Los Peñasquitos Lagoon Restoration Phase 1 Project
Operation and Maintenance Plan – Permit Level

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1.0 Introduction

Implementation of the Los Peñasquitos Lagoon Restoration Phase 1 Project (Project) includes salt marsh restoration and rehabilitation, freshwater management, sediment management, habitat enhancement of the riparian corridor, storm drain upgrades, and flood management. The restoration of 62 acres of historic salt marsh habitat has an estimated construction completion timeline of 2024–2028, followed by 5 years of adaptive management and monitoring before long-term maintenance will begin. The 62-acre restoration is in the downstream western portion of the Project site and includes construction of new tidal channels and grading to increase tidal inundation extent and frequency to the restored salt marsh. The salt marsh restoration includes non-tidal salt marsh restoration and transitional habitat that allow for the upward migration of salt marsh habitat as predicted sea levels rise occurs in the future. The restoration will remove established non-native Italian rye grass within the degraded salt marsh limits and revegetate these areas with native salt marsh vegetation. The Project includes sediment reduction measures in the upstream portion of the Project to reduce coarse-grained sediment depositing and impacting the downstream salt marsh restoration. These measures are located adjacent to the current stream channels and will use natural floodway processes to slow down storm flows and allow coarser sediments to drop out and be periodically removed. Three floodplain enhancement sediment management measures are planned along with enhancement to the Dunhill Ditch. Freshwater management components include a new continuous channel that connects upstream creek flows to downstream tidal channels. Secondary channels would also be constructed to reduce the extent and duration of freshwater ponding in historical tidal and nontidal salt marsh habitats and convey persistent dry weather flows away from the salt marsh restoration. The Project also includes flood management measures in Sorrento Valley that integrate with the floodplain enhancements and include storm flow diversions, new channels, and backflow control devices. Upgrades to existing storm drains are planned to address freshwater ponding, sediment accumulation, and trash at the storm drain outfalls. The majority of the Project site is located within a State Natural Preserve (the Los Peñasquitos Marsh Natural Preserve) that is part of Torrey Pines State Natural Reserve (TPSNR) located in north San Diego County directly west of Interstate 5 (I-5). The Project also extends into California Coastal Conservancy property, North County Transit District (NCTD) right of way and private parcels. The City of San Diego Engineering & Capital Projects will be obtaining easements to conduct operations and maintenance within these parcels.

The purpose of this Operations and Maintenance Plan (O&M Plan) is to provide the operational and maintenance requirements for the Project. This document will be updated as the design for the Project is finalized and regulatory approvals are issued. This document will become a living document for further updates based on operational experience following the 5-year post-construction adaptive management period.

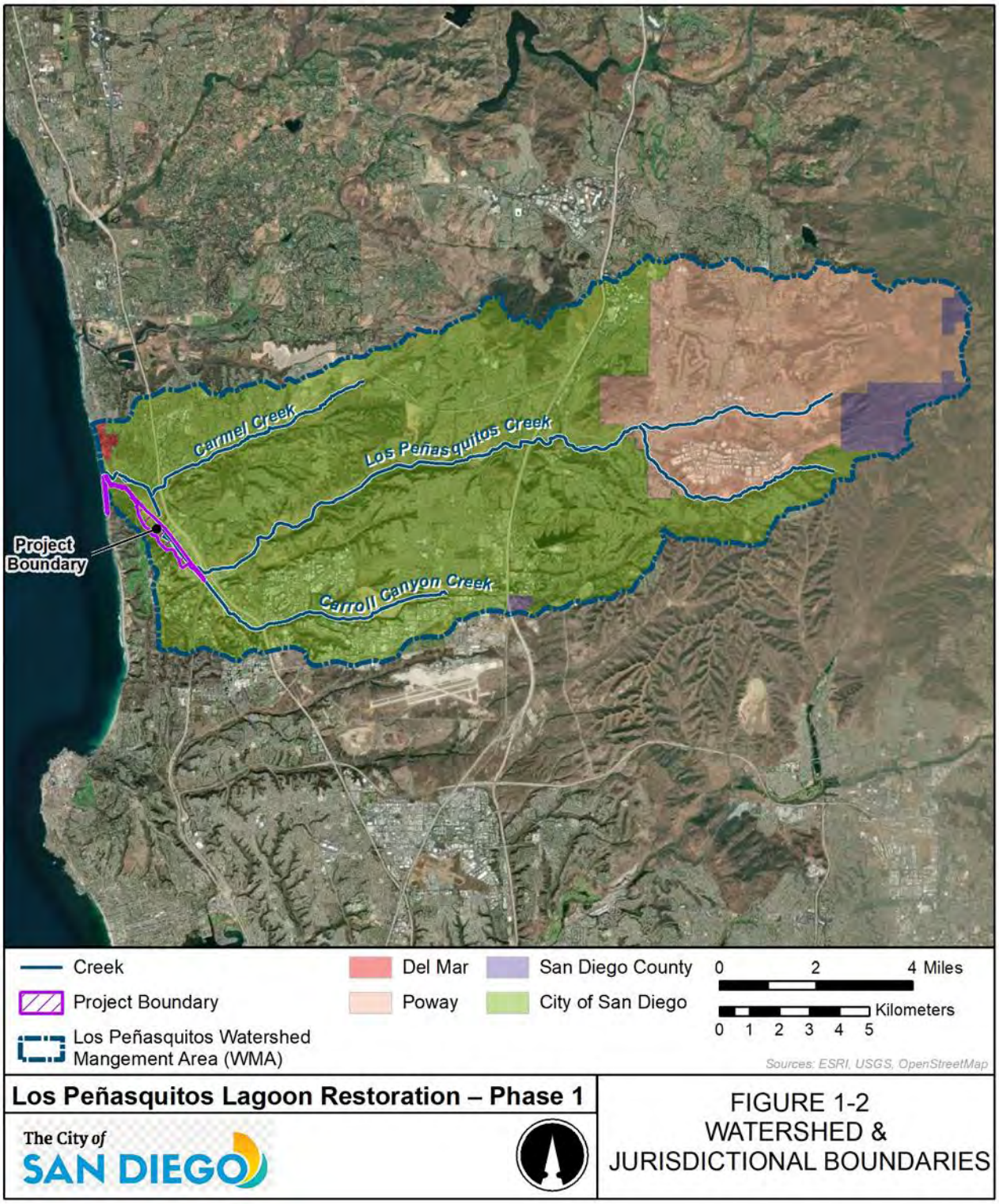
1.1 Project Description

The Project is located within the upper portion of Los Peñasquitos Lagoon (Lagoon) and the upstream riparian corridor within Sorrento Valley in the City of San Diego, San Diego County, California (see

Figure 1-1). The Lagoon is part of the Torrey Pines State Natural Reserve (TPSNR) located in coastal north county San Diego and is owned and managed by California State Parks (CSP). The Lagoon is a 565-acre coastal estuary that receives drainage from an approximately 59,212-acre watershed comprising three primary sub-drainages: Carmel Valley, Los Peñasquitos Canyon, and Carroll Canyon. The Lagoon lies primarily within the jurisdictional boundary of the City, but the Cities of Del Mar, Poway, and the County of San Diego are also included in the Los Peñasquitos Watershed Management Area (see Figure 1-2).

Figure 1-1 Project Location Map

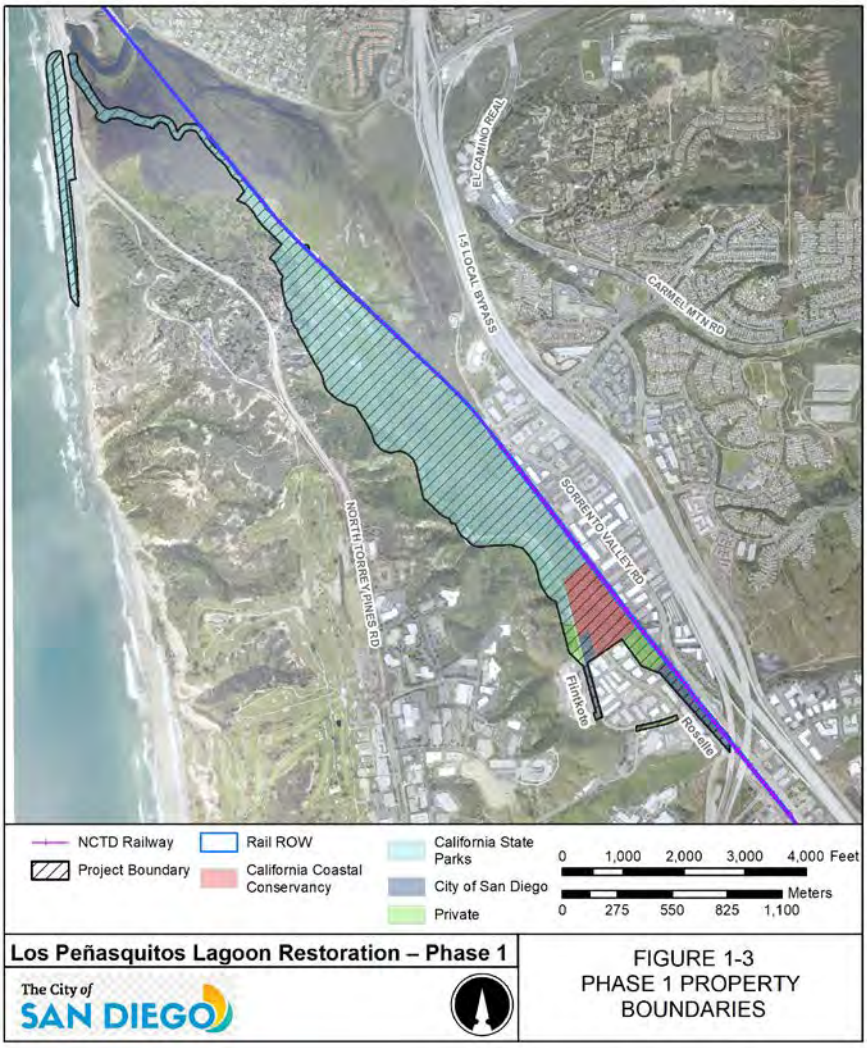
Figure 1-2: Los Peñasquitos Watershed & Jurisdictional Boundaries



Primary regional access to the Project Area is provided by Interstate 5, which runs north-south and is located east of the Project area. Sub-regional access is provided via Roselle Street and Flintkote Avenue. Access to the Lagoon is limited to protect rare species and habitats in accordance with the Lagoon's status as a State Natural Preserve. Passive recreation along the Lagoon boundaries is permitted. Current public access is available along trails, as well as roadways that border the Lagoon including Highway 101, Carmel Valley Road, Sorrento Valley Road, Roselle/Flintkote Road, and the Marsh Trail.

As shown in Figure 1-3, the Project footprint spans several parcels owned by multiple landowners including the City, CCC, CSP, and private property owners. The restoration and freshwater management elements of the Project are within the Lagoon that is part of the TPSNR and is owned and managed by CSP. The sediment management components and riparian habitat enhancements are located within the parcels owned by the City, California Coastal Conservancy, private property owners, and CSP that are outside of the TPSNR.

