

Environmental Impact Report / Environmental Impact Statement for the **San Elijo Lagoon Restoration Project**

**Final
SCH# 2011111013**



Prepared for:
U.S. Army Corps of Engineers
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Prepared for:
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Administered by:
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Encinitas, CA 92023-0634



**Volume 1 of 4
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READER'S GUIDE

BACKGROUND

A Draft Environmental Impact Report/Environmental Impact Statement (Draft EIR/EIS) for the San Elijo Lagoon Restoration Project (project) was circulated for public review in August 2014. Several federal, state, and local agencies; private organizations; and individuals submitted comment letters on the Draft EIR/EIS. A total of 39 comment letters and email comments were received by the County of San Diego (County) and the Army Corps of Engineers (Corps), including 23 letters from agencies and organizations and 16 letters from individuals. The County and the Corps prepared responses to all comments received during the public review period, which are included in the Final EIR/EIS as Appendix P, Public Comment Letters and Responses. After public review, the Draft EIR/EIS was revised in several places; either in response to public comments received or the project Applicant's, County's or Corps' desire to clarify a matter. In addition, refinements have been incorporated into Alternative 1B. The resulting Alternative 1B – Refined is described in text and figures in a Preface to the Final EIR/EIS, and potential impacts/benefits of this refined alternative are disclosed. The following provides an explanation of the modifications made to the Draft EIR/EIS.

DOCUMENT MODIFICATIONS

General Document Modifications

Issue 1

A Preface has been added to the document to describe and discuss the impacts of Alternative 1B – Refined, which was identified as the Preferred Alternative (CEQA) and preliminary Least Environmentally Damaging Practicable Alternative (NEPA) after public review of the Draft EIR/EIS. Consequently, all references to Alternative 2A as the proposed project have been removed from the document. Alternative 1B – Refined would be very similar to Alternative 1B as described in the Draft EIR/EIS, with the exception of specific refinements made to reduce impacts associated with the project, as described below. Overall, refinements would result in a grading decrease of approximately 28 acres at selected areas in the central and east basins. The extent of inundation would also be reduced under Alternative 1B – Refined by approximately 85 percent (110 acres), resulting in a substantial decrease in impacts to habitat. Impacts of Alternative 1B – Refined are the same as or less than those described for Alternative 1B, and are disclosed in detail in the Preface. As discussed in the Preface, these

changes do not result in identification of new significant environmental impacts, or a substantial increase in the severity of environmental impacts, nor has the applicant declined to adopt feasible mitigation or avoidance measures that would clearly lessen the environmental impacts of the project.

Overview of Modifications in Alternative 1B – Refined

Refinement	Resulting Reduction in Habitat Impacts
Reduced channels – Proposed channels reduced in size, where hydraulic capacity could be maintained to ensure drainage of freshwater flows and would allow tidal exchange. Reductions in channels specifically occurred in the east basin, removing one channel connection and reducing the main channel width.	Reduction of channels in the east basin preserves existing salt panne habitat east of the existing CDFW weir and high salt marsh habitat in the far east basin.
Reduced transitional area – The acreage of proposed transitional areas within the central and east basins reduced. Some transitional area is still proposed to supplement the lagoon's resiliency into the future under sea level rise.	Reduction of transitional areas decreases the conversion of jurisdictional wetland to upland. Specifically, the transitional area in the east basin was redesigned to avoid impacts to existing salt panne habitat east of the CDFW weir. Areas in the southern portion of the central basin were reduced in size to reduce impacts to mudflat and mid-marsh. Transitional habitat proposed in the refugia area in the northwest portion of the central basin was removed.
Reduced shallow grading/dredging – Shallow grading/dredging areas designed to create mudflat and low-marsh have been reduced by 28 acres, while maintaining sediment removal needed to address water quality concerns (eutrophication caused by soil nutrient accumulation).	Grading/dredging in salt marsh in the southern portion of the central basin has been reduced, resulting in a decrease in mudflat proposed, but decreased impacts to existing mid-marsh habitat. In the west basin, an area proposed for creation of low-marsh has been eliminated, reducing impacts to mudflat and surrounding mid-marsh.
Reduced size of overdredge pit – With the refinements above, and steepening of the side slopes from 5:1 to 3:1, the volume of the overdredge pit was reduced by approximately 25 percent and area reduced by 40 percent.	Reducing the size of the overdredge pit decreases potential impacts to existing and emergent low-marsh habitat in the central basin.
Reduced inundated area – Areas proposed for shallow grading/dredging would be graded by equipment that can construct in wet/soft conditions. Equipment would be restricted to the proposed limits of disturbance and would place removed sediment in channel areas that would be later dredged. Because dredging would be limited to channels, required water elevations would decrease and 85% less habitat would be inundated during construction.	Mortality of vegetation could occur in areas inundated for extended periods of time (more than 3 months). Reducing the extent and duration of inundation reduces mortality impacts to vegetation, as well as corresponding impacts to species that depend on that vegetation for nesting and foraging. Water would also be released intermittently, as recommended by the on-site biologist, enabling tidal exchange and circulation in the basin during construction. Intermittent release of water controls would allow tidal exchange in the basin under construction, similar to existing tide cycles. Because occasional tidal inundation would occur through construction, maintenance of lower than normal water levels would not be anticipated to result in additional effects to habitat or other resources. Post-construction recovery would also be enhanced because more habitats would remain intact during construction.

Issue 2

The California Environmental Quality Act (CEQA) significance thresholds in Section 3.16 Global Climate Change and Greenhouse Gas Emissions have been revised based on new guidelines from the County. The Draft EIR/EIS included thresholds recommended during development of the Climate Action Plan (CAP). The CAP is currently being revised by the County and is anticipated to be complete in 2017. As a result of the updates to the CAP, the County of San Diego Planning and Development Services issued the *Recommended Approach to Addressing Climate Change in CEQA Documents* in January 2015. These guidelines provided in this document are more conservative than those used in the Draft EIR (900 MT CO₂e instead of 2,500 MT CO₂e) and have been incorporated into the analysis for the Final EIR/EIS. This update does not constitute significant new information under CEQA Section 15088.5 because it does not encompass a change in the project, the environmental setting or related data, as described in CEQA Section 15088.5. The significance conclusion does not change from that disclosed in the Draft EIR/EIS.

Issue 3

In response to public comments and agency coordination, a generalized conceptual restoration plan has been added to the Final EIR/EIS as Appendix Q, Conceptual Restoration Plan. The addition of the Conceptual Restoration Plan does not constitute significant new information under CEQA Section 15088.5 because it merely clarifies and expands on information in the Draft EIR/EIS, as allowed under CEQA Section 15088.5.

Issue 4

Since release of the Draft EIR/EIS, additional information has become available regarding biological conditions in the lagoon. Review and analysis of the information consistent with CEQA Section 15088.5(a) is provided in Appendix R, Consideration of New Information under CEQA Section 15088.5(a). The CEQA-specific appendix documents reasons why this new available information does not necessitate recirculation of the Draft EIR.

Specific Document Modifications

Chapter 1.0 – Introduction

- Table 1-5 – Location of Required EIR Components, has been added.

Chapter 2.0 – Project Description

- Throughout Chapter 2: Discussion of existing water quality issues has been added.
- Throughout Chapter 2: Discussion of regional trends in wetland habitat changes has been added.
- Throughout Chapter 2: Discussion of changes to frequency of lagoon mouth opening since human intervention has been added.
- Throughout Chapter 2: Discussion of construction method impacts on soil characteristics has been added.
- Page 2-2: Discussion of historical habitat distribution and hydrology within the lagoon has been added.
- Section 2-11: Clarification regarding comprehensive construction monitoring program has been added.
- Table 2-17: Difference between existing and proposed habitat acreages has been added.
- Table 2-2: Discussion regarding LA-5's status as a currently approved ocean disposal site has been added.
- Table 2-20: Material placement capacities for offshore sites have been added as a footnote.
- Changes to Table 2-26:
 - Detail regarding inspection of construction equipment for invasive species has been added.
 - Detail added regarding potential for snowy plover nesting on beaches, as well as related monitoring requirements during materials placement, has been added.
 - Detail regarding preparation of a habitat enhancement plan has been added to PDF-21.
 - PDFs have been reorganized for clarity, and new numbering can be found in leftmost column.
 - Information regarding grunion monitoring has been added to PDF-57.

Chapter 3.0 – Affected Environment and Environmental Consequences

A number of other minor changes and clarifications have been made to Chapter 3, Affected Environment and Environmental Consequences. These changes reflect minor additions or clarifications and do not involve “significant new information” (with related explanations and/or references to additional discussion in other portions of the Final EIR/EIS provided where appropriate). These changes are in response to comments received during public review of the Draft EIR/EIS, as well as several of the previously noted design modifications. Clarification has also been added to some sections to identify how CEQA significance criteria were derived.

The following discussion addresses changes in the Final EIR/EIS to the following sections: 3.1 Land Use/Recreation; 3.2, Hydrology; 3.5, Geology/Soils; 3.6, Biological Resources; 3.10, Traffic, Access, and Circulation; 3.11, Air Quality; 3.16, Climate Change and Greenhouse Gas Emissions.

Section 3.1 – Land Use/Recreation

- Table 3.1-2: Conclusions have been added for each alternative.
- Page 3.1-38: Clarification regarding surfing impacts and benefits has been added.

Section 3.2 – Hydrology

- Throughout Section 3.2: Discussion has been added regarding historic changes in the condition of the lagoon mouth.
- Throughout Section 3.2: Discussion has been added about existing water quality issues within the lagoon, and the necessity of removing high-nutrient sediment to address those issues.
- Page 3.2-14: Additional description of drainage patterns and circulation from Alternative 2A has been incorporated.
- Page 3.2-15: Description of shortened flood duration under Alternative 2A has been added.
- Page 3.2-16: Discussion of increase in impervious area from Alternative 2A has been added.
- Page 3.2-28: Description of construction- and post-construction permit requirements has been added.

Section 3.5 – Geology/Soils

- Page 3.5-13: Clarification that Encinitas and Caltrans would be reviewing agencies for bridge design has been added.

Section 3.6 – Biological Resources

- Throughout Section 3.6: Information from monthly bird counts and discussion of nonlisted bird species have been included.
- Page 3.6-9: Percentages have been added for Primary Constituent Elements (PCEs) for California gnatcatcher.
- Page 3.6-34: Discussion of nonlisted migratory/wintering shorebirds has been added.

- Table 3.6-6: The difference in acreages between existing conditions and each project alternative has been added.

Section 3.10 – Traffic, Access, and Circulation

- Page 3.10-2: Mitigation measure Traffic-1 has been expanded to include submittal of traffic control plans to the City of Encinitas for approval.

Section 3.11 – Air Quality

- Clarifying language has been added to differentiate between CEQA and NEPA conclusions.

Section 3.16 – Climate Change and Greenhouse Gas Emissions

- Threshold for significance of greenhouse gas emissions under CEQA reduced from 2,500 to 900 MT CO₂e.
- Table 3.16-8 has been added to show projected 2065 habitat distribution with sea level rise for each alternative.

Chapter 5.0 – Cumulative Impacts

- Changes to Table 5-1:
 - Various projects have been added and/or updated in the cumulative impacts analysis, including the Storm Damage Reduction Project, Moonlight State Beach Lifeguard Tower, Olivenhain Trunk Sewer Project, San Dieguito W-19 Restoration Project, and ongoing Batiquitos Lagoon dredging.
 - Additional detail has been included regarding I-5 North Coast Corridor improvements within the lagoon.
 - Additional detail has been inserted regarding cultural impacts of LOSSAN rail corridor improvements within the lagoon.
- Additional discussion has been included throughout chapter regarding mitigation measures considered for significant cumulative impacts.

CONSIDERATIONS UNDER STATE CEQA GUIDELINES SECTION 15088.5(a)

Under CEQA (Section 15088.5), recirculation of an EIR is required when significant new information is added to an EIR after the availability of a draft EIR for public review, but prior to certification. Information can include changes in the project or environmental setting as well as

additional data or other information. However, new information added to an EIR is not considered significant unless the EIR is changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect. Per CEQA Guidelines “significant new information” that would necessitate recirculation can include a new significant environmental impact; a substantial increase in the severity of an environmental impact; a feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project’s proponents decline to adopt it; or the draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded. CEQA Guidelines (Section 15088.5 (b)) further clarifies that recirculation is not required where the new information added to the EIR merely clarifies or amplifies or makes insignificant modifications in an adequate EIR.

As shown in the list of changes made to the Final EIR, information added to the EIR was for the purpose of clarity, emphasis, and/or depth of discussion in response to public comment. Minor typographical errors or inaccurate wording were corrected, but these revisions were not of the nature or magnitude to result in changes to the analysis or conclusions of the EIR. Thus, based on CEQA Guidelines (Section 15088.5 (b)), these changes do not necessitate recirculation.

Per CEQA, “significant new information” that would necessitate recirculation also includes a feasible project alternative or mitigation measure considerably different from others previously analyzed that would clearly lessen the environmental impacts of the project, but the project’s proponents decline to adopt it. The Preface to the Final EIR provides a description of a refined Alternative 1B as the Preferred Alternative. Alternative 1B – Refined represents a refined Alternative 1B as presented in the Draft EIR and reflects further engineering design and modifications made in response to public comment. While Alternative 1B – Refined represents a feasible project alternative that would lessen environmental impacts, it is not considerably different from Alternative 1B as included in the Final EIR, rather it provides refinements based on less impactful construction methods and other enhancements made in response to public comments. A detailed comparison of Alternative 1B – Refined to Alternative 1B is provided in the Preface of this Final EIR/EIS. There are no new significant impacts associated with Alternative 1B – Refined. For these reasons, the inclusion of Alternative 1B – Refined as the Preferred Alternative in the Final EIR does not necessitate recirculation of the environmental document.

Based on the discussion above, the County of San Diego Board of Supervisors has determined that the changes made to the Draft EIR following public review do not constitute “significant new information” per CEQA Section 15088.5(a) and, therefore, recirculation of the Draft EIR/EIS is not required.

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PREFACE

The Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the San Elijo Lagoon Restoration Project (SELRP) did not identify a Preferred Alternative. The San Elijo Lagoon Conservancy (SELC), County of San Diego (County), and U.S. Army Corps of Engineers (Corps) chose to consider project impacts and public/agency input in the ultimate selection of a Preferred Alternative. Subsequent to release of the Draft EIR/EIS, and based upon input from the public plus local and regulatory agencies, Alternative 1B – Refined was developed and is identified as the Preferred Alternative by the SELC in this Final EIR/EIS. Alternative 1B – Refined has also been identified as the Preliminary Least Environmentally Damaging Practicable Alternative (LEDPA) by the Corps in the Draft 404(b)(1) Alternatives Analysis (Appendix O). Alternative 1B – Refined represents Alternative 1B with engineering and construction method refinements reflecting public comments and agency input (Figure P-1). These refinements would reduce the construction footprint and modify the construction method. Accordingly, impacts to existing and emergent habitats within the lagoon would be reduced, while still achieving project objectives (e.g., water quality improvements). This Preface provides the reader with project information about Alternative 1B – Refined and a disclosure of potential environmental impacts and benefits associated with the refined alternative compared to baseline conditions. Impacts are also compared to those described for Alternative 1B in Chapter 3 to confirm implementation of Alternative 1B – Refined would not result in any new significant or substantially adverse impacts.

