construction barge chosen, it may be possible to float the barge into position at high tide, let it settle on the intertidal mudflats to continue working at low tide, and then be lifted by the next high tide. In particular, existing eelgrass or oyster beds would be avoided, which would limit the extent to which this approach could be used at both sites, which have patches of eelgrass and/or other benthic organisms interspersed with the piles.

Barge settlement on mudflats during low tides, if it occurs, is not thought to present a significant impact on the mudflat habitat itself or on the benthic species that live beneath the bay floor. There could be some compression of the surface layers of bay muds, but given the relatively small footprint of construction barges, the short duration of settlement, and the highly dynamic nature of sediments and muds on the bay floor, potential impacts on the mudflat habitat or on benthic species are expected to be less than significant. In addition, following pile removal, there would be holes or depressions where the piles were pulled out or cut off several feet below the mudline. These holes would fill in with local bay muds and sediments in the coming days and weeks as the tides move over and through the project footprints.

As noted in Chapter 2 – Project Description and in Section 3.9 – Hydrology and Water Quality, the project is expected to cause very brief and highly localized increases in turbidity during pile removal and – to a lesser extent – during implementation of the habitat restoration portion of the project. Increased turbidity can adversely affect eelgrass by blocking sunlight from reaching the plant and inhibiting its photosynthesis. However, eelgrass goes dormant during the fall and winter months, and a brief reduction in water clarity would not be an issue to this species during those periods. Importantly, the project schedule for the pile removal phase is in the fall, which avoids the period of eelgrass inflorescence and greatly reduces the potential for adverse impacts on eelgrass, especially from turbidity increases.

During the restoration phase of the project, there may be minor increases in turbidity: placing reef structures would generate less resuspension of sediment than pulling piles would. Harvesting eelgrass and placing the transplants would be done by hand and would have even less chance of causing turbidity impacts. Given the already relatively high turbidity at the sites, these minor increases are expected to be less than significant. There is, however, an option for the contractor to deploy a silt curtain around existing eelgrass beds to protect them if turbidity monitoring (**MM-WQ-1)** reveals increases above those allowed by the regulatory agencies.

The project specifications include not over-harvesting the source beds for eelgrass; limits on the numbers of shoot per area of source bed have been developed and included. These are harvesting densities that have been successfully used in other projects with no significant effects on the source beds. The California Department of Fish and Wildlife has been consulted on this matter and is reviewing the application for the collection permit. Following these design specifications, the impacts on eelgrass beds would be less than significant.

The removal of creosote and the PAHs that they contain is a form of habitat enhancement that on its own would be expected to improve the ecological function and habitat quality (as well as water quality) of the portions of San Francisco Bay within the project footprints and in surrounding areas. Thus, there would be a net improvement in the tidal mudflat and eelgrass beds, as well as on the bay as a whole, making this a less-than-significant impact.

Essential Fish Habitat

Essential Fish Habitat (EFH) is regulated under the Magnuson-Stevens Fisheries Management and Conservation Act (MSA). The MSA establishes Fisheries Management Plans (FMPs) for different groups of fish that use similar types of habitat in particular geographic areas. There are three FMPs with designated EFH in the two project areas:

- The Pacific groundfish FMP,
- The Pacific salmon FMP, and
- The coastal pelagic FMP.

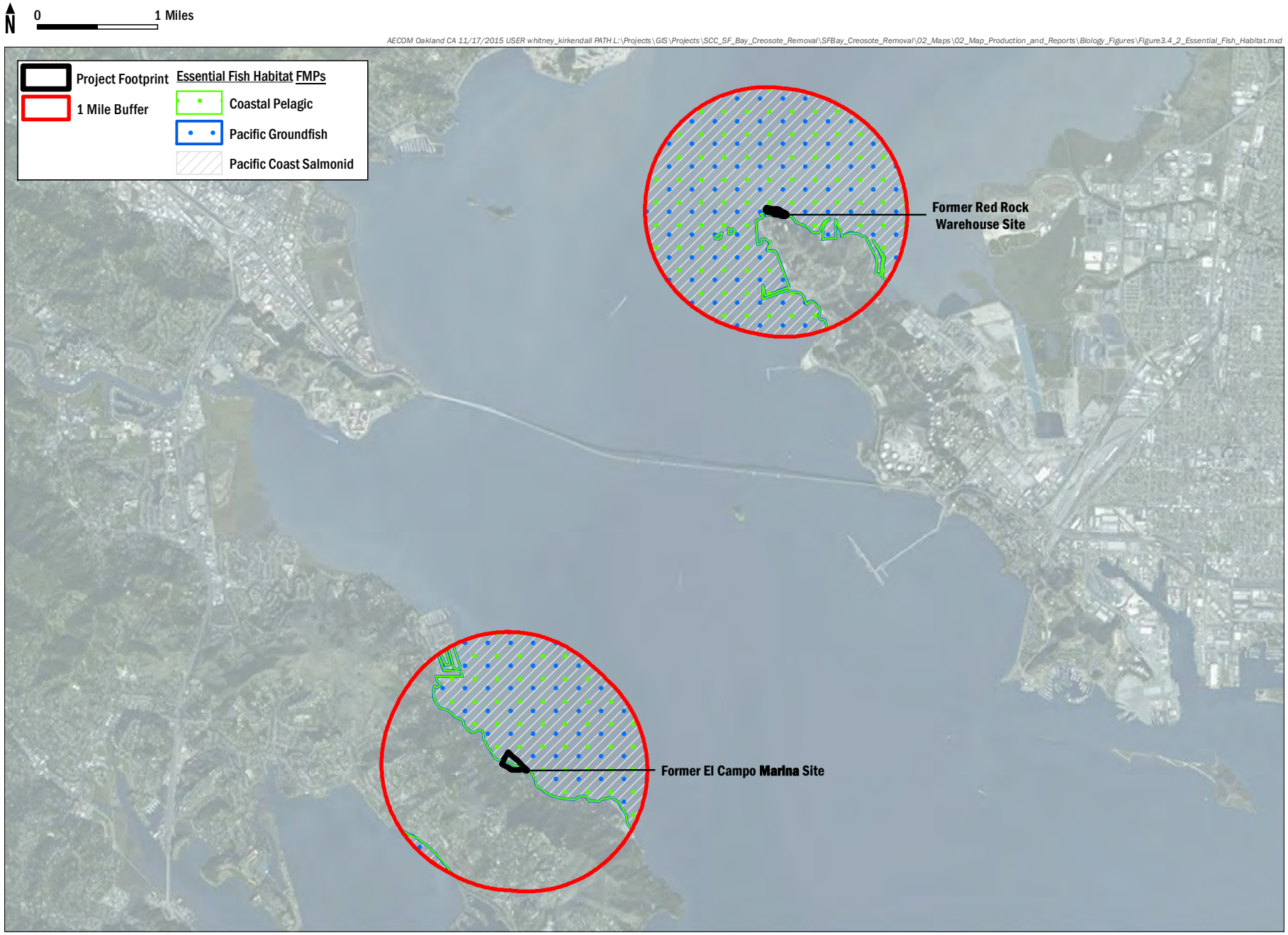
The extents of these EFH designations in relation to the project area are displayed on **Figure 22**.

EFH consultation is required when a federal agency authorizes, funds, or undertakes an action that may adversely affect EFH. The federal agency must provide NMFS (also called the National Oceanic and Atmospheric Administration (NOAA) Fisheries) with an assessment of the action's impacts to EFH. NMFS then provides the federal agency with EFH Conservation Recommendations to avoid, minimize, mitigate, or otherwise offset those adverse effects. The USACE and other federal agencies will be authorizing this project, so EFH consultation is required.

The three types of EFH listed above may be affected by the project, however briefly, from construction-related disturbances. In coordination with the USACE, the SCC has already initiated consultation with NMFS as required by the MSA, and expects concurrence that impacts on the three FMPs would be less than significant. However, the SCC will implement any recommended measures. With the implementation of NMFS-recommended measures, the project design requirements, and other environmental protection measures, any impacts to EFH would be less than significant.

Mitigation Measures for Biological Resources

MM-BR-1: Preconstruction Surveys Construction Monitoring. This mitigation measure includes two main components, preconstruction surveys and biological monitoring during construction. Both of these components were previewed in Section 2.11 – Environmental Protection Measures and are described in more detail here.



Coastal Conservancy

California State Coastal Conservancy
SF Bay Creosote Removal and Herring Habitat Restoration Project

FIGURE 22

Essential Fish Habitat within 1 Mile of Project Sites

Preconstruction surveys for terrestrial and avian special-status species will be performed by a biologist approved by NMFS and/or CDFW for such surveys. The preconstruction surveys would identify individuals, as well as nests, dens or other signs of special-status species on land and in the upper portions of the intertidal zone. If any of those species are present, establishment of a species-specific buffer distance and/or a readjustment of the on-land portions of the construction plans would be undertaken as necessary. The buffer distances would be established, maintained, and monitored as required by the regulatory agencies responsible for managing the protection of those species.

At the Red Rock Warehouse site only, the biological monitor would use the results of the preconstruction surveys to guide and approve the construction contractor's selection of a biologically appropriate route in which to clear vegetation for construction access from the staging area to the beach. The biological monitor would then mark the route and verify that workers do not go outside of it.

On the construction barge, the construction monitor would verify that the construction activities take place only within the required and approved project areas and that the turbidity monitoring and other BMPs are implemented as described in the design plans and specifications, as well as in the permits and other regulatory agreements. The construction monitor will be on-site during eelgrass planting, rockweed planting, and the placement of reef structures to ensure that restoration is properly implemented.

The construction contractor or its approved representative will record daily observations and note estimated work completed daily at each active work area. Information will be collected and presented on the daily form provided in the plans and specifications. Forms will be compiled on a daily basis, converted to a single file in pdf format, and provided via email to the contract owner's representative the following day. The owner's representative will be notified immediately if any adverse conditions (floating or suspended materials, unusual discoloration or turbidity, or odors) are noted or any special status species are observed adjacent to or within the work area. The contractor will conduct daily inspections of the water outside of any containment silt curtains that are deployed to ensure that discharge of construction sediments or materials do not cause the following conditions:

- Floating, suspended, or deposited macroscopic particulate matter or foams;
- Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;
- Alteration of temperature, turbidity, or apparent color beyond present natural background levels;
- Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
- Toxic or other deleterious substances to be present in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or that render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

A summary of impacts will be provided within 30 days of demolition completion, and within 30 days of restoration completion.

MM-BR-2: Nest Relocation. If preconstruction surveys identify an osprey nest or a nest from any other bird species covered under the MBTA, the nest(s) would be relocated according to measures approved for MBTA-protected species. There are USFWS- and CDFW-approved protocols for relocation of unoccupied nests between nesting seasons. Ongoing monitoring of project piles is proceeding so that any osprey or other nests that might be built during project planning and implementation can be identified and the nest relocated in accordance with protocols prior to project construction beginning.

Conclusion

With the implementation of the above-listed **MM-BR-1** and **MM-BR-2**, as well as the project designs and associated environmental protection measures, including construction BMPs, seasonal avoidance, and the water quality and turbidity monitoring presented as **MM-WQ-1** in Section 3., the minimal, brief, and localized impacts to special-status species and their habitats as well as various special aquatic habitats would be less than significant.

In the longer term, the removal of creosote-treated piles and the enhancement and establishment of three different habitat types will be an enhancement to a range of species using the subtidal and intertidal habitats within and around the two project areas.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?

No Impact. The project areas contain no riparian habitat or other sensitive natural community identified in plans, policies, or regulations made by a federal, state, regional, or county agency or entity that was not already discussed in item (a) above. Therefore, the project would have no impact.

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

No Impact. There are no federally protected wetlands as defined by Section 404 of the Clean Water Act in the project footprints. San Francisco Bay itself is a federally regulated non-wetland water of the U.S., and the project would both take place in these jurisdictional waters and may add some net fill to the bay. Existing fill in the form of creosote-treated piles and downed decking and other debris on the bay floor would be removed, which would be an environmental benefit. Some fill would be added in the form of the reef structures for native Olympia oyster settlement, which would be an enhancement to the habitat. The volumes of the removed and added fill are presented in Chapter 2 – Project Description; and conservative estimates yielded a net addition of fill of several dozen cubic yards. The actual net fill is likely to be much lower and could even be negative, depending on how much downed decking is able to be removed. Again, however, this would all take place within non-wetland waters of the U.S. Thus, there would be no impact on federally protected wetlands.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less-than-Significant Impact. As previously discussed, there would be two construction phases of the project: a pile removal phase and a restoration phase. There would be several months between these two phases at each project location. At each site, the in-water portion of the pile removal phase would be one to two months, and the in-water portion of the restoration treatment phase would be two to three months. During these periods, the movement in or through and use of portions of the project footprints would be somewhat disrupted by project activities. The construction barge itself, the cutting or pulling of creosote-treated piles, the placement of reef structures, the harvesting and replanting of eelgrass by divers, and the transplanting of rockweed by people along the shorelines would likely deter many fish and wildlife species from active use of these locations.

However, and as noted in Chapter 2 – Project Description, all of these activities are staggered in time and space, are quite short in duration, have highly localized effects on any given day, and are being planned to avoid most seasonal use of the aquatic sites by several Endangered Species Act-listed species. Once complete, the project would not interfere with the movement of resident or migratory fish or wildlife, affect corridors, or impede the use of native wildlife nursery sites.

On the contrary, as described above, the main goals and methods of project itself would lead to long-term improvements in the habitat for many species of fish and invertebrates in several different ways. The removal of the creosote-treated piles themselves is a benefit for Pacific herring, which have been shown to suffer reduced spawning success and impaired growth and development from the PAHs that leach out of creosote-treated piles. The subsequent addition and enhancement of eelgrass beds would provide more of what is understood to be an ideal spawning substrate for herring, which would increase the quality of that species' use of the project footprints. Though likely smaller, similar benefits associated with the enhancement of habitat complexity and diversity are expected from the increased area of intertidal shoreline that would contain rockweed transplants. Improvements to Olympia oyster recruitment are expected from the reef structures, as has been shown in similar treatments in the San Francisco Bay Living Shorelines Project.

Thus, any short-term construction-related impacts on fish and wildlife movement, migration, and use of the project footprints that may occur would be less than significant and would be more than offset by the habitat enhancements that are at the center of the project.

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

No Impact. There are no local policies or ordinances such as tree preservation protecting biological resources in the project areas. Therefore, the project would not conflict with any such ordinances, and there would be no impact.

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

No Impact. The project would not conflict with any adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or any other habitat conservation plan because there are no HCPs or NCCPs or other similar plans in the project areas. Thus, there would be no impact.

3.5 CULTURAL RESOURCES

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

As described in Chapter 2 – Project Description, this project involves removal of derelict creosote-treated wood piles, an existing source of pollution and navigational hazards in the subtidal and low intertidal portions at two different sites in San Francisco Bay, and the subsequent addition of three different types of habitat enhancements for herring and other fish species as well as for native Olympia oysters and other invertebrates. The upland portions of the project footprint at the Red Rock Warehouse site would primarily be small areas of paved or hard-packed dirt that would be used for staging and stockpiling and for drying the derelict piles. A small amount of roadside vegetation at this site would be cleared to allow construction access to the shoreline; this cleared area would be replanted with native vegetation following project activities. Finally, a section of crumbling derelict decking that remains in place over the waters of the bay would also be removed.

As this project requires federal permitting from the U.S. Army Corps of Engineers (USACE), it is considered an undertaking for the purposes of Section 106 of the National Historic Preservation Act of 1966, as amended, and associated regulations (36 Code of Federal Regulations [CFR] 800), which requires federal agencies to take into account the effects of their undertakings on Historic Properties. As part of compliance with Section 106, AECOM employees authored a Cultural Resources Inventory and Evaluation. The purposes of this study were to: (1) identify and record cultural resources within the Area of Potential Effects (APE); (2) evaluate identified resources for their potential eligibility for listing on the National Register of Historic Places (NRHP); and (3) to recommend procedures for avoidance or mitigation of adverse effects on potentially eligible resources. The APE for the project is defined as the footprints identified in Chapter 2 – Project Description, a 33-foot buffer around each footprint, restoration treatment areas, and portions of the beach in the Red Rock Warehouse location.

California Code of Regulations (CCR) Section 15064.5 notes that “a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment.” According to the CEQA guidelines, historical resources include resources that are:

- Listed in, or determined to be eligible for listing in, the California Register of Historical Resources (CRHR) (per Public Resources Code (PRC) 5024.1(k))
    - There are four CRHR Criterion that could potentially determine a resource as eligible for listing
- Included in a local register of historical resources (per PRC 5020.1) or identified as significant in a historical resource survey meeting the requirements of CEQA Section 5024.1(g)
- Determined by a lead agency to be historically significant

CEQA Section 15064.5 also applies to unique archaeological resources as defined in PRC 21083.2 (g).

Methods used to identify and record cultural resources within the APE include: a Northwest Information Center Records Search, a Previously Recorded Resources search, a Previous Studies search, archival research, a Native American Consultation, a Historical Organization Consultation, an underwater survey, and a pedestrian survey.

A record search at the Northwest Information Center found no previously recorded resources within or immediately adjacent to the Red Rock Warehouse or El Campo Marina APEs. However, two resources were previously recorded on Point San Pablo within the 0.25-mile buffer of the Red Rock Warehouse APE. One resource is a shellmound described as “small and insignificant.” The other is a partially destroyed habitation site located on a hilltop with a Native American midden, well above the high-tide line. Three resources were previously recorded within the 0.25-mile buffer of the APE at the El Campo Marina location. All three resources are shellmounds, though each had been heavily disturbed during the development of the former El Campo Resort.

A total of three previous studies have been conducted within 0.25-mile of the Red Rock Warehouse APE, including two studies conducted within the APE and a total of nine previous studies have been conducted within 0.25-mile of the El Campo Marina APE, including five studies conducted within the APE.

With regard to California Assembly Bill 52 (AB 52), which requires formal consultation with Native American tribes to be included in CEQA documents, the Native American Heritage Commission (NAHC) was contacted to request a search of the Sacred Lands File for sacred lands or other cultural properties of significance to Native Americans within or near the APEs. The Local Government Tribal Consultation List was also requested at this time. A letter response was received stating that the record search of the NAHC Sacred Lands File “did not indicate the presence” of any Native American cultural resources within the APE and a list of Native American tribes who may have knowledge of traditional cultural places in/near the APE was provided

On November 11, 2015, AECOM sent letters via electronic mail briefly describing the Project, with a map depicting the APE, the lead agency contact information, and notification that the Tribe has 30 days to request consultation pursuant to AB52, to the Native American Tribes on the NAHC Tribal Consultation List. Neither responses to the letters nor requests for consultation were received within the 30-day timeframe. Subsequently, AECOM made follow-up telephone calls to these individuals.

The primary response from the Native American Tribes on the NAHC Tribal Consultation List was a concern about the proximity of known sites to the project locations and a recommendation that a Native American monitor and archaeological monitor be present for ground disturbing activities, should they occur. Since there will be no ground disturbing activities at the El Campo location, these measures are not required.

AECOM sent letters describing the project, with maps depicting the APE, to several historical societies requesting that someone within the organization with knowledge of resources or concerns regarding the project contact AECOM. No response has been received to date.

The California State Lands Commission (SLC) Online Shipwreck Database identified no previous resources recorded in the APE or within a 0.25-mile radius. In order to obtain more information, a letter was sent via electronic mail to the SLC regarding any potential submerged cultural resources within the APE. Pamela Griggs, Assistant Chief Counsel of the SLC, responded that the database "does not contain any known shipwrecks" in the APE. However, "not all shipwrecks are listed in the database and, in some cases, listed vessels were re-floated or salvaged. Nearby vessels may be a submerged historic resource as defined in PRC Section 6313, subdivisions (b) and (c). Such a resource needs to be considered in the environmental analysis for the proposed project if it would be disturbed." Ms. Griggs also requested that she be kept apprised of the environmental review process.

The underwater survey identified a submerged vessel hull at the northeastern margin of the pile removal field slightly within the APE and a submerged lattice structure directly within the pile removal field, within the APE. The lattice structure appears to be a pontoon bridge or some other such structure. Although the abandoned vessel hull is in the vicinity of the project on San Pablo Point, there are no pilings within approximately 40 feet of the hull and it is outside of the project's area of direct impact. It will therefore be avoided by all project activities. The pedestrian survey did not result in any significant findings.

3.5.1 DISCUSSION

a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?

No Impact. A search at the Northwest Information Center did not find any previously recorded resources within or immediately adjacent to the Red Rock Warehouse or El Campo Marina locations.

As previously mentioned, there are four CRHR criterions that can potentially determine a resource as eligible for listing. The Red Rock Warehouse pilings may be potentially significant under CRHR criterion 1 due to their association with the 1940's California sardine boom. However, the structure does not retain sufficient integrity for CRHR eligibility. Besides meeting one of the CRHR criteria, a property must also retain a significant amount of its historical integrity to be eligible for CRHR listing. Since the piles are only the foundation of the structure that they originally supported—the Red Rock Warehouse and associated concrete decking, docks and gangways—, they are unable to convey the historical significance

of the warehouse. Therefore, the pilings at the Red Rock Warehouse lack sufficient integrity to convey its historical significance.

The El Campo Marina site does not meet any CRHR criteria, nor does it retain sufficient integrity for CRHR eligibility. Similar to the Red Rock Warehouse site, the El Campo Marina piles are only the foundation of the structure they originally supported. Therefore, the pilings at the El Campo Marina lack sufficient integrity to convey its historical significance.

The USACE (federal lead agency) has determined that the proposed project would have no effect on historic properties or cultural resources. It has initiated consultation with the State Historic Preservation Officer (SHPO) and requests that the SHPO concur with that determination.. Therefore, historic resources as defined in Section 15064.5 of the California Code of Regulations (CCR) are not present within the project area, and no impact on such resources would occur.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

No Impact. A search at the Northwest Information Center did not find any previously recorded resources within or immediately adjacent to the Red Rock Warehouse or El Campo Marina APEs. The cultural resources investigation performed for this project included archaeological resources and indicated that no resources eligible for listing are known to occur within the project APEs.

The USACE (federal lead agency) has determined that the proposed project would have no effect on historic properties or cultural resources. It has initiated consultation with the State Historic Preservation Officer (SHPO) and requests that the SHPO concur with that determination. Therefore, archeological resources pursuant to Section 15064.5 of the CCR are not present within the project area, and no impact on such resources would occur.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No Impact. The only ground disturbance during project activities would occur in the upper layers of bay sediment and a small portion (<0.25 acre) of land at the Red Rock Warehouse site that would be cleared of vegetation for construction access purposes. Therefore, the project would not directly or indirectly destroy a unique paleontological resource, site, or geologic feature.

d) Disturb any human remains, including those interred outside of formal cemeteries?

Less-than-Significant Impact. Based on the results of the investigations and discussions described under the previous items, no cemeteries, Native American burials, or any other human remains have been identified within either project APE. In the event that previously unknown human remains are discovered in the project area during construction, the procedures required by California Health and Safety Code Sections 7050.5 and 7052, as well as California Public Resources Code Section 5097, would be implemented. These procedures include inspection of the remains by the county coroner and a qualified

archaeologist, as well as the treatment of the remains if they are determined to be Native American in origin. Compliance with existing regulations concerning the treatment and disposition of human remains would reduce any impact to a less-than-significant level.

Exhibit 3: Initial Study and Mitigated Negative Declaration

3.6 GEOLOGY AND SOILS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less-than-Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

3.6.1 DISCUSSION

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

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to California Geological Survey Special Publication 42.)

ii) Strong seismic ground shaking?

No Impact. The proposed project would involve removing creosote-treated piles and a subsequent habitat restoration at two locations in San Francisco Bay. No project components involve the addition of any

buildings or structures that would create a hazard to people during an earthquake, nor would they increase the number of people drawn to the sites for recreational or other purposes; neither site is publicly accessible now. Additionally, both project sites lie outside of mapped Alquist-Priolo Earthquake Fault Zones which delineate the surface traces of faults known by the California Geological Survey to be active. Therefore, neither fault ruptures nor strong seismic ground shaking will expose people or structures to potential substantial adverse effects. No impact would occur.

iii) Seismic-related ground failure, including liquefaction?

No Impact. Both project sites are within the San Francisco Bay, and their onshore portions are located in areas mapped as liquefaction hazard zones by the USGS (USGS 2006). The onshore portion of the project is limited to a temporary staging and storage area at the Red Rock Warehouse site that is mapped by the USGS as having "very low" liquefaction susceptibility (USGS 2006). However, the piling-removal and habitat restoration proposed to take place in these areas would not increase the risk of seismic-related ground failure or place workers in unsafe situations, due to seismic-related ground failure, and therefore would not have the potential to expose people or structures to substantial adverse effects. Therefore, no impact would occur.

iv) Landslides?

No Impact. As mentioned previously, most of the project would occur in San Francisco Bay, and project sites are not located immediately adjacent to landslide-prone areas. Further, the onshore portion of the project is limited to a temporary staging and storage area located in a relatively flat, former marine-industrial area on ground that is either paved or hard-packed dirt. Completed project implementation would not increase the number of people drawn to either site for any purpose. Therefore, this project is not likely to expose people or structures to potential substantial adverse effects due to landslides. No impact would occur.

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

No Impact. The large majority of the project footprints are in San Francisco Bay and would thus not be subject to soil erosion or the loss of topsoil. The project designs are intended to retain and encourage deposition of marine sediments and vegetation within the project footprints as a form of habitat restoration. The onshore portion of the project is limited to a temporary staging and storage area located in a relatively flat, former marine-industrial area on ground that is either paved or hard-packed dirt. These onshore project activities would be located on paved or hard-packed land; no changes to the surface or ground cover would occur; and water and other residue coming off of the drying piles would be contained for delivery to an approved off-site disposal site. Therefore, the project would not result in substantial soil erosion or the loss of topsoil. No impact would occur.

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

No Impact. The large majority of the project footprints are in San Francisco Bay and would neither be subject to nor cause any ground instability, landslide, lateral spreading, subsidence, liquefaction or collapse. The on-land portions of the project are limited to brief use for construction staging and access and would neither result in nor be unduly subject to these forms of geological hazards. No impact would occur.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as updated), creating substantial risks to life or property?

No Impact. As noted above, the project areas would be in San Francisco Bay and would involve removing derelict creosote-treated piles, planting eelgrass and rockweed, and placing artificial reef structures for habitat restoration. Project activities do not create substantial risks to life or property from expansive soils. No impact would occur.

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

No Impact. Project activities would not require sewers, septic tanks, or alternative waste water storage or disposal systems. The on-land project activity involving waste water would be the capture and collection of water and other materials dripping off of the creosote-treated piles as they dry. This water would be put into appropriate barrels for transport to an approved disposal site. No impact would occur.

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3.7 GREENHOUSE GAS EMISSIONS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

3.7.1 DISCUSSION

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

Less-than-Significant Impact. During pile removal and habitat restoration activities, greenhouse gas (GHG) emissions would be generated from a variety of sources, including construction equipment and on-road vehicles. Following project completion, all construction emissions would cease. The Bay Area Air Quality Management District (BAAQMD) does not have thresholds of significance for GHG emissions from construction, but has developed operational GHG thresholds, including an annual operational GHG emissions threshold of 1,100 metric tons (MT) of CO_2 equivalent (CO_2e) per year. CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the global warming potential (GWP) of a GHG, is dependent on the potential infrared absorption and the lifetime, or persistence, of the gas molecule in the atmosphere. For this analysis, this operational emissions threshold is applied to construction GHG emissions. This is a conservative application of the threshold, as the construction GHG emissions would cease at the completion of construction and would not continue to occur during the operational lifetime of the project.

GHG emissions from pile removal and restoration activities were calculated as described in Section 3.3 Air Quality (details are available in Appendix B). Total GHG emissions from these activities would be approximately 87.5 metric tons of CO_2e. This would not exceed the threshold of 1,100 metric tons of CO_2e per year. Therefore, impacts from construction GHG emissions would be less than significant.

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

Less-than-Significant Impact. The El Campo Marina project site is located within Marin County, which developed the Marin County Climate Action Plan in July 2015. The Marin County Climate Action Plan includes local GHG reduction measures for land use development projects, such as residential, commercial, and mixed-use projects, and recommends that consistency with these reduction measures be used to determine consistency with the Climate Action Plan for these types of projects. The El Campo

Marina project site is also located within the Town of Tiburon. The Town of Tiburon developed a Climate Action Plan in 2011, but the plan is advisory in nature, and not considered to be a qualified greenhouse gas reduction strategy. The Red Rock Warehouse project site is located in the City of Richmond, which has not developed a Climate Action Plan or Qualified Greenhouse Gas Reduction Strategy. The City of Richmond is located within Contra Costa County, which has developed a draft Climate Action Plan in 2012 for the unincorporated areas of the County, but the plan has not yet been adopted.

Although pile removal and restoration activities would result in temporary construction-related GHG emissions, the project would not conflict with the Marin County Climate Action Plan. The project would not be considered a residential, commercial, or mixed-use development project, and the GHG reduction measures would not be applicable to the project. In addition, as described in discussion (a) above, the project would generate construction emissions levels far below the BAAQMD annual operational GHG threshold which has been set to meet the requirements of AB 32. The project would be consistent with applicable local plans, policies, and regulations for GHGs and would not conflict with the provisions of AB 32, the applicable air quality plan, or any other State or regional plan, policy or regulation of an agency adopted for the purpose of reducing greenhouse gas emissions. Therefore, the project would result in a less-than-significant impact with respect to GHG emissions.

3.8 HAZARDS AND HAZARDOUS MATERIALS

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

3.8.1 DISCUSSION

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

No Impact. The project would not involve the routine transport, use, or disposal of hazardous materials. Creosote-treated piles and other materials would be transported and disposed of during the construction phase only, and these are discussed in item (b), below.

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

Less-than-Significant Impact. The project would temporarily involve the transport and disposal of Class 2 (non-hazardous) and Class 3 (inert) materials. The transportation portion of the project would move creosote-treated pilings from the El Campo Marina site to the staging and storage area at the Red Rock Warehouse site via barges. The disposal portion would move all of the dried piles to Keller Canyon Landfill via trucks.

During the construction phase of the project, limited quantities of miscellaneous hazardous substances—such as gasoline, diesel fuel, hydraulic fluid, solvents, oils, etc.—would be used to fuel and maintain vehicles and motorized equipment. Fuel or other substances could be released accidentally during refueling operations. However, the construction contractor(s) would be required to implement spill prevention and response measures as part of its construction protocols. In addition, existing regulations require the use of BMPs for handling and storage of hazardous materials. With implementation of standard spill prevention and response protocols and compliance with existing regulations, the project would have a less-than-significant impact.

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

No Impact. There are no planned or existing schools within one quarter mile of either project site.

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

No Impact. Neither project site is listed on the Cortese List (Gov. Code, § 65962.5); therefore, project activities would not create a significant hazard to the public or the environment.

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

No Impact. No airports are within 2 miles of either project site.

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

No Impact. No private airstrips are within 2 miles of either project site.

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

No Impact. The project would not interfere with an adopted emergency response plan or emergency evacuation plan. Creosote-piling removal and the subsequent habitat restoration would not obstruct any

roadways, as most activities related to the piling removal would occur from barges within San Francisco Bay waters. Roads would only be used for work commutes by construction personnel; transport of equipment, supplies, and materials to the project sites; and transport of wastes and recovered materials away from the Red Rock Warehouse site. There would be no permanent modifications to road alignments, amount of traffic, or other changes to the environment that would interfere with an emergency response plan. Therefore, no impact would occur.

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

No Impact. The proposed project is not located within an area that is classified by the Fire and Resource Assessment program as at risk. Regardless, project activities would occur primarily via barge within the San Francisco Bay, generating no risk of wildfire. Accordingly, there would be no impact.

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3.9 HYDROLOGY AND WATER QUALITY

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

As described in Chapter 2 – Project Description, this project involves removal of derelict creosote-treated wood piles, an existing source of pollution and navigational hazards in the subtidal and low intertidal portions at two different sites in San Francisco Bay, and the subsequent addition of three different types of habitat enhancements for herring and other fish species as well as for native Olympia oysters and other invertebrates. The upland portions of the project footprints would primarily be small areas of paved or hard-packed dirt that would be used for staging and stockpiling and for drying. A small amount of

roadside vegetation would be cleared to allow construction access to the shoreline at one of the two sites; this cleared area would be replanted with native vegetation following project activities. Finally, a section of crumbling derelict decking that remains in place over the waters of the bay would also be removed.

None of these project activities would involve changes to groundwater, drainage patterns, runoff, or flood risk. Further, none of these activities would involve placing housing or any other human-used structure in a flood hazard area or in areas subject to flooding from dam or levee failures. There would be no changes to the risks or magnitude of inundation from seiche, tsunami, or mudflows. Thus, for items (b) through (e) and (g) through (j) in the checklist above, there are No Impacts expected from the proposed project. The remainder of this introductory text pertains to items (a) and (f).

There would be some brief and highly localized increases in turbidity of the waters of the bay at the two project sites during pile removal and, to a lesser extent, during placement of the various restoration treatments. Other short-term and localized effects to water quality from construction-related disturbances are also possible. The environmental protection measures described in Chapter 2 – Project Description include construction best management practices (BMPs), avoidance and minimization measures, and other conservation measures that would limit the likelihood and magnitude of effects from these construction-related activities. In spite of these measures, impacts to some aspects of water quality could still be significant, which is why the mitigation measure discussed below was developed.

The California State Coastal Conservancy (SCC) is currently conducting permitting and other regulatory clearance processes with the San Francisco Bay Regional Water Quality Control Board (RWQCB), the SF Bay Conservation and Development Commission (BCDC), the U.S. Army Corps of Engineers (USACE), and other agencies with the responsibility to protect water quality in the bay. These regulatory processes will include agency review and approval of the project designs and plans for regular water quality monitoring (including turbidity), the Storm Water Pollution Prevention Plan (SWPPP), and the construction BMPs; commitment to use water-collection and -containment systems on the construction barges and on land to capture water, sediment, and residual creosote from the removed piles; and other measures as needed and as required by the Clean Water Act (CWA) Sections 401 and 404, and other relevant permits and regulatory agreements.

3.9.1 DISCUSSION

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

Less-than-Significant with Mitigation Incorporated. As described briefly above and in more detail in Chapter 2 – Project Description, most of the project activities would take place within the waters of San Francisco Bay, and there would be small areas on already cleared and paved or hard-packed dirt land (up to 1.25 acres) for staging and for stockpiling removed piles for drying prior to disposal. There would also be a small strip of vegetation removed (<0.25 acre) for shoreline construction access. Each of these types and locations of construction activities has a small risk of spills or other forms of accidental contamination either directly into the waters of the bay or onto land where it could be picked up and carried into the bay by surface flows.

Also, the act of pulling or cutting piles and removing other derelict materials from the bay floor, as well as placing restoration treatments, is expected to suspend sediments in the water column for periods lasting from a few minutes to a few hours. These increases in turbidity themselves are a potential violation of a water quality standard, which is why the RWQCB provided guidance on the types of turbidity monitoring to be performed.

However, as part of project permitting, the project description and the project designs, plans, and specifications have been submitted to the regulatory agencies with responsibility for water quality-related issues. These project designs call for the construction contractor to further develop the SWPPP and detailed construction plans that would outline the construction BMPs and other plans for spill containment, refueling practices, and water quality monitoring during the construction phase.

The project designs and specifications for the construction contractor also require the contractor to perform turbidity monitoring in accordance with RWQCB-provided guidance for monitoring marine construction in San Francisco Bay. The details of these requirements are described in Mitigation Measure WQ-1, below. While the measure is explicitly about monitoring and reducing or containing turbidity, the potential resuspension of other contaminants already present in the project footprints along with the sediments is also possible. As described in Chapter 2, the SCC has investigated the history of each site and does not have reason to expect contaminants other than creosote to be present in amounts of concentrations greater than background levels. However, there is still potential for their presence and resuspension in the water column. The turbidity monitoring and response actions (i.e., stopping work until conditions improve, silt curtains) will also serve to reduce the resuspension of other water quality contaminants.

The issuance of water quality permits and other regulatory agreements and the subsequent implementation of their requirements, along with implementation of the Mitigation Measure WQ-1's turbidity monitoring and other environmental protection measures from the project designs and project description, would ensure that water quality standards and waste discharge requirements are not violated. Finally, as the operational stage of the project would not generate wastewater or cause other ongoing water quality disturbances, no water quality standards would be violated.

Therefore, with the implementation of Mitigation Measure WQ-1, below, the impacts on water quality standards would be less than significant.

Mitigation Measure WQ-1: Turbidity Monitoring. 1. The contractor is required to perform water quality monitoring to monitor turbidity. The contractor will prepare a turbidity monitoring plan, including product information on monitoring equipment, proposed monitoring locations and procedures to follow, should turbidity increase above background levels. The turbidity monitoring plan will include the following provisions:

1. Prior to beginning work, the contractor will monitor turbidity and light levels at the level of the eelgrass to establish a baseline. The contractor will also set buoys out to establish background water quality monitoring points upstream and downstream (based on existing currents and tides at the site) of the site. The contractor will monitor turbidity and light at

low, middle, and high tide during typical work hours for several days prior to beginning work. The contract owner's representative will review and approve the background monitoring station locations prior to monitoring.

2. During piling removal, the contractor will monitor turbidity and light levels at the frequency required by the project permits, at the same locations as the baseline monitoring plus within the work area.

3. In accordance with the project permits, light level (H_{sat}) must not fall below 5 hours a day or turbidity will not rise to more than 10% above background levels. The contractor will notify the lead engineer immediately when permit water quality criteria are exceeded. If the lead engineer determines that the water quality criteria have indeed been exceeded, demolition activities must cease until turbidity is reduced and H_{sat} increases above 5 hours. If conditions (e.g., water depth, substrate materials) are appropriate, the contract owner may deploy a silt curtain to contain resuspended materials and prevent their broader dispersal.

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

No Impact. As described above, there would be no changes to existing groundwater or to groundwater recharge systems. No aquifers or wells would be affected by the project.

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

No Impact. There are no streams or rivers at either of the two project sites. Further, as described above, there would be no changes to existing drainage patterns of surface flows, rivers, or streams. The only land-based project activities are staging and stockpiling, clearing for construction access that would be revegetated, and removal of a currently degrading (and thus water quality-reducing) section of derelict decking. Thus, there would be no increase in on- or off-site erosion or siltation associated with rivers or streams.