Figure 1-3: Project Area Property Ownership



1.2 Project Components

The Project components shown on Figure 1-4 have been developed to address impairment of Lagoon function, loss of native habitats, and degraded ecosystem services caused by urbanization that include beneficial uses identified in the San Diego Basin Plan. Without the implementation of the Project, these existing conditions will result in further impairment of the Lagoon and compliance targets and timelines of the Los Peñasquitos Watershed Management Area Sediment Total Maximum Daily Load (Sediment TMDL) will not be met. The Sediment TMDL is enforced through the Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4) draining the watersheds within the San Diego Region (MS4 Permit). The key features of the design are summarized below.

1.2.1 Floodplain Enhancements

Long term sediment loading from the watershed has impacted the riparian corridors and historical salt marsh habitats. In order to address these impacts and meet TMDL sediment load reduction targets and timelines, sediment management measures are planned upstream of the TPSNR prior to reaching the Lagoon. The floodplain enhancements are located adjacent to Carrol Canyon and Los Peñasquitos Creeks and at the Flintkote storm drain outfall. These three floodplain enhancements will use floodplain processes to slow down storm flows and allow coarse sediment to drop out into a series of cells. Accumulated sediment will then be removed periodically as part of the maintenance of these Project components. As shown on Figure 1-4 of the Project Components, in addition to the three floodplain enhancements, enhancements to the Dunhill Ditch will be implemented to allow for greater sediment storage capacity that will be periodically removed. Additional detail on these components are as follows:

Floodplain Enhancement 1

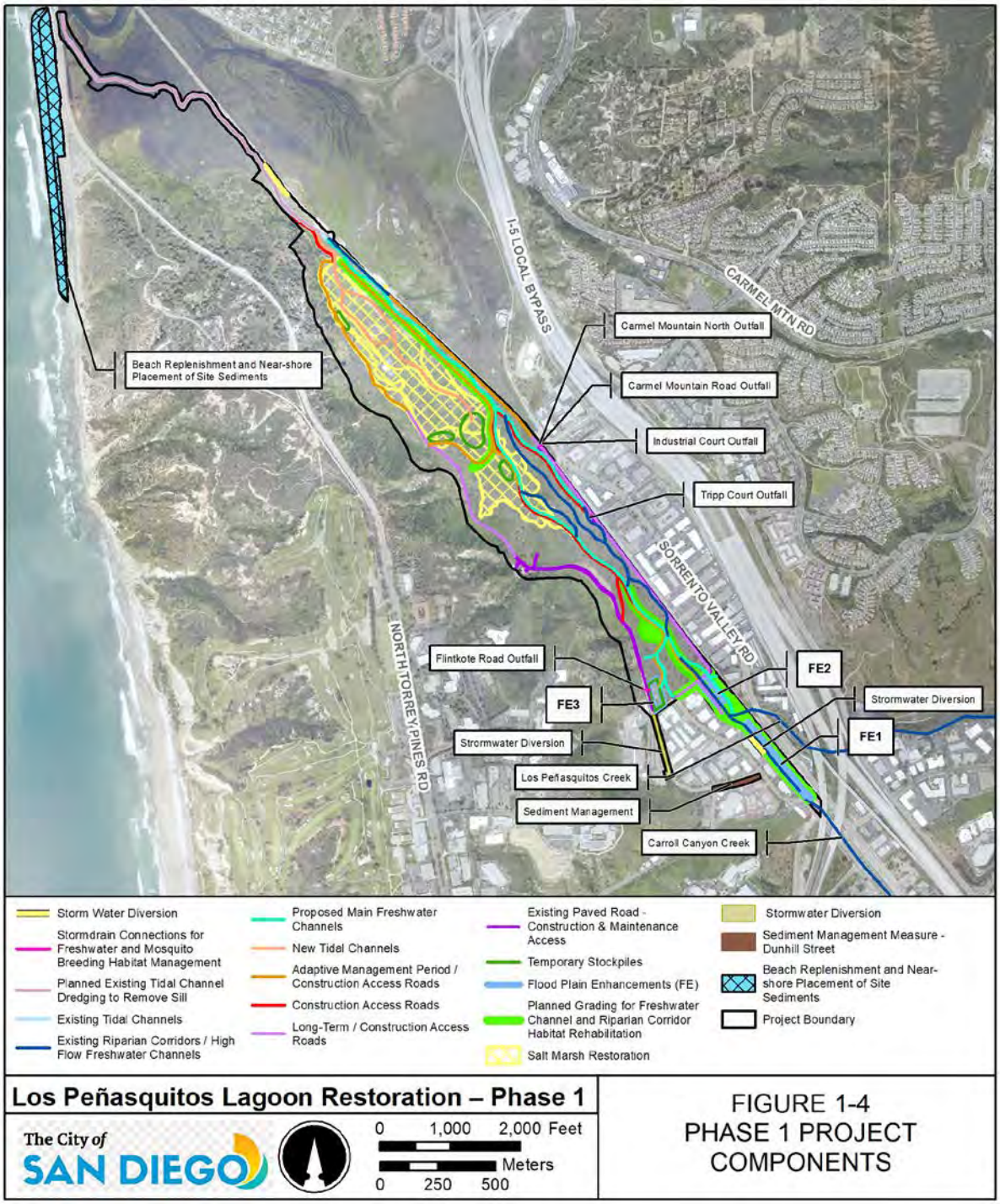
Floodplain Enhancement 1 is located adjacent to Carroll Canyon Creek upstream of the confluence of Carroll Canyon Creek and Los Peñasquitos Creek and downstream of the existing concrete channel (see Figure 1-4). The area currently consists of well-established, dense native and non-native vegetation.

As shown in Figure 1-5, the proposed improvements include expanding the channel width at the convergence of the existing Carroll Canyon Creek concrete channel with the narrow earthen bottom channel to promote peak stormwater flow into the floodplain enhancement. The floodplain enhancement 1 design allows for low dry season flow to continue to pass through the existing low flow channel that parallels the southwest side of Floodplain Enhancement 1. Bioengineered grade-control structures within the floodplain enhancement will reduce flow velocity and capture sediment within the series of cells.

The bottom of the floodplain enhancement feature is proposed as open cell articulated concrete blocks (ACB). The articulated block will allow for maintenance access and will provide a defined

baseline area for routine maintenance. The open cell ACB will be seeded, and native grasses established. The bioengineered grade-control structures will be vegetated with native riparian vegetation. The basin will include a monitoring pole with markers that indicate when maintenance will be necessary.

Figure 1-4: Project Components



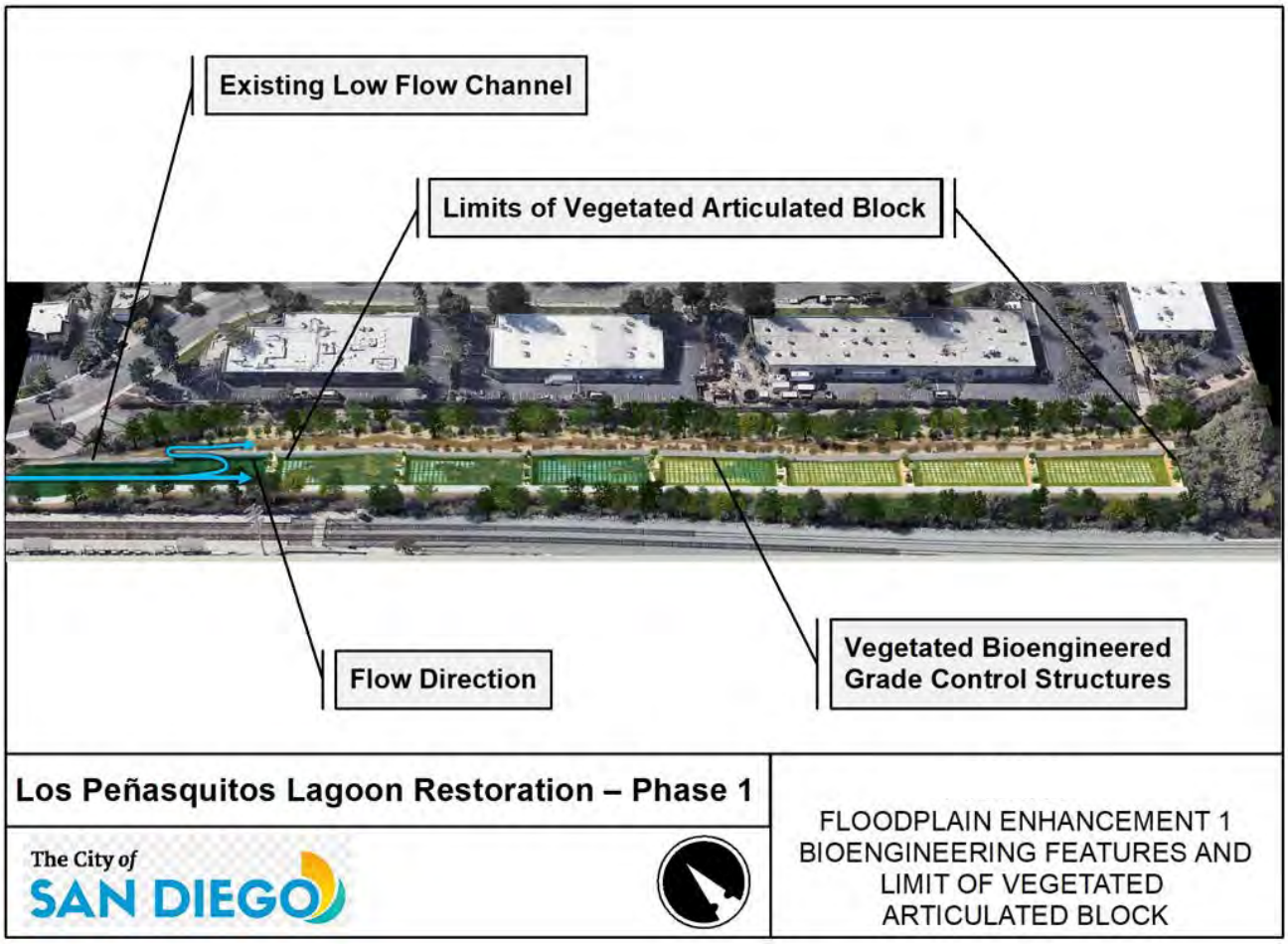


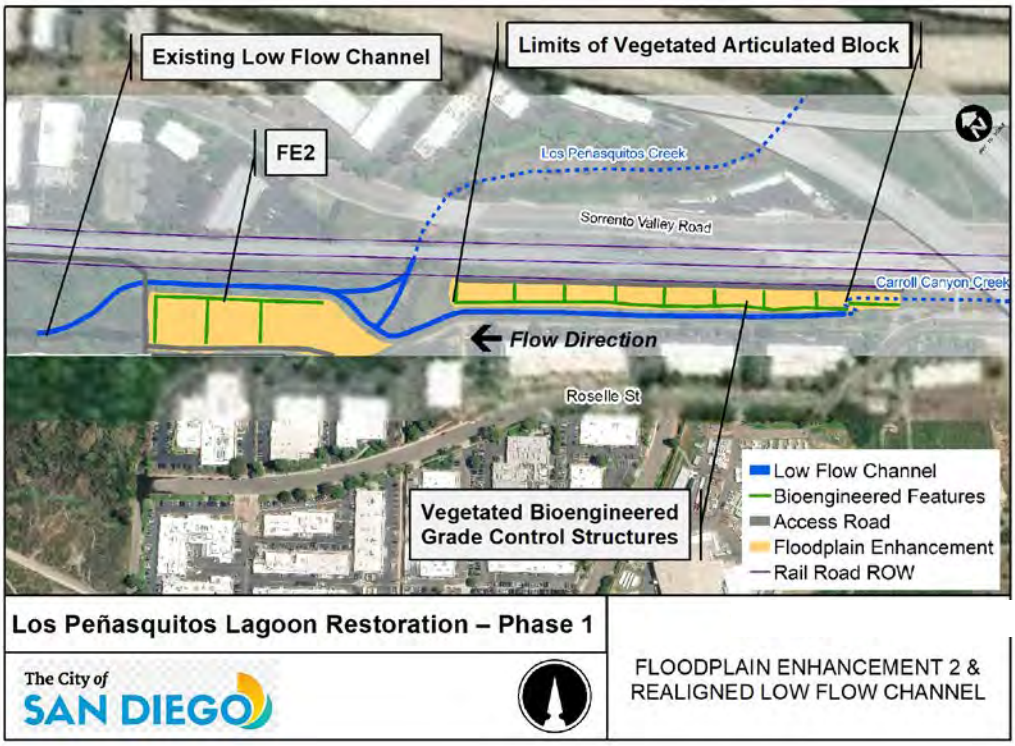
Figure 1-5: Floodplain Enhancements 1- Bioengineering Features & Limit of Articulated Block