DESCRIPTION OF REFINED ALTERNATIVE

OVERVIEW

As shown in Figure P-2 and Table P-1, Alternative 1B – Refined would be very similar to Alternative 1B with the following differences:

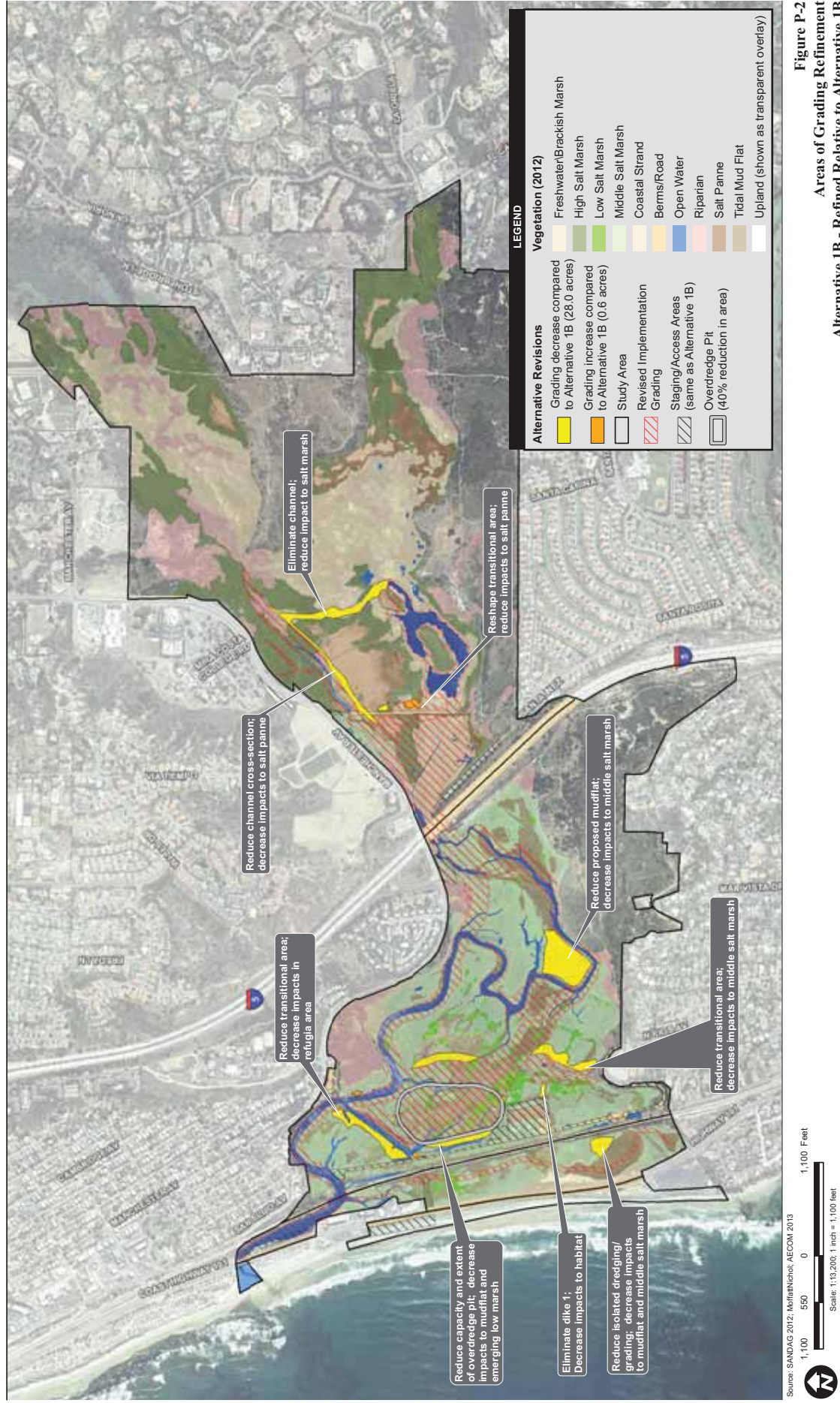
- Reduced channel widths and elimination of a proposed channel in the east basin.
- Reduction in created upland transitional areas in the central and east basins.
- Elimination of selected areas of shallow grading/dredging in the central and west basins, thereby retaining existing habitat at those locations.
- Reduction in the size of the overdredge pit via a smaller footprint and steepening the slopes, with less associated materials for beneficial reuse.

- Modified construction methods that would require less inundation (in both extent and duration).

This alternative would retain the following elements:

- A more stable and connected gradient of balanced habitat types would be created relative to existing conditions.
- Existing tidal inlet would remain and no cobble blocking features (CBFs) would be required at the inlet opening.
- Main tidal channel would be extended to the east basin and a mix of mudflats and secondary channels would be created south of the main channel in the central basin.
- Channel in the east basin would be enlarged and the California Department of Fish and Wildlife (CDFW) dike and weir would be removed.
- Existing Coast Highway 101 bridge structure would be armored against ongoing scour. In addition, the bridge would be seismically retrofitted by others.
- Bridge improvements at Interstate-5 (I-5) planned by the California Department of Transportation (Caltrans) would be implemented.
- Existing bridges at Coast Highway 101 and the North County Transit District (NCTD) would remain, but channels underneath would be deepened.
- Inlet and channel dimensions, and rock armoring, at all three crossings would be identical to Alternative 1B.
- Former sewage settling pond in the central basin would be capped with sand and topped with crushed shell for use as an avian nesting area.
- Reuse of beneficial materials in the nearshore and on-shore.
- Inlet maintenance, post-project, would occur annually.

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Table P-1
Overview of Refinements Incorporated into Alternative 1B – Refined

Refinement	Resulting Reduction in Habitat Impacts
Reduced channels – Proposed channels reduced in size, where hydraulic capacity could be maintained to ensure drainage of freshwater flows and allow tidal exchange. Reductions in channels specifically occurred in the east basin, removing one channel connection and reducing the main channel width from 275 to 180 feet.	Reduction of channels in the east basin preserves existing salt panne habitat east of the existing CDFW weir and high salt marsh habitat in the far east basin.
Reduced transitional area – The acreage of proposed transitional areas within the central and east basins reduced from 12 acres to 10. Some transitional area is still proposed to supplement the lagoon’s resiliency into the future under sea level rise.	Reduction of transitional areas decreases the conversion of jurisdictional wetland to upland. Specifically, the transitional area in the east basin was redesigned to avoid impacts to existing salt panne habitat east of the CDFW weir. Areas in the southern portion of the central basin were reduced in size to reduce impacts to mudflat and mid-marsh. Transitional habitat proposed in the refugia area in the northwest portion of the central basin was removed.
Reduced shallow grading/dredging – Shallow grading/dredging areas designed to create mudflat and low-marsh have been reduced by 28 acres, while maintaining sediment removal needed to address water quality concerns (eutrophication caused by soil nutrient accumulation).	Grading/dredging in salt marsh in the southern portion of the central basin have been reduced, resulting in a decrease in mudflat habitat, but decreased impacts to existing mid-marsh habitat. In the west basin, an area proposed for creation of low-marsh has been eliminated, reducing impacts to mudflat and surrounding mid-marsh.
Reduced size of over dredge pit – With the refinements above, and steepening of the side slopes from 5:1 to 3:1, the volume of the over dredge pit was reduced by approximately 25 percent and area reduced by 40 percent.	Reducing the size of the over dredge pit decreases potential impacts to existing and emergent low-marsh habitat in the central basin.
Reduced inundated area – Areas proposed for shallow grading/dredging would be graded by low-pressure equipment that can construct in wet/soft conditions. Equipment would be restricted to the proposed limits of disturbance, and would place removed sediment in channel areas that would be later dredged. Because dredging would be limited to channels, required water elevations would decrease and 85 percent less habitat would be inundated during construction.	Reducing the extent and duration of inundation reduces mortality impacts to vegetation, as well as impacts to species that depend on that vegetation for nesting and foraging. Impounded water would be released intermittently, as recommended by the on-site biologist, enabling tidal exchange and circulation in the basin during construction. Intermittent release of water controls would allow tidal exchange in the basin under construction, similar to existing tide cycles. Because occasional tidal inundation would occur through construction, maintenance of lower than normal water levels would not be anticipated to result in additional effects to habitat or other resources. Post-construction recovery would also be enhanced because more habitats would remain intact during construction.

Overall, refinements would result in a grading/dredging decrease of approximately 28 acres at selected areas in the central and east basins (shown in yellow in Figure P-2), and a slight increase in grading/dredging (0.5 acre) at an isolated location in the east basin (shown in orange in Figure P-2). The isolated increase is necessary to reshape the transitional area and reduce impacts to salt panne. There would be no additional species impacted by the increased grading/dredging at this location. The reduction in grading/dredging locations would occur in, or adjacent to, channels

and transitional areas to preserve existing habitats (including low-marsh, mid-marsh, and salt panne), as well as a reduction in the size of the overdredge pit. With the incorporation of these refinements, the extent of area affected by inundation would be decreased by approximately 110 acres, or 85 percent. Refinements reflect a tradeoff in minimizing impacts to existing and emergent habitat, while maintaining a project design that would still achieve the physical and water quality objectives of the project.

SPECIFICS

More detail about construction methods, habitat distribution, and materials removal/periodic maintenance is provided below.

Construction Methods

The modified construction approach under Alternative 1B – Refined would reduce inundation by utilizing low-pressure earth-moving equipment in areas proposed for shallow grading/dredging. For example, areas proposed to be lowered in elevation outside of channels (thus creating mudflats or low-marsh) would be graded by equipment designed to work within wetland soils (identified as areas of shallow grading/dredging in this discussion). This low-pressure earth-moving equipment would grade areas outside of channels and would have tracks specifically used to allow the equipment to remain on the surface of marsh sediments and minimize soil compaction during grading. Sediment removed during grading would be temporarily shifted to adjacent channels proposed for dredging. This activity would occur under relatively dry conditions rather than requiring inundation to float a dredge to modify the elevation in those areas.

Under the refined approach, the proposed dike system would be utilized to control water levels to maintain both dry and wet conditions (relative to existing), but at lower water elevations than previously proposed under Alternative 1B. After completion of grading, water levels would be increased to up to +1 foot National Geodetic Vertical Datum (NGVD) in the west basin, and up to +2 feet NGVD in the central and east basins, inundating areas primarily within channels. A cutterhead dredge would then remove both the sediment that was shifted using the low-pressure equipment and the excess channel sediment, and place both in the overdredge pit as described in Section 2.10.1 for Alternative 1B. Water controls would also be released intermittently, as recommended by the on-site biologist, enabling tidal exchange and circulation in the basin under construction. Impact areas associated with grading/dredging and inundation are shown in Figure P-3.

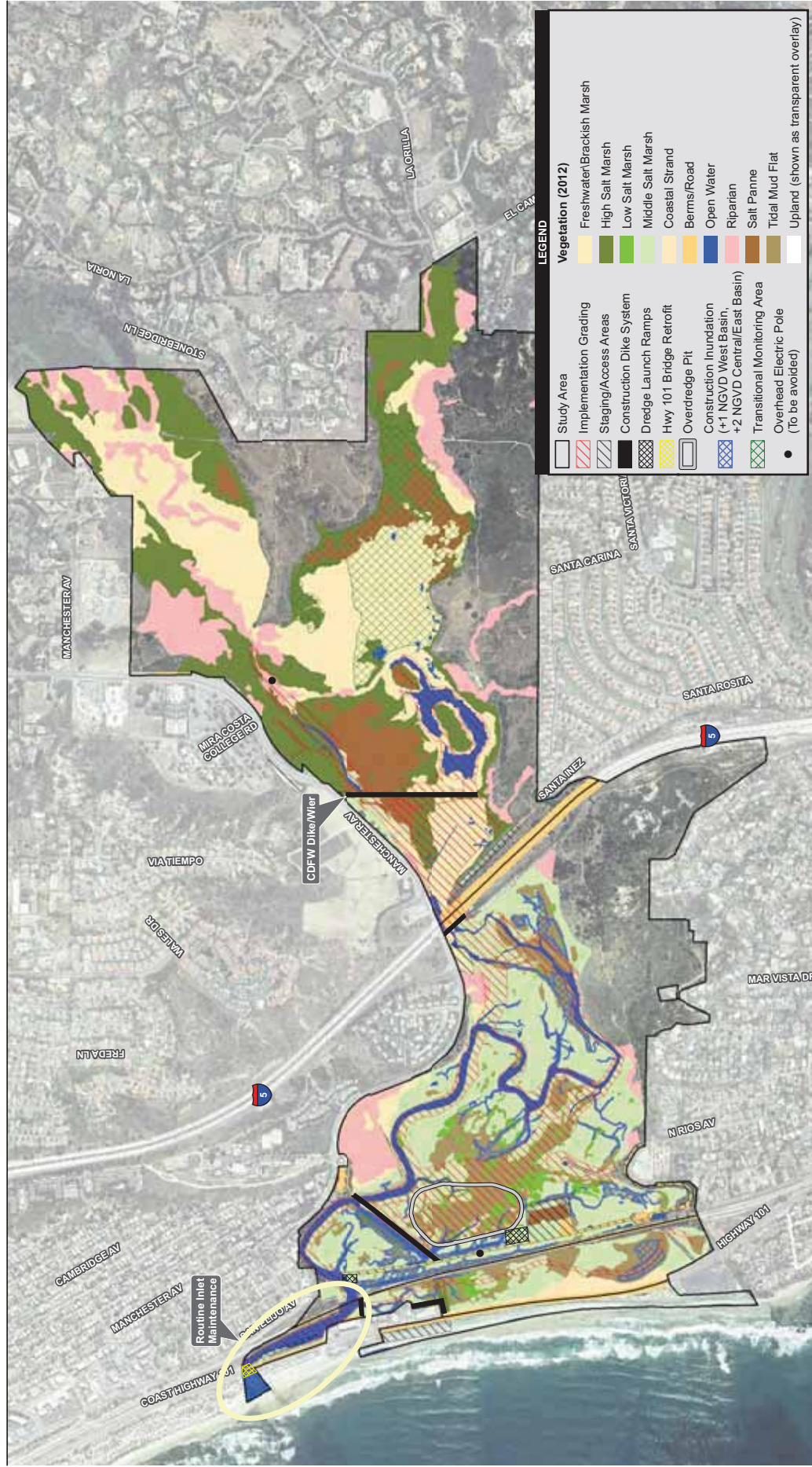


Figure P-3
Alternative 1B - Refined
Limits of Disturbance

Note: Alternative 1B - Refined would reduce inundation impacts by 85% compared to Alternative 1B. Approximately 20 acres would be inundated at different lines during construction compared to 130 acres under Alternative 1B.

Source: SANDAG 2012; Moffatt/Noel, AECOM 2013

Scale: 1:13,200; 1 inch = 1,100 feet

1,100 Feet

0

550

1,100

San Elijo Lagoon Restoration Project Final EIR/EIS

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Table P-2 outlines phasing and durations, constraints, and requirements for Alternative 1B – Refined compared to those described for Alternative 1B in the Draft EIR/EIS. The proposed dike system would be constructed to control water levels, but, rather than constructing primarily under inundated conditions, a mixture of dry and wet conditions (compared to existing conditions) would be used, with a smaller elevation range (-3 feet to +2 feet NGVD compared to a maximum inundation of +6 feet NGVD proposed under Alternative 1B). Grading would occur in areas proposed for shallow grading/dredging (e.g., mudflats and low-marsh adjacent to channels), while dredging would be limited to the creation of the overdredge pit and channels. Phasing to maintain lower than normal water levels (-3 feet NGVD) would enable shallow grading to be completed initially.