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

No Impact. There are no streams or rivers at either of the two project sites. Further, as described above, there would be no changes to existing drainage patterns of surface flows, rivers, or streams. The only land-based project activities are staging and stockpiling, clearing for construction access that would be revegetated, and removal of a currently degrading (and thus water quality-reducing) section of derelict decking. This would improve local water quality in the bay. Finally, though not the main purpose of the

project, the designs include placement of artificial reef structures in the bay, which would help attenuate wave energy and would thus somewhat reduce erosion of the coastline. The reef structures are intended to help slow tidal flows and thus make portions of the bay floor behind and between them more conducive to deposition and eelgrass establishment. This is a benefit of the project that would enhance the subtidal and intertidal habitat and would not increase on- or off-site flooding.

e) Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

No Impact. As described above, the project would not create or contribute runoff, nor would it affect any existing or planned stormwater drainage systems. There would be no new permanent sources of runoff. A SWPPP would be implemented during the construction phases of the project to avoid temporary polluted stormwater runoff.

f) Otherwise substantially degrade water quality?

Less-than-Significant with Mitigation Incorporated. As described above, there would be no long-term or permanent adverse impacts to water quality. Removal of creosote-treated piles and of crumbling or other derelict decking would be an enhancement to water quality in the bay. The project would have minor, short-term, and localized increases in turbidity, and there is potential for other similarly brief and local degradations in water quality. However, the implementation of Mitigation Measure WQ-1 described for item (a), above, and other environmental protection measures described in Chapter 2 (including construction BMPs, SWPPP, and other regulatory processes included in the Section 401 Water Quality certification from the RWQCB, the Section 404 permit from the USACE, and the BCDC permit) would reduce these potential impacts to less-than-significant levels.

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

No Impact. As described above, no housing would be constructed as part of the proposed project. Therefore, no impact would occur.

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

No Impact. As described above, no structures would be placed in the 100-year flood hazard areas or other locations that would impede or redirect flood flows. The only structures would be artificial reefs placed into the bay as a form of habitat enhancement. These would not affect flood flows. Therefore, no impact would occur.

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

No Impact. As described above, no people or structures would be exposed to risks from flooding as a result of dam or levee failure. Therefore, no impact would occur.

j) Result in inundation by seiche, tsunami, or mudflow?

No Impact. The project is almost entirely in the already inundated portions of San Francisco Bay. Only those portions that would be temporarily used for construction access and staging or stockpiling are on land. The project thus has very limited and temporary exposure to inundation by seiche, tsunami, or mudflow. Further, nothing in the project designs or related activities would do anything to increase risk or extent of inundation by seiche, tsunami, or mudflow. Therefore, no impact would occur.

3.10 LAND USE AND PLANNING

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

3.10.1 DISCUSSION

a) Physically divide an established community?

No Impact. The project involves removing creosote-treated piles and a subsequent habitat restoration within the San Francisco Bay. Neither of these project actions has the potential to physically divide an established community. No impact would occur.

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

No Impact. The project primarily occurs in the San Francisco Bay with a small portion of land at the Red Rock Warehouse site being used temporarily for staging and storage of waste and equipment. This portion of land is classified in the City of Richmond: General Plan 2030 as Open Space. The proposed project would not change the open space nature of the site. Further, the City's online zoning map viewer shows the staging and stockpiling areas and the former Red Rock Warehouse site as being in a mix of Community and Regional Recreational District (CRR) and Marine Industrial (M-4). The CRR district is predominantly open land uses are intended to retain that character in the public interest. The proposed project would be consistent with that use, as the open space use of that land would not change. The M-4 zone is intended to create, preserve, and enhance areas containing a wide range of municipal or private maritime uses such as marine terminals, cargo handling, ancillary manufacturing or related establishments in areas having extensive rail or transport facilities. The temporary use of former marine terminal areas for drying of derelict marine debris is consistent with this zoning and land use.

A two-year collaborative study, The San Pablo Peninsula Open Space Study, assessed the area's potential for regional open space and was used to reach a consensus on specific open space recommendations. The

project components would not affect the vision of The San Pablo Peninsula Open Space Study, to create a permanently protected open space and park facility on the San Pablo Peninsula (SCC 2005).

Additionally, the creosote-piling removal and disposal process has been drafted under guidance provided by the San Francisco Bay Conservation and Development Commission (BCDC), which created and continues to implement the San Francisco Bay Plan. The intended disposal site is the Keller Canyon Landfill, which has a land use permit to operate as a Class II landfill. The Keller Canyon Landfill Land Use Permit continues to grant the landfill a Maximum Daily Tonnage limit of 3,500 tons of refuse per day. The most conservative estimates of total weight of project waste to be disposed of at the Keller Canyon Landfill would be below 2,000 tons, which is below the Maximum Daily Tonnage limit by 1,500 tons. As importantly, the total mass of refuse from the project would not be hauled in one day and could be spread over time to stay below any necessary limit.

Since the project would maintain the existing land uses and is working with the regulatory agency that governs acceptable San Francisco Bay use, no impacts would occur.

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

No Impact. There are no adopted applicable Habitat Conservation Plans (HCP) or Natural Community Conservation Plans (NCCP) within the project area according to the Department of Fish and Wildlife's California Regional Conservation Plans map (CDFW 2014). The closest HCP to the project location is the PG&E Bay Area Operation and Maintenance Study Area roughly 6 miles east. The closest NCCP is the Contra Costa NCCP located approximately 34 miles east of the project site. Since there are no HCPs or NCCPs within the project area, no impacts would occur.

3.11 MINERAL RESOURCES

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

As described in the Chapter 2 - Project Description, the project primarily occurs in the San Francisco Bay with a small portion of land at the Red Rock Warehouse site being used temporarily for staging and storage of waste and equipment. The project activities conducted on land would not directly affect mineral resources or affect the ability to access mineral resources. As a result, for items (a) and (b), there are No Impacts expected from the proposed project.

3.11.1 DISCUSSION

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No Impact. The Surface Mining and Reclamation Act of 1975 (SMARA)(as mapped by the California Department of Conservation's Division of Mines and Geology) classifies the Red Rock Warehouse site as Mineral Resource Zone 2 (MRZ-2), which means that it is suitable for industrial and chemical mineral resource extraction (Stinson 1982). However, as stated above, no project activities at either of the two sites would result in the loss of mineral resources or affect the ability to access mineral resources. Additionally, no mineral resource extraction activities occur or have been known to occur within or around the project area. Therefore, no impact would occur.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No Impact. As stated above, no project activities would result in the loss of mineral resources, or affect the ability to access mineral resources. Nor is either of the two sites locally important mineral resource recovery site delineated on local plans. Therefore, no impact would occur.

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3.12 NOISE

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

3.12.1 DISCUSSION

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

Less-than-Significant Impact. Noise would be generated during project construction as a result of operating construction equipment on the project site and transporting construction equipment and materials by barge. All project-related construction noises would be limited to weekday daytime hours (7 a.m. – 6 p.m.) in order to satisfy Noise Policy 11-8 in the Noise Element of the Contra Costa General Plan, City of Richmond Municipal Code (Section 9.52.110b), and Marin Municipal Code (6.70.030[5]). As the City of Tiburon requires activities covered under its permits to end at 5 p.m.; this condition would be met if a city permit is required.

Although the City of Richmond Municipal Code has recommended maximum sound levels for construction activities where technically and economically feasible, project activities at the Red Rock Warehouse site are not located within or near areas with sensitive receptors and therefore would not expose persons to noise levels in excess of these recommended standards. There are some residential

properties located near the El Campo Marina site; however, there do not appear to be absolute limits on the maximum sound levels in Marin County or the City of Tiburon for general construction.

"Implementing Program" NO-1.a, of the Marin County General Plan, establishes four Acceptable Noise Levels that are to be used as a guide when determining appropriate new development in relation to ambient noise environment. Some land use categories under stipulations of NO-1.a include Residential, Industrial, Playgrounds, and Transient Lodging. The unacceptable noise threshold for Low Density Residential land use is $>70L_{dn}$ decibels. While not a directly applicable limit for the construction work planned, this level is a useful benchmark of what is considered unacceptably noisy.

The loudest construction equipment to be used for project activities is the deck generator. Its peak noise level is approximately 82 decibels at 50 feet. The work at El Campo Marina site nearest to shore would be removing a pile that is at a distance of 45 feet from the shoreline and 300 feet from the residence. At those distances, the peak noise would be 67 decibels, which is below the above-discussed benchmark for stationary-generated noise. Further, construction activities are temporary, the majority of piling removals would occur at greater distances, and the residents nearest the activities are aware and supportive of the proposed project.

The Red Rock Warehouse site is located approximately 3 miles from the nearest sensitive receptors. At this distance, peak noise from the deck generator would be approximately 33 decibels.

Considering the distances from the construction barge and associated equipment, the relatively low levels of construction noise, the work-period hours and days of the week, and the lack of sensitive receptors, the impact would be less than significant.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less-than-Significant Impact. Construction vibration would occur during equipment operation at both project sites, however, equipment and materials transported to the sites by barge would not produce groundborne vibrations. As there are no adopted groundborne vibration standards at either project location, and because the project construction would occur over the water, much of the vibration created by pile removal would primarily impact the bay. The impacts of pile removal to wildlife in San Francisco Bay are discussed in Section 3.4, Biological Resources. The distance between proposed construction activities and the closest noise- or vibration-sensitive residential uses at the Red Rock Warehouse site is great enough (several miles) that ground disturbance activities would be insignificant. Construction activities at the El Campo Marina site would occur exclusively in the bay, and therefore would not result in an exposure of persons to excess groundborne vibration or groundborne noise levels. The impact would be less than significant.

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

No Impact. The proposed project would involve removing creosote-treated pilings and a subsequent habitat restoration. There would be no permanent project components added to the environment with the ability to produce noise as a result of the project. Any increased noise from the project would be generated by temporary construction activities and would cease at the end of the construction period. Therefore, no impact would occur.

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

Less-than-Significant Impact. While at times, noise from construction activities at the El Campo Marina site may be perceptible at the two nearest residences, these activities would be within allowable hours and days and below criteria set by local ordinances for daytime construction activities and would not be considered a substantial increase in ambient noise. This impact would be less than significant.

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

No Impact. As there are no airports within 2 miles of either project site, there would be no impact.

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

No Impact. As there are no private airstrips within 2 miles of either project site, there would be no impact.

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3.13 POPULATION AND HOUSING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing homes, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

3.13.1 DISCUSSION

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. The proposed project would not directly or indirectly induce population growth. The project involves removing creosote-treated piles from two locations in San Francisco Bay and subsequent habitat restoration in and around those locations. Neither of these activities have the ability to substantially increase population growth near either project site or in the Bay Area as a whole. No impact would occur.

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

No Impact. The proposed project will not displace existing homes. Therefore, no impact would occur.

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

No Impact. The proposed project would not require the removal or vacancy of any residences and thus would not displace any people. The construction of replacement housing at a new location would not be required. No impact would occur.

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3.14 PUBLIC SERVICES

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

3.14.1 DISCUSSION

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

No Impact. The proposed project would involve removing creosote-treated piles from two locations in San Francisco Bay and subsequent habitat restoration in and around those locations. Neither of these project activities would have any additional impacts that would result in the increased need for public services or new governmental facilities. Therefore, no impact would occur.

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3.15 RECREATION

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

3.15.1 DISCUSSION

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

No Impact. The proposed project would involve removing creosote-treated piles from two locations in San Francisco Bay and subsequent habitat restoration in and around those locations. The project would not increase the number of residences or businesses in either the City of Richmond or the City of Tiburon, nor would it generate any demand for recreational facilities. During the course of project construction, crew workers – as members of the general public – may use nearby facilities for recreation or leisure activities. The nearest recreational facilities to the Red Rock Warehouse site are the Point Molate Beach Park and the Point San Pablo Yacht Harbor, both in Richmond. The nearest recreational facility to the El Campo Marina site is the Paradise Beach County Park in Tiburon. However, the minor and temporary nature of this usage would not contribute to significant physical deterioration of parks. Thus, the proposed project would not affect use of existing facilities, nor would it require the construction or expansion of existing recreational facilities. Therefore, no impact on recreational facilities would occur.

b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

No Impact. The proposed project would not involve the construction or expansion of recreational facilities, nor would it require the construction or expansion of recreational facilities. No impact would occur.

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3.16 TRANSPORTATION AND TRAFFIC

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

As the project would not change the existing use or character of the project sites or include any new transportation features, the project would not conflict with any transportation plans nor would it change air traffic patterns or roadway design. As a result, for items (a), (c), (d), and (f), there would be no impact and these item are not discussed further in this analysis.

3.16.1 DISCUSSION

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

No Impact. See description above. No impact would occur.

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

Less-than-Significant Impact. Regional access to the site would be via Interstate 580 (I-580). Local site access would be via Stenmark Drive, which is a named exit from I-580 just east of the Richmond-San Rafael Bridge toll plaza. The average daily traffic volume on I-580 at the Western Drive/Stenmark Drive interchange, (the closest location with recorded traffic data), is between 76,000 and 77,000 vehicles (Caltrans 2015).

Permanent project components would not result in additional vehicle traffic in or around either project site. During construction, worker transportation to the project site is not anticipated to substantially affect traffic in the area, as these trips would result in only a small additional number of passenger vehicles (10-15 on the busiest days) on highways and local roads. All construction contractors would park on site at the Red Rock Warehouse site.

Additionally, the truck trips associated with the removal and disposal of the derelict pilings are not anticipated to substantially affect traffic in the area. The combined total of volume of material removed from the two sites is estimated to be less than 1,600 cubic yards, including creosote-treated piles, concrete, decking, and other materials. The capacity of the average construction haul truck is roughly 11 cubic yards of material, which would equate to a maximum of 150 truck trips to haul the waste to the Keller Canyon Landfill. When compared to the average daily traffic volume of the area, these 150 truck trips would not substantially contribute to the existing or future traffic volumes in the project vicinity. In addition, these truck trips would not all occur in one day, but rather would be spread out over some portion of the construction phase of the project. The increase in vehicles on the road would be temporary, small in comparison to the average daily traffic volume, and would not significantly impact vehicle miles traveled or emergency access in the area. As a result, the impacts on traffic would be less than significant.

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

No Impact. See description above. No impact would occur.

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

No Impact. See description above, no impact would occur. In fact, the removal of the pilings would *decrease* hazards to aquatic vessels.

e) Result in inadequate emergency access?

Less-than-Significant Impact. See answer in item (b). The impact would be less than significant.

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

No Impact. See description above. No impact would occur.

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3.17 UTILITIES AND SERVICE SYSTEMS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

3.17.1 DISCUSSION

a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

No Impact. The San Francisco Bay Regional Water Quality Control Board (RWQCB) has provided guidance for the removal of the creosote-treated pilings; therefore, the project is not expected to conflict with wastewater treatment requirements of the RWQCB. Further, the process would be conducted in accordance with federal and state environmental protection regulations as well as RWQCB requirements. As described in the project description, wastewater would be collected off of the removed piles in containment basins on the construction barge and on land (while the piles are drying, prior to disposal). The collected water would be placed into barrels for sealing and transportation to appropriate landfills or other waste management facilities. As discussed in section 3.9.1 (a), the project designs also call for the construction contractor to further develop the SWPPP and detailed construction plans that would outline the construction BMPs and other plans for spill containment, refueling practices, and water quality monitoring during the construction phase. No impact would occur.

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

No Impact. The proposed project would not result in the demand for or construction of new water or wastewater treatment facilities or expansion of existing facilities. Water required for deconstruction work would be minimal: water would be used to fabricate the Baycrete reef structures, clean equipment; and for cooling in various engines and motors. Wastewater treatment providers would not be overloaded as a result of the project's projected demand. Therefore, no impact would occur.

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

No Impact. The proposed project would involve removing creosote-treated piles and a subsequent habitat restoration. The majority of the work would occur from barges on the San Francisco Bay, with temporary incidental parking and staging areas on the shore. No project components would create permanent impervious land that could generate additional storm water, therefore, no new storm water drainage facilities or expansion of existing facilities are required. No impact would occur.

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

No Impact. Water use for the proposed project would be minimal and can be provided from existing domestic water supplies. Mechanical devices would require a relatively small amount of water to operate, and water used for dust control would likely be less than what is typical of a commercial construction project. The project would not require new or expanded water supply resources or entitlements. No impact would occur.

e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?

No Impact. The proposed project would not result in increased demand for or the construction of new water or wastewater treatment facilities or expansion of existing facilities. As above, water required for deconstruction work and disposal of the pilings would be minimal; wastewater treatment providers would not be overloaded as a result of the Project's projected demand. No impact would occur.

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

Less than Significant Impact. Waste materials from the proposed project would include dry wooden creosote-treated pilings, residual creosote (from the drying process), remnants of concrete decking, and other demolition debris. The pilings and residual creosote would need to be disposed of at a Class 2 (non-hazardous) landfill and clean demolition debris would be disposed of at a Class 3 (inert) landfill. As described in the project description, waste from the El Campo Marina site would be transported by barge

to the Red Rock Warehouse site for drying and disposal. Project waste materials from both sites would be disposed of at Keller Canyon Landfill, the closest landfill to the Red Rock Warehouse site. As discussed in Section 3.10 – Land Use and Planning, the Keller Canyon Landfill accepts both Class 2 (non-hazardous) and Class 3 (inert) waste and has sufficient permitted capacity to accommodate the project's solid waste disposal needs. The impact would be less than significant.

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

No Impact. The creosote-piling removal and disposal process has been drafted under guidance provided by the San Francisco RWQCB and the Bay Conservation and Development Commission (BCDC) and is currently under review by those two regulatory agencies and others including the National Oceanic and Atmospheric Administration - Fisheries, the U.S. Army Corps of Engineers, and the California Department of Fish and Wildlife. The project plans and specifications include requirements for the construction contractor to comply with all permit conditions and other regulations that are relevant to solid waste collection, transportation, and disposal. Thus, all project activities would comply with applicable federal, state, and local statutes and regulations related to solid waste. No impact would occur.

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3.18 MANDATORY FINDINGS OF SIGNIFICANCE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Mandatory Findings of Significance.				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☐	☒	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; *Sundstrom v. County of Mendocino,*(1988) 202 Cal.App.3d 296; *Leonoff v. Monterey Board of Supervisors,* (1990) 222 Cal.App.3d 1337; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; *San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656..

3.18.1 DISCUSSION

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory?

Less-than-Significant Impact with Mitigation Incorporated. As described in Section 3.4 – Biological Resources, the proposed project would not adversely affect fish or wildlife habitat, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or reduce the number or restrict the range of an endangered, rare, or threatened species. The implementation of Mitigation Measures BR-1, BR-2, and WQ-1 in addition to the project designs and associated environmental protection measures, including construction best management practices (BMPs), avoidance

and minimization, seasonal avoidance, and biological monitoring during and after construction, , the minimal, brief, and localized impacts to special-status species and their habitats would be less than significant.

In the longer term, the removal of creosote-treated piles and the enhancement and establishment of three different habitat types constitute improvements to a range of species using the subtidal and intertidal habitats within and around the two project areas. Therefore, the impact would be less than significant.

The project's potential effects on historic and archaeological resources are described in Section 3.5 – Cultural Resources; no resources are known to be present within the project footprints. This finding was based upon the review of over a dozen archaeological resources assessments and a USACE (federal lead agency) determination that the proposed project would have no effect on historic properties or cultural resources. It has initiated consultation with the State Historic Preservation Officer (SHPO) and requests that the SHPO concur with that determination.. The only ground disturbance during project activities would occur in the upper layers of bay sediment and a small portion (<0.25 acre) of land that would be cleared of vegetation for construction access purposes. This area would be replanted with native vegetation following project activities. Therefore, as little chance would exist for the project to directly or indirectly destroy a unique paleontological resource, site, or geologic feature, any impact would be less than significant.

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

Less-than-Significant Impact. The proposed project involves removal of derelict creosote-treated wood piles, an existing source of pollution and navigational hazards in the subtidal and low intertidal portions at two different sites in San Francisco Bay, and the subsequent addition of three different types of habitat enhancements for Pacific herring and other fish species as well as for native Olympia oysters and other invertebrates. The upland portions of the project footprints would primarily be small areas of paved or hard-packed dirt that would be used for staging and stockpiling and drying the derelict piles. A small amount of roadside vegetation would be cleared to allow construction access to the shoreline at one of the two sites; this cleared area would be replanted with native vegetation following project activities. Finally, a section of crumbling derelict decking that remains in place over the waters of the bay would also be removed.

All impacts associated with project implementation have been identified as less than significant or no impact. These impacts are associated with construction activities and therefore temporary in nature. For example, minor construction-related noise, incremental increases in traffic and air quality emissions, as well as brief and localized increases in the turbidity of the waters of the bay would not result in substantial adverse effects to noise sensitive receptors, traffic volumes, air quality, or water quality. The operations-related and long term impacts of the project would be beneficial.

The Richmond Planning and Building Services Department, the Contra Costa County Planning Department, the Tiburon Planning and Zoning Department, and the Marin County Community Development Agency were contacted to determine whether there are any current or planned projects nearby or that would create cumulatively considerable impacts in addition to the proposed project. The Alta Robles Development, approximately 2,000 feet west of the El Campo Marina project location, was the nearest project identified through these communications. The Alta Robles Development would construct 13 single family homes on a privately owned 52 acre site. This project currently has a tentative map approved and is in the process of completing a final map. There is not a published construction timeline, so it is unknown whether it will be in construction at the same time as the proposed project.

In the event that the Alta Robles Development would be constructed at the same time as the proposed project, it is unlikely that it would contribute significantly to, or create any synergistic effect with impacts caused by project activities due to the short-term and temporary nature of the project's adverse impacts

None of the identified less-than-significant impacts would contribute to a cumulatively considerable impact when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

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

Less-than-Significant Impact. The proposed project's potential to impact human beings is addressed in various sections of this IS, including those that affect resources used or enjoyed by the public, residents, and others in the project area (such as aesthetics, public services, and recreation); those that are protective of public safety and well-being (such as air quality, geology and soils, greenhouse gas emissions, hydrology and water quality, and noise); and those that address community character and essential infrastructure (such as land use and planning, population and housing, transportation, and utilities). None of these discussions identified a potential adverse effect on human beings that could not be avoided or minimized through project design features or compliance with standard regulatory requirements. As such, project impacts to human beings would be less than significant.

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Appendix A

60% Design Set

Exhibit 3: Initial Study and Mitigated Negative Declaration

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT (2 SITES)

1. RED ROCK WAREHOUSE SITE:
2055 STENMARK DRIVE, RICHMOND, CA
CONTRA COSTA COUNTY, CALIFORNIA

2. EL CAMPO MARINA SITE:
PARADISE COVE ROAD, TIBURON, CA
MARIN COUNTY, CALIFORNIA

SITE LOCATION MAP
NTS

TIDE DATA TABLE		
NEAREST NOAA TIDE GAGE	NEAR RED ROCK WAREHOUSE: PT. SAN PEDRO GAGE, ID #9415009	NEAR EL CAMPO MARINA: PT. CHAUNCEY GAGE, ID #9415009
TIDE TYPE	ELEVATION (FT, NAVD 88 DATUM)	ELEVATION (FT, NAVD 88 DATUM)
HIGHEST PREDICTED TIDE IN 2015	6.83	7.09
MHHW	5.70	6.04
MHW	5.10	5.45
MSL	2.90	3.35
MLW	0.88	1.38
MLLW	−0.17	0.29

DATA SOURCE: NOAA WEB SITE

DRAWING INDEX	
DRAWING NUMBER	TITLE
G−1	TITLE SHEET
G−2	NOTES AND LEGEND
G−3	RED ROCK WAREHOUSE – PROJECT FOOTPRINT
G−4	EL CAMPO MARINA – PROJECT FOOTPRINT
D−1	RED ROCK WAREHOUSE STAGING AREAS AND HAULING PLAN
D−2	RED ROCK WAREHOUSE – DEMOLITION PLAN
D−3	RED ROCK WAREHOUSE – DEMOLITION SECTIONS
D−4	EL CAMPO MARINA – STAGING AREAS AND HAULING PLAN
D−5	EL CAMPO MARINA – DEMOLITION PLAN
D−6	EL CAMPO MARINA – DEMOLITION SECTIONS
D−7	DEMOLITION QUANTITIES
R−1	RED ROCK WAREHOUSE – RESTORATION PLAN
R−2	RED ROCK WAREHOUSE – RESTORATION SECTIONS
R−3	EL CAMPO MARINA – RESTORATION PLAN
R−4	EL CAMPO MARINA – RESTORATION SECTIONS
R−5	RESTORATION DETAILS – 1
R−6	RESTORATION DETAILS – 2
R−7	RESTORATION QUANTITIES
R−8	EXISTING SUBSTRATE MAPS

60% SUBMITTAL
NOT FOR CONSTRUCTION

REV. NO.	DATE	BY	DESCRIPTION

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

ENGINEER'S STAMP

DRAWN: K. Lee DATE: 9/23/15
DESIGNED: J. Hyman DATE: 9/23/15
APPROVED: D. Halsing DATE: 9/23/15

PREPARED FOR: Coastal Conservancy, 1330 BROADWAY, OAKLAND, CA 94612

PREPARED BY: AECOM, 1333 BROADWAY, SUITE 800, OAKLAND, CA 94612, PHONE: (510) 893-3600, FAX: (510) 874-3268

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

TITLE SHEET

PROJ. NO. 60390453
SHT. 1 OF 19 SHTS.
DWG. NO. G−1

Sep 23, 2015 - 2:46pm
\\1575SR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\G-1.dwg

LEGEND

LINETYPES

- PROPERTY LINE
- PROJECT FOOTPRINT
- 10 — EXISTING CONTOUR WITH ELEVATION IN FT, NAVD88
- PROPOSED FENCE
- TOP OF SLOPE
- BAY FLOOR

SYMBOLS

DETAIL — 4 / 14 13
- DETAIL IDENTIFICATION NUMBER
- SHEET NUMBER ON WHICH DETAIL IS DRAWN
- SHEET NUMBER(S) FROM WHICH DETAIL IS TAKEN

CROSS-SECTION — 1 / 14 13
- CROSS SECTION IDENTIFICATION NUMBER
- SHEET NUMBER ON WHICH CROSS SECTION IS DRAWN
- SHEET NUMBER(S) FROM WHICH CROSS SECTION IS TAKEN

A-01 — DEMOLITION AREA

NORTH ARROW

× 6.01 — EXISTING SPOT ELEVATION

ABBREVIATIONS

APPROX.	APPROXIMATE	MLLW	MEAN LOWER LOW WATER
℄	CENTERLINE	MLW	MEAN LOW WATER
CMP	CORRUGATED METAL PIPE	MSL	MEAN SEA LEVEL
CONC	CONCRETE	MON.	MONUMENT
CSP	CORRUGATED STEEL PIPE	N	NORTHING
E	EASTING	NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
EL.	ELEVATION	PVC	POLYVINYL CHLORIDE
EG	EXISTING GRADE	RCP	REINFORCED CONCRETE PIPE
EX	EXISTING	RIM	RIM ELEVATION
FT	FEET	SQM	SQUARE METER
HDPE	HIGH-DENSITY POLYETHYLENE	STD	STANDARD
INV	INVERT	TEMP	TEMPORARY
MHHW	MEAN HIGHER HIGH WATER	TYP	TYPICAL
MHW	MEAN HIGH WATER	W	WATER

GENERAL NOTES

1. PROJECT COORDINATE SYSTEM: NAD83 STATE PLANE CA ZONE 3, FEET, VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
2. BATHYMETRY SOURCE: SIDESCAN SONAR DATA COLLECTED BY MERKEL AND ASSOCIATES ON OCTOBER 16, 2014. LAND TOPOGRAPHY SOURCE: 2010 SAN FRANCISCO LiDAR PROVIDED BY THE NOAA OFFICE FOR COASTAL MANAGEMENT, CA OCEAN PROTECTION COUNCIL. THE LiDAR IS NAD83 STATE PLANE CA ZONE III FEET, NAVD88 FEET.
3. AERIAL PHOTOGRAPHS: USGS HIGH RESOLUTION STATE ORTHOIMAGERY FOR CONTRA COSTA COUNTY, CALIFORNIA, 2008. OBTAINED FROM THE NATIONAL MAP VIEWER: HTTP://VIEWER.NATIONALMAP.GOV/VIEWER/ IN AUGUST 2014. ORIGINALLY COLLECTED AS A REGIONAL EFFORT IN 2008 BY CONTRA COSTA COUNTY DEPARTMENT OF INFORMATION TECHNOLOGY.
4. ALL CONSTRUCTION AND CONSTRUCTION MATERIAL SHALL BE IN ACCORDANCE WITH THESE PLANS AND THE CITY OF RICHMOND STANDARD DRAWINGS AND SPECIFICATIONS.
5. UNDERGROUND FACILITIES AND SUBSTRUCTURES SHOWN HEREON WERE OBTAINED FROM THE BEST AVAILABLE SOURCES. HOWEVER, SINCE SOME INFORMATION WAS OBTAINED FROM OTHERS, AECOM CANNOT GUARANTEE SAID INFORMATION AS BEING ACCURATE. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE DEPTH AND LOCATION OF ALL EXISTING UTILITIES, EQUIPMENT AND SUBSTRUCTURES. IN THE EVENT OF DAMAGE TO EXISTING UTILITIES, EQUIPMENT, OR SUBSTRUCTURES, THE CONTRACTOR SHALL PERFORM ALL REPAIRS AT CONTRACTOR'S EXPENSE.
6. UPON LEARNING OF THE EXISTENCE AND/OR LOCATIONS OF ANY UNDERGROUND FACILITIES NOT SHOWN OR SHOWN INACCURATELY ON THE PLANS OR NOT PROPERLY MARKED BY THE UTILITY OWNER, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER, THE UTILITY OWNER, AND THE CITY OF RICHMOND BY TELEPHONE AND IN WRITING.
7. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE KNOWLEDGABLE ABOUT AND OBEY ALL PERMIT REQUIREMENTS WHILE PERFORMING THE WORK SHOWN ON THESE PLANS.
8. THE CONTRACTOR SHALL PRACTICE SAFETY AT ALL TIMES AND SHALL FURNISH, ERECT, AND MAINTAIN SUCH FENCES, BARRICADES, LIGHTS AND SIGNS NECESSARY TO GIVE ADEQUATE PROTECTION TO THE PUBLIC AT ALL TIMES.
9. THE CONTRACTOR SHALL HAVE COPIES OF THE APPROVED PLANS AND SPECIFICATIONS FOR THIS PROJECT ON THE SITE AT ALL TIMES, AND CONTRACTOR SHALL BE FAMILIAR WITH ALL APPLICABLE STANDARDS AND SPECIFICATIONS.

DEMOLITION NOTES

1. FEW, IF ANY, AS-BUILT PLANS OF THE EXISTING STRUCTURES ARE AVAILABLE. PRIOR TO COMMENCING DEMOLITION WORK, CONTRACTOR SHALL VERIFY ALL DIMENSIONS, QUANTITIES, STRUCTURE SIZE, PILE LOCATIONS AND EXISTING CONDITIONS AND DOCUMENT EXISTING CONDITIONS IN THE DEMOLITION AND BAY FLOOR REMOVAL PLAN, PER SPEC SECTION 02220 – DEMOLITION. ANY OMISSIONS AND DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.
2. ALL EXISTING DECK FIXTURES, STRUCTURES, MISCELLANEOUS REMNANTS AND BAYFLOOR DEBRIS WITHIN THE PROJECT AREA SHALL BE REMOVED UNLESS OTHERWISE NOTED FOR ITEMS NOT LISTED IN THE PLANS REFER TO THE SPECIFICATIONS.
3. DEMOLITION WORK ACTIVITIES MAY BE CONDUCTED FROM ON SHORE (AT RED ROCK WAREHOUSE ONLY) OR FROM VESSELS ANCHORED OFFSHORE, AND AT THE CONTRACTOR'S OFF-SITE SHORE BASE AND ASSOCIATED FACILITIES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE TYPE(S) OF EQUIPMENT, METHODS AND SEQUENCES THAT CAN BE USED TO EXECUTE THE WORK. CONTRACTOR'S EQUIPMENT SHALL COMPLY WITH ALL APPLICABLE REGULATIONS.
4. EXISTING STRUCTURES ARE IN DETERIORATED CONDITIONS. CONTRACTOR SHALL DETERMINE ANY SAFE LOADING CONDITION RESTRICTIONS APPLICABLE TO DEMOLITION ACTIVITIES BEFORE ALLOWING ANY EQUIPMENT OR PERSONNEL TO BE ON ANY STRUCTURES.
5. BEFORE PROCEEDING WITH ANY DEMOLITION WORK, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER, FOR REVIEW, A DETAILED WORK PLAN, AS REQUIRED IN THE SPECIFICATIONS, INCLUDING THE SEQUENCING, TIMING METHODS, EQUIPMENT AND LOGISTIC OF OPERATIONS.
6. REMOVAL AND DEMOLITION WORK SHALL BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS AS WELL AS CORRESPONDING PERMIT REQUIREMENTS.
7. LARGE PIECES OF STRUCTURES TO BE REMOVED SHALL HAVE TAG LINES ATTACHED TO FACILITATE RECOVERY IN THE EVENT THAT THE PIECE OF STRUCTURE IS DROPPED INTO THE WATER.
8. DURING PILE REMOVAL AND DEMOLITION, CONTRACTOR SHALL USE BEST MANAGEMENT PRACTICES IN ACCORDANCE WITH THE SPECIFICATIONS AND CORRESPONDING PERMIT REQUIREMENTS.
9. NO DEBRIS SHALL BE ALLOWED TO REMAIN IN THE WATER DURING DEMOLITION OPERATIONS. THE CONTRACTOR SHALL PROVIDE A TEMPORARY PLATFORM OR OTHER SUITABLE MEANS OF CAPTURING DEBRIS FROM THE DEMOLITION OPERATIONS. ALL DEMOLITION DEBRIS SHALL BE CONTAINED AND REMOVED FROM THE SITE PER THE CONTRACT DOCUMENTS.
10. CONCRETE SLABS AND CONCRETE DEBRIS ALONG SHORELINE SHALL REMAIN IN PLACE TO AVOID DESTABILIZING EMBANKMENT. ALL OTHER MISCELLANEOUS TIMBER AND METAL DEBRIS ALONG SHORELINE SHALL BE REMOVED AND DISPOSED UNLESS NOTED OTHERWISE.
11. DEMOLITION MATERIALS SHALL BE RECYCLED AT A PERMITTED FACILITY OR DISPOSED OF IN A PERMITTED LANDFILL IN ACCORDANCE WITH THE SPECIFICATIONS.
12. CONTRACTOR SHALL USE APPROVED STAGING AREAS ONLY. CONTRACTOR SHALL NOT BLOCK ACCESS TO ADJACENT PROPERTIES OR TRAFFIC.
13. HAZARDOUS MATERIALS ARE NOT ANTICIPATED IN THE DEMOLITION AREAS AT THE PROJECT SITES. THE CONTRACTOR SHALL STOP WORK IMMEDIATELY AND NOTIFY THE ENGINEER IF SUSPECTED HAZARDOUS MATERIALS ARE ENCOUNTERED.
14. UPON COMPLETION OF THE REMOVAL/DEMOLITION ACTIVITIES, CONTRACTOR SHALL PERFORM A DIVER SURVEY WITHIN THE PROJECT AREA. THE SURVEY SHALL DOCUMENT THE CONDITION OF THE BAY FLOOR AND IDENTIFY DEBRIS FROM PREVIOUS OPERATIONS AND/OR FROM THE DEMOLITION ACTIVITIES. IDENTIFIED DEBRIS SHALL BE REMOVED FROM THE BAY FLOOR AND DISPOSED OF OR RECYCLED AS APPROPRIATE IN ACCORDANCE WITH THE SPECIFICATIONS. IDENTIFIED PILE STUBS SHALL BE CUT OFF AT 2 FT MIN BELOW MUDLINE.

RESTORATION NOTES

1. WHERE EELGRASS CANNOT BE PLANTED DUE TO POOR SUBSTRATE, THE OWNER WILL IDENTIFY A NEW SITE FOR PLANTING IN THE SAME AREA SO QUANTITIES WILL NOT CHANGE.

