CHAPTER 2
ALTERNATIVES

2.1 OVERVIEW

Development and analysis of alternatives is an important step in the National Environmental Policy Act (NEPA) process. Alternatives are developed to identify and analyze different ways to achieve the purpose and objectives of the proposed action. The Council on Environmental Quality's NEPA regulations describe the alternatives section as the heart of an Environmental Impact Statement (EIS). Each of the alternatives analyzed should be reasonable and implementable, must be given equal treatment, and must provide a clear choice for the decision maker. Therefore, as outlined within this chapter, considerable effort was taken to develop a reasonable range of feasible alternatives. The no action alternative, which proposes no changes in the current management of the project site, serves as a baseline to which all other action alternatives are compared.

Consistent with the goals and objectives of the San Diego Bay National Wildlife Refuge (NWR) Comprehensive Conservation Plan (CCP) (USFWS 2006), the purpose of the Otay River Estuary Restoration Project (ORERP or proposed action) is to create, restore, and enhance coastal wetlands to benefit native fish, wildlife, and plant species, and to provide habitat for migratory seabirds and shorebirds as well as a range of salt marsh-dependent species. This project is also proposed to meet mitigation obligations required by Special Condition 8 of Coastal Development Permit E-06-013 for the construction and operation of a desalination facility in Carlsbad, San Diego County by Poseidon Resources (Poseidon). These requirements are set forth in the *Marine Life Mitigation Plan* (MLMP), approved by the Coastal Commission in August 2008 (Poseidon 2008). The two action alternatives present different approaches for restoring sensitive coastal habitat in accordance with the project's purpose and objectives as detailed in Section 1.4.2 of this EIS. Although both alternatives would be implemented within the same footprint, the alternatives differ in terms of the relative amounts of subtypes of coastal wetlands to be restored and enhanced, as well as the amount of excavation and fill that would be required to achieve the desired habitat types based on their tidal elevations. The document also addresses and analyzes a range of construction methods to implement the proposed restoration effort.

This chapter describes the process that was followed to identify the project site and the project alternatives. Three alternatives are analyzed in this document: the no action alternative (Alternative A) and two action alternatives (Alternative B and Alternative C). Additional alternatives that were considered but eliminated from detailed analysis are also described at the end of this chapter.

This EIS identifies Alternative B as the preferred alternative, due to increased habitat value and smaller excavation requirements; however, the alternative ultimately selected for implementation

may be different. The selected alternative may include any one of the alternatives presented above, or it could include a combination of actions from the range of alternatives described in this EIS. Such modifications may occur following completion of the EIS public review period based on the comments received from the public or other agencies.

2.2 ALTERNATIVES DEVELOPMENT PROCESS

As described in Section 1.3 of this EIS, Poseidon's Coastal Development Permit (No. E-06-013) was approved by the California Coastal Commission (Commission) in November 2007. Special Condition 8 of that permit required Poseidon to submit a MLMP addressing the impacts to marine organisms that would result from entrainment associated with the desalination facility's use of estuarine water. Following the Commission's approval of the MLMP in 2008, the Regional Water Quality Control Board (Regional Board) added a fish productivity requirement to the MLMP based on impingement of marine organisms. It is based on these actions that Poseidon was required to restore 66.4 acres of coastal wetlands as mitigation for impacts related to the operation of the desalination facility in Carlsbad (Poseidon 2008).

Before selecting the current project site, Poseidon conducted a comparison study of 15 sites in the Southern California Bight. Each site was evaluated to determine if restoration at the site would meet the terms and conditions of the MLMP. The following eight sites in San Diego County were considered: Loma Alta Slough in Oceanside; Buena Vista Lagoon, Agua Hedionda Lagoon, and Batiquitos Lagoon in Carlsbad; San Elijo Lagoon in Encinitas; the San Dieguito River Valley and Los Peñasquitos Lagoon in San Diego; and the Tijuana Estuary in the City of Imperial Beach. Additional sites considered outside San Diego County included Ormond Beach in Ventura County, the Los Cerritos and Ballona Wetlands in Los Angeles County, and the Huntington Beach Wetlands, Santa Ana River, and Anaheim Bay in Orange County. Several factors were considered in evaluating and comparing the sites, including opportunity for substantial tidal restoration for fish habitat, buffer and upland transition zone sufficient to protect restored areas, net increase in aggregate total wetland acreage, land availability, acreage availability, and possibility of timeline constraints.

Based on discussions with Commission staff, a Scientific Advisory Panel (SAP) formed by Coastal Commission staff to provide scientific expertise and representatives from other agencies, Poseidon ultimately determined that the Otay River Floodplain Site within the South San Diego Bay Unit of the San Diego Bay NWR was the most suitable mitigation site to fulfill the requirements, objectives, and restrictions outlined within the MLMP. In addition, the site has an existing conceptual restoration plan that has been described and analyzed by the U.S. Fish and Wildlife Service (USFWS or Service) in a programmatic EIS and Record of Decision prepared in conjunction with the San Diego Bay NWR CCP (USFWS 2006). Both the Commission (2011) and the Regional Board (2011) agreed with Poseidon's evaluation and approved the Otay River

Floodplain Site and preliminary restoration plan. The Service and Poseidon then entered into a Memorandum of Understanding to establish a restoration partnership.

Since November 2011, Poseidon's project team has worked in conjunction with the Service and members of the MLMP Workgroup (Commission, SAP, Regional Board, Port of San Diego, California Department of Fish and Wildlife, and California State Coastal Conservancy staff) on potential design alternatives to the originally proposed preliminary restoration plan (refer to Section 1.3).

Upon agreeing on a restoration site location, site analysis was initiated that included biological surveys, wetland jurisdictional delineations, tidal hydrology/hydraulics studies, soil characterization (e.g., contaminants testing, grain size analysis), flood and fluvial hydrology analysis, bathymetry and topographic studies, and a cultural resources inventory. In addition, earthwork calculations and cost estimates, an inundation/tidal habitat distribution study, and a fish productivity monitoring plan were prepared to assist in assessing preliminary restoration designs.

The Service, after considering the results of the soil characterization along with the volume of material that would be excavated to restore the wetland site, suggested that suitable material removed from the Otay River Floodplain Site could be put to beneficial use to restore a portion of the nearby salt ponds, as planned for in the CCP. Following discussions with the Commission and SAP, the MLMP Workgroup agreed that the proposed action would be revised to include the restoration of both the Otay River Floodplain Site and one or more of the salt ponds located north of the Otay River Floodplain Site. This decision led to the initiation of additional studies to determine which of the salt ponds would be best suited for the proposed restoration effort. Studies performed were similar to those undertaken when initially evaluating the Otay River Floodplain Site and included soils contaminants analyses, a fluvial hydraulics and sedimentation analysis, a tidal hydraulics analysis, an evaluation of levee stability, an evaluation of pre- and post-project habitat distribution to optimize habitat use by a variety of avifauna, and a salt marsh planting plan. After evaluation of the information gathered in these studies, it was determined that restoration of Pond 15, also located within the South San Diego Bay Unit of the San Diego Bay NWR, would be the best location to fulfill the requirements of the MLMP (in combination with restoration of the Otay River Floodplain Site) and support the goals of the CCP.

2.3 ALTERNATIVES EVALUATED IN DETAIL

2.3.1 Alternative A – No Action

Under the no action alternative, the Otay River Floodplain Site would not be restored or enhanced to support coastal wetlands; instead, the site would continue to support upland vegetation consisting mostly of exotic ruderal weed species and limited stands of coastal native

scrub species, as well as a few small areas of jurisdictional wetland. The existing berms around the site would not be removed, and the existing hydrology within the floodplain would not be altered. Similarly, the Pond 15 Site would not be restored to tidally-influenced subtidal and intertidal habitat; it would remain as an active part of the existing commercial solar salt operation. Periodic maintenance and management of these areas by San Diego Bay NWR staff would continue in conjunction with ongoing management on the San Diego Bay NWR. This alternative represents the baseline from which other action alternative will be evaluated.

Both sites are, however, identified in the CCP as future wetland restoration sites; therefore, even under the no action alternative, one or both of these sites could eventually be restored or enhanced to achieve San Diego Bay NWR purposes (USFWS 2006).

2.3.2 Features Common to Both Action Alternatives

The following section describes the features common to both action alternatives (Alternative B and Alternative C). Both action alternatives were developed consistent with the goals and objectives of the San Diego Bay NWR CCP (USFWS 2006), as well as the terms and conditions of the permits issued by the Commission and Regional Board for the Carlsbad Desalination Project.

2.3.2.1 General Overview of Both Action Alternatives

Both action alternatives involve restoration within the 33.5-acre Otay River Floodplain Site and the 90.9-acre Pond 15 Site (see Figure 1-2), and implementation of a number of project features. All proposed project features associated with proposed action implementation are shown on Figure 2-1a. Each action alternative would have the identical construction footprint within the same two noncontiguous sites. Under either of the action alternatives, the existing conditions in the Pond 15 Site would be permanently altered as described in Sections 2.3.3 and 2.3.4. A portion of the excavated material from the Otay River Floodplain Site would be transported to the Pond 15 Site where existing elevations within the pond would be raised to support a range of intertidal habitats. Once the desired elevations are achieved within the Pond 15 Site, the outer levee would be breached to allow permanent tidal circulation within the pond. The breach would be approximately 200 feet wide. The primary difference between the two alternatives is the extent of excavation and fill required to achieve the specified wetland habitats.

Preparation of the Final Restoration Plan (FRP) is a requirement of the MLMP, which was adopted by the Commission in November 2008. The FRP focuses on the restoration design proposed by Poseidon and the Service of subtidal, intertidal mudflat, intertidal coastal salt marsh, and upland habitats. The EIS is structured such that implementation of the FRP can be achieved through either action alternative. Although the title “Final Restoration Plan” is provided as

required by the MLMP, "final" does not imply that a restoration action alternative has been finalized at this time. The FRP is included as Appendix C of this EIS.

The following elements would be implemented as part of the restoration of the Otay River Floodplain Site and the Pond 15 Site.

Southern Otay River Floodplain Levee Relocation: An existing levee along the southern bank of the Otay River was constructed decades ago as part of the original salt works operation to create a salt pond to the south of the Otay River. The pond has long since been eliminated from the primary solar salt operation to the north, but today this levee continues to separate tidal and fluvial water in the Otay River channel from the area to the south. The Port of San Diego owns the southern portion of this obsolete pond (often referred to as Pond 20), and the Service, through a lease with the California State Lands Commission, has management responsibility for the northern portion of the pond. To facilitate tidal exchange within the restored northern portion of the pond, the existing levee, extending from Nestor Creek southwest to the general location of the bridge that crosses the Otay River, would be removed. However, to maintain current site conditions within that portion of the pond that is owned by the Port of San Diego, a new levee would be constructed along the southern edge of the restored wetland prior to the removal of the existing levee along the southern bank of the Otay River. The location of this new levee is shown in Figure 2-1a.

Pond 13 and Pond 15 Levee Modification/Pond 14 and Pond 15 Levee Modification: To facilitate the dewatering of Pond 15, and to allow for full tidal restoration of the Pond 15 Site, modifications to the existing internal levees within Ponds 13, 14, and 15 would be required. These modifications would include adjusting the existing water flow connections between ponds to remove Pond 15 from the solar salt operation and establishing new connections to the system from primary Ponds 13 and 14 to the secondary pond system. This would be accomplished in part by closing the opening in the levee located between Ponds 14 and 15. This levee would then be reinforced with excess fill material to withstand potential erosive impacts associated with tidal fluctuation in Pond 15 following its connection to San Diego Bay. The levee within the northern portion of Pond 13 would also require reinforcement and would remain separated from Pond 15.

Pond 15 Levee Modification: Pond 15 will be hydraulically connected to the San Diego Bay through an opening created in the northern salt pond levee. At the proposed Pond 15 inlet/outlet location, the existing top of the levee is about 24 feet wide at a top elevation of approximately 7 feet NAVD 88 (North American Vertical Datum of 1988). The inlet/outlet would be constructed by breaching the levee and dredging/excavating approximately 9,000 cubic yards of material to create a channel with a bottom width of 160 feet and bottom elevation of -3.0 feet NAVD 88. The footprint of the inlet/outlet excavation area is approximately 1.74 acres. As shown on Figure 2-1b, an approximately 1.30-acre portion of the inlet/outlet excavation area located to the north of the existing Pond 15 levee is land managed by the San Diego Unified Port District (Port).

Therefore, a Coastal Development Permit, Right-of-Entry Permit, long-term agreement, and other agreements or approvals must be obtained from the Port before the proposed excavation can occur. Approximately 4,300 cubic yards of cut would occur within the Port's jurisdiction. See Table 2-1 for details regarding inlet/outlet earthwork quantities within Service jurisdiction and Port jurisdiction.

Table 2-1
Pond 15 Inlet/Outlet Earthwork Quantities

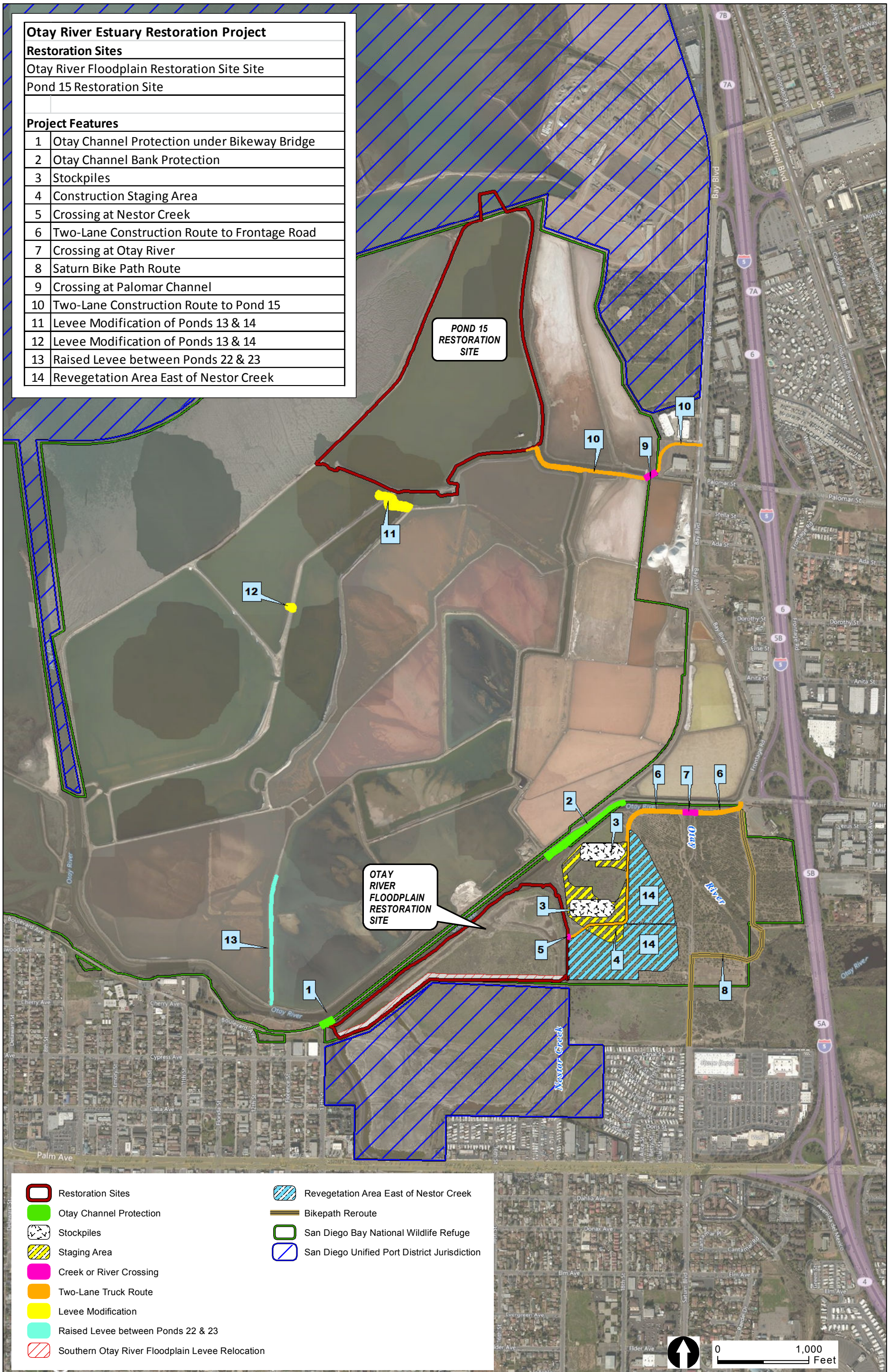
Jurisdiction	Volume of Cut (cubic yards)	Area (acres)
U.S. Fish and Wildlife Service	4,700	0.44
Port of San Diego	4,300	1.30
Total	**9,000**	**1.74**

Source: Everest International Consultants 2016.

