APPENDIX B

NFI PER

Preliminary Engineering Report
North Fiesta Island Wetland Restoration

July 11, 2025

Presented To

City of San Diego Public Works Department
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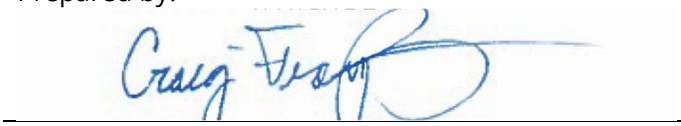

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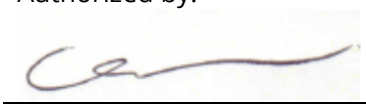

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ACRONYMS/ABBREVIATIONS

Acronym/Abbreviation	Definition
ADA	Americans with Disabilities Act
APCD	Air Pollution Control District
AR4	International Panel on Climate Change Fourth Assessment Report
AR5	International Panel on Climate Change Fifth Assessment Report
BA	Biological Assessment
bgs	below ground surface
BTR	Biological Technical Report
CADD	Computer Aided Drafting and Design
CCC	California Coastal Commission
CDFW	California Department of Fish and Wildlife
City	City of San Diego
cm	centimeter
CWA	Clean Water Act
CY	cubic yards
ESA	endangered species act
FEMA	Federal Emergency Management Agency
ft	foot, feet
ft/s	feet per second
GHG	greenhouse gas
GIS	geographic information system
HOT	highest observed tide
i.e.	in example
IPCC	International Panel on Climate Change
LECC	Law Enforcement Coordinating Council
LiDAR	Light Detection and Ranging
LOT	lowest observed tide
M&N	Moffatt & Nichol
MHHW	mean higher-high water
MHW	mean high water
MLLW	mean lower-low water
NAVD88	North American Vertical Datum of 1988
NHPA	National Historic Preservation Act 1966
NMFS	National Marine Fisheries Service
MLW	mean low water

Acronym/Abbreviation	Definition
MSL	mean sea level (0 ft elevation on NGVD 1929)
NGA	National Geospatial-Intelligence Agency
NGVD 29	National Geodetic Vertical Datum of 1929
NOAA	National Oceanic and Atmospheric Administration
OCP	Ocean Protection Council
Ped	pedestrian
PEIR	Program Environmental Impact Report
PER	Preliminary Engineering Report
RCP	representative concentration pathways
RGP	Regional General Permit
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SanGIS	San Diego Geographic Information Source
SF	square feet
SLR	sea level rise
SSURGO	Soil Survey Geographic Database
SWL	still water level
Update	2002 Update to the Mission Bay Master Plan
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WDR	Waste Discharge Requirements

1 Introduction

The City of San Diego Public Works Department has engaged a consultant team to assist in the preparation of a Program Environmental Impact Report (PEIR) for multiple prioritized improvement projects within the Mission Bay Park Improvement Zone (Improvement Zone). The Improvement Zone includes "those areas encompassed within the boundaries of Mission Bay Park, Oceanfront Walk from the Mission Bay Jetty to Crystal Pier and the adjoining coastal parks…" It also includes portions of Rose Creek, Tecolote Creek, and the San Diego River. The ultimate goal is to enhance the conditions of the Improvement Zone for the enjoyment of residents and visitors. As part of the PEIR, Preliminary Engineering Reports (PER) are being prepared for the prioritized improvement projects. The prioritized improvement projects include: Rose Creek Wetland, North Fiesta Island, Tecolote Creek, Leisure Lagoon Marsh (Cudahy Creek), Shoreline Restoration, Habitat Preservation, Bike/Pedestrian Paths and Bridges, Seawall Restoration, and Deferred Maintenance.

1.1 Project Overview

The Mission Bay Master Plan identifies North Fiesta Island as one of several locations for restoration of tidal wetlands, which balance the need for mitigation, water quality, flood control, aquatic recreation, and public safety (City of San Diego 2002). North Fiesta Island represents the northern reach of Fiesta Island and is situated in east Mission Bay (see Figure 1-1). It is located adjacent to three other major wetland restoration projects under the Mission Bay Park PEIR (Figure 1-2). A Least Tern Preserve is adjacent to the site to the north, and to the south is a kelp drying and sand maintenance/storage area. Fiesta Bay surrounds both the east and west sides of the site and are recreational areas and open water with public beaches for swimming, wading, and water sports. The beach area is popular for picnics and dog runs. Dogs are allowed off-leash. The existing terrain of the project area consists of two component land types: low-lying fill at beach elevations, and upland fill areas. With the exception of salt panne in some areas, coastal salt marsh habitat does not exist on North Fiesta Island. This is because the interior elevations of the island are too high, and there are no connections to seawater in the Bay. Coastal salt marsh habitat can be created, however, with substantial earthwork and site grading at this location. This PER identifies the feasibility and workable configuration for the North Fiesta Island Wetland Restoration.

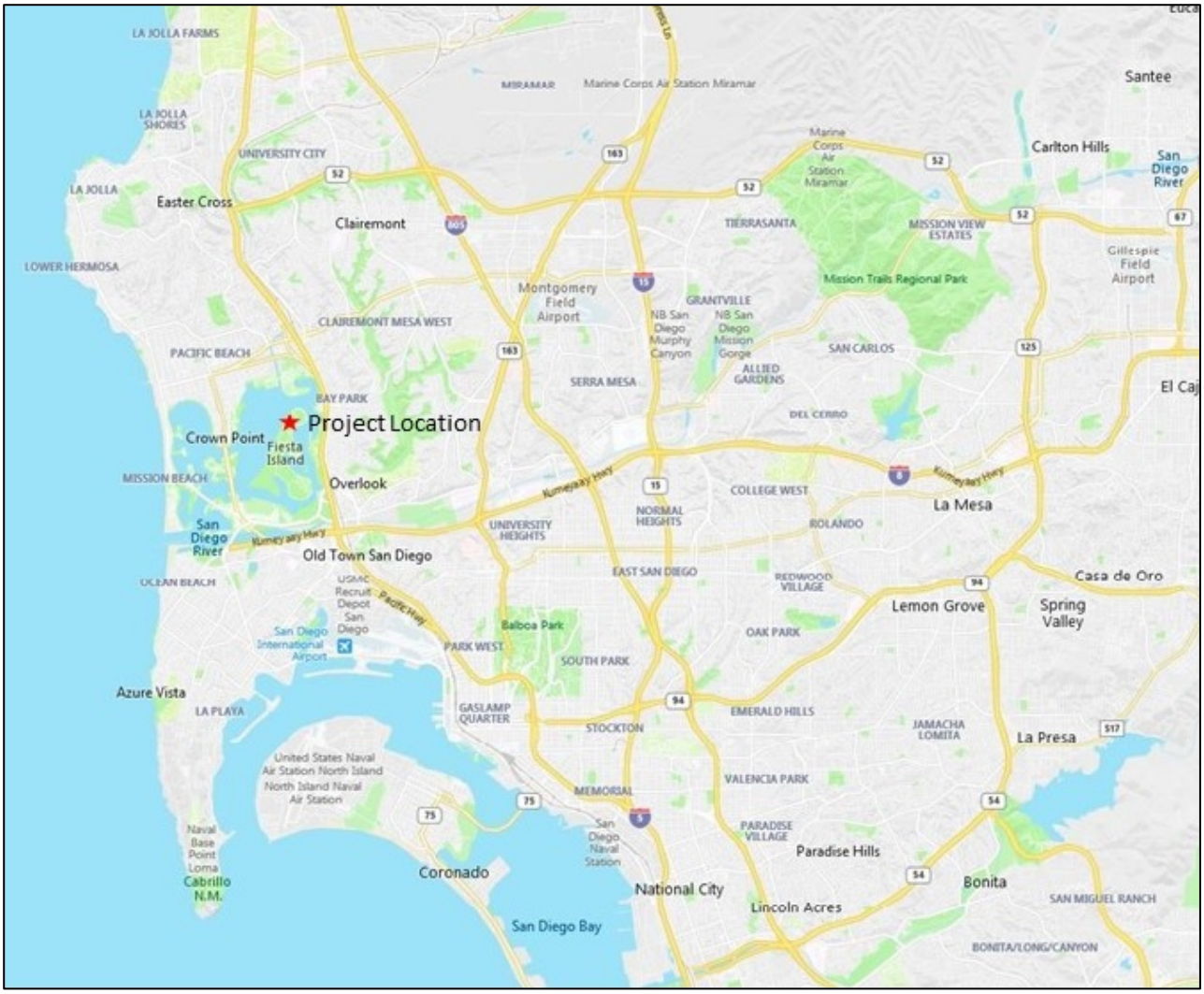

Figure 1-1. Vicinity Map

Figure 1-2. Mission Bay Park PEIR Wetland Restoration Project Areas

1.2 Project Location

Mission Bay is located within the City of San Diego, California. This coastal inlet was created over the last 18,000 years, after the last glacial period, as sea level rose to present level and riverine drainage incised the inlet. As sea level rose, the San Diego River deposited large volumes of alluvial sediment to create the delta that became the landmass for Mission Bay, previously known as False Bay (Figure 1-3). During the 1820s, the San Diego River was redirected from False Bay into the San Diego Bay. This left False Bay as a low-flow marshland. False Bay was made up of fluvial and estuarine fine sand, silts, and clays from the surface to approximately 60 feet (ft) below ground surface (bgs), which were underlain by Quaternary-age dense clayey sands, hard clays, and gravel/cobble from approximately 50-70 feet bgs south of North Mission Bay Drive, and approximately 10-30 feet bgs north of North Mission Bay Drive.

False Bay was historically unnavigable as the channels were narrow and shallow. The City began dredging in 1946 to create Mission Bay Park. Dredging operations, and subsequent land creation with dredged and upland material, occurred between 1946 and 1956, 1959 and 1961, and 1963 and 1964 to create the current configuration of Mission Bay. Landforms, such as Fiesta Island, were formed with what is geologically

described as Artificial Fill. This Artificial Fill consists primarily of loose to medium dense silty sands with intermittent layers of soft clay.

Figure 1-3. Aerial View of Mission Beach and False Bay – 1930 (San Diego, 2020)

1.3 Project Goals and Objectives

The purpose of this report is to provide a preliminary engineering recommendation for salt marsh restoration efforts at North Fiesta Island based on analysis of the existing conditions, constraints, and opportunities. In the early 20th century, the entire area was wetland, as discussed in Section 1.2. Therefore, this action would restore that prior condition. Project design considerations are focused on wetland habitat, jurisdictional limits, topography, bathymetry, stormwater, and tidal influence. This design was formulated to provide potential benefits related to the overall project goals, which are listed below:

- Water quality improvements;
- Aquatic resources;
- Fish and wildlife species;
- Environmental enhancement; and
- Recreation.

The stated overall project goals and potential benefits are discussed through the report narrative and a summary table is provided in Appendix D. The summary table shows the overall project goals and potential benefits along with qualitative and quantitative outcomes.

2 Data Collection and Existing Characteristics

The scope of this project required performing analyses of the existing topography to identify a working wetland design at North Fiesta Island. In support of the hydraulic analyses performed for the proposed tidal salt marsh design at this site, the project included data collection of available as-built drawings, topographic and hydrologic data, and a review of available reference documents. In addition, limited soils data were measured by geotechnical means; those data are presented in Section 5.2.3 of this document.

2.1 Topography and Bathymetry

Topographic data was obtained from the U.S. Geological Survey (USGS) 2014 Light Detection and Ranging (LiDAR) survey. Bathymetry data, defined as the topography of the seabed, was obtained from the Mission Bay Park 2013 Bathymetry and Eelgrass Inventory (Merkel & Associates 2013). These were incorporated into computer aided drafting and design (CADD) files and compiled with aerial data to provide ground surface elevations of the open water and ground surface areas of the project. It should be noted that topography and topographic/bathymetry (topo/bathy) data were obtained in the North American Vertical datum of 1988 (NAVD 88). A conversion between the NAVD 88 and National Geodetic Vertical Datum (NGVD 29) was performed, ensuring all analyses have been referenced to the NGVD 29 datum. Additional topographic survey data was collected by Photo Geodetic Corporation in April 2019. The horizontal basis of coordinates for this survey is referenced to the California Coordinate System of 1983 (CCS83) Zone 6, North American Datum of 1983 (NAD 83), and elevations are referenced to NGVD 29. Features from the 2019 survey, such as stormwater structures, asphalt concrete, sidewalks, fire pits, power poles, etc. were compiled into CADD.

2.2 As-Built Drawings

No as-built drawings for the project were obtained from the City of San Diego Development Services Department and Caltrans. This site was constructed nearly one-half century ago and the existing condition is vacant land, so as-built drawings do not provide information that benefits the project planning.

2.3 Available GIS Data

Geographic information system (GIS) data were collected from San Diego Geographic Information Source (SanGIS) and reviewed for information regarding land use and utilities in the area (Table 2-1). The utility data from SanGIS was analyzed to determine whether any existing utilities cross the proposed wetland area. Upon a review of this data, utilities do not appear to be located within the project area. A detailed survey of existing utilities is nonetheless recommended prior to any final engineering design for the project area.

The data layers used from SanGIS inventory are shown in Table 2-1.

Table 2-1. SanGIS Data Inventory

Data Layer	Version Date	Source (Agency)
LiDAR	2014	SanGIS, San Diego Association of Governments (SANDAG), National Geospatial-Intelligence Agency (NGA), Law Enforcement Coordinating Council (LECC), Regional Public Safety GIS, 18 Incorporated Cities
Aerial Imagery	September 14, 2011	City of San Diego
Storm Drain Network Files (Drain Conveyance, Drain Structures)	October 17, 2018	City of San Diego, SanGIS, SANDAG
Land Use	January 1, 2017	SanGIS, SANDAG
Soil Survey Geographic Database (SSURGO)	November 11, 2013	National Resources Conservation Service
Parcel Layer	February 15, 2018	SanGIS, SANDAG, Assessor/Recorder/County Clerk
Floodplain Layers	April 7, 2016	Federal Emergency Management Agency (FEMA)
Utility Layers (Sewer Main, Water Main, Storm Drainage)	March 5, 2018	SanGIS, City of San Diego Public Utilities Department, SANDAG

3 Water Levels

This section presents water level conditions that affect preliminary project design. Additionally, projected water level conditions during sea level rise (SLR) are also assessed.

3.1 Astronomical Tides

Astronomical tides are crucial to understanding daily inundation potential in Mission Bay and habitat establishment constraints and opportunities. Still water level (SWL) is defined as average water surface elevations at any instant, excluding local variation due to waves, wave run-up, and wave setup, but including the contributions of tide, storm surge, and SLR. SWL for various tidal levels are presented in Table 3-1.

Table 3-1. Existing Still Water Levels in Mission Bay (NOAA Station 9410230)

Datum	Abbreviation	Existing SWL (ft, NGVD 29)
Highest Observed Tide (11/25/2015)	HOT	5.49
Mean Higher-High Water	MHHW	3.00
Mean High Water	MHW	2.28
Mean Tide Level	MTL	0.43
Mean Sea Level	MSL	0.41
National Geodetic Vertical Datum of 1929	NGVD 29	0.00
Mean Low Water	MLW	-1.42
North American Vertical Datum of 1988	NAVD 88	-2.13
Mean Lower-Low Water	MLLW	-2.32
Lowest Observed Tide (12/17/1937)	LOT	-5.19

3.2 Measured Tides

As a part of the Mission Bay PEIR Hydrology Study (Moffatt & Nichol 2019), four pressure gauges were placed at sub-tidal locations collecting tide measurements to assess the tidal behavior of Mission Bay. No anomalous behavior of Mission Bay tides was identified in comparison with tidal measurements from the La Jolla, CA Station 9410230 (NOAA 2019). Figure 3-1 shows existing tides as measured near south Fiesta Island compared to ocean tides. The x-axis represents date and time, by the 24-hour clock (i.e., military time). There is virtually no measurable difference between bay tides and those of the ocean.

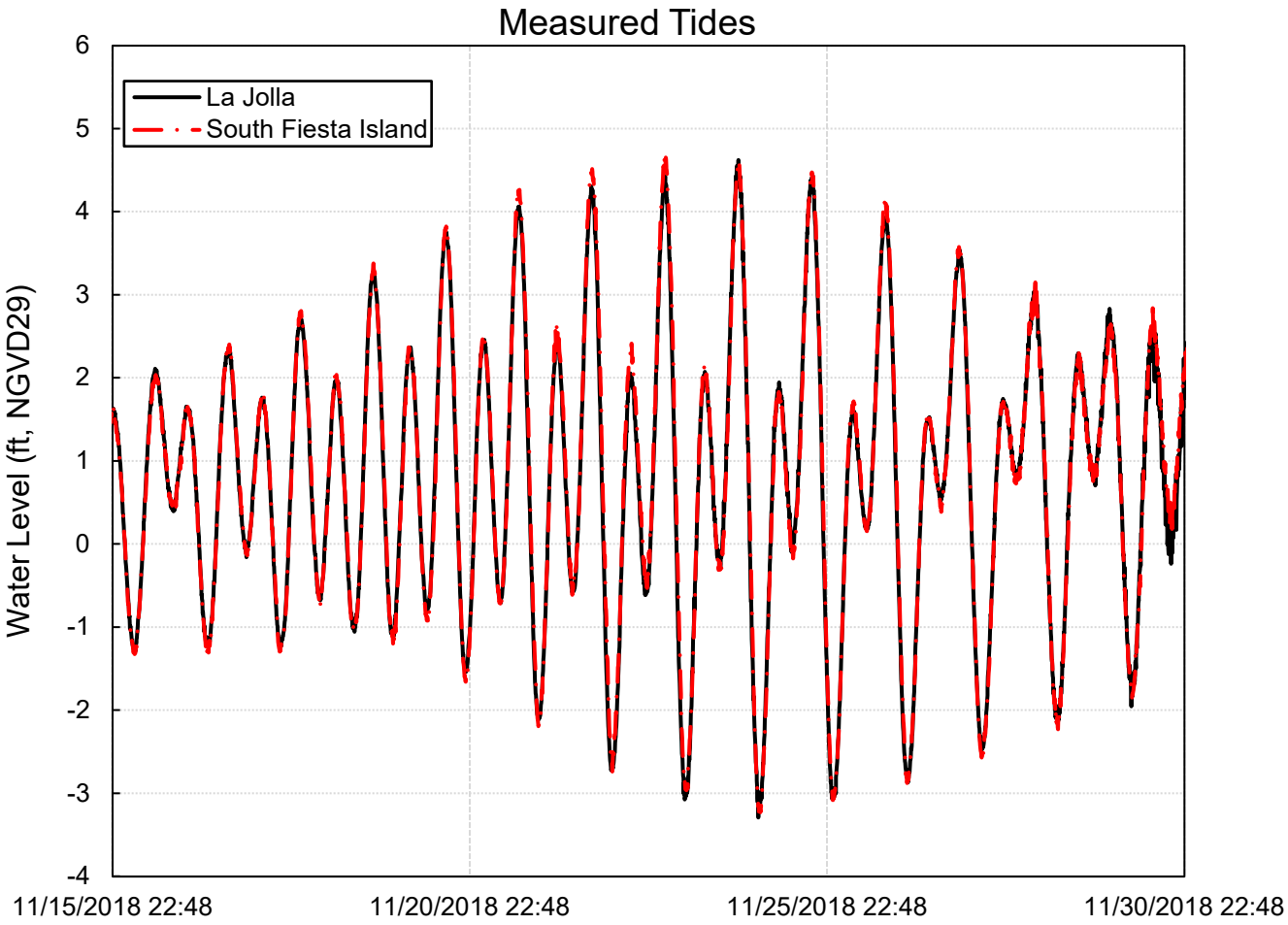

Figure 3-1. Measured Tides at Mission Bay and the Open Ocean

3.2.1 What is Sea Level Rise?

Anticipated changes in climate and sea level are a result of increasing concentrations of "greenhouse" gases in the atmosphere over time due to emissions from natural sources and the burning of fossil fuels. Greenhouse gases trap long-wave thermal radiation within the atmosphere, which causes warming of the Earth's atmosphere, lands, and oceans, resulting in climate changes and SLR (IPCC 2013). SLR science involves both global and local physical processes. Numerical models are created based on the best scientific understanding of these global and local processes to provide predictions of future SLR. Global climate and oceanographic processes are complex and dynamic. Hence, modeling efforts and predictions are periodically updated to reflect any changes in scientific knowledge. At the state level, the California Coastal Commission (CCC) recommends using the best available SLR science, which is expected to be updated approximately every 5 years.

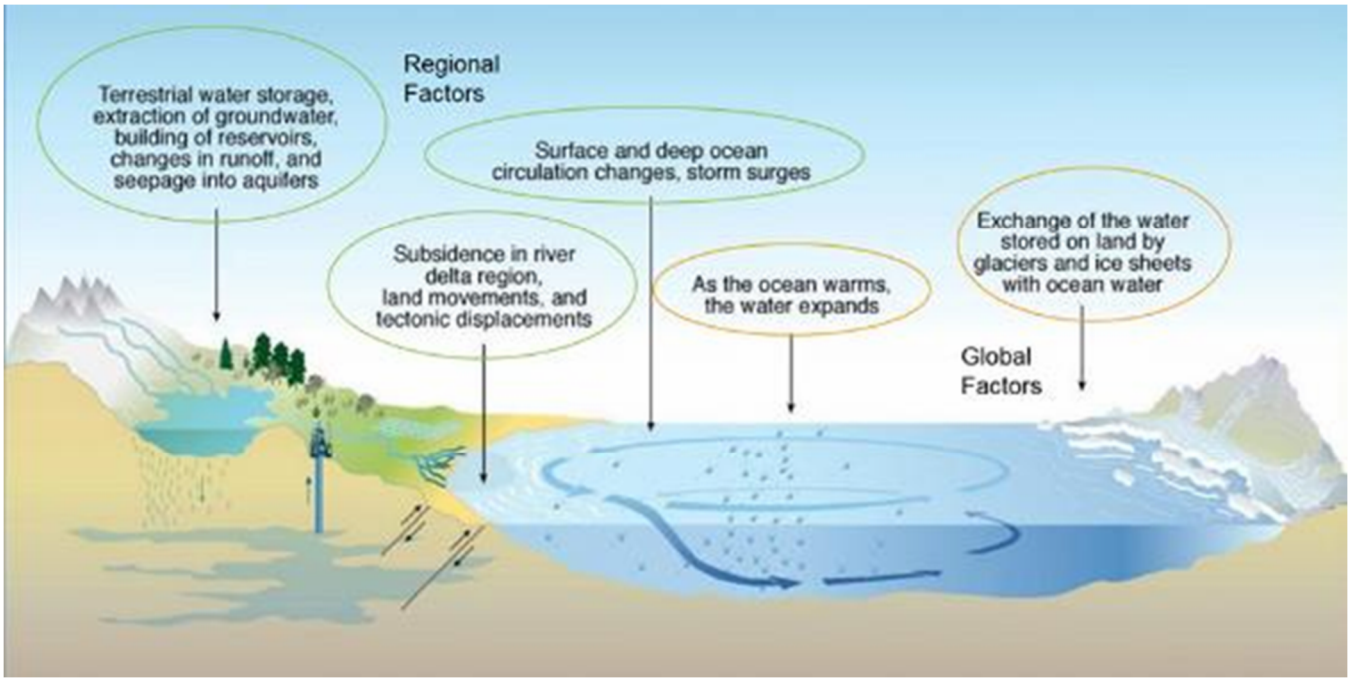

Figure 3-2. Global and Regional Factors That Influence Local Rates of SLR

The previously submitted PER report assessed SLR using the best available science at the time, which was the "Rising Seas in California: An Update on Sea Level Rise Science" report, released in April 2017, that factored polar ice sheet melting into future SLR projections (OPC 2017). The 2017 report forecasted SLR for multiple emissions scenarios and used a probabilistic approach based on Kopp et al. 2014. The following year, the OPC released an updated California State SLR Guidance based on the 2017 science update, which set the standard for local, regional, and state level SLR planning (OPC 2018). Since then, the Ocean Protection Council (OPC) recently released an updated draft of the state SLR guidance, available for public review and comment, in the State of California SLR Guidance: 2024 Science and Policy Update, issued in January 2024. The CCC currently recognizes the 2024 updated State of California SLR Guidance report as the current best available science on SLR projections for California.

