Appendix B
Habitat Restoration Plan

ESA

Final

LOMA ALTA SLOUGH WETLANDS ENHANCEMENT

Habitat Restoration Plan

Prepared for
City of Oceanside

January 2021

ESA

Final

LOMA ALTA SLOUGH WETLANDS ENHANCEMENT

Habitat Restoration Plan

Prepared for
City of Oceanside

January 2021

550 West C Street
Suite 750
San Diego, CA 92101
619.719.4200
esassoc.com

ESA

Bend	Orlando	San Jose
Camarillo	Pasadena	Santa Monica
Delray Beach	Petaluma	Sarasota
Destin	Portland	Seattle
Irvine	Sacramento	Tampa
Los Angeles	San Diego	
Oakland	San Francisco	

OUR COMMITMENT TO SUSTAINABILITY | ESA helps a variety of public and private sector clients plan and prepare for climate change and emerging regulations that limit GHG emissions. ESA is a registered assessor with the California Climate Action Registry, a Climate Leader, and founding reporter for the Climate Registry. ESA is also a corporate member of the U.S. Green Building Council and the Business Council on Climate Change (BC3). Internally, ESA has adopted a Sustainability Vision and Policy Statement and a plan to reduce waste and energy within our operations. This document was produced using recycled paper.

TABLE OF CONTENTS

Loma Alta Slough Wetlands Enhancement Habitat Restoration Plan

Page

List of Figures

List of Tables

LOMA ALTA SLOUGH WETLANDS ENHANCEMENT

Habitat Restoration Plan

1.0 Introduction

This Habitat Restoration Plan (HRP; Plan) has been prepared for the City of Oceanside's (City's) Loma Alta Slough Wetlands Enhancement Project (project) to provide the conceptual framework for wetland establishment (creation) and enhancement at the 5.8-acre Loma Alta Slough Wetlands Enhancement site. Wetland creation and enhancement resulting from approval and implementation of this Plan will be utilized to offset temporary and permanent impacts associated with the implementation of the enhancement project (i.e., self-mitigating project with a net increase in aquatic resource area). This Plan will also be used to comply with the California Environmental Quality Act (CEQA), U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), and California Coastal Commission (CCC) (and/or City of Oceanside) regulatory and permitting requirements to address and offset temporary and permanent impacts to jurisdictional wetland and non-wetland waters of the U.S. and State.

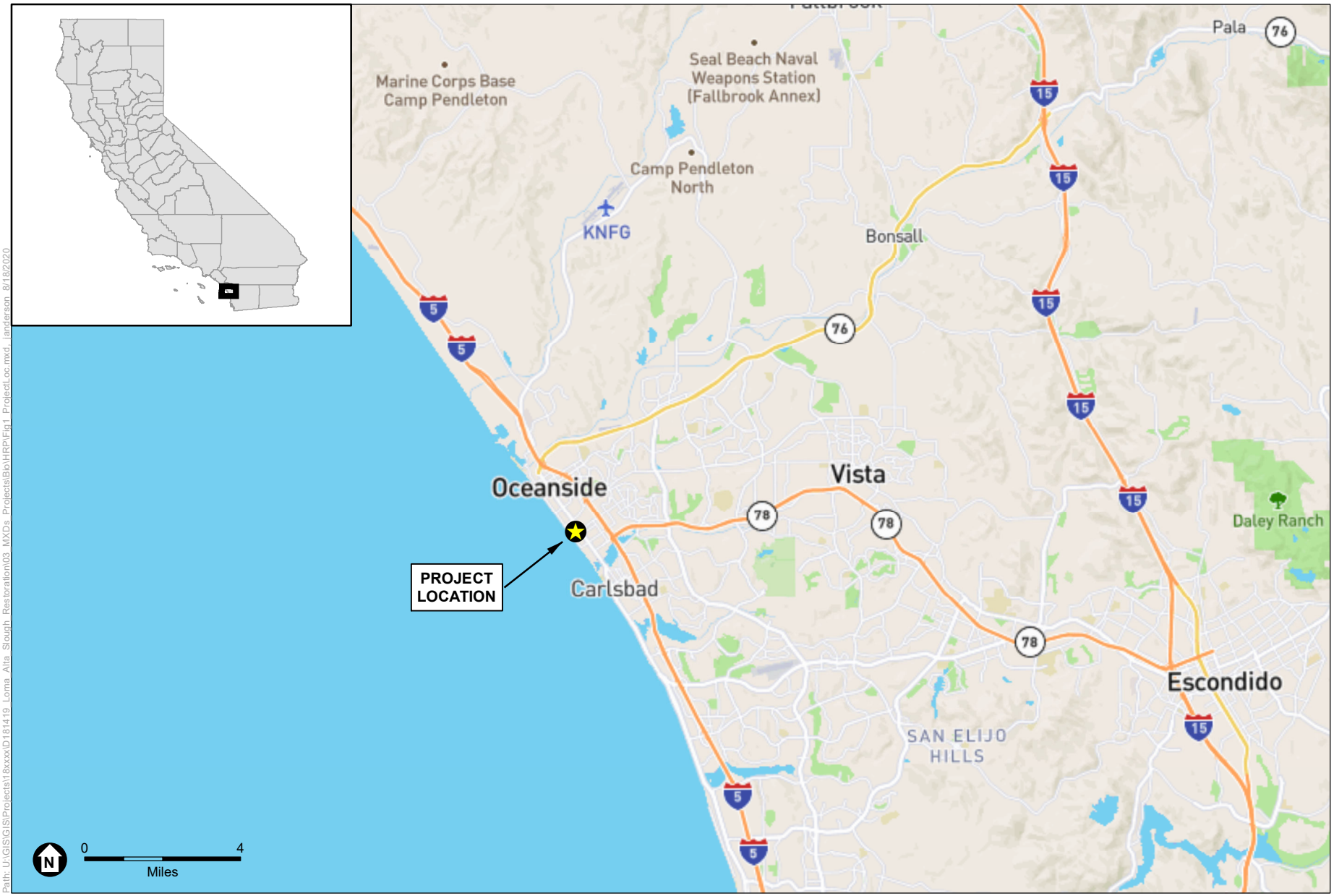
2.0 Restoration Site Description

2.1 Restoration Location

The Slough is a small coastal estuarine wetland located at the mouth of Loma Alta Creek in the City of Oceanside, San Diego County, California (**Figure 1)**. The project is located in Section 26, Township 11 South, Range 5 West of the Oceanside quadrangle U.S. Geological Survey (USGS) topographic map (**Figure 2**). The location of the site relative to the City's Draft Multiple Habitat Conservation Plan (MHCP) Subarea Plan (City of Oceanside 2010), California Coastal Zone, and City of Oceanside Coastal Zone Area Boundary is depicted in **Figure 3**. The survey area is bounded by South Pacific Street and Buccaneer Beach on the west side, South Coast Highway on the east side, Buccaneer Park and Paradise By the Sea RV Resort on the south side, and the La Salina Wastewater Treatment Plant and commercial property on the north side (**Figure 4**).

The study area is divided into four subareas for the purpose of this study (**Figure 5**):

- Existing northwest marsh area (along La Salina WWTP)
- Southwest Area (along Buccaneer Park)
- Northeast Area
- Southeast Area (triangular marsh)

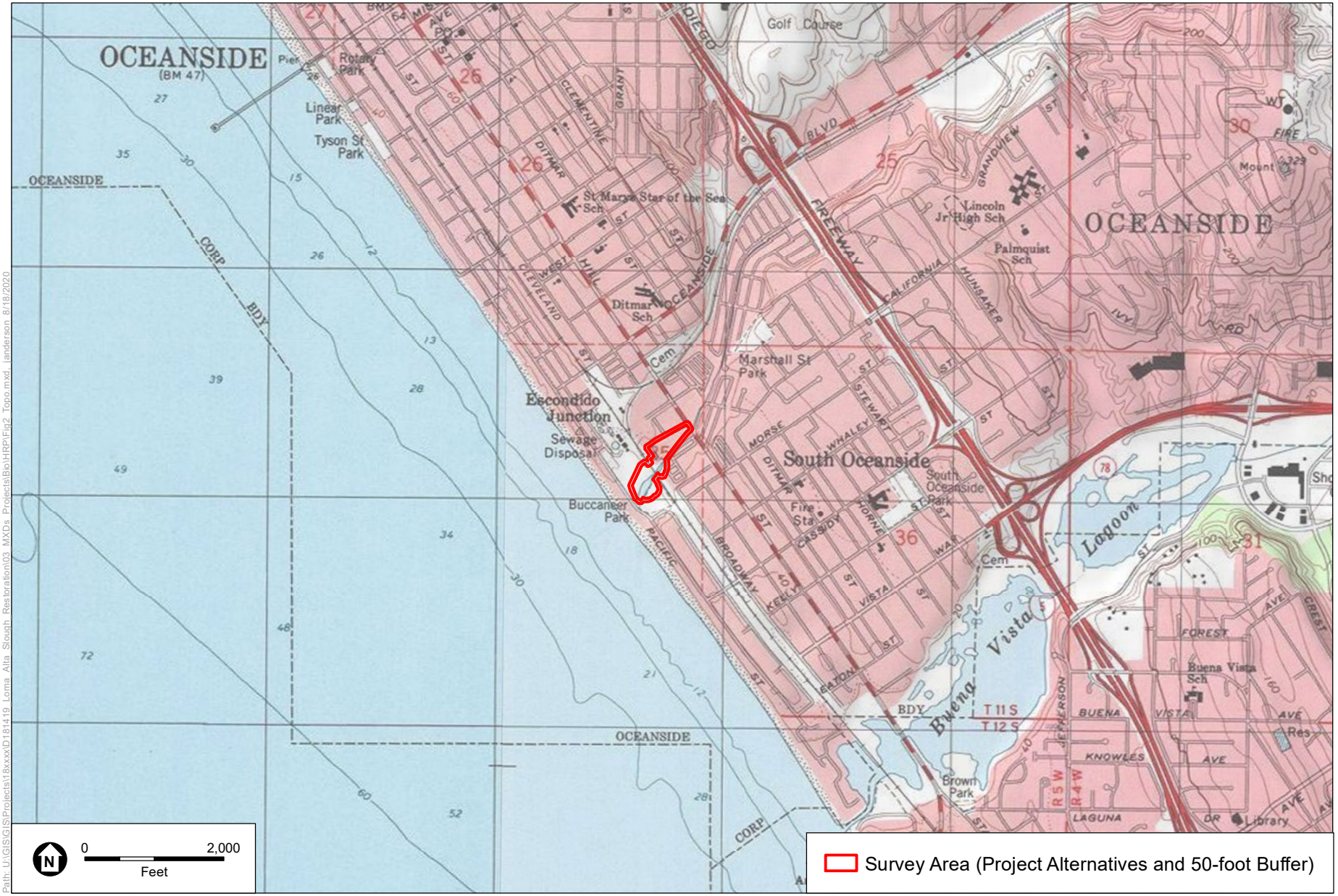


SOURCE: ESRI

Loma Alta Slough HRP

Figure 1
Regional Location

ESA



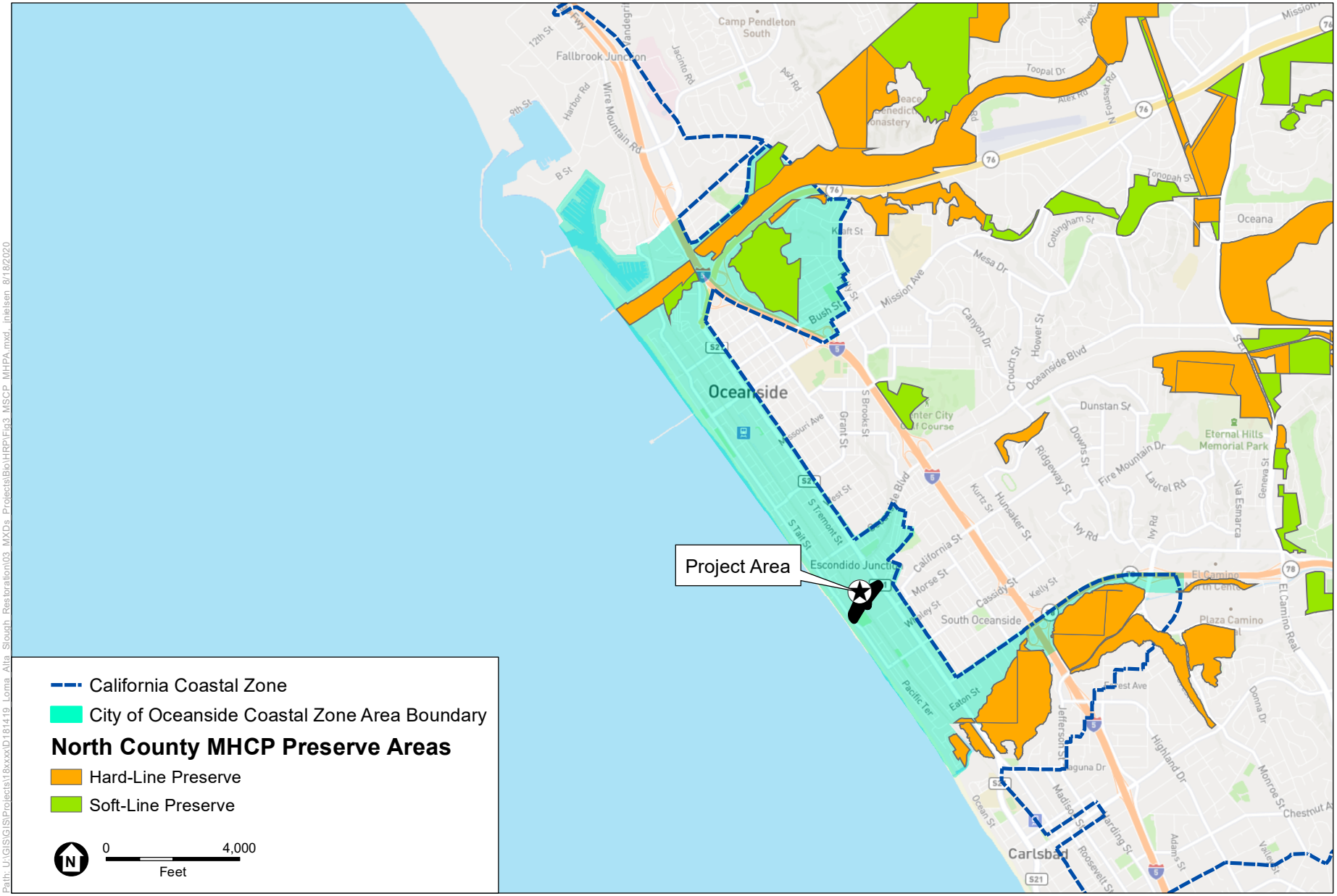
Path: U:\GIS\GIS\Projects\18xxxx\D181419_Loma_Alta_Slouth_Restoration\03_MXDs_Projects\Bio\HRP\Fig2_Topo.mxd_landerson_8/18/2020

USGS 7.5' Topo Quad San Luis Rey 1975, 1978; Oceanside 1975, 1978

Loma Alta Slough HRP

Figure 2
Topographic Map

ESA



SOURCE: Mapbox; City of Oceanside 2015; SanGIS 2019

Loma Alta Slough HRP

Figure 3
Project in Relation to MHCP Preserve Areas and Coastal Zones

ESA

SOURCE: Mapbox

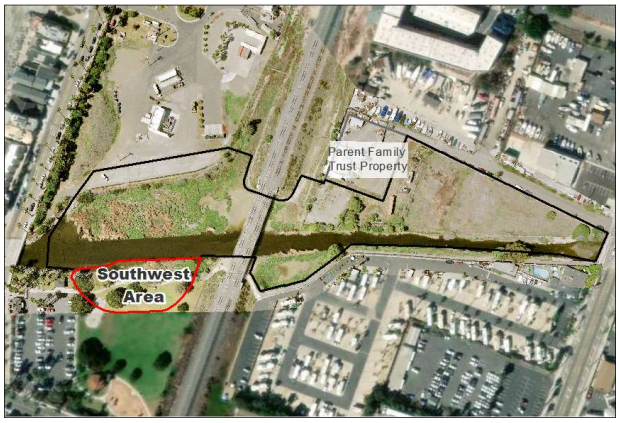
Loma Alta Slough HRP

Figure 4
Project Vicinity

ESA

Looking north (towards La Salina Wastewater Treatment Plant) from Buccaneer Park

Looking northeast from Buccaneer Park



Looking north from footpath

Looking west (towards triangular parcel) from footpath

Loma Alta Slough Wetland Enhancement Project

Figure 5

Loma Alta Slough Subareas

2.2 Historic Ecology

As long as 10,000 years prior to European colonization and the collapse of the local population, native peoples thrived along the southern California coastline. Though the regional environment changed significantly over that time, by 2,600 years ago, sea levels had stabilized and a vegetation mosaic inclusive of grassland communities, coastal sage, and chaparral, had been established and maintained. It provided native communities the opportunity to consume from aquatic, aerial, and terrestrial sources, and they took full advantage of the bounties that the ecosystem had to offer, especially those of coastal lagoons, sloughs, and estuaries (Byrd 2007). Additionally, native peoples thrived along the southern California coastline by using fire to maintain grasslands and increase yields of plants and animals harvested.

Over the past two hundred and twenty-five years, there have been significant changes to the Loma Alta Creek watershed. Based on the 1887 T-sheet, Loma Alta Slough used to be an approximately 44-acre lagoon, fed by an ephemeral drainage. The Southern California Wetlands Recovery Project's (WRP) 2018 Regional Strategy categorizes the historic Loma Alta Slough as a Large Lagoon archetype: a shallow basin created by a beach berm, with wide flat basins with extensive intermittently-flooded, unvegetated flats (WRP 2018). The Loma Alta Creek Valley was an approximately 0.15-mile-wide, low-gradient (<0.4 %), vegetated marsh, and wetland-upland transition zone habitat that extended 2 miles upstream to the confluence of an unnamed tributary (US Coast and Geodetic Survey 1887). The Slough and adjacent wetlands would have been composed of habitat suitable for a variety of fish species, crustaceans such as crab and crayfish, mollusks like clams and mussels, birds such as raptors, ducks, and geese, and amphibians such as frogs and salamanders.

On July 3, 1888, the City of Oceanside was incorporated within the Loma Alta watershed. As the City continued to grow, and regional agricultural practices altered the local ecosystem, more and more infrastructure was constructed to support the growing and expanding population. An electric plant was built in 1904 to provide electricity to downtown, a highway connecting Southern California to Oregon was constructed in 1913, and between 1948 and 1950 the La Salina WWTP was constructed adjacent to the Loma Alta Slough to treat sewage from downtown and areas along the coast. The WRP categorizes the current Loma Alta Slough as a Small Creek archetype: a small inlet with minimal subtidal habitat area, a small area of vegetated marsh at the inlet, and a generally steeper channel slope.

