HERCULES INTERMODAL TRANSIT CENTER

COMPENSATORY MITIGATION PLAN
FOR IMPACTS TO AQUATIC RESOURCES

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Executive Summary

This Compensatory Mitigation Plan for Impacts to Aquatic Resources (Plan) provides a comprehensive approach for the replacement of aquatic resources and their associated functions and values that will be lost as a result of the proposed Hercules Intermodal Transit Center Project (proposed Hercules ITC project, proposed project). Permanent and temporary impacts to aquatic resources, including wetlands, other waters of the U.S., and special aquatic sites, would occur as a result of the proposed project including construction of the proposed promenade, station building and platform, railroad modifications, extension of the Bay Trail, and associated infrastructure improvements to tie existing roadways into the proposed facilities.

This Plan details the restoration of approximately 1,500 linear feet of lower Refugio Creek in Hercules, California, including approximately 420 feet of a minor tributary to Refugio Creek referred to as the North Channel. The upstream extent of the Refugio Creek restoration detailed in this Plan will tie into a previously restored reach of Refugio Creek completed in 2001, referred to as the Gelsar Reach, which also includes two wetland preserves. The downstream extent of the restoration extends to the outfall of Refugio Creek into San Pablo Bay and includes approximately 150 linear feet of tidal channel in the Bay. Upon completion of the restoration outlined in this Plan, a contiguous corridor of restored habitat will occur along Refugio Creek with a straight line length of approximately 0.8 miles (4,200 feet), extending from San Pablo Avenue to the creek mouth at San Pablo Bay. In conjunction with wetland restoration implemented for the Gelsar Project, this Plan will create 20.37 acres of contiguous restored habitat in lower Refugio Creek (6.29 acres from current project plus 14.08 acres from Gelsar) (LSA 1999). In conjunction with the Gelsar Project, the wetlands restored by this Plan will also provide habitat continuity among a larger system of restored wetlands in the lower Refugio Creek watershed including restored wetlands on the adjacent Penterra and Hercules Properties, Inc. sites.

The total proposed mitigation acreage for impacts to waters of the U.S. is 4.091 acres. This Plan proposes to restore and place a conservation easement on 6.29 acres of habitat within Refugio Creek and the North Channel. The 6.29-acre conservation easement includes 4.56 acres of stream and wetland habitat and a 1.73-acre upland buffer. The conservation easement includes 2.328 acres of wetlands and other waters of the U.S. as compensatory mitigation for the 0.776 acres of permanent impacts to wetlands and other waters of the U.S. (3:1 ratio), 1.763 acres of wetlands and other waters of the U.S. as compensatory mitigation for the 1.763 acres of temporary impacts to wetlands and other waters of the U.S. within Refugio Creek and the North Channel due to restoration activities (1:1 ratio), and an additional 0.469 acres of wetlands and other waters of the U.S. to provide a buffer in case of poor performance in some portion of the restoration site.

No compensatory mitigation is proposed for temporary construction related impacts to 5.599 acres of bayside habitats that would occur as a result of waterside construction activities (e.g., barge access). This approximately 5.6 acre area on the bayside of the UPRR tracks that includes the new Refugio Creek outfall and intertidal mudflats will be allowed to restore

naturally. This area will be monitored to ensure successful re-establishment but will not be included in the conservation easement.

The restoration site will be monitored for up to 10 years or until success criteria have been met. Annual monitoring reports will be prepared to report the results of the monitoring visits and will be submitted annually to the USACE, as well as USFWS and CDFG. However, management of the site will continue as outlined in the long-term management plan (Section 10) to ensure that the restoration site functions in perpetuity as designed.

1.0. Introduction and Plan Objectives

1.1 Introduction

On behalf of the City of Hercules (City), HDR Engineering, Inc. prepared this Plan for the proposed Hercules ITC project. This Plan was prepared in compliance with mitigation measures outlined in the Hercules Intermodal Transit Center Draft Environmental Impact Statement/Environmental Impact Report (Draft EIS/EIR; HDR 2010). This Plan provides the details for implementation of compensatory mitigation required for the Project's anticipated impacts to Waters of the U.S. and Waters of the State regulated by the U.S. Army Corps of Engineers (USACE), the San Francisco Regional Water Quality Control Board (SFRWQCB), the California Department of Fish and Game (CDFG), and the San Francisco Bay Conservation and Development Commission (SFBCDC). The compensatory mitigation provided for in this Plan is also intended to fulfill mitigation requirements for impacts to special-status species that would occur as a result of the proposed project. This plan will be used to support the Joint Aquatic Resources Permit Application (JARPA) as well as Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) for the proposed project.

This Plan includes a brief discussion of the proposed project including Plan objectives, a description of the project location, the regulatory setting, existing conditions in the restoration area and vicinity, and gives detailed methodology regarding Plan implementation. The proposed project is shown in **Appendix A**, the project design map. Components of the proposed project not affecting aquatic resources are not discussed in detail in this Plan. For a complete project description and discussion of impacts, refer to the above mentioned EIS/EIR.

The restoration site design for Refugio Creek included in this Plan is based on the *Hercules Intermodal Transit Center Refugio Creek Restoration: Design Basis Report* prepared by RDG (RDG 2011; **Appendix B**). Sections of this Plan based on restoration site design of Refugio Creek were taken from RDG 2011 largely without modification.

1.2 Plan Objectives and Goals

The objective of this Plan is to outline the compensatory mitigation that would be performed in order to offset unavoidable impacts to aquatic resources, including waters of the U.S. and waters of the State that would occur as a result of the Hercules ITC project.

The proposed project will result in 0.776 acres of permanent impacts and 7.362 acres of temporary impacts to aquatic resources. Permanent impacts will occur as a result of track work and construction of facilities and related infrastructure. Temporary impacts will occur as a result of restoration activities associated with Refugio Creek and the North Channel (1.763 acres) and waterside construction activities in the intertidal mudflats (5.599 acres). This Plan proposes compensatory mitigation at a minimum 3:1 ratio (restored: impacted) for permanent impacts that would occur as a result of the proposed project. Temporary impacts to Refugio Creek and the North Channel will be mitigated at a minimum 1:1 ratio (restored: impacted).

No compensatory mitigation is proposed for temporary construction related impacts to the 5.599 acres of bayside habitats that would occur as a result of waterside construction activities (e.g., barge access). This approximately 5.6 acre area on the bayside of the UPRR tracks that includes the new Refugio Creek outfall and intertidal mudflats will be allowed to restore naturally as discussed in Section 6.2.2.

Construction of project facilities including track work, buildings, and other hardscape will result in permanent impacts to intertidal mudflat, California cordgrass tidal marsh, cattail marsh, pickleweed tidal marsh, seasonal wetland, pickleweed brackish marsh, brackish stream including Refugio Creek, and freshwater intermittent drainage. Existing habitats within Refugio Creek and the North Channel will be temporarily disturbed during restoration activities. Impacts to Refugio Creek and the North Channel are considered temporary because although a temporal loss of wetland functions and values will occur, these areas will be restored to wetland habitats with greater acreage and habitat value than the pre-project conditions upon completion of restoration activities. Temporary construction related impacts to intertidal mudflats may also occur as a result of construction barge activity. The intertidal mudflats are expected to naturally restore to pre-project conditions including accretion (if necessary) and revegetation of temporarily disturbed areas. No active restoration is proposed for the intertidal mudflats. A total of 11.89 acres of habitat, including 10.16 acres of wetlands and other waters and 1.73 acres of uplands, will be actively and passively restored to compensate for unavoidable impacts to aquatic resources (see **Table 4** in Section 5.2).

The method of compensation outlined in this Plan is the active restoration of Refugio Creek and the North Channel, two water bodies that have been degraded due to channelization and surrounding development, and limited passive restoration of intertidal mudflats. Restoration is the re-establishment or rehabilitation of a wetland or other aquatic resource with the goal of returning natural or historic functions and characteristics to a former or degraded wetland. Restoration may result in a gain in wetland function or acreage, or both as opposed to enhancement, which results in a gain in wetland function, but not acreage (USACE and USEPA 2008). Restoration of Refugio Creek and the North Channel, as detailed in this Plan, will result in a net increase in wetland function and acreage within the two water bodies. The intertidal mudflats will be passively restored to greater than or equal to pre-project conditions.

The primary goals of the restoration project are to (1) restore a dynamically stable channel cross section with floodplain and marshplain habitat within the project right of way that is functioning hydrologically to sustain the designed wetland habitats; (2) improve ecological function by increasing the diversity of plant and animal species and habitats in the site, (3) provide for on-site mitigation, and (4) integrate with the greater Hercules ITC project.

Restoration of the on-site portions of Refugio Creek and the North Channel will benefit the surrounding watershed by providing a contiguous block of high quality wetland habitats linked by restored stream corridors. The segment of Refugio Creek in the project site provides an important link between San Pablo Bay and upstream habitats. Restoration efforts have been completed upstream of the project site in Refugio Creek and adjacent wetland areas. These areas are functioning high quality wetlands that provide a variety of wetland functions and

values including habitat for special-status wildlife species. The upstream extent of the Refugio Creek restoration detailed in this Plan will tie into a previously restored reach of Refugio Creek completed in 2001, referred to as the Gelsar Reach, which also includes two wetland preserves. Upon completion of the restoration outlined in this Plan, a contiguous corridor of restored habitat will occur along Refugio Creek with a straight line length of approximately 0.8 miles (4,200 feet), extending from San Pablo Avenue to the creek mouth at San Pablo Bay. In conjunction with wetland restoration implemented for the Gelsar Project, this Plan will create 20.37 acres of contiguous wetlands in lower Refugio Creek (6.29 acres from current project plus 14.08 acres from Gelsar) (LSA 1999). In conjunction with the Gelsar Project, the wetlands restored by this Plan will also provide habitat continuity among a larger system of restored wetlands in the lower Refugio Creek watershed including restored wetlands on the adjacent Penterra and Hercules Properties, Inc. sites.

1.2.1 Type and Area of Habitat to be Restored

Habitats within the restoration area will include riparian woodland (including willow groves), intertidal mudflat, California cordgrass tidal marsh, cattail marsh, pickleweed tidal marsh, seasonal wetland, brackish tidal marsh (along Refugio Creek), brackish stream (Refugio Creek), freshwater intermittent drainage, and mixed scrub (upland buffer). **Table 4** in Section 5.2 summarizes the acreage of each habitat type that will be created in the restoration area.

1.2.2 Specific Functions and Values of the Habitat to be Restored

This Plan takes into account both the functions and values of the areas to be impacted and the proposed restoration areas to verify that the functions and values of the mitigation areas equal or exceed those of existing functions and values on the project site.

Impacted aquatic resources in the project site include intertidal mudflat, California cordgrass tidal marsh, cattail marsh, pickleweed tidal marsh, seasonal wetland, pickleweed brackish marsh, brackish stream including Refugio Creek, and freshwater intermittent drainage. All of these impacted habitat types will be represented in the restoration site. Habitats within the restoration area will include riparian woodland (including willow groves), intertidal mudflat, California cordgrass tidal marsh, cattail marsh, pickleweed tidal marsh, seasonal wetland, brackish tidal marsh (along Refugio Creek), brackish stream (Refugio Creek), freshwater intermittent drainage, and upland.

Functions of the impacted aquatic resources on the project site related to hydrological processes include short and long-term surface water storage, ground water recharge, and energy dissipation. Functions related to biogeochemical processes include transformation and cycling of elements, retention and removal of dissolved substances, and accumulation/retention of inorganic sediment. Functions related to habitat and food web support include maintenance of characteristic plant communities and maintenance of characteristic energy flow.

Restoration of Refugio Creek and the North Channel will increase the functions and values of aquatic resources on-site related to hydrologic processes, biogeochemical processes, and habitat and food web support (See **Table 1**). Restoration activities will result in a net increase in

aquatic habitats as well as improve the hydraulic and ecological function of Refugio Creek (RDG 2011). Refugio Creek currently backs up during peak flows due to a lack of access to the floodplain. Refugio Creek also experiences detrimentally high velocities and shear during most storm events due to a low width to depth ratio and a narrow floodprone width (RDG 2011). As a result of increasing the size of the channel and its associated floodplain, short term water storage capacity will be increased, reducing or eliminating flooding during peak flows. Increasing the width of the floodplain will enhance reduce channel velocities and allow for capturing of sediment. Creation of a flood plain will allow for establishment of brackish tidal marsh which will improve the quality and quantity of habitat for wildlife along Refugio Creek.

*Table 1. Functions and Values of Impacted and Restored Aquatic Resources on the Project Site**

Function	Effect	Impacted Habitat in the Project Site that Performs Function	Restored Habitat that will Perform Function
Hydrologic Processes			
Short-term surface water storage	Reduced downstream flood peaks	pickleweed brackish marsh, cattail marsh, seasonal wetland	brackish tidal marsh, cattail marsh, seasonal wetland
Long-term surface water storage	Maintenance of stream flows, seasonal stream flow moderation	cattail marsh	brackish tidal marsh, cattail marsh
Groundwater recharge	Maintenance of water table	pickleweed brackish marsh, cattail marsh, seasonal wetland	brackish tidal marsh, cattail marsh, seasonal wetland
Energy dissipation	Reduced erosion and sediment transport	California cordgrass tidal marsh, pickleweed tidal marsh, pickleweed brackish marsh, cattail marsh, seasonal wetland	All
Biogeochemical Processes			
Transformation and cycling of elements	Maintenance of nutrient stocks within wetland, production of dissolved and partially decayed organic matter	California cordgrass tidal marsh, pickleweed tidal marsh, pickleweed brackish marsh, cattail marsh, seasonal wetland	California cordgrass tidal marsh**, pickleweed tidal marsh**, riparian woodland, brackish tidal marsh, cattail marsh, seasonal wetland
Retention, removal of dissolved substances	Reduced transport of nutrients and pesticides downstream	pickleweed brackish marsh, cattail marsh, seasonal wetland	riparian woodland, brackish tidal marsh, cattail marsh, seasonal wetland
Accumulation/retention of inorganic sediment	Retention of sediment and attached pesticides, phosphate and other nutrients	pickleweed brackish marsh, cattail marsh, seasonal wetland	riparian woodland, brackish tidal marsh, cattail marsh, seasonal wetland
Habitat and Food Web			
Maintenance of characteristic plant communities	Food and escape and nesting cover for wildlife; spawning and nursery habitat for fish	All	All
Maintenance of characteristic energy flow	Support for populations of vertebrates and invertebrates	brackish stream, freshwater intermittent drainage	brackish stream, freshwater intermittent drainage

** Modified from Wetlands Functions and Values table at <http://www.usace.army.mil/CECW/Documents/cecwo/reg/wet_f_v.pdf>

* California cordgrass tidal marsh and pickleweed tidal marsh will naturally colonize portions of the restoration area on the bay side of the railroad berm including the Refugio Creek outfall into San Pablo Bay and the approximately 150 foot tidal channel into the Bay.