SLR projections and related project planning approaches presented in the 2024 guidance for the short SLR time horizon are based on discrete predictions over the next 30 years. This resulted in a smaller range of prediction values for a given time horizon compared to earlier reports. For example, 2018 guidance SLR projections for 2050 varied from 1.1 to 2.7 ft, a range of 19 in. of rise relative to year 2000 recorded oceanic water levels. However, the latest science, including findings from the International Panel of Climate Change (IPCC) Sixth Assessment Report (AR6) suggests a much narrower variability in SLR values by 2050, 0.5 to 1.2 ft, a range of only 8 in. as shown in Figure 3-3 (IPCC, 2019). This reduction in variability from 2024 compared to 2018 OPC guidance primarily reflects a considerable decrease in the maximum expected SLR based on the most current understanding of climate change. The range of potential SLR broadens for mid-term (2050-2100) and long-term (2100+) time horizons under the new guidance due to uncertainties in how different emissions scenarios and specific physical phenomena (e.g., the rapid melting of ice sheets) may affect future warming and sea level trends. By the end of the century and beyond, these uncertainties, especially those concerning ice sheet dynamics, contribute to a wider array of possible sea level variability. It was therefore recommended

by the State SLR Collaborative in the 2024 updated policy guidance, in reference to Senate Bill 1, that long-term projections (e.g., beyond 2100) should be used with caution (Atkins, 2021).

It should be noted that the location of the project site is approximately equidistant from both the La Jolla and San Diego stations assessed in OPC's updated 2024 policy guidance document. As such, SLR projections are within <1% of each other at the two stations with the San Diego station providing slightly more conservative or higher estimates of SLR beyond 2100+ only. The San Diego tide gauge has measured a relative increase in sea level of roughly +0.09 in. per year since 1924 (1924-2024; NOAA CO-OPS Station 9410660). This rate is anticipated to increase over time due to continued air emissions.

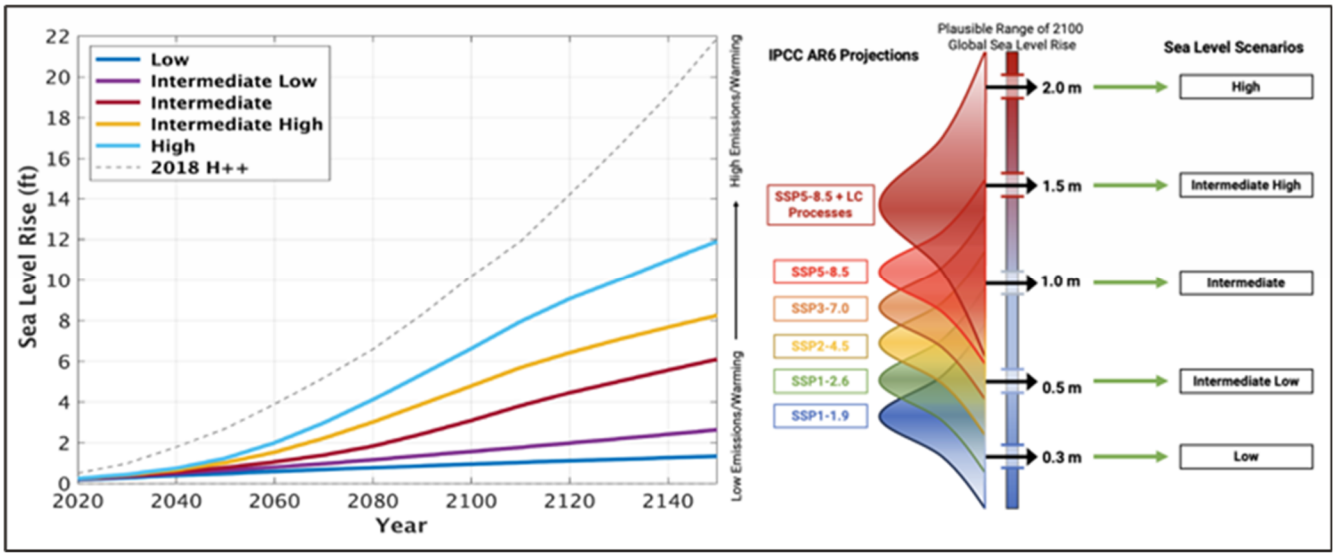

Figure 3-3. Sea Level Rise Projections – San Diego, CA

Across all three (3) time horizons (short-, mid-, and long-term), the 2018 Low Risk Aversion scenario closely tracks the range covered by the Intermediate scenario in the newly updated (2024) guidance. The 2018 Medium-to-High Risk Aversion Low and High Emission scenario corresponds to the Intermediate-High and High scenarios between 2100 and 2150, although the 2024 projections are lower in the short and mid-term time horizons. Evidence in the updated 2024 report suggests that it is reasonable to view the Intermediate scenario as the most representative of the SLR expected to occur in the near term and provides a reasonable upper bound for the most likely range of SLR by 2100. It should also be noted that the Intermediate-High and High scenarios reflect SLR at time horizons that have <1% chance of being met or exceeded by 2100 under assumed global the mean surface air temperature increases at or below 3°C.

The 2022 U.S. Interagency Task Force (ITF) report (Sweet et. al, 2022) provides the likelihood that global mean sea level will meet or exceed the ITF scenarios given various levels of global warming/emissions from IPCC AR6 climate models. The likelihood that global SLR will meet or exceed the selected Intermediate-High Scenario by 2100 is:

- Exceptionally unlikely for 3ºC of global average surface warming (0–1% chance)
- Exceptionally unlikely for 5ºC of global average surface warming (0–1% chance)

- Unlikely for very high greenhouse gas emissions when including the potential for marine ice cliff instability (0–33% chance)

The likelihood that global SLR will meet or exceed the selected High Scenario by 2100 is:

- Exceptionally unlikely for 3ºC of global average surface warming (0–1% chance)
- Exceptionally unlikely for 5ºC of global average surface warming (0–1% chance)
- Very unlikely for very high greenhouse gas emissions when including the potential for marine ice cliff instability (0–10% chance)

3.2.2 Selected Sea Level Rise Scenarios

The current best available SLR science is the State of California Ocean Protection Council Sea-Level Rise Guidance (OPC 2024). The previous PER evaluated a *Low (3.6 ft)* and *High (7.0 ft)* SLR scenario to capture a full range of uncertainty according to the previously best available SLR science. As a result, these two scenarios corresponded approximately with the Year 2100's 17% and 0.5% probabilities, respectively, and were in line with the projected sea level rise scenarios selected in the ongoing City of San Diego Sea Level Rise Vulnerability Assessment (San Diego 2019).

From the explanation provided previously in Section 3.1.1, the same projections apply but are now projected around 2105 instead of 2100 for both the Intermediate and Intermediate-High scenarios in line with the new state guidance. The following table (Table 3-2) highlights the probable timing of the selected SLR scenarios in San Diego, CA under the various emissions scenarios. Per CCC guidance, the Intermediate-High and High scenarios should be considered for most planning and adaptable projects, while reserving the High scenario for critical, long-lived, or high-risk infrastructure where failure would have severe consequences. For predicted SLR vs. observed SLR and likely ranges, see Figure 3-4. The past statewide average tide gauge record is used to assess the trajectory of near-term SLR and create an observation extrapolation for comparison to the scenarios. The shaded region that is shown in Figure 3-4, bounded by the red dotted line, represents the likely range for the observation-based extrapolation.

Table 3-2. Probable Timing Associated with Selected SLR Scenarios in San Diego, CA (OPC, 2024)

SLR Scenarios, ft	Probable Timing Associated with SLR Projections (2024 Draft Guidance Update)				
	Low	Int-Low	Intermediate	Int-High	High
3.6	2150+	2150+	2105	2085	2075
7.0	2150+	2150+	2140	2105	2090

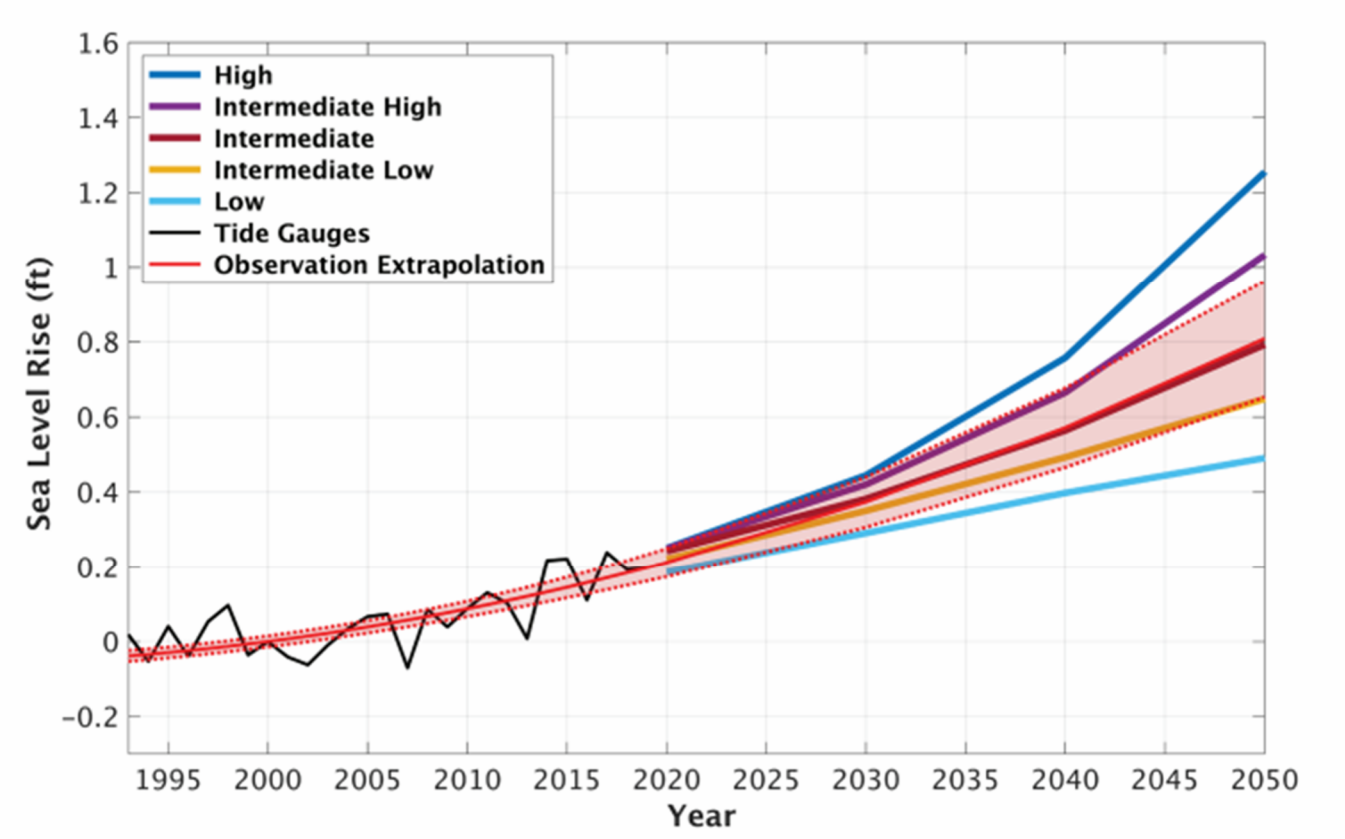

Figure 3-4. Sea Level Scenarios for California, in feet, from 2020 to 2050 relative to the baseline of 2000.

According to the State 2024 guidance, the probable timing of seeing 3.6 ft SLR occurring in San Diego is approximately 2105 (for Intermediate emissions, and 2085 for Int-High emissions). The probable timing of seeing 7.0 ft SLR is 2140 (for Intermediate emissions, and 2105 Int-High emissions) respectively. Portions of Mission Bay which are low in elevation were identified as vulnerable to SLR per the City of San Diego Sea Level Rise Vulnerability Assessment (San Diego 2019). For this report, the effects of SLR are considered within the North Fiesta Island Wetland Restoration project and are discussed further in Section 5.2.9.

As shown in Section 5.2.9, SLR will result in the gradual submerging of Mission Bay wetland habitats unless adaptive measures are implemented. For the purposes of wetland planning, SWLs under SLR scenarios are projected to pinpoint tidal elevations important to habitat and public use. Existing SWL elevations and future elevations based on the two selected SLR scenarios are provided in Table 3-3.

Table 3-3. Sea Level Rise Projected Still Water Levels

Datum	Abbreviation	Existing SWL (ft, NGVD 29)	3.6 ft SLR SWL (ft, NGVD 29)	7.0 ft SLR SWL (ft, NGVD 29)
Highest Observed Tide (11/25/2015)	HOT	5.49	9.09	12.49
Mean Higher-High Water	MHHW	3.00	6.6	10
Mean High Water	MHW	2.28	5.88	9.28
Mean Sea Level	MSL	0.41	4.01	7.41
National Geodetic Vertical Datum of 1929	NGVD 29	0.00	3.6	7
Mean Low Water	MLW	-1.42	2.18	5.58
North American Vertical Datum of 1988	NAVD 88	-2.13	1.47	4.87
Mean Lower-Low Water	MLLW	-2.32	1.28	4.68
Lowest Observed Tide (12/17/1937)	LOT	-5.19	-1.59	1.81

4 Preliminary Design

Water quality improvement and habitat creation are the primary objectives of this project. This section is intended to describe the preliminary design of wetlands restoration at the site, its probable construction cost, and preliminary project schedule.

The Mission Bay Park - Master Plan Update, adopted on August 2, 1994 and amended on July 9, 2002 (City of San Diego) identifies a portion of North Fiesta Island as a wetland restoration project. Open water areas of Mission Bay surrounding North Fiesta Island suffer from poor water quality due to insufficient water circulation and high input of contaminants (e.g., bacteria) from the inland watershed by Tecolote Creek, Rose Creek, and others (Tetra Tech, 1983). Water circulation is characterized by the residence time of seawater within a site (i.e., the frequency of tidal exchange). Assuming contaminant loads are held constant, more frequent tidal flushing (shorter residence times) result in higher water quality. Alternatively, with the same assumption, less frequent tidal flushing (longer residence times) results in poorer water quality. Tidal hydraulics analyses were used for North Fiesta Island as a quantitative method to determine tidal residence times.

Water quality and SLR factors were used to formulate a design approach for the North Fiesta Island wetlands project. Consistent with the project goals, the preliminary design intent is to create a diverse self-sustaining habitat area with representation of non-vegetated and vegetated areas that contribute to the overall health of Mission Bay. The diversity of habitat types supports the zonation of aquatic resources that benefit all trophic levels from macroinvertebrate species on the low end of the food chain to diverse avian species that preferentially feed within specific habitat types. The design response to anticipated SLR includes an emphasis on upper marsh habitat that functions under existing SWL elevations and will convert to lower marsh habitat types under future SLR elevations, as discussed in Section 3.2.2.

The preliminary design incorporates a tidal channel of appropriate depth and width to introduce the full tidal prism into the proposed restoration site to support diverse, self-sustaining tidal habitat types. In addition, the channel facilitates increased tidal exchange between Fiesta Bay and the water “behind” or east of Fiesta Island. The shortened tidal pathway through Fiesta Island is expected to improve water quality in open waters near the proposed Cudahy Creek Wetlands, Leisure Cove, and adjacent open water areas.

The grading design provides for a gentle transition from the wetlands restoration area into the Least Tern Preserve located at the northern tip of Fiesta Island. The restoration project will provide a native buffer to the south side of the Least Tern Preserve and establish resources that may be used by the terns for forage and potential nesting opportunities. Seasonal public access to recreational beaches adjacent to the restoration project will be maintained using bridges over the new tidal inlet channel in accordance with the Mission Bay Park Master Plan – Fiesta Island Amendment (PlaceWorks, 2018).

The preliminary design described below includes substantial earthwork and grading of the site to create a suitable mosaic of salt marsh habitat: subtidal, mudflat, low marsh, mid marsh, and high marsh over a majority of the project area. Higher elevation habitat occupies a portion of the project site to transition into

upland. The preliminary design also includes the construction of two bridges (each at 95 feet long x 25 feet wide) along Fiesta Island Road (west and east) and earthwork that converts a portion of the existing sandy beach on the west and east side of the project site to low marsh.

Figure 4-1 shows the preliminary habitat design for North Fiesta Island. Figure 4-2 shows a cross-section of the proposed wetland design and a portion of the adjacent Least Tern Preserve design. See Section 4.1 for a detailed description of the grading design, habitats, and other project components.

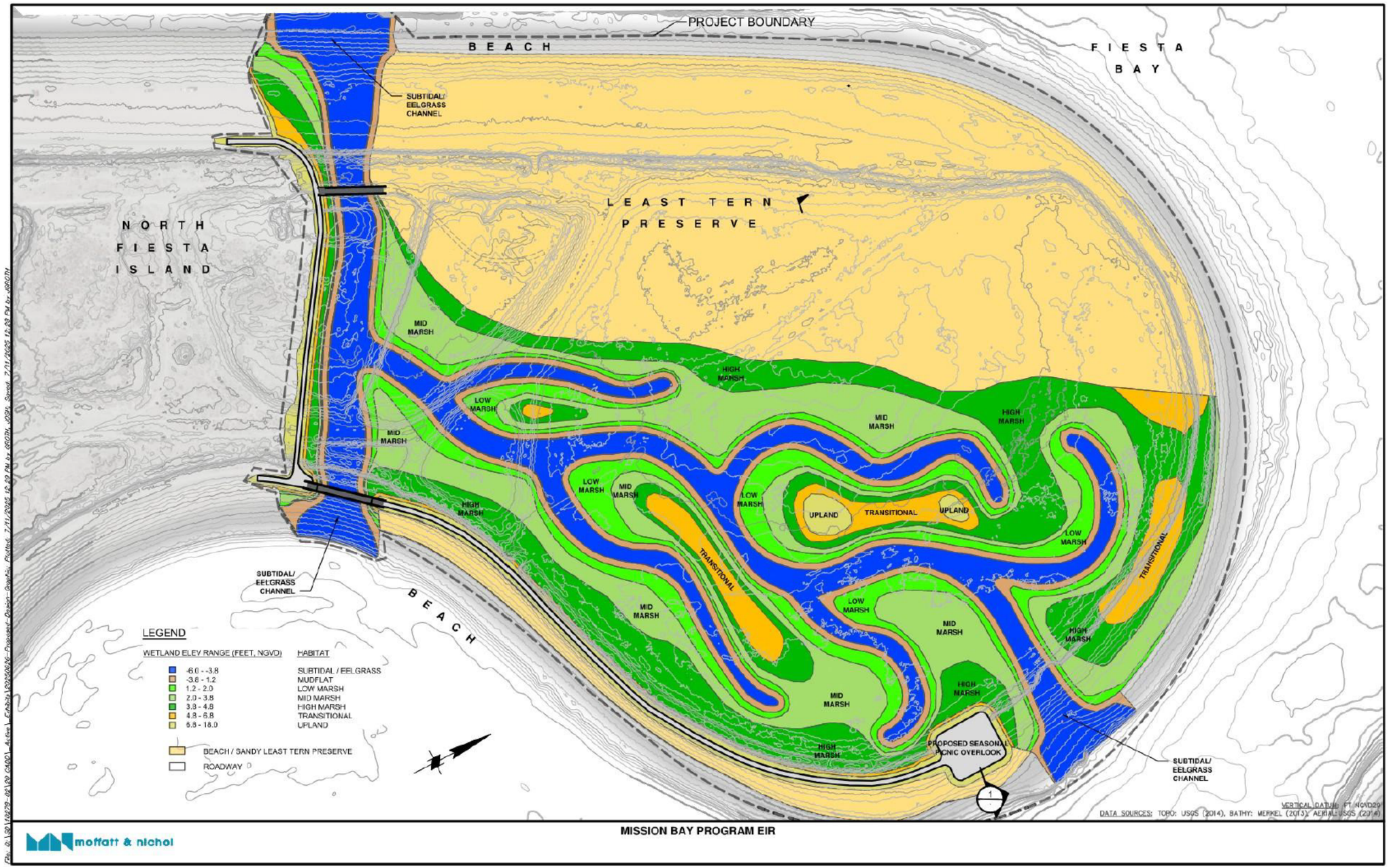

Figure 4-1. Preliminary Habitat Design

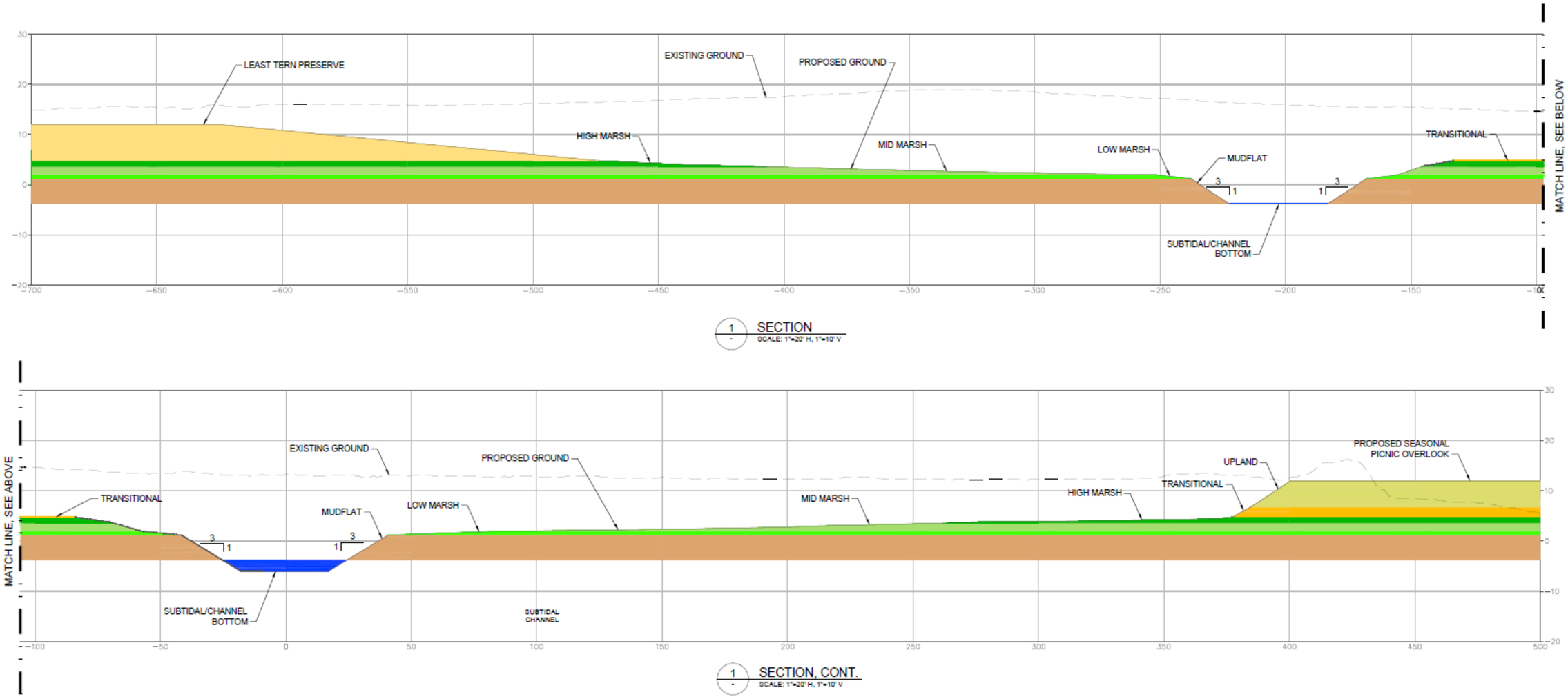

Figure 4-2. Cross-section of Proposed Wetlands

4.1 Project Components

The following sections summarize the proposed components of the wetland restoration concept.