Breaching of the levee at Pond 15 would be conducted after all earthwork within Pond 15 is completed, except for a fill area in Pond 15 near the proposed inlet/outlet that would be reserved to receive the cut material from the levee breach. Excavation would likely be conducted from west progressing to east using land-based equipment such as a long-reach backhoe situated on the top of the levee on the east side of the proposed inlet/outlet area. Future maintenance of the inlet/outlet, if any, would be conducted in accordance with applicable Port permits and approvals.

2.3.2.2 Project Features

In addition to the noncontiguous Otay River Floodplain Site and Pond 15 Site, there are several additional project features required to facilitate restoration under both action alternatives as shown in Figure 2-1a. Several methods for transporting material from the Otay River Floodplain Site to the Pond 15 Site are evaluated in this document. Project features may vary depending upon the final method selected. Three options for transporting material between the Otay River Floodplain Site and the Pond 15 Site are being considered including pumping the slurried material through a pipeline, using a conveyor belt, or transporting the material via dump trucks that would follow the construction route illustrated in Figure 2-2. Potential impacts associated with implementation of these features are addressed in Chapter 4 of this document.



Otay River Estuary Restoration Project	
Restoration Sites	
Otay River Floodplain Restoration Site Site	
Pond 15 Restoration Site	
Project Features	
1	Otay Channel Protection under Bikeway Bridge
2	Otay Channel Bank Protection
3	Stockpiles
4	Construction Staging Area
5	Crossing at Nestor Creek
6	Two-Lane Construction Route to Frontage Road
7	Crossing at Otay River
8	Saturn Bike Path Route
9	Crossing at Palomar Channel
10	Two-Lane Construction Route to Pond 15
11	Levee Modification of Ponds 13 & 14
12	Levee Modification of Ponds 13 & 14
13	Raised Levee between Ponds 22 & 23
14	Revegetation Area East of Nestor Creek

AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 2-1a

Project Features

Otay River Estuary Restoration Project EIS

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AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 2-1b

Pond 15 Levee Modification

Otay River Estuary Restoration Project EIS

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SOURCE: EVEREST INTERNATIONAL CONSULTANTS, INC. 2016

FIGURE 2-2
Truck Haul Route

Otay River Estuary Restoration Project EIS

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Project features associated with construction and material transport are outlined below:

Otay Channel Protection under Bikeway Bridge (Figure 2-1a, Project Feature 1): To protect the Otay River channel and western most Bayshore Bikeway bridge abutments from erosion, a layer of riprap would be placed at the bottom of the Otay River under the existing bridge just southwest of the Otay River Floodplain Site (Figure 2-1a). The area requiring protection is the bottom of the channel and the slope at the southern bridge abutment. The conceptual design of the riprap was estimated to have a footprint of approximately 5,500 square feet, and a fill volume of approximately 650 cubic yards.

Otay Channel Protection (Figure 2-1a, Project Feature 2): Protection of a portion of the bank that separates the Otay River from Pond 48 may be necessary to avoid bank erosion during the 100-year flood. Based on the 100-year flood velocities calculated for the project site from the preliminary construction drawings, a 1-foot layer of 5-inch rock extending approximately 1,100 long and approximately 60 feet wide would be sufficient to prevent erosion along the bank. Verification of the need for and extent of bank protection in this area would occur during the preparation of final construction plans.

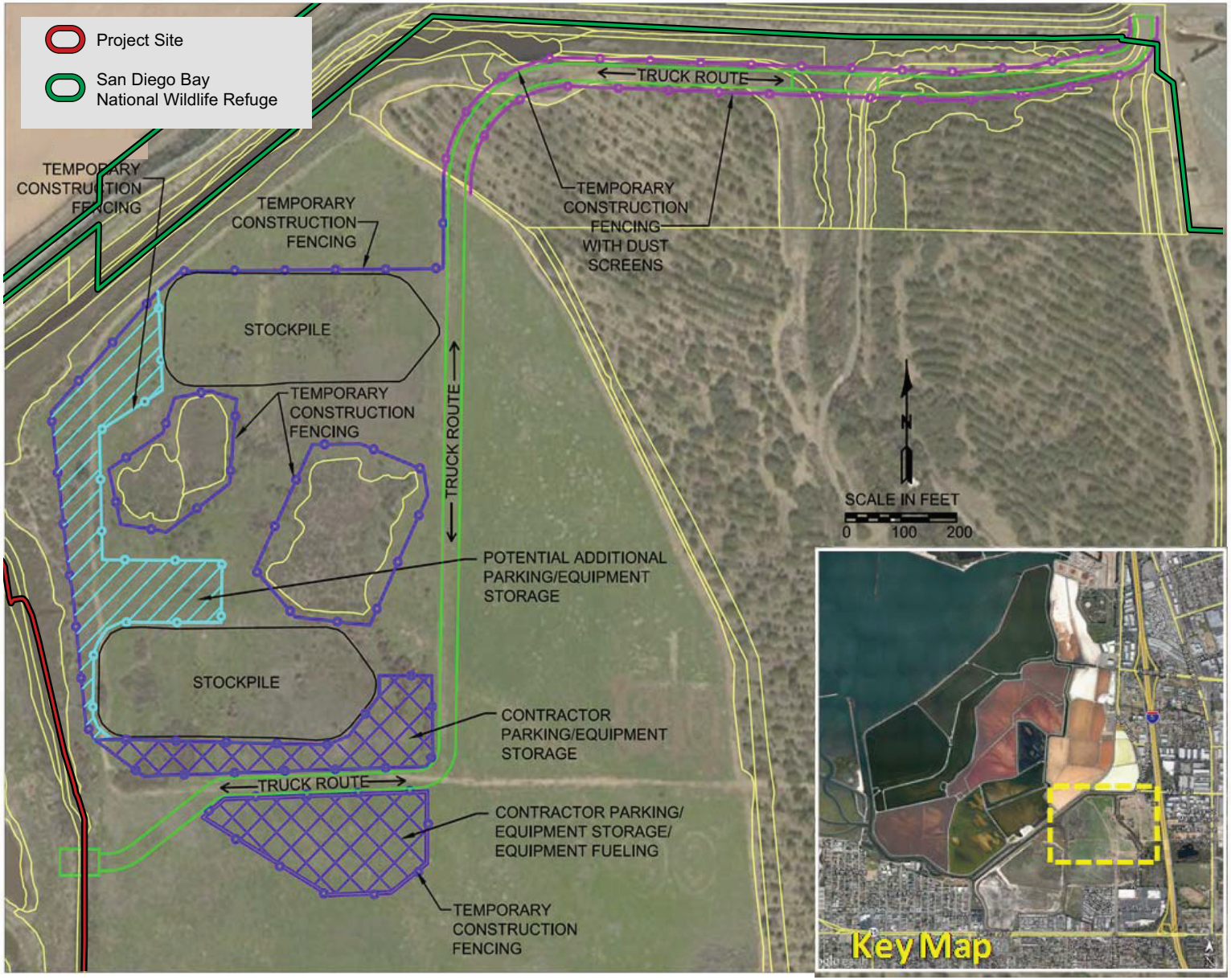
Stockpiles (Figure 2-1a, Project Feature 3): Two areas encompassing a total of 4.07 acres located in the northeastern portion of the Otay River Floodplain, to the east of Nestor Creek (Figure 2-1a), would be set aside for stockpiling excavated material. During construction operations, all excavated material from the Otay River Floodplain Site would be either loaded directly onto the specific hauling method chosen or stockpiled east of Nestor Creek while waiting for transport to the fill area, as shown in Figure 2-3a, Staging Area and Stockpiles, and 2-3b, Proposed Stockpiles Details. Excess material, approximately 36,000 cubic yards of material depending on which action alternative is implemented, would remain in this area for an unspecified period of time after completion of construction. The material would be stored on the Refuge until it is needed to implement a future project or projects within the San Diego Bay NWR Complex. Reuse of the stockpiled material for uses other than the current project would require additional NEPA review.

As material is added to the stockpiles, it would be compacted and shaped using conventional earthmoving equipment to form two semi-rectangular piles each measuring about 500 feet long and about 200 feet wide, as shown in Figure 2-3b. The stockpiled soils would be watered during construction to minimize the potential for dust generation. The height of the piles would not exceed 8 feet, with a crest elevation of +18 feet NAVD 88. The side slopes would not exceed 4:1 (horizontal:vertical). Once all material is in place, the slopes and top would be hydroseeded with a native plant mix that would provide functional habitat, soil stability, and protection from wind and water-related erosion. Temporary and long-term erosion control measures (e.g., plastic sheeting, jute matting, straw wattles, fiber rolls) would be used to ensure effective protection until vegetation can grow to provide effective controls. These erosion control measures would be maintained until the stockpile material is removed.

Staging Area (Figure 2-1a, Project Feature 4): Implementation of the project would require a site where the logistics of mobilization and demobilization can occur, as well as where other project-related activities can be coordinated. Such a construction staging area would be prepared just to the east of Nestor Creek on the uplands portion of the Otay River Floodplain Site as shown on Figure 2-3a. The existing non-native vegetation on the 6.06-acre construction staging area site would be removed and the site surface would be enhanced with appropriate surface material (e.g., non-expansive soil, gravel) to accommodate vehicle movement and reduce the potential for wind and water erosion. The staging area would be located and designed to avoid adjacent wetland areas. The site would be fenced for security purposes and erosion control measures, such as fiber rolls and/or silt fencing, would be installed around the site to minimize the potential for runoff from the site to the adjacent wetland areas. A temporary electrical distribution line may be extended to the site to serve a temporary construction trailer, and portable toilets could be provided on site for construction workers. Space would also be provided for site workers to park during construction hours. Following completion of either of the action alternatives, the staging area would be restored to prior site conditions and revegetated with appropriate native plants.

Crossing at Nestor Creek (Figure 2-1a, Project Feature 5): To access the western portion of the Otay River Floodplain Site from the staging area east of Nestor Creek, the contractor would install a temporary crossing, composed of fill material and associated culverts, across Nestor Creek. This crossing would be removed at the completion of construction, and the creek channel would be restored to its pre-project condition. The temporary culvert would be installed that would maintain a hydraulic connection to Nestor Creek.

Construction Access Route from the Otay River Floodplain Site to Frontage Road (Figure 2-1a, Project Feature 6): This construction access route would be used under any one of the three construction material transfer alternatives to provide access to the site for construction equipment, materials, and site worker vehicles. Under the truck transport option, this route would also be used as the access route for transporting excavated material from the Otay River Floodplain Site to the Pond 15 Site. The need for traffic control along this route, particularly near the end of Main Street, would be coordinated with the appropriate agencies. Construction access onto the site would occur near the entry/exit point of the Bayshore Bikeway as it extends west towards Imperial Beach. Also in this location is the entry to the parking area for Swiss Park and the County of San Diego's Otay River Valley Regional Trail western trailhead. To manage traffic and bicycle flow in this area, traffic control would be provided at this intersection whenever construction access is occurring.