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2.0 Rationale for Restoration Site Selection

Refugio Creek and the North Channel were chosen for restoration because they are water bodies occurring on the project site that are highly degraded by prior channelization and historic land use practices, which has reduced their functions and values and caused periodic flooding to occur in the lower reach of Refugio Creek. These two water bodies provide opportunities to establish ecologically self-sustaining restoration because the water source is naturally present and the soil historically and currently supports wetland habitats. Restoration of the segment of Refugio Creek in the project site will enhance the functions and values of the on-site creek segment as well as the Refugio Creek watershed surrounding the project site. In addition, restoration activities detailed in this Plan will reduce flooding in lower Refugio Creek.

Restoration of the on-site portions of Refugio Creek and the North Channel will benefit the surrounding watershed by providing a contiguous block of high quality wetland habitats linked by restored stream corridors. The segment of Refugio Creek in the project site provides an important link between San Pablo Bay and upstream habitats. Restoration efforts have been completed upstream of the project site in Refugio Creek and adjacent wetland areas. These areas are functioning high quality wetlands that provide a variety of wetland functions and values including habitat for special-status wildlife species. The upstream extent of the Refugio Creek restoration detailed in this Plan will tie into a previously restored reach of Refugio Creek completed in 2001, referred to as the Gelsar Reach, which also includes two wetland preserves. Upon completion of the restoration outlined in this Plan, a contiguous corridor of restored habitat will occur along Refugio Creek with a straight line length of approximately 0.8 miles (4,200 feet), extending from San Pablo Avenue to the creek mouth at San Pablo Bay. In conjunction with wetland restoration implemented for the Gelsar Project, this Plan will create 20.37 acres of contiguous restored habitat in lower Refugio Creek (6.29 acres from current project plus 14.08 acres from Gelsar) (LSA 1999). In conjunction with the Gelsar Project, the wetlands restored by this Plan will also provide habitat continuity among a larger system of restored wetlands in the lower Refugio Creek watershed including restored wetlands on the adjacent Penterra and Hercules Properties, Inc. sites.

In addition, Refugio Creek provides a unique opportunity to enhance/restore tidally influenced marsh habitat (currently exists as remnant pickleweed brackish marsh). It is estimated that more than 90 percent of historic tidal wetlands in the San Francisco Bay Area have been lost due to urban and industrial development resulting in the diking, draining, and filling of historic wetlands (Goals Project 2000). Because the lower portion of Refugio Creek is tidally influenced, a natural inundation regime is present to create tidally influenced brackish marsh habitat.

3.0 Site Protection Instrument

In order to compensate for impacts to aquatic resources, the City of Hercules will place a conservation easement on the 6.29-acre restoration area along the corridor of Refugio Creek and the North Channel, establishing the easement area as plant and wildlife habitat in perpetuity. The conservation easement will preserve the wetland functions and values of the restored water bodies as well as provide habitat for special-status wildlife species.

The City of Hercules shall establish a conservation easement approved by the USACE. The city has been coordinating with the Muir Heritage Land Trust who has preliminarily agreed to hold the conservation easement. The city will be responsible for the maintenance, monitoring, and security of the conservation easement area in perpetuity. The City will provide financial assurance for the Muir Heritage Land Trust so that in the event that City becomes unable to manage the restoration area at a future date, the Muir Heritage Land Trust will be able to complete necessary maintenance activities. The conservation easement shall be recorded no later than 6 months after completion of the restoration activities. Land within the conservation easement will be managed in accordance with this management plan and funded by the endowment in perpetuity. A Property Analysis Record (PAR) or PAR-equivalent analysis of the easement lands shall be conducted to determine the appropriate endowment amount to fund in-perpetuity management.

Because the conservation easement will also function as mitigation for impacts to special-status species in addition to waters of the U.S./State, the conservation easement and the management plan will also be provided to the USFWS and CDFG for their approval prior to implementation.

4.0 Project Baseline Information

4.1 Project Location

The approximately 56-acre project site is located in the City of Hercules, Contra Costa County. The project site is located on the San Pablo Bay shoreline north of Bayfront Boulevard, approximately one mile northwest of I-80. The Union Pacific Railroad (UPRR) rail line passes through the site, parallel to the shoreline. A Regional Vicinity Map is provided as **Figure 1**. The project site is located within Township 2 North, Range 4 West, in an unsectioned portion of "Mare Island, California" U.S. Geological Survey (USGS) 7.5 minute topographic quadrangle (quad). A Site and Vicinity Map is included as **Figure 2.** A Project Site Aerial Photograph showing the boundary of the project site is included as **Figure 3**.

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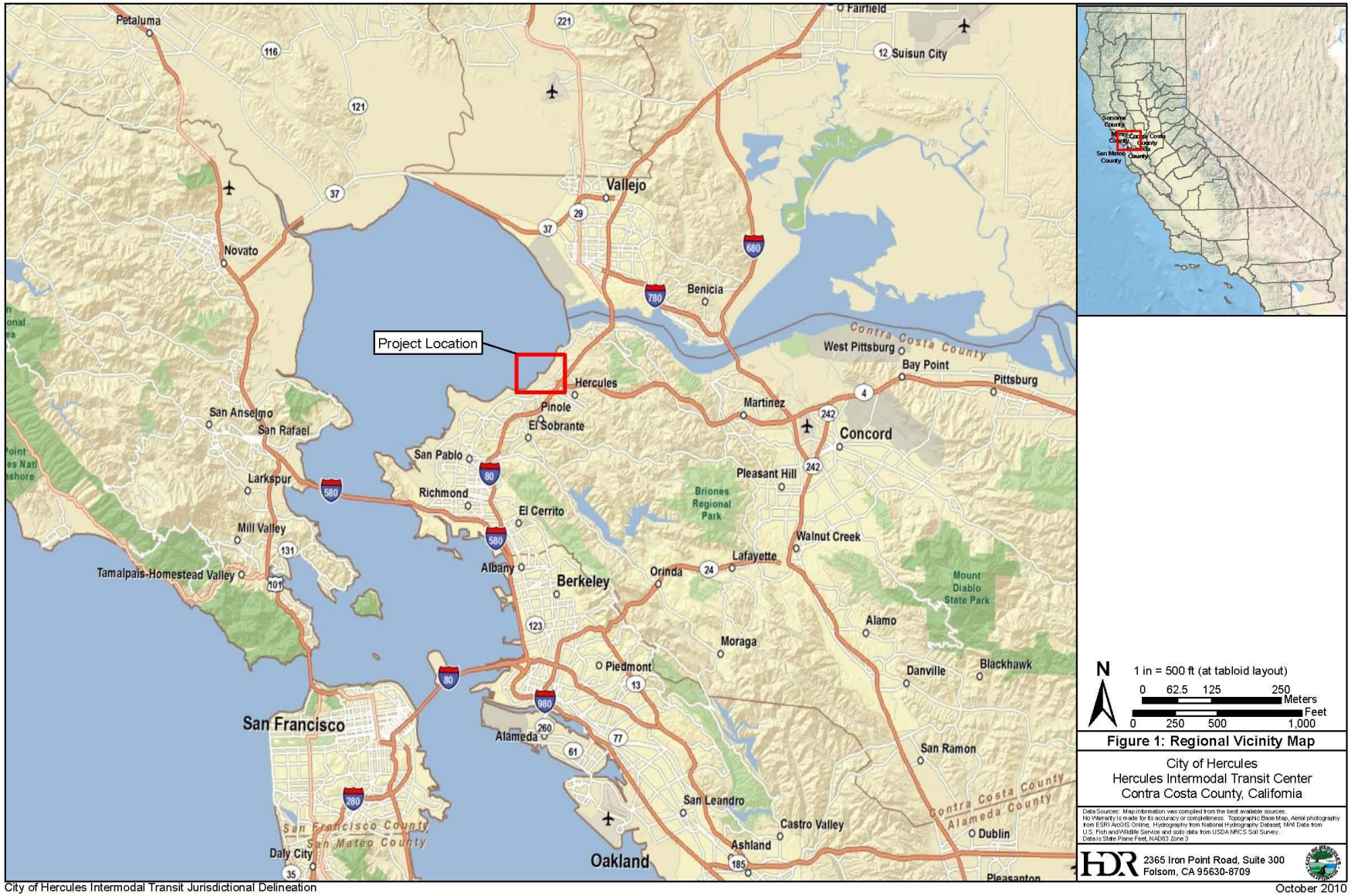
Figure 1. Regional Vicinity Map



City of Hercules Intermodal Transit Jurisdictional Delineation

October 2010

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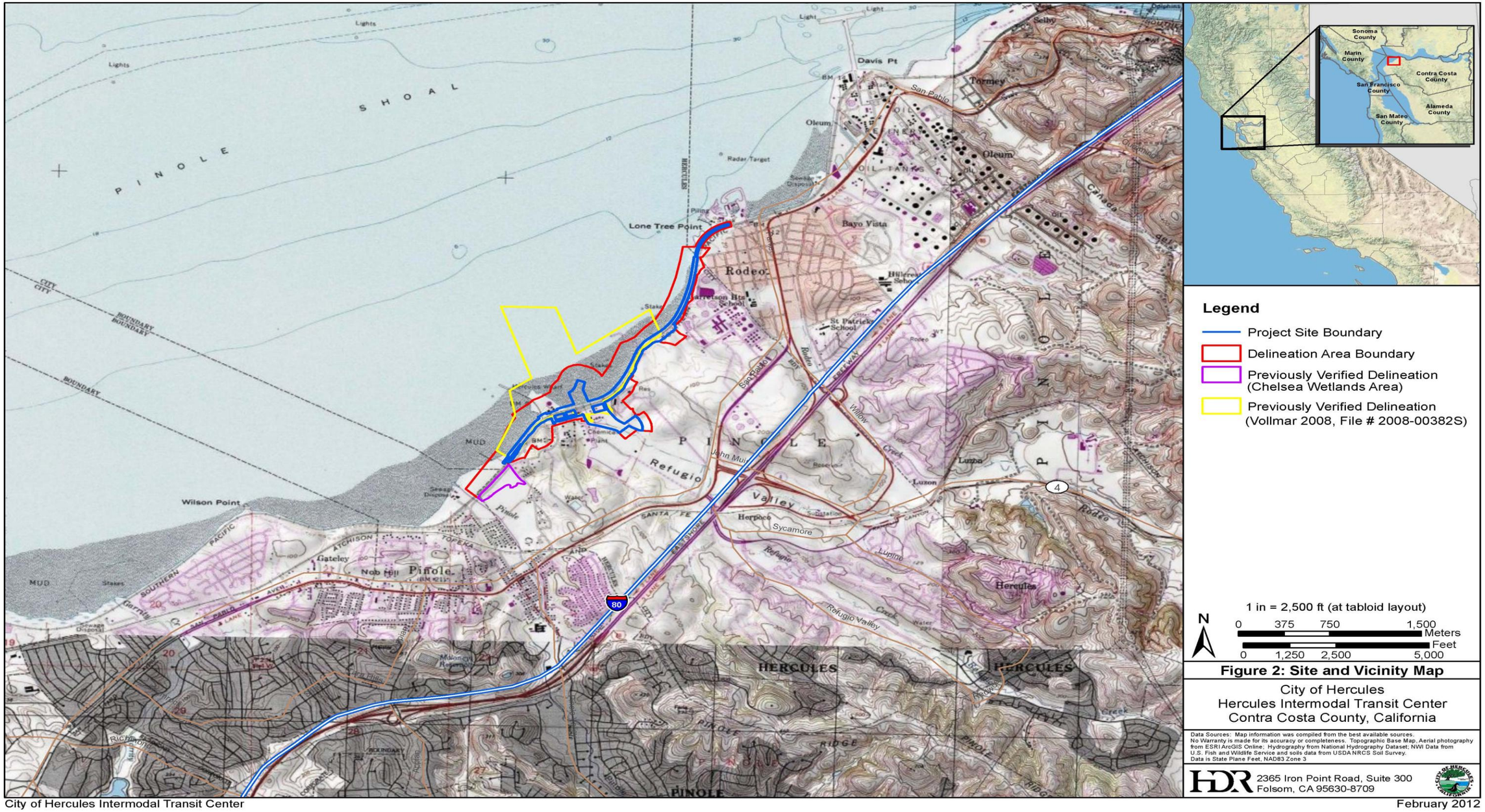
Figure 2. Site and Vicinity Map



City of Hercules Intermodal Transit Center February 2012

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Figure 3. Project Site Aerial Photograph

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4.2 Project Description

The City proposes to develop an intermodal transit center, including train and bus facilities, on the San Pablo Bay shoreline in Hercules. The City is cooperating with the Federal Transit Administration (FTA), the lead agency in compliance with the National Environmental Policy Act (NEPA) due to the anticipated use of federal funding. In compliance with CEQA and NEPA, the City and FTA prepared a joint Environmental Impact Report/Environmental Impact Statement (EIR/EIS), which was circulated for public review in September 2010. The City elected to separate the environmental review, and in August 2011, the city certified the Final EIR. FTA is currently completing necessary consultations under NEPA and anticipates finalizing the EIS and preparing a Record of Decision (ROD) in early 2012. The purpose of the proposed project is to improve and increase regional mobility and transportation options by providing new and expanded transit services with intermodal connections that will encourage use of public transit. The project would provide bus-to-train connections, in addition to providing car commuters with access to new transit options that would divert traffic from I-80, the most congested corridor in the Bay Area.