4.1.1 Wetland Habitats

Under this proposed project, tides are introduced to the interior of North Fiesta Island and the tidal hydrology supports establishment of tidal wetland habitats to a large extent. Various other factors, such as suitable soils for marsh habitats and the tidal inundation frequency (i.e. frequency in which tidal wetlands are inundated) determines the type of habitat that will colonize the project location. Tidal hydrology varies throughout the site depending on tidal conveyance, seawater supply, and site topography/bathymetry. Site topography is above-water elevation, while bathymetry is below-water elevation.

The proposed project would create a gradient of balanced habitat types relative to existing conditions through site grading modifications. Site grading will lower the high elevations in the interior of the project site and convert the existing non-native uplands to salt marsh. The grading design includes a primary channel (or main channel), secondary channels, and wetland habitat areas (Figure 4-2). The orientation of the main tidal channel is from west to east, while the secondary channels are oriented in a north-south direction. The secondary channels branch off the main channel and are designed to distribute tidal waters and the nutrients they provide throughout the salt marsh system.

As reported in the Mission Bay Hydrology Study (Moffatt & Nichol 2019), there is no tidal lag between ocean conditions and Mission Bay. This means the water level of the channels will fluctuate with the ocean tide conditions. Therefore, during low tide cycles, the water level of the tidal channels will be low; during high tide cycles, the water level of the channels will be high. Conveyance of seawater throughout the main channel and secondary channels will create a mix of salt marsh habitat that includes subtidal/eelgrass, mudflats, low marsh, mid marsh, and high marsh. The proposed project also includes a transitional wetland area that allows for upward migration of the marsh as sea level rises. Non-tidal (i.e. transitional) and upland habitat will persist around the perimeter of the project area and may receive restoration treatments under the Expansion of Habitat Preserves task under the Mission Bay Park PEIR. The project will result in 41.4 acres of restored wetlands, 3.3 acres of upland improvements for public access, and 5.4 acres of beach.

The existing and proposed salt marsh habitat areas for the Project are listed in Table 4-1.

Table 4-1. Existing and Proposed Habitat Areas

Existing Habitats	Mapped Acreage	Proposed Habitats	Designed Acreage
Subtidal/Open Water	3.0	Subtidal	10.8
Mudflat	0.0	Mudflat	4.6
Low marsh	0.0	Low marsh	5.0
Mid marsh	0.0	Mid marsh	9.3
High marsh	0.0	High marsh	9.1
Transitional	0.0	Transitional	2.6
Disturbed Habitat/Upland	14.6	Disturbed Habitat/Upland	3.3
Disturbed Salt Marsh	14.0	Disturbed Salt Marsh	0.0
Sandy Least Tern Preserve	9.3	Sandy Least Tern Preserve	0.0
Beach	9.2	Beach	5.4
TOTAL AREA	**50.1**	**TOTAL AREA**	**50.1**

A detailed breakdown of the proposed wetland habitats and their elevation range is provided below.

Subtidal (elevation range is all areas below -3.7 feet NGVD 29)

Subtidal habitat is defined as shallow areas of open water that do not drain during each tidal period. Creating or restoring shallow subtidal habitat would benefit primarily benthic invertebrates, birds, and fishes. Some plant species, especially eelgrass (*Zostera marina*), require subtidal conditions and may colonize the deeper subtidal habitats. Eelgrass beds function as nurseries for fishes and invertebrates and are directly grazed by some bird species.

Common benthic infauna occurring in subtidal habitats include worm-like forms, such as polychaetes and spionids, and filter-feeding bivalves, such as California jackknife clam (*Tagelus californica*), little neck clam (*Protothaca staminea*), and bent-nose clam (*Macoma nasuta*). Epifaunal organisms, such as sea hare (*Aplysia californica*) and rock crab (*Cancer productatus)* forage on detritus and other food sources. These and other invertebrate taxa would benefit from restored subtidal habitats, in turn supporting higher order consumers that utilize these taxa as prey.

Fish species associated with the nearshore ocean habitat would be supported by deeper waters with a connection to the Bay. Such species as white croaker (*Genyonemus lineatus*) and northern anchovy (*Engraulis mordax*) that inhabit the mid-upper water column would be supported by subtidal wetland habitats, as would demersal species such as California halibut (*Paralichthys californicus*) and leopard shark (*Triakus semifasciata*). Resident estuarine fishes, such as arrow gobies (*Clevelandia ios*) and California killifish (*Fundulus parvipinnis*) would also exploit subtidal habitat and provide food for higher order consumers in the food web. Fish and benthic invertebrate species associated with eelgrass beds, such as bay pipefish (*Syngnathus leptorhynchus*), giant kelpfish (*Heterostichus rostratus*), grass shrimp (*Hippolyte californiensis*), and speckled scallop (*Argopectin*

aequisulcatus) would potentially benefit from creation of subtidal habitats. Herbivorous birds, such as brant (*Branta bernicla*), graze directly on eelgrass and may be expected to utilize eelgrass beds in areas of substantial subtidal habitat.

Increased populations of gulls and terns, including the endangered California least tern (*Sternula antillarum browni*) that nest nearby, and other fish-eating birds, such as osprey (*Pandion haliaetus*) and brown pelican (*Pelicanus occidentalis*), would be supported by the increased fish production associated with subtidal habitats.

Mudflat (elevation range from -3.7 feet to +1.1 feet NGVD 29)

Intertidal mudflat habitat is defined as unvegetated, unconsolidated mud or sand bottom habitat. Mudflat habitat is typically situated low in the intertidal zone, between subtidal habitat and low intertidal salt marsh. Mudflats are inundated and exposed during most tidal cycles.

Creating or restoring intertidal mudflat habitat would benefit primarily benthic invertebrates and birds, particularly shorebirds that forage on benthic invertebrates. Common benthic infauna associated with mudflats are similar to those described above for subtidal habitats and include polychaetes, spionids, and filter-feeding bivalves. Common epibenthic mudflat fauna include detritivorous molluscs, such as California horn snail (*Cerithidea californica*) and bubble snail (*Bulla gouldiana*), and omnivorous crustaceans, such as lined shore crab (*Pachygrapsus crassipes*), yellow shore crab (*Hemigrapsuis oregonensis*), and fiddler crab (*Uca crenulata*). Numerous varieties of insects also occur on mudflats at low tides where they forage on detritus, algae, and other food sources left by the receding tide.

Perhaps the most conspicuous animals of the intertidal mudflats are the shorebirds that forage on invertebrates and insects, and rest there during low tide. Most shorebirds are migratory and use the food-rich mudflats to build the energy reserves necessary for long flights. Wading birds, such as Western sandpiper (*Calidris mauri*), semipalmated sandpiper (*Calidris pusilla*), and dowitchers (*Limnodromus* spp.) would be expected to forage on the restored mudflats of Fiesta Island during their annual migrations.

Low marsh (elevation range from +1.1 feet to +1.9 feet NGVD 29)

Intertidal salt marsh ranges from low marsh, dominated by California cordgrass (*Spartina foliosa*), to a mosaic of primarily succulent species that comprise the mid-salt marsh, to high salt marsh dominated by species tolerant of infrequent inundation and high salinities. Each species occurs at its highest frequency within a unique elevation zone determined by the frequency of tidal inundation, salinity, duration of saturated soil, and temperature, although the salt marsh vegetation forms a continuum across the marsh plain as opposed to occurring in discrete elevation bands. Low salt marsh occurs from approximately +1.1 feet to +1.9 feet NGVD 29.

The salt marsh is the base of the food chain in estuaries and lagoons, converting energy from sunlight to plant tissue, which supports a host of consumers. Thus, the more intertidal salt marsh habitat that is created, the greater the benefit to additional taxonomic groups that depend on the salt marsh for energy, including

vascular and non-vascular plants, aquatic invertebrates, terrestrial invertebrates, aquatic vertebrates, and terrestrial vertebrates.

The low marsh provides food and structure for a number of invertebrate taxa, including insects, such as *Incertella sp.*, and snails, such as the salt marsh snail (*Melampus olivaceus*). These invertebrates provide food for fish species that forage within the vegetated low marsh during high tides. These include the longjaw mudsucker (*Gillichthys mirabilis*) and California killifish (*Fundulus parvipinnis*). The low salt marsh provides food, cover, and structure for nesting and roosting birds. Birds of the low marsh include rails, such as Virginia rail (*Rallus limicola*), sora (*Porzana carolina),* and the endangered Ridgeway rail (*Rallus obsoletus*).

Mid marsh (elevation range from +1.9 feet to +3.7 feet NGVD 29)

Salt marsh habitat that occurs between low and high salt marsh (mid salt marsh) is inundated irregularly by tides relative to the low marsh, but at a higher frequency than the high marsh. As a result, the plant species that inhabit the mid salt marsh are adapted to high soil salinities and long periods of exposure. Food is abundant in the form of algae and epifaunal invertebrates and insects that feed on algae. The vascular plants of the mid marsh also contribute to detritus-based food chain associated with salt marsh productivity, but not to the extent of the low marsh. Many of the invertebrates that inhabit the low salt marsh also occur in the mid and high salt marsh, although algal productivity declines with increased elevation with an associated decline in invertebrate species that depend on algal food sources. Similarly, fish species that exploit the flooded salt marsh are inhibited from exploiting the irregularly flooded higher salt marsh habitats.

Bird species are perhaps the most conspicuous animal of the mid marsh. Species such as willet (*Limosa fedoa*), long-billed curlew (*Numenius americanus*), and great blue heron (*Ardea herodias*) occur in these habitats. These species prey on fishes and aquatic invertebrates in adjacent channels and, in the case of herons, on terrestrial animals such as small mammals and herpetofauna. The state-endangered Belding's savannah sparrow nests and forages in the mid salt marsh. The sensitive butterfly known as the wandering skipper (*Panoquina errans*) depends on saltgrass (*Distichlis spicata*) that grows in the high marsh, and the endangered salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*) that also occurs in the high salt marsh. Mid salt marsh habitat typically supports the state-endangered Belding's savannah sparrow, as well as other bird species discussed above.

High marsh (elevation range from +3.7 feet to approximately +4.8 feet NGVD 29)

Intertidal high salt marsh occurs at elevations between mid-salt marsh and supratidal transition zone habitat. The high marsh is irregularly to intermittently flooded and the plants of this marsh habitat are adapted to hypersaline soil conditions. The upper elevation limit for high marsh is identified as being slightly higher than the theoretical value shown in the tidal inundation frequency curve in the following report section. This is based on information presented in the Feasibility Study for ReWild Mission Bay (Everest International Consultants 2018) and the fact that high marsh and transitional habitat intermingle and can occupy some of the same elevations. Algae and its role in the food web is almost non-existent in the high salt marsh due to desiccation from infrequent tidal inundation. As a result, invertebrates that depend on algae for food are

similarly absent, or present in low numbers. Similarly, fish and invertebrates associated with intertidal creeks do not occur in the high marsh. Plant species of the high salt marsh contribute to the primary productivity of the marsh system, but not to the extent of the mid or low salt marsh. Bird species that forage on insects and aquatic biota are less common and may use the high marsh as loafing areas. Small mammals, such as mice, may exploit the higher elevations of the high marsh where tidal waters rarely reach.

Transitional (elevation range from +4.8 feet to +6.8 feet NGVD 29)

Supratidal transition zone habitat occurs between the range of the highest high tides and non-tidal supratidal uplands. These areas represent a transition from the highest salt marsh plant species to upland plant species with both plant assemblages occurring within this relatively narrow elevation band. High soil salinities prevent upland species from invading the lower transition zone while upland species out-compete salt tolerant species at the higher transition zone elevations.

Transition zone habitat is very rare in Southern California coastal wetlands where development has encroached upon the edges of tidal lagoons and estuaries. As a result, this habitat is perhaps the least understood of all wetland-associated habitats. These habitats are known to provide refugia for salt marsh species, such as the Ridgeway rail, during extreme weather and tides, as well as additional foraging habitat. As stated previously, great blue herons are known to prey on small mammals and herpetofauna that inhabit transition and upland habitats. This report assumes that important plant pollinators, such as ground dwelling bees, occur in the transition zone.

The transition zone is also important in terms of adapting to increases in tidally driven water levels (i.e., SLR). Should sea levels rise as predicted, areas of low and mid salt marsh will be inundated more frequently and by increasingly deeper water, ultimately converting to subtidal habitat. Under this scenario, the transition zone will convert to intertidal salt marsh. Thus, inclusion of transition zone in restoration alternatives provides a potential mechanism for maintaining the biological diversity of the wetland in the future.

The adjacent uplands and proposed Least Tern Preserve habitat shown along the western edge of North Fiesta Island will replace the existing preserve and is part of a separate PER. Approximately 9.3 acres of existing upland Least Tern Preserve habitat will be graded and converted to intertidal salt marsh habitat. However, a new Least Tern Preserve will be constructed along the west side of North Fiesta Island to replace the existing one and offset these construction impacts. See the Uplands PER for analysis of the proposed Least Tern Preserve, which is 27 acres.

4.1.2 Wetland Hydrology, Hydraulics and Water Quality Analysis

Tidal hydraulics of the proposed design were analyzed to address the impacts to tidal inundation frequency, hydrodynamics, and residence times (Moffatt & Nichol 2019). Tidal hydraulics field observations and modeling were analyzed to define future tidal elevations and corresponding habitat evolution with as much precision as possible. Habitat distribution is important to analyze in as much detail as possible at all stages of the project to maximize the probability that the final product will match expectations.

Tidal Elevations

Tidal elevations in Mission Bay are very similar to those outside the Bay. Due to the wide and deep geometry of the entrance channel, no tidal muting occurs within the Bay. This means that the tidal range at the proposed salt marshes will remain the same as in the open coast. For this reason, there is no potential for the revised salt marsh grading plan to affect tidal elevations.

Figure 4-3 shows modeled water surface elevations for the North Fiesta Island wetland location and the open coast. As discussed above, the full tidal range will reach the proposed salt marsh at North Fiesta Island. This is a desirable condition for salt marsh restoration because it allows the full range of habitats (subtidal, mudflat, low marsh, mid marsh, high marsh, transitional, upland) to be established within the project area.

Tidal datums at the Fiesta Island saltmarsh location were estimated in M&N (2019) and are provided in Table 4-2 below. The table lists spring tide datums, which are representative of the highest and lowest water elevations known to occur on a regular basis; while Table 4-3 lists the MHHW and MLLW datums, which are representative of the average high and low water conditions known to occur every day. The spring tide range (Spring High Tide – Spring Low Tide) throughout Mission Bay, including the proposed project, is approximately 8 ft, while the diurnal tide range (MHHW – MLLW) is about 5.8 ft.

Table 4-2. Spring Tidal Elevations Predicted for Fiesta Island

Station	Spring High Water (ft, NGVD 29)	Spring Low Water (ft, NGVD 29)	Spring Tidal Range (ft)
Offshore	4.4	-3.6	8.0
North Fiesta Island (West side of Channel)	4.5	-3.7	8.1
North Fiesta Island (East side of Channel)	4.5	-3.7	8.2
South Fiesta Island	4.5	-3.7	8.1

Table 4-3. Average Tidal Elevations Predicted for Fiesta Island

Station	MHHW (ft, NGVD 29)	MLLW (ft, NGVD 29)	Diurnal Range (ft)
Offshore	3.3	-2.4	5.7
North Fiesta Island (West side of Channel)	3.4	-2.4	5.8
North Fiesta Island (East side of Channel)	3.4	-2.4	5.9
South Fiesta Island	3.4	-2.4	5.8

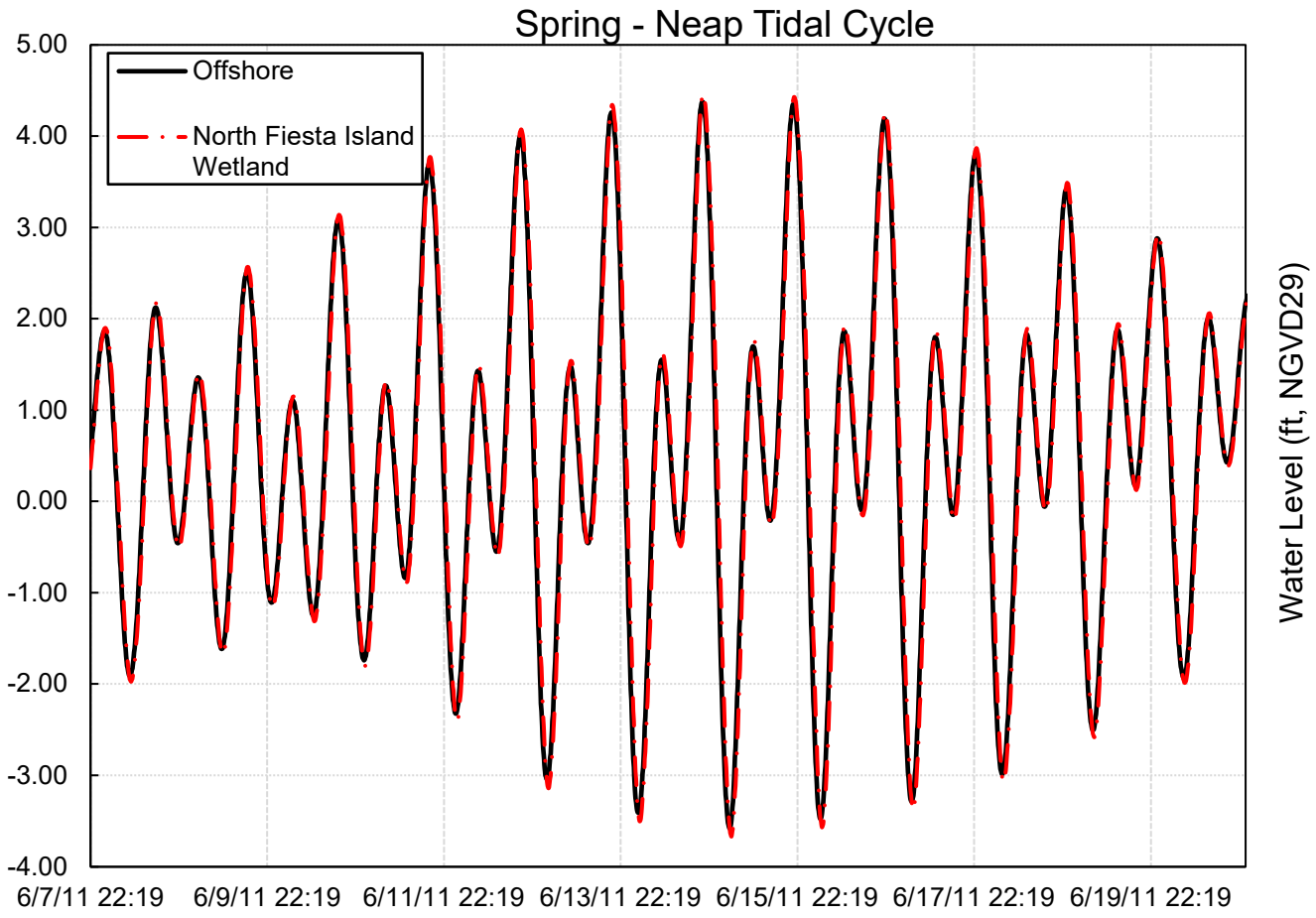

Figure 4-3. Modeled Tides at the Proposed Saltmarsh and Open Coast

Tidal Inundation Frequency

Tidal inundation frequency analysis was performed with tidal hydraulic modeling results. Inundation frequency is the percentage of time that the tidal elevation exceeds a certain elevation. This is an important factor for habitat design because vegetation establishment and distribution depends on the inundation frequency at the site. Figure 4-4 presents the tidal inundation frequency curve for the proposed wetland and the open coast. Since there is no tidal muting at the North Fiesta Island wetland, both curves are right on top of each other. The elevations and percentages shown on the graphic pertain to the various habitats to colonize the site. The high and low tides are not muted; therefore, the vertical zonation (range of occurrence) of intertidal habitat is relatively broad (compared to a muted condition) and is approximately 8 feet.

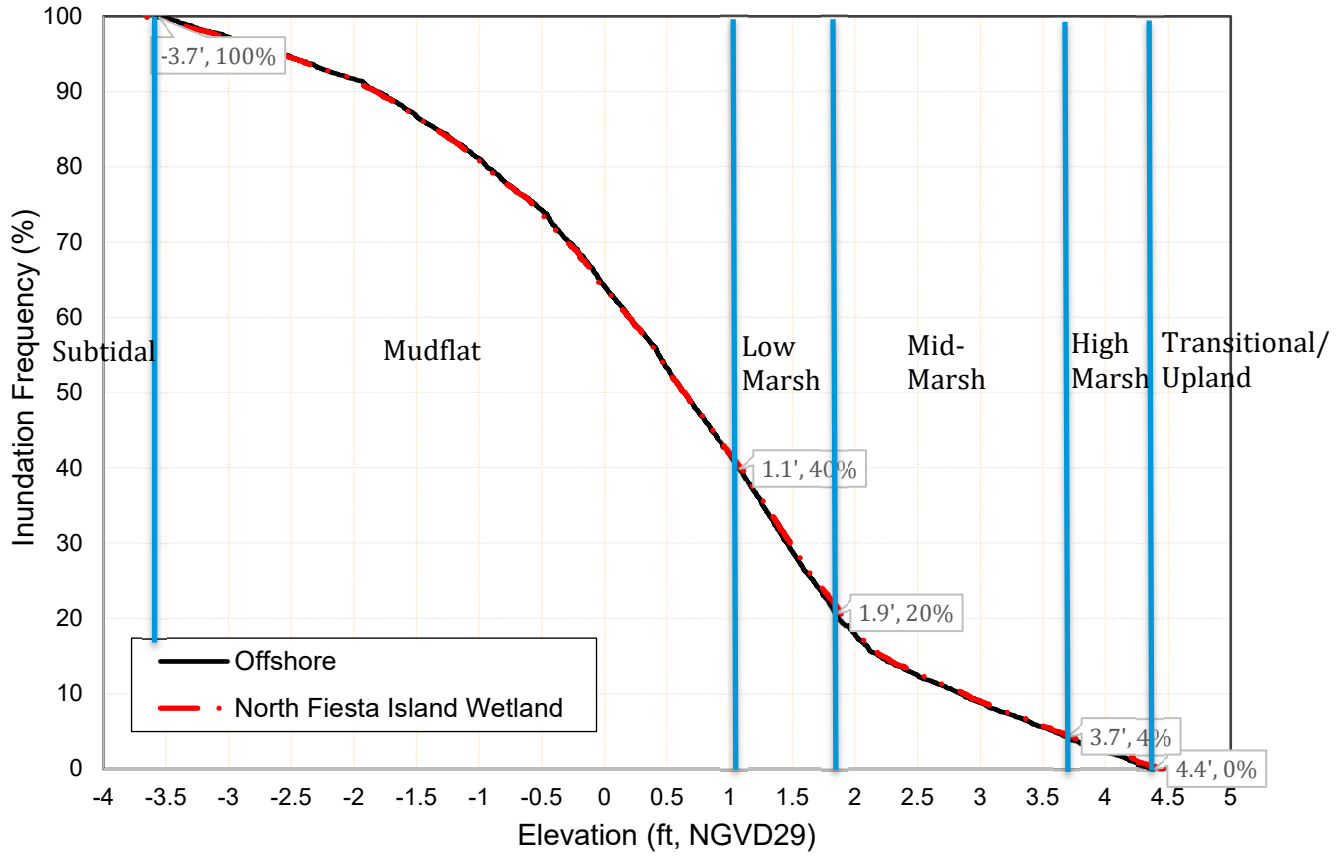

Figure 4-4. Tidal Inundation Frequency

Tidal Velocities

As opposed to the water surface elevations, tidal current velocities have a more variable distribution in time and space. Earlier versions of this report documented peak tidal current velocities at the North Fiesta Island wetland, which were computed with the Mission Bay Hydrodynamic model (M&N, 2019). Currents throughout the wetland were generally found to be weak and subtle, with peak velocities reaching up to 0.2 ft/s at specific locations in the main channel of the wetland. Although the hydrodynamic model has not yet been updated to reflect the latest salt marsh grading plan, the overall magnitude of the tidal currents is not expected to change significantly. A subtle tidal circulation is still anticipated throughout the wetland, supporting a safe and low-energy environment for visitors. As a reference, the Mission Bay entrance channel peak flood and ebb velocities are around 1.9 ft/sec and 2.5 ft/sec, respectively.