SOURCE: Everest International Consultants, Inc. 2016

FIGURE 2-3a
Staging Area and Stockpiles

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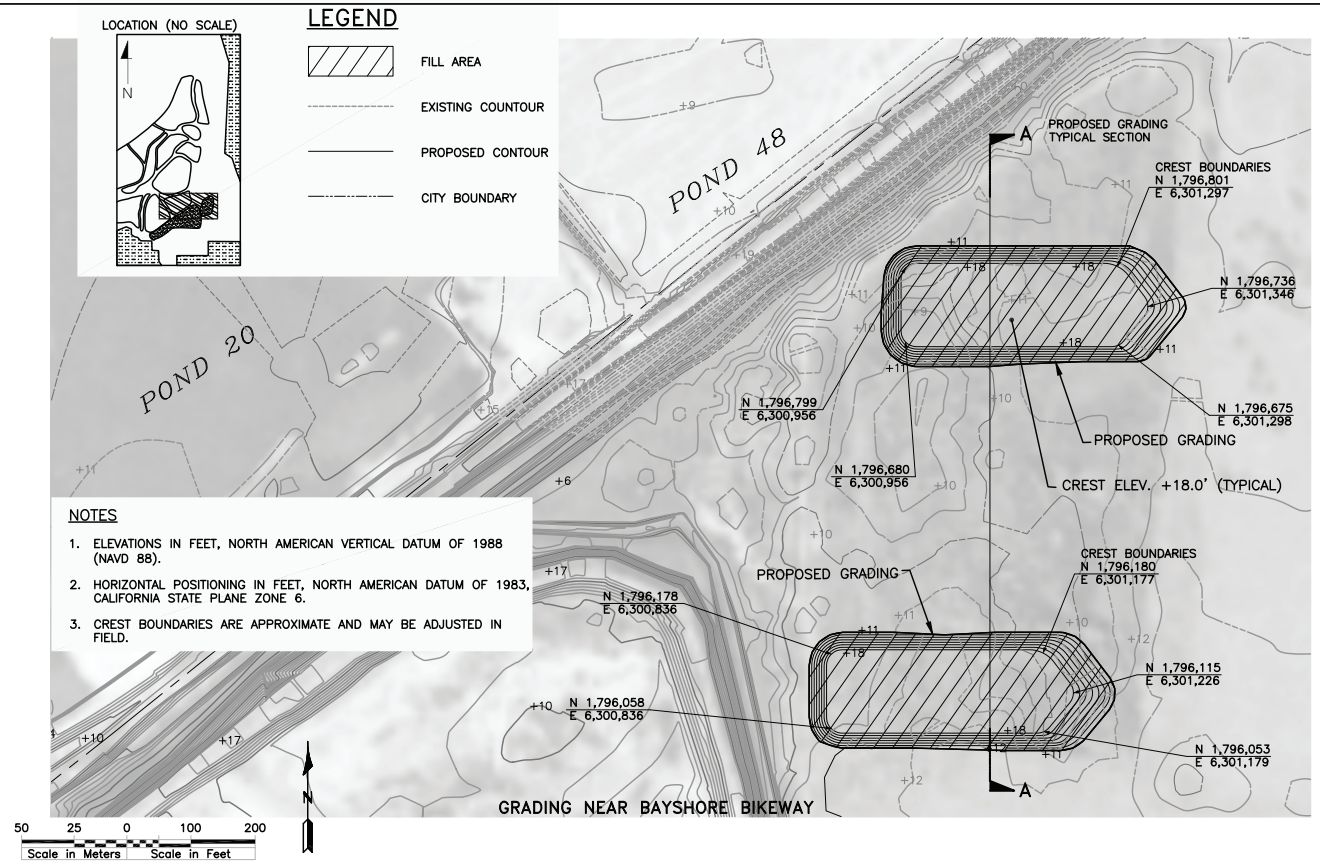
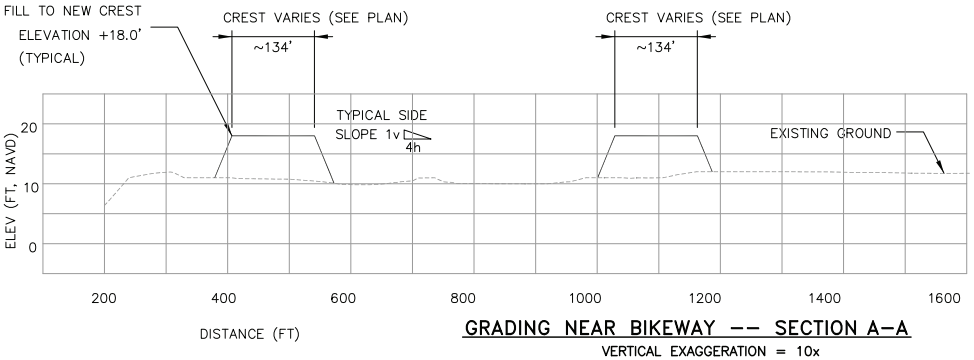


NOTES

1. ELEVATIONS IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
2. HORIZONTAL POSITIONING IN FEET, NORTH AMERICAN DATUM OF 1983, CALIFORNIA STATE PLANE ZONE 6.
3. CREST BOUNDARIES ARE APPROXIMATE AND MAY BE ADJUSTED IN FIELD.



GRADING NEAR BIKEWAY -- SECTION A-A

VERTICAL EXAGGERATION = 10x
VERTICAL 1" = 25'
HORIZONTAL 1" = 250'

NOTES

1. ELEVATIONS IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
2. HORIZONTAL POSITIONING IN FEET, NORTH AMERICAN DATUM OF 1983, CALIFORNIA STATE PLANE ZONE 6.
3. HORIZONTAL CO-ORDINATES APPROXIMATE. VERIFY IN FIELD.

SOURCE: KTU&A 2015

FIGURE 2-3b
Proposed Stockpiles Details

Otay River Estuary Restoration Project EIS

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Crossing at Otay River (Figure 2-1a, Project Feature 7): To access the construction staging area and western portion of the Otay River Floodplain Site from the end of Main Street, the contractor would install a temporary crossing at the Otay River channel. This crossing would be removed at the completion of construction; the river channel would be restored to pre-project conditions; and the site would be revegetated with appropriate native plants. In addition, at a separate location along the Otay River, as identified in Figure 2-4 and 2-5, both the potential pipeline and conveyor belt routes would have to cross the Otay River. Upon removal of any pipeline or conveyor belt, the river channel would be restored to pre-project conditions and revegetated with appropriate native plants.

Bike Path Reroute (Figure 2-1a, Project Feature 8): All construction-related access to the Otay River Floodplain Site would involve crossing a City of San Diego bike path that extends from Main Street in the north to the northern terminus of Saturn Boulevard in the south. The existing bike path would be temporarily rerouted during construction to minimize conflicts between bicyclists and construction vehicles and to ensure user safety. The temporary rerouting of this bike facility would require coordination with the City of San Diego and the County of San Diego since use of a portion of the existing Otay River Valley Regional Trail route would be needed to facilitate a reroute around the construction access point. The specific alignment would be confirmed following finalization of construction planning. Preliminary design work indicates that the path could be temporarily routed around the eastern side of the Otay River Floodplain Site, through the Otay River Floodplain, as shown in Figure 2-1a. The rerouting of this path would likely require resurfacing, at least temporarily, to accommodate bicycles. Resurfacing could be provided as a permanent stabilized soil path that could appropriately accommodate all users on the Otay River Valley Regional Trail. Once construction has been completed, appropriate adjustments to the temporary routes would be coordinated with the City of San Diego and the County of San Diego to ensure suitable access along both the existing bike path and the regional trail is restored.

Construction Access Route from Bay Boulevard to the Pond 15 Site (Figure 2-1a, Project Feature 10): A designated construction access route is also needed to access the Pond 15 Site. Construction vehicles accessing this site from Bay Boulevard would enter the site via an existing access easement located east of Pond 29. At the southeast corner of Pond 29, vehicles would cross the Palomar Channel and then travel along the levee on the southern bank of the Palomar Channel towards Pond 15. As described below, a temporary crossing over Palomar Channel would be required. In addition, measures (such as the installation of a temporary open channel or pipes) would be taken in this area to ensure the continued flow of brine between salt ponds.

Crossing at Palomar Channel (Figure 2-1a, Project Feature 9): This crossing would be necessary to allow for construction access to the Pond 15 Site, and under the truck transport option, it would be needed to accommodate the transport of excavated material from the Otay

River Floodplain Site to the Pond 15 Site. The temporary crossing would consist of fill material and associated culverts to ensure that the temporary crossing would not create impediments to water flow. The crossing must be able to support the weight of haul trucks across the Palomar Channel, directly east of the Pond 15 Site. The crossing would be removed at the completion of construction; the channel restored to its pre-project condition; and the area revegetated with appropriate native plants.

Pond 13 and Pond 14 Levee Modifications (Figure 2-1a, Project Features 11 and 12): Similar to levee modifications proposed between Ponds 13 and 15 and Ponds 14 and 15, as described previously, the internal levee between Ponds 13 and 14 would be modified to facilitate the dewatering of Pond 15, and to allow for full tidal restoration of the Pond 15 Site. These modifications would include adjusting the existing water flow connections between ponds to remove Pond 15 from the solar salt operation and establishing new connections to the system from primary Ponds 13 and 14 to the secondary pond system. This would be accomplished in part by closing the opening in the levee located between Ponds 13 and 14. This levee would then be reinforced with excess fill material to withstand potential erosive impacts associated with tidal fluctuation in Pond 15 following its connection to San Diego Bay.

Raised Levee Between Pond 22 and Pond 23 (Figure 2-1a, Project Feature 13): The elevation of the levee that extends between Ponds 22 and 23 would be raised by 2 feet from an elevation of approximately 11 feet to 13 feet NAVD88. This action would require approximately 11,500 cubic yards of fill material and the typical side slope gradient for the modified levee would be 3:1 (horizontal:vertical). This improvement would take place during the final grading stage of construction. The levee, located northwest of the Otay River Floodplain Site, would be raised to avoid any effects associated with the project on downstream flooding during significant flood events. The results of the fluvial analysis indicated that raising the top of the levee between Ponds 22 and 23 by 2 feet, from an elevation of approximately 11 feet to 13 feet NAVD 88, would divert flood flows away from the Bayside Park area and toward the northern salt ponds. To avoid any increase in the maximum water elevation in the Bayside Park area during the 100-year flood, increasing the elevation of the levee between Ponds 22 and 23 by 2 feet has been included as a project feature. At this time it is assumed that suitable fill material for the levee modification would be available on site from project excavation material such that the import of suitable fill is not anticipated.

Revegetation Area (Figure 2-1a, Project Feature 14): The 21.5-acre area east of Nestor Creek would be revegetated following completion of the proposed action. Two potential methods for revegetation are considered for this area: the first involves use of a custom seed mix, collected from the project area and tested for germination and purity; the second involves purchase of a premade Diegan coastal sage scrub seed mix from a commercial seed supplier.

SOURCE: EVEREST INTERNATIONAL CONSULTANTS, INC. 2016

FIGURE 2-4
Conveyor Belt Haul Routes

Otay River Estuary Restoration Project EIS

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SOURCE: EVEREST INTERNATIONAL CONSULTANTS, INC. 2016

FIGURE 2-5
Pipeline Routes

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Typically, for smaller scale revegetation projects, it is specified that all seeds should be collected from existing Diegan coastal sage scrub communities in the project area, in this case south San Diego Bay or nearby Tijuana River Valley. Using this method, it is usually recommended that all seed be tested by a seed laboratory certified by the Association of Official Seed Analysts or a seed technologist certified by the Society of Commercial Seed Technologists as per the standards of the California Food and Agriculture Code for purity and germination.

Alternatively, seed companies offer pre-made coastal sage scrub mixes that have been collected in California but not necessarily in San Diego County or south San Diego Bay. Seeds have been tested in-house and are available at a set price per pound. The cost to apply the hydroseed mix and irrigate are the same for each option.

Under both options, the hydroseed would be applied as slurry to the entire surface area of the disturbed portion of the area. The hydroseed slurry would consist of the required seed species and quantities and an inert wood pulp matrix. Hydroseed would be applied as an even coating over all surfaces. Potential plant pallets are provided in Appendix D, Planting Plan for Uplands.

2.3.2.3 Sea-Level Rise

Based on general scientific agreement regarding impending climate change and subsequent sea-level rise, both action alternatives evaluate the impact of potential mean sea-level rise on proposed habitats. The California State Climate Action Team and Ocean Protection Council's Science Advisory Team guidance projects that increases in sea level will range from 4.68 inches to 24 inches by 2050 (State of California 2013; Commission 2015). In addition, in 2015, the Commission adopted a sea-level-rise policy guidance document using these same projections, further validating this approach (Commission 2015). Project analysis includes the associated shifts in inundation and habitat on the two restoration sites that would occur as a result of these sea-level rise projections on future site conditions.

2.3.2.4 Construction Methods

The construction methodology for implementing either of the action alternatives is addressed below and provided in detail within the 2016 report titled *Otay River Estuary Restoration Project Construction Methodology* by Everest International Consultants, which is included as Appendix E to this EIS.

Implementation of either of the two action alternatives would require a substantial amount of earthwork, including the excavation (cut) of approximately 320,000 to 370,000 cubic yards of soil from the Otay River Floodplain Site. In both alternatives, the majority of this material would be transported to the Pond 15 Site to raise the elevations in the pond to levels suitable for supporting the desired intertidal wetland habitats and to reinforce levees in and around the Pond

15 Site. Additional material would be used to construct a new berm along the southern edge of the Otay River Floodplain Site. Excess material would be stored to the east of the Otay River Floodplain Site (stockpiles) to be used on future NWR projects.

A description of the construction methods, equipment, and schedule is presented below. Minor revisions to the construction methodology could be proposed by the contractor selected for project construction with due consideration to the requirements specified in permits, agreements, and approval documents. If the selected contractor chooses a construction methodology that is substantially different from those described below and it is determined that the implementation of the new methodology would result in additional impacts on the human environment or the impacts would be different from those described in the Final EIS, new analysis of the potential impacts to the environment would be required and a supplement to the Final EIS would be prepared.

Construction Access

Heavy construction equipment would likely be trucked to the project sites via Main Street to access the Otay River Floodplain Site and via Palomar Street to Bay Boulevard to access the Pond 15 Site. Large and heavy equipment would be transported during off-peak traffic hours. Roads that could be used for construction access routes in the vicinity of the project site are shown in Figure 2-2, with the potential truck route outlined in Figure 2-1a. Major roads in the vicinity of the Otay River Floodplain Site include Main Street to the north of the Otay River Floodplain Site and Interstate 5 (I-5) to the east. Although unlikely, there is the potential that access from Saturn Boulevard to the south could be required for mobilization or demobilization of construction equipment. Major roads in the vicinity of the Pond 15 Site include Bay Boulevard, Palomar Street, and I-5 to the east. There are interchanges to I-5 at Palomar Street, Main Street, and Palm Avenue. The primary construction staging area would be located on the Otay River Floodplain Site to the east of Nestor Creek as described previously.

Using one of the I-5 interchanges, construction equipment would access the Otay River Floodplain Site at the northeastern corner of the Otay River Floodplain Site, where West Frontage Road, Main Street, and the Bayshore Bikeway intersect. Construction equipment would access the Pond 15 Site via a NWR access easement located off of Bay Boulevard just north of the intersection of Palomar Street and Bay Boulevard. To complete the construction work on the levee between Ponds 22 and 23, construction equipment would access the site via the main entrance to the South Bay Salt Works, located off Bay Boulevard.

Within the project sites, temporary dirt roads would be established to provide access for dump trucks and other construction equipment between the excavation, staging, fill, and stockpile areas. For material transport, access routes would be established and maintained for public safety

and environmental pollution control. To access the western portion of the Otay River Floodplain Site from the construction area, the contractor would install two temporary crossings across Nestor Creek and the Otay River, as described previously under "Project Features." In addition, construction vehicles transporting material from the Otay River Floodplain Site to the Pond 15 Site may use some of the existing salt pond levees. Since the existing levees were not initially built to accommodate heavy construction traffic, temporary road improvements such as widening to 30 feet and resurfacing and/or reinforcing with gravel/mats would likely be necessary.

Access to the site during construction would be controlled through the use of gates, fencing, and/or site security services. At the end of construction, and during the nesting season, all equipment would be demobilized. Due to the variety of nesting species using the site, the exact breeding season may vary from year to year.

Earthwork

The primary construction activity of the project is earthwork. The project requires the excavation of approximately 320,000 cubic yards of soil for Alternative B and 370,000 cubic yards of soil for Alternative C within the Otay River Floodplain Site. Between 50,000 to 60,000 cubic yards of soil would also be excavated from the Pond 15 Site. The majority of the soil excavated from both the Pond 15 Site and the Otay River Floodplain Site would be beneficially used as fill and cover within the Pond 15 Site, with some material disposed of on site as fill for use of dikes, levees, and upland habitat creation. After earthwork has been completed, approximately 30,000 to 40,000 cubic yards of material would remain on site and would be stockpiled within the Otay River Floodplain portion of the San Diego Bay NWR (see Figures 2-1a, 2-3a, and 2-3b) for use on future NWR projects.