2.3 Existing Conditions and Environmental Setting

2.3.1 Infrastructure

Both the north and south sides of the creek are fully lined with rock riprap or concrete armoring within the study area. At the mouth, large rocks (2 to 4 feet in diameter) protect the development north and south of the Slough, including a lifeguard tower, all the way out to the ocean. On the northwest side of the lagoon, the channel is lined with riprap one rock thick and slightly below the elevation of the marsh and is usually submerged throughout the year. On the southwest side of the lagoon along Buccaneer Park, the riprap is more substantial, with a fully armored slope. There is an additional, thinner layer of riprap, similar to the riprap lining the marsh, creek-ward

of Buccaneer Park. Upstream, east of the railroad bridge, the channel is lined with either rock riprap or cement, although much of it is overgrown with vegetation and somewhat buried.

There are three bridges that cross Loma Alta Creek within the project reach: The Pacific Street bridge crosses over the mouth of the lagoon (owned by the City of Oceanside), the railroad bridge (owned by NCTD), which divides the lagoon into the west and east sides, and the S. Coast Highway bridge (owned by the City of Oceanside), which marks the upper end of the project. The Pacific Street bridge spans the width of the channel, although the mouth of the lagoon often closes under this bridge. The railroad bridge has four 13-foot-wide supporting piers within the lagoon. The S. Coast Highway bridge spans the width of the channel.

The La Salina WWTP is adjacent to the Slough, north of the existing marsh. The facility has had multiple upgrades over the years. An access ramp from the WWTP goes into the Slough at the northwest corner of the site, just upstream of the Pacific Street bridge. The access ramp is protected by riprap on either side. The WWTP is slated for decommissioning as soon as the new proposed Buccaneer Lift Station is active.

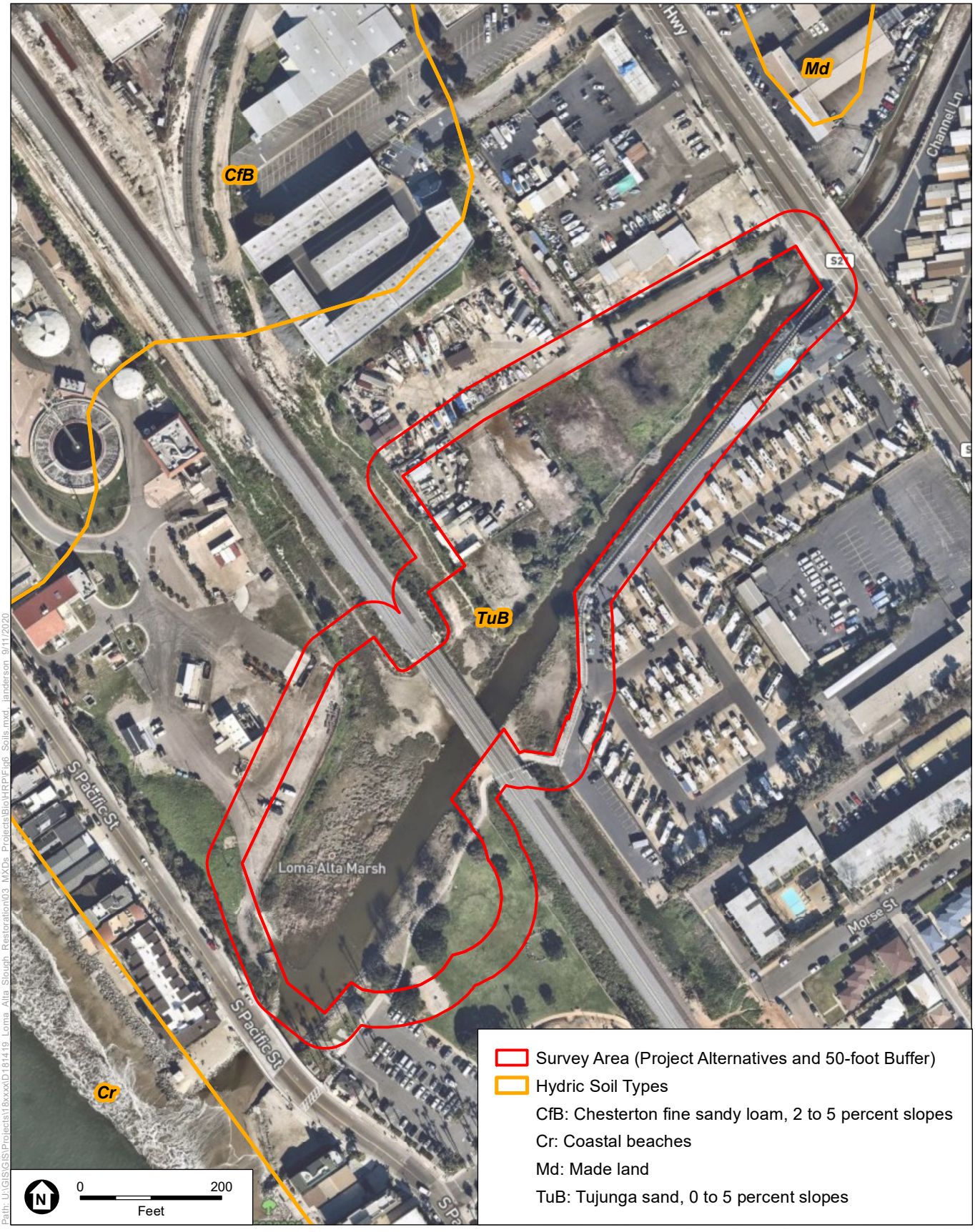
The City of Oceanside constructed a UV treatment system to reduce fecal indicator bacteria exceedances at the heavily used Buccaneer Beach. During the summer months when the sand berm blocks the Slough from tidal flows, the City operates the pumping system and UV treatment plant to collect and treat water within the Loma Alta Slough prior to discharge at the beach. This system collects water that accumulates in the Slough from urban non-storm flows through an inlet structure located at the western end of the Slough. Water is gravity-fed from this inlet to a wet well that pumps the Slough water to the treatment plant. The City operates the pumps and UV treatment plant on a daily basis during the dry season as freshwater from the watershed accumulates in the Slough and begins to fill it. The UV treatment plant is not active during the wet season as storm flows from the watershed often exceed the design treatment capacity of the plant.

2.3.2 Existing Habitat Mitigation

In 2009, habitat was restored on the west side of the railroad bridge north of the creek as mitigation for NCTD's Oceanside Passing Track Extension Project. Three distinct areas located in close proximity to one another were established to meet the required mitigation. The total area of the mitigations sites was 0.268 acres. The mitigation site is within the current project boundary, but not protected by a preservation mechanism (A. Monji (San Diego RWQCB), pers. comm., June 9, 2020).

2.3.3 Soils and Topography

Soils within the survey area are mapped entirely as Tujunga sand, 0 to 5 percent slopes (USDA NRCS 2020), as shown in **Figure 6**. This soil map unit typically occurs on floodplains, is somewhat excessively drained, and is not rated as a hydric soil. The typical depth to water table is more than 80 inches; however, this was not representative of the observed water table depth along Loma Alta Creek.



SOURCE: Mapbox 2018; Helix 2018; ESA 2019; SanGIS 2019

Loma Alta Slough HRP

Figure 6
Soils

ESA

Soils observed at aquatic resource delineation sample points included sandy soils as well as clays within the creek channel and possible fill soils at Buccaneer Park. Geotechnical borings conducted at the project site encountered areas of undocumented fill soils underlain by natural Quaternary alluvium deposits. The fill generally consisted of silty sands and clayey sands that were moist to saturated, medium dense, and fine to medium or fine to coarse grained. Some gravel and other miscellaneous debris (i.e. asphalt, brick, plastic, concrete, and wood) were also observed in the fill soils. Natural alluvial deposits were observed below the fill. In borings west of the railroad bridge, the alluvium consisted of combinations of saturated, medium dense, and predominantly fine grained silty sand, clayey sand, and sands. Natural alluvium encountered in the northeast area borings predominantly consisted of moist, firm, silty clay.

Environmental Science Associates (ESA) developed an existing conditions topographic and bathymetric surface to inform the hydrodynamic modeling and design of the restoration. The results are provided in the *Loma Alta Slough Enhancement Project, Topographic Survey Technical Memo* (ESA 2019a).

2.3.4 Hydrology

The Slough has intermittent connection to the Pacific Ocean as a result of natural mouth closing and opening—the mouth closes naturally from sand deposited by the ocean waves and currents in the spring and remains closed until storm flows breach the sand berm during the wet-weather season (September to April). Salinity data have shown seasonal density stratification of the water column in the Slough during periods of low creek flow. Dense saltwater from the ocean becomes overlain with brackish creek water during the summer months when the sand berm is closed. The City does not dredge Loma Alta Slough open. The City manages the height of the sand berm and Slough water levels to keep the Slough closed during the summer months. This prevents the flow of water with elevated bacteria levels from the Slough to the ocean to maintain higher water quality at Buccaneer Beach. The City manages Slough water levels during the summer months by intermittently pumping Slough water into the UV treatment plant. The estuary receives freshwater input from an approximately 6,300-acre watershed. When the lagoon is closed, standing water does not circulate and exchange with the ocean. Additional hydrology information in regard to tides, waves, stream flows, lagoon mouth dynamics, and coastal sediment transport are included in the project's *Feasibility Study* (ESA 2020a).

2.3.5 Vegetation Communities

Vegetation communities were mapped in 2018 by HELIX Environmental (HELIX) and revised in 2019 and 2020 by ESA (ESA 2020b). A 50-foot buffer was surveyed in addition to the project site, as defined during the Feasibility Study[1]. Vegetation communities and land cover types are based on Oberbauer et al. (2008), which are consistent with the classification system used in the North County Multiple Habitat Conservation Program (MHCP) and Draft Oceanside MHCP Subarea Plan (2010) with modified categories to indicate disturbed communities and floodplains. Vegetation communities and cover types in the survey area include coastal brackish marsh, southern coastal

[1] The Feasibility Study considered three alternatives with varying project extents. The biological survey mapped the maximum extent of the three alternatives.

salt marsh, saltpan/mudflats, open water – estuarine, disturbed habitat, and urban/developed land cover (**Table 1**; **Figure 7**). Each of these communities or land cover types is described below.

TABLE 1
VEGETATION COMMUNITIES AND LAND COVER TYPES WITHIN THE SURVEY AREA

Vegetation Community/Land Cover Type (Oberbauer et al. 2008)	MHCP Habitat Group[1]	Project Site (acres)	50-Foot Buffer (acres)
Riparian and Wetlands[2]			
Coastal Brackish Marsh	A	0.87	0.02
Southern Coastal Salt Marsh	A	0.49	0.06
Southern Coastal Salt Marsh - Disturbed	A	0.22	0.10
Saltpan/Mudflats	A	0.30	0.00
Open water - Estuarine	A	1.18	0.12
Disturbed Habitat (floodplain)	F	0.12	0.10
Urban/Developed (concrete/riprap channel)	N/A	0.11	0.10
Uplands			
Disturbed Habitat	F	1.64	0.45
Urban/Developed	N/A	1.51	2.94
Total Acres	N/A	6.44	3.88

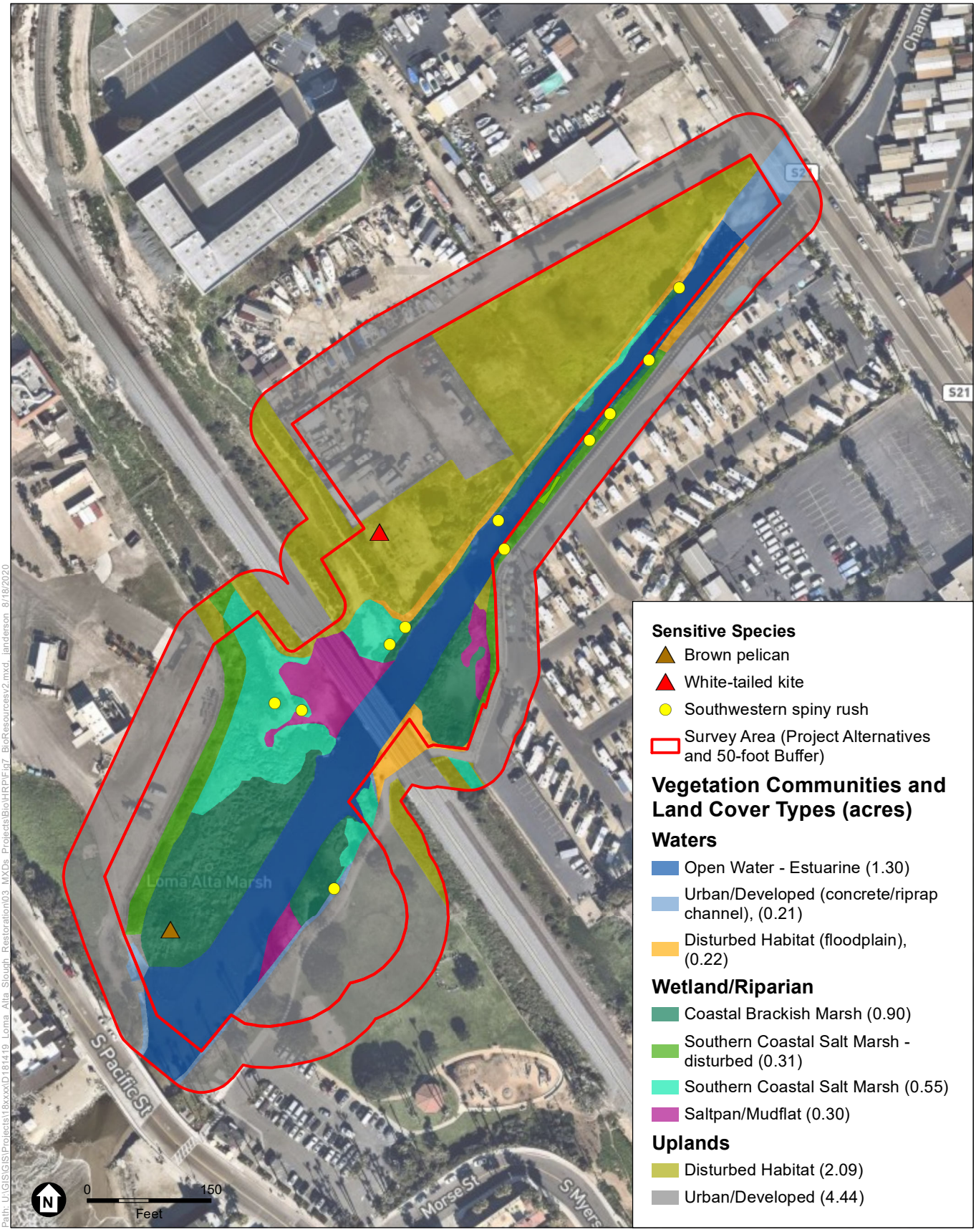
[1] MHCP Habitat Groups: Group A = coastal wetlands, including salt marsh and salt pan; riparian habitats, including oak riparian forest, riparian forest, riparian woodland and riparian scrub; vernal pools; freshwater marsh; open water; natural flood channel; disturbed wetlands; marine habitats; and eelgrass beds. Group B = rare uplands, including beach, southern coastal bluff scrub, maritime succulent scrub, southern maritime chaparral, Engelmann oak woodland, coast live oak woodland and native grassland. Group C = coastal sage scrub, including coastal sage scrub and coastal sage/chaparral mix. Group D = chaparral, excluding southern maritime chaparral. Group E = annual (non-native) grassland. Group F = Other, including disturbed land, agricultural land, and Eucalyptus.

[2] U.S. Fish and Wildlife Service definition of wetland.

The Draft Subarea Plan (2010) Plan defines habitats in six habitat groups based on sensitivity. Sensitive wetland communities are classified as Habitat Group A and sensitive upland communities are classified as Habitat Groups B through D. Within the survey area there are four Group A habitats (coastal brackish marsh, cismontane alkali marsh, cismontane alkali marsh – disturbed, and open water – estuarine), which are considered sensitive by the City's Draft Subarea Plan.

Coastal Brackish Marsh

Coastal brackish marsh is dominated by perennial, emergent herbaceous monocots up to approximately 6 feet tall. This vegetation community usually occurs at the interior edges of coastal bays and estuaries or in coastal lagoons. Brackish marshes receive both saltwater and freshwater input and often include species characteristic of both freshwater marsh and salt marsh habitats. Cover is often complete and dense. Within the survey area, this community is characterized by closed canopy stands of cattails (*Typha* sp.), bulrushes (*Schoenoplectus californicus*), and common reed (*Phragmites australis*).



SOURCE: Mapbox 2018; Helix 2018; ESA 2019

Loma Alta Slough HRP

Figure 7
Biological Resources

ESA

Southern Coastal Salt Marsh

Southern coastal salt marsh occurs along Loma Alta creek in areas with irregular tidal flooding, high salinity, and permanent saturation or high water table. Characteristic species in the survey area include salt grass (*Distichlis spicata*), pickleweed (*Salicornia pacifica*), marsh jaumea (*Jaumea carnosa*), and southwestern spiny rush (*Juncus acutus* ssp. *Leopoldii*). The disturbed areas of southern coastal salt marsh in the survey area contain non-native vegetation, including arundo (*Arundo donax*), Canary Island date palm (*Phoenix canariensis*), and ornamental mallow (*Malva* sp.), in addition to salt marsh species.

Saltpan/Mudflats

Saltpan/mudflats are coastal wetlands that form when mud is deposited by the tides or rivers and/or when saline waters pond and then evaporate, leaving a salt crust. They are commonly found in sheltered areas such as bays and estuaries. Within the survey area, small areas of saltpan/mudflat occur along Loma Alta Creek, mainly in the vicinity of the railroad bridge. These areas are generally unvegetated and are periodically exposed and inundated by the waters within the creek.

Open Water – Estuarine

Open water – estuarine consists of periodically and permanently inundated and open water portions of semi-enclosed coastal waters where tidal sea water is diluted by flowing freshwater. Salinity and depth varies dramatically (Oberbauer et al. 2008). Within the survey area, open water occurs within Loma Alta Creek, which consists of soft-bottom channel. The upstream segment of Loma Alta Creek that is concrete-lined is mapped as urban/developed (concrete/riprap channel).