Residence Time

A water residence time analysis was conducted during previous modeling efforts. Earlier versions of this report documented that implementation of the proposed saltmarsh at North Fiesta Island could promote slightly shorter residence times on the far eastern side of the Bay, an area known for its poor water quality. Per previous analysis, the estimated water residence time east of Fiesta Island is more than twice as long as

in areas west of Fiesta Island (see Figure 4-5)1. Implementation of the proposed saltmarsh is predicted to reduce residence time by a few hours in waterways east of Fiesta Island. While updated hydrodynamic modeling would be required to account for changes in the saltmarsh grading plan, the previously reported residence times are not anticipated to change significantly.

Note that greater improvements to the water residence time and thus water quality would be realized with implementation of the Tecolote Creek Wetland (M&N,2021) restoration project, which would include breaching the existing Fiesta Island Causeway to enhance the overall circulation on the far East Side of the Bay.

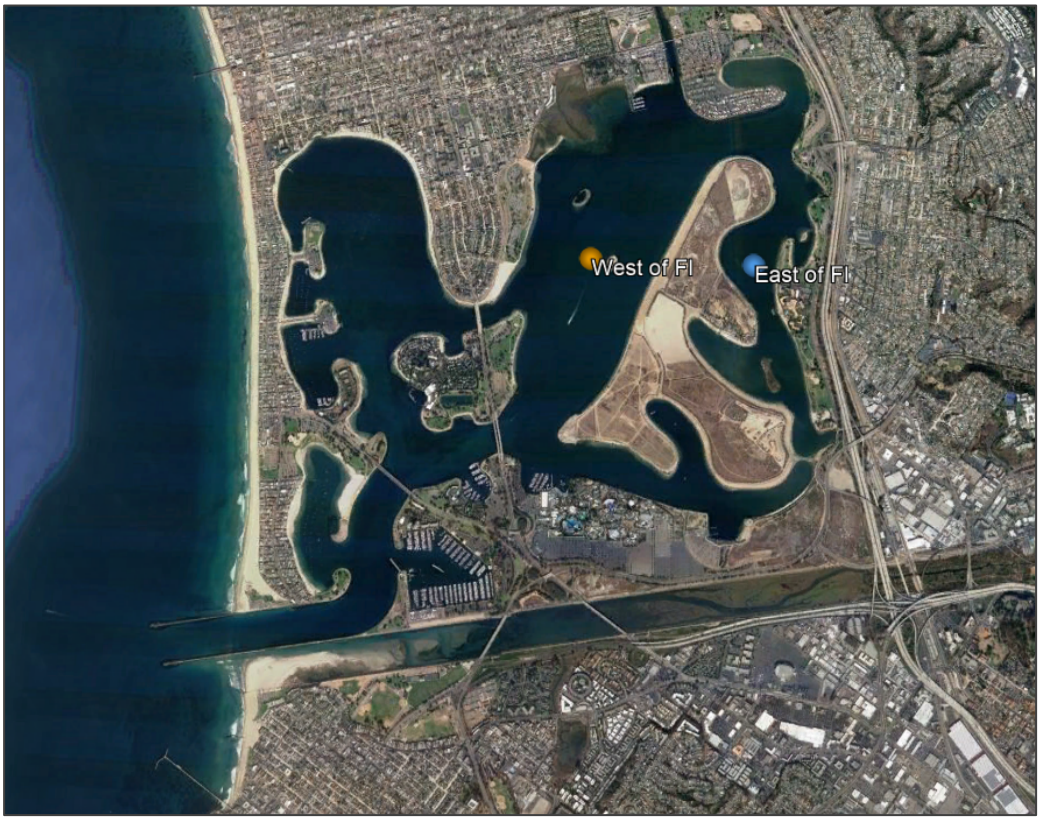

Figure 4-5. Data Extraction Points for Residence Time Analysis

Water Quality Implications on Habitat Design

Poor water quality in the open waters surrounding North Fiesta Island can be locally improved through wetland habitat creation. Runoff from the upland Fiesta Island will be partially directed into the wetland, which will capture suspended sediment and filtrate water. Furthermore, increased dimensions on the main channel

[1] Previously estimated water residence times for areas west and east of fiesta island are 10 and 27 days, respectively.

of the proposed saltmarsh, which connects waters on the east and west side of Fiesta Island, has potential to further decrease water residence times in that region.

Water quality has a direct effect on all trophic levels of the food chain in Mission Bay. Decreasing water residence times is a first order indication of water quality improvements. . Areas of Mission Bay with higher tidal exchange exhibit healthy eelgrass populations. Eelgrass supports bay fisheries and nurseries that replenish important fish stocks. These fisheries are utilized for forage by sensitive and listed species such as the endangered least tern. Water quality also promotes microbenthic invertebrates that are important foraging areas for shorebirds within Mission Bay. Accordingly, efforts to improve water quality through non-vegetated and vegetated marsh habitat establishment, and the creation of a new tidal exchange channel through North Fiesta Island provides multiple benefits to the Mission Bay ecosystem.

4.1.3 Bridge Access

Two bridges are proposed for the project – one that connects the redesigned Least Tern Preserve to Fiesta Island Road and one along the east side of Fiesta Island Road. Both bridges will be required to span over the proposed main channel, which bisects North Fiesta Island from the remainder of the Island (see Figure 4-1). These bridge facilities will create a connection from the restored areas to North Fiesta Island and allow public access along some areas of the wetlands site. The bridge connecting to the Least Tern Preserve will be restricted to scientific teams, land managers, and maintenance personnel only. Each bridge will be supported by reinforced concrete piles, which will be driven into the existing ground at the site. Although bridge and roadway design is beyond the scope of this project, each bridge will be ADA compliant and will fully-span the channels. Alternatively, culverts can be used to connect the wetland with the Bay if the City does not wish to consider bridges. Bridges are more expensive than culverts; however, culverts restrict tidal flow and can be a safety hazard to users of the Bay. Culverts also impede wildlife movement while a bridge allows for clear passage beneath the roadway by shore birds and other wildlife.

4.1.4 Fencing

The existing chain link fence that presently traverses the site will be removed during construction and a new one will be installed along the southern perimeter of the project. A new 6-foot-high chain link fence is assumed for the project - to provide a physical barrier between the restored wetlands and the remainder of North Fiesta Island. The fence's function is to restrict access and allow the site's vegetative community time to develop and mature post-construction. The fencing will also reduce the risk of damage to the salt marsh caused by either foot traffic, animals, or unauthorized vehicular traffic. While a 6-foot-high chain link fence is assumed for this project, other exclusion fence types may be explored and evaluated. Gates with locks will be installed at each bridge entry point to restrict access to seasonal usage, monitoring and maintenance, and tours if desired.

4.1.5 New Roadway

The segment of Fiesta Island Road that loops around North Fiesta Island must be demolished because of the restoration effort planned for this project. However, a new roadway segment will be constructed along the southern project boundary to ensure one-way traffic continues around the island. The roadway width and

road material will be constructed to match the existing road design along the eastern and western edges of Fiesta Island. A paved bridge approach will connect this new roadway to the bridges described in Section 4.1.3 above.

4.2 Preliminary Drawings

A preliminary set of construction drawings of the project can be found in Appendix A. Drawings are currently in draft phase and are not for construction. Drawings of the North Fiesta Island Wetland Restoration include the project components and design criteria stated in Section 4.1.

4.3 Preliminary Opinion of Probable Construction Cost

To determine a cost estimate for this preliminary design, unit costs were derived from the City of San Diego Unit Price List and similar project cost estimates. The cost estimate for construction of the preliminary design is categorized by line item as shown in Table 4-4. The cost in the table represent present-day cost and are not escalated, as the implementation schedule for this project is not known. Also, per the American Association of Cost Estimating for Class 4, the accuracy of this Opinion of Probable Construction Cost can vary from plus 30% higher to minus 20% lower.

Table 4-4. Preliminary Opinion of Probable Construction Cost

Item	Unit	Quantity Total	Unit Price	Cost
1. Mobilization/Demob of Equipment	LS	1	$1,123,800	$1,123,800
2. Earthwork and Stockpiling	CY	810,000	$13.40	$10,854,000
3. Irrigation with 1 Year of Plant Establishment	LF	7,515	$18.92	$142,184
4. Plantings	AC	31.5	$147,294	$4,497,570
5. Vehicular Bridges	SF	2,920	$600	$1,752,000
6. Pedestrian Bridges	SF	3,580	$400	$1,432,000
7. Clear and Grub	AC	44.7	$63,130	$2,821,911
8. Install Chain Link Fence – 6'	LF	1,375	$20	$27,500
9. New Roadway Construction	LF	1,050	$120	$126,000
10. Traffic Control	LS	1	$484,745	$484,745
11. Cut/fill construction haul route	LF	7,500	$45	$337,500
12. Field Office	LS	1	$10,000	$126,000
Subtotal Direct Construction Cost	NA	NA	NA	*$23,599,210*
Construction Indirect Costs (Overhead, Bond, Profit)				*$8,019,012*
Contingency (25% of Total Construction Cost)				*$7,904,556*
Total Construction Cost (Rounded)				**$39,523,000**

Item	Cost
Total Construction Cost	$39,523,000
Planning and Design (40% of Construction Cost)	$15,809,200
Environmental Permitting (5% of Construction Cost)	$1,976,150

The planning and design cost estimate is based on 40% of the total construction costs. Additionally, the environmental permitting cost is based on 5% of the total construction costs.

The cost is relatively high for two reasons. First, there are two bridges included in the project that span the main channel that would extend across North Fiesta Island. Second, the quantity of earthwork is high due to the elevation of the site. Also, the costs to irrigate and plant the habitat are higher due to the distance from a water source, see Section 5.2.2. Potable water is recommended for consideration to eliminate issuance of reclaimed water into Mission Bay, which may trigger agency concerns.

The construction cost estimate assumes the following conditions apply:

1. Staging of 810,000 cubic yards of surplus soils can occur at three sites: 1) the kelp drying and sand processing area of Fiesta Island, 2) the Over-The-Line Area on Fiesta Island, and 3) at the end of the Fiesta Island Causeway on Fiesta Island. Distribution of the surplus soils will be proportional to the amount of area available at each stockpile site. This assumption needs to be confirmed as it is key to keeping project costs and impacts manageable. Staging could occur elsewhere on Fiesta Island, but the cost may increase if it is farther from the wetland site than the three identified stockpile areas. See Section 5.1.2 for more details about the stockpile areas. The stockpiled material is useful for other wetland projects and potential other future problem areas within Mission Bay for future adaptations during SLR.
2. Construction is done in the dry with typical earthmoving equipment such as scrapers, loaders, and off-road trucks. Work in the wet will be limited to the deepest channels, and that material can be stockpiled and dried at the kelp processing site with other materials.
3. Surplus earth material is not hauled off-site due to the need for future beneficial re-use of the material, and the potential impacts that could occur to traffic/circulation, public safety, air emissions, energy consumption, noise, and road infrastructure.

4.4 Preliminary Project Schedule

The wetland restoration project can be constructed within a total time frame of 12 months with two assumptions: construction will be accomplished using conventional equipment and the surplus soil will be staged at the three stockpile areas described in this report. Due to its proximity to the Least tern Preserve, a construction buffer will likely be required by the regulatory agencies to allow construction to continue uninterrupted. Otherwise, the construction timeframe must be extended. This study recommends the buffer distance be negotiated with the agencies, as the distance can vary between 300 feet and 500 feet. If the agencies are amenable to buffer distances less than 300 feet, the project should try to do so. The bridges will require a minimum of 6 months to construct, and they are assumed to be pre-cast concrete structures that can be hauled onto the site and assembled. If bridges are not desired for the project, then culverts can be installed as an alternative during the last month of the project without affecting the hydraulics if they are sized appropriately. The last act will be to breach the openings to the channels that connect the wetland to Mission Bay.

The construction schedule can be found in Appendix B. If construction can start immediately after Labor Day with mobilization of equipment onto the site, earthwork can proceed and be completed within 195 working days (8 calendar months) assuming a production rate of the earthmoving equipment between 4,000- 5,000 cubic yards per day. The schedule shows a duration of fourteen months for earthwork, including clear and grub operations and with overlapping at the end of the earthwork phase by installation of irrigation. After irrigation installation is partially complete, planting can be initiated to overlap with the remaining irrigation installation. Both planting and irrigation require one month each, with two weeks overlap.

The number of working days to complete the work could change depending on whether the contractor works a five- or six-day work week. For this report, the project schedule durations assume no work during the major holidays (Thanksgiving, Christmas, and New Years). The remaining time available will need to be used for installation of irrigation and planting.

5 Other Considerations as Appropriate

5.1 Feasibility Analysis of Constructability

This section presents information about construction such as the approach, material re-use options, equipment needs, and phasing. Each subject is discussed below.

5.1.1 Construction Approach

The project will be constructed in two phases (Phase 1 and Phase 2). At the time of this study, it is assumed the Least Tern Preserve will be constructed in Phase 1, and the tidal salt marsh will be constructed in Phase 2. The phases can be constructed as part of one construction bid or they can be constructed as separate bid packages. Construction is anticipated to mostly occur in the dry using conventional earthmoving equipment. This is due to the existing site topography being relatively high above groundwater, the large quantity of material to be removed, and the potential time restriction for removal due to nesting season restrictions. Each factor is discussed below.

The average site elevation is approximately 11.2 feet NGVD 29 and the average elevation of the proposed wetland is +2.1 feet NGVD 29, so most of the excavation is done above the mean tide level of +0.43 feet NGVD 29. Mean tide level is likely to represent groundwater level encountered during excavation. Lower elevations are included in the proposed project, but those are at the center of channels near the inverts. Working in dry conditions can be more efficient and require shorter time periods when compared to working in wet conditions using a dredge. The quantity of soil to be removed or "cut" is relatively large at approximately 99,000 cubic yards for Least Tern Preserve construction and approximately 810,000 cy for the salt marsh construction. This quantity will require at least 45 working days to construct the Least Tern Preserve and at least 270 working days for salt marsh restoration if the work is done as efficiently as possible.

Nesting restrictions are imposed from February 15th to September 1st (with some flexibility on the end date for certain bird species) for the California Least Tern nesting area, limiting excavation activities to 5.5 months each year - unless the regulatory agencies allow for construction work to continue with mitigation measures in effect, such as construction setbacks \ buffers. Buffer distances vary from 300 feet to 500 feet depending on if birds are observed to be foraging or nesting within the work area. A shorter buffer distance can be negotiated in permits to allow some construction during nesting season.

Earthwork in the dry is loud and disturbing, so distance buffers from the nesting area would be required to enable earthwork to occur during the nesting season. If a continuous construction schedule is not allowed by the regulatory agencies, then the schedule for construction could be extended for potentially two or three nesting seasons. Working over more than one off-nesting season period will likely require the contractor to halt work, demobilize, leave the site for 6 months, and then remobilize and return. This stoppage of work and remobilization of equipment and construction crews could prolong the project for multiple years and add to the construction cost and additional impact. To avoid this, the City may wish to: 1) work ahead of time with the agencies to allow the construction to continue during the breeding and nesting

season even if unanticipated delays or complications occur or 2) carefully plan and contract for the construction to start, stop, and restart again in the months outside of the breeding restriction – as noted above this option is not ideal and will result in a lengthy construction schedule and extended periods of disturbance to birds.

One other factor that complicates construction is the approach to connecting the waters of the wetland to those of Mission Bay. The connections can be either open channels that would require bridges at the public roadway or large culverts. The advantage of culverts would be a shorter construction period. The disadvantage of culverts is that they are hydraulically less efficient than open channels and would restrict tidal flows intended to improve water circulation. They may also pose a public safety threat to people unless well marked, cordoned off, and screened over the opening. The use of bridges would require more time to construct the structures, and they are also more expensive than culverts. A possible compromise is a pre-cast bridge structure that can be transported to the site and set in place over the channel. This report assumes the use of bridges as the primary connection approach to North Fiesta Island but also addresses culverts for consideration. Use of either water conveyance feature would not affect the schedule as both can be installed at a minimum within a 6-month construction timeframe.

As stated previously a large quantity of surplus soils will be generated by this project. Therefore, three potential stockpile areas were identified on Fiesta Island to store the earthen material. This study assumes a temporary earthen road will be constructed through the center of Fiesta Island to create a haul route that connects the restoration work area to the stockpile areas during construction. Descriptions of the stockpile areas and a graphic showing the haul route are provided in Section 5.1.2. Traffic control will be required during construction at Stockpile Site #1 and Stockpile Site #3.

5.1.2 Material Disposal/Re-use Options

An opportunity for material re-use is available in the coordination of adjacent wetland restoration projects planned in Mission Bay. The Cudahy Creek Wetland Restoration, Tecolote Creek Wetland Restoration, and North Fiesta Island Wetland Restoration projects could be grouped together under one or more construction contracts to allow for the contractor to strategically balance the cut and fill volumes across two or more sites. The construction efficiency gained in this opportunity would also reduce the total construction schedule and costs of all wetlands.

Construction of the Least Tern Preserve and North Fiesta Island Wetland Restoration could occur as a single event, or they could be constructed as separate events with different construction schedules. Either way, efficiency can be maximized by allowing stockpiling of the excavated surplus soils on Fiesta Island at one or more locations nearest to the excavation area. The three potential stockpile areas identified for the project are shown in Figure 5-1 below. The sites are near the restoration work area and include:

- Site #1 – the kelp drying and sand processing area adjacent to the restoration site. This is a 15.9-acre area just south of the proposed wetland restoration area at North Fiesta Island.

- Site #2 – the stockpile area near Tecolote Creek at the end of Fiesta Island Road causeway. This area is 17.4 acres.
- Site #3 – the Over-the-Line tournament area at the center of North Fiesta Island. This area is 29.3 acres.

Figure 5-1. Fiesta Island Surplus Soil Stockpile Sites

The stockpiled soil material can be beneficially re-used in restoring other wetland sites that need the soils, such as Tecolote Creek wetlands and Cudahy wetland. Earthmoving equipment would be able to efficiently remove material from the wetland site, transport it the relatively short distance to the stockpile site and return for another load. This is the lowest cost option for material disposal/re-use. Trucks may be required for longer distances.

Stockpiling the surplus soils on Fiesta Island could potentially cause some impacts to traffic on the Island and just off the Island. In addition, hauling the material off the Island would impact the single lane access over the causeway, potentially back-up the traffic signal at East Mission Bay Drive and potentially back-up the traffic

signals at the freeway on-ramps to I-5 from Seaworld Drive. Any wet material would have to be dried prior to hauling, or it would have to be hauled off in sealed trucks, adding additional time and soil transportation costs.

Retaining the material in the stockpile areas within Mission Bay would also be prudent so that the surplus soils could be re-used beneficially later as an adaptation strategy for SLR. Some sites within the Mission Bay Master Plan area are relatively low lying and may need to be raised or bermed in the future to prevent or manage flooding.

If the material cannot be stockpiled on-site, it would have to be hauled off the Island and placed elsewhere and disposed of appropriately. The total quantity of surplus soil material produced by this project exceeds landfill capacities so it would need to be disposed of and/or re-used in other ways. Examples of other material uses that could potentially be applied in combination are listed below:

- Fiesta Island could potentially be enlarged/reconfigured in surface area by using the surplus material to fill portions of Mission Bay;
- Delivery to other wetland restoration sites within Mission Bay
- Delivery to other sites within the Mission Bay Master Plan area that need material, such as the upland habitat preserves;
- Brokered off to another project within a reasonable driving distance from Fiesta Island;
- Disposal at an upland landfill if dry;
- Potentially used for the living shorelines conceived at Mission and Ocean Beaches, and
- Disposal at an offshore ocean disposal site by barge for material excavated below the mean high tide line.

5.1.3 Equipment Needs

The suite of equipment needed to perform construction of the wetland in the dry condition with stockpiling on the Island is estimated to be:

- Scrapers with a capacity of 30 cubic yards each (5);
- Excavators (4);
- Off-road trucks with a capacity of 16 to 18 cubic yards each (12);
- Front-end loaders (5); and
- Bulldozers (5).

For wet material removal, such as the lower elevations of channels and areas where groundwater might be encountered, dewatering and amphibious excavators may be a useful component of the equipment suite. Alternatively, if a contractor chooses to build the project in the wet, one or more dredges could be used to pump the material to a disposal or re-use location. Dredges are quiet compared to earthmoving equipment and less disturbing to nesting birds. However, the dredges would need to be “fed” by earthmoving equipment, so land-based construction would be required in either case, thereby triggering the bird nesting restriction.

Dredging would likely require more time than earthmoving as the production rate of a relatively small dredge is approximately 1,000 cubic yards per day, as experienced with dredging at San Elijo Lagoon in 2019.

5.1.4 Construction Access Points

Land-based construction equipment would access the site via the Fiesta Island Causeway from East Mission Bay Drive. If water-based construction equipment is used, it could also be delivered over the Causeway or delivered over water from the Bay. Storage and standing areas can be proposed by the Contractor for approval by the City. Possible storage and staging areas may be on land on disturbed upland habitat adjacent to the site, or over water by barge.

5.1.5 Maintenance and Monitoring Requirements

Operations and maintenance will be required for the wetland. The most intensive actions may include:

- Trash removal;
- Weed removal from transitional and upland habitat areas and the Least Tern Preserve;
- Channel/culvert maintenance;
- Perimeter fence repair;
- Periodically transporting and re-supplying sandy soils to the Least Tern Preserve; and,
- SLR adaptive management.