Resulting Habitat Distribution

The proposed habitat distribution for Alternative 1B – Refined would be influenced by the reductions in grading/dredging. Changes to the proposed habitat distribution are shown in Figure P-1, and resulting acreages for specific habitats are shown in Table P-3. The refined habitat distribution would provide a connected gradient of balanced habitat types in the lagoon, similar to Alternative 1B, although some ultimate acreages anticipated under Alternative 1B – Refined would be different (e.g., low-marsh would be reduced by 1 acre) due to less area being graded to provide for conversion of habitat from its existing configuration. Maintenance and adaptive management, as described in Section 2.11, would also be a part of the refined alternative.

Table P-3
Alternative 1B – Refined Habitat Distribution

Habitat Type	Habitat Distribution (acres)			Habitat Type	Habitat Distribution (acres)		
	Existing¹	Alternative 1B	Alternative 1B – Refined		Existing¹	Alternative 1B	Alternative 1B – Refined
Avian Nesting Areas	0	2	2	Open Water/Tidal Channels and Basins	40	67	63
Mudflat	63 ²	71	66	Riparian	72	67	67
Low-Marsh	13	51	50	Coastal Strand	5	5	5
Mid-Marsh	141	98	105	Upland & Others	299	295	295
High-Marsh	120	124	125	Beach	15	15	15
Salt Panne	37	30	32	Berms and Roads	23	24	24
Freshwater/Brackish Marsh	132	99	101	Transitional (man-made)	0	12	10

¹ Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.

² Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at an elevation for sustainable mudflat.

Source: Nordby and M&N 2012; M&N 2015

Table P-2
Construction Phasing for Alternative 1B – Refined

Phase 1		Phase 2		Phase 3		Phase 4	
Construction Activity	Reduction in Impacts	Construction Activity	Reduction in Impacts	Construction Activity	Reduction in Impacts	Construction Activity	Reduction in Impacts
Construct dike 2 in central basin and confirm/improve CDFW dike	Dike 1 no longer needed to maintain refugia.	Close dike 2 and maintain water elevation at +2 feet NGVD in central basin and west portion of east basin.	Dredging would be limited to channels, and water elevations would only be required to +2 ft. NGVD.	Maintain water elevation in east basin at -3 NGVD using dike 4 and lower CDFW dike 3.	Inundation of habitat minimized.	Build dike 5 and protective dike in west basin	Inundation of habitat minimized.
Launch dredge to create over dredge pit/discharge sand to materials placement sites (10 months).	Construction of the over dredge pit can occur concurrently with clear and grub and grading outside channels.	Dredge material from channels over 4 months and place in over dredge pit (550,000 cy).	Because of limited inundation, impacts to existing vegetation would be substantially reduced, and a much smaller area of planting would be needed.	Clear/grub east basin east of CDFW dike (30,000 cy).	Dredging would be limited to channels, and water elevations would be required to +2 ft. NGVD.	Close dike 5 to maintain water level at -3 feet NGVD.	
Clear/grub 25,000 cy vegetation from central basin grading area (3 months)/ export to disposal location.	Inundation of habitat minimized.	Construct central basin transitional areas.		Grade east basin outside of channels (3 months).		Clear/grub west basin (10,000 cy).	
Close dike 2 and maintain water elevation at -3 feet NGVD to allow grading outside of channels (3 months).		Clear and grub east basin between I-5 and CDFW dike (240,000 cy).		Elevate water level to +2 feet NGVD to dredge channel areas (700,000 cy) and place in over dredge pit (4 months).		Inundate to +1 ft. NGVD, dredge channel and place in over dredge pit, nest site, and/or littoral cell placement sites.	
Reopen dike 2 after grading, leaving lagoon open to tidal action while over dredge pit is completed.		Construct dike 4 under I-5 to enable control of water elevation in east basin during Phase 3.		Construct east basin transitional areas.		Lower dikes, leaving basin and rest of lagoon open to tidal action.	
Complete North Rios access road and staging/access area preparation.		Release dike 2 and open central basin to tidal action and recovery.		Lower dike 4 under I-5 and open east basin to tidal action and recovery.		Clear tidal inlet and channel to design dimensions.	

Note: Location of dikes shown in Figure 2-15. In Alternative 1B-Refined, Dike 1 is not needed, but numbering system remains as under Alternative 1B for comparison purposes.

MATERIALS REMOVAL AND PERIODIC MAINTENANCE

Alternative 1B – Refined would involve creation of an overdredge pit to allow for disposal of poor-quality material and to provide material suitable for reuse within the littoral zone. Approximately 920,000 cubic yards (cy) of material would be exported from the overdredge pit in the central basin for reuse. This is a decrease from the 1.2 million cy (mcy) originally identified for export under Alternative 1B, as shown in Table P-4. Activities associated with long-term maintenance and adaptive management are discussed in Section 2.11 of this EIR/EIS.

Table P-4
Alternative 1B Materials Removal and Periodic Maintenance

	Alternative 1B	Alternative 1B – Refined
Initial Amount of Material Removed	1.2 million cubic yards	920,000 cubic yards
Coastal Area	0 cubic yards	0 cubic yards
West Basin	50,000 cubic yards	50,000 cubic yards
Central Basin	400,000 cubic yards	450,000 cubic yards
East Basin	750,000 cubic yards	380,000 cubic yards
Estimated Post-construction Periodic Volume Removed	40,000 cubic yards	40,000 cubic yards
Estimated Post-construction Periodic Maintenance Frequency	Annually	Annually

Source: Nordby and M&N 2012, 2015

As shown in Table P-4, the greatest change in material removal associated with Alternative 1B- Refined would be in the east basin where one channel segment would be removed entirely and another reduced.

ENVIRONMENTAL CONSEQUENCES

Implementation of Alternative 1B – Refined would not result in any new significant environmental impacts, nor in impacts with severity substantially increased beyond that disclosed for Alternative 1B in the Draft EIR/EIS. For disclosure of anticipated impacts associated with the Preferred Alternative 1B – Refined, a brief discussion by issue area is provided below. Table P-8 is located at the end of this Preface and provides a summary of impacts under both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), mitigation measures, and an impact conclusion for each issue area discussed below. This discussion is derived from the information in Chapters 3 and 4 of this EIR/EIS and focuses on impacts and benefits that would result compared to baseline conditions and where impacts or benefits would differ between Alternative 1B and the Preferred Alternative 1B – Refined. It follows the same issue area order as Chapter 3. This Final EIR/EIS is a joint document prepared consistent with state and federal law and some conclusions vary between

CEQA and NEPA. Where conclusions under CEQA and NEPA differ, text is included to clarify when an impact is significant (under CEQA) or substantially adverse (under NEPA). The analysis also reflects project design features (PDFs) as described in Section 2.10 that are referenced in Chapter 3 as well as significance criteria that are defined explicitly in Chapter 3. Resource-specific acronyms are listed in the Index at the beginning of the document but are not redefined in this Preface. The reader is referred to the corollary section of Chapter 3.

The discussion of Alternative 1B – Refined in this resource analysis is focused on the lagoon restoration component of the SELRP; materials placement options would remain the same as discussed in Chapter 3 of the EIR/EIS and are not repeated here. There would be significant and/or substantial adverse impacts to noise associated with materials placement under Alternative 1B. These impacts would remain significant and substantially adverse. Overall, less quantity would be placed as part of the Alternative 1B – Refined approach, which could reduce noise impacts. Given that no single placement site would receive more material than identified in the Draft EIR/EIS, impacts associated with materials placement under Alternative 1B – Refined would not be more severe than those identified throughout Chapter 3.

LAND USE/RECREATION

No permanent conversion of lands to other uses would occur with implementation of Alternative 1B – Refined, and the project would not strain or conflict with surrounding land uses. Permanent and temporary impacts related to land use and recreation would remain the same as disclosed for Alternative 1B in Section 3.1.

HYDROLOGY

Temporary impacts to lagoon hydrology from implementation of Alternative 1B – Refined would be similar to those discussed for Alternatives 1B in Section 3.2. The construction approach would include controlled water levels in diked areas during grading/dredging activities, minimizing the release of turbidity to the ocean. Grading/dredging extent would be approximately 155 acres and 920,000 cy of material would be moved into the overdredge pit. Additionally, approximately 20 acres would be inundated. Long term inundation would result in vegetation mortality and potential for exposed soils and associated erosion. However, this would be approximately 27 acres less grading than Alternative 1B, 280,000 cy less material moved into the overdredge pit, and 85 percent less inundation area. Alternative 1B – Refined would have similar permanent or temporary impacts to hydrology, but would be slightly less as compared to Alternative 1B, as described in Section 3.2.

OCEANOGRAPHY/COASTAL PROCESSES

Alternative 1B – Refined would not result in substantial changes to beach erosion, the littoral system, risk of damage to coastal structures or maintenance frequency. Permanent and temporary impacts related to oceanography and coastal processes would remain the same as disclosed for Alternative 1B in Section 3.3

WATER AND AQUATIC SEDIMENT QUALITY

Refinements associated with Alternative 1B – Refined would result in less inundation, grading/dredging, and ground disturbance than described in Section 3.4, resulting in fewer temporary impacts to water quality due to the potential release of pollutants or sedimentation. Areas adjacent to channels identified for grading with low-pressure earth-moving equipment as part of the refinements made to Alternative 1B would minimize the potential for turbidity within the wetland. The extent of impounded areas would be reduced, with approximately 20 acres inundated, and could be maintained for a shorter duration than that identified in Section 3.4. Dredge equipment movement would provide mechanical circulation, promoting localized lagoon circulation and turnover during inundation. In addition, water would be released intermittently during periods of no construction, enabling periods of tidal exchange and circulation. Permanent and temporary impacts related to water and aquatic sediment quality, would remain the same, or less than, those disclosed for Alternative 1B in Section 3.4. Mitigation would reduce CEQA impacts to below a level of significance.

GEOLOGY/SOILS

Restoration activities and ongoing maintenance for Alternative 1B – Refined would require excavation of less material than discussed for Alternative 1B in Section 3.5. In total, approximately 920,000 cy would be removed from the lagoon basins and tidal channels. The extent of grading/dredging and other ground disturbance for Alternative 1B – Refined can be seen in Figure P-3.

The overdredge pit would be located 145 feet from the NCTD railroad embankment, as discussed for Alternative 1B. As discussed for in Section 3.5, however, even if the pit unexpectedly collapsed, the railroad embankment stability would be unaffected. The slopes would be steepened slightly (5:1 ratio) compared to the 3:1 ratio discussed in Section 3.5. If the overdredge pit slope were to become unstable during a strong earthquake, sufficient distance would exist between the overdredge pit and the railroad berm to preclude impacts to the berm from the overdredge pit (AECOM 2015). Permanent and temporary impacts related to geology and soils would remain the same as disclosed for Alternative 1B in Section 3.5.

BIOLOGICAL RESOURCES

Refinements associated with Alternative 1B – Refined would result in fewer biological resource impacts compared to those described for Alternative 1B in Section 3.6. A total of approximately 155 acres would be graded/dredged under Alternative 1B-Refined, compared to 181.9 acres under Alternative 1B. In areas where grading has been reduced, existing habitat would remain in place, thereby reducing temporary impacts to vegetation and species. In addition, reduced grading would provide for more invertebrate retention in the topsoil, reducing temporary impacts to foraging bird species. The extent of inundation under Alternative 1B – Refined would also be substantially reduced, with proportionally more of the work being completed “in the dry” by low-pressure earth-moving equipment instead of dredging in “wet” conditions. Approximately 20 acres of the lagoon would be inundated in phases with Alternative 1B-Refined, a reduction of 85 percent from the 130 acres of inundation identified under Alternative 1B in Section 3.6. As a result of these refinements, temporary direct impacts to habitat for Belding’s savannah sparrow (*Passerculus sandwichensis beldingi*) and light-footed Ridgway’s rail (*Rallus obsoletus levipes*) would be less than that discussed under Criterion C for Alternative 1B in Section 3.6. In addition to decreased impacts from reduced grading/dredging, the system would be expected to recover more quickly, since less habitat would be inundated and more habitat would remain intact with the incorporation of the refinements to Alternative 1B. Specifically, temporary impacts to Belding’s savannah sparrow nesting habitat were identified as significant and unavoidable (CEQA) and substantially adverse (NEPA) under Alternative 1B. With Alternative 1B – Refined, this impacted acreage would be reduced from 135.7 (52 percent) to 52.1 (20 percent), increasing available nesting habitat during construction (greater than 50 percent remaining available) and reducing the overall direct temporary impact to Belding’s savannah sparrow to less than significant (CEQA) and not substantially adverse (NEPA).

Similarly, temporary direct impacts to mid-marsh, low-marsh, and salt panne habitats were identified as significant under Criterion A for Alternative 1B. With Alternative 1B – Refined, this impact to mid-marsh would be reduced from 119.8 acres (85 percent) to 41.6 acres (29 percent), impacts to low-marsh would be reduced from 12.2 acres (92 percent) to 6.5 acres (49 percent), and impacts to salt panne would be reduced from 20.3 acres (55 percent) to 5 acres (14 percent), as shown in Figures P-2 and P-3. With this increase in available habitat (greater than 50 percent remaining available) during construction, temporary direct impacts to these habitats would be considered less than significant under Criterion A. Thus, for Alternative 1B – Refined, direct temporary impacts to suitable nesting habitat for Belding’s savannah sparrow, as well as low-marsh, mid-marsh, and salt panne vegetation communities would be considered less than significant under CEQA and not substantially adverse under NEPA. Significant temporary impacts to open water and tidal mudflats would remain higher than 50 percent and would still be considered significant under CEQA and substantially adverse under NEPA for Criterion A.

Post-restoration habitat distribution for the refined alternative is provided in Table P-3. Temporary impacts to threatened and endangered species from Alternative 1B – Refined (shown in Figure P-4, Figure P-5, and Table P-5), as well as the permanent change in nesting and foraging habitats for threatened and endangered species (Table P-6) are shown as well. Other than described above, permanent and temporary impacts related to biological resources would remain the same as disclosed for Alternative 1B in Section 3.6. No feasible mitigation is available to reduce impacts to below a level of significance, as described in Section 3.6.

CULTURAL RESOURCES

There are known cultural resources in proximity to access roads proposed for use during construction of the SELRP. Project design features are included to minimize potential for accidental disturbance, but potential impacts are considered significant. Alternative 1B – Refined would result in impacts to cultural resources as disclosed for Alternative 1B in Section 3.7. Mitigation would reduce CEQA impacts to below a level of significance.

PALEONTOLOGICAL RESOURCES

Project-related ground-disturbing activities would occur only in subsurface layers in areas generally underlain by alluvial deposits that are assigned a low paleontological resource sensitivity. As described in Section 3.8, the proposed access road extending from North Rios Avenue is potentially underlain by the Delmar Formation; surface grading in the area could disturb the underlying sensitive formation. Permanent and temporary impacts related to paleontological resources would remain the same as disclosed for Alternative 1B in Section 3.8. Mitigation would reduce CEQA impacts to below a level of significance.