Salinity data provided by the City of Oceanside indicates that this portion of Loma Alta Creek consists of a mix of freshwater and saltwater from periodic breaches of the creek to the Pacific Ocean primarily during storm events, resulting in brackish water.

Disturbed Habitat

Disturbed habitat consists of areas that have been physically altered by previous legal human activity and are no longer able to support a recognizable native or naturalized vegetation association. These areas retain a soil substrate, but are generally unvegetated or support only ruderal vegetation. Within the survey area, this cover type occurs on the north side of the channel within parcels owned by the City and associated with the water treatment plant, as well as privately owned parcels. Generally, these areas exhibited evidence of past grading and mulching, and were dominated by non-native forbs such as hottentot fig (*Carpobrotus edulis*), common iceplant (*Mesymbryanthemum crystallinum*), bristly ox-tongue (*Helminthotheca echioides*), and fennel (*Foeniculum vulgare*). Non-native trees were also scattered throughout the disturbed habitat, including Mexican fan palm (*Washingtonia robusta*) and gum tree (*Eucalyptus* sp.). Additional disturbed habitat occurs along the railroad bridge where shading from the bridge and human disturbance prevent the establishment of vegetation. These areas are within the Loma Alta Creek floodplain and are designated as disturbed habitat (floodplain).

Urban/Developed

Urban/developed areas have been physically altered to the point where native vegetation communities are no longer supported. This land cover type includes areas with permanent or semi-permanent structures, pavement or other hardscape, and landscaped areas that require irrigation (Oberbauer et al. 2008). Developed areas within the survey area include portions of the water treatment plant property, adjacent Buccaneer Park and recreational vehicle (RV) resort properties, developed lots, and paved roads. While Buccaneer Park includes some native tree species, such as California sycamore (*Platanus racemosa*), these areas are considered urban/developed because the trees were intentionally planted for ornamental purposes, and they are actively irrigated and maintained. Developed areas also include concrete/riprap lined sections of Loma Alta Creek.

2.3.6 Sensitive Plant and Animal Species

One special status plant species, southwestern spiny rush, was observed onsite as scattered individuals within the cismontane alkali marsh on the northern and southern edges of the channel (Figure 7). This species is not state or federally listed under the California or federal Endangered Species Acts; however, it has a California Rare Plant Rank of 4.2, designated by the California Native Plant Society (CNPS), which signifies that it is a species of limited distribution in California, but is not yet considered rare. No additional special-status plant species are anticipated to occur onsite. Two special-status wildlife species, white-tailed kite (Fully Protected animal under CDFW Fish and Game Code 3511) and brown pelican (Fully Protected animal under CDFW Fish and Game Code 3511 and proposed for coverage under the City's MHCP Subarea Plan) were observed onsite (see Figure 7). Additionally, Cooper's hawk has a high potential to occur onsite and California least tern has a moderate potential to occur onsite.

2.3.7 Aquatic Resources

Aquatic resources in the survey area include Loma Alta Slough and associated wetlands directly abutting or hydrologically connected to the slough. Federal and/or state wetland habitats include coastal brackish marsh, southern coastal salt marsh, and saltpan/mudflat. The results and a full description of aquatic resources is included in the *Loma Alta Slough Wetlands Enhancement Project Aquatic Resources Delineation Report* (ESA 2020c).

2.4 Existing Functions and Services

The Loma Alta Slough is a locally and regionally important natural resource that provides nesting and foraging habitat for marsh and shoreline birds. The Slough was historically, and continues to be, an intermittently opening estuary, similar to many coastal wetlands in California. Historically, Loma Alta Creek upstream of the Slough was an ephemeral stream that flowed only during the wet season. Watershed urbanization, decreased sediment yield, channel engineering, degraded water quality, and wetland fill have degraded the health of the Slough. The Slough's morphology has been altered because large areas have been filled to create developed areas. In addition to impacts associated with the physical loss of wetland area, water quality issues resulting from urbanization have been ongoing since the 1960s. The functions and services of the site will be improved by restoring (i.e., creating and enhancing) aquatic and upland habitats for native species, providing a buffer from flooding and sea-level rise, improving water quality in the Slough through natural wetland processes, and enhancing aesthetic, education and recreation values of the area.

3.0 Project Description

3.1 Project Purpose and Goals

The City of Oceanside has acquired grant funds from the State Coastal Conservancy to plan, design, and permit a Slough enhancement project. The purpose of the project is to improve and restore habitat (via wetland creation and enhancement) for native species; increase habitat resiliency to sea-level rise; improve water quality in the Slough; and enhance aesthetic, education, and recreation values of the area. The goals of the project are designed to be aligned with the Southern California Wetland Recovery Project's (WRP) 2018 Regional Strategy. The project focuses primarily on the Wetland Recovery Project's Goal #1, which is preserving and restoring resilient tidal wetlands and associated marine and terrestrial habitats, and Goal #3, which is supporting education and compatible access related to coastal wetlands and watersheds. Specifically, the goals for the project are to create a resilient coastal wetland habitat with associated marine and terrestrial habitats, restore ecological and physical processes at Loma Alta Slough to maximize ecosystem benefits and support a dynamic and self-sustaining ecosystem over the long-term, and restore the Slough in a manner that promotes research, education, and community engagement in ways compatible with the restored ecosystem.

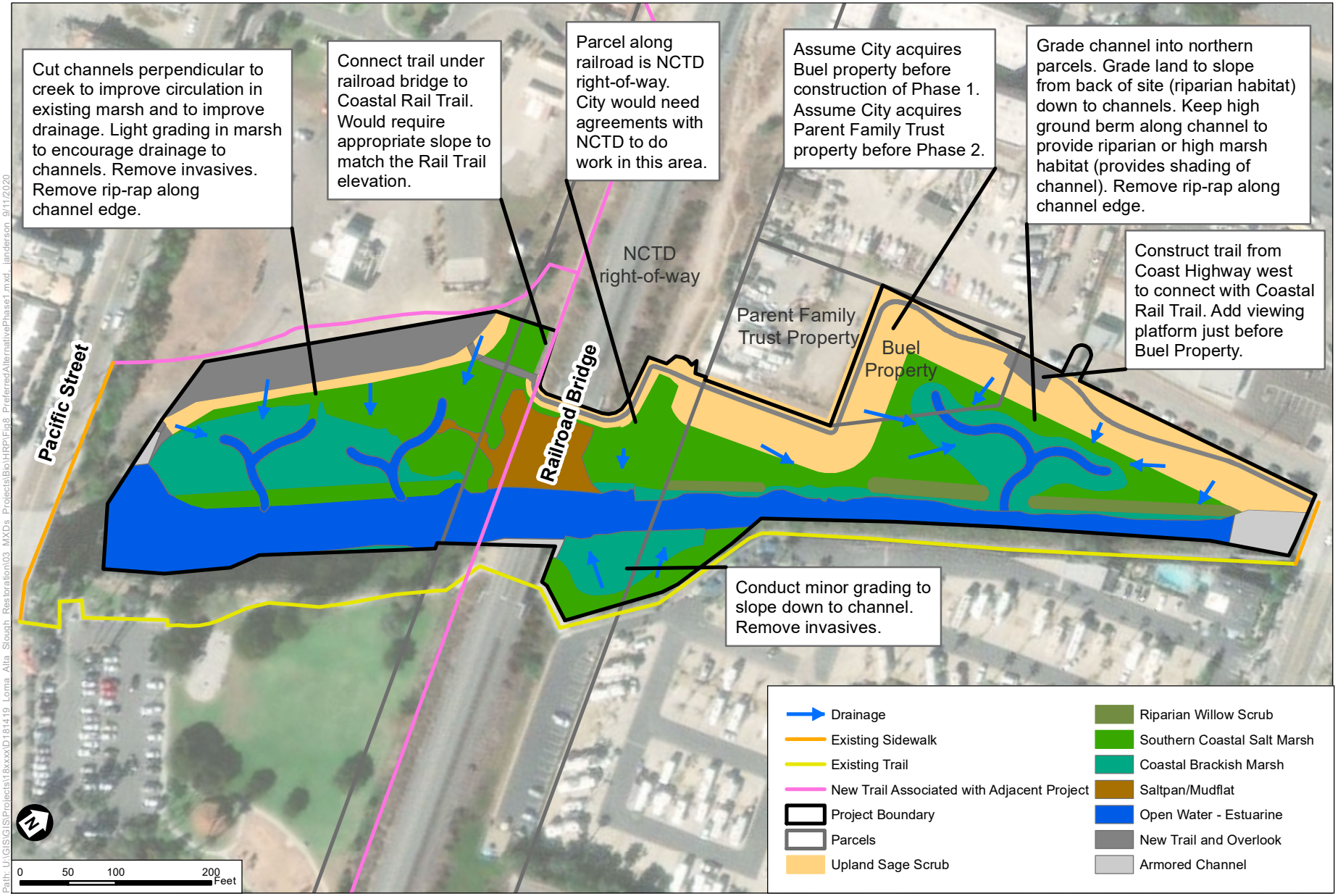
3.2 Development of Preferred Alternative

A Feasibility Study (ESA 2020a) was developed to analyze three potential project alternatives and to develop the resulting preferred alternative. The Preferred Alternative incorporated input from the public and the project's Technical Advisory Committee (TAC).

In Phase 1, the Preferred Alternative would excavate perpendicular tidal channels from the creek into the existing marsh in the northwest of the site to improve drainage (**Figure 8**). East of the railroad bridge and south of the creek, the triangular parcel adjacent to Paradise by the Sea RV Park would be graded to improve drainage to the creek. North of the creek, the site would be graded to marsh elevations with a 50-foot buffer separating the marsh from adjacent development. Perpendicular tidal channels would be excavated to encourage improved flushing of the new marsh. Rip-rap would be removed from some areas along the existing marsh in the northwest and along the proposed marsh in the northeast of the study area. Removal of the rip-rap would better connect the marsh to the creek and would enhance habitat while still preserving the stability of the system from erosion.

The Preferred Alternative would also construct a trail from South Coast Highway through the upland buffer in the northeast area and continue the trail west under the railroad bridge to connect to the Coastal Rail Trail via a boardwalk. The project would be constructed in phases based on the timing of City acquisition of parcels within the study area.

In Phase 2, assuming the City could acquire the Parent Family Trust Property, the property would be graded down to marsh elevations with a 50-foot buffer on the north of the site (**Figure 9**). The buffer area constructed in Phase 1 would be excavated down to marsh to increase the habitat connection between the properties. It is anticipated that the buffer feature would be easily modifiable with limited impacts to wetlands during construction of Phase 2 and an overall increase in wetland habitat.



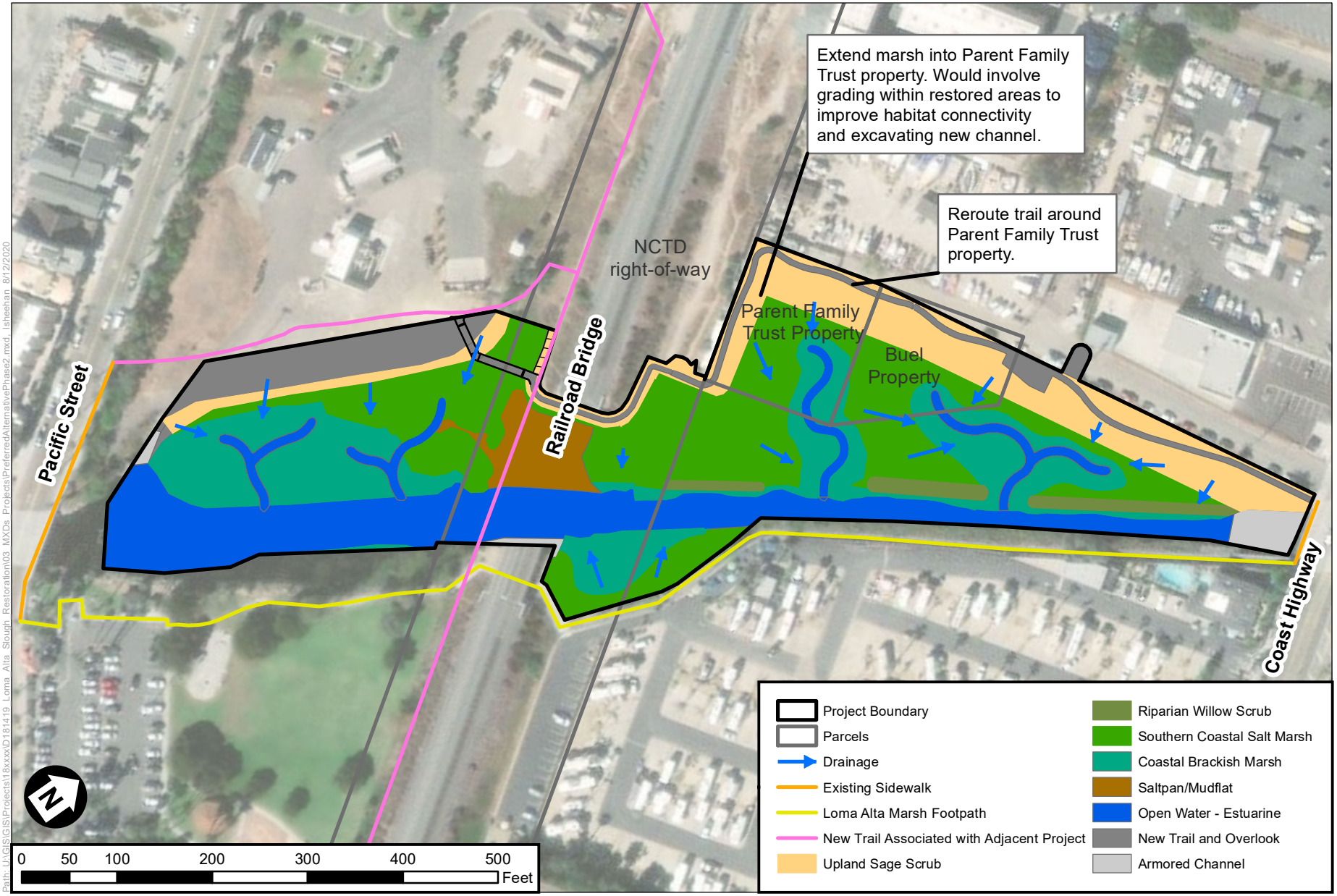
NOTE: Trail layout is approximate and final design will refine this within the buffer zone.

Loma Alta Slough Wetland Enhancement Project

Figure 8

Preferred Alternative, Phase 1

ESA



NOTE: Trail layout is approximate and final design will refine this within the buffer zone.

Loma Alta Slough Wetland Enhancement Project

Figure 9

Preferred Alternative, Phase 2

ESA

3.3 Habitat Restoration by Jurisdiction

To determine proposed jurisdictional (aquatic) resource habitat restoration (i.e., creation and enhancement) and impacts by jurisdiction, a jurisdictional field delineation was conducted by HELIX on March 8, 2018 and ESA biologists on July 1, 2019 and January 10, 2020. Aquatic features in the project site include Loma Alta Slough/Creek and associated wetlands directly abutting or with direct hydrological connection to the Slough. Jurisdictional waters, wetlands, and special aquatic sites within the project site include waters of the U.S. and State subject to the regulatory jurisdiction of the USACE pursuant to Section 404 of the federal Clean Water Act (CWA), the RWQCB pursuant to Section 401 of the CWA, streambed, banks, and associated riparian and wetland vegetation subject to the regulatory jurisdiction of the CDFW pursuant to Section 1600 of the California Fish and Game Code (CFGC), and all CDFW resources are also within the Coastal Zone and are subject to regulation by the CCC and/or the City of Oceanside, pursuant to the Local Coastal Program (LCP).

Potential impacted jurisdictional resources identified in the project site are summarized in **Tables 2 through 4**. Proposed upland habitats impacted and planned restoration acres are summarized in **Table 5**. The regulatory framework, methodology, and wetland determination datasheets for the jurisdictional field delineation are included in the *Loma Alta Slough Wetlands Enhancement Project Aquatic Resources Delineation Report* (ESA 2020c). USACE wetlands and non-wetland waters of the U.S. jurisdiction is depicted in **Figure 10.** RWQCB jurisdiction (under the CWA) is depicted in **Figure 11** and CDFW FGC Section 1600 jurisdiction and CCC and/or the City of Oceanside regulation, pursuant to the LCP is depicted in **Figure 12**. A summary of the resources is described by jurisdictional extent in the sections below.

Note, wetland creation (net increase in aquatic acreage) will be accomplished by excavation of disturbed infill and grading to convert upland habitat to wetlands, including establishment of native wetland vegetation via planting, natural recruitment, and maintenance. Wetland enhancement (improvement of the function of existing wetland) will be accomplished by removal of non-native plant species in existing wetland habitat and channel excavation, which will improve site hydrology and the health of existing habitats. New channels proposed for the existing marsh in the northwest area will be strategically placed to maximize drainage and habitat benefit through regular ebb and flow of the Slough waters into the back marsh area. This feature will aid in reducing stagnation of the back marsh in the summer months that contributes to poor water quality and vector concerns from mosquito breeding. The enhancement of the existing marsh in the northwest area and the creation of marsh in the northeast area is expected to enhance Loma Alta Creek by providing additional water quality filtration through the new marsh connected to the creek.

TABLE 2
USACE JURISDICTIONAL IMPACTS AND HABITAT RESTORATION ACREAGES

Habitat Type	Phase 1 Jurisdictional Impacts (acres)			Phase 2Jurisdictional Impacts (acres)			Phase 1 Restoration (acres)		Phase 2 Restoration (acres)		Total Created (acres)[2]	Total Enhanced (acres)[3]	Net Difference (acres)[4]
	Temporarily Impacted	Permanently Impacted	Impacted Subtotal[1]	Temporarily Impacted	Permanently Impacted	Impacted Subtotal[1]	Created	Enhanced	Created	Enhanced			
Wetland Waters of the U.S.													
Southern Coastal Salt Marsh	0.08	0.08	0.16	0.14	–	0.14	0.77	0.50	0.55	–	1.32	0.50	+1.24
Coastal Brackish Marsh	0.43	–	0.43	0.01	–	0.01	0.51	0.39	0.18	–	0.69	0.39	+0.69
Non-Wetland Waters of the U.S.													
Saltpan/Mudflats	0.06	–	0.06	–	–	–	–	0.20	–	–	–	0.20	–
Open Water – Estuarine	0.25	–	0.25	–	–	–	0.15	1.10	0.05	–	0.20	1.10	+0.20
Disturbed Habitat (floodplain)	0.11	–	0.11	–	–	–	–	–	–	–	–	–	–
Developed – Concrete/Riprap Channel	–	–	–	–	–	–	–	–	–	–	–	–	–
Total	**0.93**	**0.08**	**1.01**	**0.15**	**–**	**0.15**	**1.43**	**2.19**	**0.78**	**–**	**2.21**	**2.19**	**+2.13**

NOTES:
1 Impacted Subtotal acres is the summation of Temporarily Impacted acres and Permanently Impacted acres.
2 Total Created acres is the summation of Phase 1 Created Restoration acres and Phase 2 Created Restoration acres.
3 Total Enhanced acres is the summation of Phase 1 Enhanced Restoration acres and Phase 2 Enhanced Restoration acres.
4 Net Difference acres is the difference between the Total Created Restoration acres and the Permanent Impacted acres from Phase 1 and Phase 2.