The proposed Hercules ITC project would include the construction of a station building located southwest of Refugio Creek and a center platform accessed via a pedestrian bridge spanning the UPRR tracks to the train platform and future ferry pier. The proposed project also includes the extension of John Muir Parkway from its current terminus northeast of Tsushima Bridge. The extension of John Muir Parkway would be coupled with the extension of Bayfront Boulevard to provide an east-west connection over Refugio Creek. The John Muir Parkway/Bayfront Boulevard improvements would require a new bridge over Refugio Creek (Bayfront Bridge). Bus service would bring commuters to the ITC via a John Muir Parkway onto Transit Loop Drive and exit the ITC via Bayfront Bridge back onto John Muir Parkway (counter-clockwise direction). Commuter vehicular traffic would access the transit center wither as described above or alternatively via John Muir Parkway to the Bayfront Bridge connecting to the extension of Bayfront Boulevard and onto Transit Loop Drive (clock-wise direction).

Additionally, construction of the Hercules ITC would require improvements to the UPRR rail line, including replacement of the railroad bridge over Refugio Creek; realignment and straightening of UPRR tracks; and safety improvements, such as retaining walls and railing providing grade separation of the tracks from the Hercules Bayfront (HB) development area. Other improvements would include the Hercules Point Bridge across the UPRR tracks to provide access for the future Hercules Point open space, temporary surface parking to service the Hercules ITC, a neighborhood park, the completion of the East Bay Regional Parks District (EBRPD) trail (Bay Trail) along the waterfront area, Creekside Trail, and the realignment and restoration of Refugio Creek.

Construction of the Hercules ITC would proceed in phases over approximately 24 months. The initial phase would include John Muir Parkway extension, Bayfront Boulevard extension, upstream portions of Refugio Creek restoration, North Channel, and Bayfront Bridge. Construction of the rail platform, track relocation, signals, railroad bridge, Transit Loop and temporary surface parking lot, and station building is anticipated to begin in 2012/2013, with

the intention that the train station and bus terminal could be completed in late 2015 with operation commencing 2016. No schedule has been established at this time for the construction of the permanent parking structure. Timing of these facilities would depend on funding, economic conditions, and the development phasing of the surrounding HB development.

4.3 Environmental Setting and Biotic Communities

The Hercules ITC project site is located in northwestern Contra Costa County on the southeastern shoreline of San Pablo Bay, which is a part of San Francisco Bay. The project site is located in the City of Hercules, which lies along the I-80 corridor. The City of Hercules is located within northwestern Contra Costa County and within the greater San Francisco Bay Area. The City of Hercules is generally bounded by the southeast shoreline of San Pablo Bay to the west, the unincorporated town of Rodeo to the north, unincorporated Contra Costa County land to the east, and the City of Pinole to the south. The City of Hercules is generally characterized by flatland areas along the San Pablo Bay shoreline and rolling hills inland. Tidal salt and brackish marshes occur along the San Pablo Bay shoreline and intergrade with a variety of habitat types moving inland including coastal bluffs, freshwater marshes and streams, urban/developed land, and patches of disturbed annual grassland.

The project site is located mostly in the Refugio Creek watershed. The Refugio Creek Watershed is one of a series of roughly parallel, northwest trending valleys and ridges in west Contra Costa County. The upper watershed is bordered by large, open space areas including the Muir Heritage Land Trust's Fernandez Ranch, East Bay Municipal Utility District's watershed lands, and open space owned by local homeowners associations. The lower watershed is bordered by the San Pablo Bay. Prevalent habitats in the watershed include ruderal, eucalyptus, mixed oak/bay woodland, annual grassland, mixed riparian forest, and freshwater marsh (City of Hercules 2009).

The majority of the project site is comprised of urban/developed land and highly disturbed ruderal habitats resulting from historic industrial use and remediation. The site is a former dynamite and fertilizer manufacturing facility that operated from the 1880's to the 1980's. Remediation of the sited was principally completed in the 1990's and continues to be monitored by the California Department of Toxic Substance Control.

Upland habitat types within the project site include ruderal, railroad, riprap, and willow riparian forest. Aquatic habitat types within the project site include California Cordgrass Tidal Marsh, Intertidal Mudflat, Unvegetated Shoreline, Anthropogenic Rocky Shoreline, Brackish Stream, Pickleweed Brackish Marsh, Cattail Marsh, Seasonal Wetland, Freshwater Wetland Swale, and Freshwater Intermittent Drainage. Aquatic habitats are described in Section 2.6. Upland habitats are discussed below.

Ruderal

The vast majority of the project site has been altered by development. Adjacent to the project are the former site of a dynamite factory and the current sites of residential and commercial development. A portion of the site is currently being prepared for development, with large

stockpiles of dirt in place to compact the ground. The stockpiles are unvegetated and of little value to wildlife. The areas that are not currently developed, but have been altered or disturbed by development, are considered ruderal.

The vegetated portion of the ruderal habitat on the site is dominated primarily by non-native grasses and forbs. Dominant plant species included non-native grasses, such as ripgut brome (*Bromus diandrus*), Italian ryegrass (Lolium multiflorum), and wild oats (*Avena Fatua, A. barbata*), and non-native forbs, such as bristly ox-tongue (*Picris echioides*), black mustard (*Brassica nigara*), wild radish (*Raphamus sativus*), redstem filaree (*Erodium cicutarium*), cutleaf geranium (*Geranium dissectum*), hairy vetch (*Vicia villosa*), poison hemlock (*Conium maculatum*), and rose clover (*Trifolium hirtum*). Coyote brush (*Baccharis pilularis*), a native shrub often found in disturbed areas, is scattered in the ruderal habitat. Also scattered throughout the ruderal habitat are cultivated varieties of trees, such as blue gum eucalyptus (Eucalyptus globules), blackwood acacia (*Acacia melanoxylon*), black walnut (*Juglans californica*), and palm trees.

The western portion of the ruderal habitat has been highly disturbed by stockpiling of dirt, previous road and trail-building, on-going railroad operation, and on-and off-trail foot traffic. Vegetation in this part of the project site is low-growing and, on the stockpiles, non-existent. The eastern portion of the project site follows a slope that connects a bluff to the San Pablo Bay coastline. A strip of ruderal habitat, less than 200 feet wide, follows the slope. Vegetation is not frequently disturbed in this strip; however, on-going railroad operation provides frequent disturbance.

A portion of ruderal habitat flanks Refugio Creek and its associated wetlands. The ruderal habitat surrounding Refugio Creek is in part dominated by horticultural plantings, and in part dominated by nonnative annual grasses and forbs with scattered shrubs. During a November 2009 site visit by HDR biologists, raccoon (*Procvon lotor*) and black-tailed deer (*Odocoileus hemionus*) tracks were seen in this area. It provides a small area of foraging habitat for raccoon, black-tailed deer, and other disturbance-adapted wildlife such as domestic cat (*Felis catus*), white-crowned sparrow (*Zonotrichia leucophrys*), house finch (*Carpodacus mexicanus*), and European starling (*Sturnus vulgaris*).

Railroad

An active UPRR railroad crosses the site immediately adjacent to the San Pablo Bay shore. The railroad ROW consists of ballast rock and highly compacted dirt, and is mostly unvegetated. A number of seasonal puddles occur within the railroad ROW. The puddles are described in the Aquatic Resources section as Unvegetated Ponded Depressions. Due to the heavy activity and highly disturbed condition of the railroad ROW, the area provides limited habitat value for wildlife.

Riprap

Where the railroad ROW passes immediately adjacent to the San Pablo Bay shore, a riprap revetment is in place to stabilize the shore. Additionally, cement and other rubble, presumably

from the Hercules powder plant, line much of the shore of Hercules Point. The lower elevation riprap may provide habitat for marine invertebrates. While marine mammals such as harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*) haul out on rocky shorelines, they most commonly do so in areas that are separated from human activity. No haul-out sites are known in the area. It is very unlikely that marine mammals would make use of the riprap.

Willow Riparian Forest

Three patches of habitats with riparian forest characteristics occur on the project site: one within the railroad ROW, one in the northeastern extent of the project site, and one on the Northern Channel of Refugio Creek. All patches are liner features. They are isolated patches and not part of a larger forest. The dominant trees in the patches are red willow (*Salix laevigata*) and arroyo willow (*Salix lasiolepis*). These areas contain brackish marsh or freshwater wetland swale features with willow riparian forest characteristics. The willow riparian forest provides habitat for numerous animal species, such as those found along Refugio Creek.

4.4 Topography and soils in the project site

The project site ranges in elevation from mean sea level along the shoreline of San Pablo Bay to approximately 25 feet above mean sea level (amsl) on top of coastal bluffs.

Soil types occurring within the project site are described below and shown in the Soils Map in **Figure 4** (page 25). The soil types are generally classified as clear lake clay (Cc), Joice Muck (Ja), Lodo Clay Loam (LcE), and Tierra Loam, (TaE) (NRCS 2009).

4.4.1 Clear Lake Clay (Cc)

Clear Lake soils are found in basins and swales of drainage ways at elevations between 25 and 2,000 feet amsl. Clear Lake soils are very deep, poorly drained soils that formed in fine textured alluvium derived from sandstone and shale. A typical profile of Clear Lake soil is dark grey clay from 0 to 19 inches in depth, dark grey clay with concretions from 19 to 45 inches, and grayish brown clay with light yellowish brown masses of iron accumulations from 45 to 60 inches. The typical water table depth is between 4 and 10 feet in late summer and may be very near the surface during winter months. Clear Lake soils have negligible to high runoff and slow to very slow permeability. This soil series is classified as a hydric soil when the water table is at less than or equal to one foot from the surface during the growing season if permeability is equal to or greater than six inches per hour in all layers within 20 inches.

4.4.2 Joice Muck (Ja)

Joice soils are typically found in flat salt water marshes, near sea level. Joice soils are very poorly drained soils formed from hydrophytic plant remains and mixed alluvium. Joice soils have upper layers that are strongly acidic, black muck mixed with light grey silts and clays and lower layers that are fibrous, moderately alkaline, black clayey muck. A typical soil profile of Joice soil is black sapric material from 0 to 20 inches in depth and very dark grey, hard, sapric

material with yellowish brown mottles from 20 to 60 inches. The typical water table depth is approximately 30 inches below the surface in mid-summer and on or near the surface during the winter. Joice soils have very slow runoff and rapid permeability. This soil series is classified as a hydric soil when it is all Histels except Folistels and Histosols except Folists, when the water table is at less than or equal to one foot from the surface during the growing season if permeability is equal to or greater than six inches per hour in all layers within 20 inches, and/or when the soil is frequently flooded for long duration or very long duration during the growing season.

4.4.3 Lodo Clay Loam, 9 to 30 percent slopes (LcE)

Lodo soils are typically found in uplands between 300 and 3,400 feet amsl. Lodo soils are shallow, somewhat excessively drained soils formed in material weathered from hard shale and fine grained sandstone. A typical profile of Lodo soil is grayish brown shaly clay loam from 0 to 7 inches and shattered warped and folded dark grayish brown hard shale beneath 7 inches. Lodo soils have medium to rapid runoff and moderate permeability. This soil series is not classified as a hydric soil.

4.4.4 Tierra Loam, 15 to 30 percent slopes (TaE)

Tierra soils are found in dissected terraces and low hills at elevations between 100 and 1,200 feet amsl. Tierra soils are deep, moderately well drained soils formed in alluvial materials from sedimentary rock. A typical profile of Tierra soil is grayish brown loam from 0 to 7 inches in depth, gray loam from 7 to 11 inches, very dark grayish brown clay from 12 to 16 inches, dark brown clay loam from16 to 25 inches, light brownish grey heavy clay loam with reddish brown and yellowish brown mottles from 25 to 43 inches, and pale brown clay loam with reddish brown and yellowish brown mottles from 43 to 62 inches. Tierra loam soils have slow to rapid runoff and very slow permeability. This soil series is not classified as a hydric soil.

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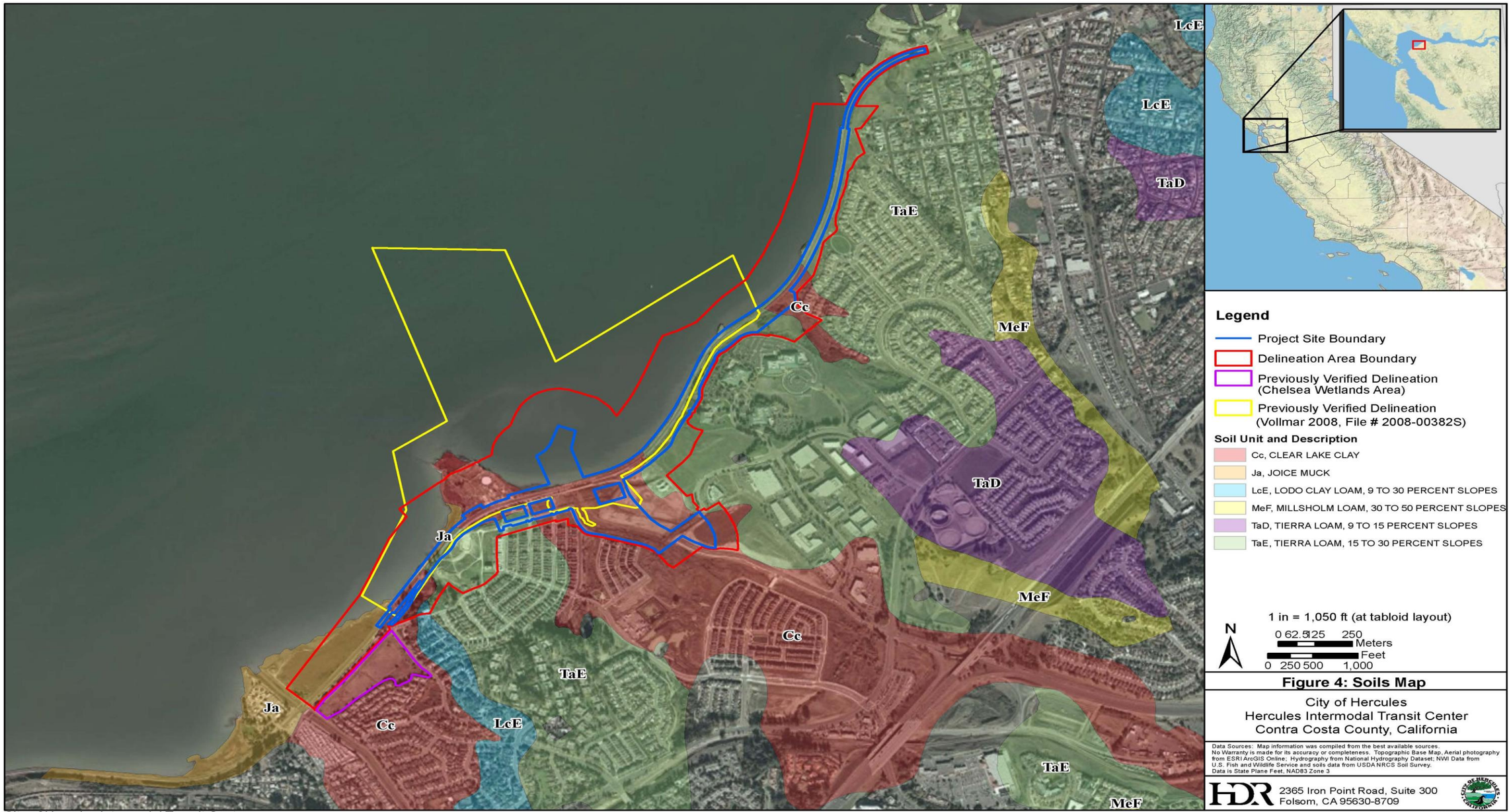
Figure 4. Soils Map