Floodplain Enhancement 2

Floodplain Enhancement 2 is located at the confluence of Carroll Canyon Creek and Los Peñasquitos Creek (see Figure 1-4). The area is relatively flat with dense riparian vegetation. Floodplain Enhancement 2 will direct stormwater flows from Los Peñasquitos Creek into the feature and allow for dry-season low flows to enter into the re-aligned low flow channel to be located along the northeastern side of the floodplain enhancement (see Figure 1-6) and serve as a Ridgeway's rail wildlife movement corridor

Within the proposed floodplain enhancement feature, bioengineered grade-control structures will be placed perpendicular to flow to reduce velocities and capture sediment from Los Peñasquitos Creek and Carroll Canyon Creek. The bottom of the floodplain enhancement will be open cell ACB. The ACB will allow for maintenance access and will provide a defined baseline area for routine maintenance. The open cell ACB will be seeded, and native grasses established. The bioengineered grade-control structures will be vegetated with native riparian vegetation. The basin will include monitoring poles with markers that indicate when maintenance will be necessary.

Figure 1-6 - Floodplain Enhancement 2 & Realigned Low Flow Channel



Floodplain Enhancement 3

Floodplain Enhancement 3 is located at the corner of Flintkote Avenue and Estuary Way within the City of San Diego-owned parcel. Floodplain Enhancement 3 is divided into thirds by bioengineered grade control structures, with the northern two-thirds receiving stormwater from the Flintkote Avenue outfall and the southern third receiving flows from the Flintkote Avenue/Roselle Street and Tower Road diversions, with its outfall along Estuary Way.

Floodplain Enhancement 3 will serve to capture additional sediment-laden runoff, which will pass through the bioengineered grade control structures to the middle third of the proposed detention area before discharging through a riser into a proposed low-flow connector channel that connects to the Lagoon. The northern and southern third of the basin will be lined with open cell ACB. The articulated block will allow for maintenance access and will provide a defined baseline area for routine maintenance. The open cell ACB will be seeded, and native grasses established. The bioengineered grade-control structures will be vegetated with native riparian vegetation. The basin will include a monitoring pole with markers that indicate when maintenance will be necessary.

Enhancements to Dunhill Ditch

Enhancement to the existing drainage ditch along Dunhill Street are planned to increase sediment management and flood flow capacity of the ditch. The existing drainage ditch receives sediment laden

storm flow from the upstream 217-acre tributary area and conveys these flows to the ditch and then into a 54-inch reinforce concrete pipe (RCP) culvert that discharges into Carroll Canyon Creek. Due to the elevation of the culvert outfall and ditch inlet compared to the water elevation in the creek during storm flows, the system experiences backflow conditions, and the capacity of the ditch to retain and manage sediment and convey stormflows becomes constrained. To address these conditions, a new stormwater diversion culvert will be implemented that conveys the flows from the Dunhill Ditch to a new outfall farther downstream where surface water elevations are lower. The ditch enhancements include grading to increase capacity and installation of open cell ACP on the bottom of the ditch to facilitate sediment management similar to the floodplain enhancements.

These sediment management measures are integral to the success of the salt marsh restoration to address impacts from sediment accumulation in restored areas.

1.2.2 Low Flow Channels Adjacent to and from Floodplain Enhancements

Low flow channels run adjacent to Floodplain Enhancement 1 and 2 and a new channel will direct flow from Floodplain Enhancement 3 to the main freshwater management channel. The proposed improvements to the low flow channel that runs along the northwestern side of Floodplain Enhancement 1 include laying back the bank and reshaping the low flow channel along the side of the floodplain enhancement to improve the establishment and sustainability of planted native riparian vegetation. Non-native plant species will be removed from both banks and revegetated with native riparian plantings to improve the existing condition of the existing channel that is characterized by steep, incised banks with scour pools and invasive plant species. The existing low flow channel that currently runs along the industrial park after the confluence of Los Peñasquitos and Carrol Canyon Creeks will be re-alignment as shown in Figure 1-6. A new channel from Floodplain Enhancement 3 that converges with the main freshwater management channel will be constructed to convey storm flows following debris and coarse sediment removal. To maintain flow capacity periodic in-channel non-native and invasive vegetation removal and sediment management may be required.

1.2.3 Stormwater Diversions

The following stormwater diversions are planned to further reduce sediment loading to the Lagoon and to reduce flood inundation in the business park during more frequent events.

- **Flintkote Avenue/Roselle Street Stormwater Diversion**: The existing 30-inch RCP discharges to a concrete-lined ditch that cuts directly through the business park with a culvert crossing at Roselle Street, before reaching the ultimate outfall location at Carroll Canyon Creek. Under existing conditions, flooding frequently occurs due to existing flood conveyance capacity and sediment accumulation, as well as backflow from Carroll Canyon Creek at the outfall location. A diversion is planned at Flintkote Avenue to outfall to the southern third of Floodplain Enhancement 3 along Estuary Way to reduce sediment loading to the Lagoon and to reduce flooding during more frequent events. A flap gate will be installed at the current outfall from this concrete ditch to Carrol Canyon Creek to control backflows during storm events.

- **Roselle Steet/Estuary Way**: The Roselle Street and Estuary Way intersection is one of three low points in the business park area. An existing dual 18-inch asbestos cement pipe (ACP) serves to convey approximately 11 acres of local business park drainage from Roselle Street and Estuary Way to Los Peñasquitos Creek. However, backflow from the creek typically occurs and floods at the sump location. Street improvements and a transition structure will be made along the northern curb to provide a connection to a low-flow connector channel to the Lagoon. The low-flow connector channel will converge with the channel from the outfall of Floodplain Enhancement 3 before connecting to the main channel enhancement area.

- **Dunhill Ditch Stormwater Diversion**: The planned diversion will move the existing 54-inch RCP that receives storm flow from the Dunhill ditch to farther down Carroll Canyon Creek. This farther downstream outfall has a lower water elevation allowing for greater capacity for sediment and stormwater management in the Dunhill ditch. The relocated underground culvert will run along the existing maintenance road.

1.2.4 Freshwater Management Channels

Freshwater management will be achieved with the implementation of a primary freshwater management channel that connects the upstream creek channels with the downstream tidal channel. Secondary freshwater management channels are also planned to reduce the retention times of storm flows that inundate the marsh plain, promote habitat conversion, and increase sediment accumulations. The reduction in retention times will reduce the conversion of historical tidal and non-tidal salt marsh to freshwater vegetation communities and non-native exotic vegetation. Secondary channels and existing channels will help convey larger storm flows through the area while also helping to drain the mid-Project area after inundation during larger events and convey suspended sediment particles through the lagoon. In addition, the freshwater channels will provide effective conveyance of dry weather flows away from salt marsh restoration areas.

The primary channel section from the main freshwater conveyance channel to the mid-Project areas will be a 4.5-foot depth channel with a 10-foot bottom width and 2:1 side slopes. The constructed channel section will vary in depth and width (between the top of banks) as it is adjusted for existing grades and to address potential scouring and sediment accumulation. Vegetated soil lifts (bioengineered reinforced channel banks) will be used in several sections to address potential scouring. The channel section will be cut 1 to 2 feet deeper than the previous flood control channel to create a consistent channel slope. The channel will acquire more natural contours and fluvial features in the post-construction period as flood water shapes the channel under dynamic flow conditions and vegetation recruitment. Management will focus on maintaining sufficient flow conveyance to achieve stated project goals.

Secondary channels and existing channels will help convey larger storm flows through the area while also helping to drain the mid-Project area after inundation during larger events. Outfalls penetrating

the railroad berm, including the Tripp Court and Carmel Mountain Road outfalls, will be served by secondary channels which will connect into the primary channel and further reduce ponding of freshwater and the duration of inundation after storm events.

As flows reach the salt marsh restoration area, secondary channels will converge to the primary channel and an elevated grade control feature (low flow diversion) will parallel the channel to contain dry weather flow and smaller storm events within the channel and direct water away from the planned salt marsh restoration. The proposed grade control feature will serve to reduce the depth and duration of freshwater storm flows within the salt marsh restoration area similar to the effect of existing berm of the former wastewater pond. In addition, the grade control feature will convey sediment around the planned restoration area and maintain sediment loading to the salt marsh restoration area below current loading conditions.

Primary and secondary freshwater management channels will include the placement of rounded cobbles at the base of the channel to reduce the frequency of channel maintenance and provide a natural substrate that will retard the establishment of woody vegetation that could reduce channel conveyance capacity. Riparian vegetation will be established outside of the conveyance channels banks to provide a continuous riparian corridor up to the limits of the new tidal influence.