Maintenance should occur regularly to ensure the habitat functions at the highest level possible for the site.

If culverts are used on-site, inspection and maintenance of the culverts should be conducted periodically to ensure proper functioning. Inspection and maintenance frequency will vary with site conditions, such as floating debris, which can plug channel openings, marine fouling organisms (mussel growth), and vandalism. Inspections are recommended every year, with periodic cleaning (if necessary) to maintain smooth operation. Inspections should verify the condition of the openings and routine monitoring of the wetland water levels to confirm unimpeded connections. Debris removal should also be included in the maintenance.

If a marine biofouling develops inside the culvert pipe, the fouling may have to be periodically removed. Cleaning of the culverts could be conducted with a hand scraper or power washer to remove bio-fouling and accumulated sediment – this is recommended only if the accumulated marine organisms interfere with conveyance of water through the pipes.

Note that when a wetland is initially restored, nutrients are sometimes mobilized on a grand scale and a bio-fouling community may quickly develop inside culverts. Continued flushing of the wetland system reduces the nutrient load and thereby also reduces the nutrient dependent marine fouling community.

A pre- and post-construction monitoring program will likely be required by the CCC to quantify changes to baseline conditions of the site over time. The monitoring plan should be integrated into existing work at Mission Bay Wetlands by local universities and potentially coordinated with the regional monitoring program

devised by the Science Advisory Panel for the Southern California Wetlands Recovery Project. Monitoring should occur for the lifetime of the project and include tidal elevations at several points and measurements of salt marsh biomass, water quality, and habitat condition and distribution.

Issues with compromised habitat conditions or hydrology would need to be addressed through adaptive SLR management. Adaptive management may include minor grading, weeding and replanting, installation of predator abatement devices, culvert modifications, and periodic thin-layer sediment augmentation may be required decades from now to maintain appropriate tidal/land elevation relationships that support the target marsh habitat diversity.

5.2 Risk Assessment

Various risks are prevalent when undertaking a wetland restoration design process. This section explores the variety of risks to help shed light on the potential future challenges that may be encountered. By documenting the risks, and developing an understanding of common challenges, future pitfalls may be avoided or minimized to achieve the best possible outcome. The multiple potential risks are summarized below. A Risk Assessment Table containing the information from the risk assessment is provided in Appendix C.

The Risk Assessment Table was prepared based on three criteria: (1) probability of each risk occurring, (2) the potential impacts to cost, and (3) the potential impacts to time until project completion. Each risk was given a value of either very low, low, moderate, or high for each of the three risk assessment criteria. Additionally, a strategy and response action for each risk was determined.

5.2.1 Land Ownership

North Fiesta Island is located within Mission Bay Park, in San Diego, CA. It is owned and maintained by the City of San Diego. As such, there are no known land ownership conflicts that may present risk to this project.

5.2.2 Utilities

A review of existing utilities was performed utilizing data from SanGIS, published by the City of San Diego Public Utilities Department and SANDAG. No existing major utilities were found within the project footprint. The only items that could be construed as potential utilities are:

1. 6 miscellaneous posts on the beach along the western shoreline of North Fiesta Island to be removed;
2. 4 miscellaneous pipes located 200 feet away from the southern project boundary and 300 feet away from the centerline of Fiesta Island Road – to be removed; and,
3. 14 fire pits on the beach along the western and northern shorelines – to be relocated.

The contractor will be required to take due precautionary measures to protect any existing utilities or structures located at the work site. It is the contractor's responsibility to contact the owners of sewer, gas and electric, water, and storm drain outfall utilities or structures prior to any excavation for verification and location of utilities and notification of commencement of work.

5.2.3 Existing Soil Data

North Fiesta Island soils have been investigated through past geologic investigations. Compromised, or contaminated soils have not been identified on the site. However, soils in North Fiesta Island have been characterized for grain size and they have a median sediment grain size (D_{50}) of 0.24 mm, representing fine sand. Being a man-made island, North Fiesta Island is composed of Artificial Fill. The soils were identified to have "high potential for liquefaction due to high groundwater…and hydraulic fills" (The Bodhi Group 2018). Cone penetration testing of North Fiesta Island was performed at a single location; results of the identified soil behavior are shown in Figure 5-2 (The Bodhi Group 2019). The upper ~15 ft of material is primarily composed of sand, underlain by ~20 ft of primarily clay material. The current extent of soil investigations on-site is likely insufficient to fully describe the material on-site. Therefore, further geotechnical and chemical investigations may be required to progress to final permitting and design. Such supporting studies and permits are not incorporated in the construction cost estimate.

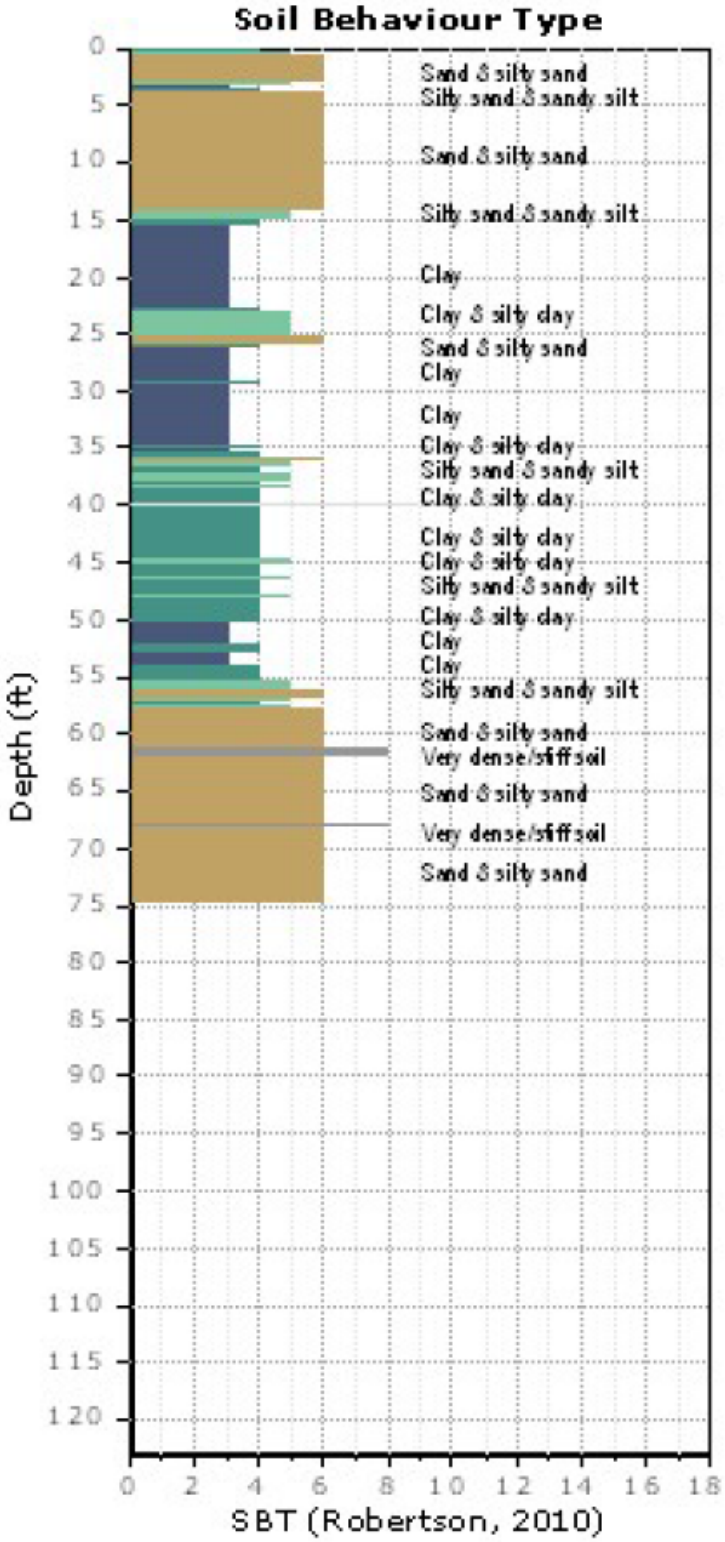

Figure 5-2. Soil Behavior Type – North Fiesta Island (The Bodhi Group 2019)

5.2.4 Proximity to Neighbors

North Fiesta Island Wetland Restoration is located within east Mission Bay. It's surrounded on its western and eastern sides by navigable waters. On its northern border is the upland Least Tern Preserve, and on its southern border is Fiesta Island uplands. Creation of the North Fiesta Island wetland will reduce public access within Fiesta Island. However, the restoration project is identified and anticipated in the Mission Bay Park Master Plan – Fiesta Island Amendment (PlaceWorks, 2018). Construction activities have the potential to impact neighbors in a multitude of ways, including, but not limited to noise and traffic impacts.

Noise impacts have the potential to disrupt visitor, commercial, and residential activity throughout Mission Bay Park. This includes several surrounding park areas, including Fiesta Island, Tecolote Shores, Playa Pacifica Park, Mission Bay Park, De Anza Cove Park, Campland on the Bay, Crown Point Park, Ski Beach Park, and Mission Bay waters, which are actively used for recreation. Commercial impacts could be felt by, for example, visitor supporting businesses, including the nearby San Diego Mission Bay Resort. Residential impacts could extend to the nearby Bay Park and Crown Point communities, and others. Nesting birds may be impacted by construction noise and may need protection with buffering.

Traffic impacts have the greatest potential to disrupt visitor use of Fiesta Island. Fiesta Island Road is a single-lane, one-way access road to Fiesta Island, adjacent to East Mission Bay Drive, Seaworld Drive, and Interstate-5. Construction activities may limit public access to Fiesta Island during certain periods of the day during construction.

Noise and traffic regulation may be necessary to restrict daily work hours and weekend work. Construction timing of the Project may be scheduled to reduce impacts to visitor use. Peak visitor use spans approximately from Memorial Day (May) through Labor Day (September). Project construction is anticipated to begin post-Labor Day and continue for 12 months, as mentioned previously.

5.2.5 Environmental Windows

Potential nearby special-status wildlife species include the endangered California least tern (*Sternula (Sterna) antillarum browni*) and threatened western snowy plover (*Charadrius alexandrinus nivosus*). Environmental constraints of threatened and endangered bird nesting seasons require that certain elements of the overall project construction be phased or timed. This "project schedule" is an important part of the permits, and engineering contract documents (plans, specifications, and estimates for contractor bidding), as well as assurances to the resource agencies that the Project will be implemented without incurring unanticipated incidental impacts. The project is based on assuming breeding restrictions limit construction from September 1st to February 15th. If this window can be extended, construction can be completed in a shorter timeframe and accommodate contingency actions if they became necessary.

5.2.6 Water Quality Concerns

North Fiesta Island Wetland Restoration is designed with the primary goal of complying with the Mission Bay Master Plan water quality improvements initiative. The first Mission Bay Master Plan (City of San Diego 1994) key recommendation is:

> *It is broadly recognized that the Park's economic and recreational future depends on the quality of the Bay's water. In response to fluctuating quality of the Bay waters, this Plan proposes a comprehensive set of measures involving state-of-the-art biological, mechanical, public education and recreation management programs. Biological measures include the establishment of salt-water marshes that can naturally filter pollutants as they enter the Bay through the creeks that drain the Bay's watershed…*

A past Water Quality Control Study (Tetra Tech 1983) identified that the water quality problem largely stems from two issues:

- *A nearly continuous input of pollutants from various point and nonpoint sources within the increasingly urbanized drainage areas inland from the bay.*
- *Flushing and circulation conditions which are generally inadequate to transport pollutants out of the Bay. As a result, pollutants can build up to undesirable levels*.

The Project proposes to create and protect a wide range of natural habitat. The habitats proposed for wetland restoration include subtidal eelgrass, mudflat, low marsh, mid marsh, high marsh, transitional, and upland habitat. Wetland habitat will serve to improve water quality. Mission Bay circulation and runoff from the upland Fiesta Island will be partially directed into the wetland to improve the capturing of suspended sediment and infiltration and filtration of water. Furthermore, a channel will connect waters on the east and west side of Fiesta Island, decreasing residence times of water in that region, which will provide improved flushing and circulation conditions in the Bay (Moffatt & Nichol 2019). Multiple actions may serve to provide a combined water quality benefit to east Mission Bay. Those may include this measure of circulation through Fiesta Island, along with measures at the Fiesta Island causeway and Tecolote and Cudahy Creek mouths to filter stormwater as part of separate projects. Each action is important and is effective when combined with other measures.

5.2.7 Competing Interests

City Charter Section 55.2 proposes that the Mission Bay Park Improvements project include efforts to restore wetlands, wildlife habitat, and other environmental assets; preserve beneficial uses of the Improvement Zone by maintaining navigable water and eliminating navigational hazards; restore embankments and erosion control features; and improve the conditions of the Improvement Zone for the benefit and enjoyment of residents and visitors.

The North Fiesta Island Wetland Restoration project makes up one project of the wider Mission Bay Park Improvements. As such, the project is focused on certain aspects of the larger City Charter Section 55.2. The project is designed to provide restoration of tidal wetlands, which balance the need for mitigation, water quality, flood control, aquatic recreation, and public safety. Public benefit may be provided by passive recreation of hiking along the perimeter, biking or driving along the roadway, being led farther into the site by docents.

5.2.8 Sensitive Habitat

Existing habitat maps of the Project site show an area of "Degraded Salt Marsh." This designation must be field verified by the City or the City's project consulting team. Marsh identified on-site could be a constraint requiring protection or mitigation if it exists. Confirmation of the on-site habitat will be made and included in the final version of this report. This may or may not constrain the project and can be definitively addressed in a subsequent stage of planning and engineering. Either way, the project could be designed to accommodate it as a constraint if needed. The remaining area of the project is Least Tern Preserve, upland habitat and beach.

5.2.9 Sea Level Rise

Salt marsh restoration at North Fiesta Island must be developed considering SLR, which is the local rate of SLR relative to the land. SLR primarily affects this project with its impact on wetland habitat distribution and functions. As sea levels increase above 3.6 feet, the wetland habitat becomes submerged, which decreases habitat diversity at the site. That impact is addressed below.

As directed by the City, this report analyzes the risk SLR poses to the site through the Year 2100. Two SLR projections (3.6 feet and 7.0 feet) were selected for Year 2100 that represent major thresholds for the project. These thresholds represent the 17% probability and 0.5% probability scenarios and are driven by coastal flooding that is expected to increase (progress inland) with a 100-year storm event in conjunction with SLR. There is a low probability that SLR could exceed 7.0 feet by the end of the century, but the range of scenarios presented here capture important impact thresholds for North Fiesta Island regardless of when they occur. As shown in Figure 5-3 and Figure 5-4 below, future habitat distribution compared to the original habitat design is significantly affected by SLR. Future impacts from a SLR increase of 3.6 feet and 7.0 feet are summarized below.

- **3.6 feet (110 cm) SLR:** most of the project would be subject to tidal inundation during high tides after restoration. Under this scenario the restored salt marsh habitat will likely transform with less high and mid low marsh, and more mudflat converting to subtidal habitat. Without raising the elevation of the site by filling or implementing adaptation measures, the site would effectively become mudflat with tidal channels. The exception is the transitional habitat area that becomes low marsh. Due to the gentle slopes proposed for the Least Tern Preserve the lower elevations of the slope could potentially convert to intertidal salt marsh habitat.
- **7.0 feet (213 cm) SLR:** under this SLR scenario, the wetlands would be nearly all subtidal and mudflat habitat area, with some limited perimeter salt marsh on earthen slopes. Without raising the elevation of the site by filling or implementing adaptation measures, the site would effectively become mudflat with tidal channels and the Least Tern Preserve would become an island.

Table 5-1 below shows the changes (in acres) to habitat areas with each SLR scenario for the proposed habitat of the Project.

Table 5-1. Change to Habitat Areas in Acres with 3.6 and 7.0 Feet of SLR

Proposed Habitats	Designed Acreage	Habitat with 3.6 ft SLR	Habitat with 7.0 ft SLR
Subtidal	10.8	14.1	29.5
Mudflat	4.6	24.5	14.8
Low marsh	5.0	1	0.5
Mid marsh	9.3	2.1	1.2
High marsh	9.1	0.3	0.1
Transitional	2.5	1.6	0.5
Disturbed Habitat/Upland	3.4	1.1	0.5
Disturbed Salt Marsh	0.0	0	0
Beach	5.4	5.4	3
TOTAL AREA	**50.1**	**50.1**	**50.1**

When SLR causes significant habitat changes in the marsh, the site can be adapted by:

- Reconfiguring and/or raising the marsh plains above future high internal marsh water levels through thin layer sediment additions (i.e., the pilot project at Seal Beach Naval Weapons Station in 2016). This will allow for mudflat and vegetated marsh habitat to persist; and/or
- Creating a muted salt marsh system by controlling the tide range. This can be accomplished by introducing culverts or tide gates, which allow flexibility in the management operation as water levels rise; the culverts and tide gates may need to be replaced over time to provide modified tide levels.

While it is possible that these adaptation strategies may need to be implemented in the near-term at some time between 2050 and 2100, they may also need to be repeated multiple times in the long-term after 2100 as sea levels rise in the future. If there is space, coastal wetlands at North Fiesta Island could migrate upward and/or in the landward direction. Otherwise, adaptation measures such as the ones listed above will be necessary if the vision is to provide vegetated marsh habitat at North Fiesta Island into perpetuity.

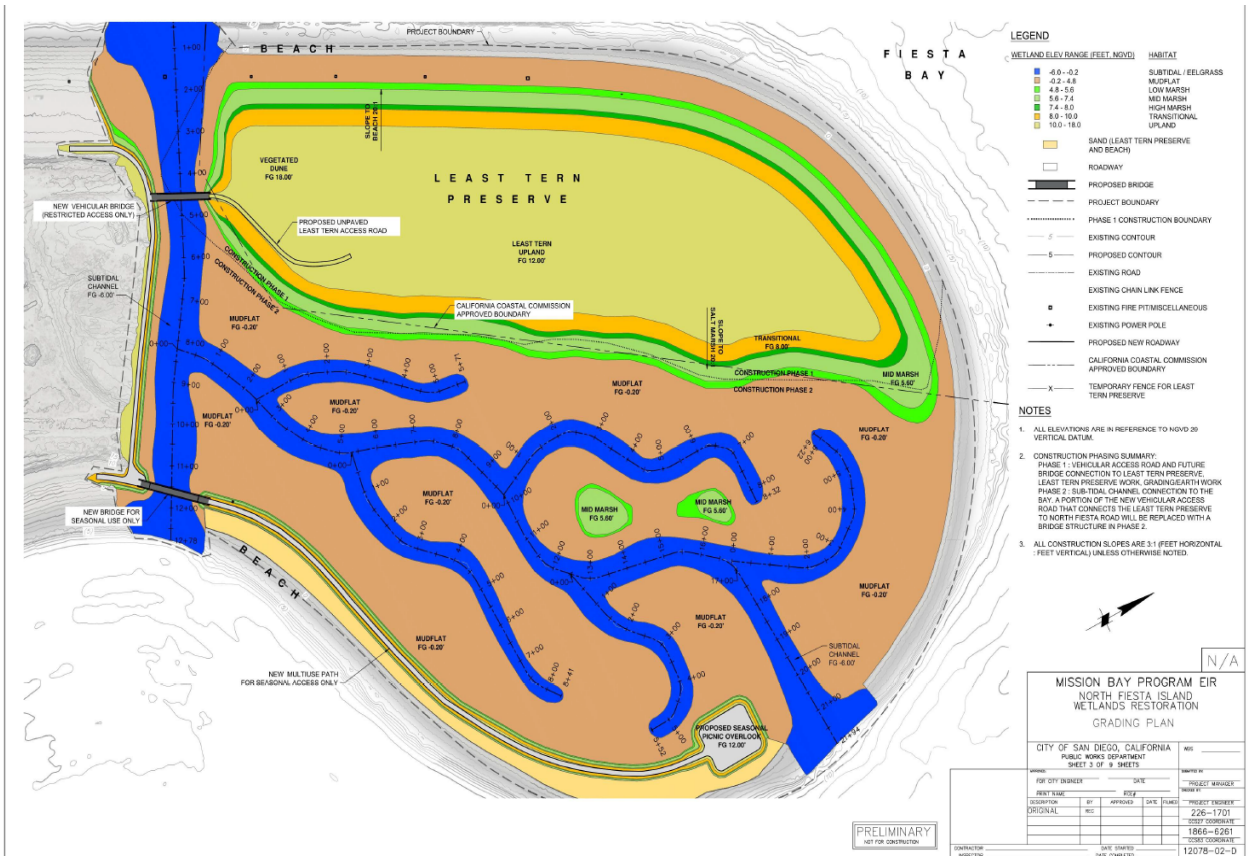

Figure 5-3. Predicted Habitat Distribution with a SLR Increase of 3.6 Feet

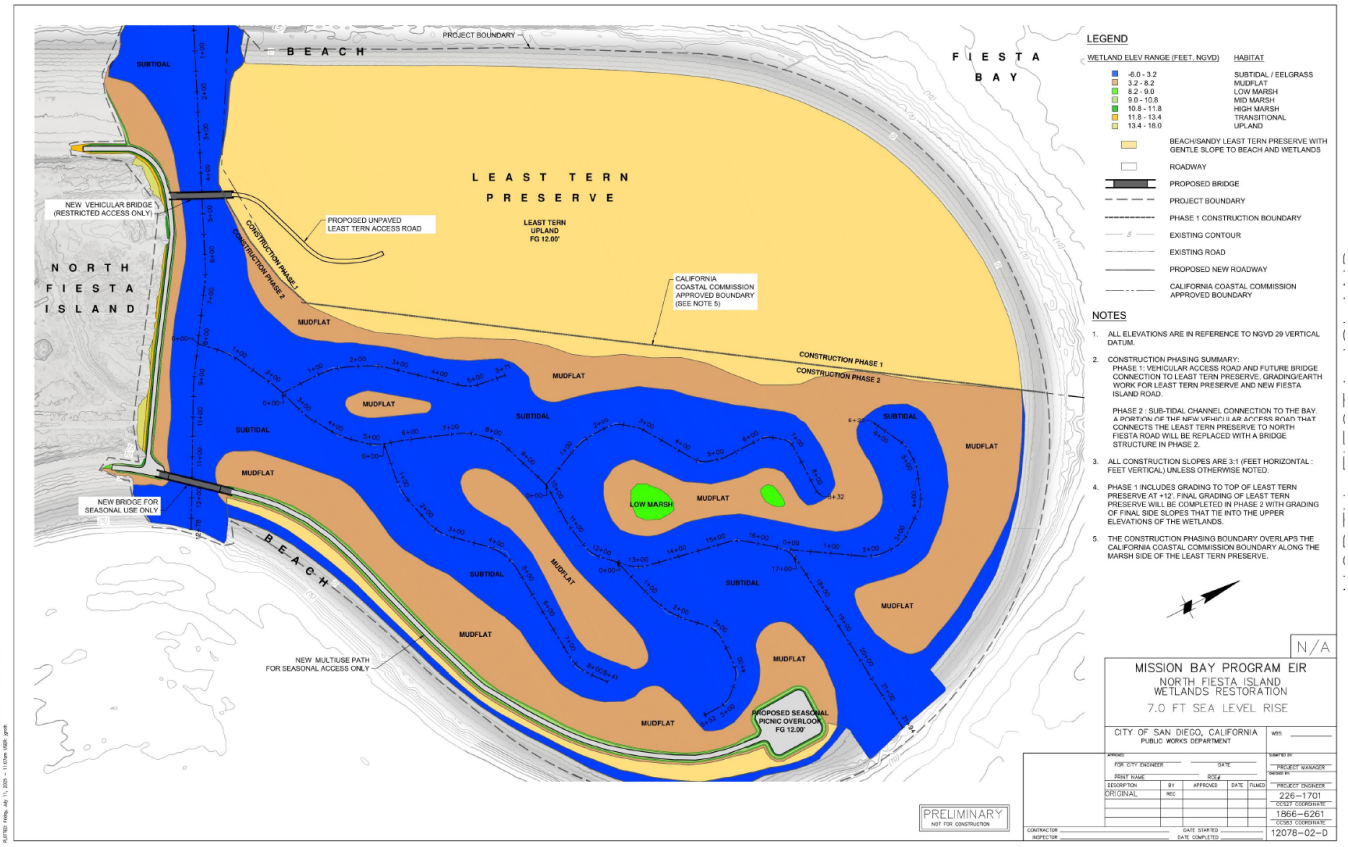

Figure 5-4. Predicted Habitat Distribution with a SLR Increase of 7.0 Feet

5.2.10 Permitting

As a result of the need to receive approval from multiple resource permitting agencies, the possibility of project delays during approval could occur which would result in an increased project schedule or require new mitigations, see section 5.4.