VISUAL RESOURCES

Construction of Alternative 1B – Refined would be similar to that described for Alternative 1B in Section 3.9 in that construction equipment would be visible in various parts of the lagoon for earthmoving/dredging; however, slightly less area would be graded/dredged (approximately 155 acres). Although there would be slightly less contrast with the refinements made to Alternative 1B, impacts under Criteria A and B would continue to be significant under CEQA and substantially adverse under NEPA because of the multi-year duration of construction and the extent of lagoon modification. Permanent and temporary impacts related to visual resources would remain the same as disclosed for Alternative 1B in Section 3.9. Available mitigation measures would be implemented, but impacts would remain significant and unavoidable.

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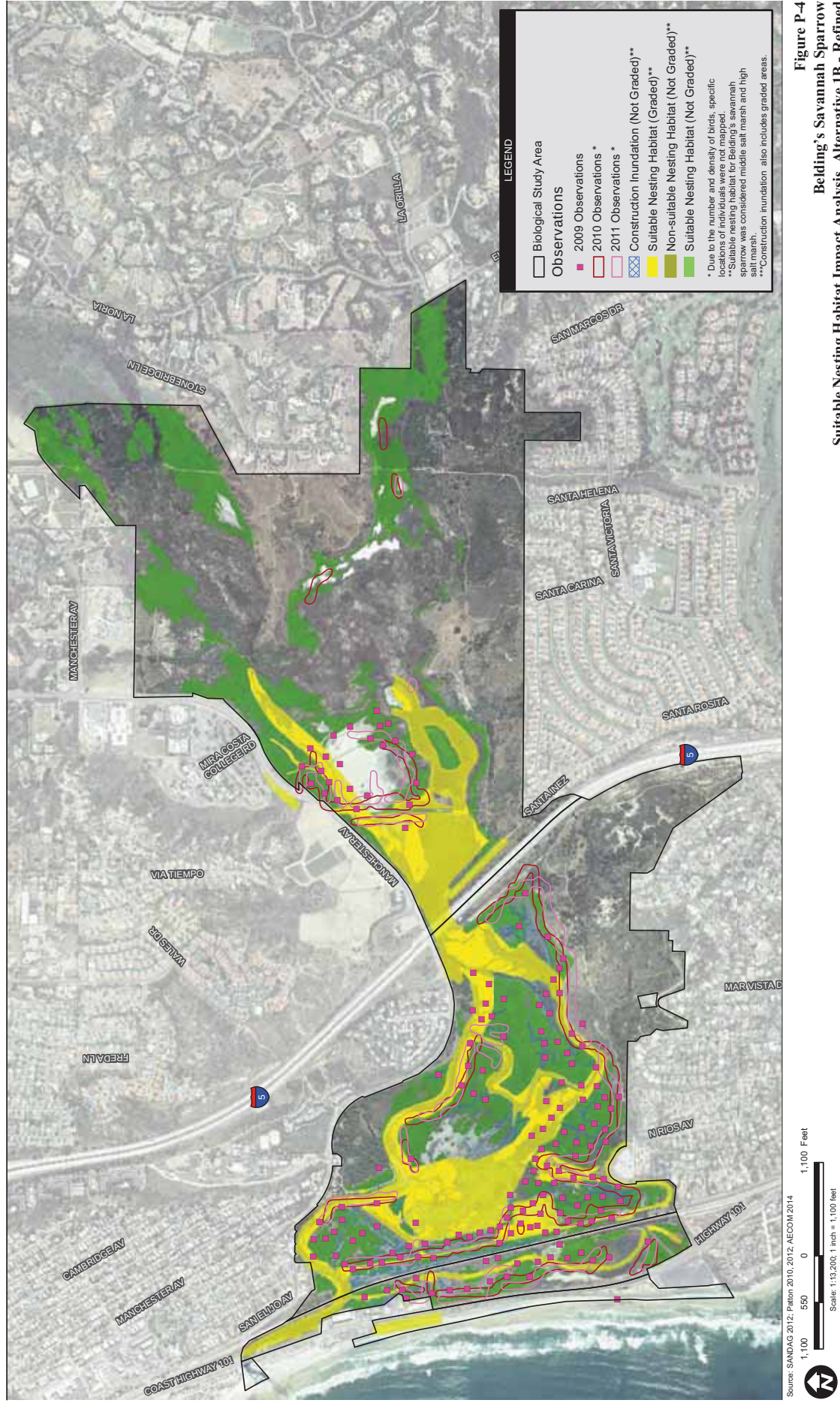


Figure P-4
Belding's Savannah Sparrow
Suitable Nesting Habitat Impact Analysis, Alternative 1B - Refined

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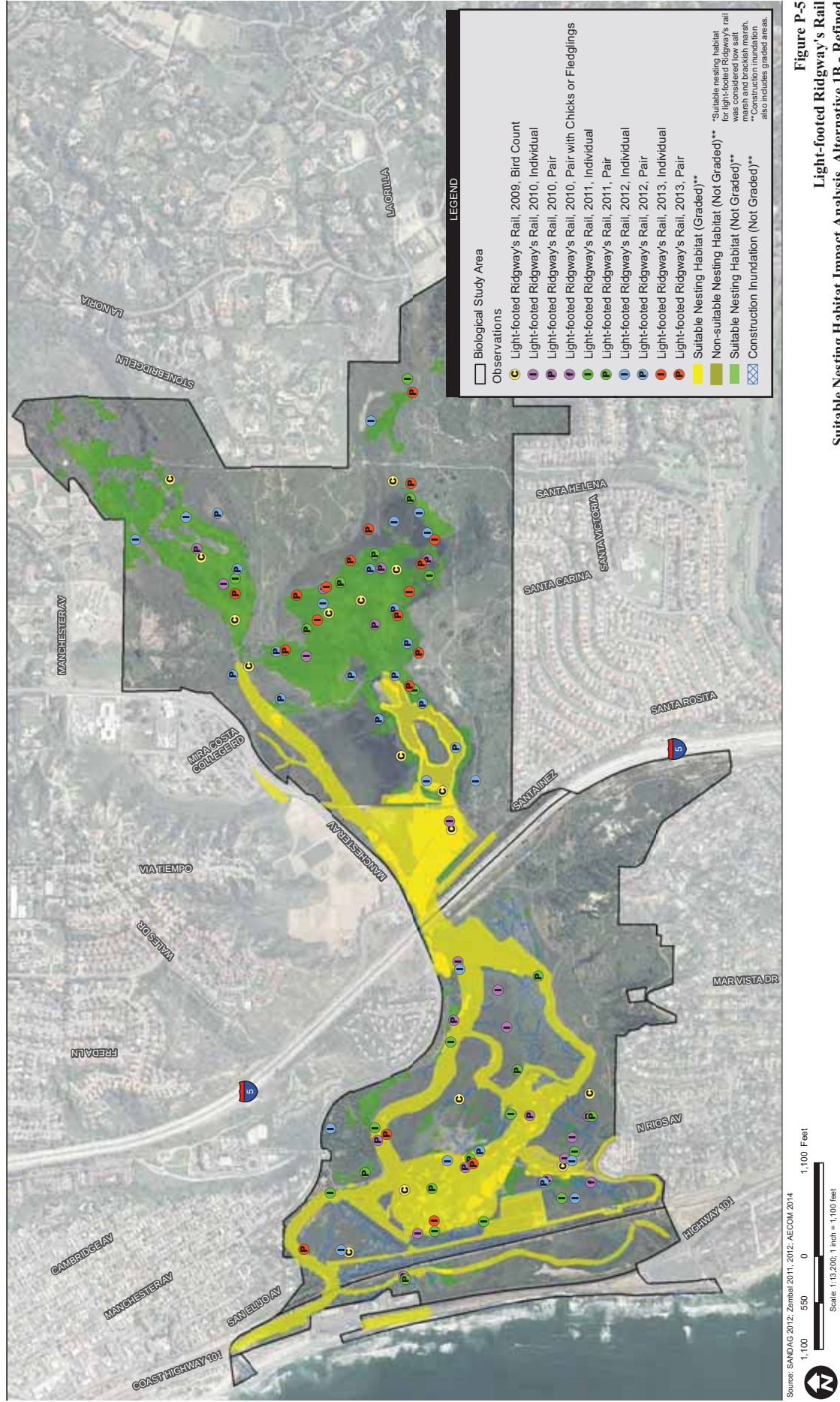


Figure P-5
Light-footed Ridgway's Rail
 Suitable Nesting Habitat Impact Analysis, Alternative 1B - Refined

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Table P-5
Alternative 1B – Refined Impacts to Suitable Habitat for Listed Bird Species

Species	Habitat Suitability*	Habitat Type	Existing Habitat	Direct Impact to Existing Habitat		Inundation Direct Impact to Existing Habitat		Total Direct Impact to Existing Habitat	
			Acres	Percent	Acres	Percent	Acres	Percent	Total Acres
light-footed Ridgway's rail	Nesting/Foraging	Coastal Brackish Marsh	131.5	21.5	16%	0.0	0%	21.5	16%
		Coastal Salt Marsh – Low	13.3	5.9	44%	0.6	5%	6.5	49%
		Total Nesting	144.8	27.4	19%	0.6	0%	28.0	19%
	Foraging	Mudflats	63.1	27.4	43%	11.5	18%	38.9	62%
		Coastal Salt Marsh – Mid	141.4	40.1	28%	1.5	1%	41.6	29%
		Coastal Salt Marsh – High	120	10.5	9%	0.0	0%	10.5	9%
California least tern	Nesting	Total Foraging	324.5	78.0	24%	13.0	4%	91.0	28%
		Salt Panne	36.9	5.0	14%	0.0	0%	5.0	14%
		Coastal Strand	5	0.0	0%	0.0	0%	0.0	0%
	Foraging	Nesting Area**	0	0.0	0%	0.0	0%	0.0	0%
		Total Nesting	41.9	5.0	12%	0.0	0%	5.0	12%
		Subtidal/Channels	40.1	30.9	77%	5.6	14%	38.8	97%
western snowy plover	Nesting	Beach	15	2.1	14%	0.2	1%	2.3	16%
		Total Foraging	55.1	33.1	60%	5.8	11%	41.2	75%
		CDFW Dike	0.4	0.4	100%	0.0	0%	0.4	100%
	Foraging	Salt Panne	36.9	5.0	14%	0.0	0%	5.0	14%
		Coastal Strand	5	0.0	0%	0.0	0%	0.0	0%
		Nesting Area**	0	0.0	0%	0.0	0%	0.0	0%
coastal California gnatcatcher	Nesting/Foraging	Total Nesting	42.3	5.4	13%	0.0	0%	5.4	13%
		Mudflats	63.1	27.4	44%	11.5	18%	38.9	62%
		Beach	15	2.1	14%	0.2	1%	2.3	16%
	Foraging	Total Foraging	78.1	29.7	38%	11.7	15%	41.2	53%
		Diegan Coastal Sage Scrub	178.1	3.0	2%	0.0	0%	3.0	2%
		Diegan Coastal Sage Scrub/Chaparral	49.3	0.0	0%	0.0	0%	0.0	0%
least Bell's vireo	Nesting/Foraging	Coyote Bush Scrub	7.5	0.0	0%	0.0	0%	0.0	0%
		Total Nesting/Foraging	234.9	3.0	1%	0.0	0%	3.0	1%
		Sandbar Willow Scrub	9	0.0	0%	0.0	0%	0.0	0%
	Nesting/Foraging	Southern Willow Scrub	61.4	2.1	3%	0.0	0%	2.1	3%
		Total Nesting/Foraging	70.4	2.1	3%	0.0	0%	2.1	3%
		Southern Willow Scrub	61.4	2.1	3%	0.0	0%	2.1	3%
southwestern willow flycatcher	Nesting/Foraging	Total Nesting/Foraging	61.4	2.1	3%	0.0	0%	2.1	3%
		Coastal Salt Marsh – Mid	141.4	40.1	28%	1.5	1%	41.6	29%
		Coastal Salt Marsh – High	120	10.5	9%	0.0	0%	10.5	9%
	Nesting	Total Nesting	261.4	50.6	19%	1.6	1%	52.1	20%
		Coastal Salt Marsh – Low	13.3	5.9	44%	0.6	5%	6.5	49%
		Total Foraging	13.3	5.9	44%	0.6	5%	6.5	49%

Table P-6
Alternative 1B – Refined Existing and Post-Construction Acreage of Suitable Habitat for Listed Bird Species

Species	Habitat Suitability*	Habitat Type	Existing Habitat Acres	Habitat Acreage Post-Restoration	Net Change in Habitat Acreage Post-Restoration	Alternative 1B – Refined Percent Change Post-Restoration	Alternative 1B Percent Change Post-Restoration (from Table 3.6-11)
light-footed Ridgway’s rail	Nesting/Foraging	Coastal Brackish Marsh	131.5	101	-30.5	-23%	-25%
		Coastal Salt Marsh – Low	13.3	50	36.7	276%	283%
	Foraging	Total Nesting	144.8	151	6.2	4%	4%
		Mudflats	63.1	66	2.9	5%	13%
		Coastal Salt Marsh – Mid	141.4	105	-36.4	-26%	-31%
California least tern	Nesting	Coastal Salt Marsh – High	120	125	5	4%	3%
		Total Foraging	324.5	296	-28.5	-9%	-10%
		Salt Pannes	36.9	32	-4.9	-13%	-19%
	Foraging	Coastal Strand	5	5	0	0%	0%
		Nesting Area**	0	2	2	200%	200%
Total Nesting		41.9	39	-2.9	-7%	-12%	
western snowy plover	Nesting	Subtidal/Channels	40.1	63	22.9	57%	67%
		Beach	15	15	0	0%	0%
		Total Foraging	55.1	78	22.9	42%	49%
	Foraging	CDFW Dike	0.4	0	-0.4	-100%	-100%
		Salt Pannes	36.9	32	-4.9	-13%	-19%
Coastal Strand		5	5	0	0%	0%	
coastal California gnatcatcher	Nesting/Foraging	Nesting Area**	0	2	2	200%	200%
		Total Nesting	42.3	39	-3.3	-8%	-13%
		Mudflats	63.1	66	2.9	5%	13%
	Foraging	Beach	15	15	0	0%	0%
		Total Foraging	78.1	81	2.9	4%	10%
least Bell’s vireo	Nesting/Foraging	Diegan Coastal Sage Scrub	178.1	173.6	-4.5	-3%	-3%
		Diegan Coastal Sage Scrub/Chaparral	49.3	49.3	0	0%	0%
		Coyote Bush Scrub	7.5	7.5	0	0%	0%
	Nesting/Foraging	Total Nesting/Foraging	234.9	230.4	0	0%	-2%
		Sandbar Willow Scrub	9	9	0	0%	-1%
southwestern willow flycatcher	Nesting/Foraging	Southern Willow Scrub	61.4	59.1	-2.3	-4%	-5%
		Total Nesting/Foraging	70.4	68.1	-2.3	3%	-4%
		Southern Willow Scrub	61.4	59.1	-2.3	-4%	-5%
	Nesting	Coastal Salt Marsh – Mid	141.4	105	-36.4	-26%	-31%
		Coastal Salt Marsh – High	120	125	5	4%	3%
Belding’s savannah sparrow	Foraging	Total Nesting	261.4	230	-31.4	-12%	-15%
		Coastal Salt Marsh – Low	13.3	50	36.7	276%	283%
		Total Foraging	13.3	50	36.7	276%	283%

TRAFFIC, ACCESS, AND CIRCULATION

Construction traffic operations discussed for Alternative 1B in Section 3.10 would remain the same with the refinements associated with Alternative 1B – Refined. Specific trip generation numbers for each alternative may vary but would not be in excess of those analyzed in Section 3.10. Therefore, the discussions of street segment operations and intersection operations in Section 3.10 would also be applicable to Alternative 1B – Refined. Permanent and temporary impacts related to traffic, access, and circulation associated with Alternative 1B – Refined would remain the same as those disclosed for Alternative 1B in Section 3.10. Available mitigation measures would be implemented, but impacts would remain significant and unavoidable.