1.2.5 Storm Drain Outfalls

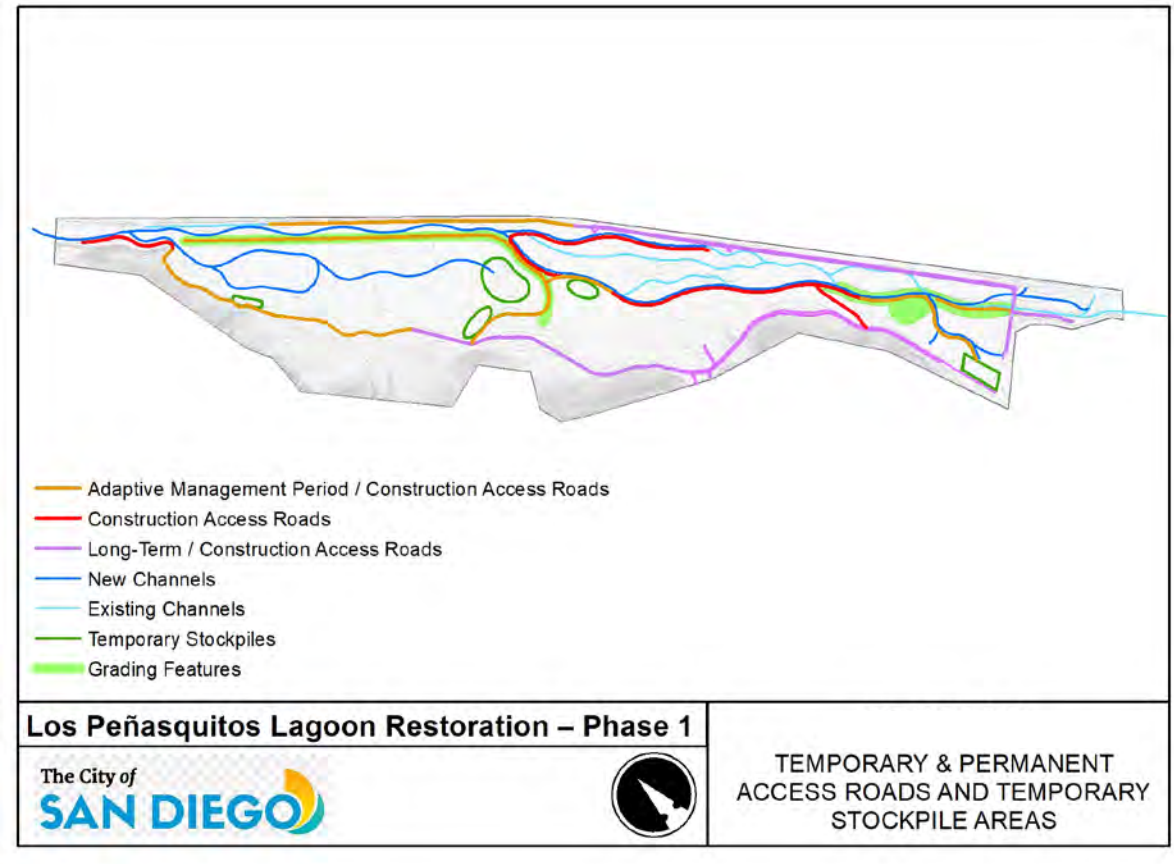
Upgrades to storm drain outfalls that directly discharge to the Lagoon will be implemented in order mitigate the accumulation of sediment and trash from these outfalls into the Lagoon and remove scour ponds that are favorable habitat for mosquito breeding (see Figure 1-4). These include the Tripp Court, Industrial Court/Carmel Mountain/Carmel Mountain North and Flintkote Road outfalls. The Industrial, Carmel Mountain and Carmel Mountain North storm drains will all discharge at the same location at the downstream side of the existing railroad bridge. The existing open channel from the Industrial Court outfall will be replaced with an underground culvert to reduce impacts from vegetation clearing that is currently needed to maintain this ditch. Upgrades to these outfalls include removal of accumulated sediment, filling in scour ponds and providing stabilization/energy dissipation (rip rap) to address future scouring and ponding at the outfalls and connecting the outfalls to the freshwater channels to address ponding. Existing rip rap at the Tripp Court and Carmel Mountain outfall will be used to minimize impacts. Upgrades include installing trash capture devices on the upstream side of the outfalls. Upgrades to the drainage pipe upstream of the outfalls to address sediment built-up and capacity issues are planned for the Industrial Court and Carmel Mountain Outfalls.

The existing storm drain system at Flintkote Avenue currently accumulates large amounts of sediment resulting in sediment overtopping the road, and ponded water near the outfall location. Frequent maintenance is required to maintain road access along Flintkote Avenue. The proposed storm drain improvement includes realigning the storm drain spanning Flintkote Avenue to outfall into the proposed northern third of Floodplain Enhancement 3. The culvert is proposed as a single cell 6 feet wide (W) by 3 feet height (H) RCB to replace the existing 36-inch RCP.

1.2.6 Temporary Adaptive Management & Long-Term Maintenance Access Roads

Following construction, temporary access road for maintenance during the 5-year Adaptive Management period will be maintained. These access roads are shown on Figure 1-7 and, together with long-term maintenance roads, will serve for maintenance access to remove accumulate sediment and debris from the three floodplain enhancements and Dunhill Ditch, the outfalls for Tripp Court and Industrial Court/Carmel Mtn Road/North Carmel Mtn. Road, and the freshwater channels in the riparian enhancement area within the California Coastal Conservancy parcel (upstream of systems first hydraulic constriction – narrowing of the marsh plain). Temporary access roads for the Adaptive Management period also extend from the long-term maintenance roads on both sides of the Project to access the revegetation areas. A temporary Adaptive Management period access road will also be maintained along the grade control feature (diversion) to access the non-tidal salt marsh revegetation areas on both sides of the feature for monitoring and maintenance. This temporary access road will also be used to monitor and maintain the freshwater channel along the feature for potential scouring as storm flow are directed into this channel from upstream primary and secondary channels.

Figure 1-7: Temporary & Permanent Access Roads and Temporary Stockpile Areas



Temporary and long-term maintenance access roads will be fifteen-feet wide and composed of an underlying woven geotextile and gravel surface. Access roads to the three floodplain enhancements will be lined with open cell articulated concrete block to provide structural stability and a defined maintenance path for the entire enhancement areas. For Floodplain Enhancement 1, the permanent access road will begin from the existing concrete channel near the existing access ramp, located near the intersection of Roselle Street and Southbound Interstate 5 on-ramp. It will provide access to the length of Floodplain Enhancement 1 before terminating near the convergence of Los Peñasquitos Creek and Carroll Canyon Creek. A permanent access road for Floodplain Enhancement 2 will begin on the west side of the existing low flow channel (planned for realignment) along the Estuary Way parcel line and then along the western side of Floodplain Enhancement 2. This permanent access road from Estuary Way will continue to cross the realigned low flow channel along the eastern side of Floodplain Enhancement 2 and serve as a permanent access road to the Tripp Court and Industrial Court/Carmel Mountain Road outfalls. There is currently no access to these outfalls to conduct maintenance activities that include removal of accumulated sediment and repair from erosion at the outfall. Access is not possible without going through this area due to the railroad embankment. Without this access road, maintenance of the outfalls is not feasible.

1.2.7 Riparian & Freshwater Wetland Habitat Enhancement & Preservation

Habitat enhancement and preservation is planned in areas adjacent to the primary and secondary freshwater conveyance channels. The alignment of the conveyance channels has been designed to coincide with areas of degraded habitat and to avoid existing established riparian corridors to reduce existing biological resource impacts. There are isolated and continuous areas of degraded habitat as a result of introduction of non-native and invasive plant species within riparian corridors, freshwater marsh, and wetland conversion zones. Treatments within riparian habitat enhancement areas will include removal of invasive plants, and reseeding with native vegetation consistent with the surrounding habitat function.

Areas of freshwater wetland and riparian habitat from outside of the enhancement areas between the upstream floodplain enhancements and the salt marsh restoration will be maintained during the 5-year Adaptive Management period to control the establishment of invasive and non-native species. These preservation areas will be monitored and managed after the end of the post-construction adaptive management period.

1.2.8 Non-tidal Salt Marsh and Tidal Salt Marsh Habitat Rehabilitation, Re-Establishment and Establishment

Within the area upstream of the grade control feature, habitat rehabilitation is planned within the continuous 14-acre area of degraded non-tidal salt marsh dominated by non-native rye grass. Rehabilitation will include clearing and grubbing of existing non-native vegetation, removal of 6-8 inches of coarse sandy soils and non-native plant seeds, fine grading to establish positive drainage to the freshwater conveyance channels, hydroseeding, and native plant container planting.

Rehabilitation may include addition of topsoil and soil amendments to improve conditions for re-establishing native vegetation. These areas will be revegetated with native vegetation appropriate for the desired habitat function.

Rehabilitation, re-establishment, and establishment of tidal and non-tidal marsh habitat is planned within the approximately limits of the historical salt marsh that was still precent in 1973 but has since been degraded by invasive grasses. These areas will be monitored during the 5-year Adaptive Management period to confirm successful conversion of the currently degraded salt marsh and converted freshwater habitats to a functioning native salt marsh area.

Salt marsh habitat restoration activities include removal of non-native perennial ryegrass (*Festuca perennis*) and excavation and grading to remove historically accumulated surface sediments to increase tidal extent and inundation. Site grading also includes the extension of tidal channels through the restoration site to increase the tidal connection, extend the tidal flows further into the site, and accelerate the passage of freshwater through the restoration area. The salt marsh restoration will use a hybrid grading refinement approach consisting of maximum touch, moderate touch, and light touch approaches to achieve the restoration.

1.3 Post-Construction Schedule

Project construction of the Phase 1 Project is expected to be completed over three to four construction seasons. Construction is anticipated to begin the fall of 2024 and extend to 2028 followed by a five-year adaptive management period.

1.3.1 Adaptive Management Period

The 5-year adaptive management period will begin following the construction of Phase 1. The purpose of the adaptive management period is to monitor and assess the success of the Phase 1 project to:

- Restore approximately 62 acres of salt marsh habitat toward the TMDL goal of moving toward 85 acres of restored salt marsh habitat by 2035
- Confirm successful conversion of the currently degraded salt marsh habitat and converted freshwater habitats to a functioning native tidal and non-tidal salt marsh habitat in accordance with the HMMP
- Confirm successful habitat preservation, enhancement, rehabilitation, re-establishment and establishment of defined habitats used for project mitigation and credits per the HMMP and approved permits
- Achieve the estimated average annual TMDL sediment load reduction of coarse-grained sediment not entering the restored salt marsh habitat
- Significantly reduce dry weather flows entering and impacting downstream salt marsh habitat

- Measurably reduce the amount and duration of ponded freshwater within the restored salt marsh habitat
- Increase tidal inundation and extent into the restored historical salt marsh
- Maintain wildlife corridors that do not impeded movement from upstream riparian habitats to the lagoon
- Manage freshwater marsh and riparian habitats through selective invasive plant removals outside the habitat enhancement areas

Based on the results of the monitoring and assessment, measures will be taken that may include the following within the restored salt marsh:

- Replacement of plants and revegetation in accordance with the Restoration Plan/Habitat Mitigation and Monitoring Plan (HMMP)
- Assess the use of "hammocks" installed between the tidal channel and the adjacent bench to hold back tidal flows to increase the duration of tidal flow within the restored salt marsh areas to increase salinity
- Minor grading to improve extent and duration of tidal inundation and reduce ponding of freshwater
- Temporary irrigation with brackish and higher salinity water to increase salinity in restore non-tidal and high tidal salt marsh

The success and effectiveness of the restoration approach and potential additional measures as listed above will be used to inform the Phase 2 restoration located to the northeast of Phase 1 from the railroad embankment to Carmel Valley Road. The effectiveness of the sediment and freshwater management measures and restoration approach will be used in the design and construction of Phase 2 to achieve the overall TMDL goal of moving toward restoring 85 acres of historical tidal and non-tidal salt marsh habitat by 2035. This goal needs to also consider the effects of climate change and sea level rise that will require transitional habitat to allow for migration of salt marsh into higher elevations.