Underground Service Alert of Northern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

60% SUBMITTAL
NOT FOR CONSTRUCTION

REV. NO.	DATE	BY	DESCRIPTION

VERIFY SCALES
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ENGINEER'S STAMP

DRAWN: K. Lee DATE: 9/23/15
DESIGNED: J. Hyman DATE: 9/23/15
APPROVED: D. Halsing DATE: 9/23/15

PREPARED FOR: Coastal Conservancy, 1330 BROADWAY, OAKLAND, CA 94612

PREPARED BY: AECOM, 1333 BROADWAY, SUITE 800, OAKLAND, CA 94612, PHONE: (510) 893-3600, FAX: (510) 874-3268

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

NOTES & LEGEND

PROJ. NO. 60390453
SHT. 2 OF 19 SHTS.
DWG. NO. G-2

Sep 23, 2015 - 2:47pm
\\157SSR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\G-2.dwg

LEGEND

EXISTING EELGRASS AREA

ABANDONED SHIP

PLAN
SCALE: 1"=40'

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REV. NO.	DATE	BY	DESCRIPTION

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

RED ROCK WAREHOUSE - PROJECT FOOTPRINT

PROJ. NO. 60390453
SHT. 3 OF 19 SHTS.
DWG. NO. G-3

Sep 23, 2015 - 2:36pm
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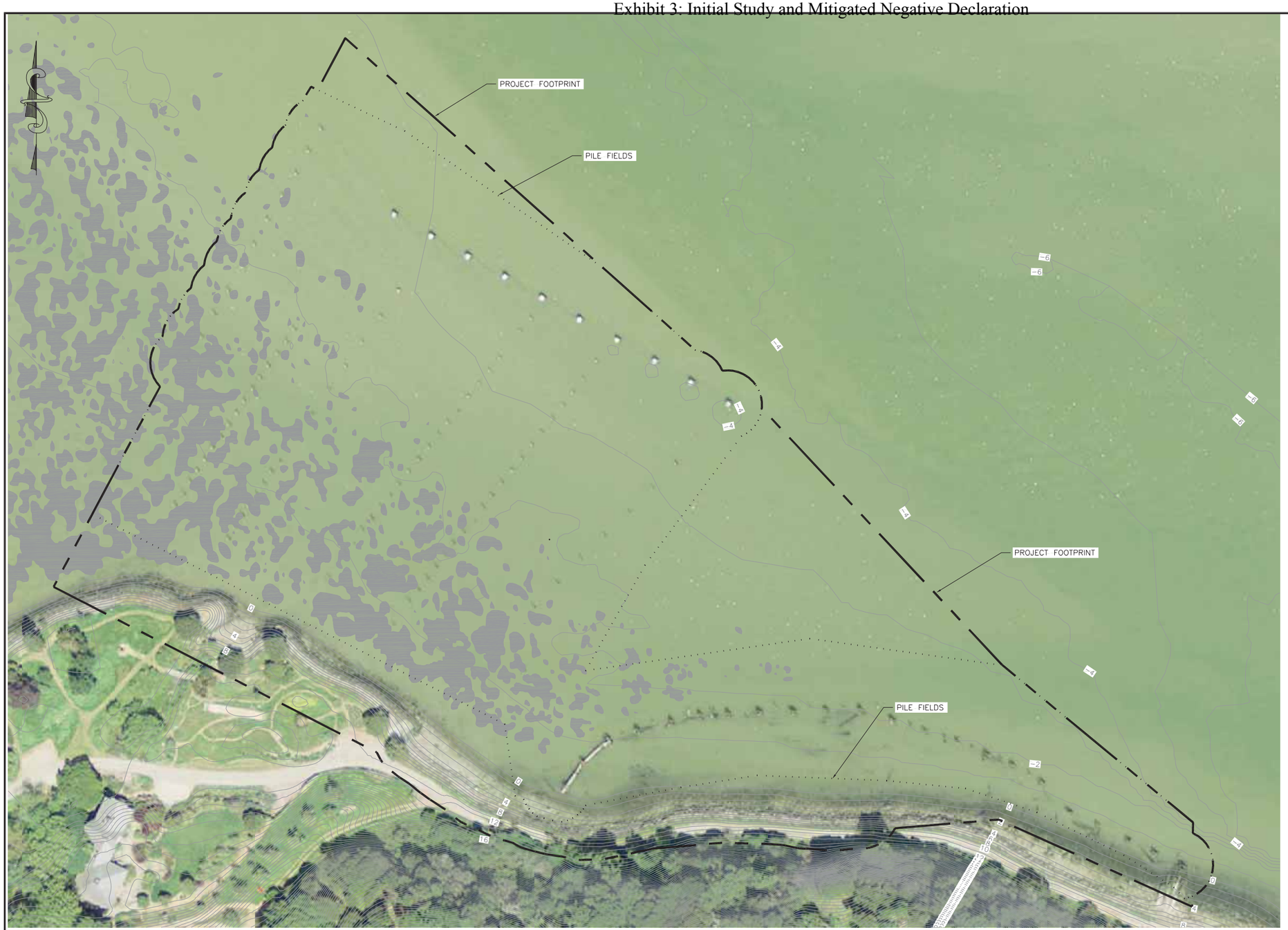

LEGEND

EXISTING EELGRASS AREA

PLAN
SCALE: 1"=50'

60% SUBMITTAL
NOT FOR CONSTRUCTION

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

EL CAMPO MARINA - PROJECT FOOTPRINT

PROJ. NO. 60390453
SHT. 4 OF 19 SHTS.
DWG. NO. G-4

Sep 23, 2015 - 2:31pm
\\1575SR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\G-4.dwg

PLAN
SCALE: 1"=100'

NOTES

1. STENMARK DRIVE IS THE SOLE ROAD FOR INGRESS/EGRESS.
2. THE PROJECT AREA ON LAND AND WATER IS OWNED BY THE CITY OF RICHMOND. STAGING AREAS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL EXECUTE TEMPORARY CONSTRUCTION EASEMENT WITH THE CITY SPECIFYING STAGING AREAS AND DESCRIBING ACCESS IN AND AROUND ACTIVE SITE CLEANUPS AND AREAS OF KNOWN CONTAMINATION.
3. ALL LAND IN THIS DRAWING OWNED BY THE CITY OF RICHMOND EXCEPT ONE TANK SITE OWNED BY EBMUD.
4. THERE ARE TWO KNOWN OSPREY NESTS AT THE SITE. SEE PERMIT REQUIREMENTS FOR WORKING NEAR THEM.

LEGEND

- FORMER FUEL STORAGE AREA OR AREA OF KNOWN SUBSURFACE CONTAMINATION
- POTENTIAL STAGING AREAS
- EELGRASS AREA
- SITE ACCESS/HAULING ROUTE

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REV. NO.	DATE	BY	DESCRIPTION

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

RED ROCK WAREHOUSE STAGING AREAS & HAULING PLAN

PROJ. NO. 60390453
SHT. 5 OF 19 SHTS.
DWG. NO. D-1

Sep 23, 2015 - 2:23pm
\\1575SR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\D-1.dwg

PLAN
SCALE: 1"=50'

NOTES

1. STENMARK DRIVE IS THE SOLE ROAD FOR INGRESS/EGRESS.
2. CONTRACTOR SHALL DEMO AND REMOVE ALL STRUCTURES BELOW MHHW IN AREA A-01. SEE ESTIMATED QUANTITIES, SHEET D-7.
3. DO NOT DEMO CONCRETE STRUCTURES ON LAND.
4. CLEAR AND GRUB VEGETATED AREA BETWEEN WORK AREA AND STENMARK DRIVE AS NECESSARY FOR DEMOLITION IN ACCORDANCE WITH SECTION 02110 – SITE PREPARATION. RESTORE CLEARED AREAS IN ACCORDANCE WITH SECTION 02950 – SITE RESTORATION.
5. THE FOLLOWING DESCRIBES THE SUBMERGED DEBRIS ACCORDING TO MERKEL & ASSOCIATES WHO CONDUCTED A SIDESCAN SONAR SURVEY OF THE SITE IN 2014: "IN THE CENTRAL CORE OF THE WAREHOUSE, TIMBER AND WAREHOUSE DEBRIS COVER APPROXIMATELY 10,360 SQUARE FEET OF THE BAY BOTTOM WHERE THE WAREHOUSE FLOOR COLLAPSED INTO THE WATER. APPROXIMATELY, 16 TO 26 BROKEN, SUBMERGED PILE BUTTS WERE NOTED WITHIN THE ORIGINAL FOOTPRINT OF THE LARGER WAREHOUSES COMPLEX AND OUTSIDE OF THE WAREHOUSE DEBRIS FIELD. OTHER DEBRIS AT THIS SITE INCLUDES A LARGE STEEL LATTICE STRUCTURE IN THE CENTER OF THE WAREHOUSE SITE AND A SUBMERGED VESSEL HULL AT THE NORTHEASTERN MARGIN OF THE PILE FIELD."

LEGEND

- STAGING AREA
- EELGRASS AREA
- ABANDONED SHIP

60% SUBMITTAL
NOT FOR CONSTRUCTION

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

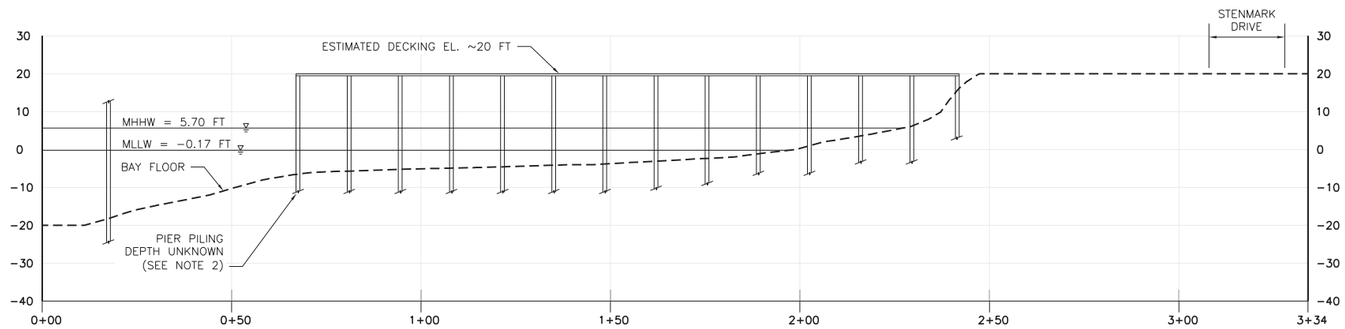
RED ROCK WAREHOUSE - DEMOLITION PLAN

PROJ. NO. 60390453
SHT. 6 OF 19 SHTS.
DWG. NO. D-2

Sep 23, 2015 - 2:54pm
\\1575SR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\D-2.dwg

NOTES

1. PILING QUANTITY SHOWN IS NOT MEANT TO BE REPRESENTATIVE AND VARIES ACROSS THE WHARF. EXACT PILING QUANTITY TO BE DETERMINED IN THE FIELD. ESTIMATES ARE PROVIDED IN DRAWING D-5.
2. WHARF ELEVATIONS ARE ESTIMATED FROM LIDAR DATA. PILING DEPTHS ARE UNKNOWN. REMOVE PILES TO 2-FT BELOW THE MUD LINE PER SPEC SECTION 02220 - DEMOLITION.



SECTION A (D2 | D3)
SCALE: 1"=20'

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REV. NO.	DATE	BY	DESCRIPTION

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

RED ROCK WAREHOUSE - DEMOLITION SECTIONS

PROJ. NO. 60390453
SHT. 7 OF 19 SHTS.
DWG. NO. D-3

Sep 23, 2015 - 3:04pm
\\1575SR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\D-3.dwg

PLAN
SCALE: 1"=50'

NOTES

1. DEMO ALL STRUCTURES BELOW MHHW. SEE ESTIMATED QUANTITIES, SHEET D-7.
2. ALL WORK WILL BE PERFORMED FROM THE WATER. NO LAND ACCESS IS CURRENTLY AVAILABLE.
3. THE RED ROCK WAREHOUSE SITE MAY BE USED FOR STAGING IF THE PROJECTS ARE PERFORMED CONCURRENTLY.

LEGEND

EELGRASS AREA

APPROXIMATE LOCATION OF PILING NOT VISIBLE IN AERIAL PHOTO

60% SUBMITTAL
NOT FOR CONSTRUCTION

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

EL CAMPO MARINA - STAGING AREAS AND HAULING PLAN

PROJ. NO. 60390453
SHT. 8 OF 19 SHTS.
DWG. NO. D-4

Sep 23, 2015 - 2:14pm
\\1575SR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\D-4.dwg

PLAN
SCALE: 1"=50'

NOTES

1. DEMO ALL STRUCTURES BELOW MHHW. SEE ESTIMATED QUANTITIES, SHEET D-7.
2. ALL WORK SHALL BE DONE FROM WATER UNLESS CONTRACTOR MAKES LEGAL ARRANGEMENTS WITH PROPERTY OWNERS.
3. THE FOLLOWING DESCRIBES THE DOLPHINS AND SUBMERGED PILES ACCORDING TO MERKEL & ASSOCIATES WHO CONDUCTED A SIDESCAN SONAR SURVEY OF THE SITE IN 2014: "ALONG THE NORTHEASTERN EDGE OF THE SITE, PILES ARE CABLED TOGETHER WITH A DIVISION BETWEEN PILES THAT SUGGEST THAT BREAKWATER PANELS OF SOME TYPE WERE HELD IN PLACE BY THIS LINE OF PILE DOLPHINS. A SIMILAR ARRANGEMENT OF PILE DOLPHINS EXTENDS TO THE SOUTH ALONG THE SHORELINE IN WHAT APPEARS TO HAVE BEEN A BUTTRESS STRUCTURE THAT RETAINS MANY HORIZONTAL TIMBERS AND VERTICAL PILES, BOTH OF WHICH APPEAR TO BE CREOSOTE-TREATED. BETWEEN THESE PILE DOLPHINS THERE ARE VERTICAL RUSTED I-BEAM PILES THAT ALSO SUGGEST THAT A BUTTRESS WALL HISTORICALLY EXISTED AT THIS LOCATION. SUBTIDALLY, THERE ARE NUMEROUS PILES AMASSED IN A PARALLEL ALIGNMENT TO THE VERTICAL PILE DOLPHIN ARRANGEMENT. THE HORIZONTAL SUBTIDAL PILES INCLUDE CONCRETE-WRAPPED AND UNWRAPPED PILES WITH A FEW PILES BEING VISIBLE ON THE SHORELINE. THE PILES SCATTERED ALONG THE BASE OF THE SHORELINE DOLPHIN ALIGNMENT ARE NOT VISIBLE FROM THE SURFACE AND ADD SIGNIFICANTLY TO THE PREVIOUSLY ESTIMATED 250 PILES AT THIS SITE. HOWEVER, THE RELATIVE PROPORTION OF THESE PILES THAT ARE CONCRETE-WRAPPED AND UNWRAPPED AND THE TOTAL NUMBER ARE NOT KNOWN AT THIS TIME BECAUSE THEY ARE PILED ON TOP OF EACH OTHER. THERE ARE AT LEAST 65 PILES THAT WERE NOTED IN THE INTERFEROMETRIC SIDESCAN RECORD, AND THERE ARE LIKELY MORE THAT WERE NOT DETECTABLE BELOW THE FIRST BROKEN PILE LAYERS."

LEGEND

EELGRASS AREA

APPROXIMATE LOCATION OF PILING NOT VISIBLE IN AERIAL PHOTO

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

EL CAMPO MARINA - DEMOLITION PLAN

PROJ. NO. 60390453
SHT. 9 OF 19 SHTS.
DWG. NO. D-5

Sep 23, 2015 - 2:16pm
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NOTES

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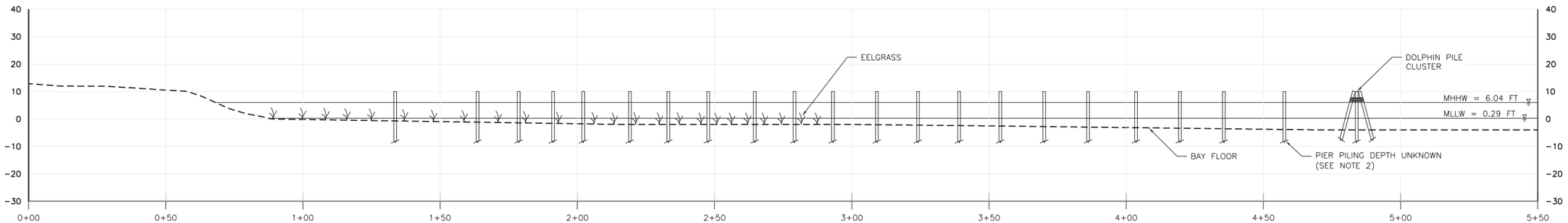
2. TOP OF PILING ELEVATIONS ARE ESTIMATED. PILING DEPTHS ARE UNKNOWN. REMOVE PILES TO 2-FT BELOW THE MUD LINE PER SPEC SECTION 02220 - DEMOLITION.



SECTION B (D5 | D6)
SCALE: 1"=20'

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

EL CAMPO MARINA - DEMOLITION SECTIONS

PROJ. NO. 60390453
SHT. 10 OF 19 SHTS.
DWG. NO. D-6

Sep 23, 2015 - 3:04pm
\\157SSR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\D-6.dwg

TABLE 1 DEMOLITION SUMMARY RED ROCK WAREHOUSE			
AREA ID	DESCRIPTION	ESTIMATED QTY.	UNITS
A-01	PILING REMOVAL	350	EA
A-01	DECKING REMOVAL	2,500	SF
A-01	REMOVAL OF DECKING ON BAY FLOOR (ALLOWANCE)	40	HR
A-01	CUTTING BROKEN PILES BY DIVERS (ALLOWANCE)	80	HR

TABLE 2 DEMOLITION SUMMARY EL CAMPO MARINA			
AREA ID	DESCRIPTION	ESTIMATED QTY.	UNITS
B-01	REMOVAL OF DECKING ON BAY FLOOR (ALLOWANCE) CUTTING OF BROKEN PILES BELOW THE MUDLINE BY DIVERS (ALLOWANCE)	40 40	HR HR
B-01	PILING REMOVAL	90	EA
B-02	PILING REMOVAL, DOLPHIN PILE CLUSTERS	50	EA
B-03	PILING REMOVAL, DOLPHIN PILE CLUSTERS PILING REMOVAL, HORIZONTAL SUBMERGED PILES	110 65	EA EA

NOTES

1. THE CONTRACTOR SHALL VERIFY ALL COORDINATES, QUANTITIES AND CHARACTERISTICS PRIOR TO START OF WORK.
2. PRIOR TO REMOVAL, CONTRACTOR'S REMOVAL APPROACH AND REMOVAL DETAILS SHALL BE OUTLINED IN THE DEMOLITION AND BAY FLOOR DEBRIS REMOVAL PLAN.
3. ALL DEBRIS WITHIN THE PROJECT AREA SHALL BE REMOVED AND DISPOSED PER THE CONTRACT DOCUMENTS. PILES NOT SHOWN ON DRAWINGS ENCOUNTERED DURING OPERATIONS SHALL BE REMOVED AND DISPOSED UNLESS OTHERWISE NOTED. OTHER ITEMS NOT SHOWN ON DRAWINGS OR MENTIONED IN THE SPECIFICATIONS WHICH ARE ENCOUNTERED DURING CONTRACTORS OPERATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER. THE ENGINEER WILL DETERMINE THE DISPOSITION OF THE ITEM.
4. ALL PILES SHALL BE REMOVED TO 2-FT BELOW THE MUDLINE. SEE SPECIFICATION SECTION 02200 – DEMOLITION FOR DETAILS.

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

DEMOLITION QUANTITIES

PROJ. NO. 60390453
SHT. 11 OF 19 SHTS.
DWG. NO. D-7

Sep 23, 2015 - 3:05pm
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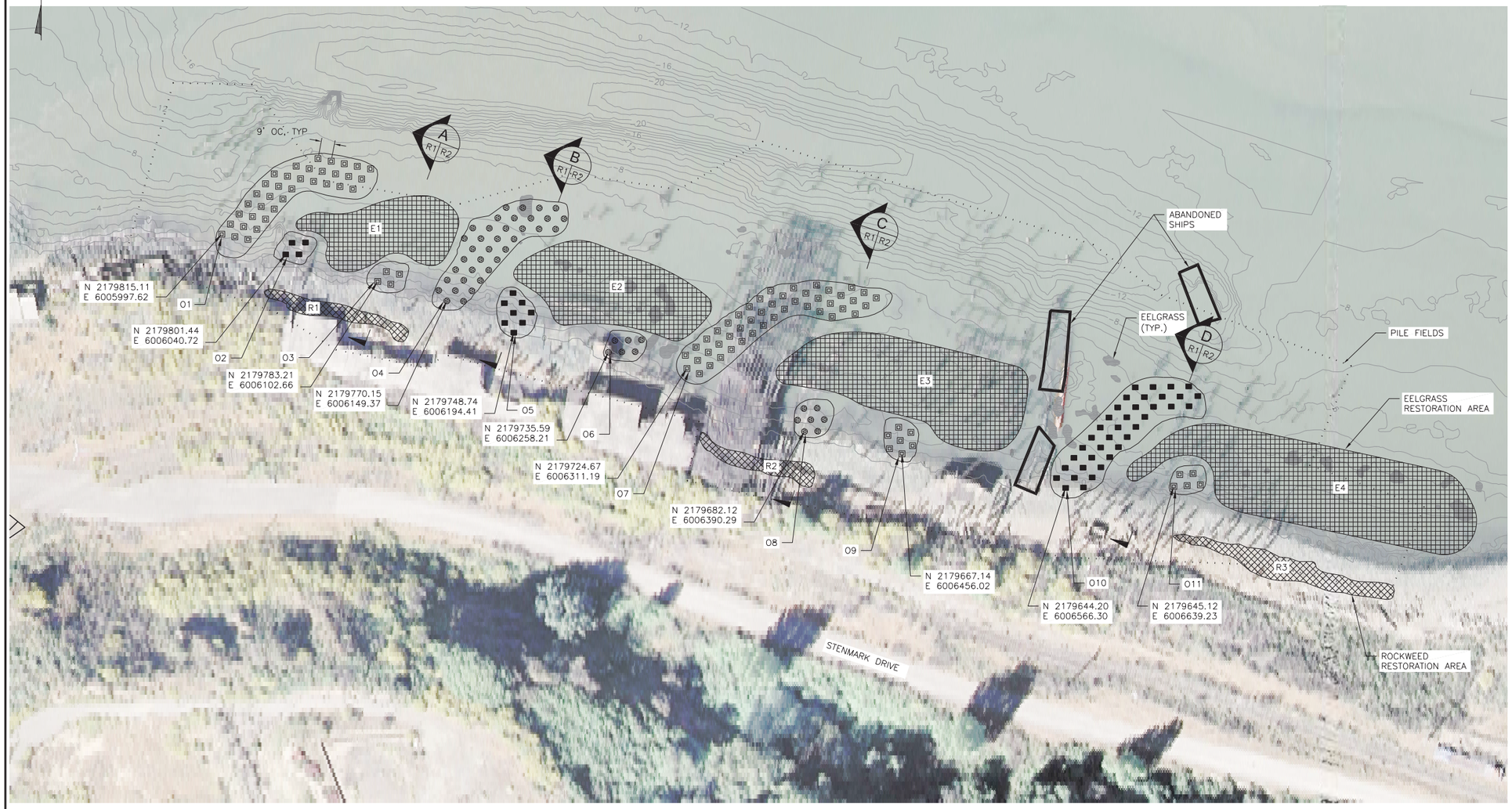

PLAN
SCALE: 1"=40'

NOTES

1. SEE ESTIMATED QUANTITIES SHEET R-7.
2. SEE RESTORATION DETAILS ON SHEETS R-5 AND R-6.
3. STENMARK DRIVE IS THE SOLE ROAD FOR INGRESS/EGRESS.
4. MAINTAIN MINIMUM 20-FT BETWEEN REEF STRUCTURES AND EXISTING AND PLANTED EELGRASS AREAS.
5. SMALL CLUSTERS OF REEF STRUCTURES ARE INTENDED TO BE PLACED OVER CONCRETE RUBBLE AREAS WHERE EELGRASS MAY NOT BE PLANTED.
6. CONFIRM COORDINATES AND BAY FLOOR ELEVATIONS AT FIRST OYSTER REEF ELEMENT WITH COORDINATES PROVIDED. CONFIRM LOCATION AND BAY FLOOR ELEVATION WITH OWNER WITH GPS OR SURVEY PRIOR TO PLACING REEF ELEMENTS AT 9-FT SPACING.

LEGEND

- EXISTING EELGRASS AREA
- ABANDONED SHIP
- EELGRASS RESTORATION AREAS
- ROCKWEED RESTORATION AREAS
- REEF BALL
- REEF BLOCK STACK
- SHELL BAG MOUND

REEF PLACEMENT TABLE

AREA ID	FIRST REEF ELEMENT COORDINATES	
O1	N 2179815.11	E 6005997.62
O2	N 2179801.44	E 6006040.72
O3	N 2179783.21	E 6006102.66
O4	N 2179770.15	E 6006149.37
O5	N 2179748.74	E 6006194.41
O6	N 2179735.59	E 6006258.21
O7	N 2179724.67	E 6006311.19
O8	N 2179682.12	E 6006390.29
O9	N 2179667.14	E 6006456.02
O10	N 2179644.20	E 6006566.30
O11	N 2179645.12	E 6006639.23

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

RED ROCK WAREHOUSE - RESTORATION PLAN

PROJ. NO. 60390453
SHT. 12 OF 19 SHTS.
DWG. NO. R-1

Sep 23, 2015 - 9:44am
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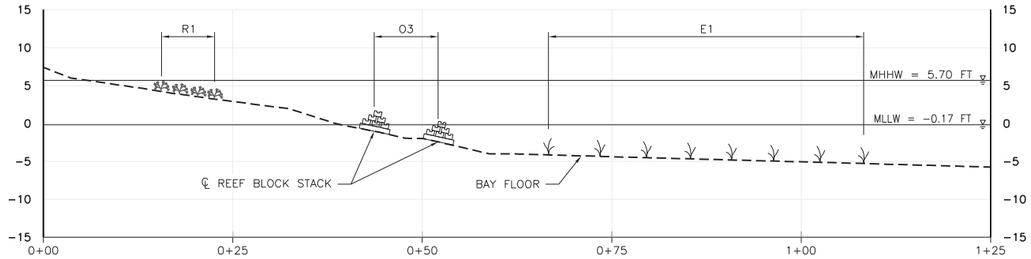

SECTION A (R1 | R2)
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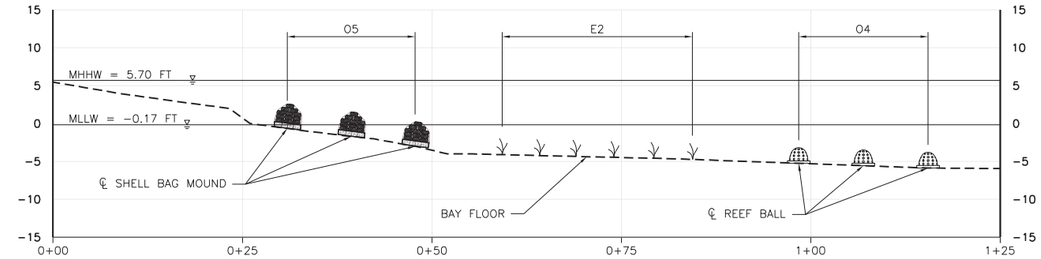
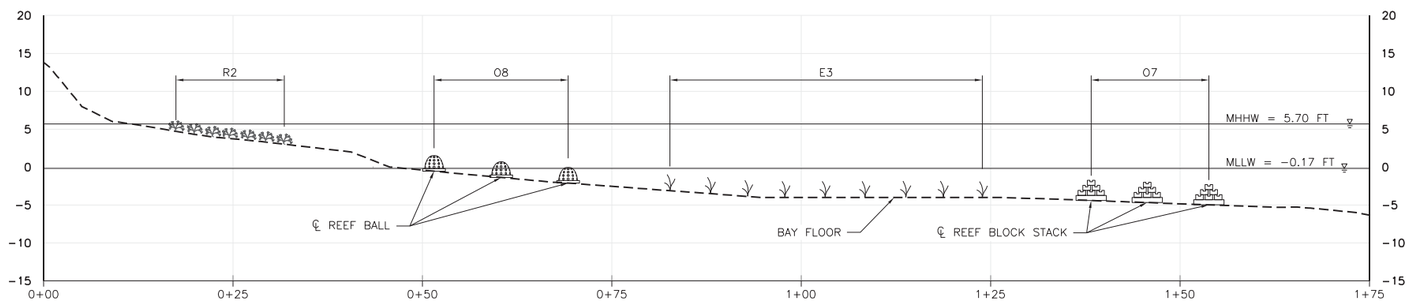
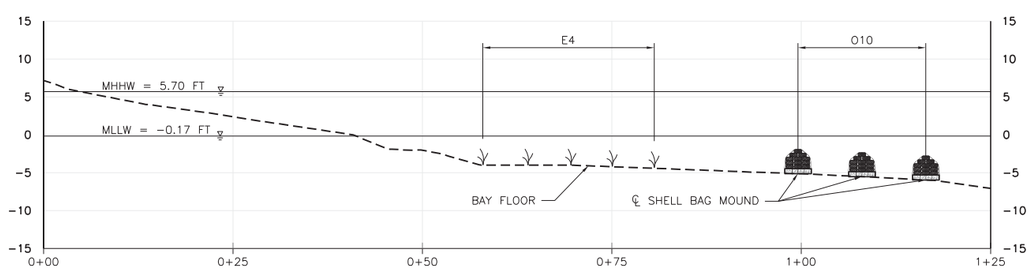


SECTION B (R1 | R2)
SCALE: 1"=10'



SECTION C (R1 | R2)
SCALE: 1"=10'



SECTION D (R1 | R2)
SCALE: 1"=10'

LEGEND

- REEF BALL
- REEF BLOCK STACK
- SHELL BAG MOUND
- EELGRASS
- ROCKWEED

NOTES

1. SEE ESTIMATED QUANTITIES, SHEET R-7.
2. SEE RESTORATION DETAILS ON SHEETS R-5 AND R-6.

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DRAWN: K. Lee DATE: 9/23/15
DESIGNED: J. Hyman DATE: 9/23/15
APPROVED: D. Halsing DATE: 9/23/15

PREPARED FOR: Coastal Conservancy, 1330 BROADWAY, OAKLAND, CA 94612

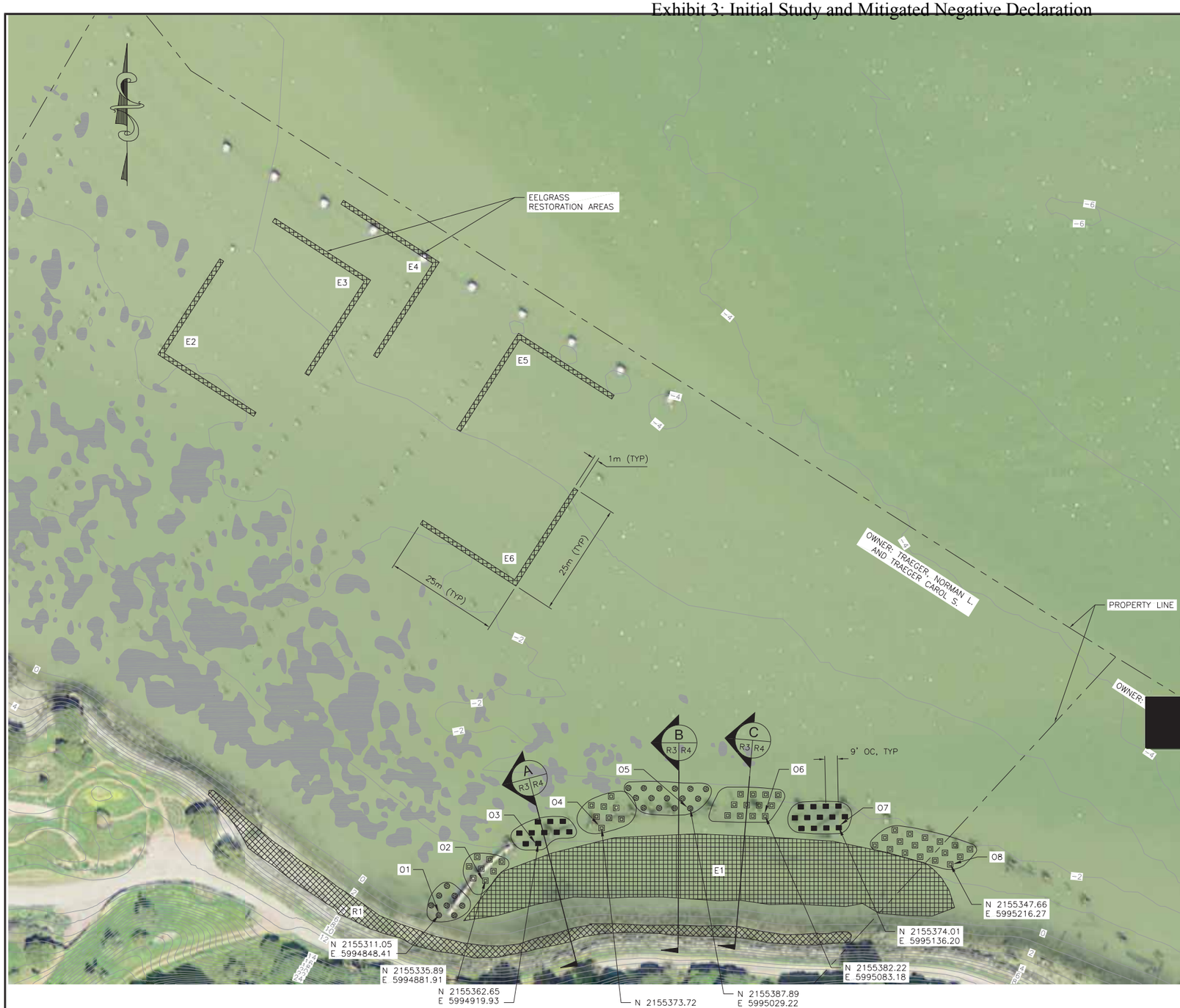
PREPARED BY: AECOM, 1333 BROADWAY, SUITE 800, OAKLAND, CA 94612, PHONE: (510) 893-3600, FAX: (510) 874-3268

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

RED ROCK WAREHOUSE - RESTORATION SECTIONS

PROJ. NO. 60390453
SHT. 13 OF 19 SHTS.
DWG. NO. R-2

Sep 23, 2015 - 11:16am
\\1575SR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\R-2.dwg



PLAN
SCALE: 1"=40'

NOTES

1. SEE ESTIMATED QUANTITIES, SHEET R-7.
2. ALL WORK SHALL BE DONE FROM WATER UNLESS CONTRACTOR MAKES LEGAL ARRANGEMENTS WITH PROPERTY OWNERS.
3. SEE RESTORATION DETAILS ON SHEETS R-5 AND R-6.
4. CONFIRM COORDINATES AND BAY FLOOR ELEVATIONS AT FIRST OYSTER REEF ELEMENT WITH COORDINATES PROVIDED. CONFIRM LOCATION AND BAY FLOOR ELEVATION WITH OWNER WITH GPS OR SURVEY PRIOR TO PLACING REEF ELEMENTS AT 9-FT SPACING.

LEGEND

- EXISTING EELGRASS AREA
- ABANDONED SHIP
- EELGRASS RESTORATION AREAS
- ROCKWEED RESTORATION AREAS
- REEF STRUCTURE (STYLE 1)
- REEF STRUCTURE (STYLE 2)
- REEF STRUCTURE (STYLE 3)

REEF PLACEMENT TABLE

AREA ID	FIRST REEF ELEMENT COORDINATES	
01	N 2155311.05	E 5994848.41
02	N 2155335.89	E 5994881.91
03	N 2155362.65	E 5994919.93
04	N 2155373.72	E 5994965.53
05	N 2155387.89	E 5995029.22
06	N 2155382.22	E 5995083.18
07	N 2155374.01	E 5995136.20
08	N 2155347.66	E 5995216.27

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NOT FOR CONSTRUCTION

REV. NO.	DATE	BY	DESCRIPTION

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PREPARED BY: AECOM, 1333 BROADWAY, SUITE 800, OAKLAND, CA 94612, PHONE: (510) 893-3600, FAX: (510) 874-3268

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

EL CAMPO MARINA - RESTORATION PLAN

PROJ. NO. 60390453
SHT. 14 OF 19 SHTS.
DWG. NO. R-3

Sep 23, 2015 - 1:25pm
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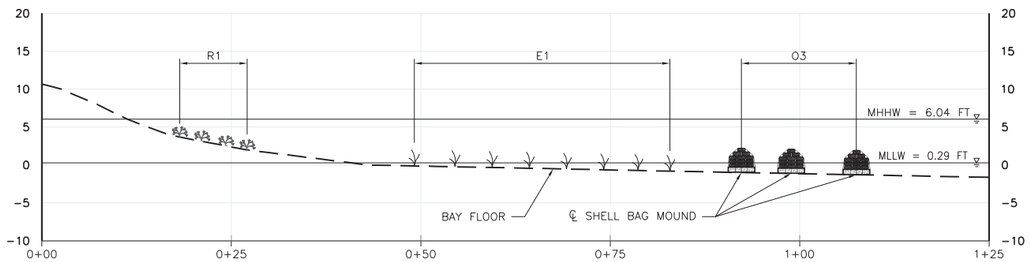
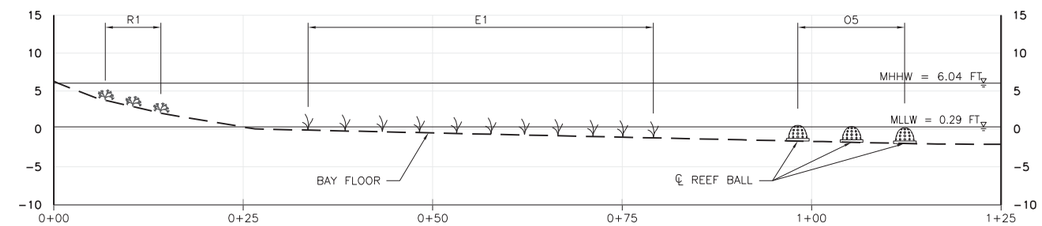


SECTION A (R3 | R4)
SCALE: 1"=10'



SECTION B (R3 | R4)
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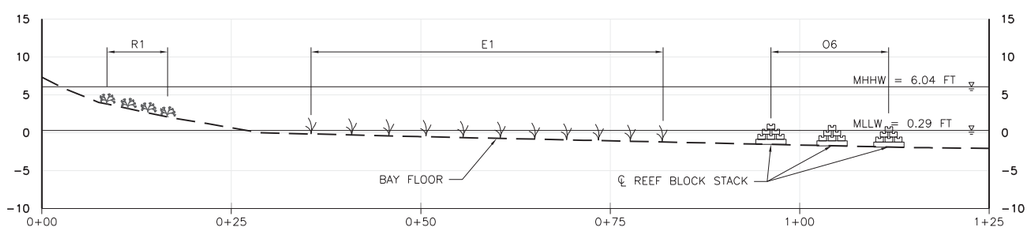

SECTION C (R3 | R4)
SCALE: 1"=10'

LEGEND

- REEF BALL
- REEF BLOCK STACK
- SHELL BAG MOUND
- EELGRASS
- ROCKWEED

NOTES

1. SEE ESTIMATED QUANTITIES, SHEET R-7.
2. SEE RESTORATION DETAILS ON SHEETS R-5 AND R-6.

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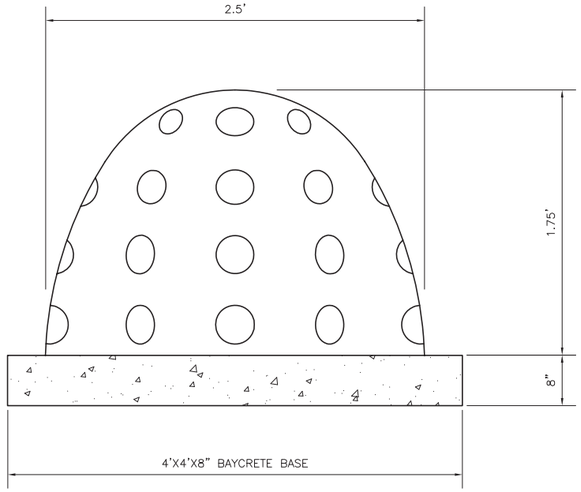
SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

EL CAMPO MARINA - RESTORATION SECTIONS

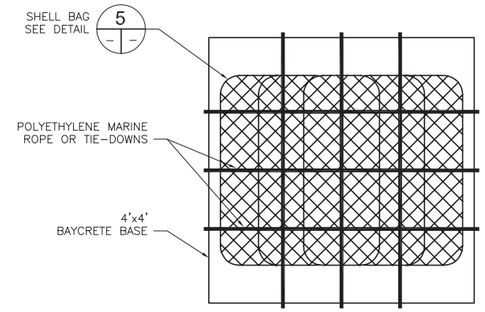
PROJ. NO. 60390453
SHT. 15 OF 19 SHTS.
DWG. NO. R-4

Sep 23, 2015 - 11:12am
\\157SSR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\R-4.dwg

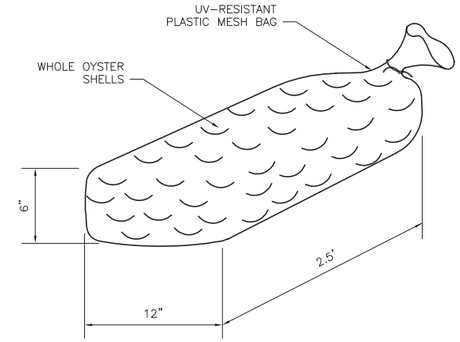


REEF BALL (STYLE 1) 1
SCALE: NTS

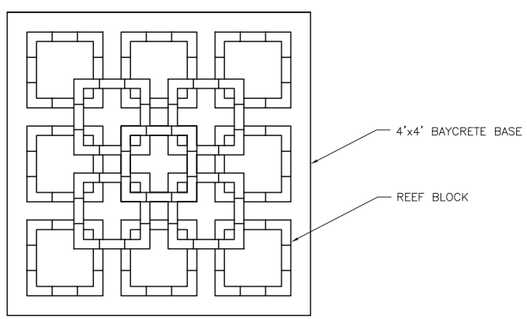
REEF BALL PHOTO



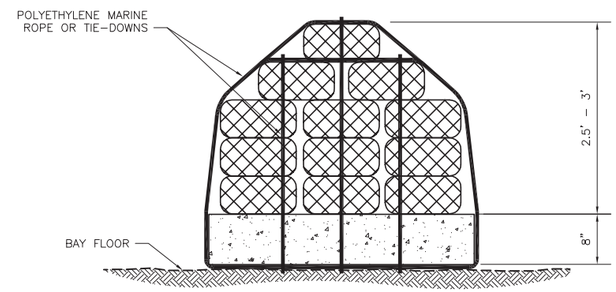
TOP VIEW



SHELL BAG DETAIL 5
SCALE: NTS

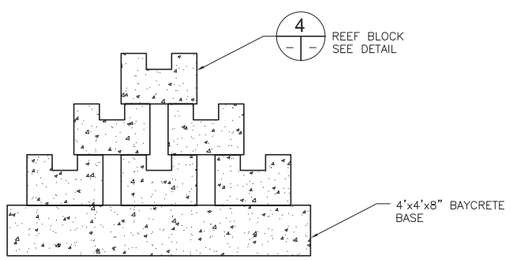


REEF BLOCK STACK PHOTO

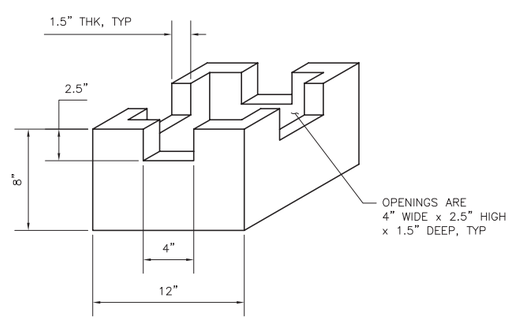


SIDE VIEW

SHELL BAG MOUND (STYLE 3) 3 R3
SCALE: NTS



REEF BLOCK STACK (STYLE 2) 2
SCALE: NTS



REEF BLOCK DETAIL 4
SCALE: NTS

NOTES

1. CONTRACTOR TO CONSTRUCT REEF STRUCTURE BALLS AND BLOCKS FROM BAYCRETE PER THE SPECIFICATIONS.
2. TO THE EXTENT POSSIBLE, CONTRACTOR TO PLACE WHOLE OYSTER SHELLS ON THE EXTERIOR SURFACES OF THE REEF STRUCTURE BALLS AND BLOCKS.
3. CONTRACTOR TO CONSTRUCT BASES AS NECESSARY TO ACHIEVE HEIGHT OF REEF STRUCTURE ELEMENT SPECIFIED BY THE OWNER. HEIGHTS WILL VARY FROM 2–4 FT DEPENDING ON WATER DEPTH.
4. CONTRACTOR TO CONSTRUCT BASES SOLELY FROM BAYCRETE. CONTRACTOR MAY STRAP REEF STRUCTURE BLOCKS TOGETHER TO FORM A BASE OR PROPOSE THEIR OWN DESIGN.