AIR QUALITY

As described in Section 3.11, construction of Alternative 1B – Refined would primarily involve dredging and off-road equipment operations, although slightly less material would be graded/dredged than originally discussed for Alternative 1B (a total of 920,000 cy). Proportionally more of this work would be completed with low-pressure earth-moving equipment (e.g., swamp dozers) rather than a dredge. The swamp dozers would likely range from 200 to 400 horsepower (hp) compared to the assumptions made for dredges (i.e., greater than 2000 hp) in Section 3.11. Assuming similar hours of operation and equipment model years, this revised equipment approach would not result in substantially increased emissions. Emissions may decrease slightly due to the decrease in intensity of equipment and overall sediment volume removal required. Permanent and temporary impacts to air quality associated with Alternative 1B – Refined would remain similar to those disclosed for Alternative 1B in Section 3.11. Available mitigation measures would be implemented, but CEQA impacts would remain significant and unavoidable.

NOISE

Grading/dredging and other construction noise and vibration associated with Alternative 1B – Refined would be as described in Section 3.12. Although slightly less material would be graded/dredged (920,000 cy), proportionally more of the work would be completed with low-pressure earth-moving equipment compared to a dredge under Alternative 1B – Refined. Noise from that equipment would be similar to noise generated by earth-moving equipment identified in Section 3.12; therefore, as described in that section, noise levels would not exceed the 75 dBA $L_{eq}(8)$ construction noise level limit established by the cities or County. Temporary noise impacts associated with Alternative 1B – Refined would remain similar to those disclosed for Alternative 1B in Section 3.12. No mitigation is available to reduce CEQA impacts to below a level of significance, as described in Section 3.12.

SOCIOECONOMICS/ENVIRONMENTAL JUSTICE

The impacts of Alternative 1B – Refined on existing regional population and associated housing, employment rates, and regional economy would remain unchanged from those described in Section 3.13. Permanent and temporary noise impacts related to socioeconomics and environmental justice under Alternative 1B – Refined would remain the same as those disclosed for Alternative 1B in Section 3.13.

PUBLIC SERVICES AND UTILITIES

As discussed in Section 3.14, restoration activities within the lagoon for Alternative 1B – Refined would require the grading/dredging, removal, and backfill of large quantities of material. The quantity of material associated with Alternative 1B – Refined would be 920,000 cy, which is reduced from approximately 1.2 mcy under Alternative 1B. The nature of these construction activities would not require substantial use of public utilities and would not result in the development of the types of facilities that could result in the need for new systems, supply, or infrastructure. There would be no substantial increase in the amount of construction debris, and no additional strain would be placed on County landfill facilities. Permanent and temporary impacts to public services and utilities associated with Alternative 1B – Refined would remain the same as those disclosed for Alternative 1B in Section 3.14.

HAZARDOUS MATERIALS AND PUBLIC SAFETY

Habitat distributions under Alternative 1B – Refined would include an increase in open water areas/tidal channels (63 acres proposed) and mudflat habitat (66 acres proposed) within the lagoon compared to existing conditions (40 and 63 acres, respectively). Most of the increase in open water/tidal channels and mudflat habitat would occur in the central and east basins. Conditions during and after construction are anticipated to be better for mosquito control than under current conditions. Implementation of Alternative 1B – Refined would facilitate the control of vectors at the lagoon and reduce the public health and safety risk associated with vector-borne diseases. Permanent and temporary impacts related to hazardous materials and public safety associated with Alternative 1B – Refined would remain similar to those disclosed for Alternative 1B in Section 3.15. Mitigation would reduce CEQA impacts to below a level of significance.

GLOBAL CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

Construction emissions for Alternative 1B are disclosed in Section 3.16, and construction emissions under Alternative 1B – Refined would be incrementally less as discussed above under Air Quality. San Elijo Lagoon will be subject to climate change regardless of the alternative

implemented. Alternative 1B – Refined would include areas of 10 acres of higher elevation (e.g., man-made transitional areas) intended to transition from upland to wetland under sea level rise. As conversion occurs, habitat distribution within the lagoon would shift in a slightly different way than discussed in Section 3.16, due to differences in post-restoration habitat distributions. Table P-7 identifies predicted habitat distributions under Alternative 1B – Refined by year 2065, assuming a sea level rise of 2 feet. This predicted distribution is relatively speculative, however, as it accounts for only sea level rise, which is one of many anticipated components of climate change. Other trends, such as changes in rainfall and weather patterns, are extremely difficult to predict and are not considered in this projected future habitat distribution.

Table P-7
Approximate Future Habitat Distribution (2065) under Sea Level Rise

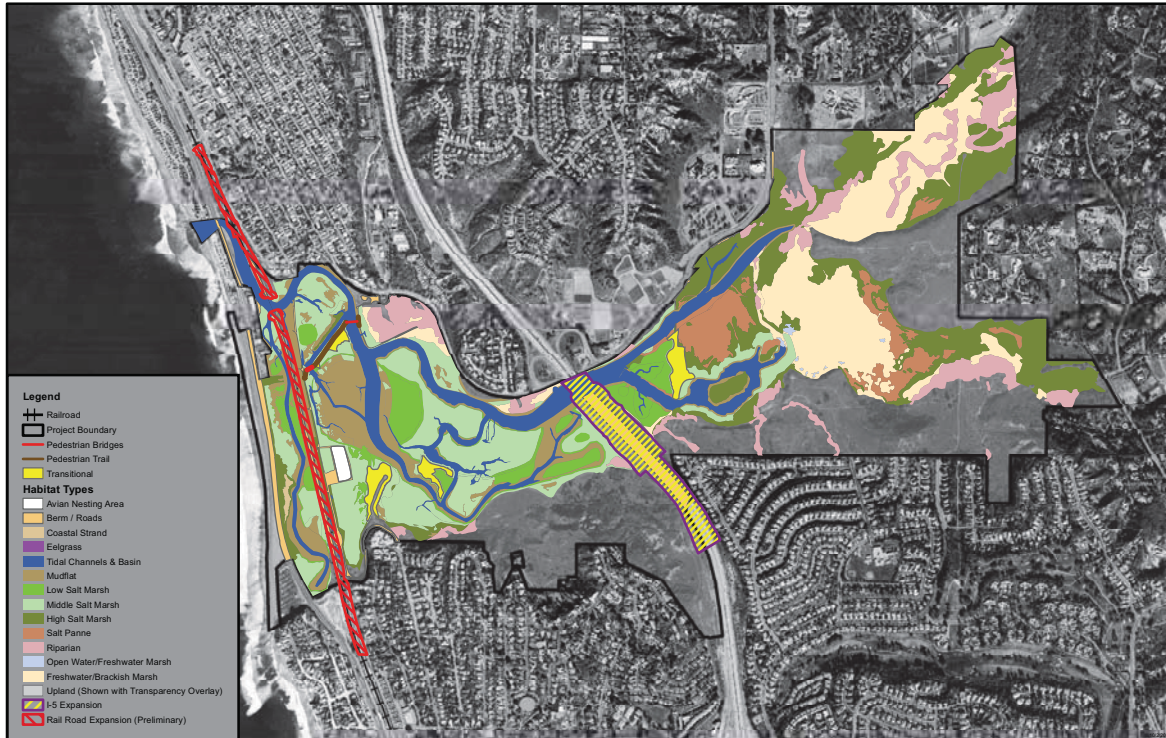
Habitat Type	Alternative 1B (Acres)		Alternative 1B – Refined (Acres)		No Project/ No Federal Action (Acres)	
	Post-Restoration	2065	Post-Restoration	2065	Equilibrium	2065
Avian Nesting Areas	2	2	2	2	0	0
Mudflat	71	147	66	152	29	161
Low-Marsh	51	75	50	82	51	55
Mid-Marsh	98	77	105	73	107	69
High-Marsh (Tidal)	44	36	45	42	47	24
High-Marsh (Non-Tidal)	80	67	80	67	120	107
Salt Panne	30	2	32	2	37	5
Freshwater/Brackish Marsh	99	64	101	64	131	87
Open Water/Tidal Channels and Basins	67	94	63	82	24	48
Riparian	67	55	67	55	71	60
Coastal Strand	5	1	5	1	5	1
Upland & Others	295	301	295	301	299	304
Beach	15	15	15	15	15	15
Berms and Roads	24	23	24	23	23	23
Transitional (man-made)	12	1	10	1	0	0
Subtotal – Tidally Influenced Area ¹	331	429	329	431	258	357
Subtotal – Non-Tidally Influenced Area ²	629	531	631	531	710	611
Total Area ³	960	960	960	962	960	960

¹ Tidally influenced areas include open water/tidal channels and basins, mudflat, low-marsh, mid-marsh, and high-marsh (tidal).

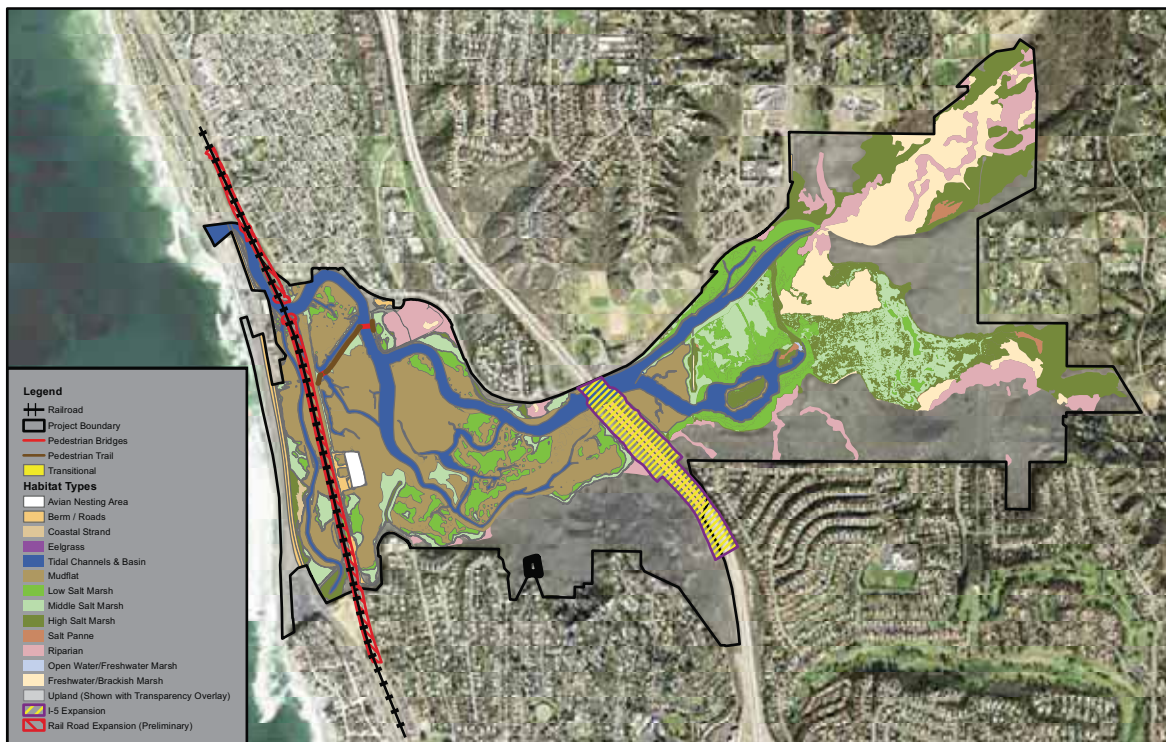
² Non-tidally influenced areas include avian nesting area, high-marsh (non-tidal), salt panne, freshwater/brackish marsh, riparian, coastal strand, upland and others, beach, berms and roads, and transitional (man-made).

³ Totals may not add due to rounding.

Figure P-6 illustrates the generalized habitat distribution change over time (from existing conditions to 2065) with sea level rise. Permanent and temporary impacts related to global climate change and GHG emissions under Alternative 1B – Refined would remain similar to those analyzed for Alternative 1B in Section 3.16. Available mitigation measures would be implemented, but CEQA impacts would remain significant and unavoidable.



Modeled Post-Restoration Conditions



Modeled 2065 Conditions



Figure P-6
Alternative 1B - Refined Generalized Habitat Distribution with Sea Level Rise

CUMULATIVE IMPACTS

In compliance with CEQA and NEPA Guidelines, Chapter 5 identified potential cumulative impacts that could occur from the incremental effects of implementation of the SELRP. As discussed in Chapter 5 for Alternative 1B, Alternative 1B – Refined would have significant cumulative impacts to biological resources, visual resources, traffic, air quality, noise, and global climate change and GHG emissions under CEQA. Substantial cumulative adverse effects (NEPA) would result for biological resources, visual resources, and traffic. The reduction in inundation, graded/dredged area, and associated materials to be disposed would have incrementally less contribution to these significant cumulative impacts, but would not eliminate them entirely. The same is true for cumulative adverse impacts.

SUMMARY OF ENVIRONMENTAL EFFECTS

Table P-8 presents a summary of the environmental impacts that would result from Alternative 1B and Alternative 1B – Refined, required mitigation measures, and CEQA level of significance after implementation of mitigation.