Prior to beginning site excavation, all areas to be graded would be cleared and grubbed with the resulting brush, trash, and debris disposed of at an approved off-site location. Once this step has been completed, excavation and transport of material would occur using some combination of trucks, bulldozers, loaders, conveyor belts, and/or pipelines as described below.

1. ***Initial Excavation at the Otay River Floodplain Site:*** Land-based excavation would be conducted with a combination of bulldozers, front loaders, backhoes, graders, scrapers, excavators, and trucks. Bulldozers would be used to move excavated material to stockpile areas, which may be necessary for staging before being transported to Pond 15. Bulldozers may also be used to move material for on-site upland or berm construction.
2. ***Moving Fill from the Otay River Floodplain Site to the Pond 15 Site:*** One of the following methods would be used to move the excavated fill materials from the Otay River Floodplain Site to the Pond 15 Site. Under any of the following methods, the Pond 15 Site would need to be dewatered prior to material placement.

3. Dump trucks (12-cubic-yard capacity) may be used to transport material from the Otay River Floodplain Site to the Pond 15 Site. As described previously, a system of haul roads and access points would need to be established and maintained. Dry material would be loaded onto trucks using a front loader or backhoe, or it would be excavated and hauled directly using scrapers. Wet material would be dried and then transported via trucks equipped with lining to retain water that remains in the soil. The anticipated truck route is shown in Figure 2-1a and 2-2.

    a. Truck traffic on this route would have some interference with the Bayshore Bikeway and City of San Diego bike path where the trucks exit the Otay River Floodplain Site onto West Frontage Road. Traffic control, including a flagman, would be provided at this intersection to ensure public safety. From West Frontage Road, the trucks would turn onto Anita Street and then to Bay Boulevard. Trucks would enter the Pond 15 Site through the NWR access easement, as described previously. The salt pond levees used in the hauling operation would be improved and widened to 30 feet, using material excavated from the Otay River Floodplain Site, to allow for two-way traffic. The round trip distance of the truck route shown in Figure 2-2 is about 7 miles. A round trip, including loading and dumping, would likely take about 36 minutes. A contractor using 12-cubic-yard trucks would have to make about 43,000 trips and 52,000 trips, respectively, for Alternative B and Alternative C.

4. Conveyor belts may be used to move excavated material within the Otay River Floodplain Site to the Pond 15 Site, as shown in Figure 2-4. The two possible routes for this long conveyor belt system, as shown in Figure 2-4, would be approximately 1.5 miles. The conveyor belt would be installed over the Otay River and under the existing Bayshore Bikeway. After crossing the Otay River and Bayshore Bikeway, the conveyor belt would continue northward, using the existing levees for support. One end of the conveyor belt would be near the Otay River Floodplain excavation site and the other end would dump either directly into the Pond 15 Site or into awaiting trucks in the Pond 15 Site, which would move the material a short distance within the pond.

5. A pipeline may be used to transport material from the Otay River Floodplain Site to the Pond 15 Site. The two possible pipeline routes would run between 1.1 to 1.5 miles long, depending on the method chosen. As shown in Figure 2-5, the pipeline may be constructed using a direct route floating across the salt ponds (Option 1), or the pipeline may be routed along the existing levees (Option 2). In this construction method, excavated material from the Otay River Floodplain Site would be dumped into a pit, mixed with water taken from the Otay River to form a slurry, which would be pumped to Pond 15 through the pipeline. If the pipeline method were selected, the excavated material would arrive at the Pond 15 Site as a slurry mixture of water and soil. The material would be distributed through the pond by periodic relocation of the dredge

pipeline discharge location. It is anticipated that it could take 1 to 5 years for the material to achieve a level of consolidation that would allow the safe use of land based equipment to distribute the material throughout the site to achieve the appropriate habitat types. Consequently, once all the material from the Otay River Floodplain Site has been pumped to the Pond 15 Site, the material would be left within the Pond 15 Site until final consolidation has been achieved. Additional equipment would be needed to conduct final grading operations in Pond 15 after enough consolidation has occurred to allow construction equipment to operate in this area.

6. ***Distribution of Fill and Final Grading in the Pond 15 Site:*** Distribution of fill material in the Pond 15 Site would be carried out with land-based equipment, such as bulldozers, scrapers, and/or long-reach backhoes. To avoid sinking in the wet, soft sediment, the bulldozers would initially push and spread the Otay River Floodplain Site fill material outward into the pond from the levees. The newly formed fill area extending from the levee would provide the working area for the trucks and bulldozers to reach farther into the pond. When the fill reaches the approximate finished ground elevations, construction equipment would be used to grade the site to the desired contours and slope variations. Such equipment may include land-based and/or amphibious construction equipment.
7. ***Final Grading:*** Final precise grading would be conducted in the Otay River Floodplain Site to achieve the final elevations of the appropriate habitat types in the excavated area. When the excavation reaches the approximate finished ground elevations, land-based equipment would be used to grade the site to the designed contours and slope variations. Final grading would include the removal of the southern levee of the Otay River within the Otay River Floodplain Site and construction of a new levee along the southern border of the restored wetland. These construction activities would be conducted with land-based equipment. At this time, it is assumed that suitable fill material for the levee construction would be available on site from excess project excavation materials.

Dewatering Pond 15 Site

Dewatering would be necessary in the Pond 15 Site to ensure accuracy of fill placement. Due to the salinity of the water in the Pond 15 Site, the water is considered a valuable commodity to the South Bay Salt Works, but a pollutant to San Diego Bay. Therefore, water would be pumped from Pond 15 to Ponds 24 and 25, which are adjacent active salt ponds. To facilitate this, the dikes around Pond 15 would be modified to hydraulically isolate the Pond 15 Site from the rest of the salt pond system. Once isolated, the brine water remaining in the Pond 15 Site would be pumped into the active salt-producing salt ponds. The volume of water in the Pond 15 Site is estimated to be about 140 million gallons. Draining this volume of water into other salt ponds would take about a month using several heavy-duty water pumps (Appendix E). Therefore, dewatering of the Pond 15 Site would be one of the initial construction tasks. Dewatering would continue throughout

construction to keep the Pond 15 Site dry. Any permits and/or approvals required to conduct the dewatering activities would be obtained prior to commencing this activity.

Areas Restored to Pre-Construction Conditions

Any areas that were bridged, reinforced, or widened to accommodate construction equipment would be restored to pre-construction conditions once construction is complete. Staging areas, access routes, and other disturbed areas would be decompacted and revegetated with appropriate native species, and, if necessary, recontoured to preconstruction conditions. Any temporary equipment, structures, or utilities (e.g., water, power) installed at the project site would be removed at the completion of construction. Temporary crossings would be removed and restored to pre-project conditions at the completion of construction.

Erosion Control

Throughout construction, the contractor would be required to comply with National Pollutant Discharge Elimination System stormwater permit conditions, which require that a stormwater pollution prevention plan (SWPPP) be prepared and implemented by the contractor. The SWPPP identifies the best management practices to be implemented throughout construction to protect water and air quality, and other sensitive resources.

Construction Equipment

The types of equipment used to construct the project and the number of various pieces of equipment would ultimately be determined by the contractor during construction. A preliminary list of construction equipment was developed to provide the information needed to evaluate potential environmental impacts within this EIS. The type and number of major construction equipment used during construction are presented in Table 2-2.

Table 2-2
Construction Equipment Summary

Equipment	Fuel Type	Equipment Quantity per each Sediment Transport Option		
		Truck Haul	*Conveyor Belt Haul*	*Pipeline Haul*
Backhoe	Diesel	4	4	4
Loader	Diesel	4	4	4
Scraper	Diesel	4	4	4
Bulldozer	Diesel	4	4	4
Dump truck	Diesel	28	4	4
Water pumps[1]	Diesel	6	6	6
Booster pump	Diesel	—	1	1
Generator	Electric	—	1	1

Source: Appendix E.
[1] Water pumps would only be needed for dewatering of Pond 15.

The fuel required for each type of construction equipment is also provided to allow evaluation of impacts to air quality and greenhouse gas emissions. If the pipeline option is used to haul material from the Otay River Floodplain Site to the Pond 15 Site, then additional equipment would be needed to conduct final grading operations within the Pond 15 Site after enough consolidation has occurred to allow construction equipment to operate in the area. It is anticipated that up to four bulldozers, four loaders, and four scrapers would be needed during the 4-month final grading operation that would occur between 2020 and 2024, as outlined in Table 2-3.

Table 2-3
Preliminary Construction Schedule

Activity	Start Date	Finish Date	Duration
Mobilization	8/1/2017	9/30/2017	2 months
Dewatering of Pond 15	10/1/2017	11/1/2017	1 month
Earthwork	10/1/2017	1/31/2018	4 months
Seasonal demobilization	2/1/2018	2/28/2018	1 month
Core nesting season (no active construction)	3/1/2018	7/31/2018	5 months
Remobilization	8/1/2018	8/31/2018	1 month
Earthwork	9/1/2018	12/31/2018	4 months
Seasonal demobilization	1/1/2019	2/28/2019	2 months
Core nesting season (no active construction)	3/1/2019	7/31/2019	5 months
Remobilization	8/1/2019	8/31/2019	1 month
Pond 15 grading (Truck/Conveyor options)	9/1/2019	12/31/2019	4 months
Pond 15 grading (Slurry option - early estimate) [1]	9/1/2020	12/31/2020	4 months
Pond 15 grading (Slurry option - late estimate)[1]	9/1/2024	12/31/2024	4 months

Note:
[1] Dates are associated with the slurry construction method only, with an estimated delay due to the consolidation of material.

Construction Schedule

Construction activities would occur in the following general order, with an approximate start date in August 2017 and estimated completion date between December 2020 and December 2024, as shown in Table 2-3, depending on the construction method chosen:

- Dewatering of the Pond 15 Site would be initiated at the start of construction as soon as the dewatering equipment is mobilized and brought to the Pond 15 Site. The Pond 15 Site would be hydraulically isolated from the rest of the salt pond system, and the approximately 140 million gallons of isolated brine water would be pumped into the adjacent active salt-producing salt ponds.
- Other mobilization and staging area set up would follow. The access/truck route would be created within the Otay River Floodplain Site and strengthened and widened, if necessary, within the salt pond access roads and the Pond 15 Site. Conveyor belts would be installed, if

applicable. The Otay River Floodplain Site would then be cleared and grubbed to begin excavation. Excavation and placement of excavated materials would occur simultaneously; otherwise, excavated material would be stockpiled while waiting for transport to the fill area.

- Excavation of the Otay River Floodplain Site and placement of fill in the Pond 15 Site would then occur, followed by final grading of both sites. Earthwork operations would generally occur within the timeframe of August 1 to February 28, to avoid disturbance during the avian nesting season. Mobilization and demobilization of construction equipment to and from the site may occur outside this timeframe if it is determined that the areas to be affected do not support nesting birds.
- At the completion of construction in the Otay River Floodplain Site, a new levee would be constructed along the southern edge of the restored floodplain to prevent the flow of tidal waters onto the adjacent property. The levee between Pond 22 and Pond 23 would be modified simultaneously with the construction of the new levee on the Otay River Floodplain Site. Once this new levee and existing levee have been completed, the existing levee between the Otay River Floodplain Site and Otay River would be removed.
- Planting would begin when earthwork is complete within the Otay River Floodplain Site and the Pond 15 Site. A detailed planting program FRP is outlined below. Planted areas would be monitored and maintained until performance standards specified in the MLMP are achieved.

Construction Coordination and Restrictions

Construction activities may impact the operation of the South Bay Salt Works due to the conveyor belt, pipeline, and construction-related traffic. Coordination with the South Bay Salt Works operators would occur during the final design and prior to commencement of construction activities.

Construction activities would be limited to within the hours of 7 a.m. and 7 p.m. Monday through Saturday (excluding holidays) in accordance with Section 59.5.0404 of the City of San Diego Municipal Code. Work would not occur on holidays due to local jurisdiction restrictions. In addition, construction activities would be scheduled around the core bird nesting season.

For the purpose of assessing environmental impacts, a preliminary construction schedule was developed for the proposed action based on the assumptions and information above. The schedule, presented in Table 2-3, is based on hauling the excavated material to the Pond 15 Site via truck and/or conveyor belt. If the pipeline method, which would transport slurried material from the Otay River Floodplain Site to the Pond 15 Site is employed, an additional 1 to 5 years may be needed to complete the construction operation.

2.3.2.5 Planting Program

The planting program would be implemented under either of the action alternatives to meet the overall goal of creating self-sustaining intertidal wetlands and to achieve the mitigation requirements described in the MLMP. MLMP performance standards that relate to vegetation within the wetland portion of the mitigation site include:

1. **Vegetation.** The proportion of total vegetation cover and open space in the marsh shall be similar to those proportions found in reference sites. The percent cover of algae shall be similar to percent cover found in reference sites.
2. **Spartina Canopy Architecture.** The restored wetland shall have a canopy architecture that is similar to the reference sites, with an equivalent proportion of stems over 3 feet tall.
3. **Reproductive Success.** Certain plant species, as specified in the work program, shall have demonstrated reproduction (i.e., seed set) at least once every 3 years.
4. **Exotics.** The important functions of the wetland shall not be impaired by exotic species.

Implementation would involve three types of wetland habitats: low, mid, and high marsh. In addition, transition zone and upland habitats are proposed since the main focus of the project is to return regular diurnal tidal flushing to both the Otay River Floodplain Site and the Pond 15 Site within the San Diego Bay NWR. Transition zones would not be considered wetland habitat for the purposes of determining compliance with the MLMP. Performance standards for the revegetation areas are outlined within the FRP for the Otay River Estuary Restoration Project (Appendix J).

To ensure adequate establishment and balanced representation of each species within each habitat, plantings would occur in groupings. The proposed salt marsh restoration would be achieved by grading (Otay River Floodplain Site) or filling (the Pond 15 Site) the project sites to elevations that are inundated by diurnal tides. Although much of both sites would receive the necessary water for plant growth through this tidal influence, the upland transition zone would be less influenced by tides, and supplemental watering would be required. Irrigation in these areas would be provided by either a temporary overhead irrigation system or pressurized water truck, or a combination of both.

For the Pond 15 Site, installation of a temporary irrigation system may not be compatible with ongoing salt operations. An irrigation system/water truck would be used to provide supplemental water to the restoration sites until plantings have become established. Irrigation would be phased out gradually depending on the local weather conditions during the establishment period (e.g., usually after the first one or two growing seasons). Irrigation of the site would be necessary until the plants are determined to be self-sufficient.