TABLE 3
RWQCB JURISDICTIONAL IMPACTS AND HABITAT RESTORATION ACREAGES

Habitat Type	Phase 1 Jurisdictional Impacts (acres)			Phase 2 Jurisdictional Impacts (acres)			Phase 1 Restoration (acres)		Phase 2 Restoration (acres)		Total Created (acres)[2]	Total Enhanced (acres)[3]	Net Difference (acres)[4]
	Temporarily Impacted	Permanently Impacted	Impacted Subtotal[1]	Temporarily Impacted	Permanently Impacted	Impacted Subtotal[1]	Created	Enhanced	Created	Enhanced			
Wetland Waters of the State													
Southern Coastal Salt Marsh	0.08	0.08	0.16	0.14	–	0.14	0.77	0.50	0.55	–	1.32	0.50	+1.24
Coastal Brackish Marsh	0.43	–	0.43	0.01	–	0.01	0.51	0.39	0.18	–	0.69	0.39	+0.69
Saltpan/Mudflats	0.06	–	0.06	–	–	–	–	0.20	–	–	–	0.20	–
Non-Wetland Waters of the State													
Open Water – Estuarine	0.25	–	0.25	–	–	–	0.15	1.10	0.05	–	0.20	1.10	+0.20
Disturbed Habitat (floodplain)	0.11	–	0.11	–	–	–	–	–	–	–	–	–	–
Developed – Concrete/Riprap Channel	–	–	–	–	–	–	–	–	–	–	–	–	–
Total	**0.93**	**0.08**	**1.01**	**0.15**	**–**	**0.15**	**1.43**	**2.19**	**0.78**	**–**	**2.21**	**2.19**	**+2.13**

NOTES:
1 Impacted Subtotal acres is the summation of Temporarily Impacted acres and Permanently Impacted acres.
2 Total Created acres is the summation of Phase 1 Created Restoration acres and Phase 2 Created Restoration acres.
3 Total Enhanced acres is the summation of Phase 1 Enhanced Restoration acres and Phase 2 Enhanced Restoration acres.
4 Net Difference acres is the difference between the Total Created Restoration acres and the Permanent Impacted acres from Phase 1 and Phase 2.

TABLE 4
CDFW/CCC JURISDICTIONAL IMPACTS AND HABITAT RESTORATION ACREAGES

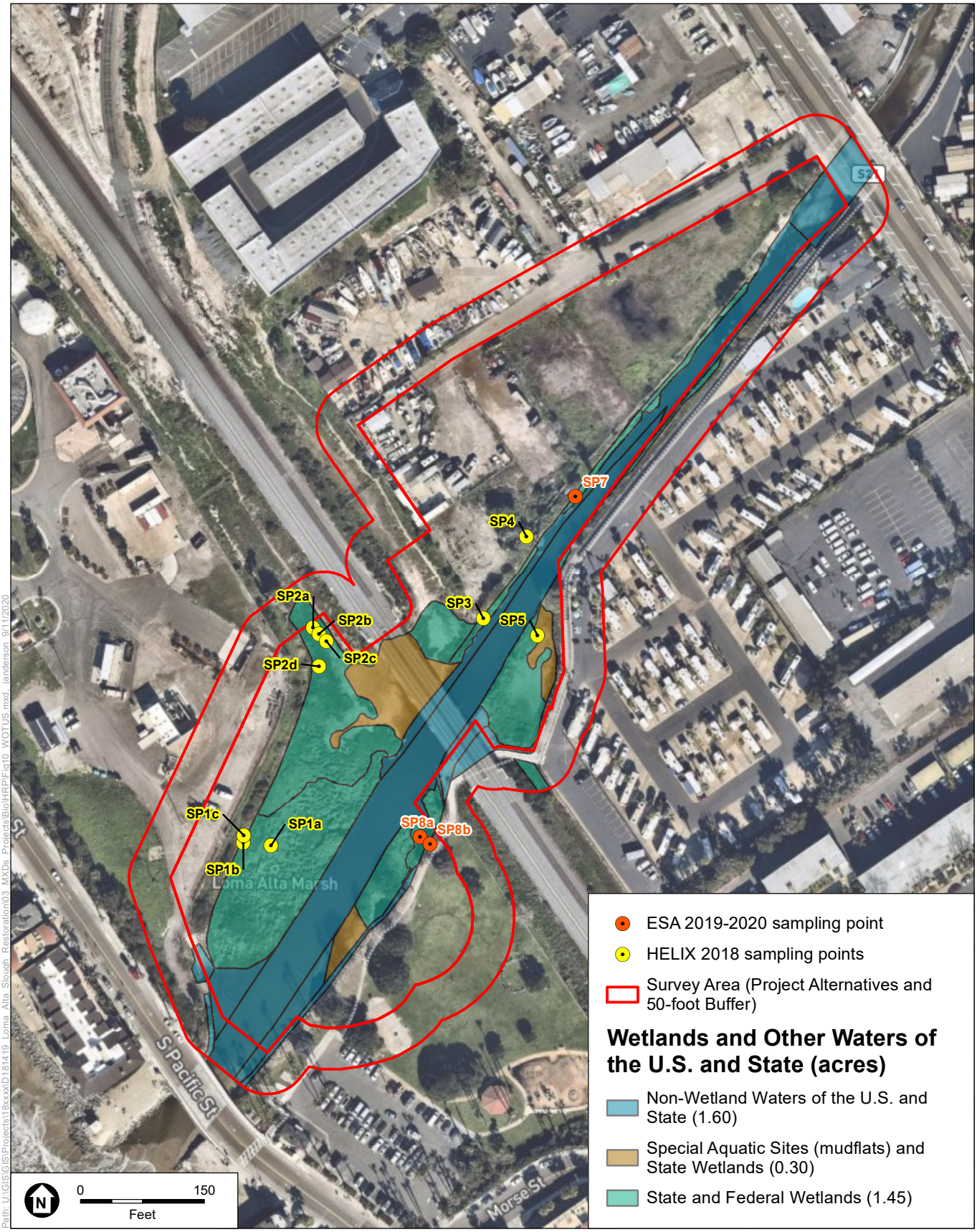
Habitat Type	Phase 1 Jurisdictional Impacts (acres)			Phase 2 Jurisdictional Impacts (acres)			Phase 1 Restoration (acres)		Phase 2 Restoration (acres)		Total Created (acres)[2]	Total Enhanced (acres)[3]	Net Difference (acres)[4]
	Temporarily Impacted	Permanently Impacted	Impacted Subtotal[1]	Temporarily Impacted	Permanently Impacted	Impacted Subtotal[1]	Created	Enhanced	Created	Enhanced			
CDFW Streambed/Riparian and CCC Wetlands/Waters													
Southern Coastal Salt Marsh	0.08	0.08	0.16	0.14	–	0.14	0.77	0.50	0.55	–	1.32	0.50	+1.24
Coastal Brackish Marsh	0.43	–	0.43	0.01	–	0.01	0.51	0.39	0.18	–	0.69	0.39	+0.69
Saltpan/Mudflats	0.06	–	0.06	–	–	–	–	0.20	–	–	–	0.20	–
Open Water – Estuarine	0.25	–	0.25	–	–	–	0.15	1.10	0.05	–	0.20	1.10	+0.20
Disturbed Habitat (floodplain)	0.11	–	0.11	–	–	–	–	–	–	–	–	–	–
Developed – Concrete/Riprap Channel	–	–	–	–	–	–	–	–	–	–	–	–	–
Southern Coastal Salt Marsh – disturbed	0.18	0.03	0.21	–	–	–	–	–	–	–	–	–	-0.03
Riparian Willow Scrub	–	–	–	0.03	–	–	0.13	–	–	–	0.13	–	+0.09
Total	**1.11**	**0.11**	**1.22**	**0.18**	**–**	**0.15**	**1.56**	**2.19**	**0.78**	**–**	**2.34**	**2.19**	**+2.19**

NOTES:
1 Impacted Subtotal acres is the summation of Temporarily Impacted acres and Permanently Impacted acres.
2 Total Created acres is the summation of Phase 1 Created Restoration acres and Phase 2 Created Restoration acres.
3 Total Enhanced acres is the summation of Phase 1 Enhanced Restoration acres and Phase 2 Enhanced Restoration acres.
4 Net Difference acres is the difference between the Total Created Restoration acres and the Permanent Impacted acres from Phase 1 and Phase 2.

TABLE 5
UPLAND HABITAT IMPACTS AND HABITAT RESTORATION ACREAGES

Upland Habitat Type	Phase 1 Jurisdictional Impacts (acres)			Phase 2 Jurisdictional Impacts (acres)			Phase 1 Restoration (acres)		Phase 2 Restoration (acres)		Total Created (acres)[2]	Total Enhanced (acres)[3]	Net Difference (acres)[4]
	Temporarily Impacted	Permanently Impacted	Impacted Subtotal[1]	Temporarily Impacted	Permanently Impacted	Impacted Subtotal[1]	Created	Enhanced	Created	Enhanced			
Upland Sage Scrub	–	–	–	0.37	–	0.37	0.85	0.10	0.24	–	1.09	0.10	+1.09
Disturbed Upland	1.61	–	1.61	0.02	–	0.02	–	–	–	–	–	–	–
Urban/Developed	0.55	0.01	0.56	0.49	–	0.54	–	–	0.05	–	0.05	–	+0.04
Total	**2.16**	**0.01**	**2.17**	**0.88**	**–**	**0.93**	**0.85**	**0.10**	**0.29**	**–**	**1.14**	**0.10**	**+1.13**

NOTES:
1 Impacted Subtotal acres is the summation of Temporarily Impacted acres and Permanently Impacted acres.
2 Total Created acres is the summation of Phase 1 Created Restoration acres and Phase 2 Created Restoration acres.
3 Total Enhanced acres is the summation of Phase 1 Enhanced Restoration acres and Phase 2 Enhanced Restoration acres.
4 Net Difference acres is the difference between the Total Created Restoration acres and the Permanent Impacted acres from Phase 1 and Phase 2.

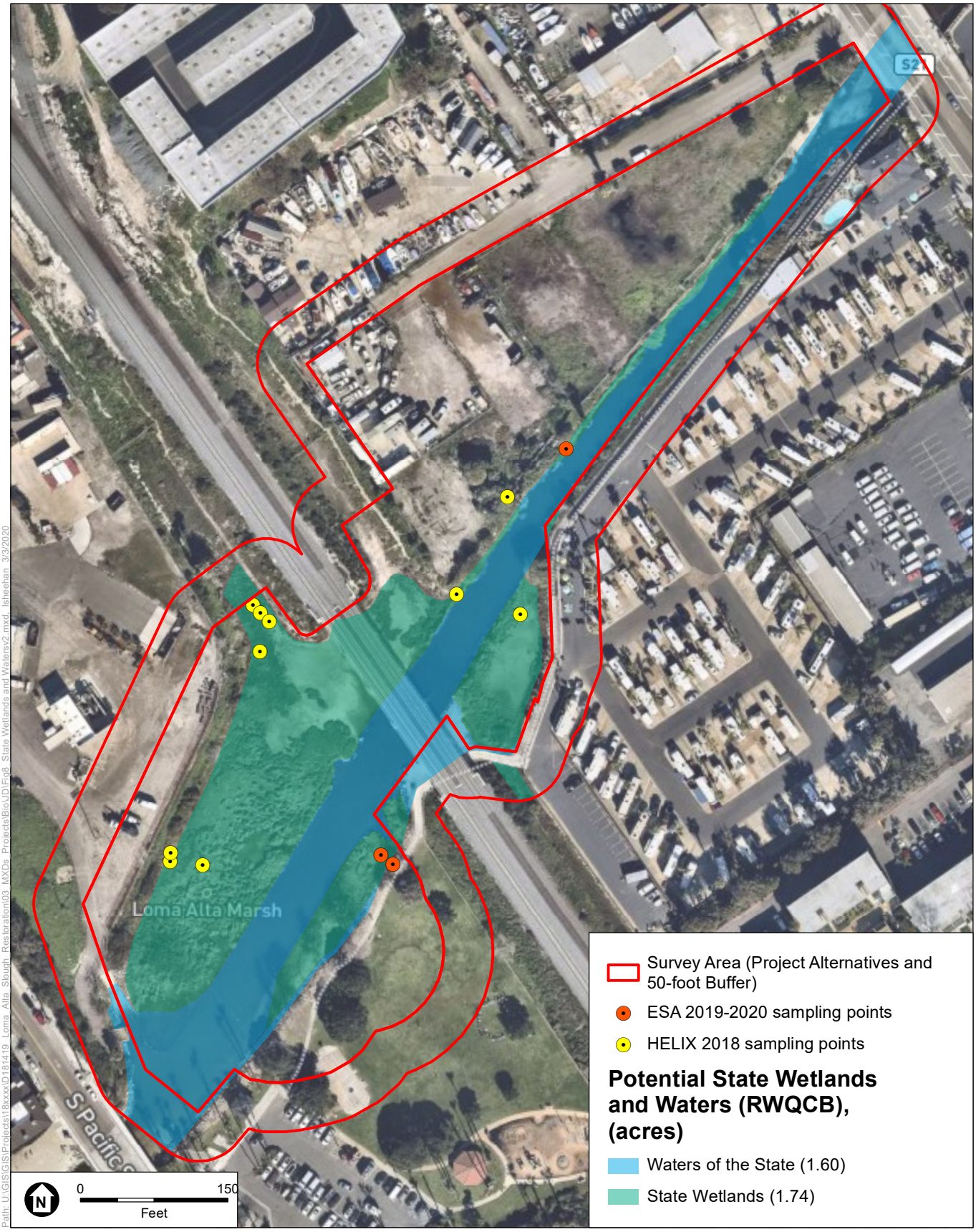


SOURCE: Mapbox 2018; Helix 2018; ESA 2020

Loma Alta Slough HRP

Figure 10
Wetlands and Other Waters of the U.S.

ESA

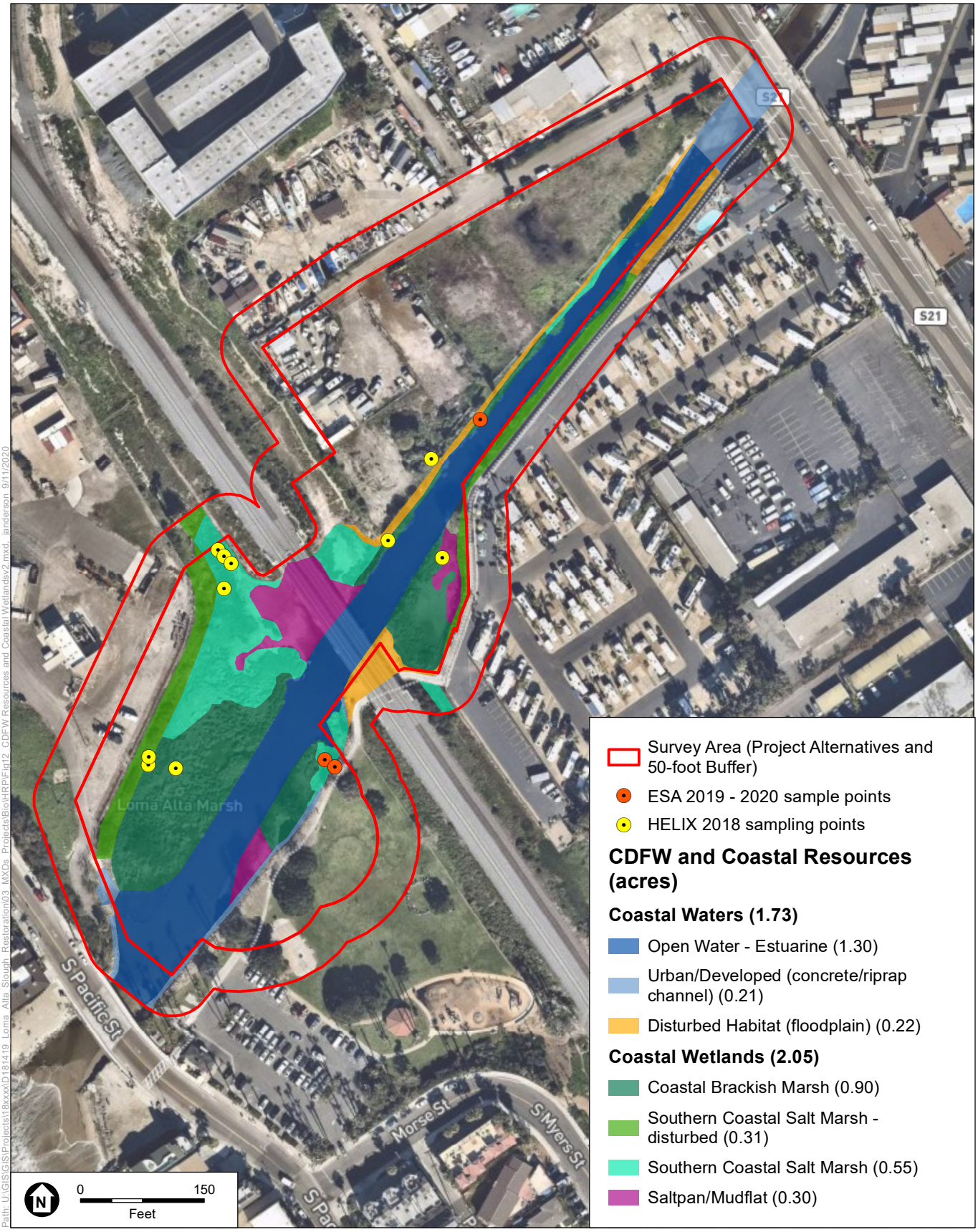


SOURCE: Mapbox 2018; Helix 2018; ESA 2020

Loma Alta Slough Wetlands Enhancement Project

Figure 11
State Wetlands and Waters (RWQCB)

ESA



SOURCE: Mapbox 2018; Helix 2018; ESA 2020

Loma Alta Slough HRP

Figure 12
CDFW Resources and Coastal Wetlands

ESA

3.3.1 Waters and Wetlands of the U.S.

USACE jurisdiction within the survey area totals 2.98 acres, including 1.32 acres of non-wetland waters, 0.30 acres of special aquatic sites, and 1.36 acres of wetlands. Wetland features include emergent intertidal estuarine wetlands directly abutting Loma Alta Creek, a relatively permanent water. Non-wetland waters include Loma Alta Creek, a relatively permanent water that flows directly into the Pacific Ocean, which is a Traditionally Navigable Water (TNW). Other special aquatic sites include intertidal estuarine mudflats associated with Loma Alta Creek.