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PREPARED BY: AECOM, 1333 BROADWAY, SUITE 800, OAKLAND, CA 94612, PHONE: (510) 893-3600, FAX: (510) 874-3268

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

RESTORATION DETAILS - 1

PROJ. NO. 60390453
SHT. 16 OF 19 SHTS.
DWG. NO. R-5

Sep 23, 2015 - 10:29am
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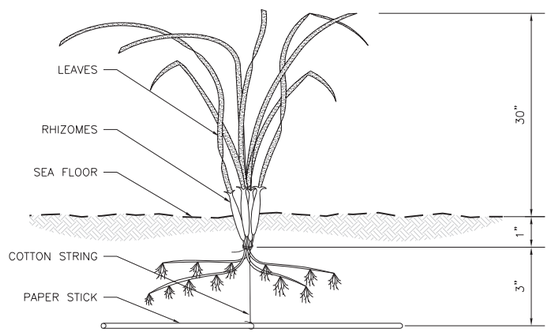

MERKEL BAREROOT EELGRASS PLANTING UNIT (1 / - | -)
SCALE: NTS

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

RESTORATION DETAILS - 2

PROJ. NO. 60390453
SHT. 17 OF 19 SHTS.
DWG. NO. R-6

Sep 23, 2015 - 3:06pm
\\157SSR-PRJ01\Projects\CreosoteProjects_\SF Bay Creosote Removal\5000 Technical Work and Background\5400 CAD\30% design\Plans\R-6.dwg

TABLE 1 RESTORATION SUMMARY RED ROCK WAREHOUSE

AREA ID	DESCRIPTION	REEF STYLE	ESTIMATED QTY.	UNITS
O1	REEF BLOCK STACK	2	36	EA
O2	SHELL BAG MOUND	3	4	EA
O3	REEF BLOCK STACK	2	4	EA
O4	REEF BALL	1	36	EA
O5	SHELL BAG MOUND	3	8	EA
O6	REEF BALL	1	6	EA
O7	REEF BLOCK STACK	2	46	EA
O8	REEF BALL	1	7	EA
O9	REEF BLOCK STACK	2	7	EA
O10	SHELL BAG MOUND	3	37	EA
O11	REEF BLOCK STACK	2	5	EA
E1	EELGRASS RESTORATION		342	SQM
E2	EELGRASS RESTORATION		514	SQM
E3	EELGRASS RESTORATION		748	SQM
E4	EELGRASS RESTORATION		993	SQM
R1	ROCKWEED RESTORATION		80	SQM
R2	ROCKWEED RESTORATION		76	SQM
R3	ROCKWEED RESTORATION		154	SQM

REEF STYLE 1 = 49
REEF STYLE 2 = 98
REEF STYLE 3 = 49
EELGRASS = 2597 SQM
ROCKWEED = 310 SQM

TABLE 2 RESTORATION SUMMARY EL CAMPO MARINA

AREA ID	DESCRIPTION	REEF STYLE	ESTIMATED QTY.	UNITS
O1	REEF BALL	1	8	EA
O2	REEF BLOCK STACK	2	8	EA
O3	SHELL BAG MOUND	3	10	EA
O4	REEF BLOCK STACK	2	8	EA
O5	REEF BALL	1	15	EA
O6	REEF BLOCK STACK	2	12	EA
O7	SHELL BAG MOUND	3	13	EA
O8	REEF BLOCK STACK	2	18	EA
E1	EELGRASS RESTORATION		1294	SQM
E2	EELGRASS RESTORATION		49	SQM
E3	EELGRASS RESTORATION		49	SQM
E4	EELGRASS RESTORATION		49	SQM
E5	EELGRASS RESTORATION		49	SQM
E6	EELGRASS RESTORATION		49	SQM
R1	ROCKWEED RESTORATION		438	SQM

REEF STYLE 1 = 23
REEF STYLE 2 = 46
REEF STYLE 3 = 23
EELGRASS = 1539 SQM
ROCKWEED = 438 SQM

NOTES

1. THE CONTRACTOR SHALL VERIFY ALL COORDINATES, QUANTITIES AND CHARACTERISTICS PRIOR TO START OF WORK.

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

RESTORATION QUANTITIES

PROJ. NO. 60390453
SHT. 18 OF 19 SHTS.
DWG. NO. R-7

Sep 23, 2015 - 10:59am
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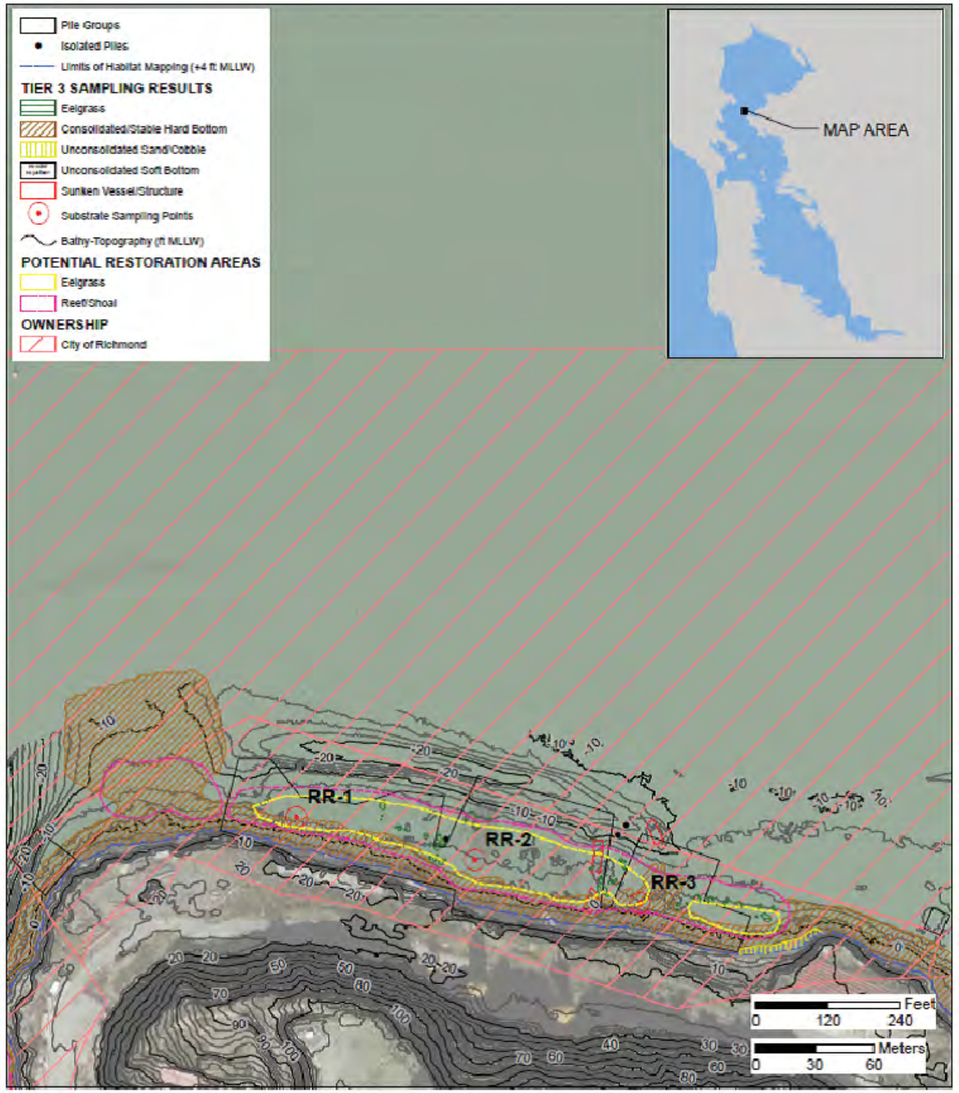
M&A #14-014-01



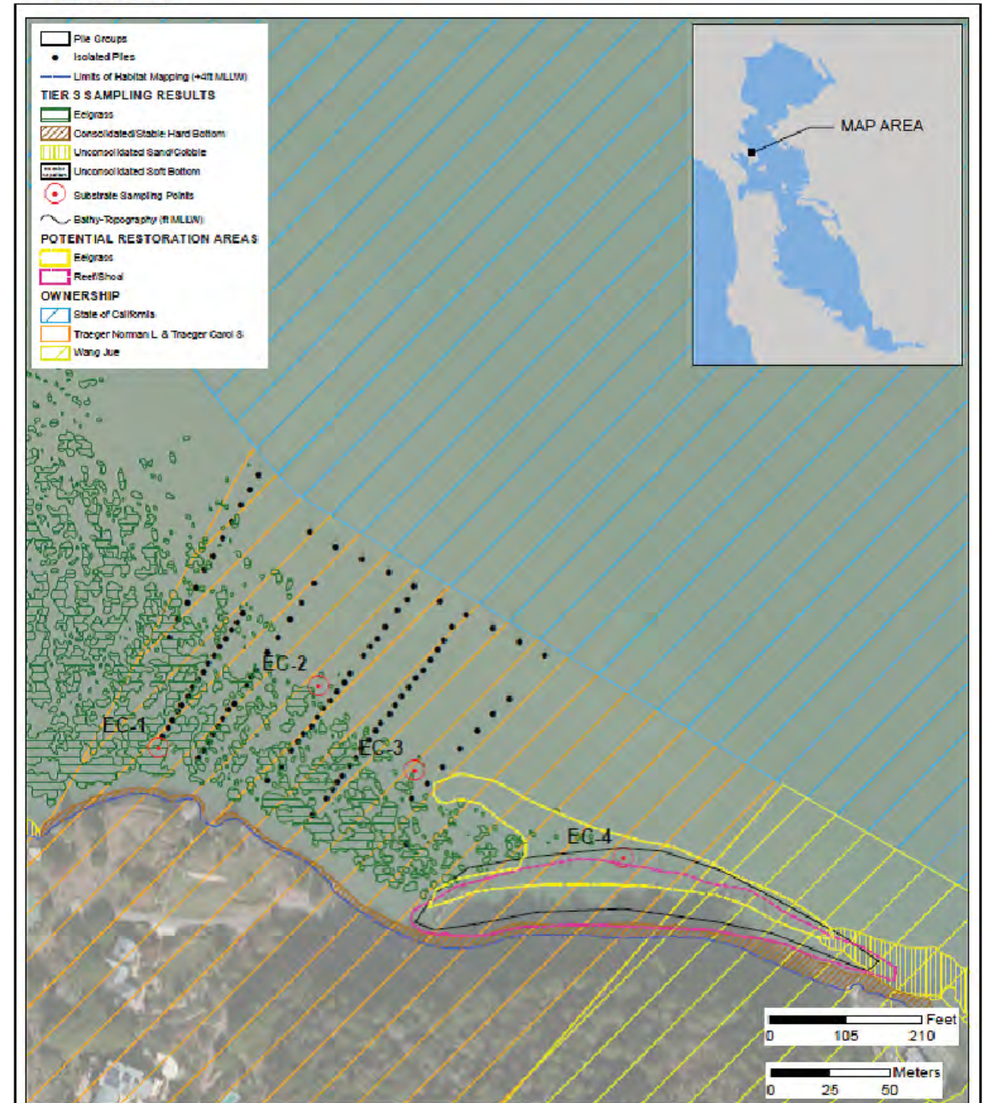
Richmond Red Rock Warehouse

SAN FRANCISCO BAY CREOSOTE PILING REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

Figure 2

Merkel & Associates, Inc.

M&A #14-014-01



El Campo Site Marina

SAN FRANCISCO BAY CREOSOTE PILING REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

Figure 3

Merkel & Associates, Inc.

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SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT

EXISTING SUBSTRATE MAPS

PROJ. NO. 60390453
SHT. 19 OF 19 SHTS.
DWG. NO. R-8

Sep 23, 2015 - 3:07pm
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TECHNICAL SPECIFICATIONS

60% Submittal

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT (2 SITES)

1. Red Rock Warehouse Site, 2055 Stenmark Dr., Richmond, CA

2. El Campo Marina Site, Paradise Cove Rd., Tiburon, CA

Coastal Conservancy

Prepared by AECOM **September 2015**

SAN FRANCISCO BAY CREOSOTE REMOVAL AND PACIFIC HERRING HABITAT RESTORATION PROJECT (2 SITES)
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01050	FIELD ENGINEERING
01140	ENVIRONMENTAL REQUIREMENTS
01300	CONTRACTOR SUBMITTALS
01311	PROJECT SCHEDULE
01400	QUALITY CONTROL
01505	MOBILIZATION AND DEMOBILIZATION
01720	RECORD DRAWINGS
DIVISION 2	**SITE WORK**
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02220	DEMOLITION
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DIVISION 7	**THERMAL AND MOISTURE PROTECTION (NOT USED)**
DIVISION 8	**DOORS AND WINDOWS (NOT USED)**
DIVISION 9	**FINISHES (NOT USED)**
DIVISION 10	**SPECIALTIES (NOT USED)**
DIVISION 11	**EQUIPMENT (NOT USED)**
DIVISION 12	**FURNISHINGS (NOT USED)**
DIVISION 13	**SPECIAL CONSTRUCTION (NOT USED)**
DIVISION 14	**CONVEYING SYSTEMS (NOT USED)**
DIVISION 15	**MECHANICAL (NOT USED)**
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APPENDICES

APPENDIX A	SITE PHOTOS TAKEN SEPT. 2014
APPENDIX B	PROJECT PERMITS (PENDING)
APPENDIX C	SURVEY BENCHMARKS (PENDING)

SECTION 01010 - SUMMARY OF WORK

PART 1 GENERAL

1.01 INVESTIGATION PRIOR TO BIDDING

A. The Contractor shall be familiar with the Project Permits provided in an appendix to these specifications.

B. A site visit and inspection of the existing sites is mandatory for all bidders. The date and time of the pre-bid site visit is announced in the advertisement for bids. Taking into full consideration the sequence of construction, the Contractor shall make proper allowances in the schedule to complete the work within the allotted time, and within the bid prices specified, including all incidental and related work required to complete the project as shown on the Plans and specified herein.

1.02 SCOPE OF WORK

A. The Work to be done under this Contract includes all work as shown in the Plans and described in the specifications, as further divided into bid items, and generally including the following:

1. Mobilization and demobilization to perform required Work.

2. Environmental protection and restoration measures as required.

3. Surveys for quantities of materials prior to and after piling removal.

4. Construction support facilities as needed, including items such as access roads, staging and stockpile areas, temporary site fencing, access control and security provisions, worker parking, and offices.

5. Demolition of wharf decking, pilings, and appurtenances. This shall be performed entirely from the water at the El Campo Marina Site; demolition at the Red Rock Warehouse site may be performed from a combination of water-based and land-based access.

6. Handling, transport, disposal of demolished wharf, pilings, and miscellaneous materials encountered during the project.

7. Removal and disposal of possibly hazardous materials.

8. Coordination with ongoing activities by the City of Richmond and its tenants at the Red Rock Warehouse work site.

9. Restoration of any disturbed vegetated land areas at the Red Rock Warehouse work site.

10. Following demolition, restoration in the bay of Pacific Herring habitat in the form of eelgrass bed transplants, rockweed relocation, and fabrication and placement of reef structures for oysters and other species.

11. All other incidental and related work required to complete the project as shown on the Plans and specified herein.

B. The Work is being managed and funded by the State Coastal Conservancy (SCC; Owner) at two locations:

1. The Red Rock Warehouse site at 2055 Stenmark Dr., Richmond, CA, 94801. The property is owned by the City of Richmond (the City) and is not open to the public.

2. The (former) El Campo Marina Site, off the north end of Paradise Cove Road, Tiburon, CA. The site is privately owned by the Traegers. A small portion of the east side of the site is privately owned by [redacted]

1.03 MISCELLANEOUS WORK COMMON TO THE ENTIRE CONTRACT

A. The Work consists of furnishing all labor, equipment, materials, supervision, and incidentals necessary to complete demolition of the facilities and ecological restoration indicated on the Plans and described herein.

B. The Work of this Contract shall be complete and all work, materials, equipment and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be provided by the Contractor as though originally indicated, at no additional cost to the Owner.

1.04 SERVICES TO BE PROVIDED BY THE OWNER DURING THE COURSE OF CONSTRUCTION

A. The Owner will provide Construction Management, Design Engineering, Specialty Environmental Inspection, and other Specialty Inspection services as may be required during the course of the Contract. The services provided by the Owner shall not relieve the Contractor of responsibility for providing Quality Control as specified in Section 01400.

1.05 CONSTRUCTION SCHEDULING AND SEQUENCING

A. Contractor shall prioritize all work necessary to complete in-water work and osprey nest work outside of restricted work windows as identified in Section 01141 – Environmental Requirements.

B. Piling removal work shall not commence until environmental protections are in place in accordance with the project permits and Section 01141 – Environmental Requirements, and erosion control measures are installed and inspected and

approved by the Engineer in accordance with Section 02270 – Erosion and Sediment Control.

1.06 MISCELLANEOUS INSTRUCTIONS TO THE CONTRACTOR

A. The Contractor's attention is directed to the fact that there may exist inactive and/or obsolete utilities in the area of work to be done under this contract. Those utilities may not be marked, and cannot be readily located in the field because of the absence of meters or meter boxes.

B. Protecting, repairing and working around such services are considered as incidental work under the appropriate bid items, and no separate payment will be made therefore.

C. Contractor is solely responsible for ensuring that any and all Contractor officers, employees, agents, subcontractors and suppliers on site fully comply at all times with any and all applicable regulations, regardless of whether Contractor chooses to conduct its compliance enforcement by assigning compliance enforcement duties to its on-site foreman or superintendent, or whether Contractor chooses to retain third party inspection services which shall be paid by the Contractor as incidental work with no additional cost to the Owner .

D. Contractor shall be solely and fully liable for any and all sanctions, fines, penalties, incidental and consequential damages arising out of Contractor's failure to comply with all applicable requirements referenced in this Section. Contractor shall be solely and fully liable regardless of whether the Owner Representative is or is not present on site at the time of such violation, and regardless of whether the Owner Representative has or has not identified, noticed, and/or alerted the Contractor of the violation.

E. In the event that the Owner Representative identifies and/or places the Contractor on notice of work activity that fails to comply with applicable specifications and/or with applicable regulations, the Owner Representative will stop the work and shall require the Contractor to remove the violating equipment and operator(s) from the work site forthwith. Any equipment and operator(s) so removed shall be barred from performing any work in any capacity on the subject project for the duration of the project. The Owner Representative will also report any such violation to Cal OSHA. The Contractor shall be barred from filing a claim arising from a work stoppage caused by the Contractor's failure to comply with applicable regulations referenced above and/or with this section.

1.07 CONTRACTOR'S USE OF SITE

A. The Owner will furnish, as indicated in the Contract Documents, the lands upon which the work is to be performed, rights-of-way and easements thereto. The Contract Documents identify restrictions specifically related to use of lands so furnished with which the Contractor will have to comply in performing the work.

Nothing contained in the Contract Documents shall be interpreted as giving the Contractor exclusive occupancy of the lands or rights-of-way provided.

B. Contractor's Work Area: The Contractor's work areas, including staging and stockpile areas, and access roads shall be as shown in the Contract Documents and as directed by the Owner Representative in the field. Contractor shall not park or stage equipment in non-designated areas without the approval of the Owner Representative. The Contractor shall submit plans showing layouts of proposed staging areas as required in Section 02110 – Site Preparation, for review and approval by the Engineer.

C. Additional Staging and Storage: Contractor shall be responsible for providing any additional staging and storage areas needed outside the indicated project boundaries. Such staging and storage areas shall not be located on public thoroughfares. The cost of any additional staging and storage areas on nearby private property shall be borne solely by the Contractor, including costs to the Owner for additional environmental clearance activities and documentation thereof. The Contractor shall not enter upon or use any property not under control of the Owner until appropriate environmental clearance has been completed and documented and a written temporary construction easement agreement has been executed by the Contractor and the property owner, and a copy of said agreement furnished to the Owner Representative prior to said use. Neither the Owner nor the Owner Representative shall be liable for any claims or damages resulting from Contractor's unauthorized trespassing or use of any such properties.

D. Maintenance of Work Area: Contractor shall at all times maintain the areas in a safe condition, remove all accumulations of rubbish and surplus materials at the end of each working day, restore them to a condition equal to that which existed prior to the start of work, and leave them at completion of the contract in a clean, orderly fashion.

E. Security of Contractor's Work Area: Security of Contractor's work areas and its property, equipment, construction materials and all other items contained in Contractor's staging areas or elsewhere on the construction site shall be Contractor's sole responsibility at all times. This requirement shall be in effect during normal working hours as well as nighttime hours, weekends and holidays.

1.08 NIGHT AND WEEKEND WORK

A. Contractor shall only be allowed to perform night work (i.e., between the hours of 5:00 p.m. and 7:00 a.m.) and weekend work in order to meet the construction schedule and to perform demolition within allowed work windows, with the written approval of the Owner. The specific schedule for night and weekend work shall be submitted in advance for review and approval by the Engineer and applicable jurisdictional permitting agencies. Once the proposed schedule has been reviewed and approved, Contractor shall provide a minimum of two (2) weeks

advance written notice of the proposed start date for night or weekend work so that arrangements can be made for inspectors to be present and local residents and businesses can be notified or required permits can be obtained.

B. The cost for all night and weekend work shall be included in the Contractor's bid. No additional compensation will be provided for night or weekend work.

C. Noise generated by night and weekend work shall not exceed the levels specified in *(TBD)*. Contractor-designed noise barriers and other mitigation measures as needed to meet specified noise limits shall be in place and approved by the Owner Representative prior to performance of any night or weekend work.

1.09 DEMOLITION REQUIREMENTS

A. The Work includes demolition and removal of facilities as indicated in the Contract Documents. The demolition work shall include but not be limited to the following:

1. Conduct all demolition work in accordance with Section 02220 – Demolition.

2. Maintain existing facilities that are to be retained fully operational and in service.

3. Demolition Work shall include, as applicable:

   a. Removal, handling, and disposal of identified wharf and pilings.

   b. Removal, handling, and disposal of wharf and pilings debris found on the Bay floor.

   c. Hazardous material abatement.

   d. Removal, salvage, and disposal of equipment.

   e. Removal and disposal of indicated facilities.

   f. Removal and disposal of clearing and grubbing vegetation.

1.10 HAULING AND DISPOSAL OF MATERIAL

A. All demolished material and construction debris shall be disposed off site, unless otherwise indicated in the Contract Documents for salvage, or as approved by the Owner Representative.

B. All material shall be disposed of in accordance with Section 02220 – Demolition.

C. The Contractor will be responsible for cleanup of soil or other debris spilled from trucks and the affected streets and roads shall be cleaned daily. Flushing of soil or other debris into storm drains or sewers is prohibited.

1.11 HAZARDOUS MATERIALS MANAGEMENT

A. The Contractor is alerted to the possibility that hazardous waste and/or contaminated material may be discovered during the course of this Contract. In the event that such hazardous/contaminated material is discovered, the Contractor shall immediately notify the Owner Representative both verbally and in writing. Upon receipt of such notification, the Owner , at its sole option, may either (a) perform the remediation/abatement work using its own forces or using an outside contractor specializing in abatement work or, (b) direct the Contractor to perform all or any part of the remediation/abatement and hazardous materials removal work.

B. If the Owner Representative directs the Contractor to perform the remediation/ abatement and removal of the hazardous materials, the Owner Representative will do so by change order. The Contractor must promptly provide a properly licensed and insured subcontractor (with CSLB hazardous substance removal certification) to perform abatement work.

C. In the event that hazardous/contaminated material is discovered, then all work in the affected area will stop pending further direction from the Owner Representative. The Owner Representative shall determine whether the abatement and removal process requires suspension of all, none or any part of the work under this Contract.

D. If during prosecution of the work of this Contract, materials are encountered that may reasonably be believed to be hazardous, the Contractor shall promptly notify the Owner to verify the presence of differing site conditions.

1.12 PROJECT-SPECIFIC SAFETY AND HEALTH REQUIREMENTS

A. The Contractor is solely responsible for identifying and complying with all applicable safety and health requirements for the Work. The applicable requirements include but are not limited to those associated with underground tunneling work, trench excavation work, fall protection, confined space work, and other hazards as may be present at the jobsite.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01025 - MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Procedures for preparation and submittal of Progress Payment Requests.

1.02 SCOPE

A. Payment for the various items of the Schedule of Bid Prices, as further specified herein, shall include all compensation to be received by Contractor for furnishing all tools, equipment, supplies, and manufactured products, and for all labor, operations, overhead and profit, applicable taxes, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of work as specified and as shown on the Drawings. No separate payment will be made for any item that is not specifically set forth in the Schedule of Bid Prices, and all costs therefore shall be included in the prices named in the Schedule of Bid Prices for the various appurtenant items of work.

B. Contract Prices shall be deemed to include all bonds and insurance, all appurtenances necessary to complete the required work, including all costs for compliance with the regulations of public agencies having jurisdiction, including Health and Safety Requirements of the California Division of Occupational Safety and Health and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA), California Water Quality Control Board, and including all costs for loss or damage arising from the Work, or from action of the elements, for any unforeseen difficulties which may be encountered, and for all risks of every description connected with the prosecution of the work until Contract Completion, also for all expenses incurred in consequence of the suspension or discontinuance of the Work as provided in the Contract.

C. Except as otherwise expressly stipulated in the Contract Documents, no payment will be made for materials stored on or off site, and for materials not yet incorporated into the work on site.

D. Neither the payment of any estimate nor of any retained percentage shall relieve Contractor of its obligation to make good all defective work or material.

1.03 BASIS OF PAYMENT

A. Unit Price Work:

1. The Owner will determine the quantities of Work to be paid for any item for which a unit price is fixed in the Contract.

2. Unless otherwise provided, determination of the number of units of work so completed will be based, so far as practicable, on the actual

measurement or count made by the Contractor or Owner Representative of the Work satisfactorily completed within the prescribed limits.

3. Measurement and computations will be made by methods as the Owner may consider appropriate for the class of work measured.

4. Should the actual quantities of Work performed under any unit price be greater or less than the estimated quantity stipulated on the Schedule of Bid Prices, or if an item of Work is deleted, the final Contract Cost will be adjusted by change order to reflect the actual quantities and actual costs including fixed costs for unit price items. Underruns or overruns greater than 25% of the estimated quantity stipulated on the Schedule of Bid Prices shall be paid in accordance with a negotiated change order, if required.

5. Contractor shall take all measurements and compute all payment quantities. The Owner will verify and approve measurements and quantities. Measurements and computations shall be made by methods approved by the Owner Representative for the class of work measured.

6. Contractor shall measure all work to be paid for on a unit price basis in accordance with United States Standard Measures except as otherwise specified. A ton shall consist of 2,000 pounds avoirdupois.

7. Material paid for by weight shall be weighed on sealed scales certified by and regularly inspected by an inspector of the state in which the scale is located.

8. When material is to be measured and paid for on a volume basis and it is impractical to determine the volume by the method of measurement specified in a Bid Item, or when requested by Contractor in writing and approved by the Owner Representative in writing, the material will be weighed in accordance with the requirements specified for weight measurement. Such weights will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by Owner Representative and shall be agreed to by Contractor before such method of measurement of pay quantities will be adopted

9. When metering devices are required in the Specifications or are used to measure the quantity of liquids used in the Work, the metering devices shall be inspected and tested for accuracy at the Contractor’s expense as often as Owner Representative may deem necessary

10. Full compensation for all expense involved in conforming to the requirements for measuring and weighing materials shall be considered as

included in the unit prices paid for the materials being measured or weighed and no additional compensation will be allowed.

11. Non-Payment for Rejected Products.

a. Payment will not be made for any of the following:

1) Materials wasted.

2) Materials determined as unacceptable before or after placement.

3) Materials not completely unloaded from the transporting vehicle.

4) Materials placed beyond the lines, grades and levels of the required Work (as indicated in the Contract Documents or as established by the Contracting Officer).

5) Materials remaining on hand after completion of the Work.

6) Loading, hauling, handling, and disposing of rejected materials.

b. Materials described above (items i through vi) shall not be included in final total quantities.

B. Lump Sum: When the estimated quantity for specific portions of Work is not indicated on the Schedule of Bid Prices and unit is designated as lump sum, payment will be on a lump sum basis for work satisfactorily completed as set forth in the Specifications and shown on the Drawings.

C. Monthly payment requests shall be based upon information developed at monthly Application for Payment meetings and shall be prepared by Contractor. The approved Schedule of Values will be the basis for Contractor's payment requests.

1. No partial progress payment will be made to Contractor until all cost information requested by the Owner is submitted and reviewed.

2. Submission of a progress schedule update for the same period of the progress payment application shall be a condition precedent to making the progress payment application.

1.04 APPLICATION AND SCHEDULE PROCEDURES

A. On the 25th of each month submit an itemized Application of Payment to the Engineer on a standardized form acceptable to the Engineer covering the work completed as of the date of the Application for Payment.

1. Submit under transmittal letter one copy of each Application for Payment filled out and signed by Contractor to both the Owner and the Engineer.

2. Submit a progress schedule update with each Application for Payment.

3. List each authorized Change Order executed prior to date of submission by Change Order Number and description, as for original items of work.

4. When the Owner requires substantiating data, Contractor shall submit suitable information with cover letter identifying Application of Payment number and date, line item by number and description.

B. Progress payments for the work performed under this Contract will be made in the manner described:

1. Progress payments will be based upon progress estimates by Contractor and verified by the Owner of the actual physical progress of the work.

2. Progress payments will be made on a monthly basis and no mid-monthly payments will be made regardless of the value of the work and material incorporated prior thereto.

3. Contractor shall certify its estimate of the quantities of the work completed, contained in the monthly progress payment estimate, by signing each such estimate prior to its submission.

4. The Engineer will make final determination if agreement cannot be reached on Contractor's progress payment request.

C. Pursuant to California Public Contract Code Section 22300, Contractor may substitute securities for any money withheld by the Owner to insure performance under the Contract. Said securities shall be in a form and of a type acceptable to the Owner.

1. At the request and expense of Contractor, securities equivalent to the amount withheld shall be deposited with City Controller or with a state or federally chartered bank as the escrow agent, who shall return such securities to Contractor upon satisfactory completion of the Contract.

2. Securities eligible for investment under Public Contract Code Section 22300 shall be limited to those listed in Section 16420 of the Government Code and to bank or savings and loan certificates of deposit.

3. Contractor shall enter into escrow agreement with City Controller for in-lieu construction payment retention provided by The City, specifying amount of securities to be deposited, terms and conditions of conversion into cash in case of Contractor's default, and termination of escrow upon completion of Contract.

4. Contractor shall be beneficial owner of securities substituted for monies withheld and shall receive any interest thereon.

1.05 PROGRESS ESTIMATES

A. Upon receiving Contractor's monthly progress payment application, the Owner Representative will review progress breakdown and make adjustments to percent of completion of each item of Work.

1. Monthly progress payments will be made based on the total value of Work items completed or partially completed, as determined by the Owner Representative with participation of Contractor.

2. Accumulated retainage will be shown as separate item in payment summary.

B. One copy of application will be returned to Contractor within 7 calendar days with a description of adjustments made. All parties shall update percent of completion values in the same manner, i.e., express value of accumulated percentage of completion to date.

C. After approving the finalized Progress Payment Report, the Owner will commence payment processing.

D. Retention will not be reduced if Contractor, in the opinion of the Owner, is behind schedule. If retention is reduced at any point during Contract and Contractor subsequently falls behind schedule, retention may be raised back to the original percentage.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

3.01 SCHEDULE OF BID PRICES

All bid items in Section 3.01 shall be priced for completion and include in the unit price the cost of all labor, material, equipment, testing, and all other work necessary for furnishing, storing, placing, installing, and maintaining the specified bid items in accordance with the Contract Documents.

GENERAL

Bid Item No. 001 – Mobilization/Demobilization

A. The Contract Lump Sum Price for this Bid Item shall include, but not be limited to, the following mobilization (#1-8) and demobilization (#9-13) activities:

1. Obtaining bonds and insurance.

2. Preparing for and obtaining Owner Representative's approval of submittals due within the first sixty (60) calendar days of the effective date of the Notice to Proceed.

3. Obtaining all permits and approvals necessary for performing the work, as required by governmental agencies or private parties, and all costs/fees associated with permits and approvals.

4. Providing and assembling work area plant, equipment, materials and supplies necessary for the prosecution of the work. This includes temporary construction, sanitary facilities, storage areas, parking, Contractor's trailer and other Contractor installations.

5. Reproduction costs of all necessary reports, sets of Specifications, and full size and half-size sets of Plans.

6. Instituting safety and security measures.

7. Clearing and grubbing of vegetation for land-based access as shown on Plans.

8. Installation and maintenance of erosion and sedimentation controls.

9. Removal of all field offices.

10. Removal of all Contractor facilities, materials and supplies.

11. Removal of other temporary facilities.

12. Removal of erosion and sedimentation controls. Final clean up including cleaning of all debris.

13. Contract Record Documents specified in Section 01720, "Record Drawings."

B. The cost of spare parts shall be included under other Bid Items for which spare parts are required by the Specifications and shall not be included as part of the demobilization cost.

C. The costs of all required testing and start-up activities are to be included under other Bid Items for which the component, system or equipment requires testing and shall not be included as part of the demobilization cost.

D. The costs of providing Operations and Maintenance Manuals and providing operation training to City personnel are to be included under other Bid Items for

which the component, system or equipment requires testing and shall not be included as part of the demobilization cost.

Total payment for this Bid Item No. 001 shall not exceed ten percent (10%) of the total amount of the contract price and will be made in 2 equal payments, half after mobilization and half after demobilization. There will be no separate or advanced payment to reimburse Contractor's expenses right after the expenses are incurred for any part of mobilization, including those expenses related to full payments for bonds, insurances, permits, etc.

Bid Item No. 002 – Environmental Monitoring and Protections During Demolition

A. Payment for this item will be made at the lump sum named in the schedule of bid prices.

B. This item covers all work associated with the environmental monitoring and protections described in Sections 01141 and 02270, in compliance with the project permits during the demolition phase of the work. The Contractor shall furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work.

C. Measurement for payment will be in accordance with an estimated percent complete for each site.

Bid Item No. 003 – Demolition Work at Red Rock Excluding Allowance Work

A. Payment for this item will be made at the lump sum named in the schedule of bid prices.

B. This item covers all work associated with the removal and disposal of approximately 350 pilings and decking visible above the water at the Red Rock site, exclusive of allowance work described in Bid Item 005. The Contractor shall furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work. The work shall include, but is not limited to, site preparation, demolition, disposal, materials handling, diver survey and site restoration.