2.3.3 Alternative B

Alternative B represents the preferred alternative, the alternative that the Service proposes to implement. However, a final decision by the Service on which alternative will be selected will occur following consideration of the comments received during the public comment period for the Draft EIS.

Alternative B would involve lowering the elevation and contouring the Otay River Floodplain Site to create tidally influenced habitat. The proposed site condition would consist of approximately 5.1 acres (15%) of intertidal mudflat, 24.6 acres (73%) of intertidal salt marsh habitat through altering elevations on the site, and 3.9 acres (12%) of upland habitat, as shown on Figure 2-6a. Species and propagation method are described in Table 2-4.

Table 2-4
Species Composition and Recommended
Propagation Method for Salt Marsh and Transition Zone Habitats

Habitat Type	Common Name	Scientific Name	Propagation Method	Spacing on Center
Low salt marsh	California cordgrass	*Spartina foliosa*	Plugs	6 feet
Mid-salt marsh	Saltwort Salt marsh daisy Sea blite	*Batis maritima* *Jaumea carnosa* *Suaeda esteroa*	Cuttings in rose pots Cuttings in rose pots Cuttings in rose pots	6 feet
High salt marsh	Saltgrass Alkali heath Shoregrass Parish's pickleweed Sea lavender	*Distichlis spicata* *Frankenia salina* *Monanthochloe littoralis* *Arthrocnemum subterminale* *Limonium californicum*	Cuttings in rose pots Cuttings in rose pots Cuttings in rose pots Seed in rose pots Cuttings in rose pots	6 feet
Transition zone	Alkali weed Boxthorn Shoregrass Parish's pickleweed Palmer's frankenia	*Cressa truxillensis* *Lycium californicum* *Monanthochloe littoralis* *Arthrocnemum subterminale* *Frankenia palmeri*	Seed in rose pots Cuttings in rose pots Cuttings in rose pots Seed in rose pots Cuttings in rose pots	6 feet

Source: Appendix J.

Alternative B would also involve raising the elevation and contouring the Pond 15 Site to create approximately 10.3 acres (11%) of subtidal channel, 18.5 acres (20%) of intertidal mudflat, 55.8 acres (62%) of intertidal salt marsh habitat, 6.3 acres (7%) ofupland habitat, as shown on Figure 2-6b and described in Table 2-5. Native wetland plant species would be installed at appropriate elevations within each site to assist in the establishment of low marsh, mid marsh, and high marsh vegetative communities. Native upland habitat would also be restored as appropriate within the site, as illustrated on Figure 2-6a and Figure 2-6b.

Table 2-5
Alternative B (Intertidal) Restoration Vegetation Communities at Project Completion

Proposed Vegetation Community	Otay River Floodplain Site (acres)	Pond 15 Site (acres)
Subtidal	0.00	10.27
Mudflat – frequently flooded	4.26	16.18
Mudflat – frequently exposed	0.79	2.36
Low salt marsh	8.88	15.58
Mid salt marsh	11.71	34.88
High salt marsh	3.97	5.37
*Total Created Wetland Habitat**	*29.61*	*84.65*
Upland habitat	3.89	6.26
Total*	**33.51**	**90.90**

Source: Appendix J.
* Acreage may not total due to rounding.

The combination of the wetlands created at the Otay River Floodplain Site and the Pond 15 Site under Alternative B is intended to provide sufficient mitigation credit to meet the MLMP requirements.

Implementation of Alternative B would require the excavation of approximately 320,000 cubic yards of soil at the Otay River Floodplain Site to lower the elevation and achieve the contours required to establish a subtidal wetland on the site (refer to Figure 2-6a). Approximately 260,000 cubic yards of the excavated soil would be beneficially used as fill and cover within the Pond 15 Site to raise the ground to elevations suitable to support coastal salt marsh habitat and nesting areas (refer to Figure 2-6b). The excavated material would also be used as fill for dikes, levees, and upland habitat creation. The remainder of the material (approximately 30,000 to 40,000 cubic yards) would be stockpiled on the northeastern portion of the Otay River Floodplain Site (refer to Figures 2-1a and 2-3a). Under the truck construction method option, approximately 56,000 truck trips would be necessary to deliver the soils from the Otay River Floodplain Site to the Pond 15 Site, assuming each truck moves approximately 12 cubic yards of material.

This restoration alternative factors in the potential for a 4.68- to 24-inch sea-level rise by 2050. Figures 2-6c and 2-6d illustrate the change in habitat types on the Otay River Floodplain Site from 2020 to 2050. Figures 2-6e and 2-6f illustrate the change in habitat types on the Pond 15 Site from 2020 to 2050. Figures 2-6c through 2-6f represent vegetation communities at each site following the most conservative projection of 24 inches of sea-level rise. The specific acreages associated with the maximum projected 24 inches of sea-level rise are outlined in Table 2-6 for the Otay River Floodplain Site and Table 2-7 for the Pond 15 Site.

Table 2-6
Alternative B (Intertidal) 24-Inch Sea-Level Rise Variation: Otay River Floodplain Site

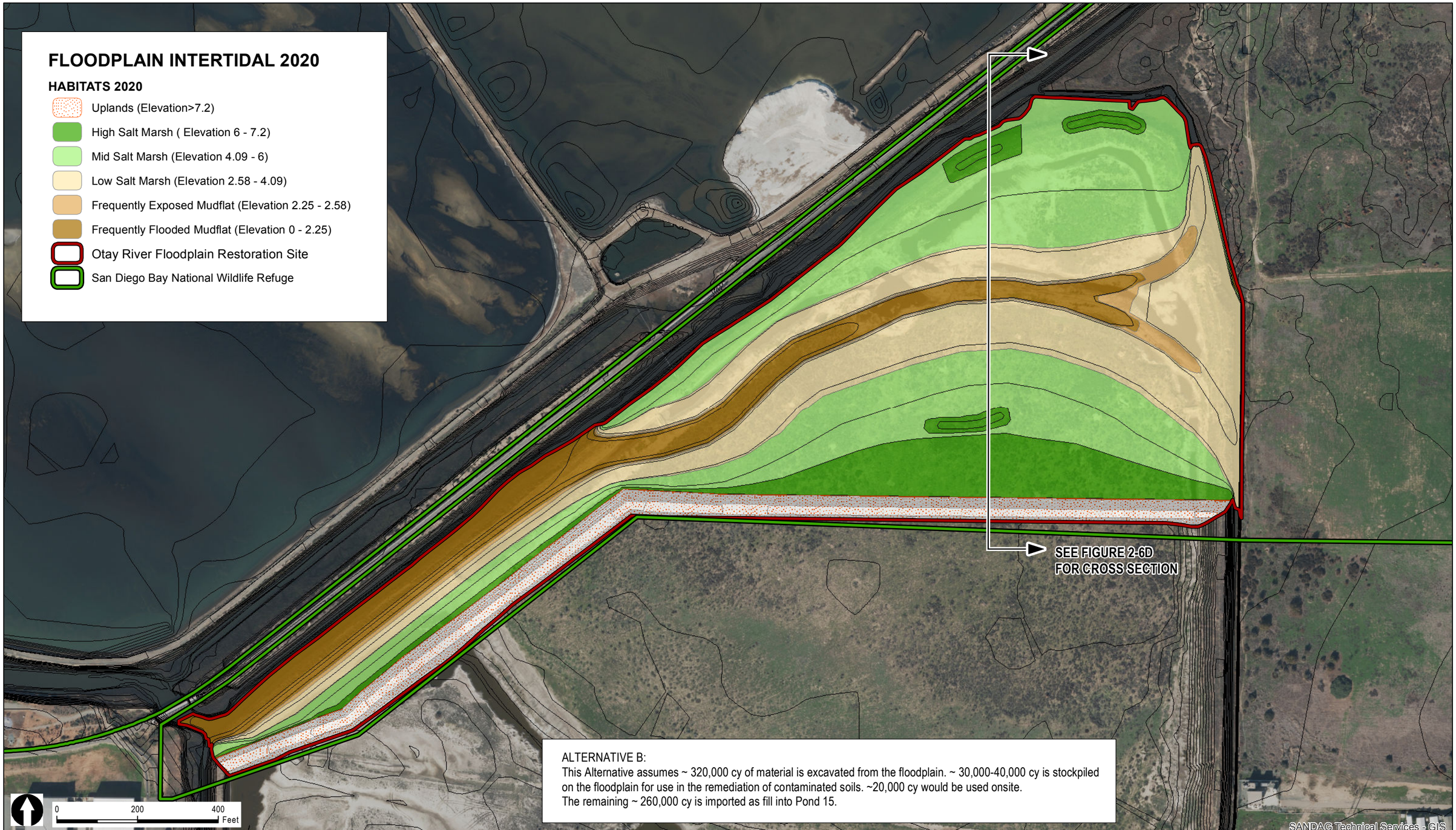
Vegetation Community to be Created	Completion of Construction 2020 (acres)	24-Inch Sea-Level Rise 2050 (acres)
Mudflat, frequently flooded	4.26	14.01
Mudflat, frequently exposed	0.79	2.59
Low salt marsh	8.88	9.81
Mid salt marsh	11.71	3.51
High salt marsh	3.97	0.25
*Total Created Wetland Habitat**	*29.61*	*30.17*
Upland habitat	3.89	3.34
Total*	**33.51**	**33.51**

Source: Appendix J.
* Acreage may not total due to rounding.

Table 2-7
Alternative B (Intertidal) 24-Inch Sea-Level Rise Variation: Pond 15 Site

Vegetation Community to be Created	Completion of Construction 2020 (acres)	24-Inch Sea-Level Rise 2050 (acres)
Subtidal	10.27	14.20
Mudflat, frequently flooded	16.18	27.56
Mudflat, frequently exposed	2.36	4.33
Low salt marsh	15.58	32.45
Mid salt marsh	34.88	7.54
High salt marsh	5.37	2.25
*Total Created Wetland Habitat**	*84.65*	*88.32*
Upland habitat	6.26	2.58
Total*	**90.90**	**90.90**

Source: Appendix J.
* Acreage may not total due to rounding.



AERIAL SOURCE: SANDAG IMAGERY 2014

FIGURE 2-6a

Alternative B - Intertidal Alternative, Otay River Site Plan

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AERIAL SOURCE: SANDAG IMAGERY 2014

FIGURE 2-6b

Alternative B - Intertidal Alternative, Pond 15 Site Plan

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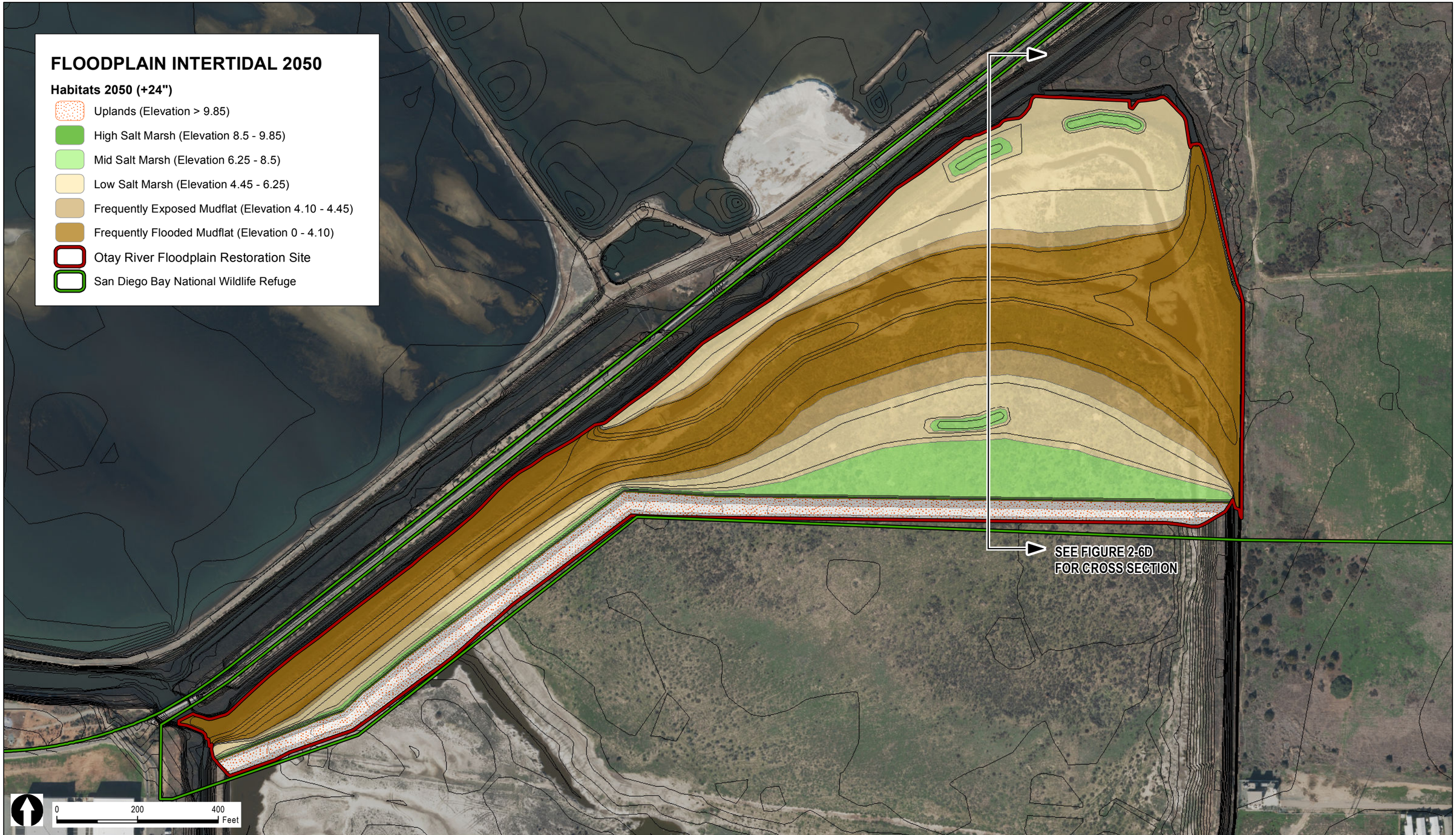

AERIAL SOURCE: SANDAG IMAGERY 2014

FIGURE 2-6c

Alternative B - Intertidal Alternative, Projected 24" Sea-Level Rise, Otay River Site Plan