3.3.2 State Wetlands and Waters

State wetlands and waters jurisdiction within the survey area totals 2.98 acres, including 1.66 acres of State wetlands and 1.32 acres of Waters of the State. All areas mapped as USACE-jurisdictional areas fall within the CWA Section 401 authority of the RWQCB. Waters of the state subject to RWQCB jurisdiction only under Porter-Cologne do not occur within the survey area. State wetlands include those mapped as USACE-wetlands as well as mudflat areas. Mudflats within the survey area are considered special aquatic sites that are considered waters of the U.S., but are also considered state wetlands in accordance with the new State Wetland Procedures, which are anticipated to be in effect at the time of project permitting and implementation.

3.3.3 CDFW and Coastal Wetlands

A total of 3.29 acres of CDFW and CCC resources occur within the survey area. Areas that are subject to notification requirements to CDFW, in accordance with FGC Section 1600 et seq., include streambeds, banks, and associated riparian and wetland vegetation. All areas under potential USACE jurisdiction were also determined to be under the jurisdiction of the CDFW, and all areas mapped as CDFW resources are also within the Coastal Zone and are subject to regulation by the CCC and/or the City of Oceanside, pursuant to the LCP.

3.3.4 Jurisdictional Resource Impacts

Temporary and permanent jurisdictional impacts from the project will be mitigated by the proposed habitat restoration (i.e., creation and enhancement) described in this Plan. Tables 2–4 present the impacts compared to the created and enhanced acreages.

3.4 Sensitive Species Impacts

Potential project impacts to sensitive vegetation communities under the City's Draft Multiple MHCP Subarea Plan (City of Oceanside 2010) include temporary impacts to coastal brackish marsh, southern coastal salt marsh, and mudflat, and minor permanent impacts to southern coastal salt marsh. The following subsets of these communities are considered to be sensitive natural communities by CDFW: coastal brackish marsh areas dominated by bulrush (*Schoenoplectus* sp.) (but not cattails [*Typha* sp.]) and southern coastal saltmarsh areas where pickleweed (*Salicornia pacifica*) or marsh jaumaea (*Jaumea carnosa*) are co-dominant with saltgrass (*Distichlis spicata*) (but not where saltgrass is the only dominant). Temporary impacts to sensitive habitat would occur as part of grading activities to implement the proposed wetland creation and enhancement.

Permanent impacts to 0.11 acres of southern coastal salt marsh would occur to construct the boardwalk connecting the trail from under the railroad bridge to the Coastal Rail Trail. However, 1.32 acres and 0.5 acres of southern coastal salt marsh will be created and restored, respectively, upon completion of restoration.

The project would result in direct impacts to one special-status plant species within the project site: southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*; California Rare Plant Rank 4.2). However, the loss of these plants would be less than significant because adequate habitat for this species within the region is conserved by the MHCP and project impacts are not expected to substantially reduce the viability of this species. No mitigation is required.

The project is not anticipated to result in direct or indirect impacts to nesting white-tailed kite (*Elanus leucurus*), brown pelican (*Pelecanus occidentalis*), or California least tern (*Sternula antillarum browni*) due to lack of suitable nesting habitat within or adjacent to the project site. However, direct impacts to migratory and nesting birds, such as Cooper's hawk (*Accipiter cooperii*), could result from the accidental destruction of nests through removal of vegetated habitats within the survey area, if construction were to occur during the general bird breeding season (January 15 through September 15). Direct impacts to migratory and nesting birds, including Cooper's hawk, would be considered significant. However, impacts to migratory and nesting birds can be avoided by completing project construction activities outside of the bird nesting season. The project site has the potential to support tidewater goby (*Eucyclogobius newberryi*) and light-footed Ridgway's rail (*Rallus longirostris levipes*). Additional surveys or habitat assessments may be required to quantify potential impacts to these species to comply with permitting requirements.

3.5 Future Conditions and Sea-Level Rise

The City is planning multiple projects in the vicinity of Loma Alta Slough that are expected to change conditions of the area in the future. This includes the La Salina Wastewater Treatment Plant Decommissioning and Buccaneer Lift Station, proposed improvements to Buccaneer Park, Loma Alta Creek Flood Control Detention Basins, and the Coastal Rail Trail Extension. Additional information regarding these projects is included in the project's *Feasibility Study* (ESA 2020a).

The City developed a set of sea-level rise scenarios based on the state guidance in the City of Oceanside's Coastal Hazard Vulnerability Assessment (ESA 2019b). **Table 6** presents the scenario date ranges and corresponding amounts of sea-level rise.

TABLE 6
OCEANSIDE SEA-LEVEL RISE SCENARIOS

		Potential Amount of Sea-Level Rise	
Scenario	**Date Range**	**(feet)**	**(meters)**
Existing Conditions	Now	0	0
Short Term	2025–2045	0.8	0.25
Mid Term	2040–2070	1.6	0.5
Long Term	2070–2100	3.3	1
Longer Term	2100–2140	5.7	1.75

Sea-level rise modeling completed as part of the project's *Hydrologic and Hydraulic Study* (ESA 2020d) suggests there is an overall trend toward the mouth of the lagoon closing more frequently with increased sea-level rise. Water levels in the estuary are expected to increase at the same or similar rate as the rate of sea-level rise. This is because the elevation of the beach berm at the creek mouth inlet is controlled by wave processes, which transport/deposit sand and build the beach berm to an elevation near or above the high tide level. In response to sea-level rise, the beach is expected to erode and move back, but the beach and inlet berm will also move up in elevation with adequate sand supply (i.e., the beach would grow vertically to keep pace with sea-level rise). The increase in elevation of the beach berm is expected to increase water levels in the Slough under both typical and fluvial storm discharge conditions.

With low amounts of sea-level rise, the habitat dynamics in the lagoon are expected to function similarly to under existing conditions. With sea-level rise, the mouth of the lagoon is expected to be closed slightly more often than under existing conditions. This could lead to more brackish and freshwater species establishing, since less salt water would be entering the lagoon. Water levels in the Slough would also increase, in proportion to the increase in the beach berm at the mouth of the lagoon. This could result in "drowning" of some of the vegetation at lower elevations and establishment of vegetation higher up the slopes, as the marsh migrates upward. However, this assumes that there would be sufficient sand to build the beach berm, and if no action is taken and the beach in front of the Slough erodes, water levels could be lower in the Slough. The restored estuary is expected to be a dynamic ecosystem that may change over time in response to infrequent extreme creek flow events, similar to how the historic estuary ecosystem may have functioned. Future climate change and potential increases in extreme wet-weather, drought, temperature, and wildfire could potentially increase the frequency and magnitude of changes or "natural" disturbances to the restored estuary ecosystem.

4.0 Project Responsibility

4.1 Financial Responsibility

The State Coastal Conservancy has provided grant funding to support the development of this Plan. The City will be responsible for securing funding for implementation of this Plan through both

phases of restoration and post-construction monitoring. Financing of project implementation will be overseen by the City. The project is anticipated to be funded wholly or in part by future State and/or Federal grant funds. The City will also be financially responsible for maintenance and monitoring activities following construction and in perpetuity.

4.2 Project Team Roles and Responsibilities

4.2.1 Project Proponent

The City will be responsible for the proposed restoration project and for retaining qualified biologists (including a restoration ecologist), engineers, and contractors and for funding implementation, maintenance, and monitoring of the project through its successful completion in coordination with City staff (i.e., City Engineer and/or other inspectors).

Contact information for the project proponent is:

Justin Gamble, Environmental Officer
Water Utilities Department – Watershed Protection Program
300 N. Coast Highway, Oceanside, CA 92054
(760) 435-5093
jgamble@oceansideca.org

4.2.2 Responsible Agencies

The USACE, RWQCB, CDFW, CCC, North County Transit District (NCTD), and City will be responsible for issuing any necessary permits or easements and reviewing and approving this Plan, and overseeing the establishment and development of habitat within the Loma Alta Slough restoration site. The primary avenue for their participation is through the permitting process; reviewing and commenting on this Plan, the construction documents, and subsequent annual reports; and through inspection and comment on significant milestones for the implementation of this Plan.

4.2.3 Responsibilities and Qualifications of Project Engineer, Restoration Ecologist, and Contractors

Project Engineer: The project engineer will develop the construction design drawings and provide supervision of the grading of the project during implementation. The project engineer will be hired by the City and will be a licensed civil engineer, specializing in coastal wetland restoration. The engineer will coordinate with the restoration ecologist and implementation contractor during construction of the project.

Restoration Ecologist: Supervision of the plant installation, maintenance, and monitoring of this restoration project will be the responsibility of a restoration ecologist experienced with wetland/riparian restoration, hired by the City. Plant installation and the maintenance monitoring period are described further in Sections 5.0–7.0. The restoration ecologist will oversee the efforts of the installation and maintenance contractor(s) during the five-year maintenance and monitoring

period[2] and coordinate with the contractor(s) to avoid impacts (outside the project footprint) to sensitive habitat, in addition to avoiding impacts to sensitive wildlife species. The restoration ecologist will be an individual or team of individuals with a degree in botany, ecology, or related field, a minimum of 5 years of experience with restoration of native wetland habitats in southern California, and be able to demonstrate successful experience on at least three similar restoration projects. The restoration ecologist will have overall responsibility for data collection, report preparation and coordination with the City to ensure that all metrics and requirements are met as applicable for the project's regulatory permits.

Installation and Maintenance Contractor: The implementation contractor will be responsible for site preparation, implementation of required erosion, discharge and stormwater pollution prevention protocols, pre-planting nonnative plant species (weed) control, installation of a temporary irrigation system (i.e., automated or alternative), and installation of native plants (container stock and cuttings) and seed mixes in accordance with restoration construction plan specifications. The maintenance contractor will be responsible for maintenance of the restoration areas for 5 years and/or until performance goals are attained with concurrence from the City and permitting agencies. Maintenance contractor responsibilities will include nonnative, invasive species (weed) control, erosion control, care of native plantings, maintenance and operation of the temporary irrigation system, re-planting and/or re-seeding as needed, trash removal, and site protection. All activities conducted will be seasonally appropriate and approved by the restoration ecologist. The maintenance contractor will meet the restoration ecologist at the site when requested and will perform all checklist items in a timely manner as directed. The installation and maintenance contractor(s) will hold a contractor's license (C-27), Qualified Applicator Licenses (QALs) to apply herbicides, and must have a minimum of 5 years of experience installing and maintaining native wetland/riparian habitats in southern California and be able to demonstrate successful completion of three similar projects. The installation and maintenance contractor may be the same firm or separate firms. Using the same contractor for installation and maintenance, or changing maintenance contractors is at the discretion of the City.

4.2.4 Nursery (Seed/Plant Procurement)

Native plant material will be provided from qualified nurseries and seed suppliers who possess a valid California Nursery License. The implementation contractor will obtain container plants from a nursery that adheres to best management practices (BMPs) to prevent the establishment and spread of *Phytophthora* root rot. Seed shall have been tested for purity and germination not more than one year prior to application of seed. Multiple suppliers may be needed to obtain appropriate seed and plant material sourced within the project vicinity. As part of pre-construction activities, the implementation contractor shall submit a list of the suppliers and seed/plant materials to the City and restoration ecologist for review.

[2] A five-year maintenance and monitoring period to verify native habitat restoration establishment and attainment of performance goals is an industry standard and typical expectation and/or requirement included in regulatory permits.

4.3 Pre-Construction Meeting

Implementation of this habitat restoration plan will begin with project approval. Prior to the initiation of restoration and enhancement activities, an onsite meeting will be held with the City, implementation contractor, restoration ecologist, and project engineer. Topics that will be addressed at this meeting include but are not limited to: (1) mobilization and protection of infrastructure; (2) contractor environmental training; (3) demarcation of sensitive areas and avoidance measures; (4) delineation of access routes and staging areas; (5) schedule of activities and milestones; and (6) overall project goals and benefits.

A summary of all major tasks related to the project, starting with the pre-construction phase, and ending with a five-year maintenance and monitoring establishment period, is provided in **Table 7**.

TABLE 7
LOMA ALTA SLOUGH RESTORATION PLAN CHECKLIST

Construction Phase	Restoration Task	Applicable Parties					
		Project Proponent[1]	Engineer	Implementation contractor	Maintenance Contractor	Restoration Ecologist	Resource Agencies[2]
Pre-Construction	Order container plantings and seed[3]	X*		X		X*	
	Attend pre-construction meeting	X	X	X		X	
	Pre-construction biological surveys	X				X	
	10-day notification to resource agencies	X				X	
	Install perimeter fencing (as needed)			X		X*	
	Document pre-installation site conditions	X*				X	
Site Preparation	Install erosion control (as needed)			X		X*	
	Non-native plant removal	X*		X		X*	
Grading	Grade site	X*	X*	X			
Installation	Install container plantings, cuttings, and seed			X		X*	
	Submit as-built mark-ups and site implementation monitoring data		X*	X			
	Document as-built conditions, including plant installation and 120-day establishment period, and prepare/submit as-built letter report	X*		X		X	
120-Day Establishment Period	Maintain site for 120 days, or until sign off by the City and restoration ecologist	X*		X		X*	X*
	Replace dead container plantings			X		X*	
Five-Year Maintenance & Monitoring Period	Maintain site for five years until signed off by the City, Engineer, and resource agencies	X*	X*		X	X*	X*

1 City of Oceanside

2 USACE, CDFW, RWQCB, CCC, and City of Oceanside

3 Must provide all source locations and receive authorization from the City of Oceanside of final seed and plant lists prior to ordering.

* Inspection of work related to this task.

5.0 Implementation Plan

5.1 Installation Schedule and Protection of Species

The implementation schedule is included in Table 7. Implementation of the restoration plan would begin during the bird nesting season (January 15–September 15), so a qualified avian biologist would be needed to conduct pre-construction surveys within one week prior to the start of work. The survey would document breeding activity of nesting and migratory birds within or immediately adjacent to the proposed work areas. If an active bird nest is found, the nest will be flagged and mapped on the project plans along with an appropriate buffer, which will be determined by the biologist based on the biology of the species. The buffer will be delineated by temporary fencing and will remain in effect as long as construction occurs or until the nest is vacated and the juveniles have fledged. The nest area will be demarcated in the field with flagging and stakes or construction fencing. The project site has the potential to support additional sensitive species, including tidewater goby and light-footed Ridgway's rail. Therefore, additional surveys or habitat assessments may be required to quantify potential impacts to these species to comply with permitting requirements prior to the start of work. If tidewater gobies are detected during the survey, additional measures shall be implemented as determined through the subsequent Endangered Species Act consultation conducted by the U.S. Army Corps of Engineers (USACE) with the U.S. Fish and Wildlife Service (USFWS) as part of obtaining the Clean Water Act Section 404 authorization for the Project.

Planting, installation of cuttings, and seeding would occur between September and October.

The maintenance and monitoring program will begin following sign-off of the 120-day establishment period and extend for a five-year period following completion of the installation. As a guideline, maintenance will be conducted monthly during the first year, eight times per year during the second and third year, and quarterly thereafter (see Section 6.1). Regular monitoring visits will be conducted to coincide with maintenance visits (refer to Section 7.1). Annual monitoring will occur in May or June to coincide with the peak growing season of wetland plant species, with an annual report distributed by the end of each monitoring year.

5.2 Site Preparation

5.2.1 Site Access and Staging

Two potential construction access and staging locations are proposed in the *Preliminary Design Report* (ESA 2020e). Staging Area #1 is located north of the northwest area within the La Salina WWTP property. Staging would occur in part of the parking lot proposed by the Buccaneer Lift Station project. Staging Area #2 is located north of the northeast area along the existing access road. Staging would occur along the road owned by the City of Oceanside.

Staging Area #1 would provide access to the northwest area, while Staging Area #2 would provide access to the northeast area and the southeast area. At Staging Area #1, it is anticipated that access to the marsh may require a temporary access ramp and allowance for overhead electric lines. Access

to the southeast area will require utilizing S. Coast Highway and the Paradise By The Sea RV Resort roads to travel from Staging Area #2.

At the completion of the project, the access and staging areas will need to be restored to existing conditions, or those identified by the City as part of the project design.

5.2.2 Delineating Limits of Work and Temporary Signage

Prior to restoration and enhancement activities, work areas will be staked, roped off, temporarily fenced, or otherwise demarcated to conspicuously mark the limits. This is to avoid impacts to native habitats outside the construction footprint, as well as to ensure that construction personnel and equipment remain within approved work, access, and staging areas and do not inadvertently affect native habitats or sensitive plant species by undertaking activities outside the authorized areas. Project boundary points will be marked in the field by the restoration ecologist based on the construction plans, and delineation materials (e.g., fenced and roped) will be installed by the implementation contractor.

Temporary signs will provide an explanation of the project and a contact number for public inquiries. Signs will be installed at all entrances to the project site. Sign language and location will be approved by the City and State or federal agencies providing implementation funding.

5.2.3 Erosion Control

Prior to planting and seeding, the implementation contractor will install BMPs for erosion control as specified in the construction plans and also a determined necessary by the contractor, restoration ecologist and City. BMPs will be installed per the approved Stormwater Pollution Prevention Plan (SWPPP) and Erosion Control Plan to comply with the Construction General Permit and City Grading Permit, respectively. Erosion control materials could include, but are not limited to, biodegradable fiber rolls (wattles), natural fiber matting, and/or organic mulch. Only natural threads and nettings are permissible (no products with plastic mesh). It is assumed erosion control materials implemented during the installation phase will be repaired/replaced during the maintenance phase, then removed or left to decompose after sufficient vegetation has established to control erosion.