During the adaptative management period maintenance activities will occur in the following project components that were described above and presented in greater detail in Section 4 for the success and sustainability of the historical salt marsh restoration and freshwater wetland habitat enhancement:

- **Floodplain Enhancements and Dunhill Ditch**: The three floodplain enhancements and Dunhill Ditch will need to be maintained as part of sediment management to achieve

TMDL sediment load reductions and not impact downstream restored salt marsh habitat and enhanced riparian habitat. Accumulated sediment and debris will be periodically removed from these sediment management features.

- **Low Flow Channels**: The low flow channels adjacent to Floodplain Enhancements 1 and 2 will need to be maintained to maintain flow capacity and address ponding and sediment accumulation. Accumulated sediment and dense and woody vegetation associated with sediment accumulation will be periodically removed from these low flow channels.

- **Stormwater Diversions**: The stormwater diversion from the Flintkote channel to Floodplain Enhancement 3, from the Dunhill Ditch to further downstream of Carroll Canyon Creek and the new outfall and channel at Roselle Street and Estuary Way will need to have sediment and debris removed periodically to maintain flow capacity.

- **Freshwater Management Channel & Habitat Enhancement Area – Segment A (California Coastal Conservancy Parcel):** The freshwater management channel and adjacent graded area from floodplain enhancement 2 to just upstream of the first hydraulic constriction within the California Coastal Conservancy parcel will be maintained in order to convey dry weather flows and control coarse sediment accumulation that has impacted riparian habitat in this area. Segment A of the freshwater management channel is shown on Figure 1-8. During the five-year Adaptive Management period, maintenance of the freshwater conveyance channels will likely require select removal of accumulated sediment and control of vegetation. Maintenance of the adjacent habitat enhancement area will include removal and management of invasive and non-native plants and removal of coarse sediment on the banks of the channel within the parcel before the hydraulic constriction. Adaptive Management access roads will be maintained in this segment for channel maintenance.

- **Freshwater Management Channel – Segment B (Between the First Hydraulic Restriction and the Grade Control Feature)**: Segment B of the freshwater management channel is shown on Figure 1-8. Maintenance of this segment is not anticipated and will rely on the use of cobbles to limit rapid growth of dense and woody vegetation. Construction access roads through Segment B will be removed and these areas restored after construction. Should a significantly large storm event deposit sediment and debris within this segment impeding the conveyance of dry weather flows, emergency permits would be required for removal of these materials and any dense and woody vegetation within the channel. Riparian vegetation will be established outside of the conveyance channels banks to provide a continuous riparian corridor up to the limits of the new tidal influence.

- **Freshwater Management Channel – Segment C (Along Grade Control Feature to Tidal Channel)**: The freshwater channel through most of the restored non-tidal salt marsh area to the grade control feature and then to its confluence with the anticipated extent of tidal influence (location of first railroad trestle) will be maintained to address both sediment accumulation to maintain dry weather flow conveyance away from the restored non-tidal and tidal salt marsh habitat. Segment C of the freshwater management channel is shown on Figure 1-8. Continuous conveyance of the dry weather flows through this area is important to re-establish salt march vegetation and control re-introduction of non-native grasses. Segments of this channel may need to be maintained as a result of possible channel scouring from large storm event flows.

- **Upgraded Storm Drain Outfalls** – Upgraded storms drain outfalls Tripp Court, and Industrial Court/Carmel Mtn. Rd/North Carmel Mtn. Rd. will need to be maintained to address accumulation of sediments and potentially scouring under large storm events. This maintenance is needed to manage sediment from impacting restored salt marsh habitat and address potential mosquito breeding habitat. The maintenance areas extend from the outfalls to the limits of the rip rap erosion protection and the first 100 feet of the outfall channel as shown on Figure 1-9.

Figure 1-8: Freshwater Management Channel Segments – Maintenance Adaptive Management Period

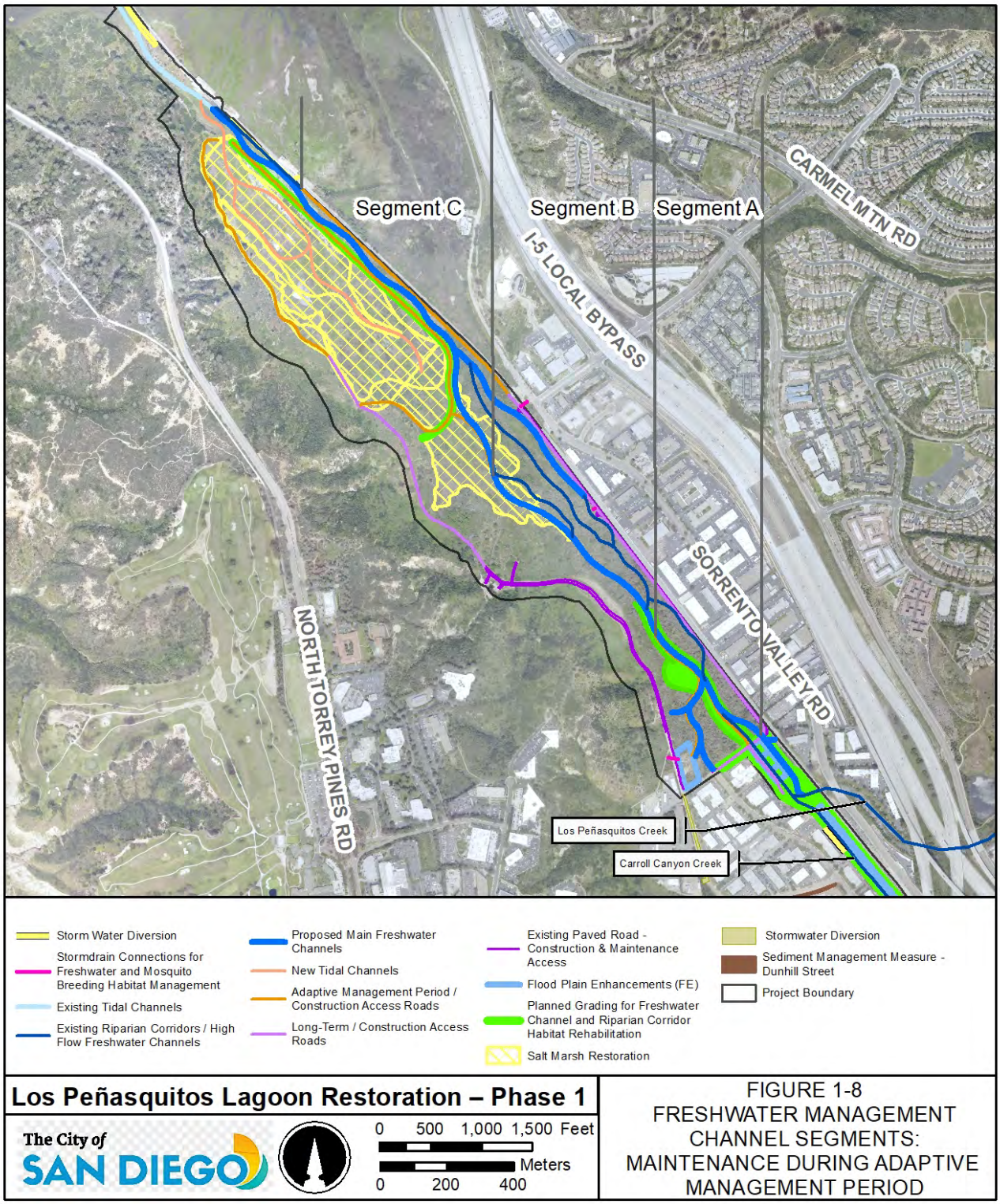
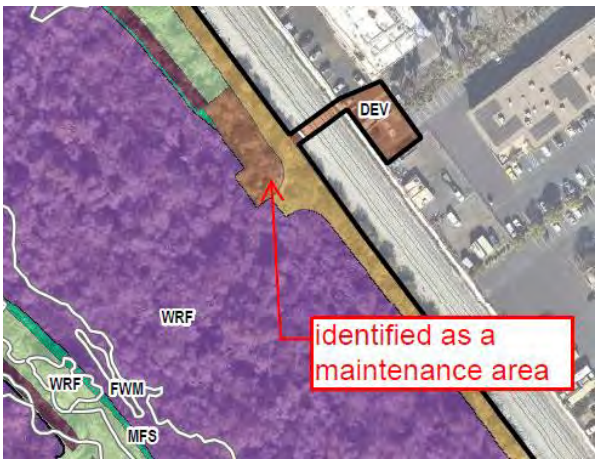
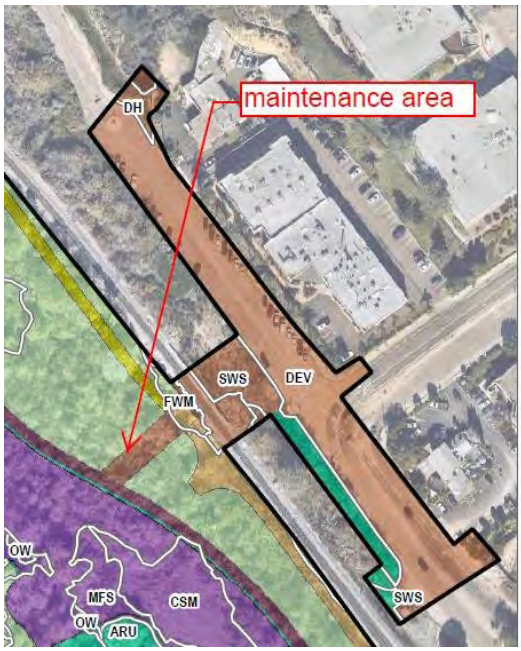


Figure 1-9: Extent of Maintenance Areas for Storm Drain Outfalls



Tripp Court Outfall



Industrial Court/Carmel Mountain Outfall

Based on the monitoring during the Adaptive Management period, the frequency of the maintenance of each of the above project elements that support and sustain the salt marsh restoration will be assessed and updated for the long-term management period. The assessment will be based on monitoring of the observed accumulation of sediment, volumes removed, frequency of maintenance and number and types of storm events. Debris and trash accumulated and removed annually will also be monitored and recorded along with vegetation removals to restore capacity and flow conveyance. These observations along with the establishment of the salt marsh restoration will inform modifications to this O&M Plan for the long-term maintenance period following the five-year Adaptive Management period.

Temporary Adaptive Management access roads will remain during this period to perform the needed maintenance of the salt marsh restoration and the above project components. These temporary access roads will be removed at the end of the Adaptive Management period and all disturbed areas restored in accordance with the HMMP. Adaptive Management roads to the freshwater channel and habitat enhancement area may remain depending on the determination of the need to periodically maintenance to control accumulated coarse sediments and invasive plants during the long-term maintenance period. This will be determined based on monitoring during the Adaptive Management period. Long term maintenance roads to the floodplain enhancements and upgraded storm drain outfalls will be maintained during the Adaptive Management period and into the long-term maintenance period.