Table P-8
Summary of Environmental Effects

	Alternative 1B	Alternative 1B - Refined	Mitigation Measure	CEQA Level of Significance after Mitigation
Land Use and Recreation				
<i>Lagoon Restoration</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
Hydrology				
<i>Lagoon Restoration</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	No impact	No impact	None required	N/A
Oceanography/ Coastal Processes				
<i>Lagoon Restoration</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
Water and Aquatic Sediment Quality				
<i>Lagoon Restoration</i>	CEQA: Because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging operations would be considered a potentially significant impact. NEPA: Not substantially adverse	CEQA: Because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging operations would be considered a potentially significant impact. NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 1B and Alternative 1B - Refined.</i> Water Quality – 1: All additional conditions, BMPs, and requirements that are identified by regulatory agencies prior to project initiation as part of the permitting process for the project, including Section 404 permit, Coastal Development Permit, Section 1601 permit, Section 401 Water Quality Certification, and the NPDES MS4 permit must be implemented. Compliance with those permit conditions would be monitored through the construction monitoring program and the contractor shall certify to the engineer of record that they have been completed. Water Quality – 2: Turbidity levels shall be actively managed by using a cutterhead dredge and/or temporarily closing the lagoon inlet. The over dredge pit shall be capped with sand material to encapsulate material and prevent it from introducing turbidity or pollutants into the water column or released into the environment. The contractor shall certify to the permit holder that the dredge operations are not responsible for release of sediments into the water column at levels resulting in increased downstream sedimentation.	CEQA: Less than significant
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A

	Alternative 1B	Alternative 1B - Refined	Mitigation Measure	CEQA Level of Significance after Mitigation
Geology and Soils				
<i>Lagoon Restoration</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
Biological Resources				
<i>Lagoon Restoration</i>	CEQA and NEPA: Construction would result in greater than 50 percent temporal loss of sensitive habitats including coastal salt marsh (low- and mid-), open water, salt panne/open water, and tidal mudflats and a significant and substantially adverse short-term direct impact and cumulative impact would result. CEQA and NEPA: Belding's savannah sparrow is a year-round resident that would experience temporary loss of greater than 50 percent of their nesting habitat. This would result in a significant and substantially adverse short-term direct impact result.	CEQA and NEPA: Construction would result in greater than 50 percent temporal loss of sensitive habitats including open water and tidal mudflats and a significant and substantially adverse short-term direct impact and cumulative impact would result. CEQA: Less than significant NEPA: Not substantially adverse.	<i>Required for Alternative 1B and Alternative 1B - Refined.</i> Feasible mitigation not available.	CEQA: Significant and unavoidable
	CEQA and NEPA: Construction noise could negatively affect breeding and foraging behavior and would result in a significant and substantially adverse direct and cumulative impact.	CEQA and NEPA: Construction noise could negatively affect breeding and foraging behavior and would result in a significant and substantially adverse direct and cumulative impact. CEQA: Less than significant NEPA: Not substantially adverse	<i>Required for Alternative 1B</i> Feasible mitigation not available.	CEQA: Significant and unavoidable (Alternative 1B only)
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required.	N/A
Cultural Resources				
<i>Lagoon Restoration</i>	CEQA: Accidental disturbance to nearby cultural resources could occur during construction use of the existing access road near sites CA-SDI-13903 and CA-SDI-20,816 and result in a potentially significant impact. NEPA: Not substantially adverse	CEQA: Accidental disturbance to nearby cultural resources could occur during construction use of the existing access road near sites CA-SDI-13903 and CA-SDI-20,816 and result in a potentially significant impact. NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 1B and Alternative 1B - Refined.</i> Cultural-5: Exclusionary fencing shall be used to avoid inadvertent disturbance of cultural resources in proximity to the APE, staging areas, and access roads. The temporary exclusionary fencing shall be placed parallel to, but outside of the APE, staging areas, or the access road's existing limits of disturbance in locations where within 15 feet. Specifically, exclusionary fencing shall be placed parallel to existing access roads used for construction access near sites CA-SDI-13903 and CA-SDI-20,816.	CEQA: Less than significant
	CEQA: Accidental disturbance of unknown buried human remains	CEQA: Accidental disturbance of unknown buried human remains	<i>Required (CEQA) for Alternative 1B and Alternative 1B - Refined.</i>	CEQA: Less than significant

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	Alternative 1B	Alternative 1B - Refined	Mitigation Measure	CEQA Level of Significance after Mitigation
	during ground disturbance would result in a potentially significant impact. NEPA: Not substantially adverse	during ground disturbance would result in a potentially significant impact. NEPA: Not substantially adverse	Cultural-4: If human remains are encountered during the proposed project: • Work at that location will be suspended and redirected elsewhere. • Corps and County DPR will be immediately notified of the discovery. • Remains will be left in place and exclusionary fencing will be placed in a 50-foot radius around the discovery. • Under the provisions of the California PRC Section 7050.5, the County Coroner will be notified in the event of discovery of human remains. • If the remains are either determined to be or there is reason to believe they are Native American, the coroner will notify the NAHC within 24 hours. • Disposition of Native American human remains on non-federal lands is within the jurisdiction of the NAHC. The Corps and County DPR, as lead agencies for the proposed project, will initiate consultation with the NAHC. As part of the consultation process, the NAHC will notify persons most likely to be descended (MLD) from the remains. No ground-disturbing work will occur in the location of the remains until consultation between the NAHC, MLD, Corps, and County DPR has been completed, and notification by the Corps and County DPR that construction activities may resume. • If the remains are discovered in situ, they will be left in place and covered with weather-proof materials such as a tarp or plywood. If they are discovered in spoils, the remains will be placed in a labeled bag and, on approval by the MLD, transported to a secure locked container. An osteologist or a forensic anthropologist will, in consultation with the MLD, inspect fragmentary bones that are suspected to be human but cannot be identified as such in the field.	
<i>Materials Disposal</i>	No impact	No impact	None required	N/A
Paleontological Resources				
<i>Lagoon Restoration</i>	CEQA: Accidental disturbance of paleontological resources could occur during construction in areas with subsurface potential and is a potentially significant impact. NEPA: Not substantially adverse	CEQA: Accidental disturbance of paleontological resources could occur during construction in areas with subsurface potential and is a potentially significant impact. NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 1B and Alternative 1B - Refined.</i> Paleo-1: A monitoring program during grading, trenching, or other excavation into undisturbed substratum or deeper bedrock beneath the soil horizons and a fossil recovery program shall be implemented per County mitigation standards for excavation equal to or greater than 2,500 cy in high or moderate potential areas. A County-approved paleontologist shall be contracted to perform	CEQA: less than significant

	Alternative 1B	Alternative 1B - Refined	Mitigation Measure	CEQA Level of Significance after Mitigation
			paleontological resource monitoring and a fossil recovery program if significant paleontological resources are encountered during grading, trenching, or other excavation into undisturbed rock layers beneath the soil horizons in proximity to the Delmar Formation along the North Rios Avenue access road. The following shall be completed: - A County-approved paleontologist shall perform the monitoring (and recovery, if necessary, and report preparation) duties pursuant to the most current version of the County of San Diego Guidelines for Determining Significance for Paleontological Resources. The contract provided to the County shall include an agreement that the grading/ trenching/excavation monitoring will be completed. The contract shall include a cost estimate for the monitoring work and reporting. - The cost of the monitoring shall be bonded. Paleo-2: A final Paleontological Resource Mitigation Report that documents the results, analysis, and conclusions of all phases of the Paleontological Monitoring Program shall be prepared, if excavation into the Delmar Formation occurs and monitoring is required.	
<i>Materials Disposal</i>	No impact	No impact	None required	N/A
Visual Resources				
<i>Lagoon Restoration</i>	CEQA and NEPA: Construction activities would result in a direct temporary and cumulative significant and substantial adverse change in the visual quality and character of the lagoon.	CEQA and NEPA: Construction activities would result in a direct temporary and cumulative significant and substantial adverse change in the visual quality and character of the lagoon.	<i>Required for Alternative 1B and Alternative 1B - Refined.</i> Visual-1: Temporary screening would be placed around construction areas that are secured with a chain-link fence (such as booster pumps, staging areas, etc., as shown in Figure 2-15) to provide visual screening of the equipment located within the secured area. Screening could be brown or green mesh or other similar screening material attached to the fencing that would visually hide or obscure the interior of the fenced areas. The screening would extend as high as the chain-link fence, which would range from approximately 6 to 10 feet, depending on the area being secured. None required	CEQA: Significant and unavoidable
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
Traffic and Circulation				
<i>Lagoon Restoration</i>	CEQA and NEPA: Bridge retrofitting activities would result in a substantially adverse and significant temporary direct and	CEQA and NEPA: Bridge retrofitting activities would result in a substantially adverse and significant temporary direct and	<i>Required for Alternative 1B and Alternative 1B - Refined.</i> Traffic-1: Prepare work zone traffic control plans for lane closures and related construction along Coast Highway 101. The work zone	CEQA: Significant and unavoidable

	Alternative 1B	Alternative 1B - Refined	Mitigation Measure	CEQA Level of Significance after Mitigation
	cumulative traffic impact due to capacity reductions causing traffic operations to degrade from LOS A to LOS F on a segment of Coast Highway 101, south of Chesterfield Drive.	cumulative traffic impact due to capacity reductions causing traffic operations to degrade from LOS A to LOS F on a segment of Coast Highway 101, south of Chesterfield Drive.	traffic control plans shall be prepared in accordance with the California Manual of Uniform Traffic Control Devices (CAMUTCD), Caltrans Standard Plans (2010), and current standards and best practices of the reviewing and approving agencies. These plans are intended to accommodate workers within the roadway, while facilitating continued circulation for road users (motorists, bicyclists, and pedestrians including persons with disabilities in accordance with the ADA) through the work zone. Traffic-2: Provide advanced notification to motorists that delays and traffic congestion will occur during bridge construction and retrofitting activities to encourage avoidance of the construction area. This notification may be accomplished through various measures such as information and detour routes included on the project website; traffic details included in all notifications sent to local residents; traffic and alternative route information published in local media; and physical traffic control measures, such as temporary signage located at various distances from the construction area.	
	CEQA and NEPA: Bridge retrofitting activities would result in a substantially adverse and significant direct and cumulative traffic impact due to reduction in capacity and the subsequent redistribution of northbound traffic to I-5 via Lomas Santa Fe Drive, causing traffic operations to degrade from LOS E to LOS F on a segment of Lomas Santa Fe Drive from Solana Hills Drive to I-5.	CEQA and NEPA: Bridge retrofitting activities would result in a substantially adverse and significant direct and cumulative traffic impact due to reduction in capacity and the subsequent redistribution of northbound traffic to I-5 via Lomas Santa Fe Drive, causing traffic operations to degrade from LOS E to LOS F on a segment of Lomas Santa Fe Drive from Solana Hills Drive to I-5.	See Traffic-1 and Traffic-2.	CEQA: Significant and unavoidable
Materials Disposal	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
Air Quality				
Lagoon Restoration	CEQA: Construction-generated ROG and NO _x emissions would exceed applicable mass emission thresholds and result in a significant direct and cumulative impact. NEPA: Not substantially adverse	CEQA: Construction-generated ROG and NO _x emissions would exceed applicable mass emission thresholds and result in a significant direct and cumulative impact. NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 1B and Alternative 1B - Refined.</i> AQ-1: Off-road construction diesel engines not registered under ARB's Statewide Portable Equipment Registration Program that have a rating of 50 horsepower (hp) or more, shall meet, at a minimum, the Tier 3 California Emissions Standards, unless such an engine is not available for a particular item of equipment. Tier 2 engines will be allowed on a case-by-case basis when the Contractor has documented that no Tier 3 equipment or emissions equivalent retrofit equipment is available for a particular	CEQA: Significant and unavoidable

	Alternative 1B	Alternative 1B - Refined	Mitigation Measure	CEQA Level of Significance after Mitigation
			equipment type that must be used to complete construction. Documentation shall consist of signed written statements from at least two construction equipment rental firms. AQ-2: Harbor craft with a Category 1 or 2 marine engine, such as tugboats used for materials disposal, shall meet, at a minimum, EPA Tier 2 marine engine emission standards. AQ-3: Dredging equipment shall be electric, if determined by the contractor to be feasible, based on availability and cost. AQ-4: Contractors shall use alternative fueled (e.g., compressed natural gas [CNG], liquefied natural gas [LNG], propane), or electric-powered construction equipment where, if determined by the contractor to be feasible, based on availability and cost. AQ-5: The following measures shall be implemented by the construction contractor to reduce fugitive dust emissions associated with off-road equipment and heavy-duty vehicles: - Exposed surfaces (e.g., unpaved access roads) shall be watered, as necessary, to control fugitive dust. - Sweepers and water trucks shall be used to control dust and debris at public street access points. - Dirt storage piles shall be stabilized by chemical binders, tarps, fencing, or other suppression measures. - Provide sufficient perimeter erosion control to prevent washout of silty material onto public roads. - Cover haul trucks or maintain at least 12 inches of freeboard to reduce blow-off during hauling. Enforce a 15-mph speed limit on unpaved surfaces.	
<i>Materials Disposal</i>	Considered together with Lagoon Restoration	Considered together with Lagoon Restoration	N/A	N/A
Noise				
<i>Lagoon Restoration</i>	CEQA: Noise impacts associated with nighttime dredging would be significant. NEPA: Not substantially adverse	CEQA: Noise impacts associated with nighttime dredging would be significant. NEPA: Not substantially adverse	No feasible mitigation measures available.	CEQA: Significant and unavoidable
<i>Materials Disposal</i>	CEQA: Noise impacts associated with nighttime material placement would be significant NEPA: Not substantially adverse	CEQA: Noise impacts associated with nighttime material placement would be significant NEPA: Not substantially adverse	No feasible mitigation measures available.	CEQA: Significant and unavoidable
Socioeconomics and Environmental Justice				
<i>Lagoon Restoration</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A

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	Alternative 1B	Alternative 1B - Refined	Mitigation Measure	CEQA Level of Significance after Mitigation
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
Public Services and Utilities				
<i>Lagoon Restoration</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
Hazardous Materials and Public Safety				
<i>Lagoon Restoration</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	CEQA: Unforeseen wastes and hazardous materials could be dredged from the lagoon and create a public health hazard from management or disposal and result in a significant impact. NEPA: Not substantially adverse	CEQA: Unforeseen wastes and hazardous materials could be dredged from the lagoon and create a public health hazard from management or disposal and result in a significant impact. NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 1B and Alternative 1B - Refined.</i> HAZ-3: A sediment management plan will be developed and implemented to test dredged materials for proper placement in the overdredge pit or for off-site transport and proper disposal and to be in compliance with local, state, and federal regulations. The plan shall specify that if unknown contamination or other buried hazards are encountered during dredging, procedures must be carried out according to applicable regulations. Any material encountered that appears to contain contaminants will be handled in accordance with local, state, and federal guidelines, and permit conditions.	CEQA: Less than significant
Global Climate Change and Greenhouse Gas Emissions				
<i>Lagoon Restoration</i>	CEQA: Construction-related GHG emissions would exceed the recommended level of significance and result in a significant and adverse cumulative impact. NEPA: Not substantially adverse	CEQA: Construction-related GHG emissions would exceed the recommended level of significance and result in a significant and adverse cumulative impact. NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 1B and Alternative 1B - Refined.</i> GHG-1: On-site material hauling shall be performed with trucks equipped with on-road engines to the extent practicable. GHG-2: Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours to the extent practicable. GHG-3: Restrict material hauling on public roadways to off-peak traffic congestion hours to the extent possible. During construction scheduling and execution minimize, to the extent possible, uses of public roadways that would increase traffic congestion. GHG-4: Use high-efficiency lighting and Energy Star-compliant heating and cooling units. Implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.	CEQA: Significant and unavoidable
<i>Materials Disposal</i>	Considered together with Lagoon Restoration	Considered together with Lagoon Restoration	N/A	N/A

EXECUTIVE SUMMARY

This section begins the updated Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) published in February 2016. As indicated in the Reader's Guide and Preface, the main body of the document does not evaluate Alternative 1B – Refined, the Preferred Alternative, separately. Rather, the evaluation focuses on the alternatives identified at the time of public review: Alternatives 2A, 1B, and 1A. Alternative 1B – Refined is the Preferred Alternative and represents a reduced alternative as compared to Alternative 1B. For an evaluation of the Preferred Alternative 1B – Refined by issue area, as well as a comparison of potential impacts with Alternatives 2A, 1B, and 1A, please refer to the Preface.

ES-1 BACKGROUND

San Elijo Lagoon is a coastal wetland formed where Escondido and La Orilla creeks meet the Pacific Ocean in the city of Encinitas, San Diego County, California. The lagoon provides habitat for sensitive, threatened, and endangered plants and animals, including resident and migratory wildlife. There are also public recreational opportunities within the San Elijo Lagoon Ecological Reserve (Reserve), including more than 7 miles of hiking trails.