5.2.4 Non-Native Removal

Non-native (weed) plant species can be divided between aggressive, invasive exotics (that can outcompete desirable native species if they are not controlled) and more benign species (that tend to diminish as native species become established). For the purposes of this plan, guidance for determining problematic invasive (exotics) is provided by species listed as “moderate” or “high” threats to California wildlands by the California Invasive Plant Council (Cal-IPC) (2020) and site observations. For the restoration and enhancement project, non-native plant treatment and control will occur during implementation in the graded areas (i.e., after grading and before planting/seeding as needed) where planting/seeding will occur and in existing habitat as part of enhancement activities. Graded areas will be initially clear of vegetation but volunteer plants including non-native species could germinate or re-sprout prior to native planting and seeding.

A combination of hand-removal, mechanical removal (e.g., chain-saw, etc.), and appropriate herbicide (i.e., wetland-approved herbicides) treatments will be used based on the species, and its location and size. The implementation contractor's Qualified Applicators and/or Pest Control Advisor (PCA) will help determine appropriate treatment methods. It is the intent of this Plan that herbicides be used judiciously and only as needed (i.e., treatment of perennial species that re-sprout). Larger woody invasive tree species in existing habitat (i.e., enhancement areas) will be cut to ground level with all above-ground portions removed from the site. All non-native plant biomass will be disposed at an approved local green-waste facility, unless the restoration ecologist approves use of some non-native debris (without live vegetative material, flowers or seed heads) as on-site mulch.

The primary invasive species detected on-site or which have potential to occur, include but are not limited to:

- *Arundo donax* (arundo)
- *Cortaderia selloana* (pampas grass)
- *Eucalyptus* spp. (eucalyptus)
- *Foeniculum vulgare* (sweet fennel)
- *Glebionis coronaria* (crown daisy)
- *Grewia occidentalis* (crossberry)
- Ice-plants (*Mesembryanthemum nodiflorum* and *Carpobrotus edulis*)
- *Lepidium latifolium* (perennial pepperweed)
- *Limonium perezii* (Perez's marsh rosemary)
- *Limonium ramosissimum* (Algerian sea lavender)
- *Limonium sinuatum* (wavyleaf sea lavender)
- *Nerium oleander* (oleander)
- *Nicotiana glauca* (tree tobacco)
- Non-native grasses (*Cynodon dactylon*, *Ehrharta* spp., *Paspalum dilatatum*, *Pennisetum setaceum*, and *Piptatherum miliaceum*)
- Palms (*Phoenix canariensis* and *Washingtonia robusta*)
- *Plumbago auriculata* (blue plumbago)
- *Ricinus communis* (castor-bean)
- *Schinus terebinthifolius* (Brazilian pepper)
- *Tamarix ramosissima* (tamarisk)

In addition to problematic invasive species, there are additional non-native (weeds) second-priority species that need to be controlled when they proliferate beyond acceptable levels and are inhibiting the establishment of native plants. The primary second-priority species detected on-site or which have potential to occur, include but are not limited to:

- *Amaranthus ablbus* (tumbling pigweed)
- *Bassia hyssopifolia* (fivehorn smotherweed)
- *Crassula ovata* (jade plant)
- *Brassicaceae (Brassica nigra*, *Hirschfeldia incana*, and *Raphanus sativa)*
- *Centaurea melitensis* (tocalote)
- *Helminthotheca echioides* (bristly ox-tongue)
- *Lactuca serriola* (prickly lettuce)
- *Melilotus indicus* (sweetclover)
- Non-native grasses (*Avena* sp., *Bromus* spp., *Festuca perennis*, and *Polypogon monospeliensis*)
- *Salsola tragus* (Russian thistle)

Prior to planting and seeding, invasive species and second-priority species will be effectively controlled (i.e., <1.0% cover). In addition, invasive species and second-priority species will be effectively controlled (i.e., <1.0% cover) in enhancement areas (existing habitat) prior to the completion of the installation phase. Non-native plant control during the post-installation maintenance period is discussed in Section 6.2.

5.3 Grading, Channel Excavation, and Riprap Removal

Prior to planting, grading and excavation of the existing fill in the northeast area is proposed to reach design grades compatible with marsh habitat. Marshplain grading will also create better drainage to reduce ponded water and stagnation. The marshplain will be graded in the entirety of the northeast area, with some areas requiring up to approximately 7 feet of excavation to achieve target marshplain elevations. Some minor grading would occur in the southeast area as well. Tidal channels will be excavated throughout the northwest and northeast area to provide sufficient hydraulic capacity to allow for drainage of tidal and fluvial water levels and facilitate more rapid vegetation establishment. Along the northern border of the project site, a sloping upland transition zone will be constructed to provide a biological buffer for the wetlands. The upland buffer in the northeast area would be graded along the road to the north until the Parent Family Trust property, and then continued south and west around the property.

In Phase 2, the upland buffer south and east of the Parent Family Trust property would be graded down to marshplain elevation, and a new buffer would be graded at the back of the property, along the access road to the north. The interior of the Parent Family Trust property would be graded down to marshplain elevations.

The planned elevation ranges for the different habitats include salt marsh (approximate elevation 7.3–8.5 feet); brackish marsh (approximate elevation 6.0–7.3 feet); riparian willow scrub (approximate elevation 8.5–11.0 feet); and upland sage scrub (above 11.0 feet).

Based on the results of the scour analysis for the project site (ESA 2020d), vegetation is likely sufficient to stabilize the channel banks and overbank areas of the restored habitat. Riprap will be removed along the northern channel edge in addition to grading to flatten the slope of the bank. Riprap would be left in place to protect bridge piers and the access ramp from La Salina WWTP.

5.4 Planting Plan and Specifications

The overall planting approach is to provide a diversity of native species adapted to site conditions (i.e., species documented on-site or in the project vicinity) in conjunction with natural recruitment to vegetate four habitats that will be created or temporarily impacted as part of the project restoration. The primary goals are to establish high functioning, self-sustaining vegetation communities that provide wildlife habitat, improve water quality, and provide aesthetic and educational public values.

The planting strategy in the marsh area is primarily based on hydrology and elevations, soil and water salinity, and the degree of anticipated natural plant recruitment. Generally, conditions west of the bridge are more saline than in the eastern portion of the site but inter-annual (seasonal and also annual) variability in tidal and freshwater inputs are expected to provide a system that is dynamic and fluctuates between saltier and brackish/fresher conditions. Therefore, Coastal Salt Marsh and Brackish Marsh plant palettes have been prepared that include some similar (i.e., cross-over/ecotonal) species to account for site condition fluctuations (e.g., pockets of brackish conditions within primarily salt marsh habitat, and vice versa). Proposed planting density in the marsh is modest because a relatively high rate of natural recruitment is expected to occur. Species such as southern cat-tail (*Typha* sp.) and California bulrush (*Schoenoplectus californicus*), which currently occur onsite, are not proposed for planting because they are expected to volunteer after restoration grading and site preparation. The species selected for planting are intended to increase plant diversity and are generally less likely to volunteer onsite.

The proposed planting approach in the marsh habitats includes installing scattered groupings (i.e., nodes), rather than in a grid, to allow different native species more space to establish and respond to hydrologic and soil conditions. A Willow Scrub plant palette and seed mix have been prepared for areas in the eastern portion of the project along the proposed berms along the creek, in part to provide willows and shading along a portion of the post-restoration water's edge. For the Willow Scrub habitat, higher density planting is proposed and expected brackish conditions have been factored into the container plant and seed species selected. In addition, an Upland Scrub plant palette and seed mix have been prepared, which are intended to establish diverse upland habitat that will serve as aquatic resource (wetland habitat) buffer area and improve overall wetland and upland functions onsite. For the Upland Scrub, higher density planting and seeding is proposed for erosion control and because limited natural plant recruitment is expected to occur.

Proposed seed mixes and plant palettes for restoration of the salt marsh (approximate elevation 7.3–8.5 feet), brackish marsh (approximate elevation 6.0–7.3 feet), riparian willow scrub (approximate elevation 8.5–11.0 feet), and upland sage scrub (above 11.0 feet) vegetation communities are presented in **Table 8 through Table 11**, respectively. In addition to container plants, cuttings of willows (*Salix gooddingii*, and *S. lasiolepis*) and arrow weed (*Pluchea sericea*) can also be installed

to supplement vegetation establishment in riparian willow scrub habitat and areas with predominately freshwater.

TABLE 8
SALT MARSH PLANT PALETTE

Container Stock				
Scientific Name	**Common Name**	**Life Form**	**Container Size**	**Number Per Acre[3]**
Bolboschoenus maritimus[1]	prairie bulrush	perennial grass-like herb	rose pot or 1-gallon	37
Cressa truxillensis	alkali weed	perennial herb	rose pot	50
Distichlis spicata	salt grass	perennial grass	rose pot	50
Frankenia salina	alkali heath	perennial herb	rose pot or 1-gallon	63
Jaumea carnosa	fleshy jaumea	perennial herb	1-gallon	38
Limonium californicum	western marsh-rosemary	perennial herb	1-gallon	38
Monanthochloe littoralis	shoregrass	perennial grass	rose pot or 1-gallon	38
Pluchea odorata[1]	marsh fleabane	annual, perennial herb	rose pot	36
Sarcocornia pacifica[2]	Pacific pickleweed	perennial herb	1-gallon	150
			TOTAL	**500**

1 *Bolboschoenus maritimus* (prairie bulrush) and *Pluchea odorata* (marsh fleabane) are expected to establish within brackish water/soil inclusions within salt marsh habitat.

2 *Sarcocornia pacifica* (Pacific pickleweed) which occurs onsite is included in the plant palette at a low density (in addition to other species) because this species is expected to establish primarily via natural recruitment after restoration grading and site preparation.

3 Plants will be installed in approximately 25 groupings (nodes) with approximately 15 to 25 plants in each planting node, and planting nodes will be at approximately 30 feet on-center. The project Restoration Ecologist will have discretion to modify groupings during plant layout (based on final grades and hydrology) to place species in ecologically appropriate locations prior to installation.

TABLE 9
BRACKISH MARSH PLANT PALETTE

Container Stock[1]				
Scientific Name[1]	**Common Name**	**Life Form**	**Container Size**	**Number Per Acre[3]**
Anemopsis californica	yerba mansa	perennial herb	1-gallon	75
Bolboschoenus maritimus	prairie bulrush	perennial grass-like herb	rose pots or 1-gallon	75
Cyperus eragrostis	tall flatsedge	perennial grass-like herb	rose pots or 1-gallon	62
Distichlis spicata[2]	salt grass	perennial grass	rose pot	75
Elymus triticoides	beardless wildrye	perennial grass	rose pots or 1-gallon	75
Frankenia salina[2]	alkali heath	perennial herb	rose pot or 1-gallon	75
Pluchea odorata	marsh fleabane	annual, perennial herb	rose pot	63
			TOTAL	**500**

1 *Typha domingensis* (southern cat-tail) and *Schoenoplectus americanus* (Olney's bulrush) which occur onsite are not included in the plant palette because they are expected to readily volunteer after restoration grading and site preparation.

2 *Distichlis spicata* (salt grass) and *Frankenia salina* (alkali heath) are expected to establish within salt water/soil inclusions within brackish marsh habitat.

3 Plants will be installed in approximately 25 groupings (nodes) with approximately 15 to 25 plants in each planting node, and planting nodes will be approximately 30 feet on center. The project Restoration Ecologist will have discretion to modify groupings during plant layout (based on final grades and hydrology) to place species in ecologically appropriate locations prior to installation.

TABLE 10
RIPARIAN WILLOW SCRUB SEED MIX AND PLANT PALETTE

Seed Mix[1]

Scientific Name	Common Name	Life Form	Min. % Purity/ Germination	Lbs./Acre
Ambrosia psilostachya	western ragweed	perennial herb	45/45	8
Distichlis spicata	salt grass	perennial grass	90/75	8
Malvella leprosa	alkali mallow	perennial herb	10/50	6
Suaeda taxifolia	woolly sea-blite	shrub	34/24	8
Heliotropium curassavicum	salt heliotrope	perennial herb	15/50	6
			TOTAL	**36**

Container Stock

Scientific Name	Common Name	Life Form	Container Size	Number Per Acre[2]
Understory and Shrubs				
Elymus triticoides	beardless wildrye	perennial grass	rose pots or 1-gallon	170
Isocoma menziesii var. *vernonioides*	coastal goldenbush	shrub	1-gallon	115
Pluchea sericea	arrow weed	shrub	1-gallon	160
Trees				
Salix gooddingii[2]	black willow	tree	1-gallon	230
Salix lasiolepis[2]	arroyo willow	tree	1-gallon	345
			TOTAL	**1,020**

1 Seed to be applied by hand and raked into the top ¼ inch of soil, or hydroseed method with hydromulch and tackifier (binder).

2 As a supplement to 1-gallon container size *Salix* spp. (willow) container plants, cuttings collected from the project area may also be installed.

3 1,020 plants per acre equals approximately planting on average 7-foot on-center. The project Restoration Ecologist will have discretion to direct layout of plants in ecologically appropriate locations in natural groupings prior to installation.

TABLE 11
UPLAND SAGE SCRUB SEED MIX AND PLANT PALETTE

Seed Mix[1]

Scientific Name	Common Name	Life Form	Min. % Purity/Germination	Lbs./Acre
Acmispon glaber var. *glaber*	deerweed	perennial herb	95/80	4
Artemisia californica	California sagebrush	shrub	30/60	3
Asclepias fascicularis	narrow leaf milkweed	perennial herb	90/65	3
Camissoniopsis cheiranthifolia	beach evening primrose	annual herb	95/90	2
Deinandra fasiculata	fascicled tarplant	annual herb	25/65	3
Encelia californica	coast sunflower	shrub	30/45	4
Eriogonum fasciculatum ssp. *foliolosum*	California buckwheat	shrub	55/16	6
Heterotheca grandiflora	telegraph weed	annual herb	60/55	2
Lupinus succulentus	arroyo lupine	annual herb	98/85	3
Malacothamnus fasciculatus	bush mallow	shrub	20/60	3
Nassella pulchra	purple needlegrass	perennial grass	90/71	4
Scrophularia californica	California bee plant	perennial herb	70/75	3
Verbenia lasiostachys	western vervain	perennial herb	90/55	2
			TOTAL	**42**

Container Stock

Scientific Name	Common Name	Life Form	Container Size	Number Per Acre[2/3]
Artemisia californica	California sagebrush	shrub	1-gallon	260
Eriogonum fasciculatum ssp. *foliolosum*	California buckwheat	shrub	1-gallon	300
Eriogonum parvifolium	sea cliff buckwheat	shrub	1-gallon	220
Heteromeles arbutifolia	toyon	shrub	1-gallon	70
Isocoma menziesii var. *vernonioides*	coastal goldenbush	shrub	1-gallon	85
Malosma laurina	laurel sumac	shrub	1-gallon	45
Rhus integrifolia	lemonadeberry	shrub	1-gallon	40
			TOTAL	**1,020**

1 Seed to be applied by hydroseed method with hydromulch and tackifier (binder).

2 1,020 plants per acre equals approximately planting on average 7-foot on-center. The project Restoration Ecologist will have discretion to direct layout of plants in ecologically appropriate locations in natural groupings prior to installation.

3 To discourage unauthorized access, cacti species such as *Opuntia littoralis* (coast prickly-pear) and/or *Cylindropuntia prolifera* (coast cholla) could also be installed as a supplement.

5.4.1 Soil Testing and Preparation

After grading and prior to planting and seeding, composite soil samples will be collected from at least eight representative locations (i.e., six in wetland areas and two in upland areas) to conduct agricultural suitability and soil composition testing. The testing results will be used to confirm post-grading soil conditions and whether soil amendments are needed. Based on the test results, it is possible some organic amendments for container plant backfill could be beneficial but larger scale soil amendment applications are not anticipated to be needed.

Soil shall be stabilized but not overly compacted (i.e., approximately 85% compaction, except where 90% compaction may be needed on slopes) and the soil surface will have minor, natural undulations/variation and be roughened to improve seed germination and growth.

5.4.2 Plant Installation

Plant/Seed Orders

Prior to installation, the implementation contractor shall submit a list of the suppliers and plant/seed materials (per the Plan palettes and seed mixes) to the City and restoration ecologist for review. The submittal will include species, quantities, container sizes, original source/collection locations, and seed purity and germination rates. Material sourced/collected outside the coastal zone between central San Diego County and southern Orange County may be rejected. If particular plant/seed material is not available, either the implementation contractor will contract with a nursery to conduct seed collection and/or plant propagation or potential substitutions will be agreed upon by the City, restoration ecologist, and implementation contractor.

Container Plants and Cuttings

Prior to installation, container stock will be inspected by the restoration ecologist for signs of pests, disease, root condition, and general health. Container plants will be checked for pests (e.g., polyphagous shot hole borer [*Euwallacea* sp.; SHB]), disease (e.g., *Phytophthora* root rot), root condition, and general health. Any infected or substandard plant material will be rejected and replaced at no additional cost to the City. Container stock will be installed as rose-pot size or one-gallon specimens. All plantings should be installed in a way that mimics a natural plant distribution. The restoration ecologist will coordinate with the implementation contractor on the plant layout to ensure species are placed in ecologically appropriate locations in accordance with the Plan.

Container stock should be installed in holes/basins that are slightly wider than the root ball of the plant, with the root collar approximately 2 inches above the soil grade. Holes may be dug with mechanical augers or by hand, at the discretion of the implementation contractor. Each hole shall be filled with water twice and allowed to drain before installing the plant, unless sufficient soil saturation is present, in which case, less or no pre-watering will be necessary. A basin will be constructed around each plant with a minimum inner diameter of approximately 2 feet. This well will be filled with water and allowed to drain following installation. Ideally, planting will occur during the rainy season between November and February (or spring depending on the timing of

project implementation) to maximize survival of container stock. Plant protectors may be used to minimize herbivory and maintain plant survival, as needed.

Cuttings/Stakes

Cuttings of willows (*Salix gooddingii*, and *S. lasiolepis*) and arrow weed (*Pluchea sericea*) can also be installed to supplement vegetation establishment in riparian willow scrub habitat and areas with predominately freshwater. Cuttings will be sourced from live cuttings from healthy plants within the vicinity of Loma Alta Slough to maintain the genetic stock on-site. Source material will be mature shrubs and trees. Specific cutting procedures would include taking cuttings that are straight or nearly so and at least 20 inches long and 0.5 to 1 inch in diameter. However, cuttings placed in or near the groundwater table should be sufficiently long enough to reach the water table. To help ensure genetic diversity within the restoration and enhancement project and limit damage to existing vegetation, no more than 5 cuttings will be collected per individual tree or shrub. The stems will be cut so that the bottom end is at an angle, to identify which end to install in the ground. All cuttings will be stripped of leaves to allow roots to develop prior to above-ground vegetation and keep the cutting from drying out, while tops will be cut flat to distinguish the top from the bottom end. Cuttings should be dipped in a liquid solution of mycorrhizal inoculum (vesicular-arbuscular mycorrhiza [VAM] fungi) immediately prior to planting. VAM inoculums are commercially available and shall include two or more such species: *Glomus intraradices*, *Glomus etunicatum*, or *Glomulus mosseae*. It is also recommended a liquid solution of mycorrhizal inoculum be applied to container plants, if they have not already been inoculated at the supplier's nursery.