City of Hercules Intermodal Transit Center

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4.5 Hydrologic Conditions in the Project Site

The project site lies along the eastern boundary of San Pablo Bay, a major subembayment positioned between the heavily marine influenced Central Bay, and Suisun Bay, which lies just west of the confluence of the Sacramento and San Joaquin rivers. The San Pablo Bay watershed, approximately 900 square miles in area, includes those lands in the northern reaches of the San Francisco Bay area whose streams flow into San Pablo Bay; the watershed is a major drainage basin for Marin, Sonoma, Solano, and Contra Costa counties (USACE, 1999). Freshwater flow to San Pablo Bay is entirely dependent on precipitation, with peak flows occurring during winter storms and spring snow melt from the Sierra Nevada range, followed by a long period of dry weather with almost no freshwater input excluding human disturbances such as dams, municipal wastewater discharges, and water export. The major freshwater sources for the Bay include Novato Creek in Marin County, Petaluma River and Sonoma Creek in Sonoma County, Napa River in Napa County and San Pablo Creek in Contra Costa County (WWR, 2007).

Aquatic habitats within the project site receive hydrologic input from direct rainfall, sheet flow, and urban runoff within the Refugio Creek watershed. Water from the Refugio Creek watershed collects in Refugio Creek and its tributaries and flows through the project site to San Pablo Bay. Additionally, part of the project site is under tidal influence. At high tide, some streams and adjacent wetlands within the project site receive inflow from San Pablo Bay.

The hydrologic conditions within the project site have been heavily altered due to historic and current development and land use activities both in the project site and in adjacent areas within the Refugio Creek watershed. The hydrologic regime of Refugio Creek and its tributaries in the project site (North Channel, Central Channel) are influenced by urban runoff from adjacent residential and industrial developments. Refugio Creek was altered in the early 1900s from a natural channel into a straightened, deepened, channeled waterway. At its downstream end, Refugio Creek was culverted under a railroad bridge. The channelization and culvert construction, in conjunction with anthropogenic flow modifications, have altered the natural hydrologic regime in Refugio Creek and presumably affected the salinity in the lower portions of the creek within the project site where a natural freshwater/brackish water/saltwater interface occurs. For example, the culverts under the railroad bridge are insufficient in size to allow Refugio Creek to flow freely into San Pablo Bay during periods of high flow, causing flow to back up behind the culverts. Areas of pickleweed brackish marsh along Refugio Creek in the project site may have been created/enhanced by wicking from surcharge activity (loading large amounts of fill onto an area in order to force water out of the dirt and prepare it for development) increasing hydrologic input from groundwater. Further discussion of historic and current conditions in Refugio Creek is included in Section 5.2.

4.6 Aquatic Resources Present in the Project Site

A national wetland inventory map is shown in **Figure 5**. Aquatic resources in the project site are shown on the map of wetlands and other waters of the U.S. in **Figure 6** at the end of this section and discussed below.

Aquatic Habitat Types

California Cordgrass Tidal Marsh

California cordgrass tidal marsh grows in limited patches along the margin of San Pablo Bay. As is typical, it is the habitat type growing closest to the open water of the San Pablo Bay. California cordgrass (*Spartina foliosa*) dominates the habitat type, growing in dense homogenous stands. Based on size and structure, all the cordgrass at the project site appears to be native California cordgrass.

Intertidal Mudflat

Intertidal mudflats occur within the offshore portions of the project site. These sparsely vegetated intertidal areas occur from approximately mean lower low water (MLLW) to mean tide level (MTL).

Unvegetated Shoreline

Unvegetated shoreline occurs inland of portions of the intertidal mudflats within the project site. This habitat type is characterized by lack of vegetation and sandy substrate.

Anthropogenic Rocky Shoreline

Anthropogenic rocky shoreline occurs inland of portions of the intertidal mudflats within the project site. Where the railroad right-of-way passes immediately adjacent to the San Pablo Bay shore, a riprap revetment is in place to stabilize the shore. This habitat type is characterized by rip-rap that abruptly leads to intertidal mudflat habitat.

Brackish Stream

Brackish streams have salinity levels between freshwater and saltwater. The project site contains two brackish streams: Refugio Creek and an unnamed stream to the east. These brackish streams are tidally influenced and contain salt-tolerant vegetation, such as pickleweed, saltgrass, or alkali bulrush.

Pickleweed Brackish Marsh

Pickleweed brackish marsh habitat occurs adjacent to the brackish stream habitats within the project site and in a large patch in the southwestern portion of the site. These marsh habitat types are typically created during periods of high flow and/or high tide. Some pickleweed brackish marshes in the project site may have been created/enhanced by wicking from adjacent

surcharge activity (loading large amounts of fill onto an area in order to force water out of the dirt and prepared it for development). Pickleweed brackish marsh contains salt-tolerant vegetation, such as pickleweed, saltgrass, or alkali bulrush.

Cattail Marsh

Several cattail marsh features occur within the project site, primarily in the vicinity of Refugio Creek and on the eastern edge of the site. They are dominated by dense stands of cattails and generally have little other vegetation. These wetland areas are likely permanently or semi permanently saturated.

Seasonal Wetland

Several non-tidal freshwater seasonal wetlands occur in shallow depressions throughout upland portions of the project site. The depressions are located on Hercules Point, near Refugio Creek, along the Bay Trail, and along the eastern portion of the railroad ROW. Many of the depressions are the result of human activities. In shallower depressions, vegetation is dominated by bristly ox-tongue, Italian ryegrass, and curly dock (*Rumex crispus*). Deeper depressions, often bounded by soil deposit berms, support more hydrophytic species, such as rabbitsfoot grass (*Polypogon monspeliensis*) and rough cocklebur (*Xanthium strumarium*).

Freshwater Wetland Swale

Several freshwater wetland swales occur within the project site, in the northeastern portion of the project site and along the eastern portion of the railroad ROW. The northern swale runs through a patch of willow riparian forest. Vegetation within these features includes and understory of herbaceous vegetation such as tall flatsedge (*Cyperus eragrostis*) and creeping wildrye (*Leymus triticoides*).

Freshwater Intermittent Drainage

Six freshwater intermittent drainage features occur in the site. Vegetation within these features include cattails (*Typha* sp). Tall flatsedge, Himalayan blackberry (*Rubus discolor*), and salt tolerant species such as saltgrass.

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Figure 5. National Wetland Inventory Map

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Figure 6. Delineation Map of the U.S.

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4.7 Regulatory Setting

This section includes a discussion of Federal, State, and local regulations pertaining to the preparation of this plan.

Federal

Federal Endangered Species Act

The United States Fish and Wildlife Service (USFWS) and the National Oceanographic and Atmospheric Administration's National Marine Fisheries Service (NMFS) enforce the provisions stipulated within the Federal Endangered Act of 1973 (hereafter, "FESA," 16USC Section 1531 et seq.). Threatened and endangered species on the Federal list (50 CFR Section 17.11, and 17.12) are protected from take, defined as direct or indirect harm, unless a Section 10 permit is granted to an entity other than a federal agency or a Biological Opinion with incidental requirements of FESA, and agency reviewing a proposed project within its jurisdiction must determine whether any federally listed species may be present in the study area and determine whether the proposed project will have a potentially significant impact upon such species. Under FESA, habitat loss is considered to be an impact to a species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species that is proposed for listing under FESA or to result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3], [4]). Therefore, project related impacts to these species or their habitats would be considered significant and would required mitigation. Other federal agencies (i.e., U.S. Forest Service, Bureau of Land Management) designate species of concern (species that have the potential to become listed), which are evaluated during environmental review although they are otherwise protected under FESA. Project related impacts to such species would also be considered a significant impact and may require mitigation.

Executive Order 13186: Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act of 1918 (16 USC Subsection 703-712), migratory bird species and their nests and eggs are protected from injury or death; these species are listed on the federal list (50 CFR Section 10.13). Project related disturbances must be reduced or eliminated during the nesting cycle.

Bald Golden Eagle Protection Act

When first enacted in 1940, the Bald Golden Eagle Protection Act prohibited the take, transport, or sale of bald eagles, their eggs or any part of an eagle except where expressly allowed by Secretary of the Interior. The Bald and Golden Eagle Protection Act was amended in 1962 to extend the prohibitions to the golden eagle as well.

Executive Order 13112: Invasive Species Prevention

On February 3, 1999, Executive Order 13112 was signed establishing the National Invasive Species Council. Executive Order 13112 required that each Federal agency whose actions may affect the status of invasive species shall, to the extend practicable and permitted by law, (1) identify such actions; (2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (3) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such action clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. In addition, it requires that Federal agencies shall pursue the duties set forth in this section in consultation with the Invasive Species Council, consistent with the Invasive Species Management Plan and in cooperation with stakeholders, as appropriate, and, as approved by the Department of State, with Federal agencies are working with intermodal organization and foreign relations.

Clean Water Act (33 U.S.C. 1251-1376)

The CWA provides guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters.

- **Section 401** requires that an applicant for federal license or permit that allows activities resulting in a discharge to waters of the U.S. must obtain a state certification that the discharge complies with for other provisions of the CWA. The Regional Water Quality Boards administer the certification program in California.
- **Section 404** establishes a permitting system for discharge by USACE regulating the discharge of dredged or fill material into waters of the U.S. (including wetlands). Implementing regulations by USACE are found at 33 CFR Parts 320-330. Guidelines for implementation are referred to as the Section 404 (b)(1) Guidelines and were developed by the EPA in conjunction with USACE (40 CFR Parts 230). The Guidelines allow the discharge of dredged or fill material into the aquatic system only if there is no practicable alternative that would have less adverse impacts.

Section 10 of the Rivers and Harbors Act (33 U.S.C. 401 et seq.)

Section 10 of the rivers and Harbors Act is administered by USACE. This section permits in navigable waters of the U.S. for all structures such as riprap, crossings, utilities, and activities such as dredging. Navigable waters are defined as those subject to the ebb and flow of ht tide and susceptible to use in their natural condition or by reasonable improvements as means to transport interstate or foreign commerce. The landward limit of waters is the mean higher high water line. The USACE grants or denies permits based on the effects on navigation. Most activities covered under this act are also cover under Section 404 of CWA.

Fish and Wildlife Coordination Act (16 U.S.C. 661-666)

This act applies to any federal project where the waters of any stream or other body of water are impounded, diverted, deepened, or otherwise modified. Project proponents are required to consult with the U.S. Fish and Wildlife Service (USFWS) and the appropriate state wildlife agency. These agencies prepare reports and recommendations that document project effects on wildlife and identify "wildlife" includes both animals and plants. Provisions of this Act are implemented through the NEPA process and Section 404 permit process

National Wild and Scenic Rivers Act (16 U.S.C. 1271-1287)

This act is administered by a variety of state and federal agencies. Designated river segments flowing through federally managed lands are administered by the land managing agency (e.g., U.S. Forest Service, Bureau of Land Management, and the National Park Service). River segments flowing through private lands area administered by the resources agency in conjunction with local government agencies. This Act prohibits federal agencies from activities that would adversely affect the values for which the river was designated.

Executive Order 11990 Protection of Wetlands (May 24, 1977)

This order establishes a national policy to avoid adverse impacts on wetlands whenever there is a practicable alternative. The U.S. Department of Transportation (DOT) promulgated DOT Order 5660.1A in 1978 to comply with this direction. On federally funded projects, impacts on wetlands must be identified in the environmental document. Alternatives that avoid wetlands must be considered. If wetland impacts cannot be avoided, then all practicable measures to minimize harm must be included. This must be documents in a specific "Wetlands Only Practicable Alternative Finding" in the final environmental document. An additional requirement is to provide early public involvement in projects affecting wetlands. The Federal Highway Administration (FHWA) provides technical assistance in meeting these criteria (FHWA Technical Advisory 6640.8A) and reviews environmental documents for compliance.

Section 1600 of the Fish and Game Code

Under this section of the Fish and Game Code, agencies are required to notify CDFG prior to any project that would divers, obstruct or change the natural flow, bed, channel, or bank of any river, stream, or lake. When an existing fish or wildlife resource may be substantially adversely

affected, DFG is required to proposed reasonable project changes to protect the resource. These modifications are formalized in a Streambed Alteration Agreement (Section 1600) that becomes part of the plans, specifications and bid documents for the project.