The Reserve is owned and managed by the California Department of Fish and Wildlife (CDFW) – 348 acres; County of San Diego Parks and Recreation Department (County DPR) – 567 acres; and the San Elijo Lagoon Conservancy (SELC) – 62 acres.

Over time, development and infrastructure constraints have affected the lagoon ecosystem and altered the balance of habitats within the lagoon (e.g., between unvegetated and vegetated intertidal habitats). Urbanization within the surrounding Escondido watershed has accelerated freshwater storm flows, generated year-round urban runoff, and increased chemicals and nutrients within the lagoon. The ecological effects of increased runoff have been compounded by water obstructions to and from the Pacific Ocean. These obstructions include an inefficient channel system and lagoon inlet, a weir in the eastern basin, and the three major transportation corridors that perpendicularly traverse the lagoon: Coast Highway 101, the North County Transit District (NCTD) railroad tracks, and Interstate 5 (I-5). These constraints on the hydraulic connection between the ocean and lagoon affect tidal exchange and drainage of freshwater flows. As a result, water surface elevations in the lagoon are different than those of the ocean, and habitat distribution and quality are adversely affected. Such factors have led to a consistent degradation of water quality (e.g., elevated bacteria levels) in the lagoon and adjacent to the lagoon inlet, leading to beach closures during moderate to large storm events that flush accumulated bacteria to the ocean. Water quality issues also occur due to the historic

accumulation of nutrients in lagoon sediments, leading to periods of extended eutrophication. Water quality within the lagoon is currently identified under Clean Water Act (CWA) Section 303(d) as impaired for eutrophication, indicator bacteria, and sedimentation.

Removal of high-nutrient sediments and restoration of tidal influence to the lagoon and enhancing freshwater fluvial flows out of the lagoon would restore the physical (soils and hydrology) and biological (biogeochemical/water quality and habitat) functions that have been degraded over the years. For the lagoon environment to be highly productive, it must be consistently replenished with water and nutrients from the ocean. Regular tidal action also promotes improved water quality.

Historically, the Southern California Bight (between Point Conception and San Diego) contained much more coastal estuarine habitat than current conditions. One of the key recommendations of recent historic ecology studies is to use historic information as a foundation for framing current restoration efforts, while taking into consideration current pressures, land use patterns, and potential future climate change (Sutula et al. 2014; Beller et al. 2014). While a return to historic conditions is not the purpose of the San Elijo Lagoon Restoration Project (SELRP), the historic lagoon environment can provide a basis for understanding potential enhancement activities. In the 19th century, San Elijo Lagoon consisted primarily of salt flats (more than 50 percent), with a smaller proportion of open water and mudflats (Beller et al. 2014). The lagoon faces different pressures today that did not occur in the past, such as increased water and sediment delivery, linear infrastructure constraints, and past activities such as waste discharge. Each of the project alternatives considered by the SELRP considers both historic and current habitat distributions but is designed to provide a more connected gradient of vegetated estuarine habitats balanced with unvegetated estuarine and open water habitats. Restoration of salt panne is complex, but remnant areas of historic salt panne would be maintained and unvegetated intertidal foraging opportunities provided by an increased emphasis on mudflats compared to existing conditions. Habitat gradients that include both vegetated and unvegetated intertidal areas are critical to enhance and restore wetland functions and services at the lagoon level.

Historic evidence suggests that San Elijo Lagoon was once a primarily perennially open system, prior to substantial man-made intervention. However, under the more developed conditions that characterize the lagoon currently, the negative effects of inlet closure have been documented (similar to many southern California lagoons and estuaries). Prolonged inlet closure has led to impoundment of freshwater and high biological oxygen demand, which have resulted in mass die-offs of fish and invertebrate populations from osmotic shock and low dissolved oxygen. Prolonged submergence of salt marsh plant species has led to their repeated temporary demise and promoted the establishment and spread of freshwater species.

Efforts have been made since the mid-1990s to actively manage the lagoon. The San Elijo Lagoon Enhancement Plan (County of San Diego 1996) identified several opportunities for enhancement and restoration, mostly by reducing sedimentation and improving tidal exchange and circulation. A long-term financial endowment was established in the late 1990s to actively fund inlet maintenance for tidal flushing. As a result of this endowment, the SELC has actively opened the inlet on at least an annual basis for more than 10 years, and the lagoon inlet has remained open over 80 percent of the time over that period. These management efforts improved habitat and water quality relative to the stagnant conditions that previously developed when the inlet was closed for prolonged periods. Other efforts involving removal of invasive species also resulted in some improvement to habitat quality. Although important, these efforts do not remedy the underlying hydraulic inefficiencies or loss of functional mudflat habitat within the lagoon.

Restoration of tidal influence to the lagoon and enhancing freshwater fluvial flows out of the lagoon, in conjunction with removal of sediments with historically accumulated nutrients, would restore the physical (soils and hydrology) and biological (biogeochemical/water quality and habitat) functions and services that have been degraded over the years.

The SELRP (proposed project) is an effort to restore lagoon functions and services to the extent practicable given the constraints of surrounding development. The SELRP has evolved over a number of years and has involved many lagoon stakeholders. This environmental document considers several restoration alternatives resulting from those efforts.

Lagoon functions, including water quality, hydraulic function, and biology, are interrelated and dependent upon each other. Implementation of the SELRP would result in certain trade-offs in terms of temporary impacts to achieve the positive long-term benefits of improved lagoon functions and services. While restoration activities would temporarily affect emerging habitats (e.g., low-marsh in the central basin), long-term water quality benefits would improve lagoon function as a whole and ultimately result in a more connected gradient of balanced habitat types that can be maintained for the long term; improved lagoon hydraulics, such as decreased water residence time resulting in decreased bacterial levels; hydrologic connectivity and sediment budget for the nearshore littoral zone; and others.

A number of infrastructure improvements are planned within the lagoon by other agencies. These include double-tracking the railroad tracks extending through the lagoon as part of the Los Angeles to San Diego Proposed Rail Corridor Improvements (LOSSAN) project and replacement of the I-5 bridge as part of the North Coast Corridor Project, proposed by the San Diego Association of Governments (SANDAG) and the California Department of Transportation (Caltrans), respectively. Senate Bill 468 (Kehoe) mandates that transportation improvements and regional habitat enhancements within the north coast corridor occur concurrently, unless

construction in phases would result in an environmentally superior alternative to concurrent construction. Consistent with Senate Bill 468 (Kehoe), I-5 and railroad bridge improvements over the lagoon would occur concurrently with the SELRP. These bridges are not part of the lagoon restoration project, and the environmental analysis for these projects proposed (and constructed) by others is addressed in other documents (SCH #2002031067/SCH#2004101076).

A Public Works Plan (PWP)/Transportation and Resource Enhancement Program (TREP) was prepared by Caltrans and SANDAG to address comprehensive, system-wide improvements in this coastal corridor. The plan identifies mitigation and enhancement actions including completion of bicycle and pedestrian connections, trail improvements, new and improved transportation facilities, habitat restoration, and compensatory mitigation projects that would provide “functional lift” to coastal resources. The PWP/TREP identifies restoration of San Elijo Lagoon and/or Buena Vista Lagoon as opportunities. The SELRP will be designed to be consistent with the parameters of the North Coast Corridor Project Restoration Enhancement and Mitigation Program (REMP). The stated intent is to improve ecological health and hydrological connectivity, as well as enhance critical coastal resources and habitats.

Additionally, the existing Coast Highway 101 bridge has seismic deficiencies and needs to be retrofitted. While bridge improvements are not a part of the lagoon restoration project, and would be implemented by others, the potential environmental impacts of the retrofit are disclosed in this document.

ES-2 PROJECT DESCRIPTION

The SELRP has two components: the restoration of San Elijo Lagoon and the disposal or reuse of materials excavated as part of the restoration.

Lagoon Restoration

The SELRP would restore San Elijo Lagoon with improved ecological function. The lagoon study area is composed of approximately 960 acres, primarily within the Reserve, and separated into four areas:

- east basin (east of I-5),
- central basin (between NCTD tracks and I-5),
- west basin (between Coast Highway 101 and NCTD tracks), and
- coastal area (between Pacific Ocean and NCTD tracks).

The SELRP would reconfigure lagoon elevations via grading/dredging and modify water flow into the lagoon via changes to the ocean inlet and lagoon channels. Elevations would be created to allow for appropriate inundation frequencies that would support specific habitat types. Generally, habitats range in decreasing elevation from mid- to high-saltmarsh, to low-saltmarsh, to intertidal mudflats, and finally to subtidal (submerged) lands. Reconfiguring the lagoon would be accomplished by dredging in some areas, which would remove high-nutrient sediments that cause eutrophication in the lagoon. In the process of sediment removal, the project would lower elevations and reuse dredged material to create other areas. An example is placement of dredged material into wetland to create upland transitional areas to supplement existing natural transitional areas located around the lagoon perimeter. This helps increase the lagoon's resiliency to future sea level rise. Additionally, some excavated material would be used to create a nesting area in the central basin. Soils within mudflat areas would be native soils lowered slightly in elevation or dredged soils placed on the sand cap over the overdredge pit. This approach would leave exposed mudflat soils that are native marsh soils containing native infauna. The project would also reconfigure or retrofit existing Coast Highway 101 over the inlet of the lagoon, depending on the alternative. While it is anticipated that retrofit work of the existing inlet would be implemented by others, the design and environmental analysis for the work is addressed in this document.

Actions and construction methods specific to each alternative are more fully described below in Section ES-5 Proposed Action and Alternatives.

Materials Disposal/Reuse

Restoration of the lagoon has the potential to generate more than 1 million cubic yards (mcy) of excess material through dredging operations. Various options are available for disposal or reuse of that material (e.g., offshore ocean and/or upland placement or disposal, placement on the beach or nearshore, and reuse on-site), depending on its characteristics. These disposal and reuse options are shown in Figure ES-1. Two alternatives would involve an overdredge pit in the central basin, which would provide better-quality sand for beach replenishment or nearshore placement, while accommodating disposal of finer-grained/poor-quality material on-site. This approach would also enable the project to remove nutrient-rich sediments in the lagoon.

Materials Disposal/Reuse sites are as follows:

- Offshore disposal at LA-5 (permitted ocean dumping area)
- Offshore stockpiling at SO-5/SO-6 (two nearby sand placement sites used for prior regional beach nourishment projects)
- Nearshore (inside littoral cell) at Cardiff

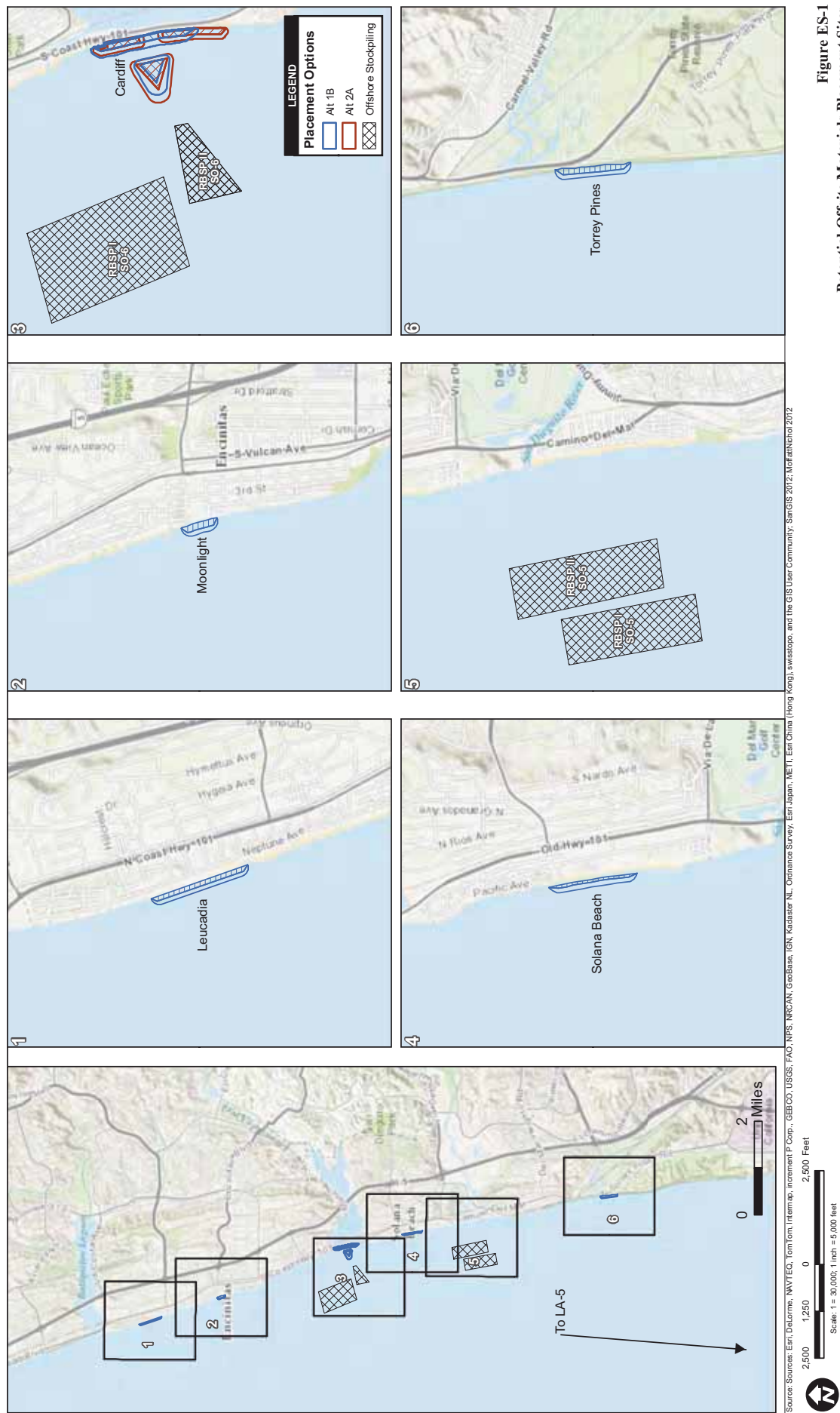
- Onshore Beach placement at nearby beaches
 - Cardiff
 - Leucadia
 - Moonlight
 - Solana Beach
 - Torrey Pines
- On-site fill to create the transition areas and underlying the nesting area

ES-3 LEAD AGENCIES ROLES AND RESPONSIBILITIES

The proposed project requires evaluation pursuant to both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) because of federal, state, and local discretionary actions. The U.S. Army Corps of Engineers (Corps) is the federal lead agency responsible for compliance with NEPA and County DPR is the lead agency responsible for compliance with CEQA. Given the proposed project's complexity and range of potentially significant issues, the appropriate environmental document is a combined EIR/EIS. The Corps and County DPR have agreed to jointly prepare this EIR/EIS to address the federal, state, and local requirements for environmental analysis and permitting. Each lead agency, along with other responsible and trustee agencies, has various permitting authority, environmental documentation certification/approval, and project approval responsibilities.

Restoration of the lagoon would require issuance of a Department of the Army permit from the Corps and a Water Quality Certification from the San Diego Regional Water Quality Control Board pursuant to Sections 404 and 401 of the CWA for discharge of fill materials into waters of the U.S. In addition, the project requires authorization/permit pursuant to Section 10 of the Rivers and Harbors Act for work in navigable waters, and, potentially, Section 103 of the Marine Protection, Research, and Sanctuaries Act for ocean disposal. The Corps is required to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for potential impacts on federally endangered or threatened species and their designated critical habitat, and with NMFS pursuant to the Magnuson-Stevens Act for potential impacts to Essential Fish Habitat (EFH). Accordingly, these regulatory and wildlife entities have key interests in the proposed project.