Cuttings will be installed so that 50 to 60 percent of their total length is below grade. The ground should be saturated prior to installation, and cuttings should be installed immediately or stored properly to avoid desiccation. Installation of cuttings should occur during the same timeframe referenced above for container plants.

Seeding

Seed application should take place during the rainy season after installation of container plants and cuttings. The contractor will obtain seed from a qualified supplier. The seed will be ordered and delivered in separate, original containers by species and inspected by the restoration ecologist. Seed must be labeled with the species, collection/source location, purity and germination percentage rates, and quantity of seed in pounds. If the delivered seed differs from specified purity and germination rates, then the application rates will be adjusted accordingly to achieve the equivalent amount of pure live seed (PLS). The restoration ecologist will inspect the seed prior to mixing with other species in the seed mix and application on-site, and will reject seed lacking certified tags or not substantially conforming to the specifications.

The riparian willow scrub seed mix can be applied by hand and raked into the top 2 inches of soil or applied via hydroseeding with mulch and tackifier. The upland scrub seed mix (for slopes above the marsh and scrub habitats) will be applied via hydroseeding with mulch and tackifier for stabilization and to improve germination results.

Seed applied by hydroseed include the following application steps:

- Hydroseed equipment shall have a built in agitation system and operating capacity sufficient to agitate, suspend and homogeneously mix a slurry of seed, organic mulching amendments and fertilizer.
- Virgin wood fiber mulch: apply at a minimum rate of 2,000 lbs./acre
- Fertilizer: Tri-C 6-2-4 soil conditioner/fertilizer or approved equal applied at a rate specified for the product. Tri-C 6-2-4 is a product that includes minerals, carbon, organic matter, humic acids, and beneficial bacteria. The ultimate rate specified will be determined by the restoration ecologist and City to confirm it will not contribute to water quality impairments.
- Organic tackifier: Gura Tack or approved equal applied at a rate of 100 lbs./acre
- Spray areas with a uniform visible coat, using the dark color of the wood fiber mulch as a visual guide. The slurry shall be applied in a downward drilling motion via a fan stream nozzle to form a blotter-like ground cover impregnated uniformly with seeds and which, after application, will allow absorption of moisture and rainfall to percolate to underlying soil.

The restoration ecologist will determine when the planting and seeding phase is successfully completed at the site. Completion of this phase will mark the beginning of the 120-day plant establishment period (PEP) within post-installation Year 1.

5.4.3 Temporary Irrigation

After grading and implementation of erosion control BMPs, temporary irrigation will be installed in the upland and transition zone and upper edge of high marsh to support and expedite native plant establishment. Temporary irrigation is not planned for the new marsh areas (due to sufficiently wet conditions) or enhancement areas.

Temporary irrigation using overspray is planned for up to three years of the five-year maintenance and monitoring period. Upon successful establishment of plants, the irrigation system will be removed. Irrigation pipe and components will be installed above grade for ease of removal, with the exception of a subgrade connection to the water main in the road north of the northeast area. Temporary irrigation would be installed for high marsh, transition zone, and riparian areas utilizing onsite potable water meters owned by the City, or through a temporary connection to the nearest operational recycled water source. An automated system would be installed with a point of connection (POC) and mainline to supply water.

Prior to completion of the installation phase, the restoration ecologist will coordinate with the implementation contractor to confirm complete irrigation coverage of planting/seeding areas above the marsh areas. The implementation contractor will be responsible for initial survival of container plants and germination of seed, and oversight and application of irrigation but the restoration ecologist and contractor should coordinate to agree on preferred irrigation frequency and quantity to support healthy plants and successful habitat establishment. Maintenance, operation, and removal of the irrigation system components during the post-installation maintenance period is discussed in Section 6.3.

5.4.4 120-Day Establishment Period

Following installation completion, the 120-day plant establishment period (PEP) will start. The 120-day PEP (i.e., first four months of post-installation Year 1) is intended to provide an observation and guarantee period to ensure that most plant material installed is becoming established. The restoration ecologist will conduct monthly monitoring visits during this period and develop a list of action items to be addressed in a timely manner, as needed. Action items may include maintenance for weed control, erosion control, irrigation, vandalism, replacement of container stock, removal of trash or debris, pest management, and site protection or signage. The implementation contractor is responsible for performing remedial measures to fix any observed problems identified by the restoration ecologist. Success at the end of the 120-day establishment period will be met if invasive plant cover is <1.0 percent, other non-native cover is <10 percent, there is 95 percent survivorship of container stock within planting areas, installed seed has begun to germinate, and there are no erosion-related issues. Some replacement planting may be needed during this period. The successful completion of this period will set the creation and enhancement area areas up with a higher probability of long-term success during the remaining eight months of Year 1 and the five-year maintenance and monitoring period.

5.4.5 Planting As-Built Conditions

Based on as-built information provided by the installation contractor and site implementation monitoring data, the restoration ecologist shall submit a brief as-built letter report to the City within 30 days of completion of plant installation activities and the 120-day establishment period. This letter will describe site preparation, plant installation methods, activities conducted during the 120-day establishment period, and the as-built status of the plants. To document baseline site conditions and implementation of this Plan, the letter will include an as-built graphic on an aerial photo base as well as photos taken from designated photo stations before and after installation.

6.0 Maintenance Program

6.1 Maintenance Activities and Schedule

After the initial 120-day maintenance period, the maintenance contractor (which may be the same firm as the implementation contractor or a separate firm) will take over responsibility for the remainder of post-installation Year 1 and the scheduled five-year maintenance period. The contractor will perform maintenance visits and activities in accordance with the restoration and enhancement goals presented in this Plan.

The intensity of maintenance over the five-year period is expected to lessen each year as invasive and other non-native plant species are removed and controlled, and native plants (from planting, seeding and volunteers) become established. As a guideline, the contractor is expected to perform maintenance approximately once a month during the first 4 months (i.e., 120-day plant establishment period), the remaining 8 months of Year 1, and Year 2. The contractor is also expected to perform maintenance approximately every 2 months during Year 3, and quarterly during Years 4 and 5. The general framework maintenance schedule is provided in **Table 12**, but

actual maintenance responsibilities may vary based on site conditions and progress relative to meeting performance goals on schedule. Maintenance may be needed more frequently, for example, to perform remedial measures (e.g., re-planting). Based on weather conditions and the degree of non-native species, additional maintenance visits may be necessary during particular seasons and periods of the restoration and enhancement project.

TABLE 12
MAINTENANCE SCHEDULE

Maintenance Task to Be Completed	Interval
Site maintenance during the 120-day establishment period (first four months of Year 1)	Monthly for first 120 days
Year 1 – Site maintenance	Monthly
Year 2 – Site maintenance	Monthly
Year 3 – Site maintenance	Every Two Months
Years 4–5 – Site maintenance	Quarterly
Remedial measures (including, but not limited to, re-planting, reseeding, and erosion control)	As needed

These maintenance guidelines are specifically tailored for native plant establishment. The maintenance program will include weed control, temporary watering/irrigation, erosion control, removal of trash, and any remedial measures deemed necessary for the success of the project (e.g., re-planting and re-seeding). Maintenance activities will be directed by the restoration ecologist. Potential damage to plants and other facilities occurring because of unusual weather or vandalism will be discussed by the City, contractor, and restoration ecologist to determine appropriate responses and measures.

The contractor will coordinate with the restoration ecologist on a regular basis to determine priority maintenance activities during different periods of the project. The primary maintenance obligations are reviewed in the following sections.

6.2 Non-Native Plant Control

Invasive species and other non-native species (second priority) are reviewed in Section 5.2.4. It is intended that invasive species (listed in Section 5.2.4 and as identified by the restoration ecologist and maintenance contractor) will be treated and removed wherever they occur within the restoration and enhancement areas and account for less than 1.0 percent cover during the last two years of the five-year maintenance period. During the maintenance phase, the restoration ecologist will create and maintain a list of invasive species that have re-sprouted or volunteered that need to be removed and controlled. The restoration ecologist will periodically update this "living" list in coordination with the maintenance contractor to track invasive species that have been eradicated and also potentially newly identified invasive species that need to be controlled. Other non-native species (less problematic) will be treated and removed within the restoration and enhancement areas and account for less than 5.0 percent cover during the last two years of the five-year maintenance period. The species will also be listed and tracked by the restoration ecologist and maintenance contractor to determine maintenance needs during different periods of the maintenance period.

In general, non-native plants should be removed before they become 12 inches high or set seed. If root systems of particular non-native plants that are in a young/small stage cannot be feasibly removed with hand-pulling, herbicides may be applied under the supervision of a licensed Pest Control Advisor by staff with a QAL. Working in coordination with the restoration ecologist, the contractor and their Pest Control Advisor retain discretion to select their preferred non-native plant treatment and removal methods as long as the work is conducted in a safe and professional manner and in accordance with the goals of this plan and all applicable local, state, and federal laws and requirements. Weed debris will be properly disposed of off-site, unless the restoration ecologist determines some weed debris can be left in-place or cut and distributed as mulch on-site.

6.3 Temporary Irrigation

Implementation and initial application of temporary irrigation for higher marsh areas, riparian willow scrub habitat, and upland scrub habitat is discussed in Section 5.4.3. Temporary irrigation using overspray is planned for up to three years of the five-year maintenance and monitoring period. Depending on the method selected, the maintenance contractor will be responsible for maintaining system components (e.g., pipe, sprinkler heads, water tanks, etc.) to ensure sufficient water is provided to establish native container plants and seed, and meet project performance standards.

The maintenance contractor and restoration ecologist will communicate and coordinate regarding preferred irrigation timing (cycles) and quantities during different points of the maintenance period. The contractor will keep a record of irrigation frequency and gallons applied monthly and annually. In general, irrigation will be applied to supplement and 'extend' the rainy season along with providing water as needed during the summer; and less frequent deeper watering (mimicking natural wetting and drying cycles) is preferred over more frequent surface watering. It is intended as native plantings become established, temporary irrigation use will be progressively reduced and then phased out completely before the end of Year 3. Once concurrence is provided temporary irrigation is no longer needed, the maintenance contractor will remove all irrigation-related materials and debris from the site.

6.4 Trash Removal

All trash will be removed by the maintenance contractor from the project site during each maintenance visit throughout the maintenance period. Care will be taken that trash removal activities minimize or avoid impacts to native plants in the project site. All trash and weed debris will be removed from the project site and disposed of at an off-site licensed waste-disposal facility.

6.5 Erosion Control

Erosion control measures in the planted areas will be replaced, or additional measures will be installed as needed or as identified by the City or restoration ecologist. Within the project site, temporary erosion control will most likely be needed on the upland slopes until these areas are sufficiently stabilized and revegetated. Erosion control materials could include, but are not limited to, biodegradable fiber rolls (wattles), natural fiber matting, and/or organic mulch. Only natural threads and nettings are permissible (no products with plastic mesh).

Any non-biodegradable erosion control materials will be removed from the project site by the maintenance contractor once the restoration ecologist determines that sufficient native plant cover is established.

6.6 Sediment Maintenance

A velocity and shear stress analysis was conducted in order to evaluate the feasibility of removing the riprap at the project site as part of the restoration (ESA 2020, Appendix A). The results showed that shear stresses for existing conditions are similar to the project conditions, with some locations higher and some locations lower. The results suggested that in many locations vegetation is likely sufficient to stabilize the channel banks and overbanks, and riprap would not be needed along the marsh edge. In areas where the channel shear stresses are greater and could result in erosion, a combination of rock slope protection (buried as feasible) and vegetated channel banks would be used to provide both channel stability and improved habitat. Based on the analysis results, substantial erosion or deposition is not expected. Initially, the tidal channels and slough bank may adjust due to natural processes, especially before the banks are fully vegetated, but this is expected in a natural system. Sediment management is not expected to be necessary except for after major storm events, if monitoring shows substantial erosion or deposition at the site.

6.7 Replacement Planting and Seeding

If performance goals outlined in Section 8.0 below, are not being met, additional measures, such as installation of replacement container plants, cuttings, and/or seed may be implemented. Depending on performance of plantings and seed (e.g., which species are establishing best) and availability of appropriate material, the City, restoration ecologist, and maintenance contractor will appropriate species for potential re-planting and/or re-seeding.

6.8 Vandalism and Site Protection

Vandalism is not expected to occur within the project site. If vandalism or unauthorized access does occur, site protection measures will be evaluated in coordination with the City to determine the best approach to protect the restoration and enhancement areas. If needed, site protection measures could include signage to indicate habitat restoration and enhancement is in progress and unauthorized access is not permitted. If this is not sufficient, temporary fencing or other measures would be considered and implemented as appropriate.

6.9 Sensitive Species Issues

The restoration ecologist will note presence of any sensitive plants or wildlife species during regular site visits and will inform the City and maintenance contractor of any sensitive species detected. In addition, the restoration ecologist on behalf of the project will inform CDFW and USFWS of any threatened or endangered species detected nesting or utilizing the site. Measures will be implemented as appropriate (e.g., temporary buffer and/or seasonal work restrictions) to protect sensitive species.

7.0 Monitoring and Reporting Program

7.1 Monitoring and Reporting Schedules

Monitoring and annual assessments will be carried out under the direction of the restoration ecologist. This monitoring program will begin with project site preparation and installation phase and continue during the 120-day PEP (first four months of Year 1) and for the planned five-year project establishment period (**Table 13**).

TABLE 13
MONITORING SCHEDULE[1]

Phase	Schedule
Implementation Monitoring	
Project site preparation and installation	At least weekly
120-day plant establishment period	Monthly
Maintenance Monitoring	
Year 1	Monthly (12 visits)
Years 2 and 3	8 visits per year
February to July	Monthly (6 visits per year)
August to January	2 visits per year
Years 4 and 5	Quarterly (4 visits per year)
Annual Monitoring	
Years 1 through 5	May or June (1 visit per year)

[1] This schedule is only a guideline; monitoring will be performed as necessary, as determined by the restoration ecologist.

Monitoring will be conducted at least weekly during project site preparation and installation, and monthly during the 120-day PEP. A post-installation and as-built report will be prepared following the successful completion of the 120-day plant PEP. Maintenance monitoring will be conducted monthly during the first year of the five-year maintenance and monitoring period. In Years 2 and 3, monitoring will be conducted monthly from February through July (to cover the peak establishment period of both spring and summer germinating species) and twice in the remainder of the year. During Years 4 and 5, monitoring will be conducted four times per year. Brief maintenance monitoring memos will be prepared following each visit to document observations, progress toward meeting restoration and goals, and any recommendations. Annual monitoring will be conducted in May or June of each year to coincide with the peak growing season for wetland habitats. The exact timing of the visits will depend on project site and weather conditions. An annual report will be prepared following each annual assessment and will be submitted to the City for review before the end of each monitoring year.

7.2 Implementation Monitoring

The restoration ecologist will be onsite at least weekly, or as needed, during plant installation to ensure that activities are being conducted per the Plan. The restoration ecologist will monitor all phases of the plant installation process, including non-native plant treatment and removal and the installation of plants and seed. The project engineer will be onsite as needed to monitor the implementation of grading and erosion control features. The restoration ecologist and/or project engineer and City must inspect and authorize each phase of work before the next phase may begin. Pre-installation photos will be taken of existing habitats in the project site from designated photo documentation stations. This information will be used later to track positive changes in habitat development/creation and enhancement due to the project activities.

7.3 Maintenance Monitoring

Following installation, the restoration ecologist will monitor maintenance activities conducted by the implementation contractor during the 120-day PEP and maintenance contractor during the remaining eight months of Year 1 and the five-year maintenance and monitoring period, in accordance with the monitoring schedule outlined in Table 13. This monitoring schedule provides guidance on planned activities; but more frequent inspections may be necessary if there are problems with contractor performance or habitat development. As reviewed in Section 7.1, monitoring memos noting any issues with plant establishment, insect pests, watering, erosion control, etc., as well as wildlife observations, will be provided to the maintenance contractor and the City.

7.4 Annual Monitoring

In addition to maintenance monitoring visits, the restoration ecologist will conduct an annual technical monitoring visit in May or June (Table 13) of each year during the five-year maintenance and monitoring period. Annual monitoring will involve the evaluation of native and non-native vegetative cover, observations of wildlife, and photo documentation. In addition, annual monitoring in Year 5 will also include a functional assessment.

The project engineer will also conduct an annual monitoring visit during the first five years post-construction. Annual monitoring will involve topographic and bathymetric surveys to evaluate changes to the creek, side channels, and marshplain and to document any erosion or deposition. Methods of each component of the annual monitoring are described below. An annual report will be prepared each year during the five-year maintenance monitoring period and submitted to the City and resource agencies.

7.4.1 Vegetation Analysis

The condition and quality of vegetation communities that will be created and restored will be assessed by using the relevé method. The relevé method was developed in Europe, and California Native Plant Society (CNPS) published a Vegetation Sampling Protocol in A Manual of California Vegetation (Sawyer and Keeler-Wolf 1995) that was developed as a quantitative sampling technique applicable to vegetation communities in California (CNPS 2000). The relevé method

provides information on the physical condition of a site, plant cover (assignment of cover classes), and species richness that provides a more complete and holistic assessment of habitat condition as compared to point-intercept transects or quadrats. Per the relevé method, representative sampling plots (i.e., assessment areas; AAs). Each contiguous created and restored native vegetation community will serve as a sampling plot to determine and assign cover classes (1: <1%, 2: 1-5%, 3a: >5-15%, 3b: >15-25%, 4: >25-50%, 5: >50-75%, 6: >75%) to native and non-native vegetation, as well as list dominant species present and presence/absence of non-native weed species. Average height of tree and shrub species and general observations of plant health will also be documented for each plot during each of the five years of monitoring.

Assessments and estimates of container planting survivorship for the entire project site will be made only in Years 1 and 2.

7.4.2 Incidental Wildlife Observations

Incidental observations of wildlife within the project site will be documented and included in each annual report. Incidental sightings made during maintenance monitoring visits will also be included. No protocol surveys are proposed as part of this Plan.