The McAteer-Petris Act (California Government Code 66600-66682)

The McAteer-Petris Act created the San Francisco Bay Conservation and Development Commission (BCDC) in 1965. BCDC's mission is the preservation of San Francisco Bay from indiscriminate filling. BCDC's fist task was compilation of a comprehensive study of the Bay and determining how future development of the bay should occur. This effort resulted in the San Francisco Bay Plan in 1968. In the 1969 the findings and policies of the Bay Plan were incorporated into the McAteer-Petris Act which was amended to make BCDC a permanent state agency. The Bay Plan continues to evolve and remains the guiding document for BCDC's actions. Section 66610 of the McAteer-Pertris Act establishes the boundaries of San Francisco Bay in relation to BCDC's jurisdiction. Essentially, all areas below the mean high tide line or in marshes, the higher of mean high tide line or a line five feet above mean seal level, and an area within a shoreline band that extends landward for 100 feet form mean high tide line are subject to their jurisdiction. Section 66632 of the McAteer-Petris Act establishes the permitting process for projects which would place fill in, on, or over any part of BCDC's jurisdiction as defined in Section 66610. Portions of the project within 100 feet of the mean high tide line are subject to BCDC's jurisdiction.

5.0 Determination of Credits/Required Compensatory Mitigation

5.1 Impacts to Waters of the U.S., Including Wetlands

The proposed project will result in permanent impacts to intertidal mudflat, California cordgrass tidal marsh, cattail marsh, pickleweed tidal marsh, seasonal wetland, pickleweed brackish marsh, brackish stream including Refugio Creek, and freshwater intermittent drainage. Existing habitats within Refugio Creek and the North Channel will be temporarily impacted during restoration activities. Impacts to Refugio Creek and the North Channel are considered temporary because these areas will be restored to wetland habitats with greater acreage and habitat value than the pre-project conditions upon completion of restoration activities. Minor temporary impacts to intertidal mudflats would also occur as a result of waterside construction activities (e.g., dredging, barge access). Temporal loss of wetlands and their associated functions and values will occur during the establishment period for the restored wetlands in Refugio Creek and the North Channel. An impact map (**Figure 7**) is provided in the back cover. **Table 2** is a Summary of Permanent Impacts to each Aquatic Resource that will occur as a result of the proposed project and the proposed compensatory mitigation.

Table 2. Summary of Permanent Impacts by Aquatic Resource and Proposed Compensatory Mitigation*

Habitat Type/Aquatic Resource	Permanent Impact
Intertidal mudflat	0.017
California cordgrass tidal marsh	0.068
Cattail marsh	0.025
Pickleweed tidal marsh	0.042
Seasonal wetland	0.542
Pickleweed brackish marsh	0.068
Brackish stream including Refugio Creek	0.007
Freshwater intermittent drainage	0.007
Total Permanent Impacts	**0.776**
Proposed Compensatory Mitigation at 3:1 ratio	***2.328***

* Aquatic resources that will not be permanently impacted by the proposed project are not included in the table.

Table 3 is summary of temporary impacts to each aquatic resource that will occur as a result of the proposed project and the proposed mitigation.

*Table 3. Summary of Temporary Impacts by Aquatic Resource and Proposed Mitigation**

Habitat Type/Aquatic Resource	Temporary Impact
Within Refugio Creek and North Channel	
Cattail marsh	0.390
Seasonal wetland	0.083
Pickleweed brackish marsh	0.714
Brackish stream including Refugio Creek	0.529
Freshwater intermittent drainage	0.047
Subtotal Temporary Impacts	**1.763**
Proposed Compensatory Mitigation at a 1:1 Ratio	***1.763***
Bayside of the UPRR	
Intertidal mudflat	5.048
California cordgrass tidal marsh	0.521
Riprap	0.030
Subtotal Temporary Impacts	5.599
Proposed Passive Restoration at a 1:1 Ratio	***5.599***
Total Temporary Impacts	**7.362**
Total Mitigation/Passive Restoration	**7.362**

* Aquatic resources that will not be temporarily impacted by the proposed project are not included in the table.

5.2 Discussion of How Compensatory Mitigation will Provide the Required Compensation

Permanent impacts to aquatic resources that would occur as a result of construction of the proposed project total **0.776 acres** as shown in **Table 2**. Temporary impacts to aquatic resources that would occur as a result of restoration activities within the Refugio Creek corridor and the North Channel total **1.763 acres** as shown in **Table 3**. A conservation easement will be established around the restoration area that is being established with the Refugio Creek corridor and the North Channel. The total area within the conservation easement will be **6.29 acres** consisting of the realigned channels of Refugio Creek and the North Channel, their associated floodplain, and the banks of both creeks. Habitat types within the mitigation area and their acreages are shown in **Table 4**. The mitigation area includes **2.328 acres** of wetlands and other waters of the U.S. as compensatory mitigation for the **0.776 acres** of permanent impacts to wetlands and other waters of the U.S. (3:1 ratio), **1.763 acres** of wetlands and other waters of the U.S. as compensatory mitigation for the 1**.763 acres** of temporary impacts to wetlands and other waters of the U.S. within Refugio Creek and the North Channel due to restoration activities (1:1 ratio), and an additional **0.469 acres** of wetlands and other waters of the U.S. to provide a buffer in case of poor performance in some portion of the restoration site. In addition, the mitigation area includes 1.73 acres of mixed scrub along the banks of Refugio Creek to provide an upland buffer between the restoration site and the surrounding development.

No compensatory mitigation is proposed for temporary construction related impacts to **5.599 acres** of bayside habitats that would occur as a result of waterside construction activities (e.g., barge access). This approximately **5.6 acre** area on the bayside of the UPRR tracks that includes the new Refugio Creek outfall and intertidal mudflats will be allowed to restore naturally as discussed in Section 6.2.2. This area will be monitored to ensure successful re-establishment but will not be included in the conservation easement.

The proposed mitigation provides for “no net loss” of wetlands/waters acreage by 1) mitigating for permanent impacts to wetlands/waters at a 3:1 ratio (2.328 acres restored:0.776 acres permanently lost); 2) mitigating for temporary impacts to wetlands/waters within the corridor of Refugio Creek and the North Channel resulting from restoration activities at a 1:1 ratio; and 3) providing for passive restoration/natural colonization of approximately 5.6 acres of bayside habitats disturbed during construction. Additional compensation above a 1:1 ratio for permanent impacts to wetlands/waters will compensate for the temporal loss of wetland functions and values during establishment of the restoration area to ensure “no net loss” of wetland functions and values.

Table 4. Summary of Habitats within the Restoration Area

Habitats within the Restoration Area	Acreage
Within Conservation Easement (Refugio Creek and North Channel)	
Tidal Marsh (brackish)	2.12
Seasonal wetland	1.15
Cattail marsh	0.09
Brackish and Freshwater Stream	0.95
Riparian Woodland (includes willow groves)	0.25
Subtotal Wetland/Riparian Habitats	***4.56***
Mixed Scrub (upland buffer habitat)	1.73
Subtotal Acreage within Conservation Easement	***6.29***
Within Bayside Portion of the Restoration Area*	
California cordgrass tidal marsh	Acreage unspecified
Pickleweed tidal marsh	Acreage unspecified
Intertidal Mudflat	Acreage unspecified
Subtotal	**5.6**
Total	**11.89****

* Not included in the Conservation Easement

** Includes 9.69 acres of wetlands and other waters of the U.S. proposed as mitigation for permanent and temporary impacts shown in Tables 2 and 3, an additional 0.469 acres of additional wetlands and other waters of the U.S. mitigation within the conservation easement to provide a buffer in case of poor performance, and 1.73 acres of upland buffer habitat between the mitigation area and surrounding development.

6.0 Mitigation Work Plan

6.1 Responsible Parties

The City of Hercules would be responsible for overseeing Plan implementation including restoration and monitoring activities. A qualified biologist or restoration ecologist would be required to oversee or implement restoration and monitoring activities.

6.2 Restoration Site Design

6.2.1 Refugio Creek Segment

The restoration design for approximately 1,300 linear feet of Refugio Creek from the upstream project boundary at the Gelsar Reach downstream to the Transit Loop Bridge, including the North Channel, was prepared by Restoration Design Group (RDG). RDG 2011 (**Appendix B**) includes the restoration site design and the basis for design for this segment including the geomorphic analysis, hydrologic analysis, and ecological basis for design. Portions of RDG 2011 were incorporated into this Plan largely without modification and are included in this section for the purpose of summarizing the restoration site design. For further discussion and background information, refer to **Appendix B**.

Refugio Creek is a channelized annual stream and a low-flow tributary of San Pablo Bay that traverses the UPRR ROW east of Hercules Point. Within the project area, the creek passes through three 72-inch-diameter culverts located under a service road, then under the railroad bridge, and empties into San Pablo Bay. The segment of Refugio Creek between the downstream face of the Railroad Bridge and the point that the low-flow channel terminates in San Pablo Bay, includes approximately 150 linear feet of tidal channel. As a result of historic filling, the creek banks have developed very steep to vertical profiles, and are supported by sand and concrete bags along the banks. The creek banks within the project site range in height from 8 to 14 feet from creek bed to top-of-bank. The existing low-flow creek channel varies in width (top-of-bank to top-of-bank) from approximately 20 feet in the upstream portion to about 40 feet in the downstream portion. A non-tidal tributary, referred to as the North Channel, enters the main creek channel from the northeast near the southern project boundary. An additional non-tidal tributary (referred to as the Central Channel) enters the main creek channel from the south, approximately in the middle of the main channel length on the project site.

The three culverts under the access road restrict flow during flood events and result in overtopping of the access road and railroad tracks. The existing channel also has a 90-degree bend where Refugio Creek encounters the access road and a second 90-degree bend, where flows enter the culverts under the access road. These man-made sharp bends further reduce channel capacity to convey flows. The proposed creek restoration will realign and restore Refugio Creek upstream approximately 1,000 feet to the southern project boundary. As part of restoration these bends will be eliminated, the creek straightened, and a new outlet to San Pablo Bay constructed. A reach of Refugio Creek upstream of the southern project boundary (referred to as the Gelsar Reach) was restored in 2001 as part of earlier development projects.

The proposed restoration work in the project area will include similar elements to upstream restoration to allow a smooth and complete habitat restoration of the entire lower creek. The City will place a conservation easement over the restored creek area within the project area, and will confirm existing conservation easements or extend the proposed conservation easement upstream to include the upper portion of Refugio Creek previously restored.

The proposed creek restoration will create a new meandering low flow channel and enlarged marsh within the project area that will improve hydraulic and ecological function. The creek channel will be re-graded and widened in order to restore a more natural serpentine form, increase flood-flow capacity, provide a creek floodplain, and restore associated tidal wetlands.

Construction of the new meandering channel will increase the overall length and acreage of Refugio Creek in the project area from approximately 1,590 feet (0.54 acre) to 1,652 feet (0.95 acre). Native plant species will be planted, and it is anticipated that there will also be some voluntary colonization of tidal marsh species, including pickleweed, gum plant, and other native species. The proposed realignment will require creating a new mouth into San Pablo Bay. The existing creek and culverts near the existing railroad bridge will be filled and the new bridge described above constructed over the new creek alignment.

The North Channel is a 420 ft long tributary of Refugio Creek that enters the site from a culvert that currently drains approximately twenty one acres of developed land. The channel currently functions as a swale and will be restored as a minor tributary to Refugio Creek.

6.2.2 Refugio Creek Outfall and Intertidal Mudflats

Active restoration is not planned for the segment of Refugio Creek from the upstream side of the Transit Loop Bridge to the terminus of the 150 foot tidally influenced channel into the Bay, including the surrounding temporarily disturbed intertidal mudflats. The bed and banks of Refugio Creek under the Transit Loop Bridge and the railroad berm will be an engineered trapezoidal channel of sufficient size to meet the necessary flood conveyance requirements. The new UPRR Bridge will require supporting piles that will be placed in the middle of the channel under the UPRR where the channel widens before it enters the Bay. The Transit Loop and UPRR Bridges will also require rock slope protection and armor placed in the channel bed to prevent scour. Approximately three feet of rock slope protection will be keyed in and placed within the channel bed. Sparse vegetation is expected to establish in this reach due to low ambient light levels and channel armoring. A channel will be excavated into the intertidal mudflats at the location of the new mouth of Refugio Creek. Channel design has not been completed. Preliminarily it is anticipated that the creek bottom elevation will be extended 50 feet beyond the rock slope protection at the creek mouth. Little change is expected to occur in the intertidal mudflats as a result of the proposed project. Disturbances to bottom sediments are expected to be temporary, with the mudflats returning to current conditions upon completion of construction as a result of natural tidal processes. The intertidal mudflats are sparsely vegetated and are expected to remain sparsely vegetated.

In areas where the bottom elevation has been lowered either by dredging or disturbance of bottom sediments during construction, accretionary sedimentary processes can be expected to

restore the bottom elevation to the pre-construction elevation or a similar equilibrium elevation. This will occur as floodtides carry in suspended sediments that deposit in the slack waters during high tide. Ebb tidal currents are insufficient to re-suspend all of the deposited muds and silts. Sediment will accumulate until the mudflats reach an elevation where deposition and re-suspension of sediments is in equilibrium due to a decrease in inundation and sedimentation. In the newly formed channel, ebb tidal currents and freshwater flows are expected to counteract these sedimentary processes (Philip Williams and Associates; Faber, P. M., 2004) and maintain the channel. Once restored to pre-project conditions, intertidal mudflats will either remain unvegetated or become vegetated based on soil salinity, particle size, and inundation regime.

Areas of disturbed California cordgrass tidal marsh and intertidal mudflat at and near the mouth of the new Refugio Creek channel will be allowed to vegetate via voluntary colonization of tidal salt marsh species occurring in San Pablo Bay with the species composition dictated by the micro topography of the mudflats. Allowing plant establishment to proceed from local native seed sources carried by tidal waters from nearby marshes is the recommended method for restoration of tidal marshes in San Francisco Bay that are not isolated hydrologically from the Bay (Philip Williams and Associates; Faber, P. M., 2004). Tidal salt marsh restoration projects in the San Francisco Bay region have shown that native salt marsh vegetation will voluntarily colonize intertidal mudflats in elevational areas appropriate for plant growth and will begin within one to two growing seasons (Napa Salt Pond Restoration, Carl's Marsh, Muzzi Marsh, Sonoma Baylands, Coyote Creek Lagoon) (Philip Williams and Associates; Faber, P. M., 2004).