1.3.2 Habitat Mitigation Period

The Restoration Plan/HMMP (Dudek 2022) identifies methods and a schedule to maintain, monitor, and manage restored habitat areas to meet compensatory mitigation standards. Habitat restoration involves site preparation, grading, planting, and temporary irrigation installation that will occur as part of phased construction (i.e., subphase 1A in 2024/25, subphase1B in 2025/26, and subphase 1C in 2026/27). Following completion of construction of each subphase, plantings and non-planted restoration areas, will be monitored and maintained for a period of 5 years or until final performance standards are met. Therefore, habitat mitigation monitoring period is expected to overlap with the Adaptive Management Period, but may extend further in time, depending on whether monitoring data indicate that performance standards have been met. The methods and schedule for monitoring and maintenance are detailed in the Restoration Plan/HMMP (Dudek 2022).

1.3.3 Long-Term Management

The long-term maintenance period will begin following the 5-year Adaptive Management period. Monitoring of the success and effectiveness of the restoration approach and sediment and freshwater management measures will be used in the design and construction of Phase 2 to achieve the overall TMDL goal of moving toward restoring 85 acres of historical tidal and non-tidal salt marsh habitat by 2035. Monitoring and assessment of the Adaptative Management period maintenance activities will inform the frequency and extent of maintenance as the project moves into long-term maintenance. At that time this O&M Plan will be revised and updated according to the results of the monitoring and assessment during the Adaptive Management period. Long-term maintenance is anticipated for the sediment and freshwater management elements that include the floodplain enhancements, Dunhill Ditch, stormwater diversions, storm drain outfalls, long-term access roads and segments of the freshwater management channels. Maintenance of the restored salt marsh habitat will continue a part of TMDL compliance monitoring and maintenance. The long-term maintenance of the restored salt marsh will need to consider continued adaptation and changes in habitat due to sea level rise and other effects from climate change. Established salt marsh may be converted to open water depending on the extent and elevation of sea level rise and transitional zones may convert to salt marsh habitat.

1.4 Restoration Plan/Habitat Mitigation and Monitoring Plan

The Restoration Plan/HMMP (Dudek 2022) provides the required details to support the issuance of compensatory mitigation credits for the project. These mitigation credits are intended to offset not only the permanent impacts of the Phase 1 project (i.e., permanent access roads and floodplain enhancement features), but also provide advanced credits for future co-permittee projects including Phase 2 Lagoon Restoration. To meet compensatory mitigation credit standards, the Restoration Plan/HMMP includes details regarding baseline conditions, the restoration work plan including target habitat functions and construction methods, determination of mitigation credits, short- and long-term site protection measures, a maintenance plan, ecological performance standards, monitoring and

reporting requirements, long-term and adaptive habitat management, financial assurances, and procedures to certify successful completion of mitigation. Elements of the Restoration Plan/HMMP that are pertinent to operations and maintenance are summarized below, but please reference the Restoration Plan/HMMP for greater detail (Dudek 2022).

1.4.1 Habitat Maintenance Plan

Following installation of each sub-phase of restoration, site visits will be conducted monthly during Year 1 of the mitigation and monitoring program. During Years 2 and 3 site visits will be conducted monthly December through April and quarterly thereafter. During Years 4 and 5, site visits/monitoring will be conducted quarterly. More frequent monitoring will be conducted as needed to meet the performance standards indicated herein. A schedule is shown in Table 1-1. A separate schedule will be implemented for each sub-phase of restoration based on timing of installation completion. For example, initial restoration of sub-phase 1A is expected to be installed in 2024 and monitoring would continue through 2029, while initial restoration of sub-phase 1B would be monitored from approximately 2025 through 2030. Maintenance, as prescribed in this Restoration Plan/HMMP, will be conducted throughout all restoration areas (including areas designated as impact neutral or otherwise not recognized as mitigation credit) as well as any additional mitigation credit areas (e.g., wetlands adjacent to Project grading and enhancement areas). Maintenance pertaining to plant establishment, replacement planting, and seeding would not apply to restoration areas that are not planted (e.g., freshwater and tidal channels).

Table 1-1.
Maintenance Schedule (Each Sub-Phase of Restoration)

Task[1]	Year 1	Year 2	Year 3	Year 4	Year 5
Weed and Pest Control[2]	Monthly	Monthly (Dec–April); quarterly thereafter	Monthly (Dec–April); quarterly thereafter	Quarterly	Quarterly
Plant Replacement[3]	Annually, Oct–Dec	Annually, Oct–Dec	Annually, Oct–Dec	As needed; Oct–Dec	As needed; Oct–Dec
Supplemental Water[4]	As needed	As needed	As needed	As needed	As needed
General Site Maintenance	Monthly	Monthly (Dec–April); quarterly thereafter	Monthly (Dec–April); quarterly thereafter	Quarterly	Quarterly
Erosion Control and Sedimentation	Monthly	Monthly (Dec–April); quarterly thereafter	Monthly (Dec–April); quarterly thereafter	Quarterly	Quarterly
Trash Removal	Monthly	Monthly (Dec–April); quarterly thereafter	Monthly (Dec–April); quarterly thereafter	Quarterly	Quarterly
Fencing and Signage Maintenance	Monthly	Monthly (Dec–April); quarterly thereafter	Monthly (Dec–April); quarterly thereafter	Quarterly	Quarterly

Notes:

[1] Maintenance task schedule and frequency will be adjusted, as appropriate, depending on site conditions and in coordination with the Project biologist. It is anticipated that more-intensive maintenance will occur during the first few years of the Project, and taper down as the Project approaches Year 5.
[2] Any maintenance performed during the bird nesting season (March 1 through September 15) will be conducted under direction of the Project biologist.
[3] Should extensive planting be required in Years 4 or 5, even due to unforeseen circumstances, the mitigation and monitoring program may be required to be extended.
[4] Performed as-needed during the first 3 years of the 5-year program, depending on site conditions. No supplemental watering will occur for the final 2 years of the maintenance and monitoring period.

1.4.2 Habitat Mitigation & TMDL Performance Standards

The proposed Project is designed to meet two sets of performance standards: 1) restoration of various native habitat to meet Project and future mitigation requirements and 2) restoration of salt marsh or salt panne to meet the requirements of the TMDL. To support the assessment of performance towards meeting compensatory mitigation standards, the Restoration Plan/HMMP identifies two reference sites, methods to determine vegetation composition/cover (using transect methods), habitat functions (using the California Rapid Assessment Method), and jurisdictional boundaries (using wetland delineation methods). Annual performance standards are provided for native species richness, native container plant survival, minimum native plant cover (relative to reference site), maximum total non-native cover, and maximum percent perennial invasive cover. Monitoring will be performed according to the schedule outlined in Table 1-1, which will inform maintenance to be conducted and provide the results of vegetation monitoring relative to annual performance standards.

The Sediment TMDL requires "successful restoration of 80% of the 1973 acreage of lagoon salt marsh habitat" (RWQCB 2012). This percentage has been estimated as requiring 84 total acres of salt marsh restoration within the lagoon. This requirement is intended to bring about the conversion of existing freshwater and disturbed habitats to one of several saline communities, consistent with historic conditions in the lagoon. These communities may include tidal and non-tidal salt marsh (including high marsh and mid marsh), salt panne, mudflat, intertidal and subtidal channels. In contrast to compensatory mitigation, TMDL restoration areas need only occur in Los Peñasquitos Lagoon, regardless of ownership or existing easements/utilities. Based on analysis of existing vegetation communities (including levels of disturbance) and proposed restoration types, the Project is expected to restore 62 acres towards the total 84-acre TMDL restoration goal. To demonstrate compliance, the Sediment TMDL requires monitoring "each Fall for changes in the extent of the vegetation types" through acquisition of aerial photos, digitizing at an approximate 1:2,500 scale, and interpretation and classification of various land covers as "saltmarsh, non-tidal saltmarsh, freshwater wetland, non-tidal saltmarsh – *Lolium perrene* infested, southern willow scrub/mulefat scrub, herbaceous wetland, or upland land cover" (RWQCB 2015).

2.0 OPERATION AND MAINTENANCE RESPONSIBILITIES

Operation and maintenance (O&M) of the Phase 1 project will be the responsibility of the City of San Diego under the Memorandum of Agreement (MOA) with California Department of Parks & Recreation. The City's Stormwater Department Operation and Maintenance Division will have the responsibility of scheduling and conducting the maintenance of the sediment and freshwater management elements. A City hired contractor will conduct management actions for the revegetated restored salt marsh and freshwater wetland enhancements and other management areas in accordance with the HMMP. The City's Stormwater Department will be responsible for conducting the monitoring and reporting for compliance with the HMMP, TMDL and project permits. Following completion of permit compliance, it is expected that project monitoring will be incorporated into the Peñasquitos Lagoon-wide Monitoring Program that is conducted by the National Estuarine Research Reserve in coordination with the California Department of Parks & Recreation. The City will hire contractors to perform the monitoring and assessment during the Adaptive Management period for compliance purposes and to inform the design and construction of Phase 2. The City will coordinate with California Department of Parks & Recreation on the monitoring and reporting.

3.0 OPERATION, INSPECTION AND MAINTENANCE ACTIVITIES & FREQUENCIES

The inspection and maintenance activities and frequencies of the sediment management elements, freshwater management channels, stormwater diversions and storm drain outfalls are summarized in the following sections for each system component. The inspection and maintenance requirements for the floodplain enhancements, Dunhill Ditch, low flow channels, stormwater diversions, freshwater management channels, and upgraded storm drain outfalls are presented in the following sections and tables.

3.1 Floodplain Enhancements & Dunhill Ditch

The frequency of sediment removal from the three Floodplain Enhancements and Dunhill Ditch will depend on the number and intensity of the storm events during the wet season. It is estimated that removal of sediment from the floodplain enhancements and Dunhill Ditch will be needed at least annually prior to the storm season and at least once following a larger storm event. The frequency of vegetation management within the floodplain enhancements and Dunhill Ditch will depend on the vegetation growth and sediment accumulation. On a minimum annual basis, the floodplain enhancements and Dunhill Ditch will be inspected, and maintenance will be conducted. Maintenance may also be conducted in phases by cells within the floodplain enhancements depending on the amount of sediment accumulated in each cell and available time for maintenance considering storm events and bird breeding season.

The floodplain enhancements are separated into cells by vegetated grade control structures. The grade control structures divide the floodplain enhancements into multiple cells allowing for focused and phased sediment management to limit the duration of maintenance activities. Depending on the amount of sediment accumulated in each cell, sediment removal activities can be focused on those cells with greater sediment to reduce the duration of maintenance activities and reduce potential noise and air quality impacts.

The floodplain enhancements and Dunhill Ditch will contain articulated concrete block (ACB) at the bottom of these features to facilitate the measurement of the amount of sediment accumulated and the limit of excavation. The ACB will also allow for access of maintenance equipment to limit the duration of maintenance activities and reduce potential noise and air quality impacts. The ACB will be interlocked and anchored to a foundation for stability under equipment loading and flood velocities. The type of equipment and methods for sediment and debris removal will maintain the integrity of the ACB and will be based on geotechnical analysis that is planned as part of the final design and will be included in the updated O&M Plan that will be provided with the final design. The current O&M Plan is for permitting purposes and will be the basis for the updated O&M Plan. The anticipated type of equipment that will be used for the maintenance of the floodplain enhancements includes a frontend loader, two dump/haul trucks, and a chipper. Sediment removed will be transported to either the Torrey Pines State Beach for beach replenishment, if suitable, or to the Miramar Landfill.