5.3 Project Conflict Coordination and Evaluation

Design and construction of the North Fiesta Island Wetland Restoration project must coordinate with the following major development projects at Fiesta Island and nearby within Mission Bay Park:

- Fiesta Island Deferred Maintenance
- Fiesta Island Bike/Pedestrian Paths and Bridges
- Wetland Restoration
    - Cudahy Creek Cove Wetland Restoration
    - Tecolote Creek Wetland Restoration & Fiesta Island Causeway Tidal Culverts

Currently (at the time of the authoring of this report) there are no Capital Improvement Program (CIP) projects relevant to the North Fiesta Island Wetland Restoration project area.

5.3.1 Fiesta Island Deferred Maintenance

As a part of the Mission Bay Park PEIR, a deferred maintenance program is in progress to prepare a maintenance plan and preliminary drawings of identified maintenance, repair, or rehabilitation of play areas, restroom buildings, shoreline restoration, seawall, and parking lot areas. This project may include proposals for facility maintenance, which could conflict with or complement the North Fiesta Island Wetland Restoration project.

This project is currently in progress, and no Fiesta Island maintenance is currently proposed. Therefore, no project conflicts are identified, and future coordination and evaluation is to occur upon further development of this project.

5.3.2 Fiesta Island Bike/Pedestrian Paths and Bridges

As a part of the Mission Bay Park PEIR, a Bike/Pedestrian Paths and Bridges study was prepared including a report and preliminary drawings for bike and pedestrian paths and bridges throughout Mission Bay Park. Within this project, Fiesta Island is proposed to be improved with bike and pedestrian paths and bridges, which could conflict with or complement the North Fiesta Island Wetland Restoration project.

The City is currently reviewing draft concepts of this project. No project conflicts are identified, and future coordination and evaluation is to occur upon further development of this project.

5.3.3 Wetland Restoration

As a part of the Mission Bay Park PEIR, multiple wetland restoration projects are proposed throughout the Bay. Wetland restoration is currently also being proposed at Cudahy Creek Cove and Tecolote Creek with the addition of a culvert or channel under the Fiesta Island Causeway.

Construction timing of all wetland restoration projects in Mission Bay is currently undefined. There is a potential for construction of such projects to be complementary to one another. Beneficial reuse of excavated dredge material could be distributed across sites in place of imported material to maintain sediment on-site and reduce construction costs across several restoration projects. Additionally, mobilization and demobilization costs increase construction costs; phasing of construction of wetland restoration projects could capitalize on the availability and proximity of construction equipment, materials, and crew. Wetland restoration projects could potentially be grouped under one construction contract, allowing the contractor to plan efficient use of construction equipment, materials, and crew.

5.4 Environmental Considerations and Permits

Environmental permits required to construct the North Fiesta Island Wetland are summarized in but not limited to Table 5-2. As a part of the Mission Bay Park PEIR, the City is seeking to streamline state and federal resource agency approval for all future projects, including North Fiesta Island Wetland Restoration. This work includes but is not limited to preparation and submission of applications for regulatory permits to the U.S. Army Corps of Engineers (USACE), pursuant to Section 404 of the federal Clean Water Act (CWA) and Section

10 of the Rivers and Harbors Act; California Regional Water Quality Control Board (RWQCB), pursuant Section 401 of the federal CWA; and California Department of Fish and Wildlife (CDFW), pursuant to the California Fish and Game Code (Section 1600). Additionally, permitting support and strategy for the CCC pursuant to the California Coastal Act and Coastal Zone Management Act is in progress under the Mission Bay Park PEIR.

Pursuit of a USACE Section 404 CWA ~~programmatic~~ permit is anticipated t~~o be applied for as a Regional General Permit (RGP)~~ to authorize the implementation of multiple projects within Mission Bay. An RGP can authorize a category or categories of activities, such as the Mission Bay Park Improvements, in a specific geographical region for activities that are similar in nature and cause only minimal individual and cumulative environmental impacts.

In pursuit of a U.S. Fish and Wildlife Service (USFW) ~~Programmatic~~ Biological Opinion, a Biological Assessment (BA), which is a modified version of a Biological Technical Report (BTR), is required in accordance with Section 7 of the Endangered Species Act (ESA). The BA is focused on project impacts on and restoration benefits for California least tern, western snowy plover, and other federally listed species, including marine species, which have the potential to occur within the project area.

In pursuit of a RWQCB ~~programmatic~~ 401 Water Quality Certification, an application will be required ~~as well as RWQCB issued General Waste Discharge Requirements (WDRs)~~ for authorization of Mission Bay Park Improvements.

Resource agency-imposed restrictions play a strong role in construction costs and duration. During discussions with resource agencies, permit restrictions will be negotiated, including but not limited to:

- Hours of Operations
- Noise Control
- Light Control
- Dust Control
- Fueling
- Site Access
- Storage and Staging
- Impacts to Habitat and Sensitive Species

Regarding the above topics, the City should strive for the following in order to maintain flexibility of construction methods:

- 6-day work weeks
- Hours of operation from 7AM to 6PM with occasional night work, as necessary
- Fueling and equipment maintenance permitted on-site
- Land-based and water-based site access

- Wide environmental window
    - The timing of construction in sensitive areas may also be affected by the patterns of nesting and breeding birds. Typically, the nesting season window is mid-February through early-September, which coincides with a large portion of the dry season. However, it may be argued that minimal sensitive habitat is present at all project sites, due to the high level of shoreline development in Mission Bay. Note that a Least Tern nesting site is adjacent to this proposed wetland.
    - Optimally, the environmental window can be relaxed with application of sufficient buffers, and the Project can be constructed without breaks or unnecessary haste. The Project is anticipated to be constructed in the dry which can be swift compared to dredging. If it were dredged, however, one approach to enable consideration of year-round construction would be to use an electric dredge. This equipment is quieter than standard diesel equipment with fewer air emissions and is, therefore, more environmentally sensitive. An electrical substation is assumed needed near the dredge launch site to accommodate the electric dredge.
- Flexible construction access and staging areas, although this site can only be accessed over the Fiesta Island Causeway.
    - Multiple construction access and staging areas allow various approaches to be conceived by contractors to increase competition during bidding.
    - Staging areas within or close in proximity to the construction area reduces construction duration and cost.

Table 5-2. Environmental Permit Requirements

Agency	Permit
Federal	
U.S. Army Corps of Engineers (USACE)	• Permit under Section 404 of the Clean Water Act, 33 USC Section 1344 • Section 10 of the River and Harbors Act of 1899, 33 USC Section 403 • Issue Record of Decision (ROD) • Fish and Wildlife Coordination Act, 16 USC Sections 661-666
National Marine Fisheries Service (NMFS)	• Magnuson-Stevens Fishery Conservation and Management Act, as amended 1996 (Public Law 104-267)
State Historic Preservation Officer/Tribal Historic Preservation Office	• National Historic Preservation Act of 1966 (NHPA), Section 106 Consultation with SHPO/THPO (36 CFR Part 800)
U.S. Fish and Wildlife Service (USFW)	• Endangered Species Act, 16 USC Sections 1531-1544 Section 7 Consultation with the federal lead agency (i.e., USACE) • Programmatic Biological Opinion
State	
California Coastal Commission (CCC)	• Coastal Development Permit • Consistency Certification, Section 30600(a) of the California Coastal Act, or Waiver of Federal Consistency Provisions
California Department of Fish and Wildlife (CDFW)	• Streambed Alteration Agreement, Section 1602 of the California Fish and Game Code

Agency	Permit
	• California Endangered Species Act Section 2081 Incidental Take Permit
Regional Water Quality Control Board (RWQCB)	• Water Quality Certification under Section 401 of the Clean Water Act
Regional/Local	
San Diego Air Pollution Control District (APCD)	• Authority to Construct/Permit to Operate for any dredge

5.5 City Professional Standards and Mission Bay Masterplan Consistency

Concept development, design, and permitting of North Fiesta Island Wetland Restoration must comply with City standards and the Mission Bay Park Masterplan (City of San Diego 2002). An inventory of relevant standards, potential conflicts, and potential resolutions to such conflicts, is provided in Table 5-3.

Table 5-3. Inventory of Relevant Standards

Source	Standards and Recommendations	Compliance/ Potential Conflict	Implementation/ Solution
Mission Bay Park Master Plan	It is broadly recognized that the Park's economic and recreational future depends on the quality of the Bay's water. In response to fluctuating quality of the Bay waters, this Plan proposes a comprehensive set of measures involving state-of-the-art biological, mechanical, public education, and recreation management programs.	North Fiesta Island Wetland Restoration preliminary design is developed with the general goal of improving or maintaining water quality.	**Improvements** - Wetland Habitat - Tidal Channel across Fiesta Island
	The turf and beach areas along the Park's shorelines support the most intensive public recreational activity in Mission Bay. These areas draw users from throughout the San Diego region. With the County's population on the rise, the capacity of the park to accommodate this activity must be commensurately increased.	North Fiesta Island Wetland Restoration preliminary design is developed with the general goal of improving or maintaining public recreational activity.	**Improvements** - Natural Passive Recreation of walking, biking or driving along the wetland perimeter roadway - Docent-led tours - Educational research opportunities
	The rise of environmental awareness in recent decades has been paralleled by an increase in the desire for more natural recreation venues. The telephone survey conducted as part of the Master Plan Update revealed that a majority of San Diego residents would like to experience parts of Mission Bay in a more natural condition.	North Fiesta Island Wetland Restoration preliminary design is developed with the general goal of improving or maintaining the natural condition of Mission Bay.	**Improvements** - Eelgrass Habitat - Subtidal Habitat - Mudflat Habitat - Low Marsh Habitat - Mid Marsh Habitat - High Marsh Habitat - Transitional Habitat - Upland Habitat

Source	Standards and Recommendations	Compliance/ Potential Conflict	Implementation/ Solution
	In response to an extraordinary level of public demand for preservation and enhancement of natural resources, this Plan includes a number of proposals aimed at improving the Park's wildlife habitats.	North Fiesta Island Wetland Restoration preliminary design is developed with the general goal of improving or maintaining the natural condition of Mission Bay.	**Improvements** - Eelgrass Habitat - Subtidal Habitat - Mudflat Habitat - Low Marsh Habitat - Mid Marsh Habitat - High Marsh Habitat - Transitional Habitat - Upland Habitat
Mission Bay Park Master Plan (Continued)	Pg. 82 – Mission Bay Park should be planned, designed, and managed for long-term environmental health. The highest water quality; sustained biodiversity; ongoing education and research; and the reduction of traffic noise, and air pollution should all be priorities. The Park's natural resources should be conserved and enhanced not only to reflect environmental values, but also for aesthetic and recreation benefits.	North Fiesta Island Wetland Restoration preliminary design is developed with the goal of improving environmental conditions for Mission Bay Park.	**Improvements** - Water Quality - Eelgrass Habitat - Subtidal Habitat - Mudflat Habitat - Low Marsh Habitat - Mid Marsh Habitat - High Marsh Habitat - Transitional Habitat - Upland Habitat - Natural Recreation
	Pg. 90 – As part of Dr. Dorman's study, opening channels through Fiesta Island…was also evaluated. Tidal simulations conducted on a scaled model of the Park revealed that the Fiesta Island channel only marginally improved water circulation…The Fiesta Island channel should be pursued only if the need to create eelgrass beds outweigh its capital cost and if proven technically feasible.	North Fiesta Island Wetland Restoration preliminary design includes a channel which connects east and west Fiesta Island.	- Channel design was proven technically feasible and was found to improve water circulation (Moffatt & Nichol 2019). - Eelgrass Habitat

Source	Standards and Recommendations	Compliance/ Potential Conflict	Implementation/ Solution
	Pg. 90 - ...the creation of wet-lands in the Park should be pursued as part of a comprehensive program to improve the quality of the Bay waters.	North Fiesta Island Wetland Restoration preliminary design is developed with the general goal of improving or maintaining water quality.	**Improvements** - Wetland Habitat
	Pg. 91, Wetland Habitat Recommendation No. 71 – Additional eelgrass beds should be created wherever possible in Mission Bay. As eelgrass is very sensitive to water quality, new eelgrass beds should be located in well flushed areas of the Park. Potential sites are...Fiesta Island Channel: 12+/- acres. The channel is proposed as a possible eelgrass mitigation area – if proven essential and cost-effective.	North Fiesta Island channel subtidal habitat is proposed as eelgrass habitat. Total acreage of subtidal/eelgrass habitat is less than 12 acres, as the channel is only a small portion of what is an approximately 30-acre site.	**Improvements** - Eelgrass Habitat
2018 City CADD Standards	The City uses Bentley MicroStation as its basic CADD graphics engine, for engineering design and drawing production, if approved by the City, Design Consultants may use other industry standard CADD systems, such as AutoCAD, to produce hard copy or PDF files which can be transmitted appropriately to the Project Managers as submittals. However, for compatibility reasons, all electronic CADD file submittals must be created in MicroStation or approved CADD system using City specified seed files that will be uploaded into the City's CADD file management system and shall conform to the requirements set forth in these standards (https://www.sandiego.gov/publicworks/edocref/drawings).	Submit final electronic CADD files in MicroStation.	No conflict.
City Stormwater Guidelines	Project plans to comply with The City of San Diego Storm Water Standards and the MS4 Permit.	Project plans to comply with City standards.	No conflict.

5.6 ADA and Title 24

The Americans with Disabilities Act (ADA) of 1990 is a civil rights law prohibiting discrimination against individuals with disabilities. With respect to North Fiesta Island Wetland Restoration, ADA requirements pertain to the proposed Fiesta Island roadway and bridges that cross over the proposed Fiesta Island channel. However, roadway and bridge design are beyond the scope of this project. Therefore, there are no public use components of the project and ADA requirements are not applicable.

Title 24 is a California Building Standards Code establishing requirements for "energy conservation, green design, construction and maintenance, fire and life safety, and accessibility" of a building's "structural, mechanical, electrical, and plumbing systems." No buildings are proposed as a part of the North Fiesta Island Wetland Restoration and, therefore, Title 24 requirements are not applicable.

6 References

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A: Preliminary Drawings

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND WETLAND RESTORATION

CONTRACTOR'S RESPONSIBILITIES

1. PURSUANT TO SECTION 4216 OF THE CALIFORNIA GOVERNMENT CODE, AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION, YOU MUST CONTACT THE REGIONAL NOTIFICATION CENTER (E.G., UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA) AND OBTAIN AN INQUIRY IDENTIFICATION NUMBER.
2. NOTIFY SDG&E AT LEAST 10 WORKING DAYS PRIOR TO EXCAVATING WITHIN 10' OF SDG&E UNDERGROUND HIGH VOLTAGE TRANSMISSION POWER LINES (I.E., 69 KV & HIGHER).

MONUMENTATION / SURVEY NOTES

THE CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEY MONUMENTS AND/OR VERTICAL CONTROL BENCHMARKS WHICH ARE DISTURBED OR DESTROYED BY CONSTRUCTION. A LICENSED LAND SURVEYOR OR LICENSED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING IN THE STATE OF CALIFORNIA SHALL FIELD LOCATE, REFERENCE, AND/OR PRESERVE ALL HISTORICAL OR CONTROLLING MONUMENTS PRIOR TO ANY EARTHWORK, DEMOLITION, OR SURFACE IMPROVEMENTS. IF DESTROYED, A LICENSED LAND SURVEYOR SHALL REPLACE SUCH MONUMENT(S) WITH APPROPRIATE MONUMENT(S). WHEN SETTING SURVEY MONUMENTS USED FOR RE-ESTABLISHMENT OF THE DISTURBED CONTROLLING SURVEY MONUMENTS AS REQUIRED BY SECTIONS 6730.2 AND 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED WITH THE COUNTY SURVEYOR. IF ANY VERTICAL CONTROL IS TO BE DISTURBED OR DESTROYED, THE CITY OF SAN DIEGO FIELD SURVEY SECTION SHALL BE NOTIFIED IN WRITING AT LEAST 7 DAYS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF REPLACING ANY VERTICAL CONTROL BENCHMARKS DESTROYED BY THE CONSTRUCTION.

ABBREVIATIONS

CY	CUBIC YARD
EL, ELEV	ELEVATION
EX, EXIST	EXISTING
FG	FINISH GRADE
FT	FEET
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
SD	STORM DRAIN
TYP	TYPICAL
IE	INVERT ELEVATION
MIN	MINIMUM
PROP	PROPOSED
MIN	MINIMUM

DISCIPLINE CODE

G	GENERAL
D	DEMOLITION
C	CIVIL

SHEET INDEX

INDEX #	SHEET #	DRAWING NAME
1	G-1	COVER SHEET
2	C-1	GRADING - PLAN 1
3	C-2	GRADING - PLAN 2
4	C-3	PROFILES
5	C-4	PROFILES
6	C-5	PROFILES
7	C-6	PROFILES
8	C-7	PROFILES
9	C-8	PROFILES

PROJECT TEAM

DUDEK: MIKE SWEESY, PRINCIPAL RESTORATION ECOLOGIST
EMILY SEKLECKI, ENVIRONMENTAL PLANNER

MOFFATT & NICHOL: CHRIS WEBB, SUPERVISORY COSTAL SCIENTIST
CRAIG FRAMPTON, COASTAL SCIENTIST
CHRIS O'DAY, COASTAL SCIENTIST

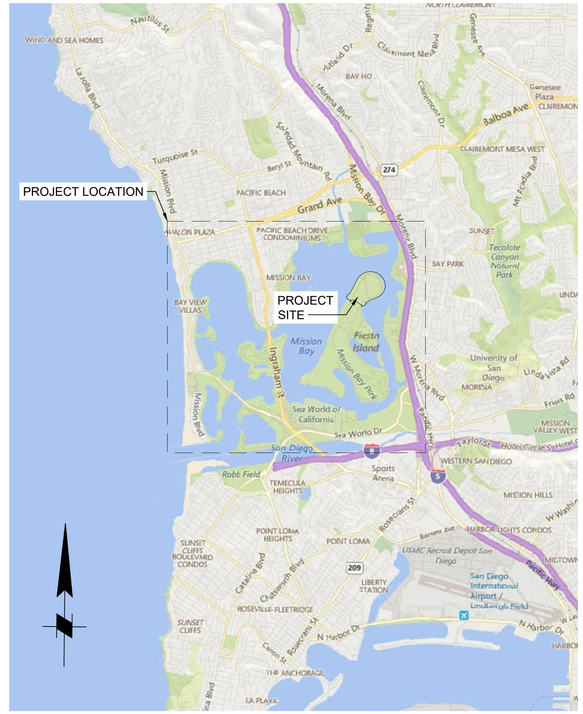
LEGEND

WETLAND ELEV RANGE (FEET, NGVD)	HABITAT
-6.0 - -3.8	SUBTIDAL / EELGRASS
-3.8 - 1.2	MUDFLAT
1.2 - 2.0	LOW MARSH
2.0 - 3.8	MID MARSH
3.8 - 4.8	HIGH MARSH
4.8 - 6.8	TRANSITIONAL
6.8 - 18.0	UPLAND

- BEACH/SANDY LEAST TERN PRESERVE WITH GENTLE SLOPE TO BEACH AND WETLANDS
- ROADWAY
- PROPOSED BRIDGE
- PROJECT BOUNDARY
- PHASE 1 CONSTRUCTION BOUNDARY
- 5 — EXISTING CONTOUR
- 5 — PROPOSED CONTOUR
- EXISTING ROAD
- EXISTING FIRE PIT TO BE RELOCATED
- MISC. POST TO BE REMOVED
- PROPOSED NEW ROADWAY
- CALIFORNIA COASTAL COMMISSION APPROVED BOUNDARY
- X — PROPOSED FENCE

PROJECT LOCATION

PROJECT LOCATION
NTS



VICINITY MAP
NTS

G-1

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND
WETLANDS RESTORATION
COVER SHEET

PRELIMINARY
NOT FOR CONSTRUCTION

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

The City of SAN DIEGO Public Works

moffatt & nichol
1660 HOTEL CIRCLE NORTH, SUITE 500
SAN DIEGO, CALIFORNIA 92108
PH (619) 220-6050 FAX (619) 220-6055

SPEC. NO.

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 1 OF 9 SHEETS

WBS

APPROVED:
FOR CITY ENGINEER DATE
PRINT NAME RCE#

SUBMITTED BY:
PROJECT MANAGER

CHECKED BY:
PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	REC			

226-1701
CCS27 COORDINATE
1866-6261
CCS83 COORDINATE

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

12078-02-D

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PLOTTED: Friday, July 11, 2025 - 10:40am USER: jgroth

MATCH LINE SHEET C-2

LEAST TERN PRESERVE

MISC.POST TO BE REMOVED, TYP

EXISTING FIRE PIT TO BE RELOCATED, TYP

LEAST TERN UPLAND FG 12.00'

CALIFORNIA COASTAL COMMISSION APPROVED BOUNDARY (SEE NOTE 5)

SLOPE TO BEACH 20:1

SLOPE TO SALT MARSH 20:1

PROPOSED UNPAVED LEAST TERN ACCESS ROAD

VEGETATED DUNE FG 18.00'

BEACH

HIGH MARSH FG 3.80'

MID MARSH FG 2.00'

TRANSITIONAL FG 4.80'

LOW MARSH FG 1.20'

SUBTIDAL CHANNEL FG -3.80'

SUBTIDAL CHANNEL FG -6.00'

SLOPE 3:1, TYP

CONSTRUCTION PHASE 1

CONSTRUCTION PHASE 2

SUBTIDAL/EELGRASS

PROPOSED NEW FIESTA ISLAND ROAD FG 10.00'

NEW VEHICULAR ACCESS ROAD AND FUTURE BRIDGE (RESTRICTED FOR MAINTENANCE AND SCIENTIFIC MONITORING PURPOSES)

PROJECT BOUNDARY

NEW BRIDGE FOR SEASONAL USE ONLY

NEW MULTIUSE PATH FOR SEASONAL ACCESS ONLY

PROPOSED ROAD CONNECTION TO EXISTING ROAD

EXISTING ROAD

FIESTA BAY

NORTH FIESTA ISLAND

1 C-3

2 C-3

3 C-3

7 C-4

LEGEND

WETLAND ELEV RANGE (FEET, NGVD)	HABITAT
-6.0 - -3.8	SUBTIDAL / EELGRASS
-3.8 - 1.2	MUDFLAT
1.2 - 2.0	LOW MARSH
2.0 - 3.8	MID MARSH
3.8 - 4.8	HIGH MARSH
4.8 - 6.8	TRANSITIONAL
6.8 - 18.0	UPLAND

- BEACH/SANDY LEAST TERN PRESERVE WITH GENTLE SLOPE TO BEACH AND WETLANDS
- ROADWAY
- PROPOSED BRIDGE
- PROJECT BOUNDARY
- PHASE 1 CONSTRUCTION BOUNDARY
- 5 EXISTING CONTOUR
- 5 PROPOSED CONTOUR
- EXISTING ROAD
- EXISTING FIRE PIT TO BE RELOCATED
- MISC. POST TO BE REMOVED
- PROPOSED NEW ROADWAY
- CALIFORNIA COASTAL COMMISSION APPROVED BOUNDARY
- X PROPOSED FENCE

NOTES

1. ALL ELEVATIONS ARE IN REFERENCE TO NGVD 29 VERTICAL DATUM.
2. CONSTRUCTION PHASING SUMMARY:
   PHASE 1: VEHICULAR ACCESS ROAD AND FUTURE BRIDGE CONNECTION TO LEAST TERN PRESERVE, GRADING/EARTH WORK FOR LEAST TERN PRESERVE AND NEW FIESTA ISLAND ROAD.