In San Francisco Bay, there is usually an abundant seed source of the most common native salt marsh plants. Colonization of newly created intertidal mudflats in the San Francisco Bay area typically occurs by seed or from plant fragments. Colonization can also occur when an adjacent population expands vertically by vegetative growth, if the area is within the species elevational range. Pacific cordgrass, alkali bulrush, or annual pickleweed is typically the first vegetation to colonize an accreting mudflat and dominate the low marsh (Philip Williams and Associates; Faber, P. M., 2004).

California cordgrass tidal marsh and pickleweed tidal marsh occur within and adjacent to the Refugio Creek outfall in areas with suitable depth and substrate. California cordgrass is expected to colonize the lower elevational areas immediately adjacent to the intertidal mudflats. Pickleweed is expected to colonize areas of slightly higher elevation adjacent to the upland transition at the railroad berm. The community composition of the restoration area is expected to vary over time as the location of the transitional zone between cordgrass tidal marsh and pickleweed tidal marsh responds to changes in the physical composition of the site. Based on previous restoration projects in the San Francisco Bay, it can be reasonably assumed that vegetation will begin to colonize any temporarily disturbed mudflats at appropriate elevations for plant growth the first growing season after construction is completed. Pickleweed is expected to colonize the bayside mudflats the first year and achieve dense cover within five years. Cordgrass is expected to colonize the bayside mudflats within three to five years and achieve dense cover within 10 years.

6.2.3 Ecological Basis for Design

The entire creek channel within the project site will be influenced by the tides and will contain varying levels of brackish water depending on the tidal cycle and contributing freshwater flow from Refugio Creek. At the downstream end of the site, the marshplain is designed to evolve into a tidal marsh as the tides deposit sediment and the marsh accretes to the height of mean higher high water (MHHW). In areas upstream where the floodplain is above MHHW (Station 10+50), fluvial processes dominate and the floodplain transitions to a complex mixture of riparian forest and seasonal wetlands.

Approximately 1.3 acres will be tidally dominated marshplain and 1.1 acres will be fluvially dominated floodplain. These sizes will vary over time as the location of the transition between marshplain and floodplain respond to changes in the physical composition of the site. The floodplain is designed to receive overflow from the creek during storms on a yearly basis and is thus a highly dynamic area. Undoubtedly much of this area would exhibit qualities typical of seasonal wetlands, but as a part of an active floodplain it will be subjected to frequent disturbance that will change both size and composition of these wetland areas throughout the floodplain. This area will be highly variable as slight changes in elevation will dictate the degree of tidal connectivity and salinity. The composition of riparian woodland and seasonal wetland within the floodplain is expected to remain dynamic as variations in yearly rainfall, scour and deposition, and the maturation of vegetation influence the characteristics of the floodplain.

6.2.4 Design Plans

Design plans prepared by RDG are included in **Appendix C**.

6.2.5 Water Source

The water source that will be relied on to establish self-sustaining wetland habitat within the restoration area will be tidal flows from San Pablo Bay, influenced by freshwater flows within the North Channel, Central Channel, and Refugio Creek from upstream runoff, sheet flow, and stormwater discharge from adjacent developed areas.

Spray irrigation will be used for uplands and season wetlands during the establishment period. Spray irrigation will be from the top of bank, with seasonal wetlands receiving additional sprayheads to ensure complete coverage. The marsh plain will remain un-irrigated and portions of the riparian woodland will not receive complete coverage. The irrigation is intended to be temporary and will be turned off after the first three years of growth.

6.2.6 Soil Management

Mulch will be liberally applied to upland areas to improve soil health and improve moisture retention of the soil.

6.2.7 Erosion Control Measures

Erosion control measures including wattles, jute netting, mulching, and seeding would be installed throughout the restoration area to stabilize disturbed soils and minimize erosion when the cofferdams are removed. When the primary channel grading and restoration work is completed and the bridge installed, the cofferdams would be removed and Refugio Creek would be allowed to flow naturally through the newly constructed channel.

6.3 Construction Methods

The proposed Refugio Creek Restoration would include standard earthmoving equipment (e.g., bulldozers, excavators), plus specialized equipment (e.g., backhoes) to be used near Refugio Creek.

Within the Refugio Creek corridor area, approximately 16,381 cy of material will be cut and approximately 2,524 cy will be filled to accomplish creek restoration. This will generate 13,587 cy of export material that will either be used within the currently undeveloped portion of the waterfront area as surcharge materials, or moved to an off-site storage area within the City limits. The entire channel from the upstream project boundary to the bay side edge of the UPRR ballast will effectively be filled, and a new meandering channel will be constructed. Tidal wetlands will be constructed by excavating and widening the steep banks of the existing creek into a gradually sloped floodplain to allow tidal influence. The North Channel will also be re-graded and enhanced to accommodate an expanded wetland area. This area may also provide some stormwater detention and water quality improvements prior to discharge back into the North Channel and downstream into Refugio Creek and ultimately into San Pablo Bay.

To prepare for Refugio Creek realignment, excavation will begin on the south side of the railroad bridge to tie into the existing alignment of Refugio Creek. This will be followed by excavation on the north side of the railroad bridge to tie into San Pablo Bay and complete realignment of the creek. The creek will be backfilled to its new alignment. Railroad bridge work will be completed prior to diverting the creek into the realigned segment.

Constructing the new mouth of Refugio Creek in San Pablo Bay will be done using a long reach excavator from the shore. Excavation work within the Bay will be done during low tide. Creek excavation work is anticipated to be done from the landside. The mouth of Refugio Creek can most likely be excavated from the landside, but excavation may require an excavator be placed on pontoons. The creek channel will be continued into San Pablo Bay for approximately 200 feet to provide an initial unobstructed tidal connection. Silt curtains will be installed for work in open water. Long-term maintenance is not expected to be required.

Refugio Creek will be dewatered during construction to minimize erosion and sedimentation and allow for excavation in dry conditions. Cofferdams or a similar dewatering technique will be installed at upstream and downstream locations to dewater Refugio Creek to enable constructing in dry conditions. The contractor will construct cofferdams approximately fifteen feet upstream and downstream of the proposed work limits. The cofferdams will be constructed of clean sand bags, washed gravel, sheet metal, or water inflated cofferdam method

(such as AquaDam). If necessary, temporary fill used to construct the cofferdam will occupy the minimum footprint possible. Water will be pumped from the upstream location to the downstream location via a temporary flexible pipe. At the discharge location, to minimize the potential for erosion, the water flows from the pipe will be discharged via one of two alternative methods: 1) a T-pipe to reduce velocities over a riprap apron or 2) into a containment area between two cofferdams adjacent to San Pablo Bay. The riprap apron and containment area will be constructed over visquine or similar material to facilitate clean-up. Associated sandbags, sheet metal piling, and/or rock will be removed and the area restored to preconstruction contours. The cofferdam will also be used to restrict tidal flow into the construction area.

Stream crossings at the UPRR, Transit Loop, and Bayfront bridges will be constructed so that the bridges completely span the new creek channel and footings/abutments are placed outside of the channel. However, the new UPRR bridge, a two span structure, will require supporting piles that will be placed in the middle of the channel under the UPRR where the channel widens before it enters the Bay. Over time, it is anticipated that this section will silt-in due to tidal action and naturally form a new low-flow channel. The Transit Loop and UPRR bridges will also require rock slope protection and armor placed in the channel bed to prevent scour. Approximately three feet of rock slope protection will be keyed in and placed within the channel bed. The Bayfront Bridge is a two span structure and the Transit Loop Bridge is a single span structure. Both of these structures will clear span the creek low-flow channel which will be graded to encourage a more natural meander along the widened channel.

Restoration of Refugio Creek may be completed in one or in multiple phases depending on seasonal variation and construction progress. Phases of construction will be planned to be completed within a construction season to ensure that channel construction and modification does not occur during the wet season. Erosion control measures including wattles, jute netting, mulching, and seeding will be installed throughout the restoration area to stabilize disturbed soils and minimize erosion when the cofferdams are removed. When the primary channel grading and restoration work is completed and the bridge installed, cofferdams will be removed and Refugio Creek will be allowed to flow naturally through the newly constructed channel.

6.4 Site Preparation

Preparation of the site for replanting will consist of removal of all construction material and any other foreign material introduced during construction (e.g., trash, debris), and weed removal. All construction materials will be removed from the restoration area upon completion of creek realignment activities. The restoration area will then be cleared of existing weeds prior to planting.

6.5 Revegetation

The objectives of the revegetation strategy are to provide soil stability through bioengineering, wildlife habitat via native plant community establishment, and invasive species control by

focusing on aggressive native species that perform well at disturbed sites. These objectives work to meet the broader goals for this project noted in Section 1.2 of this document.

Habitat types that will be created within Refugio Creek and the North Channel by active planting include brackish tidal marsh, seasonal wetland, riparian woodland (including willow groves), cattail marsh, and upland.

6.5.1 Soil Bioengineering

Willow plantings (*Salix lasiolepis* and *Salix laevigata*) along the stream corridor are the primary bioengineering strategy employed. In the fluvial sections of the creek, willow will be concentrated near the outside bends to provide structure to the banks and encourage relative channel stability. Willow will be planted as live poles, with limited use of live fascines where the added stability is deemed appropriate. The calculated water velocities and shear stresses indicate that more robust bioengineering systems are not warranted.

6.5.2 Revegetation Strategy by Habitat Type

The revegetation strategy aims to restore specific habitat types within the Refugio Creek Corridor. The revegetation strategy is specific to each habitat type, with specifics discussed below.

Tidal Marsh (Brackish): Because the marshplain relies on natural sedimentation to build the high marsh over time, the marshplain will not be actively planted. It is expected that the marshplain will rise at least six inches and likely higher as sea level rise begins to affect marsh elevations throughout the bay. During this process of aggradation, the marshplain is expected to be colonized by low and mid marsh species such as *Spartina foliosa* and *Salicornia* spp. Over time *Spartina foliosa* will give way to high marsh species such as *Distichlis spicata*, *Jaumea carnosa* and *Frankenia salina*.

Invasive *Spartina alternifolia* appears to be of relative low concern at this site (RDG 2011). Personal communication between RDG and staff of the Invasive Spartina Project indicated that there are no known populations in the vicinity of Refugio Creek and that the population of invasive *Spartina* and hybrids has been reduced by as much as 90% since work to eradicate it from the San Francisco Bay began (RDG 2011; **Appendix B**).

Seasonal Wetland: The seasonal wetlands will be seeded with a native wetland/riparian seed mix. Plugs of *Leymus triticoides*, *Carex barbarae* and other rhizomatous species will be incorporated to encourage quick cover within the constructed wetlands.

Riparian Woodland: Above the tidal limits, the floodplain will be dominated by riparian vegetation. The seasonal wetlands will form in constructed depressions within the floodplain. Riparian vegetation such as *Acer negundo, Salix lasiandra, Salix lasiolepis, and Rubus ursinus* will be planted throughout the remainder of the floodplain, including the margins of the creek and along the subtle ridges that separate the seasonal wetlands within the floodplain. The willow will be planted from live cuttings, the remaining species will be from restoration grade container stock.

Willow Groves (sausals): There are existing clumps of willow growing in select locations at the site suggesting that there are pockets of fresh groundwater within the tidal sections of Refugio Creek. To encourage these willow groves in the restored project, willow will be planted throughout the site with the idea that it will perform well in areas with natural access to groundwater, and likely perform poorly in other areas. This strategy may result in high mortality, but produce an overall condition of scattered willow sausals throughout the site. The location of willow planting will be adjusted during construction if seeps become evident during grading activities.

Cattail marsh: Cattail marsh will be planted/seeded with primarily with *Typha* spp. and *Carex* spp.

Mixed Scrub (Upland): The upland will be seeded with an upland native seed mix and planted with container stock. The representative plant species of the upland areas include *Eriogonum fasciculatum, Baccharis pilularis*, *Nassella pulchra,* and *Elymus glaucus.*

6.5.3 Aggressive Colonizers

Invasive species are a consistent threat to urban stream restoration projects. Collective experience acquired over the last decade of restoring streams in the Bay Area has revealed that the most successful strategy for restoring ecological health to urban streams is to focus on the aggressive colonizer species. These are species that are the first to colonize a site after a disturbance. *Salix spp., Alnus rhombifolia, Populus fremontii, Baccharis pilularis, Rosa californica, Artemisia douglasiana, Rubus ursinus, Leymus triticoides, Distichlis spicata, and Carex barbarae* are all examples of aggressive native plants that can compete for light and space with many non-native and invasive plants likely to attempt to colonize the site immediately after construction. Many of these preferred species also provide habitat structure. They stabilize banks to limit further disturbance, shade the creek to reduce the amount of emergent aquatic vegetation, and improve the soil conditions so that natural succession of species on the site can occur over time.

The plant palette will include additional species for diversity and aesthetic interest in addition to the colonizing species. These additional species are intended to add value to the project and will be planted at locations and numbers that will not compromise the overall success of the revegetation effort even if some of these accent species underperform.

6.6 Invasive Species Control

6.6.1 Control of Invasive Species During Site Construction

The upland portions of the project site are disturbed and contain primarily nonnative species, many of which are considered invasive by the California Department of Food and Agriculture and the California Invasive Pest Plant Council. However, these species are ubiquitous to disturbed habitats in the region. Nonnative aquatic nuisance species such as cordgrass are currently absent from the project site. California cordgrass dominates the habitat type, growing in dense homogenous stands. Based on size and structure, all of the cordgrass at the project site appears to be the native California cordgrass and not among the invasive species of cordgrass.

There is a potential that non-native cordgrass or other non-native species could be introduced to the project site during construction of the restoration site. If non-native cordgrass was introduced to the project site, it could spread and potentially competitively displace or hybridize with the existing native cordgrass. Additionally, any aquatic habitats disturbed by construction could become rapidly colonized by non-native species.