The modeled annual average sediment capture and removal goal is 1,200 tons per year, or approximately 25,000 cubic yards annually. This annual average sediment capture is anticipated per the design modeling to be deposited primarily into the three floodplain enhancements, low flow channels and the upstream portion of the freshwater management channel (Segment A) for the first five years. This amount will vary depending on the number and type of storm events. The capture and removal goal will be measured annually based on the number of truck loads hauled to the beach replenishment site and Miramar Landfill as a measure of TMDL compliance.

The vegetated grade control structures will be maintained at the same frequency as the sediment removal and based on inspections. Damage to the gabion foundation or the vegetated berm will be repaired, invasive plants removed, and native plantings trimmed or replaced to maintain grade control function and habitat value. The spaces between the ACB will be seeded to establish native grasses. The type of grasses will be resilient to the anticipated sediment accumulation and maintenance activities. Inspections of the floodplain enhancement will include the condition of the native grasses within each cell and the need to re-establish these grasses as well as invasive plant management.

The three floodplain enhancements also contain debris and trash capture devices on the grade control structures between the cells. Accumulated debris and trash behind these structures will be removed during the sediment removal activities and transported to the Miramar Landfill.

Maintenance activities for the Floodplain Enhancements will be performed outside the bird nesting season with the exception of maintenance needed following a large storm event where large amounts of sediment and debris have been captured and require removal to prevent migration of these materials into the Lagoon should another large event occur within the same season. If maintenance is required during the bird nesting season, Project Design Features and Mitigation Measures will be implemented in accordance with the approved permits that include biological monitoring.

Table 3-1 presents the inspection, maintenance activities and frequencies for floodplain enhancements and Dunhill Ditch.

Table 3-1: Inspections & Maintenance Activities & Frequencies – Floodplain Enhancements and Dunhill Ditch

Inspection Activities- Floodplain Enhancements 1, 2 and 3 and Dunhill Ditch	Suggested Frequency
• **In-Person Monitoring of Accumulated Sediment, Debris and Trash:** o Inspector shall observe and record the amount of accumulated sediment within each cell using the depth gauge that uses the top of the ACB as reference. Based on the inspection results and the amount of sediment accumulated, maintenance will be performed. o The amount of debris and trash accumulated within each cell and behind the trash containment devices on the grade control structures shall be observed and recorded. Based on the inspection results and the amount of debris and trash accumulated, maintenance will be performed.	Annually and after larger storm events (greater than 2-year 24-hour event).

• **In Person Inspection of Vegetation:** o Inspector shall observe and record the amount of vegetation within each cell that is not associated with native grasses established between the ACB. Vegetation that has established as a result of accumulated sediment and invasive plants that have established between the ACB shall be noted. Based on the inspections, vegetation management may be conducted as part of the sediment and debris removal activities. o Inspection shall also note the condition of the native grasses within each cell and required re-establishment of these grasses and invasive plant management noted. Required maintenance shall be performed based on the inspections. o Inspections of the native vegetation on the grade control structures between the cells shall be conducted and required trimming, replacement and removal of non-native plants noted.	Annually
• **In Person Inspection of Damage:** o Inspector shall observe and record damage to the ACB, vegetated grade control structures, access road, banks of floodplain enhancements and channel entrances into and out of the features. Maintenance and repairs shall be completed following from the inspection results.	Annually and after large storm events
Maintenance Activities – Floodplain Enhancements 1, 2 and 3 and Dunhill Ditch	**Suggested Frequency**
• **Removal of Accumulated Sediment:** o Based on the annual inspections and inspections after large storm events, sediment accumulated within the floodplain enhancements cells that are above the elevations indicated on the depth gauge shall be removed. These depth gauge will be installed in each cell and use the ACB as a baseline. These designated elevations required to maintain capacity and to prevent sediment from being transported downstream during large events (greater than 10-year event) will be defined in the final design. Sediment will be removed and placed on Torrey Pines State Beach, if suitable, or used as cover material at the Miramar Landfill in accordance with approved permits. • **Removal of Accumulated Debris and Trash:** o Based on the annual inspections and inspections after large storm events, accumulated trash and debris within the floodplain enhancement cells and behind the trash containment devices on the grade control structures will be removed and taken to the Miramar Landfill.	Annually and after larger storm events depending on inspections
• **Vegetation Management:** o Based on the annual inspections, vegetation within each cell, which is not associated with native grasses established between the ACB, that have established on the accumulated sediment shall be removed as part of the annual sediment removal. o Invasive plants that have established between the ACB shall be removed. Based on the inspections, revegetation to re-establish native grasses will be conducted.	Annually

o Based on inspections of the native vegetation on the grade control structures between the cells, required trimming, replacement of native plants and removal of non-native plants shall be conducted.	
• **Maintenance due to Damage:** o Based on the annual inspections and inspections after large storm events, damage observed to the ACB, vegetated grade control structures, access road, banks of floodplain enhancements and channel entrances into and out of the features shall be repaired and/or replaced to maintain system design function and capacity.	Depends on inspection observations

3.2 Low Flow Channels

Under a less frequent schedule (potentially twice during the 5-year Adaptive Management period), sediment removal from the low-flow channel adjacent to Floodplain Enhancement 1 will be required. The side slopes and banks of the low flow channel along Floodplain Enhancement 1 will not require maintenance other than management of invasive plants. Limited maintenance (every 5 years – once during the Adaptive Management period) is anticipated in the re-aligned low flow channel along Floodplain Enhancement 2. The low flow channel from the outfall from Floodplain Enhancement 3 to the main freshwater management channel will require limited maintenance anticipated at 3-5 year intervals or twice during the 5-year adaptive management period. Sediment accumulation within this channel should be controlled by Floodplain Enhancement 3. It is important that this channel be maintained with the removal of accumulated sediment and dense and woody vegetation growth to convey design storm flows to the main freshwater channel to maintain the capacity of Floodplain Enhancement 3 to reduce sediment load to the salt marsh restoration. The type of equipment that is anticipated to be used in this area includes backhoe, 1-2 dump/haul trucks, Bob Cat Loader and chipper.

Maintenance activities for the low flow channels will be performed outside the bird nesting season. The low flow channel adjacent to Floodplain Enhancement 2 is within a wildlife corridor and will require maintenance activities to be conducted outside of the bird nesting season and with biological monitoring per the approved permits.

Table 3-2 presents the inspection, maintenance activities and frequencies for the low flow channels adjacent to floodplain enhancements 1 and 2 and from 3.

Table 3-2: Inspections & Maintenance Activities & Frequencies – Low Flow Channels

Inspection Activities- Low Flow Channels Adjacent to Floodplain Enhancements 1, 2 and from Floodplain Enhancement 3	Suggested Frequency
• **In-Person Inspection of Low Flood Channels for Accumulated Sediment:** o Inspector shall observe and record the amount of accumulated sediment within the low flow channels. Based on the inspection results and the amount of sediment maintenance will be performed.	Annually
• **In Person Inspection of Vegetation:** o Inspector shall observe and record the amount of extensive (e.g. thick and dense reeds) and woody vegetation (e.g. willows) within each channel that is impacting the conveyance of the design flows and resulting in backflow into the floodplain enhancements and/or ponding of dry weather and/or storm flows within the channel. This vegetation will be associated with sediment accumulation as these channels will have cobble at the channel base to slow the establishment of dense and woody vegetation and reduce maintenance. Low flow channels adjacent to Floodplain Enhancements 1 and 2 will have persistent dry weather flows and need to continuously convey these flows to the freshwater management channel. Vegetation management will be conducted as part of the sediment removal activities.	Annually
• **In Person Inspection of Scouring:** o Inspector shall observe and record evidence of scouring of the channel bottom or side slopes that require maintenance. Maintenance and repairs shall be completed within the same year of the inspection results.	Annually
Maintenance Activities – Low Flow Channels Adjacent to Floodplain Enhancements 1, 2 and from Floodplain Enhancement 3	**Suggested Frequency**
• **Removal of Accumulated Sediment:** o Based on the annual inspections, sediment accumulated within the low flow channels shall be removed and placed on Torrey Pines State Beach, if suitable, or used as cover material at the Miramar Landfill. The need for accumulated sediment removal will be determined based on the depth of sediment and evidence of ponding of dry weather flows and/or backflow to the floodplain Enhancements.	1-2 times during 5-year Adaptive Management period based on inspections
• **Removal of Vegetation:** o Based on the annual inspections, extensive and woody vegetation within the channels associated with sediment accumulation shall be removed as part of the sediment removal. Invasive plants that have established in the channel banks will also be removed.	1-2 times during 5-year Adaptive Management period based on inspections

• **Maintenance due to Damage:** o Based on the annual inspections, damage due to scouring from larger storm events shall be repaired to maintain system design function and capacity and control sediment migration to the salt marsh restoration.	Depends on inspection observations

3.3 Stormwater Diversions

Maintenance will be required for the three stormwater diversions located that three diverts stormwater flows from the Flintkote Avenue/Roselle channel to Floodplain Enhancement 3, the new outfall and channel at Roselle Steet and Estuary Way, and the relocated culvert from the Dunhill Ditch to farther down Carrol Canyon Creek. Maintenance of these diversion is needed to further reduce sediment loading to the Lagoon and to reduce flood inundation in the business park during more frequent events. The diversions at the Flintkote channel to Floodplain Enhancement 3 and the Dunhill Ditch diversion are underground culverts that will have maintenance access manholes placed at designated intervals. Maintenance of these underground culverts will include removal of sediment and debris using a vacuum truck. Sediment and debris are likely to accumulate in these culverts following storm events. The frequency of the maintenance will depend on the number and type of storm events. It is anticipated that maintenance will be required on an annual basis to maintain flow capacity.

The maintenance of the outfall and channel at Estuary Way and Roselle Street is an open channel that will require periodic removal of accumulated sediment and debris and management of vegetation due to accumulated sediment. Maintenance of this diversion will be similar to the low flow channels adjacent to and from the floodplain enhancements.