7.4.3 Photo Documentation

Photos will be taken from the same photo locations that will be established prior to the start of the project installation phase. Photos will be taken from these same locations as part of all five annual monitoring events and will be included in the respective year's annual report. The photo locations will be recorded with GIS survey points in the field and then mapped on an aerial photograph in the baseline monitoring report (as-built report following the 120-day plant establishment period) and all subsequent annual reports. To visually demonstrate the progress of the restoration and enhancement effort, photos taken immediately after installation will be included in each report for comparison with the respective year's annual assessment photos.

7.4.4 Condition Assessment

A wetlands condition assessment is proposed to document pre- and post-project conditions and to track progress towards anticipated improvements (i.e., "functional lift) in on-site functions and services. The wetlands condition assessment will follow the methodology of the California Rapid Assessment Method (CRAM) Estuarine Module, *California Rapid Assessment Method for Wetlands Perennial Estuarine Wetlands Field Book, Ver. 6.1* (CRAM Wetlands 2013), or the most recent applicable CRAM module.

A CRAM assessment will be conducted prior to project installation (i.e., baseline condition) and twice during the five-year maintenance and monitoring period (i.e., during Year 3 and final Year 5) to determine whether the project has developed the target functions and services. At the end of five years, the overall post-restoration CRAM score will be compared to the baseline CRAM assessment score. Results from the Year 5 CRAM assessment will be included in the Year 5 annual report.

7.4.5 Topographic and Bathymetric Surveys

The project engineer will conduct a topographic and bathymetric survey to evaluate any changes to the creek, side channels, and the marshplain. Transects will be established so that the same locations are monitored each year to allow for comparison over time. While on site, the project engineer will identify any areas of erosion or deposition and survey those areas in addition to established transects, as necessary.

7.4.6 Annual Reports

An annual report will be prepared each year by the restoration ecologist and project engineer during the post-installation five-year monitoring period. The annual reports, which will be submitted to the City and permitting agencies will review qualitative (horticultural), quantitative (botanical), and functional monitoring results, progress of the restoration and enhancement areas relative to the performance goals, and any recommended remedial measures or adaptive management measures. Annual reports will be submitted to the City and permitting agencies within two months of the completion of a respective monitoring year (note: monitoring period calendar to be determined based on the installation phase completion date). In addition to the information listed above, the annual reports will include:

- A list of names, titles, and companies of persons who prepared the content of the report and participated in monitoring activities
- Figures including representative photographs and permanent viewpoint location photographs depicting site restoration progress over time
- Maps identifying creation/restoration and enhancement areas, monitoring locations, photo point locations, relevé method Assessment Area (AA) plots, remedial planting and/or seeding location areas and invasive species removal areas, as appropriate
- A list of native and non-native species detected in all restoration and enhancement areas, including any sensitive plant or wildlife species that may be detected

7.5 Performance Goals

Performance goals are provided to verify the jurisdictional aquatic (wetland) restoration and enhancement areas achieve desirable characteristics within three to five years. The same performance goals can be used to track the progress and establishment of the upland sage scrub revegetation areas. The performance goals are based on the site's ecological conditions, composition of the native natural communities on-site, experience on other similar projects, and reasonable expectations regarding the intended condition of created/restored and enhanced native habitats after 5 years. Yearly performance goals are provided as milestones to help determine if the restored habitats are on an adequate trajectory, and if remedial measures are necessary to meet final performance goals. A combination of qualitative, quantitative, and functional monitoring results will determine if performance goals are being met and if measures need to be adjusted or implemented to meet those final goals. For example, the amount of potential re-planting and/or re-seeding would be determined by the site's performance and the recommendations of the restoration ecologist.

7.5.1 120-Day Establishment Period

Success at the end of the 120-day PEP will be met if targeted non-native invasive species cover is less than 1.0 percent, other non-native cover is less than 10.0 percent, there is at least 95 percent survivorship of container stock within planting areas, and there are no erosion- or trash (construction debris, etc.) related issues.

7.5.2 Five-Year Maintenance Period

Annual performance goals have been set to track the progress of the restoration and enhancement effort. These performance goals are summarized in **Table 14** below and are described in the following text. The performance standards will only be applied to the jurisdictional aquatic (wetland) restoration/creation and enhancement areas.

TABLE 14
PERFORMANCE GOALS

Milestone	Performance Goals[1]	Remedial Measures
Grading, Site Preparation, Initial Treatment and Removal of Invasive Species and other Non-Natives, Installation of BMPs and Temporary Irrigation System, and Planting and Seeding	All invasive species initially treated and/or removed (i.e., <1% cover) and other non-natives adequately controlled (i.e., <10% cover); erosion control in place as needed; no trash	Install erosion control measures; remove trash and debris, and treat and removal additional non-native species as needed
Year 1 (includes 120-day Plant Establishment Period)	Container plant survival 95%, total native absolute cover from planted, seeded, and volunteer species of 5%; total invasive species of <1% and total non-native cover of other non-native species <10%; no erosion or trash	Re-plant and re-seed if necessary; intensify control of non-native species as needed; repair erosion; remove trash
Year 2	Container plant survival 90%, total native absolute cover from planted, seeded, and volunteer species of 20%; total invasive exotic species of <1% and total non-native cover of other non-native species <10%; no erosion or trash	Same as above, as necessary
Year 3	Total native absolute cover from planted, seeded, and volunteer species of 35%; at least 14 native species (species richness); total invasive exotic species of <1% and total non-native cover of other non-native species <10%; no erosion or trash	Same as above, as necessary
Year 4	No temporary irrigation; total native absolute cover from planted, seeded, and volunteer species of 55%; at least 14 native species (species richness); total invasive exotic species of <1% and total non-native cover of other non-native species <5%; no erosion or trash	Same as above, as necessary
Year 5	No temporary irrigation; total native absolute cover from planted, seeded, and volunteer species of ≥75%; at least 16 native species (species richness); total invasive exotic species of <1% and total non-native cover of other non-native species <5%; no erosion or trash	Same as above, as necessary

[1] Invasive species are defined as species listed as “Moderate” or “High” threats to California wildlands by the California Invasive Plant Council (Cal-IPC 2020) and based on site conditions and observations.

7.5.2.1 Container Plant Survival

Container plantings should have at least 95 percent survival during the 120-day PEP and the remainder of Year 1, and 90 percent survival for Year 2. If mortality of the original plantings exceeds these thresholds, they will be replaced at least annually by the maintenance contractor with appropriate species approved by the City and restoration ecologist. Container plant survival will only be assessed for the first two years because after that time it can become difficult to differentiate accurately between container plantings and volunteers. Although container plant survival thresholds are not proposed beyond Year 2, supplemental planting and/or seeding after Year 2 may still potentially be needed if native plant cover is below annual performance goals.

7.5.2.2 Species Richness

Species richness and recruitment are closely linked. Species richness is the number of species present in an area – the higher the number of species, the greater the richness. Recruitment is the successful, natural reproduction, and/or establishment of plants. When recruitment is achieved by many species, richness and overall diversity will increase. No species richness goals are provided during Years 1 or 2 while the planting and seeding sites are in their early stages of establishment. For Years 3 and 4, the species richness goal is presence of at least 14 native species in the respective marsh, riparian and upland habitats. For Year 5, the species richness goal is at least 16 native species in these habitats. If species richness goals are not achieved, the restoration ecologist will determine if the habitat conditions (including species richness) are established as desired, or if supplemental planting and/or seeding may be recommended.

7.5.2.3 Native Vegetation Cover

Performance goals for native cover are based on current observations of native cover within adjacent, undisturbed habitat as well as the fact that native wetland upland habitats will take time to develop before it mirrors the stature of the mature, surrounding habitat. Native cover goals for Year 1 and 2 are modest (i.e., 5% and 20%, respectively) because above-ground native plant growth tends to be low in the early stages of revegetation as plants and their root systems become established. Native plant annual cover goals progressively increase to a final Year 5 goal of ≥75 percent. If the establishment of native cover is not on track to meet interim or final goals, corrective measures (e.g., re-planting, re-seeding, adding cuttings, hand watering, and/or increasing removal of non-native species) should be implemented.

7.5.2.4 Non-Native Vegetation Cover

Effective treatment and control of non-native plants is a critical factor in the establishment and success of native habitat restoration projects. As the restoration successional process occurs and the revegetation effort takes hold, non-native species presence and cover should decrease due to treatment and removal of these species and expanding cover by native vegetation. In Years 1 through 5, targeted invasive species should account for no more than 1 percent cover. In Years 1 through 3, other non-native species should account for no more 10 percent cover; and in Years 4 and 5, no more than 5 percent cover.

7.5.2.5 Conditional Assessment

A CRAM evaluation of the restoration project site will be included as part of the Year 5 monitoring report. The five-year CRAM score projection will be treated as target scores. As discussed in Section 7.4.4, to determine whether the project has developed the target functions and services, the five-year CRAM score will be compared to the baseline CRAM assessment score. For the wetland creation and restoration portions of the project, results of the CRAM assessment during Year 3 and Year 5 will be compared to the baseline results and proposed assessment target goals.

8.0 Completion of Restoration

8.1 Notice of Completion

Once the project has completed the Plan and substantially met the performance goals as presented in a final project establishment monitoring report, the City will notify and coordinate with the permitting agencies to obtain concurrence and request a Notification of Completion. If requested, a site visit may be conducted with the responsible agencies to verify project site conditions. Prior to project completion, any remaining non-biodegradable materials (e.g., temporary fencing, etc.) from the project site will be removed. The project site may qualify for early approval if final performance goals are met and the site has been off supplemental irrigation for at least two growing seasons prior to final approval.

8.2 Long-Term Management – Operations and Maintenance

Once the site has met the five-year performance goals and has been signed off by the permitting agencies, long-term management will be the responsibility of the City of Oceanside. Specific management activities for the restoration and enhancement project include providing long-term maintenance and monitoring, vector control, trash removal, and non-native vegetation control, as described below.

8.2.1 Site Protection Mechanism

The City will record a restrictive covenant or other site protection mechanism to preserve and protect the wetland and native upland habitats as biological open space. This may include rezoning of the parcels included in the restoration area to a compatible land use designation, such as open space or public park lands. Site protection options are further detailed in the project's CEQA document.

8.2.2 Site Access and Public Access

City staff including designated maintenance staff, and contactors and consultants retained by the City, shall have access to the site for maintenance and monitoring related activities, or as otherwise authorized.

8.2.3 Maintenance and Monitoring Parameters

City staff will be responsible for directing and/or conducting all long-term monitoring efforts and maintenance measures. City staff and designated maintenance staff will ensure management actions are consistent with the City of Oceanside Draft MHCP Subarea Plan (City of Oceanside 2010) and the LCP guidelines and regulations. Maintenance and repair of trails and the overlook would be performed as needed. This may include repairs to the trail substrate (e.g., decomposed granite), trash servicing and removal and repairs to any interpretive features installed along the trail system. As the restoration habitat matures, vegetation management may be necessary to maintain open trail corridors and good site lines for user safety.

8.2.4 Vector Control

Vector control activities currently occur within the existing wetland in the northwest of the study area. The project area is part of the County's Department of Environmental Health (DEH) Site 336 and routinely gets treated for mosquitoes. Typically, standing water is present in several areas of the northern bank of the existing marsh. County DEH representatives have identified mosquito larvae in these ponded areas.

The restored and enhanced wetlands are designed to provide improved drainage and tidal flushing through establishment of side channels to support tidal wetland functions, which would also discourage vector breeding; however, it is possible that vector control within certain areas of the restored wetland may need to be conducted.

8.2.5 Trash

Trash removal would occur as needed within the restored wetlands and uplands by hand. Trash removal would likely be needed after major storm events or the first storm of the season when trash is washed from the watershed down to the Slough. City officials will coordinate with applicable resource agencies to obtain necessary approvals and/or authorizations prior to sending work crews into sensitive wetland areas to remove trash and debris within Loma Alta Slough.

8.2.6 Non-Native Vegetation Cover

Removal of invasive species should occur on site in perpetuity, possibly through the combination of a volunteer program and long-term management of the site using methods similar to those used during implementation.

8.2.7 Potential Environmental Stressors

Other stressors that have the potential to negatively affect the habitat quality of the project site include, but are not limited to: fire, flood, excessive erosion or aggradation, significant streambed migration, or effects from adjacent or upstream land uses.

Should affects from environmental stressors or events be observed, the City shall perform an analysis to identify the effects of the stressor(s) and formulate remedial action(s) intended to support dynamic habitat equilibrium and wildlife use of the project site. Depending on the nature

of the stressor, consultation with additional regulatory agencies and/or specialists may be warranted. Any adaptive management, remedial action, or regular management activity performed shall be implemented in accordance with applicable regulatory guidelines.

Climate change is likely to produce dryer conditions and more intense and frequent rain events that could impact the site. With respect to rainfall trends, the majority of climate models indicate that annual average rainfall will decrease in California particularly in the lower latitude Southern California region (Thorne et al. 2012) as a result of increased temperatures. However, extreme rainfall events are expected to increase given the greater moisture availability anticipated under a warmer atmosphere. In particular, atmospheric rivers (narrow corridors in the atmosphere that transport water vapor and are the most significant driver of extreme rainfall events in California) are projected to increase by most current climate models (Gershunov et al. 2013). This increase in atmospheric river frequency is expected to change flood frequency, intensity, and timing depending on the season, flood type, and location. For Loma Alta Creek, dryer conditions with climate change could reduce dry-weather creek inflows to the estuary. This could be a benefit to the restored Slough, since the existing dry-weather flow to the estuary is elevated above historic levels due to watershed development. For wet-weather conditions with climate change, more intense and more frequent extreme rainfall and creek flow events could increase sediment delivery from upstream to the estuary. Warmer, drier summers could also lead to increased fire frequency, further increasing sediment loads. However, since most of the watershed is developed, this increase may be minimal.

8.3 Funding

The City of Oceanside will identify a source(s) of implementation funding, likely through additional State and/or Federal grant opportunities for wetland restoration.

9.0 Remediation Measures

9.1 Adaptive Management

Adaptive management will be implemented in the event of unforeseen or unpredictable circumstances. Adaptive management is defined, for the purposes of this project, as a flexible, iterative approach to the management of biological resources, directed over time by the results of ongoing monitoring activities and direct observation of environmental stressors that may be producing adverse results within the project site. Adaptive management will include the utilization of quantitative monitoring data and qualitative assessments in the field monitoring to determine if adaptive management measures are needed. Following an event that causes damage to all or part of the project site, these data will be used in part to drive management considerations for repair of damaged areas. Achieving the key goals of project completion and supporting healthy, self-sustaining native vegetation communities will be the focus of all adaptive management decisions.

9.2 Natural Disaster

Should the project site be impacted due to a natural disaster such as fire or flood (i.e., catastrophic event), the project proponent (City) will not be held fully responsible for resulting effects and

impacts outside the proponent's control. If a natural disaster occurs, the City will monitor site conditions including safety considerations (i.e., erosion and further flooding) and the degree of natural recruitment of native habitat (i.e., from resprouting of planted areas and volunteers). Native plant natural recruitment will be utilized to the extent feasible. If natural recruitment by itself is not sufficient to meet project goals, the City will develop proposed remedial measures to improve site conditions. If complete attainment of performance goals is not possible (i.e., via natural recruitment and implementation of feasible remedial measures) under the changed conditions, the City will consult the regulatory agencies to agree on follow-up actions and reasonable expectations for successful completion of the mitigation project.

10.0 References

Byrd, B.F. 1998. Harvesting the Littoral Landscape During the Late Holocene: New Perspectives from Northern San Diego County. *Journal of California and Great Basin Anthropology*. Vol. 20, No. 2 (1998), pp. 195–218.

City of Oceanside. 2010. Oceanside Subarea Habitat Conservation Plan/Natural Community Conservation Plan. City of Oceanside, CA.

CNPS (California Native Plant Society) Vegetative Committee. 2000. CNPS Relevé Protocol. October 20 (Revised August 23, 2007). URL: https://www.cnps.org/cnps/vegetation/pdf/cnps_releve_protocol_20070823.pdf

California Rapid Assessment Method (CRAM) for Wetlands. 2013. *Perennial Estuarine Wetlands Field Book Version 6.1*. January 2013.

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Environmental Science Associates (ESA). 2019a. *Loma Alta Slough Enhancement Project, Topographic Survey Technical Memo.* Prepared for the City of Oceanside. August, 22, 2019.

ESA. 2019b. *City of Oceanside Coastal Vulnerability Assessment*. Prepared for the City of Oceanside. October 2019.

ESA. 2020a. *Loma Alta Slough Wetland Enhancement Feasibility Study*. Prepared for the City of Oceanside. May 2020.

ESA. 2020b. *Loma Alta Slough Wetlands Enhancement Project Biological Technical Report*. Prepared for the City of Oceanside. May 2020.

ESA. 2020c. *Loma Alta Slough Wetlands Enhancement Project Aquatic Resources Delineation Report*. Prepared for the City of Oceanside. May 2020.

ESA. 2020d. *Loma Alta Slough Wetlands Enhancement Hydrologic and Hydraulic Study.* Prepared for the City of Oceanside. May 2020.

ESA. 2020e. *Loma Alta Slough Wetland Enhancement Project Preliminary Design Report*. Prepared for the City of Oceanside. August 2020.

Gershunov, A., B. Rajagopalan, J. Overpeck, K. Guirguis, D. Cayan, M. Hughes, M. Dettinger, C. Castro, R. E. Schwartz, M. Anderson, A. J. Ray, J. Barsugli, T. Cavazos, and M. Alexander. 2013. "Future Climate: Projected Extremes." In *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 126–147. A report by the Southwest Climate Alliance. Washington, DC: Island Press.

Oberbauer, T., M. Kelly, and J. Buegge. 2008. *Draft Vegetation Communities of San Diego County*, based on "Preliminary Descriptions of the Terrestrial Natural Communities of California" prepared by Robert F. Holland, Ph.D. for State of California, The Resources Agency, Department of Fish and Game (October 1986).

Sawyer, J. O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. 471 pp.

Thorne, James, Ryan Boynton, Lorraine Flint, Alan Flint, and Thuy-N'goc Le (University of California, Davis and U.S. Geological Survey). 2012. Development and Application of Downscaled Hydroclimatic Predictor Variables for Use in Climate Vulnerability and Assessment Studies. California Energy Commission. Publication number: CEC-500-2012-010.

Natural Resources Conservation Service (NRCS). 2019. Web Soil Survey. Available at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed January 2020

USDA Natural Resources Conservation Service (NRCS) 2020. Web Soil Survey. Available at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed January 2020.

WRP. 2018. *Wetlands on the Edge: The Future of Southern California's Wetlands: Regional Strategy 2018*. Prepared by the California State Coastal Conservancy, Oakland, CA.