In order to prevent the introduction of non-native cordgrass and/or other non-native plant species to the project site, the following measures will be implemented:

- All construction equipment to be utilized in or adjacent to the restoration area shall be thoroughly cleaned to remove dirt and weed seeds prior to being transported or driven to or from the project site.
- If any borrow soil or other stockpiled material (e.g., rock slope protection) to be placed in or adjacent to the intertidal mudflats and salt marsh habitats is transported to the project site from an offsite location, it shall be inspected for the presence of noxious weeds or invasive plants.
- If noxious weeds or invasive plants are present in imported materials, the contractor shall remove approximately five inches of the surface of the material from the borrow site before transporting to the project site.
- Before removal, this material will be chemically or mechanically treated to kill the existing noxious weeds and invasive plants, and will not be used for the project without approval.
- All undesirable exotic plants will be eradicated either during initial site grading or prior to site preparation. If grading precedes planting by more than a few months, it will be necessary to eradicate all undesirable exotic plants that have become established prior to planting and seeding of the mitigation site.
- Initial weed eradication will be performed by hand, with the following exceptions: if pampas grass (Cortaderia spp.), giant reed (Arundo donax), or tamarisk (Tamarix spp.) are subsequently discovered on site, they may be removed by motorized equipment (i.e. excavation) or by the use of herbicides. Herbicide will be limited to systemic herbicides approved by the U.S. Environmental Protection Agency (EPA) for use in aquatic situations. Herbicides will be used by cutting the plants to the base and wicking the exposed stalks with the herbicide.

6.6.2 Control of Invasive Species in the Restoration Site Post-Construction

Invasive species control will be implemented as part of regular maintenance of the restoration site. The following measures will be implemented.

- Weed control will be maintained throughout the five-year monitoring period. Ongoing weed control will be accomplished manually by the use of a hoe or other tool to uproot the entire plant or by herbicide application. All maintenance personnel will be trained to distinguish weed species from native vegetation to ensure that only weed species are removed or sprayed with herbicide.

- The restoration area will be maintained to a maximum of 15% cover of woody or perennial weeds throughout the five-year monitoring period. Weeds will be removed reaching six inches in height or setting seed, whichever occurs first.
- During the first two years of monitoring, weed removal will occur at intervals of not more than 30 days. During the remaining monitoring period, weed removal will occur at intervals of not more than 90 days.
- A cleared space, 18 inches from the base of the plant, will be maintained around each container plant to minimize competition from other plant species.
- Erosion control measures included in the project would not use species listed as noxious weeds. Invasive or noxious species would not be planted as part of the planting plan. Only native plants will be planted.

The plant palette focuses on aggressive colonizer plant species (RDG 2011). Once native species become established, invasive species are not anticipated to pose a severe threat to the restoration site. However, invasive species will be monitored and controlled to ensure that the restoration area functions as designed in perpetuity (see Section 11).

6.7 Fencing and Signage

The perimeter of the restoration site will be fenced and signage will be installed on the fencing to limit public access. Fencing will be placed along the upland boundaries of the restoration area. Fencing will be of either split-rail or post and cable construction and will be a minimum of three feet in height. Interpretive signs will be placed at 100 foot intervals along the edge of the restoration. Signs will include a statement informing the public that the site is a restoration site, discuss the resources present and why they are protected, the name of the party responsible for the site, and contact information for the responsible party.

7.0 Performance Standards and Success Criteria

Performance standards/success criteria are tied to the Plan goals and objectives, specifically the following objectives: (1) restore a dynamically stable channel cross section with floodplain and marshplain habitat within the project right of way that is functioning hydrologically to sustain the designed wetland habitats; (2) improve ecological function by increasing the diversity of plant and animal species and habitats in the site, (3) provide for on-site mitigation.

The performance standards/success criteria in this Plan include requirements for hydrology, vegetation, and wildlife per item 1 and 2 listed above, and overall acreage of restored wetlands per item 3.

7.1 Success Criteria for Establishment of Wetland Hydrology

Success criteria for establishment of wetland hydrology will be applied to the seasonal wetlands in the restoration site. The success criteria will not apply to other wetland types in the restoration site such as the tidal marsh or marshplain areas. Success criteria for establishment of native vegetation will ensure that tidal marsh and the marshplain function as designed. The success criteria for the seasonal wetlands will be for them to exhibit evidence of wetland hydrology for three consecutive years by the end of the five year monitoring period. During the five year monitoring period, on-site wetlands will be evaluated for evidence of wetland hydrology annually. This can be conducted simultaneously with vegetation monitoring events. Evidence of wetland hydrology will be determined based on the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE, 2008). One primary or two secondary indicators of wetland hydrology must be present. The results of the wetland hydrology assessment will be provided in each annual monitoring report. If a designated seasonal wetland area(s) is not exhibiting wetland hydrology, remedial actions will be taken to provide hydrologic input such as re-contouring of the site. If the success criteria is not met at the end of five years, additional annual monitoring will occur until the success criteria has been met for at least three consecutive years.

If the seasonal wetlands are not functioning as designed due to a lack of hydrologic input as a result of drought or the sites hydrologic regime simply does not function as planned to support seasonal wetlands, the USACE, CDFG, and USFWS will be notified and alternative measures will be pursued to compensate for seasonal wetland habitat. Alternative measures could include application of credit from other on-site restoration such as upland buffers to compensate for the seasonal wetland acreage or purchase of mitigation credits or in-lieu fee payments. Seasonal wetland habitat should not be forced to establish on site if repeated attempts fail.

7.2 Success Criteria for Establishment of Native Vegetation

Success criteria for establishment of native vegetation will include criteria for survival of the restoration plantings, criteria for establishment of wetland vegetation in terms of percent cover, and criteria for invasive species control.

7.2.1 Success Criteria for the establishment of restoration plantings

Seasonal Wetland and Upland Plantings

The success criteria for the establishment of seasonal wetland and upland plantings of plugs and container stock will be to achieve 80 percent survival for three consecutive years by the end of the 5-year monitoring period. If less than 80 percent of the restoration plantings have survived for three consecutive years by the end of the 5-year monitoring period, replanting and additional years of monitoring will be conducted until 80 percent of the plantings are alive and healthy and have been in the ground for three years.

Survival of seasonal wetland and upland plantings will be monitored quarterly and the percent survival of the restoration plantings will be reported in each annual monitoring report (See Section 7). If less than 80 percent survival of seasonal wetland and upland plantings is reported in the first annual monitoring report, or any subsequent annual monitoring report, replanting of the restoration area will occur within 30 days to bring the survival rate up to 80 percent. If survival of the seasonal wetland and upland plantings is observed to be below 60 percent during any quarterly monitoring visit, replanting will occur within 30 days to bring the survival rate up to 80 percent.

Riparian Woodland and Mixed Woodland/Chaparral Scrub Plantings

The success criteria for the establishment of container plantings of trees and shrubs in the riparian woodland and mixed woodland/chaparral scrub habitats will be to achieve 80 percent survival for three consecutive years by the end of ten years. The container plantings of trees and shrubs will be monitored quarterly for five years and annually thereafter. If less than 80 percent of the restoration plantings have survived for three consecutive years at the end of the 10-year monitoring period, replanting and additional years of monitoring will be conducted until 80 percent of the plantings are alive and healthy and have been in the ground for three years. If the success criteria have been met by the end of five years, monitoring of container plantings may be discontinued. In order to provide habitat diversity, if percent survival falls below 80 percent in any one category of plantings (tree, shrub, woody vine etc), replanting will occur to bring the survival of species in that category up to 80 percent. However, if any one species or group of species is found to be performing poorly in the restoration site, replacement species can be used at the discretion of the Restoration Site Manager in coordination with the USACE, USFWS, and CDFG.

In order to allow for natural successionary processes to function in the restoration area, natural recruitment/voluntary colonization of native species may be applied toward the 80 percent success criteria, in each category and in the restoration site as a whole. For example, if a species of woody shrub native to the project region becomes established in the restoration area but was not planted in the restoration area, the total number of individuals of that woody shrub may be applied to the success criteria for the woody shrub category and to the total success criteria for riparian woodland plantings. In addition, if a species planted in the restoration area reproduces and establishes numbers of individuals above the number planted, those additional individuals may be applied to the success criteria for the appropriate category and to the total

success criteria for riparian woodland plantings. Like the original plantings, individuals established in the restoration site via natural recruitment/voluntary colonization would have to survive for three years to be counted in the final success criteria. It is conceivable and reasonably likely that the success criteria will be met via a combination of original plantings becoming established and natural recruitment/voluntary colonization of the site.

Table 5 is a simplified example of how natural recruitment/voluntary colonization of native species could be applied to the success criteria for percent survival. The numbers of plantings and species listed in the table are for illustrative purposes only.

Table 5. Sample Success Criterion Calculation

Species - Number of Individuals Planted in the Restoration area	Number of Original Plantings Alive/Dead	Number of live plantings required to meet 80% survival	Natural Recruitment/voluntary colonization (Yes or No/Species/Number of Individuals)	Criterion Met (Yes or No/Number of live plants)
Populus fremontii - 100	60 alive/40 dead	80	Yes, 10 *P. fremontii* saplings and 11 *Salix spp.* saplings	Yes/81 live plants in hydrophytic tree category

Survival of riparian woodland plantings will be monitored quarterly and the percent survival of the restoration plantings will be reported in each annual monitoring report (See Section 8). If less than 80 percent survival of riparian woodland plantings (taking into account natural recruitment/voluntary colonization) is reported in the first annual monitoring report, or any subsequent annual monitoring report, replanting of the restoration area will occur within 30 days to bring the survival rate up to 80 percent. If survival of the riparian woodland plantings is observed to be below 60 percent during any quarterly monitoring visit, replanting will occur within 30 days to bring the survival rate up to 80 percent.

Plant species that will be established at the restoration site are discussed in Section 6.5.2. The plant palette includes trees, shrubs, and herbaceous vegetation. The plant palette consists of species typical of similar wetland habitats in the region. The goal of actively establishing vegetation in a wetland is to provide a jumpstart to the wetland's ability to provide beneficial functions and values. The goal of preparing a plant palette is to ensure that the restoration area is similar in species abundance and diversity to other similar wetland habitats in the region and provides wetland functions and values as well as optimal wildlife habitat.

The amount of living vegetation in a wetland directly influences the functions and values of the wetland. Living plants influence the quantity, quality, and spatial distribution of water and sediment within a wetland (Collins et al., 2008). Vascular plants in tidal marshes and riverine environments entrap suspended sediment, reduce wave energy, decrease the velocity of water flowing through the wetland, and function as wildlife habitat. In addition, much of the sediment pile in tidal marshes is plant detritus, which is a main source of essential nutrients for plants and animals (Collins et al., 2008).

The value of wildlife habitat in a wetland is positively correlated with species abundance and diversity. The functions of wetland systems as a whole are optimized when a rich native flora dominates the plant community and when the plant community exhibits complex three-dimensional structure due to species diversity and diversity in age classes of the vegetation (Collins et al., 2008). In order to ensure that species abundance and diversity is maintained in the restoration site, the 80 percent success criteria will be incorporated for each category of plantings (e.g., trees, shrubs, and herbaceous species).

7.2.2 Success Criteria for Establishment of Wetland vegetation in terms of Percent Cover

Success criteria for establishment of wetland vegetation in terms of percent cover will be applied to the restored tidal marsh, seasonal wetland, riparian woodland, and cattail marsh.

The success criteria in this Plan are considered reasonable for the subject wetland habitats, however, ecological processes working on the restoration site may take longer than prescribed and/or may result in wetlands that are performing the target functions and values but not meeting the specific target criteria. If the success criteria for percent cover described in this section are not met within 5 years (or ten years for riparian woodlands), a review of the subject wetlands will be conducted by a qualified restoration ecologist/biologist. The restoration ecologist/biologist will determine if the subject wetlands are performing satisfactorily according to the functions and values described in this Plan and if they contain an acceptable percent cover of vegetation when compared to similar wetland habitats in the region. If the subject wetlands are determined to be performing satisfactorily and contain an acceptable percent cover of vegetation, the subject wetlands will be considered to have met their success criteria and monitoring can be discontinued. If the subject wetlands are not performing satisfactorily or do not contain an acceptable percent cover of vegetation as compared to similar habitats in the region, the qualified restoration ecologist/biologist will recommend whether monitoring should be continued for an additional period of time to allow habitats to establish or whether alternative measures should be pursued to bring the wetlands up to acceptable condition such as revegetation, site grading, or other physical alterations.

Tidal/Brackish Marsh/Cattail Marsh

The overall success criteria for the establishment of marsh will be a minimum of 80 percent cover in the vegetated margins of the marsh by the end of the 5-year monitoring period as prescribed for the Gelsar Reach (LSA 1999). Percent cover in the marsh habitats will be monitored annually and will be reported in each annual monitoring report (See Section 8).

Seasonal Wetland

The overall success criteria for the establishment of seasonal wetland will be a minimum of 85 percent cover of herbaceous grasses and forbs by the end of the 5-year monitoring period as prescribed for the Gelsar Reach (LSA 1999). Percent cover in the seasonal wetlands will be monitored annually and will be reported in each annual monitoring report (See Section 7).

Riparian Woodland

The overall success criteria for the establishment of riparian woodland will be a minimum of 80 percent cover of native hydrophytic trees and shrubs within 10 years as prescribed for the Gelsar Reach (LSA 1999). Percent cover in the riparian woodland will be monitored annually for the first five years in the later third of the growing season and will be reported in each annual monitoring report (See Section 7). After year five, the riparian woodland will be monitored every other year up to a maximum of ten years. If the success criterion has been reached by the end of year five, monitoring can be discontinued.

7.2.3 Success Criteria for the Maintenance of Invasive Species

The restoration area will be maintained to a maximum of 15 percent cover of invasive weeds throughout the five-year monitoring period. Invasive weeds will be considered those species with a rating of high or moderate by the California Invasive Plant Council (Cal-IPC). At the discretion of a qualified restoration ecologist/biologist, species on the Cal-IPC list with a moderate rating that are ubiquitous throughout the region may be discounted from the 15 percent cover criterion (e.g., *Lolium multiflorum*). The percent cover of invasive weeds in the restoration area will be calculated during each quarterly monitoring visit and the results will be included in each annual monitoring report. Invasive weed management will occur as stated in Section 6.6.2. If the success criterion has not been reached by year five, invasive species management will be implemented and additional monitoring will occur until the success criterion has been reached for three consecutive years.