C. Measurement for payment will be in accordance with an estimated percent complete.

Bid Item No. 004 – Demolition Work at El Campo Excluding Allowance Work

A. Payment for this item will be made at the lump sum named in the schedule of bid prices.

B. This item covers all work associated with the removal and disposal of approximately 350 pilings and decking visible above the water at the Red Rock site, exclusive of allowance work described in Bid Item 005. The Contractor shall

furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work. The work shall include, but is not limited to, site preparation, demolition, disposal, materials handling, diver survey and site restoration.

C. Measurement for payment will be in accordance with an estimated percent complete.

Bid Item No. 005 – Demolition Allowance

A. Payment for this item will be made at the hourly rate named in the schedule of bid prices.

B. This item covers all work associated with removing debris and piling stubs below the water at both sites. The Contractor shall furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work. The work shall include, but is not limited to diving, materials handling, piling cutting, and environmental monitoring and protections for this work.

C. Measurement for payment will be in accordance with the total hours worked by the Contractor's team. One hour of work duration is counted as one, regardless of the number of workers or equipment on the job.

Bid Item No. 006 – Materials Disposal Allowance

A. Payment for this item will be made at the per ton rate named in the schedule of bid prices.

B. This item covers all work associated with disposing of creosote-treated wood debris from the work under Bid Item 005. The Contractor shall furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work.

C. Measurement for payment will be in accordance with the total weight of debris disposed of.

Bid Item No. 007 – Environmental Monitoring and Protections During Restoration

A. Payment for this item will be made at the lump sum named in the schedule of bid prices.

B. This item covers all work associated with the environmental monitoring and protections described in Sections 01141 and 02270, in compliance with the project permits during the restoration phase of the work. The Contractor shall furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work.

C. Measurement for payment will be in accordance with an estimated percent complete for each site.

Bid Item No. 008 – Oyster Bed Restoration

A. Payment for this item will be made at the lump sum named in the schedule of bid prices.

B. This item covers all work associated with the fabrication and installation of the three types of oyster bed restoration elements at the sites. The Contractor shall furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work. The work shall include, but is not limited to, site preparation, fabrication, handling, transport, installation, surveying, record drawings, and site restoration.

C. Measurement for payment will be in accordance with an estimated percent complete for each site.

Bid Item No. 009 – Eelgrass Restoration

A. Payment for this item will be made at the lump sum named in the schedule of bid prices.

B. This item covers all work associated with the fabrication and installation of the eelgrass restoration at the sites. The Contractor shall furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work. The work shall include, but is not limited to, site preparation, fabrication, handling, transport, installation, surveying, record drawings, and site restoration.

C. Measurement for payment will be in accordance with an estimated percent complete for each site.

Bid Item No. 010 – Rockweed Restoration

A. Payment for this item will be made at the lump sum named in the schedule of bid prices.

B. This item covers all work associated with the fabrication and installation of the rockweed (Fucus) restoration at the sites. The Contractor shall furnish all labor, materials, equipment, plant, tools, transportation, and incidentals as required or specified to perform the work. The work shall include, but is not limited to, site preparation, handling, transport, installation, surveying, record drawings, and site restoration.

C. Measurement for payment will be in accordance with an estimated percent complete for each site.

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Optional Bid Item No. A – Deployment of Silt Curtain Around Eelgrass Beds at the El Campo Site

A. Payment for this item will be made on a lump sum basis for deploying a silt curtain extending from the water surface to the sea floor to protect the eelgrass bed at El campo from turbidity from the work area.

B. The lump sum price, unless otherwise noted, shall include all labor, material, equipment, and all other work, including incidentals, necessary for installing and maintaining the silt curtain during no more than 1 month of work as described in the Contract Documents.

C. Measurement for payment will be in accordance with an estimated percent complete.

END OF SECTION

SECTION 01050 - FIELD ENGINEERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Providing and paying for field engineering services required for Project.

1. Survey work required in execution of Project.

2. Civil, structural and other professional engineering services specified or required to verify that Contractor's construction methods are in accordance with Contract Documents.

B. Field measurements also will be required for existing and new construction, and for siting, anchoring, embedding, aligning, and connecting work.

1.02 RELATED SECTIONS

A. Section 01010: Summary of Work

B. Section 01720: Record Drawings

C. Section 02951: Eelgrass and Rockweed Restoration

D. Section 03301: Baycrete and Reef Structures

1.03 QUALIFICATIONS OF SURVEYORS AND ENGINEERS

A. Qualified engineers or registered land surveyors, acceptable to Engineer and Owner.

B. Registered professional engineers of the disciplines required for the specific service on the Project, licensed in California.

1.04 SURVEY REFERENCE POINTS

A. Survey control points and benchmarks in the project area are provided in an Appendix to the specifications.

B. Locate and protect control points before starting site work, and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to the Engineer.

2. Report to Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

3. Require surveyor to replace Project control points which may be lost or destroyed. Establish replacements based on original survey control.

1.05 PROJECT SURVEY REQUIREMENTS

A. Establish a minimum of two permanent benchmarks at each Work site, referenced to data established by survey control points.

1. Record locations, with horizontal and vertical data, on Project Record Documents.

2. This requirement is exempted at the El Campo site where all work shall be conducted from the water.

B. Establish lines and levels, locations and layouts, by instrumentation and similar appropriate means:

1. Restoration elements:

a. Locations and elevations of reef structures; location of each structure to be recorded on a geographic positioning system (GPS).

b. Locations and Bay-floor elevations of eelgrass and rockweed transplants.

C. From time to time, verify layouts by same methods.

1.06 RECORDS

A. Maintain a complete, accurate log of all control, survey, and field measurement work as it progresses.

B. On completion of foundation walls and major site improvements, prepare a certified survey showing all dimensions, locations, angles and elevations of construction.

1.07 SUBMITTALS

A. Submit name and address of surveyors and professional engineers to Engineer.

B. Submit documentation to verify accuracy of field and design engineering work.

C. Submit certificate signed by registered engineers or surveyors certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.

D. Where design engineering, drawings, calculations and civil or structural construction methods and procedures are required to be submitted for review, they shall bear the stamp and signature of the responsible registered professional engineer.

E. Surveys for measurement of quantities shall be reduced and plotted, necessary calculations performed and results presented in an orderly form. All plotted plans, cross sections, calculations, and recap sheets shall be submitted to the Engineer for review and record.

END OF SECTION

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SECTION 01140 – ENVIRONMENTAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This specification section covers the environmental requirements including monitoring that shall be completed by the Contractor to ensure compliance with project permits, mitigation measures, and operational requirements during the construction period and during any optional or extra work requested by the Owner. The Contractor shall be responsible for monitoring described in this specification and other project specifications.

1.02 PROJECT SPECIFIC REFERENCES

A. The project environmental permits and documents that the Contractor shall comply with are provided in Appendix B to these specifications and form a part of this specification. Contractor shall review all environmental authorizations in this Appendix for detailed requirements.

B. The following project permits are provided in Appendix B:

1. US Army Corps of Engineers (USACE): Either a Section 404, Nationwide Permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) or Nationwide Permit 28 (Cleanup of Hazardous and Toxic Wastes).

2. NOAA Fisheries Section 7 consultation under the Endangered Species Act including Essential Fish Habitat under the Magnuson Stevens Fishery Conservation and Management Act and Fish and Wildlife Conservation Act.

3. San Francisco Bay Conservation and Development Commission (BCDC): Administrative permit.

4. California Department of Fish and Wildlife consultation to limit any impacts and maximize benefits to state-listed fish and wildlife.

5. San Francisco Bay Regional Water Quality Control Board: Section 401 Water Quality Certification.

6. California State Lands Commission: Coordination to confirm whether project is on state-owned or leased lands, and to confirm CEQA compliance.

7. California State Historic Preservation Office: Coordination to correctly document historic status and related process of creosote structures to be removed.

1.03 SUBMITTALS

A. The Contractor shall submit the following in accordance with Section 01300 – Submittals:

1. Preconstruction Submittals:

   a. Certification of Contractor Review of Permits

   b. Biological Resources Training Log Sheets

   c. Baseline Turbidity and Light Data in Eelgrass

2. Submittals during Demolition:

   a. Daily Observation, Work Progress and Water Quality reports

B. Reporting Format: All field monitoring data shall be collected on an Engineer-approved form. Copies of actual forms prepared in the field shall be submitted to the Engineer along with any reports retyped in the office. Photos are encouraged when applicable and shall be submitted when taken. Reports may be submitted electronically to the Engineer or Engineer-designee.

C. Record Keeping: The Contractor shall prepare daily reports. The reports shall be emailed to the Engineer on the following day. The paper daily reports shall be kept in a file in the Construction Trailer and provided to the Engineer in paper format if requested.

1.04 CONSTRUCTION MONITORING

A. Contractor shall conduct water quality monitoring as described in Section 3.1 below. While the project permits provided in the Appendix require more monitoring than that described in these bid documents, the Contractor is only responsible for the monitoring described in this Section.

B. Reporting of Daily Observations and Work Progress: Contractor shall record daily observations and note estimated work completed daily at each active work area. Information shall be collected and presented on the daily form provided in Table 1 or in an alternate format approved by the Engineer. Forms shall be compiled on a daily basis, converted to a single file in pdf format, and provided via email to the Engineer the following day. The Engineer shall be notified immediately if any adverse conditions (floating or suspended materials, unusual discoloration or turbidity, or odors) are noted or any special status species are observed adjacent to or within the work area. If containment silt curtains are deployed, Contractor shall conduct daily inspections of the water outside of the containment silt curtains to ensure that discharge of construction sediments or materials do not cause the following conditions:

1. Floating, suspended, or deposited macroscopic particulate matter or foams;

2. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

3. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

4. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and

5. Toxic or other deleterious substances to be present in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or that render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

C. Water Quality Monitoring and Reporting: Contractor shall conduct daily water quality monitoring (described below) in all areas where construction activities have the potential to affect water quality. Data shall be collected and presented on a form similar to the Daily Form provided in Table 1. The format for the form must be approved by the Engineer. The Engineer shall be notified immediately if any exceedances of the permit limits are noted.

1.05 SPECIAL-STATUS SPECIES AT THE PROJECT SITE(S)

A. Table 2 provides a summary the presence of special-status species identified as potentially occurring in the work vicinity. All work may proceed at all times while the Contractor is implementing the procedures described in this specification and in Section 02220 – Demolition. [*Note: Table 2 is AECOM's current understanding of the windows of sensitivity for listed species. The list of species and how the work windows will impact construction sequencing and construction methods will be determined in future consultation with the permitting agencies.]*

B. Permit Compliance and Coordination: At all times the Contractor shall be in compliance with the permits provided in Appendix B. At all times, the Contractor shall adjust its work at the direction of the Engineer if they identify that the Contractor is not in compliance with the permits. The Engineer's Biological Monitor shall participate in weekly progress meetings and the Contractor shall coordinate with them as necessary to allow them to complete all their monitoring, inspections and surveys during the project.

C. Biological Resources Training for Construction Crews:

1. Before any work occurs, the Contractor's field staff shall attend a mandatory environmental-education program for construction personnel, designed and conducted in the field by the Engineer. The training is to

cover all of the special-status species that could potentially occur on-site (e.g., osprey, green sturgeon, longfin smelt, chinook salmon, and steelhead). That program will include a description, representative photographs, and the legal status of each of species; terms and conditions of the permits; 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 special-status species during project implementation. All construction workers of the Contractor or its Subcontractors shall be required to receive the training, and when new workers are added to the crew, they shall receive the training before being allowed to work on-site.

a. The training shall be up to 1 hour in duration and held at the meeting room in the Contractor's or Engineer's construction trailer.

b. After each training session is administered, the Contractor shall submit the sign-in sheets showing which employees and subcontractor employees received the training, when the training was conducted and who conducted the training. Construction workers identified onsite as not having had the training can be removed from the worksite by the Engineer.

2. Certification of Contractor Review of Permits:

a. Prior to commencing any staging, grading, demolition, or construction, the General Contractor or Contractors in charge of that portion of the work shall submit written certification that s/he has reviewed and understands the requirements of the project permits provided in the Appendix of the specifications.

1.06 EELGRASS SURVEY AND PROTECTION

A. The established eelgrass beds, shown on the drawings, are subject to protection.

B. Contractor is required to perform water quality monitoring and follow the measures outlined in Section 02220 – Demolition to protect the eelgrass.

C. Eelgrass beds shall be surveyed and the boundary between the eelgrass beds and the work area shall be marked with buoys before work begins. Work activities within the perimeter marked by the buoys are prohibited. The Owner's biologist shall inspect the eelgrass bed prior to buoy installation to make sure it has not changed substantially from the 2014 survey shown on the drawings.

D. The Owner’s biologist will be onsite during all marine construction activities to monitor the eelgrass beds and ensure that they are not impacted by Contractor activities.

E. It is anticipated that, since the bay water at the project sites is already turbid, the turbidity impacts to the eelgrass will not be significant. There is an Optional Bid Item for the Contractor to deploy a silt curtain around the eelgrass beds. The Owner may exercise this Optional Bid Item if observations or turbidity monitoring during the work indicate that the silt curtain is needed to protect the eelgrass.

1.07 SUBMERGED BOAT WRECKAGE

A. There are known submerged boats at the Red Rock site. The Contractor shall leave these materials in place unless directed by the Owner; they are not a part of this project.

PART 2 - PRODUCTS

2.01 TURBIDITY METERS

A. Contractor shall use a turbidity meter approved by the Engineer. Turbidity resolution shall be 0.01 NTU or better, accuracy of +/- 2% of reading or 0.3 NTU, whichever is lower, and range from 0 to 1,000 NTU. All monitoring instruments and equipment shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Note that separate meters (3 or more additional meters) may be required to allow monitoring of turbidity given the wide range of ambient turbidity conditions in the project area.

B. Contractor shall use an underwater light meter approved by the engineer and suitable for the range of results anticipated for the project site.

PART 3 - EXECUTION

3.01 TURBIDITY AND LIGHT LEVEL MONITORING

A. Contractor shall monitor turbidity and light levels in the eelgrass bed in accordance with protocols outlined in this section and the permits in the Appendix.

B. Prior to beginning work, Contractor shall monitor turbidity and light levels at the level of the eelgrass to establish a baseline. Contractor shall also set buoys out to establish background water quality monitoring points upstream and downstream (based on existing currents and tides at the site) of the site. Contractor shall monitor turbidity and light at low, middle, and high tide during typical work hours for several days prior to beginning work. The Owner’s Representative shall review and approve the background monitoring station locations prior to monitoring.

C. During piling removal, Contractor shall monitor turbidity and light levels at the frequency required by the project permits, at the same locations as the baseline monitoring plus within the work area.

D. In accordance with the project permits, light level (Hsat) must not fall below 5 hours a day or turbidity shall not rise to more than 10% above background levels. Contractor shall notify Engineer immediately when permit water quality criteria are exceeded. If the Engineer determines that the water quality criteria have indeed been exceeded, demolition activities must cease until turbidity is reduced and Hsat increases above 5 hours. The Owner may elect to exercise deployment of the silt curtain.

3.02 CONTRACTOR-GENERATED HAZARDOUS WASTES/EXCESS HAZARDOUS MATERIALS

Contractor-generated hazardous wastes shall be removed on a daily basis to the extent possible. Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste, or waste that would reasonably be suspected to be hazardous, in compliance with 40 CFR 262. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes, protect it from the weather by placing it in a safe covered location, and take precautionary measures such as berming or other appropriate measures against accidental spillage. Storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations is the Contractor's responsibility. Transport Contractor generated hazardous waste off City property within 30 days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials must be immediately reported to the Owner. Cleanup and cleanup costs due to spills are the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility.

3.03 FUEL AND LUBRICANTS

Storage, fueling and lubrication of equipment, boats, barges and motor vehicles must be conducted in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded must be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site is not allowed. Fuel must be brought to the project site as needed.

3.04 RECYCLING AND WASTE MINIMIZATION

Contractor shall participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project.

3.05 PREVIOUSLY USED EQUIPMENT

Contractor shall clean all previously used construction equipment prior to bringing it onto the lands and waters of the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, invasive species and invasive plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

SECTION 01140 – ENVIRONMENTAL REQUIREMENTS

Table 1: Daily Reporting Form

STANDARD DAILY OBSERVATIONS		
Location (Pond):	Site	
	Demolition Activity	
Date:		
Time:		
Activity or Activities Accomplished:		
Weather Conditions:	Air Temp:	
	Wind Speed and Direction:	
	Precipitation:	
Person/Company Reporting:		

Evidence/Presence of:	YES	NO
Floating or suspended materials of waste origin generated by the work		
Odors		
Discoloration and/or Turbidity		
Beneficial Use		

Describe any “yes” answers per instructions on back:

SECTION 01140 – ENVIRONMENTAL REQUIREMENTS

SECTION 01140 – ENVIRONMENTAL REQUIREMENTS

Table 2: Potential Presence of Fish and Wildlife Species at the Project Sites

	Jan	Feb	March	April	May	June	July	August	September	October	November	December
Raptor and Migratory Bird Nesting (Including Osprey)	Nesting Season										Nesting Season	
Green sturgeon	Present in San Francisco Estuary year-round											
Longfin smelt		Juveniles present										
Chinook salmon, Central Valley spring-run, adult			Migration									
Chinook salmon, Central Valley spring-run, juvenile	Emigration											Emigration
Chinook salmon, Sacramento River winter-run, adult	Migration										Migration	
Chinook salmon, Sacramento River winter-run, juvenile	Emigration								Emigration			
Steelhead, Central California Coastal, adult	Peak migration											
Steelhead, Central California Coastal, juvenile	Emigration											
Steelhead, Central Valley, adult	Peak migration											
Steelhead, Central Valley, juvenile			Emigration									

END OF SECTION

SECTION 01300 - CONTRACTOR SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of material sources.

B. Submittal requirements.

1.02 RELATED SECTIONS

A. Project progress schedules and status reports are specified in Section 01311 – Project Schedule.

B. Submittals related to the Contractor's quality program are specified in Section 01400 - Quality Control.

C. Preparation and submission of project record documents are specified in Section 01720- Record Drawings.

1.03 LIST OF MATERIALS SOURCES:

The Contractor shall submit to the Engineer a list of the Contractor's sources of materials. The list shall be submitted in sufficient time to permit proper inspections and testing of materials to be furnished from such listed sources in advance of their use.

1.04 SUBMITTAL REQUIREMENTS

A. Schedule of Submittals: Within ten calendar days after the effective date of Notice to Proceed, the Contractor shall submit a completed submittal schedule and list of products for all items requiring the Engineer's review and approval, as follows:

1. Submittals, including description of the item and name of manufacturer, trade name and model number.

2. Specification reference.

3. Intended submission/resubmission date(s).

4. Order release date.

5. Lead time to delivery/anticipated delivery date(s).

6. Highlight any items that require expedited review to meet the project schedule.

These schedules shall be presented in a form acceptable to the Engineer in both electronic and hard copy versions and shall be updated and sent to the Engineer

on a monthly basis. Identify all submittals that are required by the Contract Documents and determine the date on which each submittal will be submitted in conformance with the schedules specified in Section 01311 – Construction Schedule.

B. Professional Seal Required: Submittals involving engineering design services, when required by the Contract Documents or by governing codes and regulations, such as shoring and underpinning, excavation support structures, falsework for concrete, corrosion control system design, and load and design calculations, shall be sealed and signed in blue ink by a professional engineer, currently registered in the State of California, for the discipline involved.

C. Review Period:

1. Prepare submittals sufficiently in advance so that approval may be given before commencement of related work.

2. Allow 30 calendar days after receipt by the Engineer for review of each submittal, including resubmittals.

3. The Contractor shall be responsible for determining whether or not certain governmental entities and utility districts require longer review periods. When longer review periods are required, the Contractor shall schedule the Work accordingly, so that the Work and project progress schedules are not adversely impacted.

D. Submittal Delivery: Ship submittals prepaid or deliver by hand or email directly to the Engineer.

E. Transmittal Form: Accompany submittals with an Owner-furnished transmittal form in duplicate containing the following information:

1. The Contractor's name, address, and telephone number;

2. Submittal number and date;

3. Contract title and number;

4. Supplier's, manufacturer's, or Contractor's name, address, and telephone number; and

5. Subject identification, including Contract Drawing and Specification reference.

F. Changes in Approved Submittals: Changes in approved submittals will not be allowed unless those approved submittals with changes have been resubmitted and approved, in the same manner as the original submittal.

G. Supplemental Submittals: Supplemental submittals initiated by the Contractor for consideration of corrective procedures shall contain sufficient data for review. Make supplemental submittals in the same manner as initial submittals.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. Contractor's Review and Approval:

1. Each submittal shall be reviewed, stamped, and signed as reviewed and approved by the Contractor prior to submission. The Contractor's approval shall indicate review and approval with respect to the following responsibilities:

2. The Contractor shall be responsible for:

    a. The correctness of the drawings, for shop fits and field connections, and for the results obtained by the use of such drawings.
    b. Verification of catalog numbers, and similar data.
    c. Determination and verification of field measurements and field construction criteria.
    d. Checking and coordinating information in the submittal with requirements of the Work and of the Contract Documents.
    e. Determination of accuracy and completeness of dimensions and quantities.
    f. Confirmation and coordination of dimensions and field conditions at the site.
    g. Safety precautions.
    h. Errors or omissions on submittals.
    i. Coordination and performance of work of all trades.
    j. Identification of deviation(s) from Contract requirements.

3. The Contractor shall coordinate each submittal with the requirements of the Work, placing particular emphasis upon assuring that each submittal of one trade is compatible with other submittals of related work. Ensure submittal is complete with all relevant data required for review.

4. The Contractor shall stamp, initial or sign the submittal, certifying:

    a. Dimensional compatibility of the product with the space in which it is intended to be used.
    b. Review of submittals for compliance with Contract requirements.

5. Do not start work for that requires approval by the Engineer until submittals have been returned to the Contractor with official indication that approval has been granted by the Engineer.

6. If the submittal is designated to be sent to the Engineer for information, approval by the designated approval authority shall take place before submission to the Engineer.

7. Approval of drawings and associated calculations by the Engineer shall not relieve the Contractor from the responsibility for errors or omissions in the drawings and associated calculations, or from deviations from the Contract Documents, unless submittals containing such deviations were submitted to the Engineer and the deviations were specifically called to the attention of the Engineer in the letter of transmittal and within the submittal, and approved specifically by the Engineer as a Contract change.

8. Approval of the Contractor’s submittal by the Engineer shall not relieve the Contractor of any responsibility, including responsibility for accuracy and agreement of dimensions and details.

B. Review by the Engineer**:** One marked up reproducible set of drawings, one copy of product data, and one sample will be returned to the Contractor.

C. Distribution of Submittals after Review: Distribute prints or copies of approved submittals, bearing the Engineer's or designated approval authority's stamp and signature, to the Contractor's field office and the Engineer's field office; to affected and concerned Subcontractors, Suppliers, and fabricators; and to affected and concerned members of the Contractor's workforce.

1.06 ENGINEER'S REVIEW

A. Submittals will be reviewed for conformance with requirements of the Contract Documents. Review of a separate item will not constitute review of an assembly in which the item functions. Nether review nor approval shall relieve the Contractor from Contractor’s responsibility for accuracy of submittals, for conformity of submittals to requirements of Contract Documents, for compatibility of described product with other provided products and the rest of the system, or for prosecution and completion of the Contract in accordance with the Contract Documents.

B. Submittals shall be understood as being made for approval, unless otherwise specified, for example, as being made for information, record, or review. The Engineer will indicate its reviews of submittals and the action taken (approvals and non-approvals) by means of its review stamp. The review stamp will be affixed by the Engineer, the action block will be marked, and the stamp will be signed in blue ink and dated.

1. Approval of the submittal by the Engineer does not relieve the responsibilities of the professional Engineer who originally signed and

sealed the submittal or the responsibilities of the Contractor to meet the Contract requirements.

C. The review-stamp action-block marks will have the following meanings:

1. The mark APPROVED is an acceptance, and means that the submittal appears to conform to the respective requirements of the Contract Documents; that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed; and that the submittal need not be resubmitted.

2. The mark APPROVED AS NOTED – RESUBMISSION NOT REQUIRED is an acceptance, and means that the submittal appears to conform to the respective requirements of the Contract Documents upon incorporation of the reviewer's corrections, and that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed. Submittals so marked need not be resubmitted unless the Contractor challenges the reviewer's exception within 7 calendar days. All noted changes will be reflected in the as-built drawing by the Contractor.

3. The mark LIMITED APPROVAL – RESUBMISSION REQUIRED is an approval except for the work impacted by the notes and comments, and means that the submittals requires corrections to conform to the respective requirements of the Contract Documents. Fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed at the Contract’s risk only for the elements of work not impacted by and changes required to incorporate the reviewer’s corrections. The noted work cannot proceed until verification by the Engineer that the review’s correction have been properly incorporated in the submittal.

4. The mark NOT APPROVED – RESUBMISSION REQUIRED is a disapproval, and means that the submittal requires corrections to conform to the respective requirements of the Contract Documents, and that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may not proceed until incorporation of the reviewer's corrections and verification by the Engineer that the reviewer's corrections have been properly incorporated in the submittal.

5. The mark REJECTED – RESUBMISSION REQUIRED is a disapproval, and means that the submittal is deficient to the degree that the reviewer cannot correct the submittal with a reasonable degree of effort, has not made a thorough review of the submittal, and that the submittal needs revision and is to be corrected and resubmitted.

6. The mark NOT REVIEWED is acknowledgement of receipt and means that the submittal is for information and record purposes only.

D. Review stamps or other approval methods of the various designated approval authorities may not be the same as those of the Owner. The Contractor shall work with the various designated approval authorities and shall obtain approvals in the clearest and most straightforward manner possible.

PART 2 **PRODUCTS – NOT USED**

PART 3 **EXECUTION – NOT USED**

END OF SECTION

SECTION 01311 - PROJECT SCHEDULE

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

B. Section 01010 – Summary of Work

C. Section 01141 – Environmental Requirements

D. Section 01300 – Submittals

1.02 DESCRIPTION OF WORK

A. This section describes preparation and submittal of the Project Schedule. The Project Schedule may be constrained by the environmental requirements described in Section 01141.

1.03 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or consultant specializing in Scheduling with three (3) years minimum experience in scheduling construction work of a complexity comparable to this project.

1.04 FORMAT

A. Schedule: Format to be determined by Contractor.

B. Scale and Spacing: Time scale using units of approximately one week. Allow spacing for notations and revisions

1.05 SCHEDULES

A. The progress schedule to be prepared by Contractor shall consist of a Schedule as described herein. The Schedule shall be based on the precedence diagramming method with no lead and/or lag time. Preparation of the Schedule is solely the responsibility of the Contractor; senior management personnel shall actively participate in its development. The Schedule shall consist of a detailed network, mathematical analyses, and network diagrams.

B. The network diagram shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by Contractor. The basic concept of a network diagram shall be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.

C. The substantial and final completion dates for the work which is shown in the complete Schedule shall be those detailed in the Contract documents.

D. Activities contained in the schedule and the mathematical analyses and shown on the schedule shall include:

1. Construction activities, which shall have a minimum duration of one work day and a maximum duration of ten work days. The activity shall be descriptive of the work to be performed. If, in the opinion of the Contractor, a task requires greater than fifteen work days to perform, that task shall be broken into two or more logically discrete activities, each with durations equal to or less than fifteen work days. The definition "start" or "finish" are not acceptable.

2. Submittal, review and approval of samples of materials and shop drawings. A minimum of 10 working days or two (2) working weeks per sheet of drawings to be reviewed, whichever is greater, shall be scheduled for review and approval of submittals by Architect.

3. Fabrication, installation and testing of special materials or equipment.

4. Activities of User, including delivery and installation of Owner-provided equipment and furnishings, substantial completion, punch list, and closeout requirements, or of Engineer or others that affect progress of the work.

E. The schedule shall show the duration of each activity in work days. Update monthly to show actual progress of each activity.

F. Related activities shall be grouped in the schedule. The activities on the critical path shall be highlighted. Weekends, holidays and other non-work periods shall be indicated. Where float or slack exists, the activities shall be shown at the earliest times they can be completed.

1.06 SUBMITTALS

A. A preliminary schedule defining the work during the first sixty (60) days following the Notice to Proceed shall be submitted to Engineer (Owner’s Representative) within 10 days following Notice of Award. Contractor's general approach for the balance of the contract shall also be indicated. The format of this submittal and the information provided therein shall be in accordance with Paragraphs 1.04 and 1.05 of this section.

B. The complete Schedule shall be submitted to Engineer within 30 days following the Notice to Proceed.

C. Documents to be submitted shall include:

1. Three copies of the proposed schedule.

D. Contractor shall submit, as part of its monthly Application for Payment, a report of the actual construction progress by updating the Schedule and the report required in Subparagraph 1.05 of this section. All approved contract changes shall be included in this report. This report shall be submitted in the format and medial described in Paragraph 1.05 of this section.

1. The report shall show the activities or portions of activities completed during the reporting period and their total value as basis for the Contractor's request for payment. The report shall state the percentage of the work actually completed and scheduled as of the report date and the progress along the critical path in terms of days ahead or days behind the mutually acceptable schedule dates. If the work is behind schedule, progress along other paths with negative float or slack shall also be reported

2. Contractor shall submit a narrative report with the updated Schedule which shall include a description of current and anticipated problem areas, current and anticipated delaying factors, the impact of these areas and factors, and actions taken or proposed to correct these areas and factors.

1.07 UPDATING SCHEDULE

A. If Contractor thereafter desires to make changes in its method of operating or scheduling, it shall notify the Engineer in writing, stating the reasons for the proposed change. If the Engineer considers these changes to be of a major nature it may require Contractor to revise and submit, at no increase in the Contract Sum or Contract Time, all of the affected portion of the Schedule to show the impact of the requested change on the balance of the work. Such a submittal shall undergo the review and acceptance process defined in Section 1300. A change may be considered to be of a major nature if the time estimated to be required or actually used for an activity, the network logic, or sequence of activities varies from the original Schedule to a degree that there is reasonable doubt regarding the Contract Completion Date. Changes affecting activities with adequate slack time shall be considered as minor changes, except that an accumulation of minor changes may be considered a major change when their cumulative effect might affect the Contract completion date. Out of sequence operations by the Contractor without prior notification to the Engineer may be considered a "de facto" change of a major nature by the Engineer.

1.08 DISTRIBUTION

A. Following joint review, distribute copies of updated schedules to Contractor's project site file, to Subcontractors, Suppliers, Engineer and Owner.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01311 - PROJECT SCHEDULE

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SECTION 01400 - QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Source of materials.

B. Work quality.

C. Manufacturer's specifications and instructions.

D. Specialist applications/installer.

E. Manufacturer's field services.

F. Engineer's monitoring.

G. Engineer's inspections and tests.

H. Contractor's quality control testing.

I. Test reports.

J. Quality control audits.

K. Certificates of compliance.

L. Special inspections.

1.02 MEASUREMENT AND PAYMENT

A. Separate measurement or payment will not be made for work required under this Section. All costs in connection with the work specified herein will be considered to be included with the related item of work in the Bid Schedule of the Bid Form, or incidental to the Work.

1.03 SUBMITTALS

A. General: Refer to Section 01300 – Contractor Submittals, for submittal requirements and procedures.

B. Within five days after completion of testing performed by or for the contractor, submit test results of such tests to the Engineer. Identify test reports with the information specified for submittals in Section 01300 – Contractor Submittals, and additionally, the name and address of the organization performing the test, and the date of the tests.

1.04 SOURCE OF MATERIALS

A. In accordance with Section 01300 – Contractor Submittals, the Contractor shall notify the Engineer in writing of the sources from which the Contractor proposes to obtain materials requiring Owner approval, certification, or testing.

1.05 WORK QUALITY

A. Shop and field work shall be performed by mechanics, crafts-persons, artisans, and workers skilled and experienced in the demolition, fabrication and installations of the work involved. The work shall be performed in accordance with the Contract Documents and the reviewed and accepted Shop Drawings.

B. Work shall be erected and installed plumb, level, square, and true, or true to indicated angle, and in proper alignment and relationship to the work of other trades. Finished Work shall be free from defects and damage.

1.06 MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS

A. Unless otherwise indicated or specified, manufactured materials, products, processes, equipment, systems, assemblies, and the like shall be erected, installed, or applied in accordance with the manufacturer's instructions, directions, or specifications. Said erection, installation, or application shall be in accordance with printed instructions furnished by the manufacturer of the material or equipment concerned for use under conditions similar to those at the jobsite.

B. Any deviation from the manufacturer's printed installation instructions and recommendations shall be explained and acknowledged as correct and appropriate for the circumstances, in writing, by the particular manufacturer. The Contractor will be held responsible for installations contrary to the respective manufacturer's installations and recommendations.

1.07 SPECIALIST APPLICATOR/INSTALLER

A. Materials, equipment, systems, and assemblies requiring special knowledge and skill for the application or installation of such materials, equipment, systems, or assemblies shall be applied or installed by the specified product manufacturer or its authorized representative or by a skilled and experienced Subcontractor qualified and specializing in the application or installation of the specified product.

B. The installation Subcontractor shall be approved by the product manufacturer, as applicable.

1.08 MANUFACTURER'S FIELD SERVICES

A. The Contractor shall have the manufacturer of a product, system, or assembly that requires special knowledge and skill for the proper application or installation of such product, system, or assembly provide appropriate field or job service at no additional cost to the Owner. The Contractor shall have the manufacturer inspect and approve the application or installation work.

B. The Contractor shall make all necessary arrangements with the manufacturer of the products to be installed to provide onsite consultation and inspection services to assure the correct application or installation of the product, system, or assembly.

C. The manufacturer's authorized representative shall be present at the time any phase of this work is started.

D. The Contractor shall have the manufacturer inspect and approve all surfaces over which, or upon which, the manufacturer's product will be applied or installed.

E. The Contractor shall have the manufacturer's representative make periodic visits to the site as the work progresses as necessary for consultation and for expediting the work in the most practical manner.

1.09 ENGINEER'S MONITORING

A. The Engineer will perform surveillance inspection of the Contractor's on-site construction activities. Surveillance inspection consists of a review, observation, or inspection of Contractor personnel, material, equipment, processes, and test results, performed at random or at selected stages of the construction operations. The purpose of surveillance inspection is to determine if an action has been accomplished or if documents have been prepared in accordance with selected requirements of the Contract Documents.

B. The Contractor shall provide access to the Work and shall furnish the Engineer reasonable facilities for obtaining such information as may be necessary to be fully informed of the quality and progress of the Work.

C. Surveillance inspection does not take the place of the Contractor's quality programs or assume any responsibility for such programs or the quality of the Work. The Contractor shall establish its own quality program, perform the required inspections, and provide the necessary documentation to assure that acceptable quality has been achieved. The Contractor is responsible for specifying and controlling the quality of work performed by its Subcontractors.

1.10 ENGINEER'S INSPECTIONS AND TESTS

A. The Engineer may perform inspections and tests as necessary to determine the Contractor's compliance with Contract requirements. The Engineer may

perform such additional inspections and tests as it deems necessary to verify compliance with Contract requirements.

B. For inspections and tests by the Engineer, the Engineer will provide the services of a qualified testing laboratory, soils engineer, or inspector, selected and paid for by the Owner.

C. The Owner-employed testing laboratory will supervise the preparation and selection of samples required for testing.

D. The Contractor shall provide such facilities and assistance as the testing laboratory may require for obtaining the necessary samples.

1.11 CONTRACTOR'S QUALITY CONTROL TESTING

A. Scope: The Contractor shall perform quality control inspections and tests as necessary to ensure compliance with Contract requirements.

B. Testing Services:

1. Quality control testing is the testing of materials prior to their delivery from a manufacturer, or during construction, such as soils compaction tests, load tests, concrete tests during placement, concrete strength tests, pipe leakage tests, and such other tests as are specified in the various Sections of the Specifications to ensure compliance with the Contract Documents. The Contractor shall assume full responsibility for quality control testing and shall give sufficient notice to the Engineer to permit the Engineer to witness the tests. Quality control testing shall be at the expense of the Contractor and shall be performed by a Contractor-employed independent testing firm.

C. Laboratory Tests: All laboratory testing shall be performed by an independent, qualified testing laboratory approved by the Engineer. The selected laboratory shall employ the proper equipment and qualified testing personnel for the testing specified in these Specifications. The Contractor shall obtain the Engineer's approval of the testing equipment and personnel. The Engineer may monitor the operations to ensure that tests are being performing in accordance with approved procedures and in compliance with these Specifications.

D. Qualification of Laboratory Testing Personnel: Personnel performing laboratory tests shall be qualified for such work by virtue of prior experience and training.

E. Testing Equipment: Testing equipment shall be in satisfactory operating condition, of adequate capacity and range, and accurately calibrated. Testing equipment shall be calibrated in accordance with national standards which are certified by the National Institute of Standards and Technology. Testing equipment shall be calibrated at the frequency recommended by the equipment manufacturer.

1.12 TEST REPORTS

A. Test reports shall include the following information:

1. Actual test results compared with the Contract requirements and identification of all non- conforming items.

2. Calibration Certificates.

B. The Engineer will make available to the Contractor copies of all test reports of tests performed by the Engineer.

1.13 QUALITY CONTROL AUDITS

A. The Engineer may perform quality control audits of the Contractor's, Subcontractor's, and Supplier's quality records and performance. The Contractor shall ensure that all quality control records and places of work are open and available to the Engineer for inspection. The Engineer will give 30 days notice of intention to audit specific activities or installations.

B. The Contractor, Subcontractor, or Supplier being audited shall be available during the audit as required by the audit team.

1.14 CERTIFICATES OF COMPLIANCE

A. The Contractor may use certificates of compliance for certain materials and products in lieu of the specified sampling and testing procedures. Submit any certificates required for demonstrating proof of compliance of materials with specification requirements with each lot of material delivered to the Work. The lot so certified shall be clearly identified by the certificate. Certificates shall be signed by an authorized representative of the producer or manufacturer and shall state that the material complies in all respects with Contract requirements.

B. The Schedule specified in Section 01311 - Project Schedule, shall indicate the date scheduled for the submittal of certificates. In the case of multiple shipments, each of which shall be accompanied by a certificate of compliance, the scheduled date on the Project CPM Schedule shall indicate the initial submittal only.

C. The certificate of compliance shall be accompanied by a certified copy of test results or shall state that such test results are on file with the producer or manufacturer and shall be furnished to the Owner on request. In addition to the identifying information specified for submittals in Section 01300 – Contractor Submittals, the name and address of the organization performing the tests, the date of the tests, and the quantity of material shipped.