   PHASE 2 : SUB-TIDAL CHANNEL CONNECTION TO THE BAY. A PORTION OF THE NEW VEHICULAR ACCESS ROAD THAT CONNECTS THE LEAST TERN PRESERVE TO NORTH FIESTA ROAD WILL BE REPLACED WITH A BRIDGE STRUCTURE IN PHASE 2. WETLAND RESTORATION GRADING.
3. ALL CONSTRUCTION SLOPES ARE 3:1 (FEET HORIZONTAL : FEET VERTICAL) UNLESS OTHERWISE NOTED.
4. PHASE 1 INCLUDES GRADING TO TOP OF LEAST TERN PRESERVE AT +12'. FINAL GRADING OF LEAST TERN PRESERVE WILL BE COMPLETED IN PHASE 2 WITH GRADING OF FINAL SIDE SLOPES THAT TIE INTO THE UPPER ELEVATIONS OF THE WETLANDS.
5. THE CONSTRUCTION PHASING BOUNDARY OVERLAPS THE CALIFORNIA COASTAL COMMISSION BOUNDARY ALONG THE MARSH SIDE OF THE LEAST TERN PRESERVE.

80' 40' 0 80' 160'

SCALE: 1"=80'

C-1

PRELIMINARY
NOT FOR CONSTRUCTION

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND WETLANDS RESTORATION
GRADING PLAN

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 2 OF 9 SHEETS

WBS

APPROVED:
FOR CITY ENGINEER DATE
PRINT NAME RCE#

SUBMITTED BY:
PROJECT MANAGER

CHECKED BY:
PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	REC			

226-1701
CCS27 COORDINATE

1866-6261
CCS83 COORDINATE

CONTRACTOR DATE STARTED
INSPECTOR DATE COMPLETED

12078-02-D

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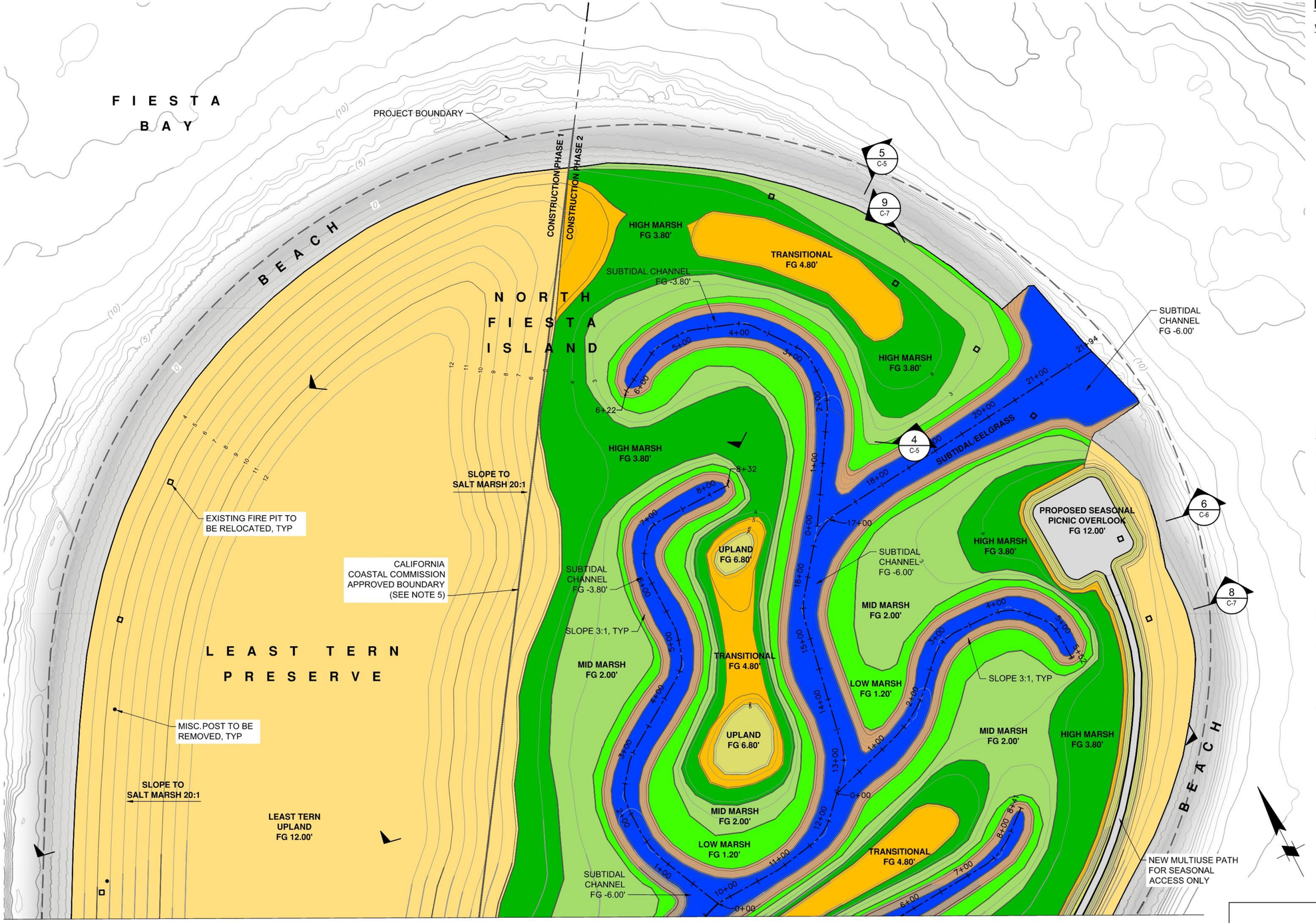

LEGEND

WETLAND ELEV RANGE (FEET, NGVD)	HABITAT
-6.0 - -3.8	SUBTIDAL / EELGRASS
-3.8 - 1.2	MUDFLAT
1.2 - 2.0	LOW MARSH
2.0 - 3.8	MID MARSH
3.8 - 4.8	HIGH MARSH
4.8 - 6.8	TRANSITIONAL
6.8 - 18.0	UPLAND

- BEACH/SANDY LEAST TERN PRESERVE WITH GENTLE SLOPE TO BEACH AND WETLANDS
- ROADWAY
- PROJECT BOUNDARY
- PHASE 1 CONSTRUCTION BOUNDARY
- 5 EXISTING CONTOUR
- 5 PROPOSED CONTOUR
- EXISTING ROAD
- EXISTING FIRE PIT TO BE RELOCATED
- MISC. POST TO BE REMOVED
- PROPOSED NEW ROADWAY
- CALIFORNIA COASTAL COMMISSION APPROVED BOUNDARY
- X PROPOSED FENCE

NOTES

1. ALL ELEVATIONS ARE IN REFERENCE TO NGVD 29 VERTICAL DATUM.
2. CONSTRUCTION PHASING SUMMARY:
   PHASE 1: VEHICULAR ACCESS ROAD AND FUTURE BRIDGE CONNECTION TO LEAST TERN PRESERVE, GRADING/EARTH WORK FOR LEAST TERN PRESERVE AND NEW FIESTA ISLAND ROAD.

   PHASE 2 : SUB-TIDAL CHANNEL CONNECTION TO THE BAY. A PORTION OF THE NEW VEHICULAR ACCESS ROAD THAT CONNECTS THE LEAST TERN PRESERVE TO NORTH FIESTA ROAD WILL BE REPLACED WITH A BRIDGE STRUCTURE IN PHASE 2. WETLAND RESTORATION GRADING.
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4. PHASE 1 INCLUDES GRADING TO TOP OF LEAST TERN PRESERVE AT +12'. FINAL GRADING OF LEAST TERN PRESERVE WILL BE COMPLETED IN PHASE 2 WITH GRADING OF FINAL SIDE SLOPES THAT TIE INTO THE UPPER ELEVATIONS OF THE WETLANDS.
5. THE CONSTRUCTION PHASING BOUNDARY OVERLAPS THE CALIFORNIA COASTAL COMMISSION BOUNDARY ALONG THE MARSH SIDE OF THE LEAST TERN PRESERVE.

80' 40' 0 80' 160'
SCALE: 1"=80'

C-2

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND WETLANDS RESTORATION
GRADING PLAN

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 3 OF 9 SHEETS

WBS

APPROVED: FOR CITY ENGINEER ____ DATE ____
PRINT NAME ____ RCE# ____

SUBMITTED BY: PROJECT MANAGER
CHECKED BY: PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	REC			

226-1701 CCS27 COORDINATE
1866-6261 CCS83 COORDINATE

CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____

12078-02-D

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NORTH FIESTA ISLAND

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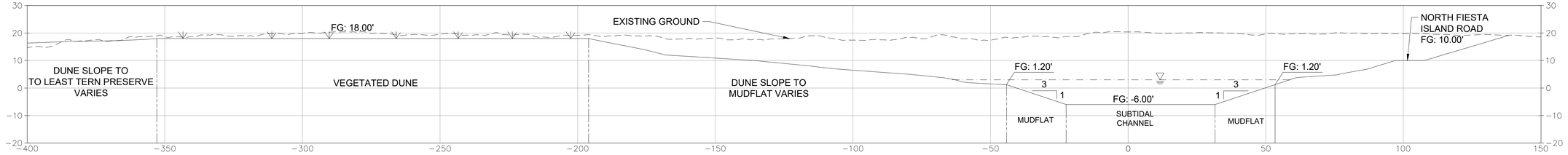
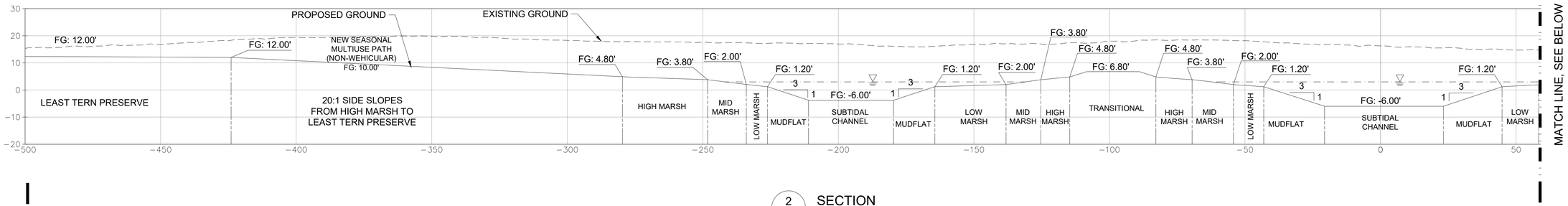


1 C-1 **SECTION**
SCALE: 1"=20' H, 1"=20' V



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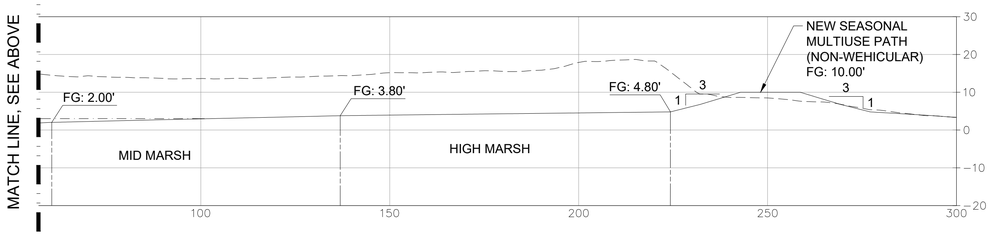

2 C-1 **SECTION CONT.**
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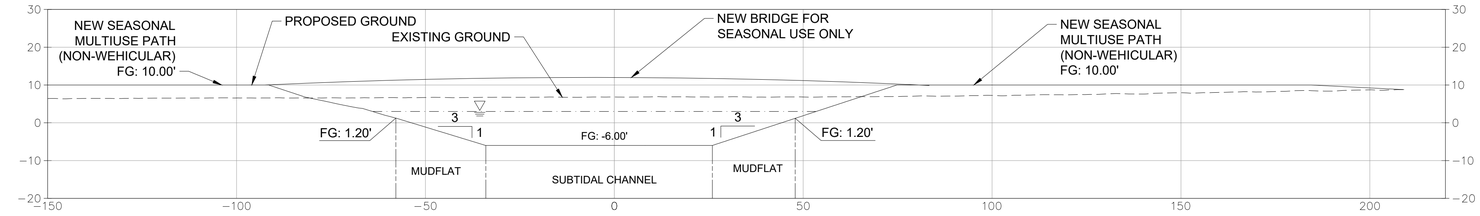


3 C-1 **SECTION**
SCALE: 1"=20' H, 1"=20' V

NOTES

1. ALL SLOPES SHALL BE A MAXIMUM STEEPNESS OF 3H:1V UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE IN REFERENCE TO NGVD 29 VERTICAL DATUM.

LEGEND

- EXISTING GROUND
- FINISHED GROUND
- MHHW LINE (+3.00')
- HABITAT BOUNDARY
- VEGETATION

20 10 0 20 40
SCALE: 1"=20'

PRELIMINARY
NOT FOR CONSTRUCTION

C-3

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND WETLANDS RESTORATION
NORTH FIESTA ISLAND – SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 4 OF 9 SHEETS

WBS

APPROVED:
FOR CITY ENGINEER DATE
PRINT NAME RCE#

SUBMITTED BY:
PROJECT MANAGER

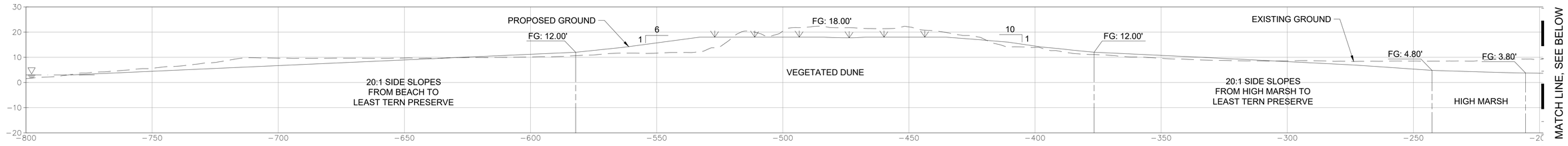
CHECKED BY:
PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	REC			

226–1701
CCS27 COORDINATE
1866–6261
CCS83 COORDINATE
12078–02–D

CONTRACTOR DATE STARTED
INSPECTOR DATE COMPLETED

NORTH FIESTA ISLAND



7 / C-1 **SECTION**
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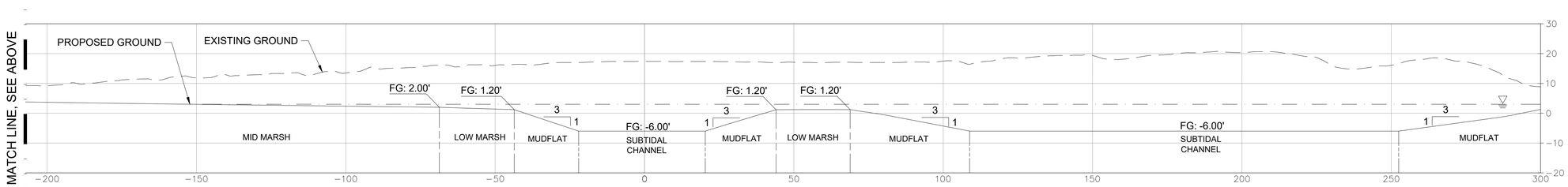

7 / C-1 **SECTION, CONT.**
SCALE: 1"=20' H, 1"=20' V

NOTES

1. ALL SLOPES SHALL BE A MAXIMUM STEEPNESS OF 3H:1V UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE IN REFERENCE TO NGVD 29 VERTICAL DATUM.

LEGEND

- EXISTING GROUND / HIGH MARSH
- FINISHED GROUND
- MHHW LINE (+3.00')
- HABITAT BOUNDARY
- VEGETATION

20 10 0 20 40
SCALE: 1"=20'

PRELIMINARY
NOT FOR CONSTRUCTION

C-4

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND
WETLANDS RESTORATION
NORTH FIESTA ISLAND – SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 5 OF 9 SHEETS

WBS

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SUBMITTED BY:
PROJECT MANAGER

CHECKED BY:
PROJECT ENGINEER

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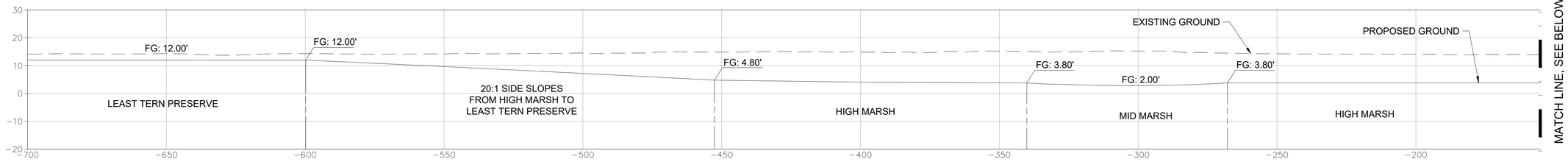
ORIGINAL	REC			

226–1701
CCS27 COORDINATE
1866–6261
CCS83 COORDINATE
12078–02–D

CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____

NORTH FIESTA ISLAND



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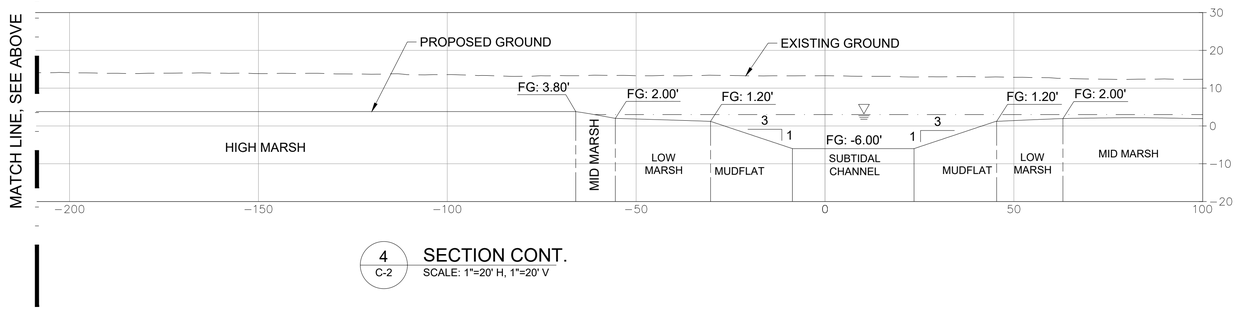

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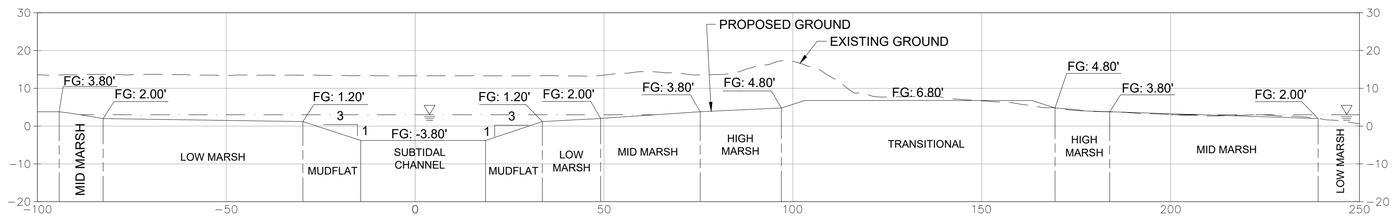

5 C-2 **SECTION**
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NOTES

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LEGEND

- EXISTING GROUND
- FINISHED GROUND
- MHHW LINE (+3.00')
- HABITAT BOUNDARY

20 10 0 20 40
SCALE: 1"=20'

PRELIMINARY
NOT FOR CONSTRUCTION

C-5

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND
WETLANDS RESTORATION
NORTH FIESTA ISLAND – SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
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SHEET 6 OF 9 SHEETS

WBS

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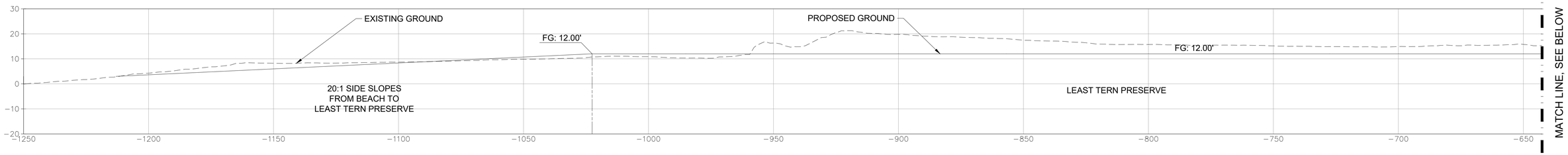
1866–6261
CCS83 COORDINATE

CONTRACTOR — DATE STARTED
INSPECTOR — DATE COMPLETED

12078–02–D

NORTH FIESTA ISLAND



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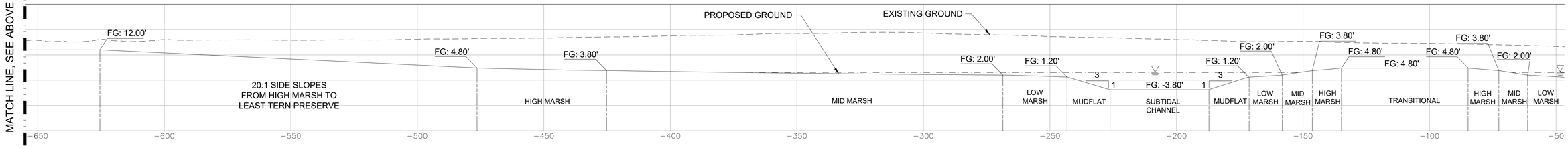