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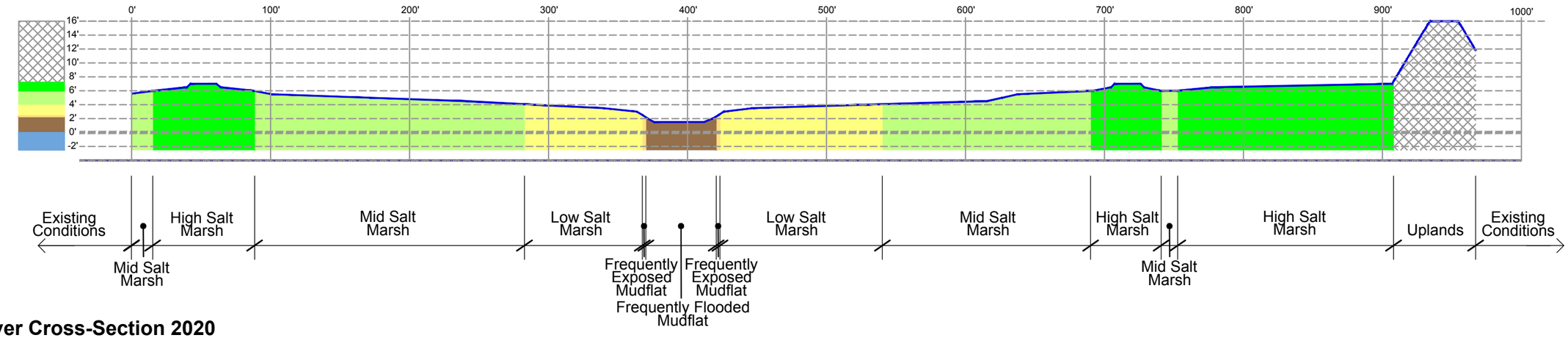
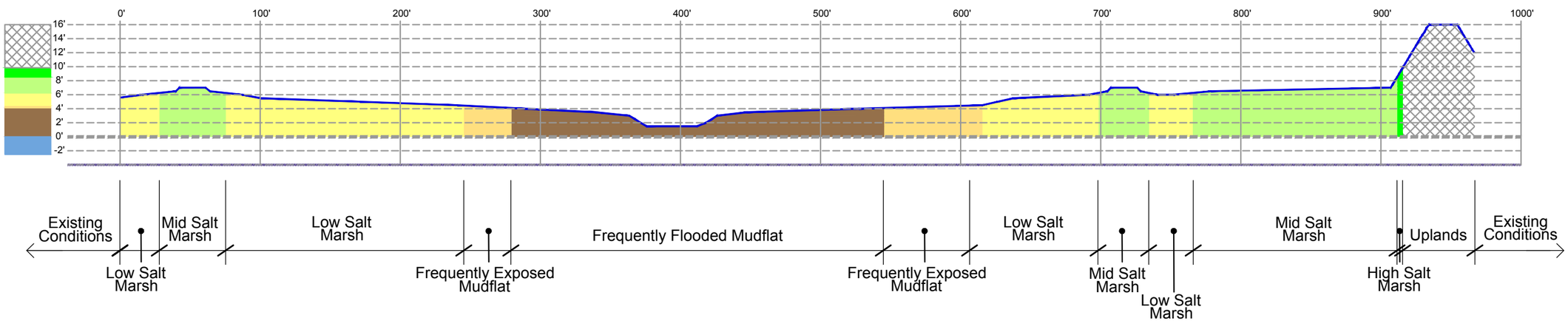
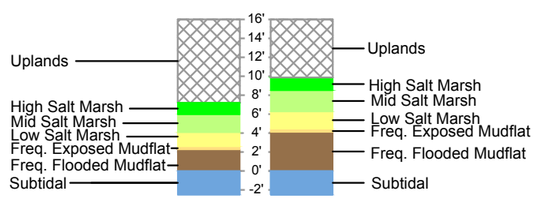


Otay River Cross-Section 2020



Otay River Cross-Section with 24" Projected Sea-Level Rise (2050)



Otay River Intertidal 2020 Otay River Intertidal 2050

Habitat Elevation Comparison between 2020 and 2050

VERTICAL SCALE 5x HORIZONTAL SCALE

NOTE:
This cross section is for illustrative purposes only, and not for construction.

FIGURE 2-6d

Alternative B - Intertidal Alternative, Otay River Cross-Sections: 2020 and Projected 24" Sea-Level Rise (2050)

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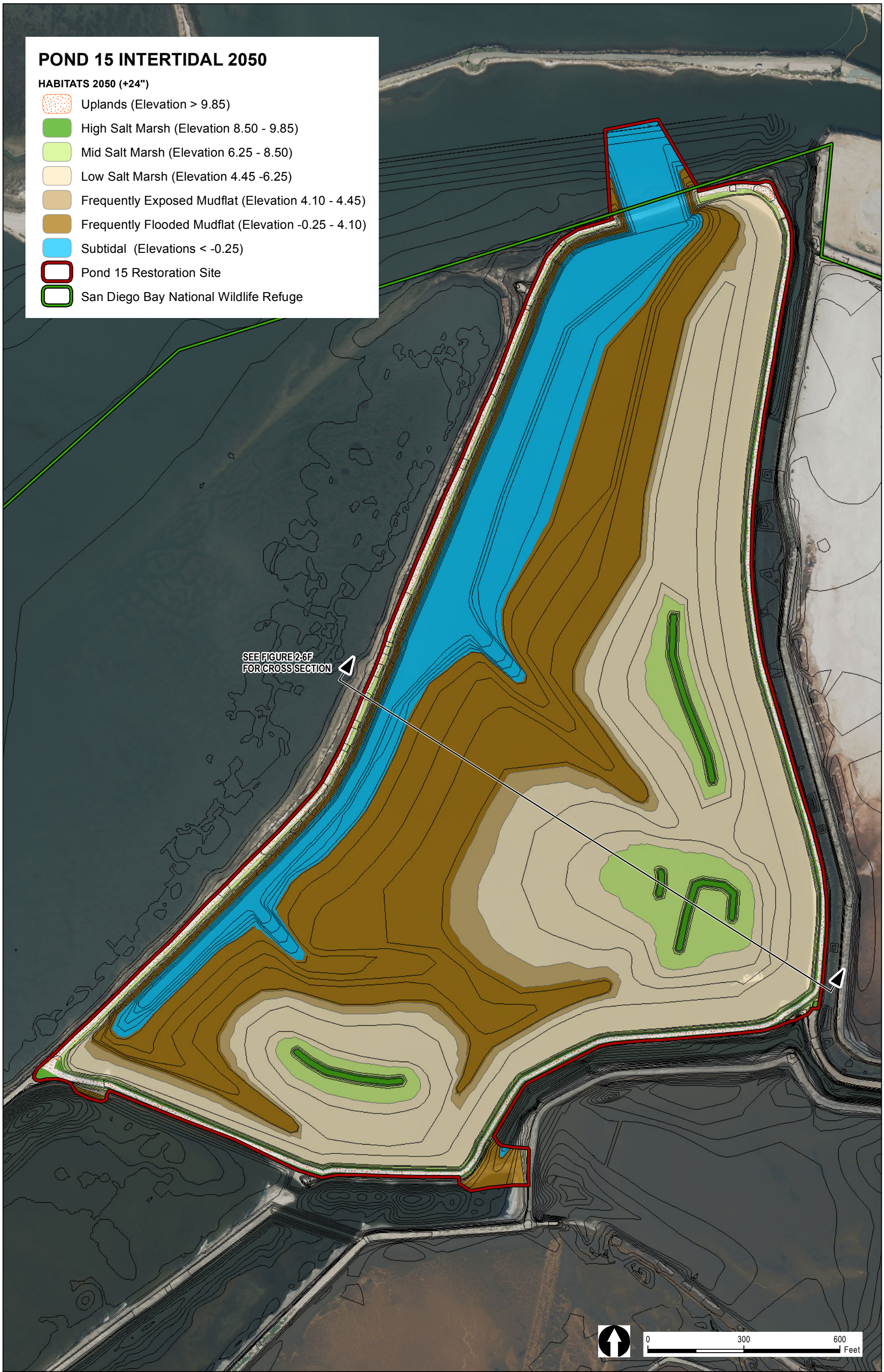

AERIAL SOURCE: SANDAG IMAGERY 2014

FIGURE 2-6e

Alternative B - Intertidal Alternative, Projected 24" Sea-Level Rise, Pond 15 Site Plan

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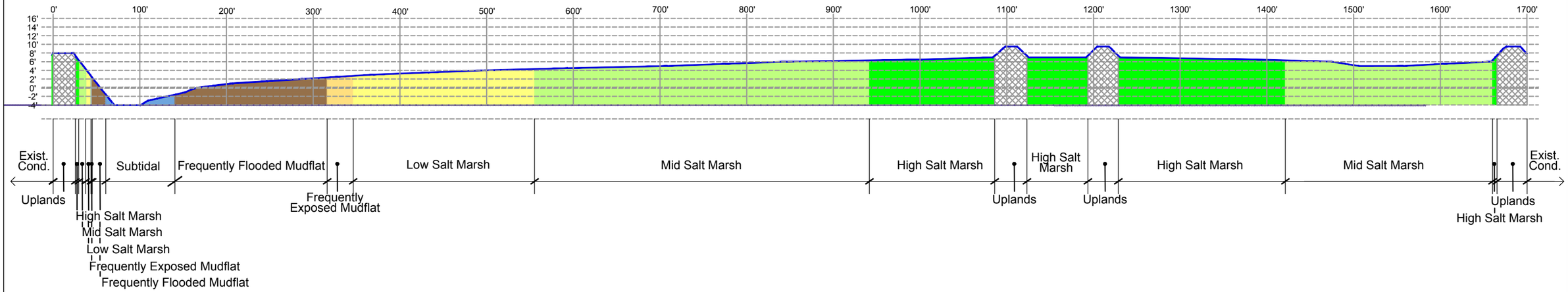
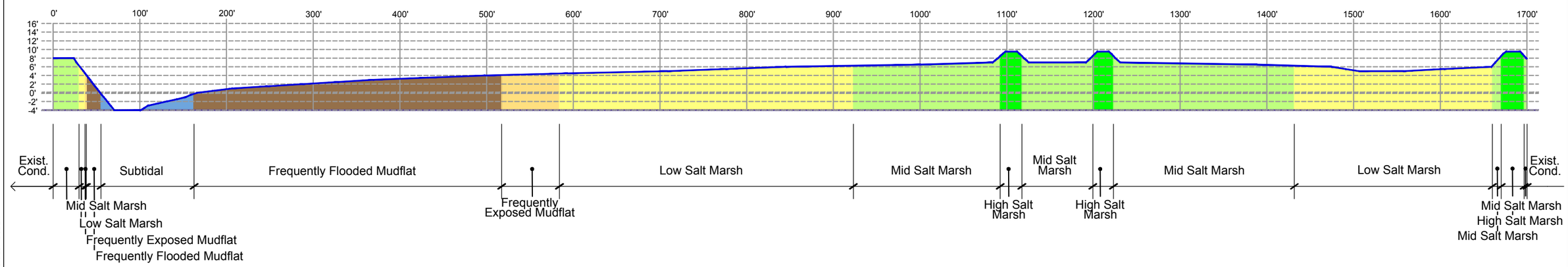
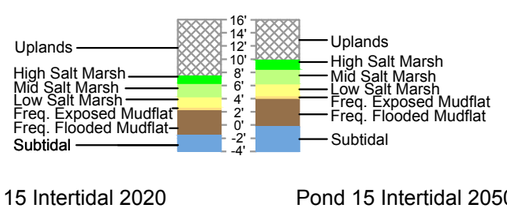


Pond 15 Cross-Section 2020



Pond 15 Cross-Section with 24" Projected Sea-Level Rise (2050)



Habitat Elevation Comparison between 2020 and 2050

NOTE:
This cross section is for illustrative purposes only, and not for construction.

VERTICAL SCALE 5x HORIZONTAL SCALE

FIGURE 2-6f

Alternative B - Intertidal Alternative, Pond 15 Cross-Sections: 2020 and Projected 24" Sea-Level Rise (2050)

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2.3.4 Alternative C

Alternative C would involve altering the Otay River Floodplain Site and Pond 15 Site to create a subtidal channel within the Otay River Floodplain Site. Under Alternative C, the subtidal zone would be surrounded by mudflat and increasing elevations of salt marsh. Specifically, Alternative C would involve lowering the elevation and contouring the Otay River Floodplain Site to create approximately 4.5 acres (14%) of subtidal channel, approximately 6.4 acres (19%) of intertidal mudflat, 18.5 acres (55%) of intertidal salt marsh mudflat, and 4.1 acres (12%) of upland habitat, as shown on Figure 2-7a and described in Table 2-8.

Alternative C would also involve raising the elevation and contouring the Pond 15 Site to create approximately 10.2 acres (11%) of subtidal channel, 18.3 acres (20%) of intertidal mudflat, 54.6 acres (60%) of intertidal salt marsh, 7.85 (9%) of upland habitat as shown on Figure 2-7b and described in Table 2-8. Both sites would be planted with an appropriate mix of native plants that would mature into low marsh, mid marsh, and high marsh vegetative communities. Native upland habitat would also be restored as appropriate within the site, as shown on Figures 2-7a and 2-7b. The subtidal areas would provide fish spawning and foraging habitat, and the unvegetated mudflat would provide foraging habitat for adult and juvenile fish during high tides.