D. Materials used on the basis of a certificate of compliance may be sampled and tested by the Engineer at any time. The fact that material is used on the basis of a

certificate of compliance shall not relieve the Contractor of its responsibility for incorporating material in the Work which conforms to the requirements of the Contract, and any such material not conforming to such requirements will be subject to rejection, whether in place or not.

E. The Owner reserves the right to reject a certificate of compliance and require submittal and execution of sampling and testing procedures described herein.

1.15 SPECIAL INSPECTONS

A. Any special inspections required shall be executed by an independent inspection organization, not affiliated with the Contractor or its regular quality control organization.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01505 - MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

A. This Specification Section outlines those responsibilities of the Contractor that are scheduled to be performed for both mobilization and demobilization.

B. Related Sections:

1. Section 01010 – Summary of Work
2. Section 01141 – Environmental Requirements
3. Section 01300 – Contractor Submittals
4. Section 02270 – Erosion and Sediment Control

1.02 WORK SITE

A. This project is for the demolition of pilings and habitat restoration work in the Bay in two project areas. The Limits of Work are generally shown on the drawings. While the Red Rock Warehouse site work area (on land and in the water) is owned by the City of Richmond; the El Campo Marina site is privately owned. The Contractor shall confirm the limits of work with the Owner prior to mobilization. All worksites shall be returned to existing conditions or better upon demobilization.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Mobilization shall include furnishing specified submittals, moving onto the Site all equipment necessary for the Work; furnishing and erecting plants, temporary work areas, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of Work.

B. Prior to the mobilization of all plant, equipment, offices or temporary facilities to the Site, the Contractor and Owner Representative shall jointly perform a site survey of the existing conditions.

C. Mobilization shall include, but not be limited to, the following work items:

1. Attendance at pre-construction meeting.
2. Signatures on all Contract Documents necessary to proceed.
3. Delivery of all required pre-construction submittals, including project schedule, submittal schedule, and others as specified.
4. Mobilizing and moving onto site the Contractor's plant, equipment, tools, materials and labor required for the first 30 days of work.

5. Providing the Contractor's Project Manager, Project Superintendent, Project Engineer and Site Safety Representative at the Project site full time.

6. Obtaining and paying for all required permits, insurance, and bonds.

7. Installing temporary construction power, wiring, and lighting facilities if necessary.

8. Providing on-site sanitary facilities and potable water facilities.

9. Arranging for and erection of Contractor's work and storage yards and any required on-site and off-site parking areas.

10. Posting all OSHA-required notices and establishing safety programs as defined in Contractor's Cal-OSHA approved Safety Program.

11. Fabricating and erecting project signs, construction area signs, traffic handling and detour signs, and temporary traffic control devices.

12. Preparing and submitting Site Specific Contractor Health and Safety Plan.

13. Providing onsite communication facilities, including telephones.

14. Constructing and implementing safety and security features.

15. Installing erosion control measures, and other environmental protection measures such as environmental fencing as Specified in Sections 01140 and 02270, indicated in the Drawings, and/or covered in applicable permits (provided in Appendix B).

16. All other incidental work of a general and administrative nature as specified in the Contracting Requirements and General Requirements and not covered under separate bid items.

D. Demobilization shall include, but not be limited to, the following work items:

1. Demobilizing and removal of the Contractor's facilities and equipment.

2. Removing all project signs from project site, and removing all construction area signs, traffic handling and detour signs, and temporary traffic control devices from project vicinity.

3. Removing all temporary construction facilities and other equipment and utilities from the site as Contractor's property within 10 calendar days after Final Completion. Cleanup of all debris and restoring the site as specified.

4. Furnishing all required equipment installation certification forms, warranty documents and Operations and Maintenance (O&M) data and manuals and spare parts, special tools and keys.

5. Coordinate and attend O&M meeting and hand-off meeting.

6. Performing and submitting all manufacturer installation checkouts.

7. Preparing and submitting all final documents, including certified payroll, and other records of payments to suppliers and subcontractors, and lien releases/claims waivers needed to close the contract within the time requirements.

8. Furnishing the Contractor's Final Updated Construction Drawings (Record Drawings) per Section 01720.

9. Finishing all punch list work within the time requirements.

10. Restoring disturbed vegetated areas in accordance with Section 02950.

11. Performing final site cleanup and restoration as required.

12. Providing signoffs from affected property owners and permitting agencies confirming that their requirements have been met.

13. Completing all specified close-out requirements.

14. Requesting final payment.

PART 2 **PRODUCTS (NOT USED)**

PART 3 **EXECUTION (NOT USED)**

END OF SECTION

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SECTION 01720 - RECORD DRAWINGS

PART 1 GENERAL

1.01 DESCRIPTION

A. Contractor shall provide and maintain on the jobsite one complete set of prints of all Plans which form a part of the contract. Immediately after each portion of the work is installed, indicate all deviations from the original design shown on the Plans either by additional sketches or marked in red ink thereon and reviewed by Owner's Representative. Upon completion of the job, deliver this record set to the Owner's Representative.

B. The Contractor shall supply the Owner Representative with GPS or surveyed coordinates of the locations and ground elevations of all restoration elements and plantings. This information, along with electronic copies of the record drawings (CAD and PDF formats) shall be submitted to the Owner upon completion of the project.

C. Record GPS location of any abandoned facilities (i.e., end of pipe).

D. Record drawings shall be submitted with final request of progress payment.

E. Make the record drawings available for review by Owner in Contractor's field office.

F. Protect the record set from damage or loss.

1.02 DETAILED REQUIREMENTS

A. The Contractor shall provide Record Drawings which shall clearly show all differences between the contract Work as drawn and as installed for all concealed construction, as well as construction added to the Contract, which is not indicated on the Contract Drawings.

B. Concealed shall mean construction installed underground or in an area which cannot be readily inspected by use of access panels, inspection plates or other removable features.

C. Show all changes in the Work, or Work added on the Record Drawings in a contrasting color.

D. In showing changes in the Work, or added Work, use the same legends that are used on the Contract Drawings. Indicate exact locations by dimensions and exact elevations. Give dimensions from a permanent point.

E. Record by marking on the Drawings all changes in the Work which occur during construction, including addition of approved change orders.

F. Show locations and key dimensions, depths and elevations of all underground lines, conduit runs, sensor lines, valves, capped ends, branch fittings, pull boxes, etc.

G. Record information on how to maintain and/or service concealed Work.

H. CAD files shall be in AutoDesk AutoCAD .dwg file format, latest version.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Deliver the marked record set of Drawings to the Owner prior to acceptance of the Work.

B. Photograph all buried facilities, prior to backfill.

C. Owner will provide CAD files of conformed drawing set. Contractor will edit these to create record drawings in CAD and PDF format electronic files.

END OF SECTION

SECTION 02110 - SITE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. This specification section covers the following items of work:

1. Mobilization of labor, materials, equipment, and supplies necessary to complete the work.

2. Clearing and grubbing designated areas and disposal of debris.

3. Preparation of staging and stockpile areas.

4. Protection from injury of trees, shrubs, vegetation and existing features designated to remain.

1.2 DEFINITIONS

A. Whenever in this section the following terms are used, the intent and meaning shall be interpreted as stated below:

1. Clearing:

   a. Clearing shall consist of cutting, removing, and disposing of material from the ground surface, such as trees, brush, logs, stumps, weeds, grasses, and obstructions of any kind. Trees, shrubs, and vegetation designated to remain shall not be removed or disturbed. Trees and shrubs adjacent to work areas shall be protected from damage.

   b. Clearing shall also include the removal and disposal of trash piles and rubbish from the work site created during the duration of the work.

2. Grubbing: Grubbing shall consist of cutting, removing, and disposing of all material found below the ground surface. Tree stumps shall be ground to a minimum of 2’-0” below finish grade.

1.3 SUBMITTALS

A. The Contractor shall submit a detailed clearing and grubbing plan for the areas indicated on the plans to be cleared. Include in the plan the proposed method(s) of disposal of cleared vegetation.

B. The Contractor shall submit a detailed staging and stockpile area plan for each site. The plan shall address handling, stockpiling, cutting, drying, loading, and transportation routes for all demolition debris.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. Clearing and grubbing operations shall be conducted with minimum interference with roads and adjacent facilities.

B. The Contractor shall stake out all work areas designated for clearing and grubbing. The Contractor shall be responsible for the accuracy, maintenance and observation of all lines and elevations.

C. The location, limits, and methods to be used for clearing and grubbing shall be reviewed with the Engineer prior to start of work.

D. Areas, facilities, equipment and vegetation outside of Contractor work areas, which are affected by the Contractor's work, shall be restored to a condition as good as existed before the work began.

3.2 CLEARING AND GRUBBING

A. Clearing and grubbing shall be completed prior to the start of demolition specified in Section 02200 – Demolition.

B. All areas will require the Engineer’s approval prior to the start of clearing and grubbing work.

3.3 STAGING AND STOCKPILING

A. Contractor shall establish a staging and stockpile area at an area or areas to be approved by the Engineer and the City of Richmond. Areas anticipated to be provided by the City for staging and stockpiling are shown on the plans (they are marked as Staging Areas on the plans).

B. Staging and stockpile area shall provide sufficient room to cut all removed planks and pilings into 5-foot lengths and allow them to dry before loading for off-hauling.

C. Staging and stockpile area shall not impeded traffic or pedestrian movement.

D. Staging and stockpile area shall be prepared to comply with Section 02270 Erosion and Sediment Control and project permits.

3.4 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

A. Burning of combustible materials, or their burial, will not be permitted on City property.

B. Chip tree trunks and root balls and haul off site and dispose legally.

C. All remaining cleared and grubbed materials shall also be chipped and hauled off site and disposed legally.

3.5 ADDITIONAL SITE PREPARATION ACTIVITES

A. See additional site preparation activities described in Section 02220 – Demolition and Section 01141 - Environmental Requirements.

END OF SECTION

SECTION 02220 – DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. This Specification Section presents the requirements for demolition, handling, and disposal of:

1. Creosote-treated wood pilings and support beams
2. Piles or other materials that have broken previously and are now on the sea floor
3. Piles that break above the sea floor during removal
4. Miscellaneous equipment and appurtenances

B. The Contractor shall demolish existing facilities as indicated, in accordance with the Plans at the two sites.

C. Pilings are to be removed in accordance with these specifications and permit conditions using methods designed to minimize turbidity in the bay and avoid impact to adjacent eelgrass beds.

1.02 RELATED SECTIONS:

A. Section 01110 – Summary of Work

B. Section 01141 – Environmental Requirements

C. Section 01300 – Submittals

D. Section 02270 –Erosion and Sediment Control

E. Section 02950 – Site Restoration

1.03 SUBMITTALS

A. Make submittals in accordance with Section 01300 – Submittals.

B. Work Plan: Contractor shall submit for Engineer review and approval, a Work Plan covering each site, including the following items:

1. Demolition and Bay Floor Debris Removal Plan which shall include, but not be limited to:

   a. Contractor's quantities of materials to be demolished for each site, based on a careful land and water-based inspection

b. Procedures for complying with permit conditions for all demolition activities.

c. Procedures for removal of the different types of piles present to minimize turbidity generation to the greatest extent possible. The method of “snapping” the pile by rocking it back and forth with a crane until the pile breaks at the “point of fixity,” where the pile and the top of the solid soil meet, is not an acceptable method, nor is vibratory removal of piles.

d. Proposed locations for disposal of all site materials.

2. Marine Safety Plan which shall include, but not be limited to:

a. Health and Safety Plan including Diving Safety Plan (which shall include an Emergency Response Plan)

b. Marine Communication Plan

c. Traffic Management Plan including Marine Transportation Plan

d. Critical Operations Plan which, at a minimum, shall consist of:

1) Anchoring Plan

2) Rigging and Lifting Plan

3) Oil Spill Response Plan

4) Hazardous Material Management Plan (HMMP)

C. Silt Curtain Product Information and Deployment Plan (Optional): If required, Contractor shall submit for Engineer review and approval a Silt Curtain Deployment Plan addressing the following:

1. The location, type, size, positioning/anchoring, and characteristics of proposed silt curtains and oil booms and schedule for deployment, maintenance and repositioning. Include manufacturer’s product information/cut sheets.

2. Provide shop drawings and design calculations for the curtain itself, attachments and anchoring plan. The drawings shall be prepared, signed, and stamped by a Professional Engineer registered in the State of California.

D. Turbidity Monitoring Plan: Submit a turbidity monitoring plan, including product information on monitoring equipment, proposed monitoring locations and procedures to follow, should turbidity increase above background levels

E. Proposed demolition procedures shall provide for the safe conduct of the work, careful removal and disposition of materials and equipment, protection of existing facilities which are to remain undisturbed, coordination with existing facilities to remain in service, and timely disconnection and reconnection of utility services. A storage plan for any salvaged items shall be included.

F. Pile Remover Qualifications: Submit resume of Crane Operator for Piling Removal demonstrating a minimum of 3 prior projects in the last 3 years in which he/she removed pilings from the water by crane. Provide contact information for the client of each project to verify performance.

1.04 DEMOLITION

A. Existing pavement, structures, equipment, piping, valves, ductwork, electrical gear, instrumentation, utilities, and related appurtenances such as anchors, supports, and hardware indicated or required to be demolished as part of the work shall be removed and disposed of unless otherwise indicated. Removed items shall be disposed of offsite by the Contractor.

B. Demolition shall be performed as shown on the Plans and as necessary to perform the required work.

1.05 SALVAGE

A. Items of existing equipment, piping, valves, electrical gear, instrumentation, utilities, and appurtenances indicated to be salvaged shall be removed without any degradation in condition from that prior to removal. Salvaged items shall be stockpiled and protected on the site at a location chosen and approved by the respective site owners. The Contractor shall be responsible to properly safeguard the salvaged items against damage and loss during removal and handling.

B. Items to be salvaged include:

Item	Description
None	

1.06 ABANDONMENT

A. Existing piping, utilities, and appurtenances to be abandoned shall be prepared by the Contractor as indicated.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall complete a site survey to finalize the number and types of standing piles, the area(s) of visible decking, and submerged piles and decking prior to the initiation of any demolition activity.

B. The Contractor shall coordinate demolition work with the Owner Representative. Unless otherwise indicated, the Contractor shall be responsible for the sequence of activities. Work shall be performed in accordance with applicable safety rules and regulations.

C. The Contractor shall verify that any utilities connected to structures, equipment, and facilities to be removed or abandoned are rendered inoperable, replaced with new utilities, or adequately bypassed with temporary utilities before proceeding with demolition.

D. The Contractor shall take precautions to avoid damage to adjacent facilities and to limit the Work activities to the extent indicated.

3.02 PROTECTION OF EXISTING FACILITIES

A. Contractor shall carefully survey the existing facilities and examine the Specifications and Plans to determine the extent of demolition and coordination with the work. Existing facilities not subject to demolition shall be protected and maintained. Damaged existing facilities shall be repaired to the previous condition or replaced.

B. Owner staff and their representatives shall be afforded safe passages around areas of demolition.

3.03 SILT CURTAIN INSTALLATION (OPTIONAL)

A. If required by the permitting agencies, or if indicated by turbidity monitoring during the execution of the work, Contractor shall install silt curtains around the eelgrass beds to prevent turbidity from migrating there. Install curtains within the Bay in accordance with approved submittal. Contractor may select the areas and sequence in accordance with their means and methods of demolition, as long as they are in accordance with the project permits cited in Section 01141 – Environmental Requirements.

B. The Contractor shall coordinate installation of the curtain with the Supplier, the Engineer and regulatory agencies.

C. The curtain and appurtenances shall be shipped and stored in accordance with Supplier's recommendations and in a manner that will not compromise the integrity of the curtain.

D. The Contractor shall be responsible for inspecting and maintaining the curtain in working condition throughout the project. All repairs shall be compatible with the recommendations of the Supplier.

E. Curtains shall not be removed until all work within the Bay is completed.

3.04 DEMOLITION

A. General: Demolish and remove existing wharf, pilings, and debris within the project limits as shown on the Plans and in accordance with the following:

1. Demolition crane operator shall be approved in advance by Owner as being experienced in pile removal.

2. All existing deck fixtures, hardware, and piping shall be removed and disposed of unless otherwise noted.

3. During demolition activities the Contractor shall be responsible for maintaining the stability of the adjacent shoreline. The Contractor shall establish adequate survey points to monitor adjacent embankment during demolition. Accidental collapse of portions of the existing embankment due to Contractor operations shall be repaired at no additional cost.

4. No debris shall be allowed to remain in the water during demolition operations. The Contractor shall provide a temporary platform or other suitable means of capturing debris from the demolition operations.

5. All demolition debris shall be contained and removed from the site.

6. Large features to be removed shall have tag lines attached to facilitate recovery from the Bay if needed.

7. Items not shown on the Plans or mentioned in the specifications which are encountered during Contractor operations shall be brought to the attention of the Engineer who will determine the disposition of the items.

8. Existing structures are in deteriorated conditions, the contractor shall determine any safe loading condition restrictions applicable to demolition activities before allowing any equipment or personnel to be on any structures.

9. Demolition activities and hauling activities shall be limited to normal workdays and hours (e.g., Monday through Friday generally from 8 a.m. to 5 p.m.). If authorized by the Owner, truck operations could be extended.

Haul routes shall be selected in consultation with Owner's staff to minimize traffic load and congestion. Ridesharing shall be encouraged and appropriate signage and safety requirements shall be implemented at the Contractor's staging area.

10. Cease operation and notify Engineer immediately if demolition appears to endanger life, environment, facilities, or property. Do not resume operations until safe conditions have been restored.

B. Deck and Dolphin Fixtures Removal

1. Deck and dolphin fixtures to be removed include metal, fenders, mooring fixtures, and miscellaneous remnants.

2. Fixture removal may occur concurrently with deck demolition.

C. Wharf Decking Removal

1. Remove all structural deck members including decking, joists, caps, beams, curbs, connection hardware, and other miscellaneous features.

2. All creosote-treated wood and materials shall be disposed of at a permitted landfill facility licensed to take creosote-treated timber.

D. Piling Removal

1. The Contractor shall adhere to all requirements of Federal, State, and local regulatory agencies as well as all the permit requirements for the protection of the marine environment during commencement of their work.

2. Piles at the sites appear to be creosote-treated wood. The piling removal approach in this project is as required by the San Francisco Bay Regional Water Quality Control Board (RWQCB). Contractor shall attempt to remove the pilings in a different way, depending on the contamination of the surrounding sediments or muds.

a. If the sediment is known or thought to be contaminated, the Contractor shall cut the piling at the mudline.

b. If the sediment is not contaminated, the Contractor shall attempt to remove the entirety of each piling by pulling the piling straight out. Contractor is prohibited from using vibration or a back-and-forth, rocking movement intended to snap the piling because this generally increases turbidity.

1) If, prior to attempting to remove the entire piling, visual inspection of the pilings indicates that the pilings lack the necessary integrity to be pulled without splintering,

crumbling, or otherwise disintegrating, Contractor shall change to the cutting method described below.

2) If, during attempts to use direct pulls on the piling to remove it, the piling breaks at a level higher than 2 feet below the mudline, the Contractor shall cut the remaining pile to a level 2 feet below the surrounding existing sediment or mudline.

c. The removal method(s) utilized for each site shall be described for Owner approval in the Demolition and Bay Floor Debris Removal Plan.

3. The removed piles shall be loaded onto a barge and transported back to the Contractor's staging area where any non-creosote materials such as concrete or metal shall be separated and recycled or disposed of offsite as appropriate at a permitted facility.

4. The barge shall be designed in such a way as to prohibit sediment or debris from falling back into the water. The work surface on the barge deck shall include a containment basin for piles, concrete, and any mud or sediment removed during pulling. Upon removal from substrate, the piles shall be moved expeditiously from the water into the containment basin.

5. Jetting away the sediments around the piles is not allowed. Where the method selected is expected to generate concrete chips or dust in the water, a special curtain shall be deployed around the individual pile so the contractor may capture any concrete pieces for offsite disposal.

6. Intentional breaking of timber piles above the mudline is prohibited.

7. The piles shall not be shaken, hosed-off, stripped or scraped off, left hanging to drip or any other action intended to clean or remove adhering material from the pile.

8. Any sediment accumulated from the pile removal operations shall be assumed to contain creosote and shall be contained and eventually tested and disposed offsite in an appropriate landfill.

E. Piling Stub Removal/Diver Survey

1. Upon completion of wharf, decking, and piling demolition and removal, the Contractor shall perform a post-demolition diver survey within the project areas. The survey shall document the quantity and type of pilings stubs above the mudline, the condition of the Bay's floor and identify quantities and types of debris from previous operations and/or from the demolition activities remaining on the Bay floor. The Contractor shall submit the results of the survey to the Owner with descriptions of their approach to

removal of the piling stubs and debris. The Owner may elect to leave some debris in place if it has established eel grass growing on it. After this submittal is approved by the Owner, then the Contractor can proceed with piling stub and debris removal.

2. Identified piling stubs shall be cut off at 2 feet below mudline.

3. Identified debris shall be removed from the Bay's floor and disposed of or recycled as appropriate in accordance with the Project's Bay Floor Debris Removal Plan and Section F below.

4. The Owner will confirm piling stub removal by conducting a post-construction side-scan sonar study in accordance with Section 02950 – Site Restoration.

F. Bay Floor Debris Removal

1. Bay floor debris including above water timber piles, underwater timber piles, fallen timber piles, collapsed decking, steel piping, and other miscellaneous items, as shown on the Plans or as encountered during demolition activities, shall be removed.

2. All the Bay floor debris within the project limits shall be removed unless it will involve the disturbance of eel grass. Timber piles not shown on the Plans encountered during operations shall be removed. Other items not shown on the Plans or mentioned in the specifications, which are encountered during the Contractor's operations, shall be brought to the attention of the Engineer. The Engineer will determine the disposition of the items.

3. All removed debris shall be transported to the Contractor's staging area and recycled or disposed at a permitted landfill facility.

4. The Owner will confirm bay floor debris removal by conducting a post-construction side-scan sonar study in accordance with Section 02950 – Site Restoration.

G. Removal of debris and piping along shoreline

1. Existing undamaged concrete slabs and concrete debris along the shoreline shall be left in place to avoid destabilizing the embankment. Degraded decking that is suspended over water by derelict piles, and all other timber and metal debris along the shoreline, shall be removed and disposed.

2. On-shore piping shall be removed or left in-place as indicated in the Plans.

H. The following best management practices (BMPs) shall be used to prevent hazardous waste release and minimize creosote release, sediment disturbance and total suspended solids generation during the demolition operations:

1. Install a floating surface boom to capture floating surface debris.

2. Keep all equipment (e.g., bucket, steel cable) out of the water and grip piles above the waterline.

3. Slowly lift the pile from the sediment and through the water column.

4. Dispose of all removed timber piles, floating surface debris, sediment spilled on work surfaces, and all containment supplies at a permitted upland disposal site that accepts creosote-treated wood and materials contaminated with creosote.

I. The following basic construction measures shall be implemented by the Contractor to minimize exhaust and dust emissions during the demolition operations:

1. All unpaved and exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.

3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.

5. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure [Cal. Code Regs., tit. 13, § 2485]). Clear signage shall be provided for construction workers at all access points.

6. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

7. Project vessels and equipment that rely on internal combustion engines for power and/or propulsion shall be kept in good working condition and compliant with California emission regulations. Maintenance logs shall be

provided to the Engineer prior to demolition and on a monthly basis during demolition.

8. The Engineer will direct Contractor to post a publicly visible sign with the telephone number and person to contact at the lead agency (e.g., Bay Area Air Quality Management District [BAAQMD]) regarding dust complaints. This person shall respond and take corrective action within 48 hours.

J. The following basic construction measures shall be implemented by the Contractor to minimize the disturbance of sensitive species during the demolition operations:

1. The Project disturbance area shall be limited to the minimum required to complete the Project.

2. Vessel traffic and movements shall be minimized to reduce potential physical displacement or injury of fish.

K. The following basic construction measures shall be implemented by the Contractor to prevent nesting birds from using any of the wharf structures slated for removal:

1. To minimize the likelihood of nesting birds using the piles or decks to support nests, these structures shall be prioritized for removal.

2. The Owner will provide a biologist who will conduct a nesting bird survey 14 days prior to the start of the demolition, and provide an on-site biologist to monitor the site during demolition for any bird nesting activities. In the event that an active nest is found in the Project vicinity, the Engineer (in consultation with the California Department of Fish and Wildlife and U.S. Fish and Wildlife Service to prevent disturbance or destruction of the nest) will direct Contractor to establish the appropriate no-work buffers.

L. The following BMPs shall be implemented by the Contractor for ballast water management and biofouling removal to reduce the potential for introducing aquatic invasive species to a less-than significant level:

1. Vessels over 300 gross tons in size shall be regulated under the State's Marine Invasive Species Program.

2. Project vessels less than 300 gross tons in size shall be inspected and biofouling shall be removed from vessels less than 300 gross tons prior to travelling to the Project area.

M. Contractor shall keep a hazardous materials inventory for all hazardous materials to be stored, used, or transported for the Project in, on, or around the wharf, work

barges, and the Contractor's staging area. A current inventory shall be kept on site at all times and shall include the name of the material, the type, capacity, number and location of storage containers, type of hazard (pressure release, fire, explosion, asphyxiation, toxicity, bioaccumulation, etc.), and the maximum storage capacity at each location. Prior to the demolition work, an HMMP shall be prepared to include shall include specific methods for control and containment of hazardous materials identified in the hazardous material inventories from demolition through disposal. Emergency contacts shall be listed for use in the event of a release of hazardous materials. The HMMP shall include, but is not limited to, the following:

1. A hazardous materials inventory that identifies the type, location, estimated quantity and nature of each potentially hazardous material located at the wharf.

2. Equipment containing other hazardous materials, such as switches and gauges that contain mercury, shall be tagged prior to removal for special handling to prevent an inadvertent discharge on the deck surfaces or into Bay waters.

3. If hazardous materials are identified, a specialty abatement contractor shall be acquired to mitigate these issues in compliance with State and Federal regulations prior to the general demolition of the wharf.

4. Any hazardous materials brought to the Project site, e.g., diesel oil or paints, shall also be included in the HMMP.

N. The following BMPs shall be implemented by the Contractor for handling creosote-containing materials, spill prevention and containment, erosion and sedimentation prevention, and monitoring requirements:

1. During demolition activities, a floating boom and skirt shall be deployed around the Project site and absorbent booms and pads shall be provided on marine vessels on site.

2. Within upland areas, implement silt fences, straw wattles and other measures determined appropriate for erosion and sediment control.

3. Waste, such as discarded demolition materials, chemicals, litter, and sanitary waste at the demolition site shall be properly controlled.

4. Vessel fueling shall be required at Contractor's staging area or at an approved docking facility. No cross-vessel fueling shall be allowed.

5. Marine vessels generally shall contain petroleum products within tankage that is internal to the hulls of the vessels. All deck equipment shall be equipped with drip pans to contain leaks and spills. All fuels and lubricants

aboard the work vessels shall have a double containment system. Chemicals used within the Project area and on marine vessels shall be stored using secondary containment.

O. The Plans indicate existing facilities to be demolished and/or salvaged. Auxiliary utilities including such services as water, air, chemicals, drainage, lubrication, fluid power, electrical wiring, controls, and instrumentation are not necessarily indicated. The Contractor shall verify the scope of the work to remove the equipment indicated; coordinate its shutdown, removal, replacement, or relocation; and submit an outage plan. The removal of existing facilities for demolition, salvage, and relocation shall include the following requirements:

1. Equipment supports, including concrete pads, baseplates, mounting bolts, and support hangers, shall be removed. Damage to the existing structure shall be repaired as indicated.

2. Exposed piping including vents, drains, and valves shall be removed. Where exposed piping penetrates existing floors and walls, the piping, including wall thimbles, shall be removed to a minimum depth of 2 inches. Resultant openings in any structure to remain shall be repaired as indicated.

3. Electrical control panels, junction boxes, motor control centers, and local switches and pushbuttons shall be removed.

4. Exposed electrical conduits and associated wiring shall be removed. Resultant openings in structures to remain shall be repaired as indicated.

5. Connections to embedded electrical conduits shall be removed a minimum of 2 inches inside the finished surface of the existing structure. Wiring shall be removed and the resulting openings shall be repaired as indicated.

6. Associated instrumentation devices shall be removed.

7. Auxiliary utility support systems shall be removed.

8. The area shall be thoroughly cleaned such that little or no evidence of the previous equipment installation will remain.

9. Asphalt and concrete pavement, curbs, and gutters shall be removed as necessary to perform demolition. The limits of removal shall be sawcut. When the required improvements have been constructed, new asphalt and concrete pavement, curbs, and gutters shall be placed to match the original unless otherwise indicated.

10. Footings, foundation walls, below-grade construction and concrete slabs on grade shall be demolished and removed to a depth not less than 36-inches below existing ground surface.

11. Below-grade areas and voids resulting from demolition of structures shall be completely filled. After fill and compaction, surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as indicated.

12. When existing pipe is removed, the Contractor shall plug the resulting open ends whether or not so indicated. Where removed piping is exposed, the remaining piping shall be blind-flanged or fitted with a removable cap or plug.

13. When existing piping is removed from existing structures, the Contractor shall fill resulting openings in the structures and repair any damage such that the finished rehabilitated structure shall appear as a new homogeneous unit with little or no indication of where the new and old materials join. The openings in water-bearing structures shall be filled with non-shrink grout to be watertight and reinforced as required or indicated. In locations where the surface of the grout will be exposed to view, the grout shall be recessed approximately 1/2 inch and the recessed area filled with cement mortar grout.

14. Electrical reconstruction shall be conducted by the Contractor in a safe and proper manner to avoid injury from electrical shock to the Owner Representative's and Contractor's personnel. Electrical equipment to be shut off for a period of time shall be tagged, locked out, and sealed with a crimped wire and lead seal and made inoperable. At no time shall electrical wiring or connections which are energized or could become energized be accessible to Contractor, Owner Representative, or other personnel without suitable protection or warning signs.

P. The Contractor shall perform a functional test of existing equipment that is relocated and reinstalled to ensure the equipment functions in the manner documented during the initial inspection. The Contractor shall inform the Owner Representative in writing a minimum of 5 Days prior to the functional testing in order for the Owner Representative to witness the test. If, in the opinion of the Owner Representative, the relocated equipment does not function in a satisfactory manner, the Contractor shall make repairs and modifications necessary to restore the equipment to its original operating condition at no additional cost to the Owner Representative.

3.05 ABANDONMENT

A. Existing facilities to be abandoned shall be prepared as indicated. Where existing buried piping is to be abandoned, the Contractor shall remove the abandoned

pipe for a distance of 5 feet from any connecting structures. Openings at the existing structures shall be repaired. The remaining pipe shall be capped at both ends prior to backfill. Buried piping that is 12 inches diameter or greater shall be completely sand-filled prior to closure of the piping ends.

3.06 DISPOSAL OF DEMOLISHED MATERIALS AND DEBRIS

A. General: Except for items or materials directed to be recycled, remove demolished materials and debris from Project site and legally dispose of them at a permitted landfill.

1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials and debris.

C. Disposal: Transport demolished materials and debris off Project site and legally dispose of them at a permitted landfill.

D. Submit official weigh tags from the landfill for each load in accordance with Section 01025 – Measurement and Payment.

3.07 OCCUPANCY AND POLLUTION CONTROL

A. Water sprinkling, temporary enclosures, chutes, and other suitable methods shall be used to limit dust and dirt rising and scattering in the area. The Contractor shall comply with government regulations pertaining to environmental protection.

B. Water shall not be used if it creates hazardous or objectionable conditions such as ice, flooding, or pollution.

3.08 CLEANING

A. During and upon completion of work, the Contractor shall promptly remove tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by work in a clean, approved condition.

B. Adjacent structures shall be cleaned of dust, dirt, and debris caused by reconstruction, as requested by the Owner Representative or directed by governing authorities, and adjacent areas shall be returned to condition existing prior to start of work.

C. The Contractor shall clean and sweep streets and roads daily.

END OF SECTION

SECTION 02270 - EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies requirements for erosion control and prevention of sediment discharge from the Work. The scope of work includes:

1. Identifying potential sources of pollutants that may affect the quality of stormwater discharges.

2. Identifying non-stormwater discharges.

3. Designing, implementing and maintaining Best Management Practices (BMP) for control of erosion and sediment discharge.

B. Related Sections:

1. Section 01141 – Environmental Requirements.

C. Definitions:

1. Stormwater Pollution Prevention Plan (SWPPP): A plan prepared and implemented by the Contractor prior to any clearing, grading, or excavation subject to the General Permit issued by the California State Water Resources Control Board, as specified in Section 01561 and applicable permits.

2. BMP: Measures recommended by the California Stormwater Quality Association (CASQA) for erosion control, temporary sediment control, wind erosion control, and tracking of discharge.

D. Performance Requirements:

1. The Contractor shall provide erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties according to requirements of authorities having jurisdiction.

2. The Contractor shall inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

3. The Contractor shall prevent the discharge, or creation of a potential discharge, of any material to storm drains or waters of the State of California.

1.02 REFERENCE

A. CASQA, Storm water Best Management Practice Handbook, Construction.

1.03 **SUBMITTALS**

A. Working Drawings and Methods Statements:

1. Submit a list all of the construction activities and material that have the potential to contribute sediment to stormwater discharge. Describe the anticipated soil and stockpile materials at the construction site.

2. Submit a list all of the construction methods that have the potential to track sediment off-site onto haul routes and access roads. Identify BMP for control and tracking of sediment off-site during construction. Provide BMP selection details, advantages, and disadvantages.

3. Submit a vicinity map that shows outline of construction site perimeters, staging areas, access roads, major roadways, geographic features and landmarks, municipal storm sewer systems, bodies of water within and adjacent to the project vicinity, wetlands, known wells, off-site draining into the construction site, and general topography. Identify anticipated discharge locations for the work. Show the area to be disturbed by construction activities, and location of the stockpiles. Indicate locations of erosion control measures such as straw rolls, silt fences, concrete swales, detention basins, infiltration basins, sediment basins, slope protection, erosion control, landscaping, ditch lining, and energy dissipaters. Identify wheel wash, and garbage storage and pickup sites.

4. Submit working drawings that show installation details, dimensions, and materials for implementing each BMP identified on the vicinity map. Identify quantities of materials for implementing BMP to be stored on-site for ensuring adequate supply for the work. Show storage locations on the vicinity map.

5. Submit shop drawings and material data sheets for manufactured BMP measures.

6. Identify sampling and analyses strategies to detect discharge of sediment and pollutants. Provide sampling schedules for discharges that have been identified as potentially contaminated.

7. Submit detailed methods for monitoring the weather, alerting work crews, and implementing additional BMP for rainfall and/or high wind. Include provisions for weekends and holidays.

8. Provide time schedules to construct, implement, and maintain BMP for the work for the duration of construction.

B. Provide inspection schedules to ensure that each BMP measures is in place, functioning properly, and adequate for the work. Include inspection of storage and handling area for construction materials that have the potential to contribute sediment or pollutants.

1.04 QUALITY ASSURANCE

A. Preconstruction Meeting: Contractor shall participate in an on-site meeting with the Owner Representative not less than 2 weeks prior to implementing erosion and sediment control measures. Items to be discussed include:

1. Erosion and sediment control methods to be implemented and a schedule for implementation.

2. Quality Control procedures, including inspection and maintenance protocol.

3. Reporting requirements.

B. Comply with the requirements of all applicable permits and environmental requirements.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Store adequate quantities of materials for implementation of each BMP as shown on the vicinity map.

B. Packaged Material:

1. Deliver packaged materials showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

1.06 REJECTION AND SUBSTITUTION

A. All materials not conforming to the requirements specified herein shall be considered defective and such materials, whether in place or not, shall be rejected and be immediately removed from the site and replaced with acceptable materials.

1.07 SITE OBSERVATION VISITS

A. Schedule site observation visits with the Owner Representative prior to commencement of work to verify existing conditions and environmentally sensitive areas.

B. The Contractor or his authorized representative shall be on site at the time of each site observation visit.

PART 2 PRODUCTS

2.01 MATERIALS

A. Straw rolls: manufactured from certified weed free straw that is wrapped in tubular black plastic netting, approximately 8 inches in diameter by 25-30 feet long. Ultra Tech Ultra-StormWattle Erosion Control Rolls or equal.

B. Silt fences.

1. Mirafi prefabricated silt fence with posts or approved equal, with the following properties:

a. Materials:

1) Fabric: Type 100X - Woven Polypropylene with minimum 100 lbs/in2 grab tensile strength

2) Size: Width: 4 feet minimum.

3) Description: Pre-fabricated and pre-assembled silt fence with 1-1/2 inch nominal square hardwood posts. Top edge shall be reinforced with high strength industrial tensioning belt.

4) Properties:

Property	Test Method	Value
Grab Tensile Strength	ASTM D4632	120 lbs
Mullin Burst Strength	ASTM D3786	10%
Permittivity	ASTM D4491	0.2 sec-1
Water Flow Rate	ASTM D4491	20 gal/min/ft2
UV Stability	ASTM D4355	70%
Grab Tensile Elongation	ASTM D4595	10%

C. Stockpile covers: polyethylene tarps.

D. Catch basin filter fabric: UltraTech Ultra-DrainGuard or equal.

E. Geotextile filter fabric: Type 100X - Woven Polypropylene with minimum 100 lbs/in2 grab tensile strength

F. Oil absorbent sock filters: 3M High-Capacity Petroleum Sorbent pads, rolls and rugs, or equal.

G. Hydroseed and Mulch: Per Section 02272.

H. Erosion Control Fiber Matrix: Mat Inc. “Soil Guard” spray-on bonded fiber matrix or approved equal.

I. Rip Rap: Sound, angular rock fragments free of sand, dust, organic material, excessive cracks, mineral lenses or other impurities. Twenty percent by weight shall be at least 4 inches in size.

PART 3 EXECUTION

3.01 GENERAL

A. Implement BMP measures prior to clearing or grading the site.

B. Protect stockpiled areas prior to forecast storm events using polyethylene covers and/or other appropriate cover systems.

C. Protect disturbed areas prior to forecast storm events using geotextile blankets, straw rolls, and/or other appropriate blanket systems.

D. Protect disturbed areas from overland sheet flow from adjacent areas prior to forecasted storm events using curbs, swales, dikes, berms, inlets, drains, and/or other appropriate stormwater diversion systems.

E. Trap any loose sediment from disturbed areas before discharging any stormwater using silt fences, filter fabric, straw rolls, and/or other appropriate sediment trapping systems.

F. Dissipate the velocity of the discharged stormwater to prevent erosion using rock, grouted rip rap, rubble, and/or other appropriate stormwater velocity dissipation systems.