7.3 Success Criteria for Use of the Restoration Site by Wildlife

The success criteria for use of the restoration site by wildlife will be use of the restoration site by a suite of vertebrates typical of similar wetland habitats in the region and an increase in diversity over the pre-project conditions. The success criteria for wildlife will be qualitative. Reconnaissance level surveys targeted at wildlife will be conducted annually during the appropriate season to view the highest diversity of wildlife on the site. The results of the wildlife surveys will be compared to available information on faunal diversity in similar habitats in the region, if available, and the list of wildlife species observed in the project site during biological surveys conducted in support of NEPA/CEQA documentation and Section 7 Consultation.

Surveys will be conducted annually to determine vertebrate species occurring in the restoration site. The surveys will be inclusive of all vertebrates to the extent feasible but will focus on readily observable wildlife and their sign such as birds, medium to large sized mammals, amphibians, and reptiles. No protocol presence/absence surveys for special-status species would be conducted. The surveys will report all vertebrate fauna observed in the restoration site and will be included in the annual monitoring report. A qualified wildlife biologist will determine if the restoration site is being successfully used by wildlife typical of similar habitats in the region and if use of the restoration area by wildlife is equal to or greater then pre-project conditions. It may take several years for wildlife to establish in the restoration area. If the success criteria have not reasonably been met at the end of the five year monitoring period,

additional annual monitoring will be conducted until the success criteria have been met for three consecutive years. No active manipulation of the site will be conducted to encourage use by wildlife. Active manipulation, if necessary, will focus on achieving the target habitats thereby encouraging use of the site by wildlife.

Animal species expected to use the restoration area include a variety of birds such as mallard, California quail, killdeer, black phoebe, San Pablo song sparrow, and red-winged blackbird; reptile and amphibian species such as Pacific tree frog, and potentially western pond turtle and California red-legged frog; and mammal species such as raccoon, black-tailed deer, and opossum. The restored creek channel and marshplain is expected to support a much higher diversity of invertebrates than pre-project conditions due to a substantial increase in habitat heterogeneity. Aquatic invertebrate sampling was not conducted prior to mitigation site construction and is therefore not proposed as part of the monitoring and success criteria.

7.4 Success Criterion for Habitat Acreage to be Created

The success criterion for the establishment of habitat acreage will be to achieve a minimum of 4.56 acres of functioning wetland and riparian habitat (including mixed woodland/chaparral scrub) along the corridors of Refugio Creek and the North Channel by the end of the 5-year monitoring period. Due to the dynamic nature of the wetlands proposed in the restoration area, it is not practical to assign specific success criteria to individual wetland habitats or types of wetland habitat. For this reason, the success criterion is tied to an overall target acreage of habitat within the Refugio Creek and North Channel corridors.

If the success criterion for the habitat acreage is not met within 5 years, a review of the restoration site wetlands will be conducted by a qualified restoration ecologist/biologist. The restoration ecologist/biologist will determine if the restoration site is performing satisfactorily according to the functions and values described in this Plan and if the designed habitats have established successfully when compared to similar wetland habitats in the region. If the restoration area is determined to be performing the functions and values as designed in this Plan but the specific habitat composition is different from the initial design due to minor variances in site conditions caused by ecological factors not anticipated in the conceptual design, the success criteria for habitat acreage will be considered met and monitoring can be discontinued as long as 4.56 acres of functioning habitat has established. If the habitat acreage is not being met because the restoration area is not performing satisfactorily due to unsuccessful establishment of habitat, the qualified restoration ecologist/biologist will recommend whether monitoring should be continued for an additional period of time to allow habitats to establish or whether alternative measures should be pursued to bring the jurisdictional acreage up to the target amount such as revegetation, site grading, or other physical alterations.

8.0 Monitoring of the Restoration Area

Monitoring of the restoration area will consist of regular monitoring site visits by a qualified biologist/restoration ecologist and submittal of monitoring reports to the USACE, as well as UFSWS and CDFG. An initial monitoring site visit will be conducted within 30 days of completion of restoration activities. Thereafter, the restoration site shall be monitored for up to 10 years or until success criteria have been met. Annual monitoring reports will be prepared to report the results of the monitoring visits and will be submitted annually to the USACE, as well as USFWS and CDFG, by January 31st of each year. The first annual monitoring report will be submitted on January 31st the first winter after restoration site implementation.

8.1 Monitoring Site Visits

8.1.1 Initial Monitoring Site Visit

The primary purpose of the initial monitoring site visit is to establish the baseline conditions for the restoration site that will be used as reference criteria for each subsequent monitoring visit. The baseline conditions will be documented through collection of data and preparation of as-built plans. During the initial monitoring site visit, necessary information will be collected in order to support the preparation of as-built plans for the restoration site. The as-built plans will include the location of each individual restoration planting, photo point locations for use during each monitoring visit (location to be determined at the time of the initial monitoring site visit), and other pertinent information such as the boundaries of planting zones, and restoration site boundaries. Additionally, the first annual monitoring site visit will be conducted at this time. Requirements for annual monitoring site visits are described below.

8.1.2 Subsequent Monitoring Site Visits

Each subsequent monitoring site visit would utilize the as-built plans established from the initial monitoring visit to document any change in conditions within the restoration site. If conditions arise that dictate a need to modify monitoring methodology anytime after the initial monitoring visit, USFWS would be contacted for approval of any changes prior to their implementation.

Each survey year, a qualified biologist/restoration ecologist would make a minimum of four quarterly site visits; one in winter, one in spring, one in summer, and one in fall. During each quarterly site visit, a survey of the restoration site will be conducted. The survey will include collection of biological information on flora and fauna, wetland hydrology, and acreage of wetland habitats as discussed in Section 7; an evaluation of the adequacy of the fencing, signs, and weed control efforts in the restoration area; and a general assessment of the habitat, including any real or potential threats to the restoration area plantings and habitat, such as erosion, fire, off-trail vehicle or pedestrian use, vandalism, excessive weed growth, etc. Four photographs will be taken at each designated photo point during each site visit; one facing north, one facing east, one facing south, and one facing west. The locations of designated photo points will be determined during the initial monitoring site visit and shown on the as-built plans. A sample inspection sheet is included as **Appendix D**.

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9.0 Evaluation of Restoration Site Function Using CRAM

9.1 Introduction to CRAM

California Rapid Assessment Method (CRAM) will be conducted annually at the restoration site in order to monitor site condition over time. CRAM is a standardized method for rapidly assessing wetlands in California. Large amounts of public and private funds are being spent on wetland restoration activities in California; however a standardized system of evaluating and monitoring wetlands is largely lacking. A statewide database of wetland assessments is also lacking (Collins et al. 2008). CRAM provides a standardized method for evaluating all wetlands in California and provides a basis for comparison of similar wetland types across the State. CRAM is designed to provide valuable information about wetland condition while expending relatively little time and money.

CRAM can be used and has been used for a variety of purposes involving assessing the condition of wetlands in order to improve decision making. CRAM can be used to assess ambient condition of wetlands within a watershed, assist with identifying the best sites for restoration, and monitoring wetland restoration activities.

CRAM is based on the key assumptions that the condition of a wetland is dependant on the physical landscape that surrounds the wetland and the source of hydrology for the wetland as well as the wetland itself (Collins et al., 2008). Natural processes and anthropogenic disturbances within the landscape surrounding the wetland and its hydrology source affect the condition of the wetland as well as its potential functions and values. The Assessment Area (AA) is the portion of a wetland that is the subject of a CRAM assessment. CRAM evaluates four attributes of a subject wetland's AA: (1) buffer and landscape context; (2) hydrology; (3) physical structure; and, (4) biotic structure. Each attribute has submetrics that are scored with an "A", "B", "C", or "D" grade. The letter score is then converted to a numerical score attributed to each submetric of 12 points for an "A", 9 points for a "B", 6 points for a "C", and 3 points for a "D". The numerical scores for each submetric are used to calculate the overall attribute score, which is based on the number of points received out of the total available for each attribute. The attribute scores are then averaged to derive an overall CRAM score for the wetland. The final CRAM score represents the overall condition of a wetland but does not represent any particular function.

Identical CRAM scores can be achieved by different wetlands with completely different attribute scores. Therefore, a crucial component of CRAM analysis is to evaluate individual attribute scores and even submetric scores to interpret the meaning of the overall score. The scores for each attribute are directly proportional to the functional capacity of the wetland (Collins et al. 2008). Higher scores indicate more functional capacity. The stressor checklist within the CRAM field data form combined with submetric scores is used to identify possible causes for the attribute scores. An individual CRAM score is a snapshot of the condition of a wetland as it exists currently and does not take into account previous conditions or the desired

state of the wetland from a resource manager's perspective. Repeated analysis must be conducted to compare condition over time, as will be implemented in the restoration area.

9.2 Implementation of CRAM

CRAM will be used to monitor the overall condition and progress of the restoration site during the five year monitoring period. CRAM analysis will be conducted once a year, during the latter third of the growing season, beginning the first growing season after restoration activities are implemented. The results of the CRAM analysis will be included in the annual monitoring reports and uploaded to the CRAM database located at www.cramwetlands.org. If the results of the CRAM analysis indicate a lack of progress within the restoration area or indicate that the restoration area is functioning significantly more poorly than other similar wetlands in the region where CRAM scores have been reported, recommendations will be made in the annual report to improve conditions within the restoration site. An evaluation of the CRAM scores in conjunction with the results of the annual monitoring reports will be used to determine any necessary remedial actions to improve wetland function.

10.0 Maintenance Plan

Maintenance of the restoration site will be conducted by the City. City staff will conduct weekly visits to the restoration site during the first dry season after restoration site establishment and a minimum of monthly thereafter. Maintenance activities shall include, but are not limited to the following activities:

- Removal of garbage from the restoration area;
- Repair or replacement of fencing or signs identifying the area as a restoration area;
- Watering or soil replacement for vegetation in poor health;
- Replacement of any dead or damaged planted vegetation; and
- Removal of invasive or noxious weeds.

If during any of the biological monitoring visits it is determined that additional maintenance activities are necessary for site success, recommendations for additional maintenance activities will be made in the annual monitoring reports and remedial actions will be taken by the City as necessary. A summary of yearly maintenance activities shall be included in the annual monitoring reports.

11.0 Long-Term Management Plan

The City currently proposes to complete all management and maintenance activities necessary for the restoration area. To ensure the long term preservation of the restoration area in perpetuity, the City proposes to establish a conservation easement over the restoration area. The City has been coordinating with the Muir Heritage Land Trust who has agreed preliminarily to hold the conservation easement. The City will establish a long term financial assurance mechanism to provide adequate funding to the Muir Heritage Land Trust to provide management and maintenance of the restored area in the event that the City is unable or fails to complete necessary management activities.

Upon successful completion of restoration site establishment per the success criteria established in this Plan and after the active monitoring period is over, management of the restoration site will continue to be conducted by the City. The goal of the long-term management is to ensure that the restoration site functions in perpetuity as designed. The responsibility for long-term management of the restoration site may be transferred to another USACE-approved third party upon written notice and approval by the USACE prior to the transfer.

Regular maintenance of the restoration site will be conducted to ensure that the integrity of the site is not compromised and that the overall habitat value is maintained. Site visits will be conducted at the discretion of the City or approved third party site manager, but no less than once a quarter (prior to completion of monitoring period, trips will be monthly); to identify any needed site maintenance. Maintenance activities shall include, but are not limited to the following activities: removal of garbage from the restoration area; repair or replacement of fencing or signs identifying the area as a restoration area; removal of significant stands of invasive or noxious weeds, and a qualitative evaluation of the success of the restoration site once a year. If circumstances beyond the control of the City or third-party restoration site manager arise that lead to damage or killing of a significant number of plants in the mitigation area, such as severe flooding, vandalism, fire etc., the USACE would be contacted so that they can make a determination as to the Applicant's replacement responsibilities.

12.0 Adaptive Management Plan

If restoration can not be carried out as outlined in this Plan or the restoration site is performing poorly upon implementation of the measures outlined in this Plan for restoration site establishment, the City or the third party restoration site manager will notify the USACE. Modifications to the restoration plan will be made as need and submitted to the USACE for approval. No modifications to the restoration site design will be made without approval by the District Engineer.

If monitoring or other information such as CRAM analysis indicates that the restoration site is not progressing towards meeting the goals of this Plan, the restoration site manager must notify the District Engineer as soon as possible. The District Engineer will evaluate and pursue measures to address deficiencies in the Plan in consultation with the responsible parties and other responsible resource agencies including USFWS and CDFG. Measures will be implemented as necessary to ensure that the restoration site meets goals comparable to those described in the Plan objectives including but not limited to: site modifications, design changes, revisions to maintenance requirements, and revisions to monitoring requirements. Performance standards may be revised to account for measures taken to address deficiencies in the restoration project. No other revisions to performance standards will be allowed except in the case of natural disasters.

13.0 Financial Assurances

The City currently proposes to complete all management and maintenance activities necessary for the restoration area. In coordinating with the permitting agencies and with the Muir Heritage Land Trust, the City will establish a long term financial assurance mechanism to ensure that the restoration work is completed as designed and to ensure, in perpetuity, adequate funding to provide management and maintenance of the restored area in the event that the City is unable or fails to complete necessary management activities. Funding mechanisms for the financial assurances may include the establishment of a landscape and lighting district (pursuant to the Landscape and Lighting Act of 1972), performance bonds, irrevocable trusts, escrow accounts, casualty insurance, letters of credit, etc. The financial assurance will be completed and executed prior to the initiation of construction for the Hercules ITC and will be a requirement for permit approval.

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Appendix A. Project Design

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Appendix B. Hercules Intermodal Transit Center Refugio Creek Restoration: Design Basis Report

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Appendix C. Hercules Intermodal Transit Center Refugio Creek Restoration: Draft Permit Set

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Appendix D. Sample Preserve Inspection Sheet

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