Table 2-8
Alternative C (Subtidal) Restoration Vegetation Communities at Project Completion

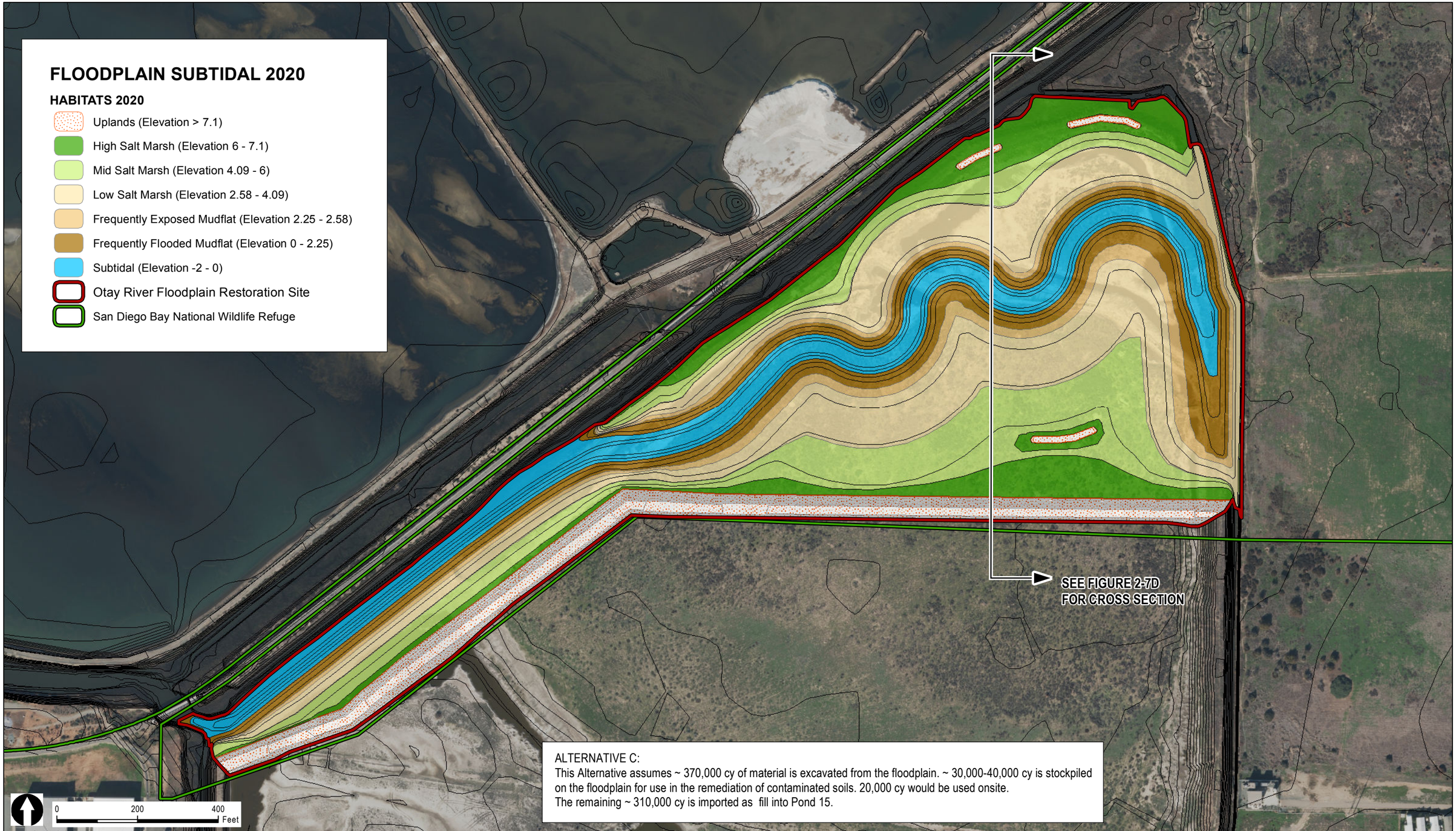
Proposed Vegetation Community	Otay River Floodplain Site Acres	Pond 15 Site Acres
Subtidal	4.48	10.23
Mudflat, frequently flooded	4.43	16.11
Mudflat, frequently exposed	2.00	2.16
Low salt marsh	8.34	12.11
Mid salt marsh	6.21	28.06
High salt marsh	3.94	14.39
*Total Created Wetland Habitat**	*29.41*	*83.06*
Upland habitat	4.10	7.85
Total*	**33.51**	**90.90**

Source: Appendix J.
* Acreage may not total due to rounding.

The combination of the wetlands created at the Otay River Floodplain Site and Pond 15 Site under Alternative C would also be expected to provide sufficient mitigation credit to meet the MLMP requirements.

Implementation of Alternative C would require excavation of approximately 370,000 cubic yards of soils at the Otay River Floodplain Site to alter the elevation and achieve the contours required to establish a subtidal wetland on the site (refer to Figure 2-7a). In addition, between 50,000 and

60,000 cubic yards of soil would be excavated from Pond 15. This material must be excavated to create the appropriate habitat types and transfer material to throughout the Pond 15 Site. Approximately 310,000 cubic yards of the excavated soil would be beneficially used as fill and cover within Pond 15 to raise the ground to elevations suitable to support coastal salt marsh habitat and nesting areas. The excavated material would also be disposed of on site as fill for dikes, levees, and upland habitat creation. The remainder of the material (approximately 30,000 to 40,000 cubic yards) would be stockpiled within the northeastern portion of the Otay River Floodplain Site (refer to Figures 2-1a and 2-3a). Under the truck construction method option, approximately 52,000 total truck trips would be necessary to deliver the soils from the Otay River Floodplain Site to the Pond 15 Site, assuming each truck moves approximately 12 cubic yards of material.



ALTERNATIVE C:
This Alternative assumes ~ 370,000 cy of material is excavated from the floodplain. ~ 30,000-40,000 cy is stockpiled on the floodplain for use in the remediation of contaminated soils. 20,000 cy would be used onsite.
The remaining ~ 310,000 cy is imported as fill into Pond 15.

AERIAL SOURCE: SANDAG IMAGERY 2014

FIGURE 2-7a

Alternative C - Subtidal Alternative, Otay River Site Plan

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AERIAL SOURCE: SANDAG IMAGERY 2014

FIGURE 2-7b

Alternative C - Subtidal Alternative, Pond 15 Site Plan

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This restoration alternative factors in the potential of a 4.68- to 24-inch rise in sea level by 2050 (State of California 2013; Commission 2015). Figures 2-7c and 2-7d illustrate the change in habitat types from 2020 to 2050 at the Otay River Floodplain Site. Figures 2-7e and 2-7f illustrate the change in habitat types from 2020 to 2050 at the Pond 15 Site. Figures 2-7c through 2-7f represent vegetation communities at each site following the most conservative projection of 24 inches of sea level rise. The specific acreages associated with the maximum projected 24 inches of sea-level rise are outlined in Table 2-9 for the Otay River Floodplain Site and Table 2-10 for the Pond 15 Site.

Table 2-9
Alternative C (Subtidal) 24-inch Sea-Level Rise Variation: Otay River Floodplain Site

Vegetation Community to be Created	Completion of Construction 2020 (acres)	24-Inch Sea-Level Rise 2050 (acres)
Subtidal	4.48	4.48
Mudflat, frequently flooded	4.43	15.04
Mudflat, frequently exposed	2.00	1.48
Low salt marsh	8.34	6.96
Mid salt marsh	6.21	1.99
High salt marsh	3.94	0.36
*Total Created Wetland Habitat**	*29.41*	*30.31*
Upland habitat	4.10	3.20
Total*	**33.51**	**33.51**

Source: Appendix J.
* Acreage may not total due to rounding.

Table 2-10
Alternative C (Subtidal) Sea-Level Rise Variation: Pond 15 Site

Vegetation Community to be Created	Completion of Construction 2020 (acres)	24-Inch Sea-Level Rise 2050 (acres)
Subtidal	10.23	14.40
Mudflat, frequently flooded	16.11	24.95
Mudflat, frequently exposed	2.16	2.76
Low salt marsh	12.11	25.78
Mid salt marsh	28.06	17.31
High salt marsh	14.39	3.08
*Total Created Wetland Habitat**	*83.06*	*88.28*
Upland habitat	7.85	2.63
Total*	**90.90**	**90.90**

Source: Appendix J.
* Acreage may not total due to rounding.

2.3.5 Comparison of Alternatives

As outlined above, there are three potential alternatives outlined in this EIS. A comparison of implementation of each alternative is outlined in Table 2-11, a comparison of restoration acreage for each alternative is outlined in Tables 2-12 and 2-13, and associated sea-level rise is provided in Tables 2-14 and 2-15.

Table 2-11
Comparison of Earthwork Quantities

Activity	Alternative A – No Action Alternative	Alternative B - Intertidal	Alternative C - Subtidal
Material excavated from Otay River Floodplain Site	0	320,000 cubic yards	370,000 cubic yards
Material to remain on site	0	20,000 cubic yards	20,000 cubic yards
Material to be transported to Pond 15	0	260,000 cubic yards	310,000 cubic yards
Material excavated from Pond 15 Site (to remain on site)	0	50,000–60,000 cubic yards	50,000 –60,000 cubic yards
Anticipated truck trips (one-way)	0	56,000	67,000
Stockpiled material to remain on site	0	30,000 – 40,000 cubic yards	30,000 – 40,000 cubic yards

Source: Appendix E.

Table 2-12
Comparison of Vegetation Communities on Otay River Floodplain Site at Project Completion

Total Habitat	Alternative B	Alternative C
Subtidal	0.00	4.48
Mudflat, frequently flooded	4.26	4.43
Mudflat, frequently exposed	0.79	2.00
Low salt marsh	8.88	8.34
Mid salt marsh	11.71	6.21
High salt marsh	3.97	3.94
*Created Wetland Habitat Total**	*29.61*	*29.41*
Upland habitat	3.89	4.10
Total*	**33.51**	**33.51**

Source: Appendix J.

Table 2-13
Comparison of Vegetation Communities on Pond 15 Site at Project Completion

Total Habitat	Alternative B	Alternative C
Subtidal	10.27	10.23
Mudflat, frequently flooded	16.18	16.11
Mudflat, frequently exposed	2.36	2.16
Low salt marsh	15.58	12.11
Mid salt marsh	34.88	28.06
High salt marsh	5.37	14.39
*Created Wetland Habitat Total**	*84.65*	*83.06*
Upland habitat	6.26	7.85
Total*	**90.90**	**90.90**

Source: Appendix J.

Table 2-14
Comparison of Vegetation Communities on the Otay River Floodplain Site in 24-Inch Sea-Level Rise Scenario

Total Habitat	Year 2050	
	Alternative B	*Alternative C*
Subtidal	0.00	4.48
Mudflat, frequently flooded	14.01	15.04
Mudflat, frequently exposed	2.59	1.48
Low salt marsh	9.81	6.96
Mid salt marsh	3.51	1.99
High salt marsh	*0.25*	*0.36*
*Created Wetland Habitat Total**	*30.17*	*30.31*
Upland habitat	3.34	3.20
Total*	**33.51**	**33.51**

Source: Appendix J.

Table 2-15
Comparison of Vegetation Communities on the Pond 15 Site in 24-Inch Sea-Level Rise Scenario

Total Habitat	Year 2050	
	Alternative B	*Alternative C*
Subtidal	14.20	14.40
Mudflat, frequently flooded	27.56	24.95
Mudflat, frequently exposed	4.33	2.76
Low salt marsh	32.45	25.78
Mid salt marsh	7.54	17.31

Table 2-15
Comparison of Vegetation Communities on the Pond 15 Site in 24-Inch Sea-Level Rise Scenario

Total Habitat	Year 2050	
	Alternative B	*Alternative C*
High salt marsh	2.25	3.08
*Created Wetland Habitat Total**	*88.32*	*88.28*
Upland habitat	2.58	2.63
Total*	**90.90**	**90.90**

Source: Appendix J.

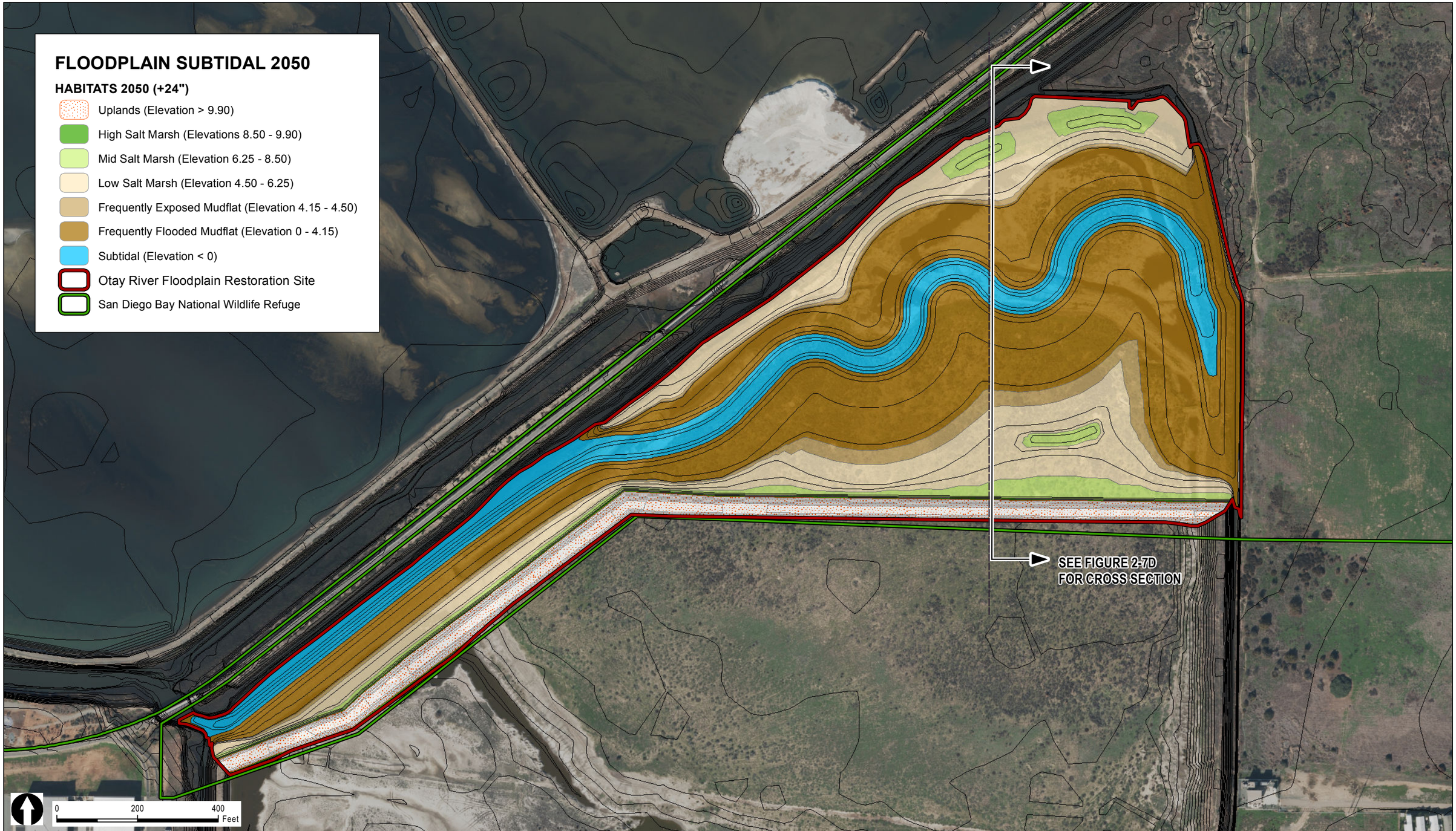
2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.4.1 Alternative Restoration Sites and Initial Restoration Concepts

On May 9, 2009, the Regional Board approved the MLMP as a condition of the National Pollution Discharge Elimination System permit required for the project. The Regional Board conditioned this approval by requiring that mitigation occur within San Diego County unless all opportunities for restoration in the San Diego County proved to be infeasible.

Commission staff directed Poseidon to develop a wetland restoration plan for the wetland site(s) identified through the site selection process. The wetland restoration plan must meet the minimum standards and incorporate as many of the objectives set forth by the Commission as feasible, as described in Chapter 1, Introduction.

In January 2010, Poseidon submitted an analysis of 12 potential restoration sites to the Commission. The report concluded that the Otay River Floodplain site located within the San Diego Bay NWR was the best site to accomplish Poseidon's MLMP mitigation requirements and met the minimum requirements and objectives as set forth by the Commission. This site was subsequently supported by the California Department of Fish and Wildlife. On February 9, 2011, by a vote of 11-0, the Commission adopted a resolution approving the Otay River Floodplain Site. Subsequently, Poseidon developed three preliminary restoration alternatives that met Commission requirements within the Otay River Floodplain Site. Each concept included subtidal, intertidal mudflat, intertidal low, mid, and high salt marsh habitats, a wetland/upland zone, and a buffer zone on the eastern and southern portions of the site. The concepts differed in the specific acreage of each wetland zone and the manner in which these zones are laid out.