G. Confine construction materials that have the potential to contribute pollutants to storage and handling areas shown on the vicinity map. Provide adequate cover from the rain and wind to these storage areas using polyethylene covers and/or other appropriate cover systems. Contain areas where liquids are stored and handled using geomembranes, sandbags, berms, dikes, and/or other liquid containment systems.

H. Confine garbage to the storage and handling areas shown on the vicinity map. Provide adequate shelter from the rain and wind using containers.

I. Protect municipal storm sewer systems shown on the vicinity map from discharge of pollutants and sediment from the construction site using sandbags dams fitted

with filter fabric, oil absorbent sock filters, and/or other appropriate oil and sediment filtering systems.

J. Stabilize inactive disturbed areas as soon as feasible after the cessation of construction activities.

K. Preserve existing vegetation to the extent feasible to minimize surface area of exposed soil.

L. Preserve condition of haul routes and access roads from tracked sediment using vehicle tire washers, street sweepers, and/or other appropriate sediment tracking control systems.

M. Immediately notify the City Representative of any situation requiring additional erosion control devices to prevent soil erosion or sedimentation into any area beyond the project limits.

3.02 MAINTENANCE AND REPAIR/RESTORATION

A. Immediately repair, restore, and/or replace any low performing BMP identified in the high wind and rain storm reports. Immediately implement additional BMP in construction areas with insufficient BMP as identified in the high wind and rain storm reports. Repair, restore, and/or replace any deficiencies noted in scheduled inspections prior to forecast storm events.

B. Inspect straw rolls after significant storms. Ensure straw rolls are in contact with the soil. Replace straw rolls after 1 year or sooner if required.

C. Seed and protect any areas that remain unworked for more than 30 days.

D. At no time shall the Contractor apply fertilizers, pesticides, or herbicides other than those specified to any of the planted or hydro seeded areas unless directed by the City Representative.

E. Operate and maintain storm and surface water facilities as follows:

1. Remove sediment from behind silt fences and straw rolls to prevent overtopping.

2. Prevent sediments from being flushed to the downstream system during cleaning.

3. Sediment, trash, and debris shall be removed from catch basin grate surfaces when blocking more than 20 percent of the grate surface.

4. Sediment, trash, and debris shall be removed from catch basin interiors when debris exceeds 1/3 of the depth from bottom to pipe invert.

5. Sediment, trash, and debris shall be removed from rock dams, ponds, and traps when more than 1 foot of sediment has accumulated.

F. Dust Control:

1. During dry weather conditions, take preventative measures to minimize the wind transport of soil. Use water sprinkling, temporary enclosures, and other methods to minimize dust and dirt migration.

3.03 MONITORING AND REPORTING

A. Monitor each BMP measure, storage and handling area for construction materials that have the potential to contribute pollutants, and areas for garbage storage and pickup during storm events involving high wind and rain to ensure that they function properly and are adequate for the work. Provide performance details for each BMP in the required reports as specified in the SWPPP.

B. Monitor construction site areas for adequacy of BMP implementation. Provide details for each area monitored in the high wind and rain storm report.

C. Monitor each municipal storm sewer system, known well, wetland, and body of water shown on the vicinity map for adequacy of BMP implementation. Provide details in the high wind and rain storm report.

3.04 CLEAN-UP AND DISPOSAL

A. All work areas shall be kept clean, neat and orderly at all times.

B. Remove all stockpiles from the site upon completion of the work.

C. Remove all temporary erosion and sediment control devices from the site upon completion of the work.

D. Remove all mulch and straw from paved areas.

E. Remove any detrimental plants growing in the work area not specified in the seed mix.

F. Upon completion of work, remove rubbish, trash, debris resulting from operation. Remove unused equipment and implements of service; leave worksite in neat, acceptable condition as to meet approval of the City Representative.

END OF SECTION

SECTION 02950 – SITE RESTORATION

PART 1 GENERAL

1.01 SUMMARY

A. This specification section covers the following site restoration for all areas disturbed during site demolition activities.

1. Reseeding disturbed vegetated areas on terrestrial portions of sites
2. Removal of all temporary Storm Water Pollution Prevention Plan (SWPPP) measures
3. Assistance to Owner for final site survey
4. Demobilization

1.02 SUBMITTALS

A. Submit a Plan for site restoration, noting all areas to be seeded or otherwise replanted, to the Engineer prior to the start of site restoration activities.

B. Submit the following information for review and acceptance by the Engineer:

1. Information describing the source, proposed mix, and application rate of native grass seeds to be used for site restoration for Owner review and approval.

C. Submit the following tackifier information for review and acceptance by Engineer:

1. Supplier
2. Application rate
3. Weed-free certification

1.03 REGULATORY REQUIREMENTS

A. The Contractor shall comply with all City, State and Federal codes/ requirements.

1.04 QUALITY ASSURANCE

A. Landscape restoration specialty subcontractor shall possess a State of California Landscape Contractor license and shall provide references for three recently completed restoration projects similar in complexity, material, design, and extent to that indicated for this Project and with a record of successful establishment.

B. Perform work in accordance with the best standards of practice relating to various trades under continuous supervision of a qualified, experienced foreman.

1.05 SITE CONDITIONS

A. Contractor shall inspect all existing features and conditions at the job site, including access and extent of work that needs to be done prior to commencement of work.

1.06 PROTECTION

A. Protect areas, facilities, equipment and vegetation outside of Contractor work areas from damage during restoration activities. Where areas or items are affected by the Contractor's work, restore to a condition as good as existed before the work began at no cost to the Owner.

B. Protect all existing native trees and native plant materials that are to remain for the duration of the Contract unless otherwise noted elsewhere. Should any native plant removal be necessary outside of areas previously designated for disturbance, provide a detailed vegetation removal plan to the Engineer and applicable resource agencies for review and approval before any vegetation trimming or cutting is performed.

1.07 FINAL OWNER SIDE SCAN SURVEY

A. Following completion of Contractor demolition activities, Owner shall conduct a side scan sonar survey of the work area to confirm that the project requirements have been met.

B. Any protrusions above the Bay floor identified by the Owner as representing incomplete work shall be removed by Contractor at no additional cost to Owner.

C. Contractor shall not de-mobilize until Owner’s surveys confirm project requirements have been met.

D. Final Contractor payment shall not be made until Owner confirms project requirements have been met.

E. Contractor shall provide as-needed support to Owner for completion of side scan sonar survey.

PART 2 PRODUCTS

2.01 WEED-CONTROL PRODUCTS

A. Non-chemical, targeted and landscape-level integrative pest management (IPM) treatment is the preferred choice for non-native invasive plant control. Methods for small non-native invasive plant infestations include manual removal with weed wrenches or string trimmers, hand pulling, or solarization.

B. If herbicides are used for weed control, follow all applicable county, state and federal guidelines.

2.02 FERTILIZER

A. No fertilizer will be allowed.

B. The use of root stimulant is not allowed.

2.03 OFFSITE COMPOST

A. Compost shall be Certified Weed-Free.

B. Types of acceptable products are composts, manures, mushroom composts, alfalfa, peat mosses etc. low in salts, low in heavy metals, free of pathogens and other deleterious materials.

C. Composted wood products are conditionally acceptable (stable humus must be present). Red wood or cedar based products are not acceptable.

D. Sludge-based materials are not acceptable.

E. Carbon:nitrogen ratio shall be less than 25:1.

F. The compost shall be aerobic without malodorous presence of decomposition products.

G. The maximum particle size shall be 0.5 inch, 80% or more shall pass a No. 4 screen for soil amending.

H. Humus material shall have an acid-soluble ash content of no less than 6% and no more than 20%. Organic matter shall be at least 50% on a dry weight basis.

I. The pH of the material shall be between 6 and 7.5.

2.04 PESTICIDES

A. Pesticides shall not be used.

2.05 WOOD CELLULOSE FIBER MULCH (HYDROMULCH APPLICATION)

A. Paper mulch shall not be used.

B. Mulch shall be free from mold and other deleterious materials. Mulch shall not contain any growth or germination inhibiting substances.

C. Mulch shall be Certified Weed Free.

D. Wood cellulose fiber shall be commercially available and produced from virgin wood fiber. Fiber shall be of such character that fiber will disperse into uniform slurry when mixed with water. The water content of the fiber before mixing into the slurry shall not exceed 15 percent of the dry weight of the fiber. The moisture content of the fiber shall be clearly marked on the package.

1. Ash Content: Fiber shall not contain more than 7 percent ash as determined by the Technical Association of the Pulp and Paper Industry (TAPPI) Standard T 413, and shall be nontoxic to plant or animal life.

2. Water-holding Capacity: Fiber shall have a water-holding capacity by weight of not less than 1,200 percent. Water-holding capacity of the fiber shall be marked on the package.

3. Coloring: Fiber shall be colored to contrast the area on which the fiber is to be applied. The material used for color shall be nontoxic to plant and animal life. Paper fiber mulch is not allowed.

2.06 TACKIFIER

A. Tackifier shall be a concentrated, biodegradable, derivative of an organic material, ConTack AT by ProPlus Company or approved equal.

2.07 WATER

A. Water shall be fresh and not contain elements toxic to plant life.

2.08 MYCHORRHIZAL INOCULUM

A. Endomycorrhizal inoculum shall consist of spores, mycelium, and mycorrhizal root fragments of arbuscular fungi in a solid carrier suitable for handling by hydro-seeding or dry seeding equipment. The carrier shall be the material in which the inoculum was originally produced, and may include organic materials, vermiculite, perlite, calcined clay, or other approved materials consistent with mechanical application and with good plant growth.

2.09 SEED

B. Deliver all seed to the site tagged and labeled in accordance with the California Agricultural Code. The seed shall be acceptable to the County Agricultural Commissioner.

C. Seed shall be of a quality which has a minimum pure live seed content of 80% (percent purity times percent germination), and weed seed shall not exceed 0.5% of the aggregate of pure live seed and other material.

D. Confirm seeding areas and quantities prior to commencing work.

E. Seed species shall be thoroughly mixed prior to application as seed may settle during shipping and transport.

PART 3 EXECUTION

3.01 SHIPMENT, DELIVERY, STORAGE AND HANDLING

A. Coordinate and schedule the delivery of material and equipment associated with replanting or other site restoration activities to Project site.

B. Store material in accordance with all State and local codes and regulations governing material.

C. Do not drop materials from vehicles.

D. Keep seed and container plants in a cool dry place during delivery and when temporarily stored onsite, protect seed from moisture, wind, heat, vandalism, rodents, insects, weather, and other conditions that would damage or impair viability of seed.

3.02 SITE PREPARATION FOR PLANTING

A. GENERAL

1. Perform the work under this Section before planting and/or seeding, and only during periods when beneficial results can be obtained. When excessive moisture, winds or other unsatisfactory conditions prevail, the work shall be stopped when directed by the Engineer or Owner representative.

B. SITE CONDITIONS

1. Inspect Project site before proceeding with any work, carefully check existing conditions, existing improvements, grades, access to the site, existing vegetation, and verify dimensions and conditions affecting the Work. Report any discrepancies to the Engineer.

2. Field-verify that all areas to be planted are clear of weeds and debris prior to soil preparation.

3. Do not perform soil preparation work in areas where soil is contaminated with deleterious materials, construction debris or any other non-natural substances. Do not proceed until contaminated soil is removed.

4. Do not work soil when moisture content is so great that excessive compaction will occur, or when it is so dry that dust will form in air.

C. SOIL PREPARATION

1. Minimize disturbance of topsoil. Otherwise, if slope is less than 2:1, uniformly till soil to depth of 6 inches by rototilling, or any other approved method.

2. If slope is greater than 2:1 scarify surface with a metal rake or similar tool parallel with contours to allow for deeper seed penetration during hydroseeding and to prevent erosion.

3.03 SEEDING PERFORMANCE CRITERIA

A. SEEDING AND HYDROMULCHING

1. Slopes less steep than 2:1

a. Hydroseed or manually disperse with bellygrinders the seed mix (so that it is in direct contact with existing soil). If manually dispersed, rake seed in. For hydroseed mixtures use not more than 500lbs. of virgin wood fiber, to maintain seed in suspension in slurry.

b. Hydro apply or otherwise evenly distribute Certified Weed Free organic soil amendment (such as Biosoil Mix 7-2-3) at a rate of 1,000 pounds per acre. Apply additional compost consisting of onsite wood chips and duff from cleared vegetation to bring the compost layer to a thickness of ¾”. If necessary, use off site compost to achieve ¾” thickness. Use minimum amount of virgin wood fiber to maintain compost in suspension.

c. Distribute Certified Weed Free native grass straw mulch (either manually or with a straw blower) at a rate of 3,000 lbs./acre.

d. Apply tackifier at the rate of 80 lbs./acre.

2. Slopes steeper than 2:1

a. Hydroseed or manually disperse with bellygrinders the seed mix (so that it is in direct contact with existing soil). If manually dispersed, rake seed in. For hydroseed mixtures use not more than 500lbs. of virgin wood fiber, to maintain seed in suspension in slurry.

b. Hydraulically apply or otherwise evenly distribute Certified Weed Free organic soil amendment (such as Biosoil Mix 7-2-3) at a rate of 1,000 pounds per acre. Apply additional compost consisting of onsite wood chips and duff from cleared vegetation to bring the compost layer to a thickness of 3/8”. If necessary, use off site compost to achieve 3/8” thickness. For hydroseed mixtures use not

more than 500lbs. of virgin wood fiber, to maintain seed in suspension in slurry.

c. Within 48 hours of seeding, install heavy coir erosion fabric (900g/m2) with non-pressure treated Douglas fir tapered wooden stakes cut from 2x4s (24” long) at 3’ OC in the field, 18” OC at overlaps and edges. Leave top 4” of stake above ground to allow for future securing of fabric to soil.

d. Install coir wattles (rolls) top, bottom and mid-slope.

e. Distribute Certified Weed Free native grass straw mulch (either manually or with a straw blower) at a rate of 4,000 lbs./acre.

f. Apply tackifier at the rate of about 120 lbs./acre.

B. MAINTENANCE AFTER SEEDING

1. Maintenance shall begin immediately after seeding is completed and shall continue throughout the seeding period. Maintenance of the seeded areas shall include regular observations of the sites, hand removal of weeds, and repair of damaged areas until completion of the plant Monitoring Period as specified in Section 3.08 Maintenance and Establishment.

2. Protect seeded areas from vehicle or pedestrian traffic.

3. Areas damaged prior to Construction Completion or which have failed to germinate prior to Construction Completion shall be repaired by the Contractor to their original condition and/or reseeded within seven working days at no additional expense to the Owner.

C. CLEANUP

1. Excess and waste material shall be removed from the seeded and staging areas and shall be disposed of offsite.

3.04 MAINTENANCE AND ESTABLISHMENT

A. This includes the vegetation warranty and establishment period work. This work includes plant maintenance, non-native invasive species removal, plant re-setting, plant replacement, adaptive management, restoration site inspections, and record keeping.

B. The Plant Establishment Period shall begin as soon as any permanent vegetation is planted, and shall extend until success criteria are met as determined by the yearly monitoring reports.

C. The Monitoring Period will begin following the final installation acceptance. The Monitoring period will extend for one year.

D. Performance Requirements:

1. Plant Maintenance

a. Perform plant maintenance tasks as needed based on monthly monitoring visits during the Monitoring Period, unless more intense maintenance is required as determined by the Owner representative.

2. Non-native Invasive Species Removal

a. Remove non-native invasive plant species from the Project site and offsite spoils pile before flowering or reaching four inches in height whichever occurs first.

3. Plant Re-setting

a. Reset plant material that becomes dislodged or otherwise unseated in its natural growing condition.

4. Plant Replacement

a. Replace diseased and dead plants with plants of the same species and container size within one month during the first six months of planting.

5. Cleanup

a. Maintain the Project site in a condition clean of installation and establishment debris throughout the Monitoring Period.

3.05 SEEDING WARRANTY

A. Seeded areas not producing required native herbaceous vegetation cover within one (1) month of the seeding operations shall be prepared, reseeded and maintained with the same seed mix and as per the original specification at no additional expense to the Owner. See also Plant Maintenance described in the previous section.

B. Plant material and infrastructure installed under this Contract shall be guaranteed against inferior workmanship or improper establishment, as determined by the Owner representative. Identified deficiencies shall be replaced by the Contractor at no additional cost to the Owner.

C. Seeded areas that are 85% vegetated after one year shall be meet final acceptance.

3.06 REMOVAL OF SWPPP MEASURES

A. Contractor shall remove all temporary erosion control measures before demobilizing from the site.

B. All removed temporary erosion control measures shall become the property of the Contractor.

3.07 DEMOBILIZATION

A. Contractor shall not demobilize until the Owner confirms that project requirements have been met.

B. Contractor shall leave the work area in a clean and orderly condition. No demolition debris or equipment shall remain on site following demobilization.

C. Demobilization includes installation of all permanent erosion control measures.

3.08 FINAL ACCEPTANCE

A. PLANTING AND SEEDING FINAL ACCEPTANCE

1. Planting/Seeding areas layout inspection.

2. Erosion control material installation inspection.

3. The final inspection shall consist of a preliminary final and a final.

   a. Prior to the completion of the one year Monitoring Period, a preliminary final (punch list) inspection shall be held by the Owner representative. The quantity and type of plants installed and the acceptability of the plants installed, in accordance with the requirements stated herein shall be determined and noted in writing. A punch list of items to be corrected by the Contractor prior to the final inspection shall be determined at this time.

   b. At the final inspection, the Owner representative will evaluate the deficiencies noted in the preliminary final inspection to determine if they have been satisfactorily corrected.

   c. After establishment items and cleanup have been satisfactorily completed, as determined by the Owner representative, the Owner representative will issue an acceptance of the Monitoring Period in writing. Written acceptance by the Owner representative shall

constitute the completion of the contractor's responsibilities for the Monitoring Period.

END OF SECTION

SECTION 02951 - EELGRASS AND ROCKWEED RESTORATION

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall collect and transplant eelgrass (*Zostera marina*) and rockweed (*Fucus gardneri*) in accordance with the Contract Documents.

B. The collection of transplant materials, placement, maintenance, and monitoring methods shall fully comply with applicable permit requirements.

C. Work shall include, but is not limited to, all labor, tools, materials, equipment, and incidentals required to complete activities shown on the Drawings, described in these specifications, and as directed by the Owner's Representative. No deviations from the plans or these specifications shall be allowed without written approval from the Owner's Representative. The Contractor shall plan for appropriate crew sizes supplied with necessary equipment to complete the required work for the collection and placement of transplants, as described in this Section.

D. All transplant donor material collections shall be undertaken under a valid Scientific Collector's Permit (SCP) issued to the Contractor under California Fish & Game Code (CFGC) Section 1002. The SCP must explicitly cover this project and Contractor shall be responsible for all fees and other costs required to obtain the required authorizations and comply with the provisions of this permit. Fees are expected to be about $500.

E. Contractor shall submit to California Department of Fish and Wildlife (CDFW) a Notice of Intent to Collect the rockweed and eelgrass in order to receive from them a Letter of Authorization (LOA). All planting shall be completed under a LOA issued to the Contractor by CDFW under CFGC Section 6400. The LOA is anticipated to include limitations on harvesting methods, density, total harvested units, and locations of harvest. The LOA will also likely include obligations for pre-harvest and post-harvest donor bed surveys and reporting the CDFW as well as activity notifications to the Department. Compliance with the terms of the LOA is the Contractor's obligation.

1.02 DEFINITIONS

A. PLANTING PERIOD ACCEPTANCE: Planting Period Acceptance is the milestone when all work associated with the transplanting of rockweed and eelgrass is completed to the Owner's satisfaction.

B. HEALTHY PLANTS: Healthy plants shall be those that are of good form, free of disease, are robust, and exhibit vigorous growth. Plants must not be stressed.

1.03 QUALIFICATIONS

A. All work shall be done by an experienced Contractor familiar with estuarine habitat restoration and industry methods and standards for such work. The Contractor shall employ modern equipment and state of the art methods and techniques. The Contractor shall have a minimum of 3 years of applicable on-the-job experience with eelgrass planting and other estuarine habitat restoration.

B. Prospective Contractors shall be qualified and capable of obtaining the applicable permits and authorizations at the time of proposal and shall be responsible for all related fees and compliance with all conditions imposed under these permits and authorizations at no additional cost to the Owner.

1.04 SUBMITTALS

A. Furnish submittals in accordance with Section 01300-Contractor Submittals for approval.

B. Schedules: In accordance with Section 01311 – Project Schedule, Contractor shall provide the following schedules within 15 calendar days of the Award of Contract, and before any work is started.

1. Harvest schedule: Contractor shall provide a harvest schedule describing planned activities, their locations, start dates, and durations.

2. Planting schedule: Contractor shall provide a planting schedule describing planned activities, their locations, start dates, and durations.

C. Equipment: A list of equipment to be used during the collection, preparation, transportation, and planting of transplant material.

D. Planting Methodology: Provide a narrative description of the planting approach to be taken by Contractor from access to harvest to completion of planting that includes collection, handling, processing of units, and planting of plants. The narrative shall include measures taken by Contractor to minimize damage to donor sites.

E. Permits: Submit evidence of Scientific Collector's Permit, Notice of Intent to Collect and LOA from CDFW prior to commencing eelgrass or rockweed restoration.

F. Records:

1. Transplant collection activities: Reports with locations and numbers of plants collected on each day of work.

2. As-built drawings indicating where transplants were installed, when, and in what areas.

1.05 INSPECTIONS

A. It is the Contractor's responsibility to notify the Engineer at least 10 working days prior to each anticipated inspection. The Engineer may at any time inspect work without notification. The following are key inspection events:

1. Initial collection and preparation of transplant materials.

2. Planting layout acceptance inspection.

3. Final Planting Inspection: This inspection shall be performed by the Owner's Representative in two parts at the end of the Planting Period. First, a preliminary punch list inspection of the planted areas shall be performed. This inspection shall be followed by the final verification inspection upon Contractor notice of punch list items completion. During the preliminary inspection, unsatisfactory conditions and deficiencies shall be listed in a punch list. The following items shall be reviewed: health of transplanted material, proper location, orientation and placement of transplanted material, and restoration of areas incidentally disturbed during transplanting. During the verification re-inspection, the Engineer shall evaluate completion of the punch list items to ensure they have been corrected. A "Final Planting Acceptance" shall be issued after all planting requirements have been satisfactorily completed and approved by the Owner's Representative. If the Owner's Representative is required to perform additional punch list items verification inspections because any of the punch list items are not complete during the first verification inspection, the Contractor shall be responsible for any expenses associated with the additional inspection. Partial acceptance of any area or any item shall not be issued. Written, signed and dated "Final Planting Acceptance" issued by the Owner's Representative shall constitute the satisfactory completion of the seeding work.

1.06 TRANSPORTATION, STORAGE AND HANDLING

A. Transportation: Transplant material shall be protected from desiccation and contamination during delivery.

B. Transportation: If eelgrass is to be transported over a distance, or held for more than an hour between collection and placement, it shall be loosely covered with a breathable, light colored fabric (e.g., light burlap) that is soaked in seawater and the transplants should be moved out of water under an evaporative cooling fabric cover, but not submerged.

C. Storage: Transplant material shall be stored in areas approved by the Owner's Representative. Transplant material shall be stored in clean, flowing bay water with adequate flushing to maintain the cool water conditions and the vigor of the

transplant material. Alternatively, transplant material may be temporarily stored loosely in mesh bags within the Bay.

D. Storage: Any donor material shall be harvested, processed, and planted within a 24-hour period from the time of collection to the time of planting. This requires that Contractor coordinate activities such that only the amount of material that can be effectively handled in one day is harvested at any given time.

E. Handling: Material collected for transplanting shall be handled in a fashion that prevents desiccation, breakage, leaf damage, or other damage during all transplant procedures.

1.07 TIMES AND CONDITIONS

A. Transplanting Conditions: Transplanting shall be performed only during periods when beneficial results can be obtained. When excessive heat, winds, or other unsatisfactory conditions prevail, the work shall be stopped as directed by the Owner's Representative. The Contractor shall be prepared to transplant at the time when all conditions (weather, water conditions, temperature) are acceptable.

B. Weather Limitations: Proceed with the collection and placement of transplant materials only when existing and forecasted weather conditions permit transplanting to be performed when beneficial and optimum results may be obtained. The collection or placement of transplants shall not commence on days when the official weather report predicts 77°Fahrenheit (F) or higher temperature during work periods when eelgrass is being transported or held out of the water at any time of the day.

C. Transplant materials shall be inspected for non-native, invasive species. If such species are identified, they shall be removed from the transplant material and destroyed. Specifically, plants shall be freshwater dipped in three successive 3 minute freshwater dips to remove the invasive amphipod (*Ampithoe valida*). Freshwater dip waters shall be disposed of in upland areas to avoid discharge of amphipods back to the Bay. Water shall be replaced in the dip reservoirs regularly to maintain salinities below 3 parts per thousand in the dips.

PART 2 PRODUCTS

2.01 Eelgrass (*Zostera marina*) Transplants

A. Eelgrass transplant materials shall be harvested by hand from moderate to dense eelgrass beds.

B. Materials shall be harvested in a manner that results in minimal disturbance of substrate and remaining shoots. Collection shall occur by motion liquefaction of sediments around the rhizome to the extent necessary to extract plants that include intact leaf bundles, maristems, and rhizomes with a minimum of four

nodes and internodes. A gentle vibrating motion shall be used while lifting the rhizomes from the sediments, resulting in liquefaction around the rhizomes and roots to allow extraction of viable plant material with healthy rhizome segments and well-formed root initiates. This method creates minimum disturbance to surrounding eelgrass and substrate.

C. Thick rhizomes, a minimum of 2 to 3 inches long, rather than thinner rhizomes, shall be selected. These bare-root shoots shall be placed in appropriate containers where separation and counting of individual shoots shall occur before placing them in totes for transport.

D. Harvest of donor material from the donor beds shall be restricted to 10% or less of total rhizome count per square meter. Extraction density is managed on an area (square footage) basis and not in aggregate. As such, only 10% of the shoot and rhizome material from any given square meter of bed may be collected, irrespective of the size of the donor bed. Individual plants within donor beds should be marked in a Geographic Positioning System (GPS) and/or with a removable flag or other marker prior to removal so that repeated harvestings do not occur from the same donor area. Any physical markers shall be removed following project activities.

E. Individual shoots shall be aggregated into groups of four shoots with their full rhizome structure and processed into planting units of shoot bundles attached to a paper stick anchor (typically called a confectioner stick) using a length of 100% cotton twine. The dimensions of the stick anchors shall be approximately 3.5 inches long and 1/8-inch in diameter. The twine shall be knotted onto the paper stick anchor firmly and shall be knotted snuggly around the top of the rhizome bundle just below the meristem of the plants. The length of twine between the anchor and the shoots shall be 3 inches (+/- 0.5 inch). Following anchor attachment, the leaves of each planting unit shall be cut to a length of approximately 30 inches to facilitate handling and planting.

2.02 ROCKWEED (*Fucus gardneri*) TRANSPLANTS

A. Whole thallus translocation of rockweed shall be performed by locating and hand removal of rocks supporting large thalli of rockweed from identified donor sites. Rock selection shall be based on the manageable size of the rock, robustness of the rockweed thalli, and presence of adjacent rockweed such that the removal from the donor site does not diminish reproductive stock. The Owner's Representative shall identify the specific rocks for the Contractor to relocate to the restoration area.

B. Large thalli appropriate for transplanting are defined as individual growths at least 6 inches long and having robust bladder tips and multiple branches from the holdfast.

C. Rocks supporting transplanted rockweed shall be 5 to 50 pounds in weight;

D. The removal of transplant materials shall not reduce the rockweed density of the donor bed to less than 1 mature thallus per 4 square meters (~43 square feet; the donor beds should be marked in a GPS and/or with a removable flag or other physical marker prior to removal of transplant material so that repeated harvestings do not occur from the same donor area; any physical markers shall be removed following project activities;

E. Rockweed thalli supporting rocks shall be collected and moved directly from point of collection to point of placement within a period of less than 4 hours;

F. Rockweed shall not be transplanted when air temperatures are over 77°F;

G. If rockweed is to be transported over a distance, or held for more than an hour between collection and placement, it shall be loosely covered with a breathable, light colored fabric (e.g., light burlap) that is soaked in seawater and the transplants should be moved out of water under an evaporative cooling fabric cover, but not submerged.

H. Translocation of rockweed by sexually reproductive material shall be accomplished by collection of ripe bladders by snipping from existing thalli at donor sites. Not more than 20% of the existing terminal inflorescence shall be collected from any given thallus. A total of 18 pounds of inflorescent bladders shall be collected. Bladders shall be transported in the same manner as described for full thalli transplants.

I. Mesh bags used for transplanting of sexually reproductive rockweed shall be made of UV-resistant plastic mesh, approximately 1 gallon size.

PART 3 PLANTING

3.01 Planting of Eelgrass Transplants

A. Planting shall not begin until the Contractor has finished the removal of creosote piles and other debris, and has received approval of the Owner's Contractor to begin planting.

B. Eelgrass transplants shall only be placed in areas of suitable substrate, consisting of predominantly sand or mud, with a minimum sediment depth of 6 inches, as determined by probing the sediment with a narrow rod. Presence of rubble in the sediment matrix is acceptable.

C. Any unusual substrate condition that shall require special treatment shall be reported to the Owner's Representative.

D. Individual planting units shall be installed by excavating a hole (using a garden trowel or by hand) approximately equal to the size of the unit, and inserting the planting unit into the hole so that the rhizomes are at a depth of approximately 1

to 2 inches below the substrate and the paper stick anchor is parallel with the sediment surface at a depth of approximately 4 to 5 inches below the sediment surface, as shown in the project drawings. The hole is then back-filled with substrate and vibrated by hand to ensure sediments settle tightly around the plants. Leaf blades are then pulled free of the substrate and stood upright from the bottom.

E. Eelgrass plantings shall be placed to achieve a density of 1 transplant unit per 1 square meter (~11 square feet) within the designated planting areas. Where unsuitable planting substrate occurs such as is the case for portions of the Red Rock Warehouse site, the Contractor shall seek the nearest suitable sediment gap and plant at that location. As a result, all areas of suitable sediment shall have at least one plant per square meter. Some areas may have more than one plant per square meter if unsuitable substrate resulted in foregoing some planting areas. As a result, the number of planting units to be planted will not vary based on substrate conditions.

F. The Contractor shall produce a map or “record drawing” for the Owner identifying where areas where planted and where unsuitable planting conditions were encountered.

3.02 Placement of Rockweed Transplants

A. Planting shall not begin until the Contractor has finished the removal of creosote piles and other debris, and has received approval of the Owner’s Contractor to begin planting.

B. Transport rockweed transplants to receiver site and position and stabilize rocks into the shoreline area by fitting rocks into gaps in existing stone, or partially embedding rocks and positioning existing rocks to lock them into position against wave displacement. All rockweed should be located within the appropriate rockweed zone (+1.3 feet to +3.9 feet relative to NAVD88) as indicated on the drawings.

C. Whole thallus rockweed transplants shall be placed to achieve a density of one thallus per 1 square meter (~11 square feet) within the transplant area.

D. In addition to transplants, rockweed restoration shall also be implemented using sexually reproductive material. Approximately three pounds of clipped conceptacles (bladders located at the tips of the thalli containing reproductive cells) shall be placed into each of six ¼-inch mesh bags. Three bags shall be deployed at each of the two restoration sites.

E. Reproductive material is ripe when distinct tubercles show on the inflated bladders. Bags shall be closed and attached by a floating polypropylene line to a temporary gravity clump weight set at the approximate +1.3 foot contour within the restoration area. The length of the anchor line shall allow the mesh bag to

extend up to the 3.9-foot elevation (all elevations in NAVD88 datum), but the line shall not exceed 10 feet in length. If the distance between the +1.3 and +3.9 foot line is greater than 10 feet, the clump weight shall be moved upslope until the bag reaches the 3 foot elevation when fully extended. The bag shall be allowed to freely swing at the radius of the line.

F. The center point and radii of the tether lines shall be recorded for each of the bags and provided to the Owner.

G. The mesh bag shall be left in place for a period of 30 days prior to removing the bags. .

3.03 CLEANUP

A. Upon daily completion of transplant collection and planting operations, the portion of the Site used for a work or storage area by the Contractor shall be cleaned of all debris, superfluous materials, equipment, and garbage.

END OF SECTION

SECTION 03301: BAYCRETE AND REEF STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

A. This specification section includes but is not limited to requirements for the following items of work:

1. Fabrication of reef balls and reef block stacks out of “baycrete”, which is a custom mix of concrete that permitting agencies allow for use in the Bay. It has been successfully used in at least 4 other restoration projects in the Bay. The recipe for baycrete is as follows:

   a. 10 gallons sand sourced from San Francisco Bay

   b. 10 gallons crushed oyster shells

   c. 1 ¼ - 5 gallon buckets Type II Portland cement

   d. 1/4 - 5 gallon bucket parts microfibers

   e. Water as appropriate

   f. 8 oz. ADVA 140 to accelerate curing (optional)

2. Fabrication of oyster shell bag mounds.

B. Furnish all labor, materials, tools, equipment and other services necessary for casting, curing, transporting, surveying and placing, baycrete and other restoration structures required for the Contract work.

1.02 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Where a date is given for reference standards, that edition shall be used. Where no date is given for reference standards, the latest edition available on the date of Notice Inviting Bids shall be used.

B. American Concrete Institute (ACI):

1. ACI 117: Specifications for Tolerances for Concrete Construction and Materials and Commentary.

2. ACI 301: Specifications for Structural Concrete.

3. ACI 304: Measuring, Mixing, Transporting and Placing Concrete.

4. ACI 305R: Hot Weather Concreting.

5. ACI 306R-88: Cold Weather Concreting.

6. ACI 308: Standard Specification for Curing Concrete.

7. ACI 309: Guide for Consolidation of Concrete.

8. ACI 318: Building Code Requirements for Reinforced Concrete and Commentary.

C. American Public Works Association, Southern California Chapter (APWA):

1. Standard Specifications for Public Works Construction (SSPWC).

D. American Society for Testing and Materials (ASTM):

1. ACI-211Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

2. ASTM C C260/C260M-10a- Standard Specifications for Air-Entraining Admixtures for Concrete.

3. ASTM C 494/C494M-10a- Standard Specifications for Chemical Admixtures for Concrete.

4. ASTM C 33/C33M-11- Concrete Aggregates.

5. ASTM C 150-Portland Cement.

6. ASTM C 39/C39M-10 (Standard Specifications For Compressive Testing)

7. ASTM C94: Standard Specification for Ready-Mixed Concrete.

8. ASTM C172: Practice for Sampling Freshly Mixed Concrete.

9. ASTM C1077: Practice for Laboratories Testing Concrete and Concrete Aggregates for use in Construction and Criteria for Laboratory Evaluation.

E. State of California, Department of Transportation (CALTRANS):

1. California Department of Transportation (Caltrans): Test Method No. 109, Method for Testing of Weighing and Measuring Devices.

2. California Department of Transportation (Caltrans): Test Method No. 217, Method of Testing for Sand Equivalent.

3. Test Method No. 515, Method of Testing for Relative Mortar Strength of Portland Cement Concrete Sand.

F. American Association of State Highway Transportation Officials (AASHTO):

1. AASHTO M182: Burlap Cloth Made From Jute of Kenaf.

1.03 SUBMITTALS

A. Submit in accordance with Section 01300, Contractor Submittals at least 60 days in advance of the relevant work commencing or materials being ordered, unless noted otherwise.

B. Submittals shall include the following:

1. Source of fine and coarse aggregate, including test results from an approved testing laboratory for all tests required by this section. Once approved, the source of fine or coarse aggregate shall not be changed without written approval of the Owner Representative.

2. Mix designs for each strength and type of concrete proposed for use. Each mix design shall show clearly where each mix will be used in the work and shall show all ingredients of the mix and shall include:

a. Type, brand, source and amounts of cement, silica fume, pozzolans, admixtures or other additives. Include mill test reports for cement proposed for use on the project.

b. Source and amounts of water and aggregates.

c. Sieve analysis of coarse and fine aggregates.

d. Representative samples of materials for materials testing and mix proportion testing.

e. Combined grading of each mix design.

f. Specific gravity of all materials.

g. Results of all required tests shall be submitted with the proposed mix design. Refer to Article 1.04 for Quality Assurance requirements.

3. Baycrete admixture material specifications, instructions for use and material safety data sheets.

4. Bond preventer material specifications, instructions for use and material safety data sheets.

C. Contractor shall submit a Baycrete Component Casting Plan with complete details of their proposed approach to component fabrication to allow the Owner Representative to evaluate the acceptability of the plan. The submittal shall include, but not be limited to the following:

1. Name of suppliers of form materials and baycrete components.

2. Location of casting facility.

3. Capacity and number of transit equipment.

4. Estimated travel time from plant to work site.

5. Details of the methods for forming, fabricating, curing and storing baycrete items.

6. Details of the means and methods for stockpiling, handling and mixing baycrete and its components

7. Provisions for meeting hot and cold weather concreting requirements.

D. Certificates of compliance for each cement component offered for use as detailed in Article 1.04, Quality Assurance.

E. A delivery ticket with all the information stated in Section 13 of ASTM C94, excepting actual scale weights of materials, shall be furnished to the Owner Representative with each batch of baycrete before utilization in casting.

1. Provide a print out of the actual scale weights for all components utilized.

1.04 QUALITY ASSURANCE

A. Contractor Qualifications: 10 years of experience constructing and placing baycrete or similar concrete structures.

B. Construction Standard: Applicable requirements of the Reef Ball Foundation, ACI 301 and recommendations of ACI 318.

C. Concrete Products and Materials Tests: Certified by independent commercial testing laboratories. Submit certification on cementitious products and aggregates performed within the past 6 months.

D. Baycrete Mix Designs: The baycrete mix design is provided by the State Coastal Conservancy after consultation with Reef Ball International. The mix has been proven at other restoration sites in San Francisco Bay (the bay). AECOM has not been involved in the development or testing of this mix.

E. Baycrete Testing:

1. Preliminary Batch Testing: Contractor shall conduct a trial mix and fabrication of each of the 2 types of baycrete restoration element: reef blocks and reef balls. The Contractor shall test this first batch of the baycrete mix for slump, temperature, air entrainment and after forming,

compressive strength at 7 and 14 days. The purpose of the testing is to develop performance standards for these paramaters, optimize the baycrete mix and qualitatively assess the structural integrity of the elements for placement in the bay. Submit test results to Owner. Fabrication of project baycrete restoration elements shall not proceed until the results of testing and forming the trial elements have been reviewed by the Owner.