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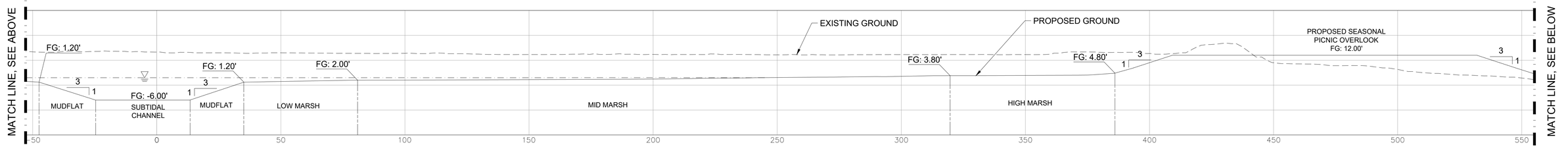

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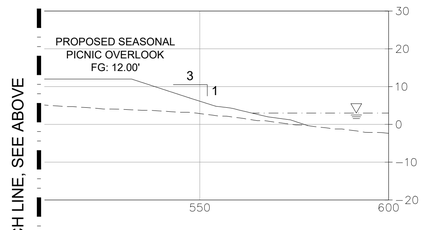

6 C-2 **SECTION, CONT.**
SCALE: 1"=20' H, 1"=20' V

NOTES

1. ALL SLOPES SHALL BE A MAXIMUM STEEPNESS OF 3H:1V UNLESS OTHERWISE NOTED.
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LEGEND

- EXISTING GROUND
- FINISHED GROUND
- MHHW LINE (+3.00')
- HABITAT BOUNDARY

20 10 0 20 40
SCALE: 1"=20'

PRELIMINARY
NOT FOR CONSTRUCTION

NORTH FIESTA ISLAND

C–6

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND
WETLANDS RESTORATION
NORTH FIESTA ISLAND – SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 7 OF 9 SHEETS

WBS

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226–1701
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1866–6261
CCS83 COORDINATE

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INSPECTOR DATE COMPLETED

12078–02–D

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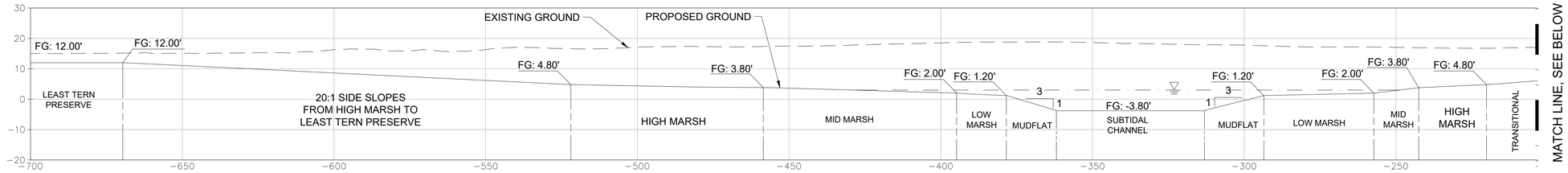

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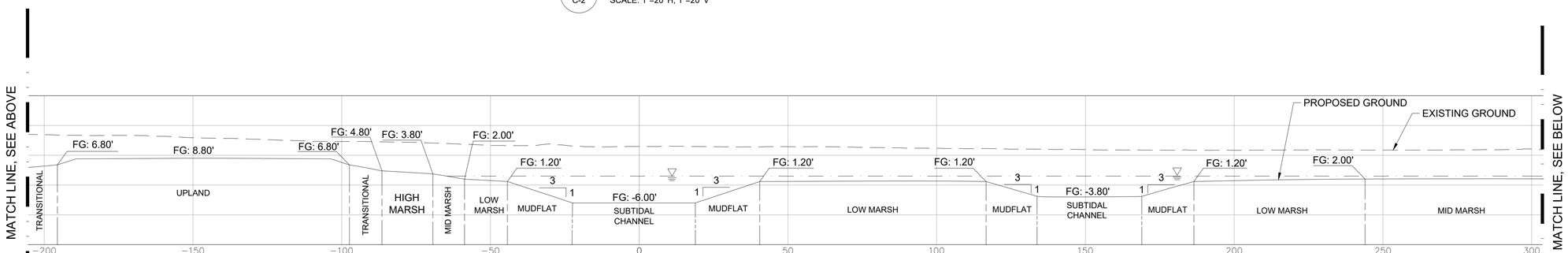

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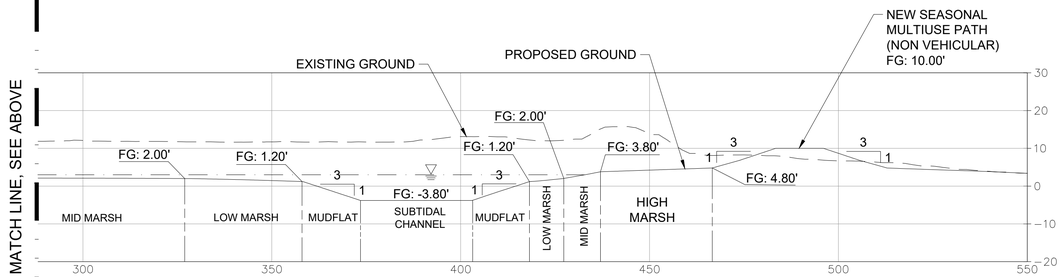

8 C-2 **SECTION, CONT.**
SCALE: 1"=20' H, 1"=20' V

NOTES

1. ALL SLOPES SHALL BE A MAXIMUM STEEPNESS OF 3H:1V UNLESS OTHERWISE NOTED.
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LEGEND

- EXISTING GROUND
- FINISHED GROUND
- MHHW LINE (+3.00')
- HABITAT BOUNDARY

20 10 0 20 40
SCALE: 1"=20'

PRELIMINARY
NOT FOR CONSTRUCTION

NORTH FIESTA ISLAND

C-7

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND WETLANDS RESTORATION
NORTH FIESTA ISLAND – SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 8 OF 9 SHEETS

WBS

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FOR CITY ENGINEER DATE
PRINT NAME RCE#

SUBMITTED BY:
PROJECT MANAGER

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PROJECT ENGINEER

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226–1701
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CCS83 COORDINATE
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CONTRACTOR DATE STARTED
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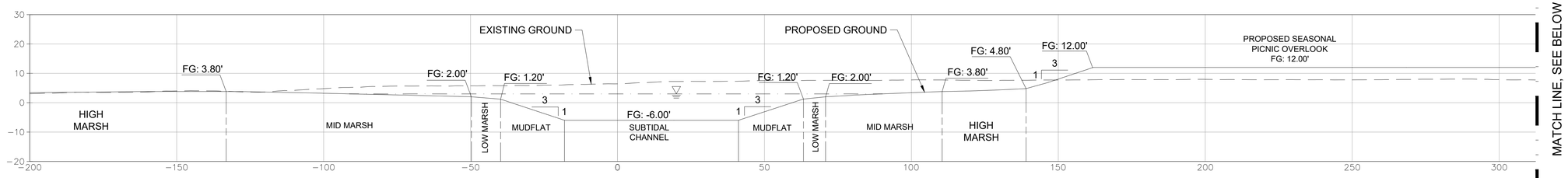

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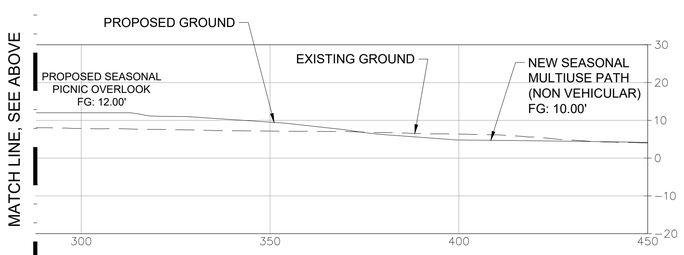

9 / C-2 **SECTION, CONT.**
SCALE: 1"=20' H, 1"=20' V

NOTES

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2. ALL ELEVATIONS ARE IN REFERENCE TO NGVD 29 VERTICAL DATUM.

LEGEND

- EXISTING GROUND
- FINISHED GROUND
- MHHW LINE (+3.00')
- HABITAT BOUNDARY

20 10 0 20 40
SCALE: 1"=20'

PRELIMINARY
NOT FOR CONSTRUCTION

C-8

MISSION BAY PROGRAM EIR
NORTH FIESTA ISLAND
WETLANDS RESTORATION
NORTH FIESTA ISLAND – SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 9 OF 9 SHEETS

WBS

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CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

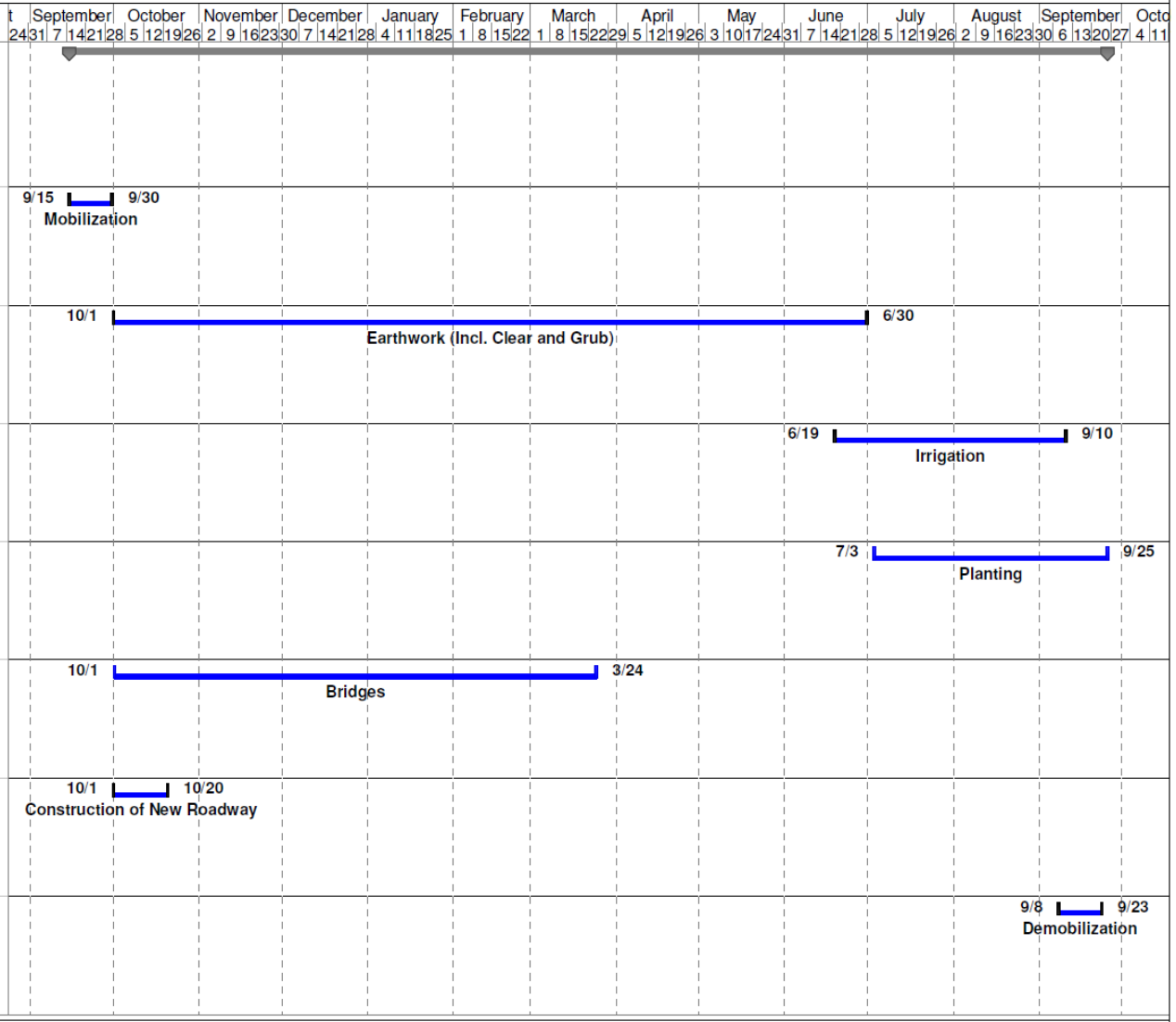
12078–02–D

NORTH FIESTA ISLAND

B. Preliminary Project Schedule

North Fiesta Island Wetland Restoration Schedule

ID	Task Name	Duration
0	**Draft - North Fiesta Island Wetland Restoration Schedule**	**270 days**
1	**1 Mobilization**	12 days
2	**2 Earthwork (Incl. Clear and Grub)**	195 days
3	**3 Irrigation**	60 days
4	**4 Planting**	61 days
5	**5 Bridges**	125 days
6	**6 Construction of New Roadway**	14 days
7	**7 Demobilization**	12 days



Project: Draft - North Fiesta Island We
Date: Fri 7/11/25

Task — Project Summary — Manual Task

Summary — Critical

C. Risk Assessment Table

RISK ASSESSMENT TABLE			Project Name:	**North Fiesta Island Wetland Restoration**				
Risk Description				Risk Assessment			Risk Response	
ID #	Category	Title	Risk Statement	Probability	Cost Impact	Time Impact	Strategy	Response Actions
1	PM	Land Ownership	North Fiesta Island is located within Mission Bay Park, in San Diego, CA. It is owned and maintained by the City of San Diego. As such, there are no known land ownership conflicts that may present risk to this project.	Very Low	Very Low	Very low	Permit	Permit project through necessary resource agencies, including California Coastal Commission, US Fish and Wildlife, and State Lands Commission to ensure no conflict of land ownership.
2	PM	Utilities	No existing major utilities were found within the project footprint. The only items that could be construed as potential utilities are: miscellaneous posts along the beach, four miscellaneous pipes\culverts in the uplands, and sixteen fire pits. A thorough field survey should be performed to identify existing utilities. A water line is located approximately 0.55 miles south of the restoration area and appears to bring water from the mainland to the San Diego Youth Aquatic Center.	Very Low	Moderate	Very low	Permit	The contractor will be required to take due precautionary measures to protect any existing utilities or structures located at the work site. It is the contractor's responsibility to contact the owners of sewer, gas and electric, water, and storm drain outfall utilities or structures prior to any excavation for verification and location of utilities and notification of commencement of work. If irrigation is proposed for the restoration area, an existing water line is available along Fiesta Island Road - approximately 0.55 mile south of the restoration site. A point of connection must be created to bring water from this connection point to the restoration area.

RISK ASSESSMENT TABLE			Project Name: **North Fiesta Island Wetland Restoration**					
Risk Description				Risk Assessment			Risk Response	
ID #	Category	Title	Risk Statement	Probability	Cost Impact	Time Impact	Strategy	Response Actions
3	Construction	Existing Soil Data	A 2024 soil investigation by Eurofins was conducted on-site to analyze physical and chemical properties of the material on-site. The results indicate the soils might be suitable for reuse at other wetland restoration areas planned for Mission Bay, however, additional testing might need to be conducted to ensure the sediment is suitable for placing the material back into a marine environment. Should the sediment be found to be physically or chemically incompatible for use as fill in adjacent wetland sites, then off-site disposal may be required, which will significantly impact cost and schedule.	Low	Moderate	Moderate	Permit	Further geotechnical or chemical investigations may be required to progress to final permitting and design.
4	Construction	Proximity to Neighbors	The northern portion of the island is minimally developed, which minimizes risks associated with neighbors. Low risks are present, including potential traffic and noise impacts during construction, especially to nearby parks and businesses (e.g., Fiesta Island, Tecolote Shores, Playa Pacifica Park, San Diego Mission Bay Resort, etc.). Permanent land use changes to the existing beach areas may negatively impact recreational access and activities.	Low	Very low	Moderate	Mitigate	Noise and traffic regulation may be necessary to restrict daily work hours and weekend work. Construction timing of the Project may be scheduled to reduce impacts to visitor use. Peak visitor use spans approximately from Memorial Day (May) through Labor Day (September). Project construction is anticipated to occur from post-Labor Day to February 15th. The risk associated with project controversy will be mitigated by involving the public in the development of the project and minimizing all negative project impacts.

RISK ASSESSMENT TABLE			Project Name:	**North Fiesta Island Wetland Restoration**				
Risk Description				Risk Assessment			Risk Response	
ID #	Category	Title	Risk Statement	Probability	Cost Impact	Time Impact	Strategy	Response Actions
5	Environment	Environmental Windows for Construction	As a result of constructing adjacent to a Least Tern Preserve and less than one mile from Kendall Frost Marsh Preserve, the presence of threatened or endangered birds may occur requiring avoidance or mitigation.	High	High	Moderate	Mitigate	Nesting restrictions are imposed from February 15th to September 1st (with some flexibility on the end date for certain bird species) each year for the California Least Tern nesting area to the north. This will limit construction and excavation activities to 5.5 months each year, unless through negotiations the permitting agencies allow construction to continue for a longer duration. Earthwork in the dry is loud and disturbing, so distance buffers from the nesting area would be required to enable earthwork to occur during the nesting season. The buffers typically range from 300 to 500 feet and would potentially occupy large areas of the future wetland site and may not be practical. Therefore, it may be more effective to construct the wetland restoration first then the Least Tern Preserve. Or the project could attempt to construct the project outside of the nesting season and limit construction activity to one off-season event by maximizing earthwork production - given the large amount of surplus soil material however, it is probably not possible to complete the work within one off-season event.
6	Environment	Water Quality Concerns	Temporary water quality impacts may occur during construction, such as increased turbidity, especially if construction takes place in wet conditions. The project is anticipated to provide permanent improvements to water quality within the Bay, however.	Low	Low	Low	Mitigate	Construction is anticipated to take place in dry conditions to, which will avoid water quality impacts. Should a phases of construction take place in wet conditions, a turbidity boom may be necessary to curb effects of wetland grading or channel opening.

RISK ASSESSMENT TABLE			Project Name:	**North Fiesta Island Wetland Restoration**				
Risk Description				Risk Assessment			Risk Response	
ID #	Category	Title	Risk Statement	Probability	Cost Impact	Time Impact	Strategy	Response Actions
7	PM	Competing Interests	The project is identified by the City in the Mission Bay Park Master Plan, prepared with significant public input, and complies with key aspects of City Charter Section 55.2. Public which were not involved in the Master Plan may oppose aspects of the project, such as the potential decrease in available beach area. Also, since the Over The Line area is identified as one of the stockpile sites for surplus soils, there could be public opposition to that proposal.	Moderate	Moderate	Moderate	Mitigate	The risk associated with project controversy will be mitigated by involving the public in the development of the project and minimizing all negative project impacts.

RISK ASSESSMENT TABLE			Project Name:	**North Fiesta Island Wetland Restoration**				
Risk Description				Risk Assessment			Risk Response	
ID #	Category	Title	Risk Statement	Probability	Cost Impact	Time Impact	Strategy	Response Actions
8	Environment	Sensitive Habitat	Existing habitat maps of the Project site show approximately 14 acres of "Degraded Salt Marsh." This should be field verified by the City or the City's project consulting team. Any marsh identified on-site could be a constraint requiring protection or mitigation if it exists. The existing Least tern Preserve is also a sensitive habitat that will be impacted by this project.	Moderate	Moderate	Low	Investigate and Mitigate	Confirmation of the on-site habitat will be made and included in the final version of this report. A majority of the project area is upland habitat, Least Tern preserve, and beach. The Least Tern Preserve is considered sensitive to this area and any impacts to it must be mitigated. Should the presence of existing wetland habitat be confirmed, then an assessment of the restored habitat acreage must be done to determine if it exceeds the acreage of existing sensitive habitat by a ratio of 4:1 or greater. Mitigation might become necessary if the acreage of proposed restored habitat does not exceed existing wetland habitat by a ratio 4:1. This could be managed on the design side, as there is an opportunity to peel back the leeward slope of the Least Tern Preserve to accommodate additional high harsh or transitional habitat where the toe of slope meets the wetlands. The current design shows the leeward slope extending beyond the Coastal Commission's approved boundary at the expense of transitional wetlands. Therefore if additional proposed wetland habitat is required for mitigation, it can be addressed in future design phases.

RISK ASSESSMENT TABLE			Project Name:	**North Fiesta Island Wetland Restoration**				
Risk Description				Risk Assessment			Risk Response	
ID #	Category	Title	Risk Statement	Probability	Cost Impact	Time Impact	Strategy	Response Actions
9	Environment	Sea Level Rise	SLR primarily affects this project with its impact on wetland habitat distribution and functions. As sea levels increase above 3.6 feet, the wetland habitat becomes submerged, which decreases habitat diversity at the site.	Moderate	High	Low	Adaptive Management	When SLR causes significant habitat changes in the marsh, the site can be adapted by: - Reconfiguring and/or raising the marsh plains above future high internal marsh water levels through thin layer sediment additions (i.e., the pilot project at Seal Beach Naval Weapons Station in 2016). This will allow for mudflat and vegetated marsh habitat to persist; and/or - Creating a muted salt marsh system by controlling the tide range. This can be accomplished by introducing culverts or tide gates, which allow flexibility in the management operation as water levels rise; the culverts and tide gates may need to be replaced over time to provide modified tide levels.
10	PM	Permitting	As a result of the need to receive approval from multiple resource permitting agencies, the possibility of project delays during approval could occur which would result in an increased project schedule or require new mitigations	Moderate	Low	High	Mitigate	Engage resource agencies early in the process to anticipate and negotiate constraining regulations. During the approval process, the team will work directly with the resource agencies to ensure timely response times and the efficient transfer of information. The project will be required to comply with the latest regulations.

D. Objectives and Goals Table

PROJECT GOALS AND OBJECTIVES TABLE		Project Name:	North Fiesta Island Wetland Restoration					J-18097-A
			Overall Goals (Qualitative Outcome)					
ID #	Potential Benefits	Description/ Qualitative Outcome	Water Quality	Aquatic Resources	Fish and Wildlife Species	Environmental Enhancement	Recreation	Quantitative Outcome
1	Habitat creation	•Existing fill area of the island will be converted to a functioning salt marsh •The wetland will complement the adjacent tern nesting area by providing additional foraging area. This will also create an opportunity for bird watching •The creation of salt marsh and transitional marsh will increase the biodiversity of the site	X	X	X	X	X	•Creation of 40 acres of salt marsh habitat •The creation of areas for bird watching will add recreational visitors to the area
2	Storm water runoff water quality improvement	•The proposed main tidal channel will improve water circulation and water quality, which will improve public safety and recreational use in East Mission Bay	X	X	X	X	X	•Improved water quality will increase the aquatic recreational experience
3	Flood control	•The 100-year storm event will not be conveyed through the wetland, but the wetland may serve some filtration purpose overall within Mission Bay during stormflow conditions.	X	X	X	X	X	•There may not be a quantitative outcome for stormflow at this site.
4	Reduced maintenance	•Thin layer sediment augmentation is not anticipated until Sea Level Rise (SLR) increase causes the low, mid, and high salt marsh habitat to convert to mudflat and subtidal habitat •To keep the main channel functioning, the inlets on the west and east side of the island may need to be artificially opened if the inlets close from excess sedimentation. Maintenance activity of this kind is anticipated to be infrequent however.		X	X	X		•A SLR increase of 3 feet or greater will likely trigger the need for maintenance such as thin layer sediment augmentation •The inlet(s) may need to be opened periodically using equipment such as a small dozer to keep the tidal inlets connected to bay waters
5	Resilience linked to future climate change and sea level rise	•Salt marsh restoration at North Fiesta Island has been developed considering SLR by elevating marshes to allow some SLR while remaining salt as marsh.		X	X	X		•SLR adaptation strategies may need to be implemented in the future. The estimate based on current data is that SLR adaptation measures may be required at times between 2065 and 2100 (2.0 to 4.8 feet of SLR, respectively) under an intermediate-high emissions scenrio.