AERIAL SOURCE: SANDAG IMAGERY 2014

FIGURE 2-7c

Alternative C - Subtidal Alternative, Projected 24" Sea-Level Rise, Otay River Site Plan

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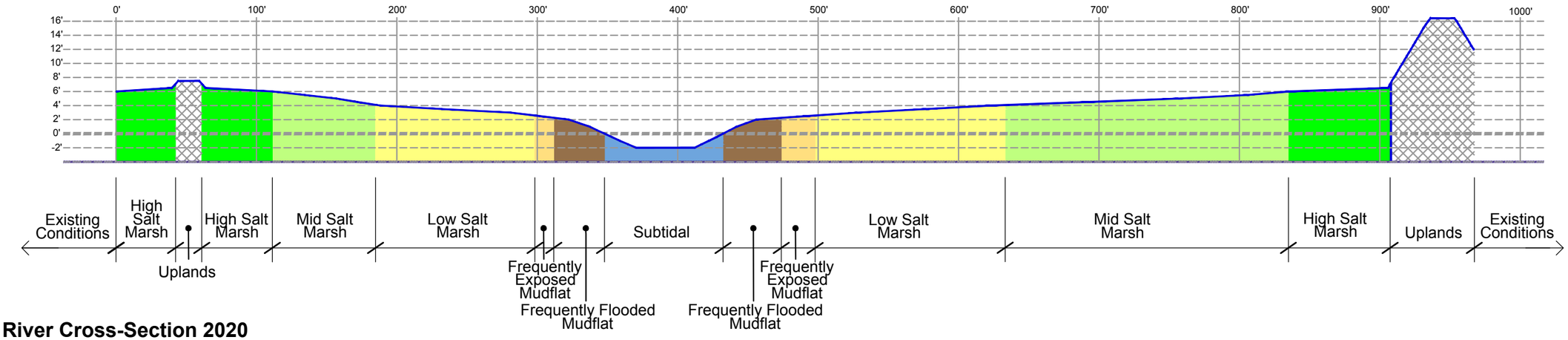
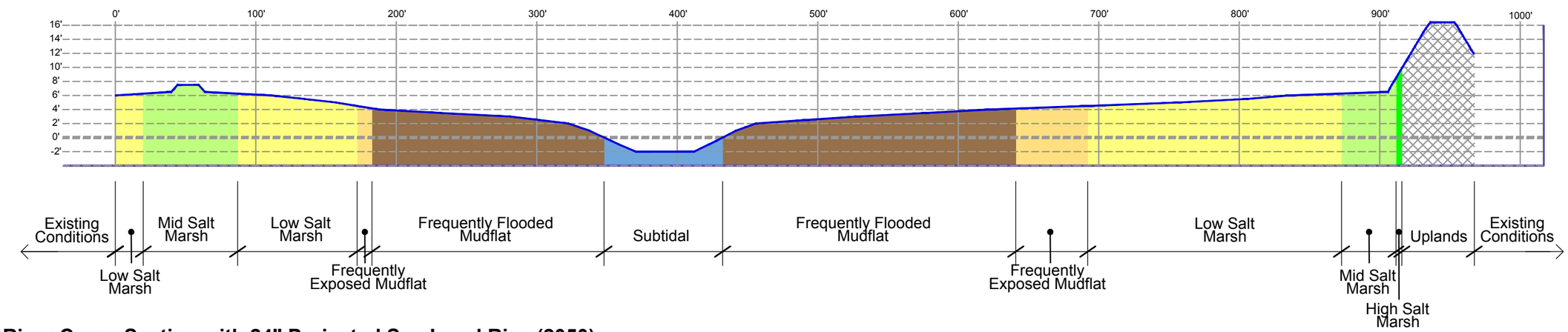
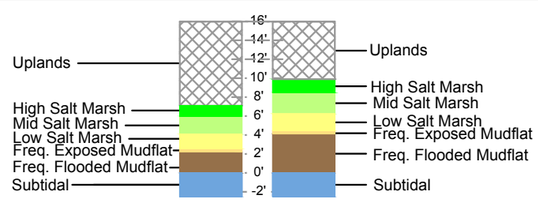


Otay River Cross-Section 2020



Otay River Cross-Section with 24" Projected Sea-Level Rise (2050)



Otay River Subtidal 2020 Otay River Subtidal 2050

Habitat Elevation Comparison between 2020 and 2050

VERTICAL SCALE 5x HORIZONTAL SCALE

NOTE:
This cross section is for illustrative purposes only, and not for construction.

FIGURE 2-7d

Alternative C -Subtidal Alternative, Otay River Cross-Sections: 2020 and Projected 24" Sea-Level Rise (2050)

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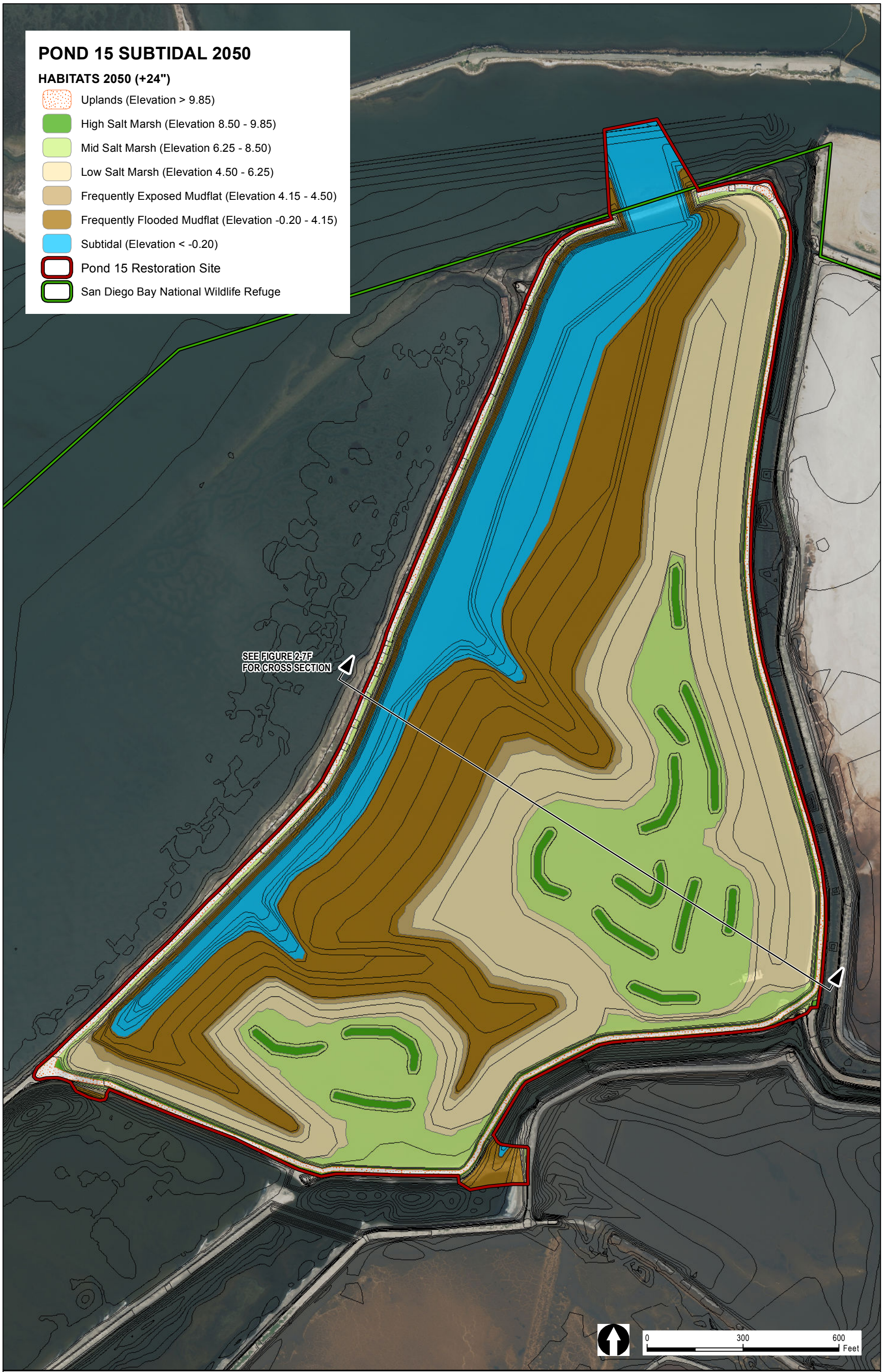

AERIAL SOURCE: SANDAG IMAGERY 2014

FIGURE 2-7e

Alternative C - Intertidal Alternative, Projected 24" Sea-Level Rise, Pond 15 Site Plan

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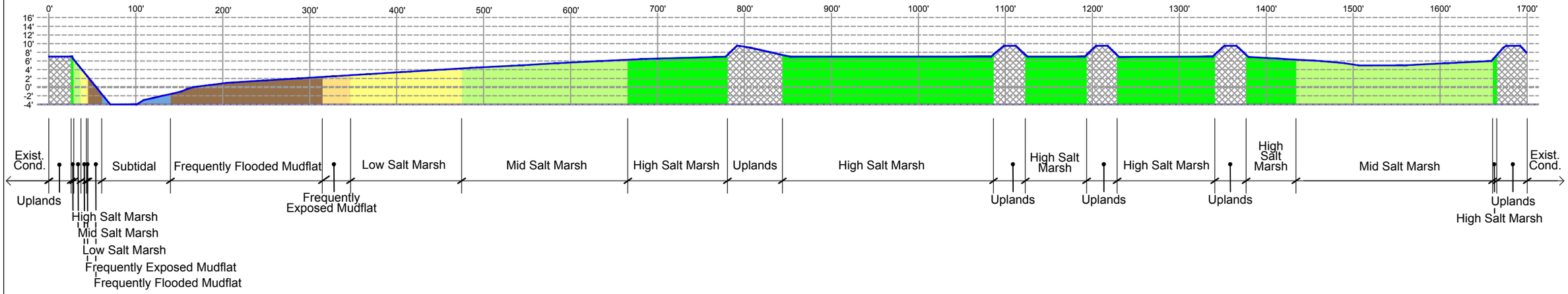
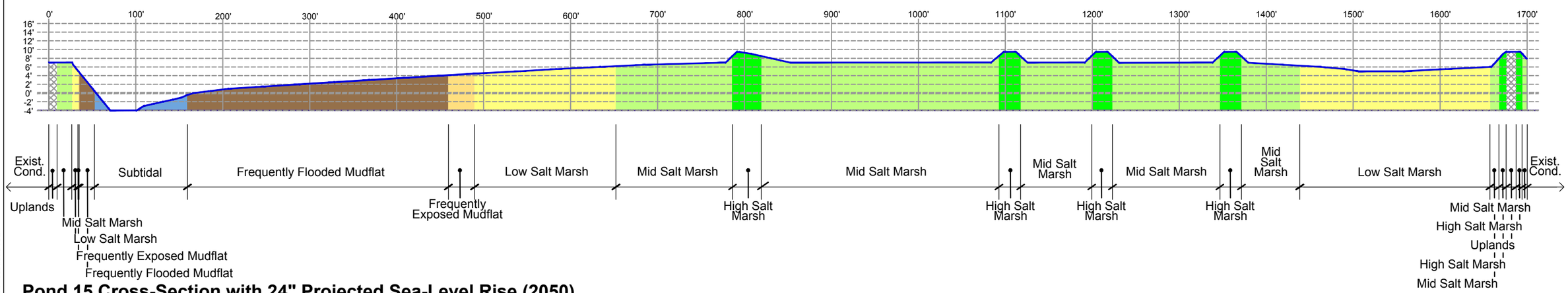
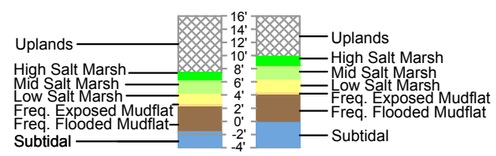


Pond 15 Cross-Section 2020



Pond 15 Cross-Section with 24" Projected Sea-Level Rise (2050)



Pond 15 Subtidal 2020 Pond 15 Subtidal 2050

Habitat Elevation Comparison between 2020 and 2050

NOTE:
This cross section is for illustrative purposes only, and not for construction.

VERTICAL SCALE 5x HORIZONTAL SCALE

FIGURE 2-7f

Alternative C -Subtidal Alternative, Pond 15 Cross-Sections: 2020 and Projected 24" Sea-Level Rise (2050)

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After 2011, several environmental issues resulted in modification of the conceptual restoration options. These included:

- Boundary adjustment with River Partners riparian restoration of the Otay River Floodplain
- Guidance regarding consideration of sea level rise in development of restoration plans
- The Service's desire to use sediment and soils excavated in the Otay Floodplain to restore one or more active salt ponds within the refuge to tidally influenced wetlands
- The Service's desire to avoid dredging of the Otay River
- The discovery and subsequent avoidance of significant cultural resources
- The discovery and subsequent avoidance of contaminated soils, including hazardous waste

Each of these issues resulted in a reduction in the size of restoration area within the Otay River Floodplain. An Integrated Restoration Project was developed that included a reduced restoration footprint in the Otay River Floodplain with the majority of the restoration occurring in active solar salt evaporation Pond 15 using sediment excavated from the Otay River site. Accordingly, two alternatives were developed for the Otay River Floodplain portion of the integrated project: the Subtidal Alternative and the Intertidal Alternative. Proposed restoration activities in Pond 15 are identical for both alternatives. These alternatives are presented in detail in this EIS.

2.4.2. Alternative Breach Site for Pond 15

Restoration of Pond 15 requires that the pond's outer levee be breached to facilitate the flow of tidal waters from San Diego Bay into and out of the restored pond. As proposed, the levee would be breached along the northern boundary of Pond 15, requiring excavation to create a channel with a bottom width of approximately 160 feet and bottom elevation of -3.0 feet NAVD 88. To excavate the proposed channel at this location would require that project related activities extend beyond the Refuge boundary and into an area of San Diego Bay that is under the jurisdiction of the San Diego Unified Port District (Port District). This portion of the bay was disturbed in the past to accommodate the discharge of cooling waters from the South Bay Power Plant.

To avoid extending construction activities into the Port District's jurisdiction, the potential to breach the outer levee along the westerly boundary of Pond 15 was considered, but eliminated from detailed analysis because of the extent of loss that would occur to intertidal mudflat habitat under this alternative. Extensive intertidal mudflat habitat occurs along the entire length of the pond's western boundary, supporting a range of wetland dependent organisms including migratory shorebirds, while only a thin band of intertidal mudflat borders the pond's northern outer levee. Minimizing impacts to sensitive intertidal mudflats is not feasible under an alternative that includes breaching the western outer levee of Pond 15.

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