2. Testing During Fabrication: Contractor shall test every days' batch of baycrete for slump and compressive strength in accordance with ASTM C39 and submit result to Owner. Contractor shall also test baycrete temperature and air temperature twice daily.

F. Field Inspection:

1. The Contractor shall advise the Owner Representative of his readiness to proceed at least 72 hours prior to initial casting. No casting shall be made without the inspection and acceptance of forms by the Owner Representative.

2. When forms are removed, void, stone pockets, and other defects shall not be remedied until the Owner Representative has inspected them and given his direction.

G. Plant Inspection:

1. The Owner Representative will have access to and has the right to inspect and approve facilities of suppliers, manufacturers, subcontractors, and contractors providing products.

2. The Owner Representative will have access to and will have the right to inspect and approve all forms, forming processes, and finished casts.

H. Certificates of Compliance: Acceptability of the following materials will be based upon documentation furnished by the manufacturer identifying each batch of material and certifying compliance with the requirements specified:

1. Portland cement.

2. Admixtures and curing materials.

3. Aggregates.

4. Silica fume, and pozzolans.

I. Concrete (Baycrete) Tests, as Placed: Performed by Testing Laboratory:

1. Concrete Sample: ASTM C172. Provide all material required.

2. Compressive strength: A set of four standard 6-inch x 12-inch baycrete cylinders will be cast for each 100 cubic yards or fraction thereof for testing every other day of baycrete batched onsite.

   a. Making, storing and initial cure of cylinders: ASTM C31.

   b. Testing laboratory: Provided by the Contractor

   c. Final cure and tests of cylinders: ASTM C39. Testing laboratory will transport cylinders from site, cure, test and provide report. Test two cylinders at age of 7-days, and two at 28-days.

   d. Results outside the limits (average compressive strength) indicate possible cause for rejection of baycrete as indicated and directed by the Owner Representative.

1.05 TOLERANCES

A. Evaluation and acceptance of baycrete and concrete structures will be in accordance with ACI 301.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery, storage, and handling shall be in accordance with the following specific requirements:

1. Cement:

   a. Bins or silos shall be tight, moisture proof and provide for free movement to discharge opening. Where storage is provided for different types of cement or cementitious materials, different materials shall be isolated to prevent intermingling or contamination.

   b. Storage bins for bulk cement shall be so constructed that there will be no dead storage and they will be of sufficient capacity to maintain an adequate supply at all times.

   c. Sack cement or cementitious materials shall be stored in a weather-tight warehouse and cement shall not be stacked more than seven sacks high.

   d. Upon deliver at the site, store immediately in a dry, weather-tight, properly ventilated structure/container, with adequate provisions for prevention of moisture absorption and overheating of the cement.

2. Aggregates:

   a. Procedures shall be implemented for unloading, stockpiling and intra-plant handling of aggregates, such as to prevent harmful segregation, breakage, and inclusion of foreign material. Stockpiles shall be located to prevent contamination and arranged to assure that each aggregate as removed from its stockpile is distinct and not intermingled with others. Separate storage bins or compartments for each size and type of aggregate shall be properly constructed and charged to prevent mixing of different sizes or types.

   b. Dry sand shall be moistened before handling, when necessary, to prevent segregation.

   c. Aggregates in storage and conveyors for aggregates shall be shaded;

   d. Water spray or misting of coarse aggregate stockpiles for evaporative cooling effect. Adequate drainage shall be provided beneath the stockpiles;

   e. Immersion of coarse aggregates in chilled water and/or processing fine aggregates in chilled water in its final classification;

   f. Cooling the coarse aggregate while on the belt conveyor enroute to the batch bins by spraying with chilled water;

   g. Chilling batch water by heat pump technology, liquid nitrogen injection or other such means as approved by the Owner Representative; and

   h. Use of ice as batch water provided adequate and reliable means for weighing crushing (uncrushed block ice shall not be allowed), and transporting the ice to the mixer are provided.

3. Water:

   a. Water shall be in adequate supply, with pressures sufficiently constant or regulated to prevent interference with accuracy of measurement.

4. The Contractor shall provide facilities for obtaining samples of cement, pozzolan, aggregates, and baycrete for their own quality control program and for use by the Owner Representative. The facilities shall be provided at the batching plant.

PART 2 PRODUCTS

2.01 GENERAL

A. Obtain materials from an established and experienced manufacturer or supplier. Provide new materials of ingredients guaranteed to perform the service required.

2.02 MATERIALS

A. Portland Cement: Shall be Type II and conform to ASTM C-150

B. Water: Shall be potable and free from deleterious substances and shall not contain more than 1000 parts per million of chlorides or sulfates and shall not contain more than 5 parts per million of lead, copper or zinc salts and shall not contain more than 10 parts per million of phosphates.

C. Fine Aggregate: Shall be sand sourced from San Francisco Bay. This material is available from Lind Marine of Petaluma, CA.

D. Concrete Admixtures: Shall be in compliance with ASTM C-494.

E. Bags for stacked oyster bags shall be quarter-bushel mesh bags, approximately 2.5 feet long by 1 foot wide by 6-8 inches thick, with integrated drawstrings for closure. Plastic mesh shall contain lamp black for UV resistance.

F. Oyster shells for stacked oyster bags shall be clean whole Pacific oyster shells. Oyster shells will be provided by the Owner for this project at no cost.

G. Crushed oyster shells shall be used in the baycrete mix. These are available from Lind Marine of Petaluma, CA.

H. Cement:

1. All Portland cement shall be in accordance with the requirements of ASTM C150 for low alkali cement. Type II cement shall be used unless otherwise specified or permitted by the Owner Representative.

2. Pozzolan shall conform to the requirements of ASTM C618, Class N.

3. Blended Cement shall conform to ASTM C595, Type 1P(MS)

I. Baycrete Aggregates:

1. Aggregate Source:

a. Fine and coarse aggregate shall be obtained only from sources approved by the Owner Representative. The Contractor shall notify

the Owner Representative in writing not less than 30 days prior to use, naming the source of fine and coarse aggregate. Once such notification is given, the source of fine or coarse aggregate shall not be changed without prior written approval of the Owner Representative. Approval of sources shall not be construed as constituting approval of all materials taken from said sources, and the Contractor shall be responsible for the specified quality of all such materials used in the work.

b. Aggregate shall not originate from sources susceptible to producing reactive or degenerative rock products.

2. General: ASTM C33:

a. Provide free from organic materials, waste products, clay balls, shale, and mica and thoroughly washed before use.

b. Provide aggregates that do not deleteriously react with the alkalies in the cement.

c. Reactivity: ASTM C289. Submit graphical data showing compliance. Aggregates determined to be potentially reactive with alkalis shall not be used.

d. Fine aggregate shall be of such quality as to develop relative mortar strength of not less than 90 percent when tested in accordance with the requirements of Caltrans Test Method No. 515.

3. Sand equivalent: ASTM D2419 or CALTRANS Test 217. For three tests not less than 70, with an average greater than 75.

a. Fine aggregate varying in any respect from the foregoing requirements shall not be used in the work.

b. Washed or saturated sand shall be allowed to drain for at least 24 hours to uniform water content before batching.

c. Dry sand shall be moistened before handling to prevent segregation.

J. Bond preventer shall be a nonstaining type, which will provide positive bond prevention. Proposed material will be approved by the Owner Representative.

K. All materials required for protection of the baycrete shall be available at the project site before cold weather concreting.

2.03 WATER

A. The water for curing and washing aggregate, and the water for mixing baycrete shall be potable, clean, and free from objectionable quantities of organic matter, alkali, salts, oil and other impurities which, in the opinion of the Owner Representative, might reduce the strength, durability, or otherwise adversely affect the quality of the baycrete.

B. Water shall not contain more than 1,000 parts per million of chlorides as Cl nor more than 1,000 parts per million of sulfates as SO_4. In no case shall the water or ice contain an amount of impurities that will cause a change in the setting time of Portland cement of neither more than 25 percent nor a reduction in the compressive strength of mortar at 14 days of more than five percent when compared to the results obtained with distilled water. Water shall be potable and free from deleterious substances.

C. Water for curing shall not contain any impurities in a sufficient amount to cause discoloration of the baycrete or mortar, or produce etching of the surface.

D. Potable water shall be made available to the Contractor by the Owner at no cost at one of the on-land staging areas. The sources of water other than this shall be approved by the Owner Representative prior to use and any change in water supply shall be tested by the Contractor at their cost and approved by the Owner Representative prior to use.

2.04 ADMIXTURES AND MICROFIBERS

A. Only admixtures and microfibers described by the Reef Ball Foundation in their concrete specification are allowed. See http://www.reefball.org/concretespecifications.htm.

2.05 DESIGN OF BAYCRETE MIX

A. General:

1. Employ an independent commercial testing laboratory complying with ASTM C1077 and favorably reviewed by the Owner Representative to design all baycrete mixes and carry out all necessary testing.

2. If the testing laboratory has satisfactory mix designs available from prior projects, submit test record statistics to demonstrate compliance with the requirements of this Section.

3. If new mix designs are required, prepare a range of trial batches for each design and submit the mixes that demonstrate satisfactory test results

4. Allow for the variability of baycrete strength from test to test by increasing the required average compressive strength over the specified strength as specified in 2006 IBC Section 1905.3 & 1905.6.

5. Design the mixes far enough ahead of production casting to allow completion of trial batch testing and submittal of the test results and mix design to the Owner Representative for review.

6. The Contractor shall take sole responsibility for selection of laboratory, submittal of materials to laboratory in time for all tests, and overall timing of all aspects of testing program, including submittals.

7. Prepare mix designs for baycrete placement by the batch process and/or by pumping, as required, and state the process on the design submittal.

8. Design the mixes to take into account hot or cold weather conditions and the time required to transport the baycrete from the mixer to the site and to place within the forms. If accelerating or retarding admixtures will be required for only a proportion of the baycrete placements, submit test results that include the full range of options.

9. Do not exceed the water-cementitious material ratios. Vary the water-reducing admixtures to accomplish an increase in slump or workability time.

10. Proportion cementitious materials, aggregates, and water by weight.

11. Check periodically the weight of moisture contained within the stockpiled aggregates. Compensate for this water when proportioning the baycrete mix and adjust when change occurs.

12. Do not use chlorides in any baycrete mix.

B. The materials for baycrete will be proportioned to produce a baycrete capable of being deposited so as to obtain maximum density. Where deposited in forms, the baycrete shall have maximum smoothness of surface, and have an ultimate compressive strength, at the age of 28 days, as designated by the baycrete Class number. Water-cement ratio is determined by weight of water and Portland cement or Portland cement plus pozzolan.

C. The nominal maximum size of coarse aggregate for any part of the work shall be the largest of the specified sizes whose use is practicable from the standpoint of satisfactory placement and consolidation of the baycrete .

D. Accelerators containing chlorides shall not be used. Nonchloride accelerators and high-range water reducers may only be used where approved by the Owner Representative.

E. The Owner Representative may rescind the approval for use of any admixture, which demonstrates incompatibility with the materials being used on the work. Any admixture so rejected shall be replaced with an admixture that demonstrates compatibility.

F. Durability:

1. Air content: Provide concrete mixes with air content based on aggregate size as follows:

Table 03301-1	
Nominal maximum size of coarse aggregate, inches	**Total air content, percent by volume**
3/8-inch or 3/4 inch	6
1-1/2 inches	4.5
3 inches	3

2. Water-cement ratio: For concrete that will be exposed to water when the structure is completed, water-cement ratio shall not exceed 0.48±0.3 percent.

G. Use the larger size aggregate unless section dimensions and clear spacing between reinforcing bars, in accordance with ACI 318 requirements, require a smaller size.

H. Mix Test Requirements:

1. Compression: ASTM C192 for cylinder preparation. ASTM C39 for cylinder tests. Perform three tests after 7 days and three more after 28 days curing.

2. Air Content: Conform to ASTM C231.

3. After favorable review of the mix design, no variations of the constituents are permitted during the project without prior submittal and favorable review.

2.06 ACCESSORY MATERIALS

A. Reef ball forms shall be from the Reef Ball Foundation (www.reefball.org). No substitutions shall be permitted. The model reef ball to be used on this project is the “Mini-Bay Ball”.

B. The Contractor shall custom design forms for the reef blocks. Custom forms for reef blocks shall be from new, clean materials.

C. Sheet Materials: ASTM C 171. Waterproof paper, plastic sheeting or white burlap-polyethylene sheet.

1. Plastic sheeting: fungus-resistant, minimum 4 mil thick, clear and free of defects, having ASTM E96 perm rating of not more than 0.5.

2. Water proof paper: Two layers of non-staining kraft paper laminated with latex adhesive and reinforced with glass in both directions. Seal joints with 2-inch-wide tape with water resistant adhesive.

D. Wet Blankets: Clean cotton mats (burlap is unacceptable). Provide material free from any substance which will have a deleterious effect on the concrete. Use a thickness sufficient to retain moisture between programmed applications of water.

2.07 SOURCE QUALITY CONTROL

A. Forms: Verify that components are satisfactory for the purpose. Verify that designs, products and samples have been submitted for product review.

B. Concrete:

1. Verify that ready-mix batch plant delivery tickets contain all product information necessary for acceptance of the concrete delivered to site.

2. Verify that the mixing and trucking equipment have adequate capacity to deliver the concrete batches on time, thoroughly mixed and discharged without segregation.

PART 3 EXECUTION

3.01 GENERAL

A. Fabrication of the baycrete reef balls and reef blocks re acknowledged to be custom designs; however, the Contractor is to use standard concrete procedures and techniques for successful fabrication.

3.02 PROPORTIONING CONCRETE MATERIALS

A. Place no baycrete prior to favorable review of submittals for reinforcing material, materials specified in this Section and the mix design proposed. Unfavorable results of actual pours may require a redesign of mixes.

B. Make no substitutions to the constituents tested in the design of baycrete mixes without favorable review of the revised mix and the new test results.

3.03 FORMS FOR CASTING BAYCRETE

A. The Contractor shall follow the project drawings for the design of the custom-made baycrete elements.

B. The forms for the reef ball units are available commercially as described in Section 2.06 above.

C. Forms for manufacturing precast baycrete units shall be of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Forms shall be constructed so that the forces and vibrations to which the forms will be subjected cause no damage to the precast baycrete unit.

D. Forms shall be constructed out of inert materials that will not leach or deposit any deleterious or toxic substances into the castings. The use of inert or biodegradable, sacrificial casting pieces that remain in the casting are allowed.

E. Forms shall be cleaned of baycrete build-up prior to re- use.

F. Form release agents shall be applied according to the manufacturer's recommendations and shall not be allowed to build up on the form casting surface.

G. Products shall not be removed from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms a minimum of 48 hours after the final set of concrete.

3.04 BATCHING AND MIXING OF MATERIALS

A. General:

1. Baycrete shall conform to ASTM C94 and to these specifications, except, when a conflict exists between ASTM C94 and these specifications, these specifications shall govern.

2. Baycrete shall be discharged at the job within 1-1/2 hours after the water has been added to the cement and aggregates, and prior to stiffening or initial set.

B. Batching in adverse weather:

1. Cold Weather: Based on ACI 306R, when the air atmospheric temperature is below 55 degrees F, or is likely to fall below 55 degrees F during the 24-hour period after placing, heat the materials before mixing, so that the temperature of the mix when deposited shall be between 60 degrees F and 70 degrees F. Do not heat the mixing water over 140 degrees F. Remove

lumps of frozen material and ice from the aggregate before they are placed in the mixer.

2. Hot Weather: Based on ACI 305R, when the air temperatures are above 90 degrees F, reduce the temperature of the baycrete mix by using ice as part of mixing water, and protecting aggregates and cement from direct rays of the sun. Do not place baycrete when the air temperature exceeds 80 degrees F.

3. If the provisions given in 1. and 2 above are not possible or practical, postpone the batching until favorable weather conditions.

3.05 CASTING BAYCRETE

A. Inspection:

1. Unless specifically waived by the Owner Representative, all formwork shall be inspected and approved prior to casting of baycrete. The Contractor shall notify the Owner Representative at least 24 hours in advance of all inspections for baycrete castings. Prior to such notification all work shall be complete and ready for inspection on that portion of the work for which baycrete is to be cast. Any defective or incomplete work discovered by the Owner Representative shall be corrected in a timely fashion to allow for re-inspection and further corrective action if necessary.

2. Remove hardened baycrete and foreign materials from the inner surface of the mixing and conveying equipment. Remove all debris from the space to be occupied by the baycrete.

3. Provide satisfactory redundancy in the casting and transportation of materials so that work can continue in the event of a breakdown.

4. Baycrete shall be cast as soon as possible after leaving the mixer without segregation or loss of ingredients.

5. Baycrete shall not be dropped through reinforcement or into any deep form, whether reinforcement is present or not, so as to cause segregation, nor shall baycrete be placed in any form in such a manner as to leave an accumulation of mortar on the form surfaces above the placed baycrete. Hoppers and, if necessary, vertical ducts of canvas, rubber, or metal (non-aluminum) shall be used in the forms, or other means shall be employed so that the baycrete is deposited, as nearly as practicable, directly in its final position. The baycrete shall not be caused to flow such that the lateral movement permits or causes segregation. Clusters of coarse aggregate separated from the baycrete mass shall be scattered before the baycrete is vibrated. In no case shall the free fall of baycrete exceed four feet below

the ends of ducts, chutes, or buggies; nor shall the horizontal movement of baycrete in the forms exceed five feet.

6. Do not use aluminum materials in pumping lines, transfer hoppers or chutes longer than 12 feet. Provide conveyor belts instead of chutes when the distance is longer than 50 feet. Use a storage hopper at the start of the line.

7. For pumped baycrete, provide a hose with an angle-change to create a back-pressure at the outlet.

8. Provide illumination if necessary inside the forms so that the placed baycrete will be visible from the deck at the top of the formwork.

9. Provide thermometer for measuring baycrete temperature when weather conditions are predicted to go beyond the range of 50 degrees Fahrenheit (F) to 80 degrees F.

10. Precautions shall be taken to prevent overloading floors, beams, and other members, and the Contractor shall comply with the Owner Representative's instructions respecting the loads, which may be imposed on such members during construction.

B. Embedded Items:

1. Before and during baycrete casting reinforcement, anchor bolts, and any other materials shall be accurately and properly placed in accordance with approved Shop Drawings, or as directed by the Owner Representative. They shall be secured against displacement with templates or other approved methods during placement of the baycrete. Incorrectly located items to be embedded shall be reset as directed by the Owner Representative. Embedded items shall be kept clear of the reinforcement.

2. Hot-dip galvanize all ferrous metal sleeves, inserts, anchors, and other embedded ferrous items unless shown otherwise. Set anchor bolts for equipment in templates, carefully plumbed and checked for location and elevation with an instrument, and held in position rigidly by double nutting to the template to prevent displacement while baycrete is being poured.

3. Move reinforcement bars as necessary to avoid interference with other reinforcing steel, conduits, or embedded items, but not so as to impair design strengths of the member. If bars are moved more than two bar diameters, submit the resulting arrangement of bars for review.

C. Surface Preparation:

1. Immediately before casting baycrete, all surfaces of forms upon or against which the baycrete is to be placed shall be free from standing water, free from oil, objectionable coatings; and loose, detached, or unsound fragments.

2. All surfaces of forms and embedded items that have been encrusted with dried mortar or grout from baycrete previously cast shall be cleaned of all such mortar or grout before the surrounding or adjacent baycrete is placed.

3. Where the placing of baycrete is to be interrupted long enough for the baycrete to take its final set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work.

4. Before new baycrete is placed on old baycrete, the bonding surface of the old baycrete shall be roughened to enhance the joining of old-to-new baycrete. The surface shall be roughened to create a profile of approximately 1/4 inch using abrasive blasting or high-pressure water blasting techniques.

5. Bond-preventer compound to be applied to the surfaces of forms to prevent bonding, as shown on the Drawings, shall be applied in accordance with the manufacturer's printed instructions, except that the compound shall be applied by brush. Care shall be taken to keep the compound off the surfaces of the grooves in which sealant is to be placed. Bond preventer shall be used only where permitted by the Owner Representative.

6. No baycrete shall be cast until all formwork, installation of parts to be embedded, and preparation of surfaces involved in the placing have been approved by the Owner Representative.

D. Temperature:

1. The temperature of baycrete as placed shall not be more than 75 degrees F. Hot weather concreting shall comply with ACI 305R. When the temperature of the materials or the probability of increases in ambient air temperature indicates a temperature of baycrete, as placed, above 75 degrees F, the Contractor shall employ effective means to maintain the temperature of baycrete within the specified limits, such as pre-cooling aggregates and mixing water, using ice as part of the mixing water, shading of aggregates, or placing at a time of day when the ingredients will not produce baycrete above 75 degrees F. Any wetting of aggregates for cooling shall be performed sufficiently in advance of delivery into the batching plant bins and in such manner that the batched material will have a uniform and stable water content.

2. The Contractor shall submit to the Owner Representative its method of obtaining and maintaining the required baycrete temperature.

3. Placement Temperature: The minimum temperature of baycrete immediately after placement shall be as specified in Column 2 of Table 3301-2. The temperature of baycrete as placed shall not exceed the values shown in Column 2 of Table 3301-2 by more than 20 degrees F.

Table 3301-2. Temperature Requirements

Least Dimension of Section (inches)	Minimum temperature as placed and maintained during the protection period (degrees F)	Maximum gradual decrease in surface temperature during any 24 hour after end of protection (degrees F)
Less than 12	55	50
12 to less than 36	50	40
36 to 72	45	30
Greater than 72	40	20

4. Protection temperature: Unless otherwise specified, the minimum temperature of baycrete during the protection period shall be as shown in Column 2 of Table 3301-2. Temperatures specified to be maintained during the protection period shall be those measured at the baycrete surface, whether the surface is in contact with formwork, insulation, or air. Measure the temperature with a surface temperature measuring device having an accuracy of ±2 degrees F. Measure the temperature of baycrete in each placement at regular time intervals not less than twice per 24 hour period.

5. Termination of protection: The maximum decrease in temperature measured at the surface of the baycrete in a 24-hour period shall not exceed the values shown in Column 3 of Table 3301-2. Do not exceed these limits until the surface temperature of the baycrete is within 20 degrees F of the ambient or surrounding temperatures. When the surface temperature of the baycrete is within 20 degrees F of the ambient or surrounding temperature, all protection may be removed.

E. Consistency:

1. The quantity of water entering into a batch of baycrete shall be just sufficient, with a normal mixing period, to produce a baycrete which, can be worked properly into place without segregation and which can be compacted to give the specified density, impermeability, and smoothness of surface. The quantity of water shall be changed as necessary with variations in the nature or water content of the aggregate, to uniformly produce the desired consistency.

2. Except as indicated in Article 2.05. J, the slump of the baycrete immediately prior to placing shall be in accordance with the limits in the table below, measured in inches.

   a. The slump, as indicated herein, shall be measured in accordance with the methods prescribed in ASTM C143.

   b. The "Working Limit" is the maximum slump permissible for estimating the quantity of mixing water to be used in the baycrete. The specified slump will be the minimum slump that will enable placing and consolidating baycrete as specified and will be less than the "Working Limit." The "Inadvertency Margin" is the allowable deviation from the "Working Limit" for such occasional batches of baycrete as may inadvertently exceed the "Working Limit." Batches of baycrete with slumps above the working limit will be rejected if the frequency of their occurrence exceeds 50 percent of the slumps measured. Baycrete with a slump exceeding the "Rejection Limit" shall not be used for the work. Baycrete that has been rejected for failure to meet slump limits shall not be salvaged for use in the work. Increased mixing time, addition of dry materials, or similar modifications of a rejected batch for the purpose of conforming to slump limits will not be permitted. The slump limits and margin will be developed by the Contractor during the batch testing described in Section 1.04.

   c. The retempering of baycrete or mortar will not be permitted. Any baycrete or mortar, which has stiffened so that proper placement and consolidation cannot be assured, shall be wasted.

F. Casting:

1. Transfer the baycrete to the place of final deposit as rapidly as practical by methods which can prevent the separation or loss of ingredients. Under no circumstances shall partially hardened baycrete be deposited. Deposit baycrete in the forms as close to its final position as practical to avoid rehandling. Maintain, until the completion of the pour, a plastic concrete surface, approximately horizontal.

2. Deposit baycrete without segregation of the aggregate and without displacement of the reinforcement.

3. Deposit baycrete continuously or in layers so that no baycrete will be deposited on baycrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously as originally planned, locate construction joints during the placement.

G. Time Limit: Deposit all baycrete in its final position in the forms within 1-1/2 hours of batching.

H. The Contractor shall protect all baycrete against damage from inclement weather, excessive heat, overstress, lack of moisture, or any other cause until final acceptance by the Owner Representative. Special care shall be taken to prevent the drying out of baycrete during the curing period and to avoid roughening or otherwise damaging the surfaces.

3.06 CONSOLIDATION

A. The Contractor shall consolidate all baycrete by spading and tamping by hand. Vibratory consolidation shall not be used.

3.07 REPAIR OR REPLACEMENT OF DEFECTIVE BAYCRETE

A. No repairs shall be made until after inspection and approval of the proposed method by the Owner Representative.

B. Any baycrete found to be damaged; or which may have been originally defective; or which becomes defective at any time prior to the final acceptance of the completed work; or which, for any other reason, is not in accordance with the specifications, shall immediately be satisfactorily repaired, or removed and replaced with acceptable baycrete.

C. Only water cure will be permitted on areas requiring treatment of surface defects until such treatment has been satisfactorily completed.

D. All repairs and replacements herein specified shall be promptly executed by the Contractor.

E. It is the intent of these specifications that repairs are made, if possible, while the base baycrete is still uncured (green).

3.08 BAYCRETE FINISHES

A. All finished formed surfaces shall conform accurately to the shape, alignment, and sections shown on the Drawings.

B. Increase the humidity of the air directly above the baycrete surface, prior to and during finishing operations by adding a fine fog mist of water to the air with mist nozzles when atmospheric conditions (temperature, humidity, and wind) are such that rapid evaporation of mixing water from the baycrete is likely to occur.

C. Complete all patching and finishing within 10 days after stripping forms.

D. External corners shall be rounded or beveled, where required, by the use of molding strips or with suitable molding or finishing tools.

3.09 BAYCRETE TOLERANCES

A. Tolerance limitations for all structures shall be in accordance with Article 1.05 except that for all elements of the structure, the tolerances permitted in the several categories shall not be combined to allow a total combined tolerance greater than that allowable under a single category.

B. Where tolerances closer than those given above are necessary to accommodate the installation of all items or equipment, they shall be limited to values compatible with the installation requirements.

C. Failure of baycrete to meet specified tolerances will be grounds for rejection of baycrete work.

3.10 CURING AND PROTECTION

A. General: Maintain baycrete above 50 degrees F and below 90 degrees F in a moist condition and without external loadings for 14 days after forming. After the specified initial moist cure, provide further moist curing, impervious-sheeting curing, or application of liquefield membrane-forming compound, as noted.

B. Prevent baycrete from drying during the required curing period. If water curing is used, terminate use at least 24 hours before any anticipated exposure of the baycrete to freezing temperatures.

C. Combustion heaters: Vent flue gases from combustion heating units to the outside of the enclosure.

D. Overheating and drying: Place and direct heaters and ducts to avoid areas of overheating or drying of the baycrete surface.

E. Hot Weather Requirements: Provide additional cooling to baycrete when temperatures rise to more than 75 degrees F, or low humidity, wind and temperature combine to cause high surface evaporation, over 0.2 lb/sq. ft./hour:

1. Provide additional water if curing by fog spray or ponding or saturated blankets.

2. Provide shade to surfaces exposed to direct sunlight.

3. Apply an evaporation retarder during the finishing operation, following the manufacturer's recommendation.

4. Maximum air temperature: During the protection period, do not expose the baycrete surface to air having a temperature more than 20 degrees F above the values shown in Column 2 of Table 03301-2, unless otherwise specified. The protection period may be reduced to 2 days if use of one or more of the following to alter the baycrete mixture is accepted:

F. Cold Weather Requirements: Provide adequate equipment for heating the placed baycrete during freezing or near freezing weather:

1. Whenever the surrounding air temperature is below 40 degrees F, or may fall below 40 degrees F within the 24-hour period after pouring of baycrete, maintain all freshly poured baycrete at not less than 50 degrees F for 5 days.

2. Keep the housing, covering, or other protection in place and intact at least 24 hours after the artificial heating is discontinued.

3. Do not use manure, salt, calcium chloride, or other chemicals on the baycrete to prevent freezing.

G. During periods not defined as cold weather, but when freezing temperatures may occur, protect baycrete surfaces against freezing for the first 24 hours after placing.

3.11 TRANSPORTATION

A. Transporting precast baycrete reef structures ("units") and filled shell bags to sites:

1. Precast baycrete units shall be handled and transported in a manner to minimize damage. Lifting devices or holes shall be consistent with industry standards. Lifting shall be accomplished with methods or devices intended for this purpose as indicated on shop drawings. Upon request, the precast baycrete producer shall provide documentation on acceptable handling methods for the product.

2. Filled shell bags will be placed on to pallets before transportation and sufficiently wrapped to prevent perforation of bags during transport and handling.

3. Precast baycrete units and filled shell bags shall be delivered to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite all precast baycrete units

shall be inspected by the customer or customer's agent for quality and final acceptance.

4. Precast baycrete units shall not be shipped until it can be shown that the baycrete strength has reached at least 75 percent of the specified 28-day strength, or that damage will not result, impairing the performance of the product.

3.12 FIELD TESTING

A. The Owner Representative will make all quality assurance (QA) tests. The Contractor shall cooperate in the making of such tests by furnishing necessary labor to assist the Owner Representative in obtaining, handling, protecting, and curing samples at the work site.

B. The Contractor shall be responsible for all quality control (QC) tests to determine compliance with these specifications. The Contractor shall perform quality control tests of baycrete at test locations designated by the Owner Representative to demonstrate compliance with this specification section and Section 01400, "Quality Control."

C. The determination of compressive strength in pounds per square inch will be made by testing 6-inch by 12-inch cylinders fabricated and cured in accordance with the requirements of ASTM C31 and tested in accordance with the requirements of ASTM C39. The Owner Representative will make tests and analyses of the aggregate and of the resulting baycrete at frequent intervals, and the mixes used shall be changed whenever such change is necessary or desirable in order to secure the required workability, density, impermeability, surface finish, and strength.

D. Before baycrete production is started, the Contractor shall provide acceptable facilities for obtaining samples of cement, aggregates, and baycrete as required. These facilities shall be provided at the batching and mixing plant. Samples of aggregate and samples of baycrete shall be furnished as requested by the Owner Representative.

3.13 FIELD QUALITY CONTROL

A. Baycrete Casting:

1. Verify that forms and reinforcement are accurately placed and secured in position. Confirm that both forms and reinforcement have been inspected and approved with all requested corrections, re-inspected and approved.

2. Verify that tie wire ends have been bent back away from the forms.

3. Verify that all sleeves, castings, pipes, conduits, bolts, anchors, and any other items required, are accurately and securely placed within or on the forms.

4. Verify waterstop is correctly in place and that splices are watertight.

5. Verify adequate vibrators used are available.

6. Check that the mix design is compatible with the method of placement of the baycrete.

B. Baycrete Curing:

1. Verify procedures and equipment are available for controlling baycrete temperature during hot and cold weather conditions.

2. Verify actual time of application of evaporation retardant, fog spray and curing materials for each placement.

3.14 PLACEMENT OF SHELL BAG MOUNDS AND PRECAST STRUCTURES

A. Contractor shall provide adequate access to the sites for the Owner and Owner's Representative to inspect fabrication, hauling, storage and proper handling of the shell bag mounds and precast baycrete reef structure products.

B. Precast reef structures and shell bag mounds will not be moved to their final location without the direction and approval of the Owner Representative.

C. Precast baycrete units shall be lifted by suitable lifting devices at points provided for that purpose. The Contractor is responsible for replacing any baycrete elements that break during transport.

D. Precast structures and shell bag mounds will be placed at the locations shown on the plans, and the locations will be confirmed with geographic positioning system (GPS) or surveying in accordance with Section 01050.

E. Baycrete structures and shell bag mounds shall be placed in a way that will minimize resuspension of sediments and disturbance to eelgrass and other natural resources in accordance with Section 01141.

3.15 CLEANUP

A. The Contractor may be required, at any time prior to final acceptance of the work, to clean all permanently exposed surfaces of baycrete, if deleterious substances are found or suspected on it.

B. Upon completion of all work performed under this Section, remove from the site all excess materials, storage facilities and temporary facilities. Smooth and

clean all debris in the areas where used for or occupied during access and staging operations. The site condition shall be cleaned and acceptable to the Owner Representative.

END OF SECTION

Site Photos Taken September 22, 2014

Red Rock Warehouse Site

El Campo Marina Site

Appendix B

Air Quality and Greenhouse Gas Calculations

CONSTRUCTION EMISSIONS SUMMARY TABLE

	ROG	NOx	Exhaust PM10	Exhaust PM2.5	CO_2e (Metric Tons)
Red Rock Warehouse Site (tons)	0.24	0.31	0.05	0.05	37.64
El Campo Site (tons)	0.36	0.46	0.08	0.08	49.90
Total Tons	0.60	0.76	0.13	0.13	**87.54**
Average Daily (lbs)	**20.0**	**25.5**	**4.5**	**4.4**	**-**
BAAQMD Average Daily Significance Thresholds (lbs)	**54**	**54**	**82**	**54**	**-**

CAL EE MOD RESULTS

		ROG	NO_X	CO	SO_2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio-CO_2	NBio-CO_2	Total CO_2	CH_4	N_2O	CO_2e
Phase	**Year**	**Tons/Yr**										**MT/YR**					
Red Rock - Pile Removal	2016	0.0176	0.2007	0.0995	3.00E-04	4.53E-03	8.45E-03	1.30E-02	1.24E-03	8.06E-03	9.29E-03	0	26.6883	26.688	2.38E-03	0	26.7382
Red Rock - Restoration	2017	6.82E-03	0.0774	0.0323	7.00E-05	9.10E-04	3.44E-03	4.34E-03	2.40E-04	3.16E-03	3.40E-03	0	6.0285	6.0285	1.65E-03	0	6.063
El Campo - Pile Removal	2016	0.0323	0.3342	0.1747	4.10E-04	4.68E-03	0.0163	0.0209	1.27E-03	0.0155	0.0168	0	36.2952	36.295	4.73E-03	0	36.3947
El Campo - Restoration	2017	6.82E-03	0.0774	0.0323	7.00E-05	9.10E-04	3.44E-03	4.34E-03	2.40E-04	3.16E-03	3.40E-03	0	6.0285	6.0285	1.65E-03	0	6.063

OFFROAD 2007 EMISSION FACTORS (at different horsepowers)

							Emissions							
					Total hr/day	Total gal/day	Tons/day	Tons/day	Tons/day	Tons/day	Tons/day	Tons/day	Tons/day	Tons/day
CY	Equipment	Fuel	Max HP	Class	Activity	Consumption	**ROG** Exhaust	**CO** Exhaust	**NOX** Exhaust	**CO2** Exhaust	**SO2** Exhaust	**PM** Exhaust	**N2O** Exhaust	**CH4** Exhaust
2016	Vessels w/ Outboard Engines	G2	25	Pleasure Craft	1057.348	566.006	0.322	0.656	0.025	3.203	0.0001	0.053	0.002	0.020
2016	Vessels w/ Outboard Engines	G2	50	Pleasure Craft	1032.257	1427.873	0.500	0.842	0.069	10.553	0.0002	0.096	0.004	0.031
2016	Vessels w/ Outboard Engines	G2	120	Pleasure Craft	907.719	2634.961	0.861	1.627	0.127	19.591	0.0003	0.180	0.006	0.054

Notes:

Equipment types not available in OFFROAD 2011, therefore, OFFROAD 2007 emissions data was used.

Emission rates derived from OFFROAD 2007 emissions inventory and activity for Calendar Year 2016.

Emission rates calculated using midpoint horsepower of engine size bins.

MARINE ENGINE EMISSIONS

Phase	Equipment Type	# of Pieces	Operating Hrs/Day	Total Days of Use	Engine HP	Load Factor	**ROG** (tons)	**CO** (tons)	**NOx** (tons)	**CO_2** (metric tons)	**SO_2** (tons)	**PM** (tons)	**N_2O** (metric tons)	**CH_4** (metric tons)	**CO_2e** (metric tons)
Red Rock - Pile Removal	Tug Boat for Barge	1	8	21	50	1.00	0.108	0.183	0.015	2.077	0.000	0.021	0.001	0.006	2.48028
Red Rock - Restoration	Tug Boat for Barge	1	8	20	50	1.00	0.103	0.174	0.014	1.979	0.000	0.020	0.001	0.006	2.36217
El Campo - Pile Removal	Tug Boat for Barge	1	8	43	50	1.00	0.222	0.374	0.031	4.254	0.000	0.043	0.002	0.013	5.07867
El Campo - Restoration	Tug Boat for Barge	1	8	20	50	1.00	0.103	0.174	0.014	1.979	0.000	0.020	0.001	0.006	2.36217

Notes:

PM2.5 and PM10 conservatively assumed to be equal to PM.

Tug engine size assumed to be 50 HP.

Load factor conservatively assumed to be 1.

EQUIPMENT AND HAULING ASSUMPTIONS

Pile Removal

Red Rock Warehouse

Equipment	Number	Duration (months)
Barge (assumed to not be self-powered)	1	1
Tug Boat (for manuevering barge)	1	1
Excavator / Crane	1	1
Generator Set (to power hydraulic saws and hand held tools)	1	1

Hauling

Truck Round Trips	85
Round Trip Distance (miles)	100

Assume 50 miles to Keller Canyon Landfill

El Campo Marina

Equipment	Number	Duration (months)
Barge (assumed to not be self-powered)	1	2
Tug Boat (for manuevering barge)	1	2
Excavator / Crane	1	2
Generator Set (to power hydraulic saws and hand held tools)	1	2

Hauling

Truck Round Trips	65
Round Trip Distance (miles)	100

Assume 50 miles to Keller Canyon Landfill

Habitat Restoration

Red Rock Warehouse

Equipment	Number	Duration (months)
Barge (assumed to not be self-powered)	1	1
Tug Boat (for manuevering barge)	1	1
Excavator / Crane	1	1

El Campo Marina

Equipment	Number	Duration (months)
Barge (assumed to not be self-powered)	1	1
Tug Boat (for manuevering barge)	1	1
Excavator / Crane	1	1

All equipment assumed to operate 8 hours/day, 5 days/week

Barge assumed to not be self powered, would be moved by a tug boat/skiff

Tug boat/skiff assumed to be 50 HP, gasoline outboard motor vessel.