Table 3-3: Inspections & Maintenance Activities & Frequencies – Stormwater Diversions

Inspection Activities- Stormwater Diversions	Suggested Frequency
• **In-Person Inspection of Stormwater Diversions for Accumulated Sediment & Debris:** o Underground Stormwater Diversions – Inspection shall be conducted from the maintenance access manhole to the extent practical. Supervised and trained staff for confined space entry may be necessary for inspections to access the type and amount of accumulated sediment and debris for determination of needed removal equipment. o Open Channels and Outfalls - Inspection shall observe and record the amount of accumulated sediment and debris. Based on the inspection results and the amount of sediment maintenance will be performed.	Annually
• **In Person Inspection of Vegetation:** o Open Channels and Outfalls - Inspector shall observe and record the amount of extensive (e.g. thick and dense reeds) and woody vegetation (e.g. willows) within the channel and outfall that is impacting the conveyance of the design flows and resulting in backflow and/or ponding of storm flows	Annually

within the channel. This vegetation will be associated with sediment accumulation. Vegetation management will be conducted as part of the sediment removal activities.	
• **In Person Inspection of Damage and Scouring:** o Underground Stormwater Diversions – Inspection shall include noting any damage or needed repair to diversion culvert, manholes, inlets and outfalls. o Open Channels and Outfalls - Inspector shall observe and record evidence of scouring of the outfall, channel bottom or side slopes that require maintenance. Maintenance and repairs shall be completed within the same year of the inspection results.	Annually
Maintenance Activities – Stormwater Diversions	**Suggested Frequency**
• **Removal of Accumulated Sediment:** o Underground Stormwater Diversions - Based on the annual inspections, sediment and debris accumulated within the underground culvert and transported for use as cover material at the Miramar Landfill. The need for accumulated sediment removal will be determined based on the depth of sediment and evidence of blockage or conditions that reduce the conveyance capacity of the culvert. o Open Channels and Outfalls - Based on the annual inspections, sediment and debris accumulated within the outfall and channel and transported for use as cover material at the Miramar Landfill. The need for accumulated sediment removal will be determined based on the depth of sediment and evidence of ponding and/or backflow.	2 times during 5-year Adaptive Management period based on inspections
• **Removal of Vegetation:** o Open Channels and Outfalls - Based on the annual inspections, extensive and woody vegetation within the outfalls and channels associated with sediment accumulation shall be removed as part of the sediment removal. Invasive plants that have established in the channel banks will also be removed.	2 times during 5-year Adaptive Management period based on inspections
• **Maintenance due to Damage:** o Underground Stormwater Diversions – Based on inspections, repair damage to diversion culvert, manholes, inlets and outfalls. o Open Channels and Outfalls - Based on the annual inspections, damage due to scouring from larger storm events shall be repaired to maintain system design function and capacity and control sediment migration to the salt marsh restoration.	Depends on inspection observations

3.4 Freshwater Management Channels

During the five-year adaptive management period, maintenance of Segments A and C of the freshwater conveyance channels will require select removal of accumulated sediment and control of vegetation (see Figure 1-8). Temporary maintenance access roads will be maintained during the Adaptive Management period for channel maintenance in Segment A and C (see Figure 1-7). Segment

A is from Floodplain Enhancement 2 to end of the Coastal Conservancy parcel where an existing hydraulic restriction will continue to promote sediment accumulation. Segment C is located from the non-tidal rehabilitation area just upstream of the grade control feature around the salt marsh restoration to where the freshwater management channel enters the tidal channel. In this segment sediment accumulation and the need to keep dry weather flows away from the non-tidal restoration area are a concern due to the known conversion and degradation of the habitats from coarse sediments and persistent freshwater flows. Further downstream in Segment C, as the freshwater management channel flows between the grade control feature and the railroad embankment, storm flow velocities are anticipated to increase due to the hydraulic constriction and could results in localized erosion and scouring under large storm event conditions. Channel banks along this downstream portion of Segment C will be stabilized with natural vegetation, and where needed, bioengineered bank reinforcement.

Segment B between these two segments is located within a wider floodplain (no hydraulic constrictions like Segment A that results in sediment accumulation) with existing isolated channels and predominantly freshwater wetland vegetation with some fragmented historical non-tidal salt marsh (not like Segment C that is within the large 14-acre non-tidal restoration). In the long-term this segment will be allowed to meander and braid as a natural channel to provide for a resilient freshwater marsh and riparian habitat. Maintenance of this segment is not anticipated and will rely on the use of cobbles to limit rapid growth of dense and woody vegetation. Construction access roads through Segment B will be removed and these areas restored after construction. Access to Segment B by maintenance vehicles and equipment will not be provided after construction. Should a significantly large storm event deposit sediment and debris within this segment impeding the conveyance of dry weather flows, emergency permits would be required for removal of these materials and any dense and woody vegetation within the channel.

Conveyance of dry weather flows is the key function of the freshwater channel in all these segments to allow the salt marsh restoration (both non-tidal and tidal) to establish. To maintain this function through all the segments, rounded cobbles will line the channel bottoms on all the segments (A and C as well) to provide a substrate that will retard the establishment of dense and woody vegetation that could reduce channel conveyance capacity. Riparian vegetation will be established outside of the conveyance channels banks to provide a continuous riparian corridor up to the limits of the new tidal influence.

Adaptive Management maintenance roads are located along Segment A and along the grade control features and railroad easement along Segment C. These maintenance access roads along Segment C will be removed and the areas restored with native vegetation following the Adaptive Management period. The access roads to Segment A will be removed and the habitat restored based on the monitoring of sediment accumulation and invasive plant management in this area. Focused sediment removal and invasive plant management may be needed into the long-term maintenance period due to the existing hydraulic restriction at downstream of this area. This O&M Plan will be updated based on the monitoring and assessment during the Adaptive Management period for the long-term maintenance of the project.

Type of equipment that is anticipated to be used includes backhoe, 1-2 dump/haul trucks, Bob Cat Loader and chipper. Maintenance activities for the freshwater management channels will be performed outside the bird nesting season.

Table 3-4 presents the inspection, maintenance activities and frequencies for the freshwater management channels.

Table 3-4: Inspections & Maintenance Activities & Frequencies – Freshwater Management Channels

Inspection Activities- Freshwater Management Channels	Suggested Frequency
• **In-Person Inspection of Freshwater Management Channels (Segments A, B and C) for Accumulated Sediment:** o Inspector shall observe and record the amount of accumulated sediment within the freshwater channels. Inspector shall note the extent and depth of accumulated sediment above the rounded cobble and evidence that the channel is not effectively conveying dry weather flows. This would be indicated by dry weather flows overtopping the channel and/or ponding of dry weather flows within the channel. Based on the inspection results and the amount of sediment observed, maintenance will be performed in Segments A and C.	Annually
• **In Person Inspection of Vegetation in Channels (Segments A and C):** o Inspector shall observe and record the amount of extensive (e.g. thick and dense reeds) and woody vegetation (e.g. willows) within each channel segment that is impacting the conveyance of dry weather flows and design storm flows resulting flows overtopping channels and ponding of dry weather and/or storm flows within the channel. This vegetation will be associated with sediment accumulation as these channels will have cobble at the channel base to slow the establishment of dense and woody vegetation and reduce maintenance. Vegetation management will be conducted as part of the sediment removal activities for Segments A and C.	Annually
• **In Person Inspection of Scouring (Segment C):** o Inspector shall observe and record evidence of scouring of the channel bottom or side slopes that require maintenance. Maintenance and repairs shall be completed within the same year of the inspection results.	Annually
Maintenance Activities – Freshwater Management Channels	**Suggested Frequency**
• **Removal of Accumulated Sediment:** o **Segments A & C**: Based on the annual inspections, sediment accumulated within the freshwater management channels within Segments A and C shall be removed and placed on Torrey Pines State Beach, if suitable, or used as cover material at the Miramar Landfill. The need for accumulated sediment removal will be determined based on the depth of sediment and evidence	1-2 times during 5-year Adaptive Management period based on inspections

of ponding of dry weather flows and/or dry weather flows not contained within the channel. o **Segment B:** No maintenance is anticipated for this segment unless a large significant storm deposits debris and sediment that restrict the conveyance of dry weather flows. An emergency permit would be required to access and maintain this segment.	
• **Removal of Vegetation:** o **Segments A & C**: Based on the annual inspections, extensive and woody vegetation within the channels associated with sediment accumulation shall be removed as part of the sediment removal. Evidence of dry weather ponding and overtopping of channel will determine need for vegetation management. Invasive plants that have established in the channel banks will also be removed.	1-2 times during 5-year Adaptive Management period based on inspections & as part of sediment removal
• **Maintenance due to Damage:** o **Segments A & C**: Based on the annual inspections, damage due to scouring from larger storm events shall be repaired to maintain system design function and capacity and control sediment migration to the salt marsh restoration.	Depends on inspection observations

3.5 Temporary Adaptive Management & Long-Term Maintenance Access Roads

Temporary Adaptive Management access roads will be maintained through this period as they will be used for maintenance access of key Project components necessary for the success and sustainability of the restoration. The Adaptive Management access roads will be inspected annually for damage from maintenance vehicle access and larger storm events. Inspections shall include observations and field notes on damage to the gravel aggregate road base and drainage management culverts and storm flow conveyance channels. Any damage reported during the annual inspections, will be prepared the same fiscal year. Following the Adaptive Management period, Adaptive Management roads will be removed, and the areas restored with native vegetation. Temporary Adaptive Management access roads to Segment A of the Freshwater Management channel may be retained into the Long-Term maintenance period depending on the observed sediment accumulation and invasive plant management required. All other Adaptive Management roads will be removed, and the habitat restored. These inspections will then be done on a less frequent basis with repairs as the Project moves into the Long-Term Maintenance period as there are less roads requiring maintenance.

3.6 Maintenance of Restored Areas

The Restoration Plan/HMMP has a detailed schedule and description of maintenance required during the habitat establishment period, following grading and plant installation. This maintenance includes general site maintenance (e.g., removal of trash), irrigation system maintenance, replacement

planting and seeding, pest management, and erosion control. In additional to these typical maintenance measures, the Restoration Plan/HMMP outlines an approach to adaptive management that is flexible and iterative and is directed over time by the results of ongoing monitoring activities and direct observation of environmental stressors that are producing adverse results within the restoration area. Individual environmental stressors are discussed in more detail in the Restoration Plan/HMMP and include herbivory, plant disease, and adverse hydrologic conditions.

An integral part of a successful long-term sustainability of restoration areas is early detection of problems, determining the cause(s) of those problems, and attempting to correct those problems so that the restoration area achieves its objectives and ecological performance standards. If annual performance guidelines are not met for any given year in the 5-year monitoring period and/or if restoration areas experience a significant unexpected problem, the Project biologist will prepare an analysis of the cause(s) of failure and will propose remedial actions in the annual report.

Adaptive management measures will use qualitative data gathered in the field prior to and throughout the monitoring period to assess aquatic functions and values, the effects of weeding maintenance, and the status of seed germination and cover within the restoration area. Following an event that causes damage to all or part of the restoration area, this data will be used to drive management considerations for the repair of the damaged areas. Achieving the key goals of the mitigation program and establishing a naturally functioning aquatic resource will be the focus of all adaptive management decisions.

If determined necessary, the Project biologist, in consultation with the City, will notify the regulatory agencies and prepare an analysis of the Project's problem(s) and propose remedial actions to correct the problems in order to meet the performance standards and success criteria at the end of the 5-year maintenance and monitoring period. The maintenance and monitoring obligations will continue and/or alternative contingency measures and interim performance standards will be negotiated until the regulatory agencies give final permit compliance/approval or approval for alternative compensation measures.

Following completion of permit compliance, it is expected that restoration area monitoring will be incorporated into the Peñasquitos Lagoon-wide Monitoring Program that is conducted by the National Estuarine Research Reserve in coordination with the California Department of Parks & Recreation. Adaptive management will continue in a manner consistent with State's management Natural Reserves. It is expected that with sea level rise and other climatic changes, that habitat composition may shift over time but management will aim to conserve native species and habitats through control of invasive species establishment or expansion.