County DPR is part owner of the Reserve and manages it in coordination with the SELC and CDFW. As owner, the County will issue a right-of-entry permit for implementation of the project, and will certify the EIR in compliance with CEQA. Upon certification, the County will issue Findings and a Statement of Overriding Considerations, as necessary, with issuance of the Notice of Determination (NOD).



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ES-4 PURPOSE AND NEED AND PROJECT GOALS

Over the past several decades, the lagoon system has gradually degraded due to the expansion of urban development within the upstream watershed. This development has altered the hydrology and water quality and, subsequently, the physical and biological functions of the lagoon system. Water quality has decreased due to nutrient accumulation in lagoon sediments, lack of circulation in the lagoon, and sedimentation in areas of impounded water. Habitats within the lagoon have been rapidly converting to habitats with greater freshwater influence. If measures are not taken to improve lagoon water quality and hydrology, muted tidal exchange, nutrients bound in sediment, and restricted water circulation will continue to degrade the physical and biological functions of the lagoon. Freshwater marsh and higher elevation salt marsh habitats will likely continue to expand and dominate the system, at the expense of unvegetated intertidal habitats. Water quality issues will continue to cause eutrophication and low dissolved oxygen conditions during certain periods of the year. Sensitive plant and animal species currently dependent on the aquatic and intertidal habitats within the lagoon would be adversely affected by these conditions.

The NEPA purpose of the proposed project, as well as the Corps' overall project purpose, is to enhance and restore the physical and biological functions and services of San Elijo Lagoon by increasing hydraulic efficiency in the lagoon, addressing existing water quality impairments, and halting ongoing conversion of unvegetated wetland habitats to support a more connected gradient of balanced habitat types.

The overall CEQA goal to protect and restore, then maintain via adaptive management, the San Elijo Lagoon ecosystem and its adjacent uplands can be further refined into four categories of objectives:

1. Physical restoration of lagoon estuarine hydrologic functions
2. Biological restoration of habitat and species within the lagoon
3. Management and maintenance to ensure long-term viability of the restoration efforts
4. Maintain recreational and educational opportunities

ES-5 PROPOSED ACTION AND ALTERNATIVES

Over the life of the project, various options for restoration of the lagoon have been considered, as well as various options for disposal of material dredged from the lagoon. Each of the alternatives evaluated would restore lagoon functions and services through dredging and grading to create a connected gradient of habitats.

All four alternatives identified in this document are analyzed at an equal level of detail:

- Alternative 2A
- Alternative 1B
- Alternative 1A
- No Project/No Federal Action Alternative

Alternative 2A

This alternative, shown in Figure ES-2, would improve tidal action by constructing a new inlet south of the existing inlet. The new inlet would require stabilization through the incorporation of cobble blocking features (CBFs) at the beach and development of a “prefilled ebb bar” located in the nearshore area outside of the new outlet location. A new bridge along Coast Highway 101 would also be constructed to span the proposed new inlet location, and would incorporate a dedicated pedestrian sidewalk for access along the shoreline. The increased tidal action from the new inlet would also create a more connected gradient of balanced habitat types than presently exist.

With this alternative, a new subtidal basin would be created just landward of the new inlet in the west and central basins to capture sediment entering the lagoon. The main tidal channel would be widened and redirected just west of I-5, and would then extend into the east basin. The southern channel and secondary channels within the central basin would also be improved by providing connections to the main channel along the east and west ends of the secondary channels, and providing a more gradual habitat gradient along channel banks (e.g., subtidal to mudflat to vegetated marsh). The existing channel in the east basin would be widened from 130 to 261 feet and the existing weir would be removed. These actions would promote more tidal exchange east of I-5 and allow more freshwater flows to exit the lagoon. Dredging, particularly in the central basin, would remove nutrients bound in lagoon sediments that can lead to eutrophication. Man-made transitional habitat would be created by filling on top of, and alongside, the remnants of the weir. This habitat is intended to provide refugia in the form of continually transitioning habitat over time as sea level rises. Three other areas of transitional habitat above tidal elevations would be created in the central basin. Together, these would supplement the natural transitional habitat occurring in a band around the perimeter of the lagoon. A former sewage settling pond in the central basin would be filled and capped with sand and crushed shell for use as a nesting area.

The primary change in habitat distributions under Alternative 2A would be an increase in open water areas/tidal channels and mudflat habitat within the lagoon compared to existing conditions. Open water areas and tidal channels would be increased in all three lagoon basins compared to existing conditions. Mudflat and open water/tidal channels would be actively created throughout the central basin and replace existing mid-marsh and low-marsh habitat. Similarly, open water/tidal channels and low-marsh would be actively created in the east basin where freshwater/brackish

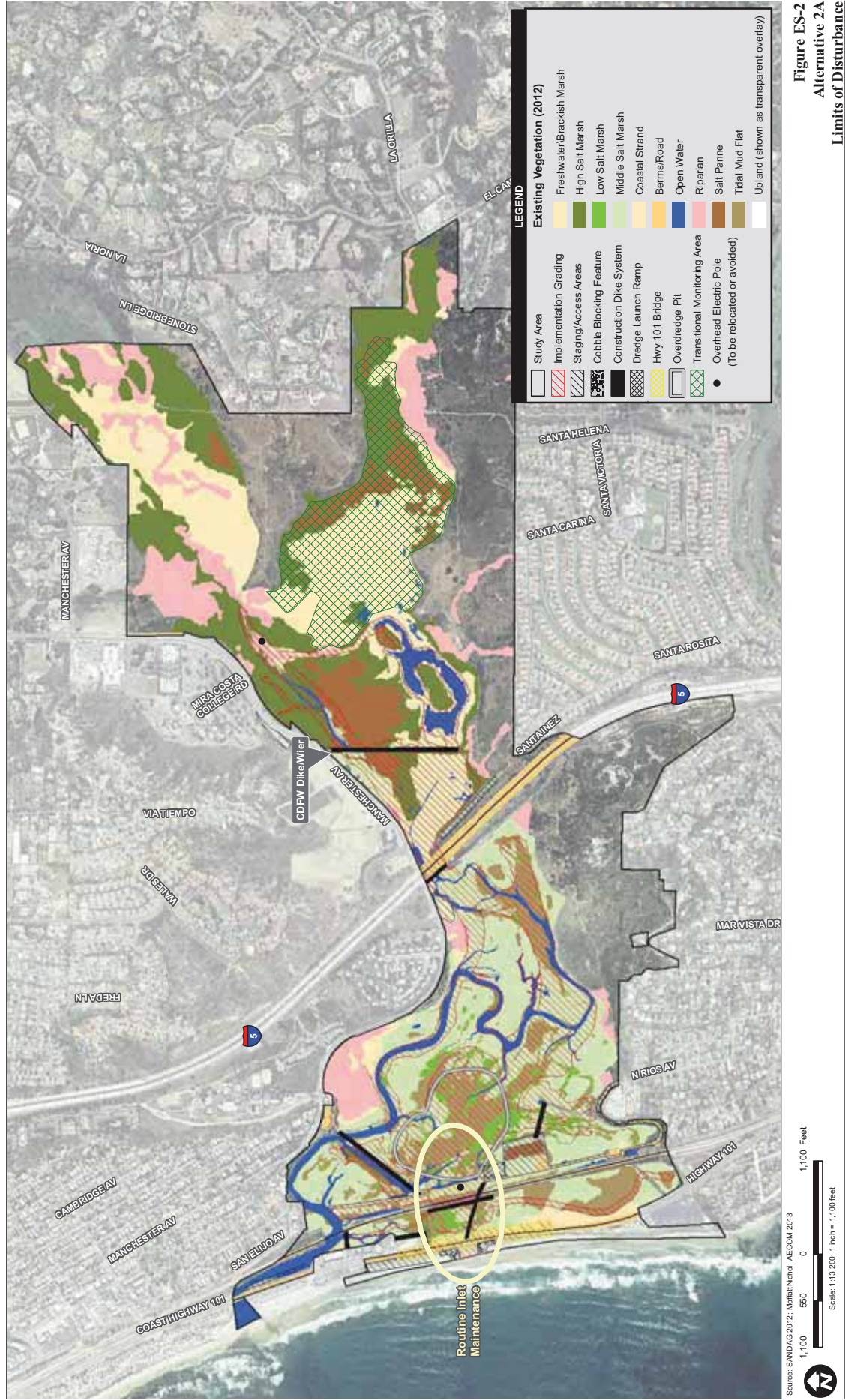


Figure ES-2
Alternative 2A
Limits of Disturbance

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marsh currently exists. Increases to estuarine habitat (low-, mid-, and high-marsh) may also occur as a result of conversion of salt panne and freshwater/brackish marsh in the far east basin as tidal expression increases.

Alternative 2A would involve overexcavation of the proposed sedimentation basin so that poor-quality material (e.g., fine-grained) could be buried in an “overdredge” pit and covered with a sand cap. The good-quality (e.g., larger-grained) material from the overdredge pit in the central basin would then be available for beneficial reuse. It is anticipated that approximately 1.4 mcy of material would be exported for reuse for the initial implementation of Alternative 2A. Approximately 500,000 cubic yards (cy) of this sand material from the overdredge pit would be placed in the ocean nearshore, west of the proposed inlet location to “prefill” the anticipated ebb bar that would form off the inlet.

Alternative 2A would require a new Coast Highway 101 bridge at the new inlet location. The new bridge would not increase vehicular capacity along Coast Highway 101, but it would include a separated pedestrian walkway on the west side of the structure to ensure north-south pedestrian and bicycle access. Changes to the I-5 and NCTD crossings would be implemented by others, but changes to Coast Highway 101 are included in the proposed project. Bridge improvements at the I-5 crossing, as planned by Caltrans, would lengthen and deepen the existing channel opening. The NCTD railroad would remain in place and another bridge constructed by NCTD to span the proposed inlet, although the channel underneath the existing railroad tracks would require deepening for improved hydraulics as part of the LOSSAN Project. Rock armoring would be installed at all three features to provide channel bank and bridge abutment protection and prevent undermining by increased tidal/fluvial flows.

The nearshore zone off San Elijo Lagoon contains a high volume of cobbles and the proposed new inlet would minimize cobble migration into the lagoon through the use of CBFs. The CBFs would be two relatively short, low rock features along the sides of the tidal inlet channel.

Routine maintenance dredging would be required to maintain appropriate inlet connection to the ocean, and approximately 300,000 cy is anticipated to be dredged from the basin every 3 to 4 years. Maintenance would occur over a period of 5 months and the material is planned for placement on Cardiff Beach south of the new tidal inlet.

Alternative 1B

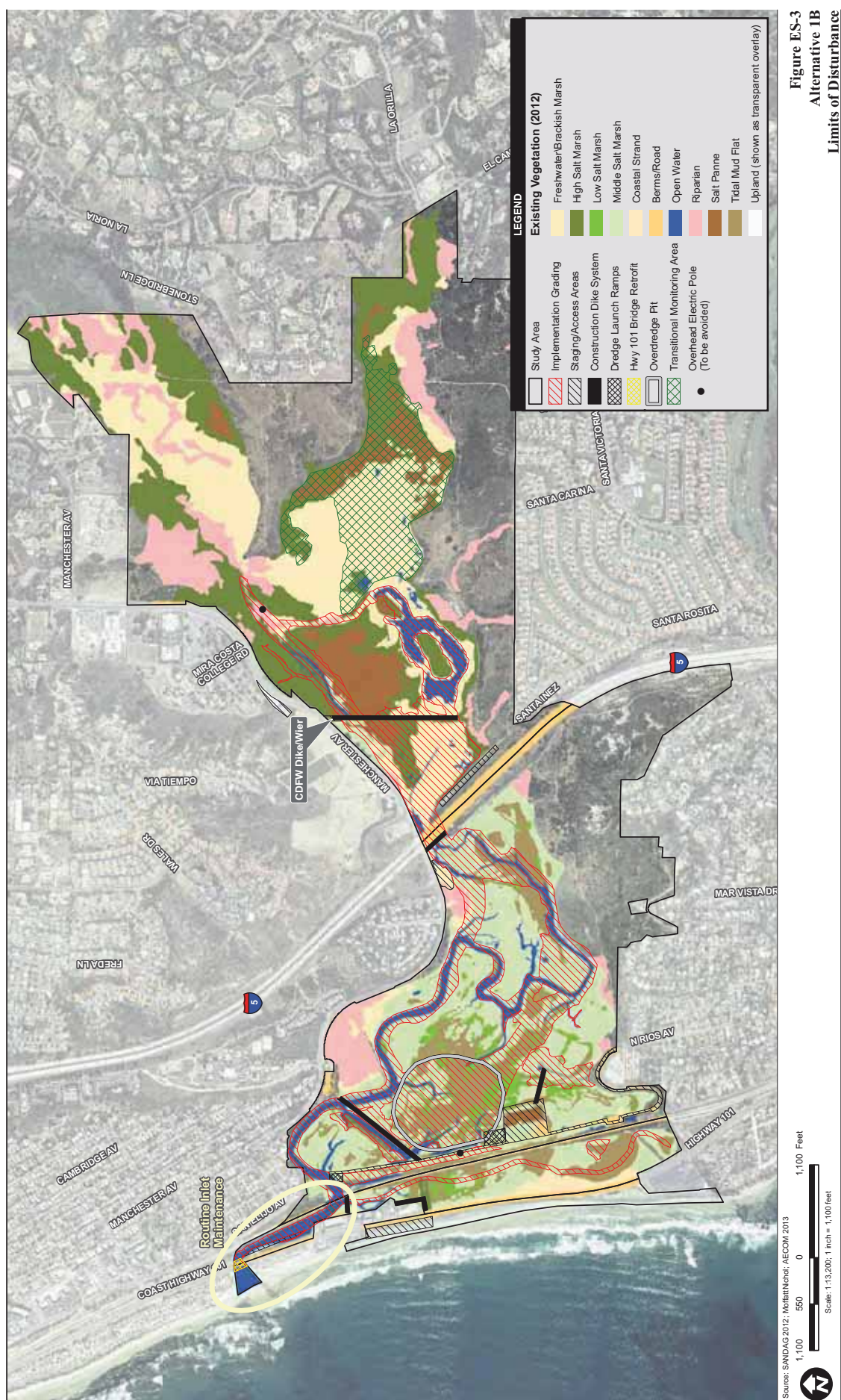
Alternative 1B, shown in Figure ES-3, would create a more connected gradient of balanced habitat types relative to existing conditions through modifications to channels and habitat areas within the lagoon. The existing tidal inlet would remain and no CBFs would be required. The existing Coast Highway 101 bridge structure over the existing inlet would be retained.

Under Alternative 1B, the main tidal channel would be extended and a mix of mudflats and secondary channels created south of the main channel in the central basin. The southern channel and secondary channels within the central basin would also be improved by connecting both east and west ends to the main channel to increase circulation and creating a habitat gradient along channel banks. Existing emergent low-marsh would be retained to the extent possible to create a more connected gradient of balanced habitat types in the basin. Retention of emergent low-marsh would be balanced with the need to remove high-nutrient sediments that currently cause water quality issues, such as eutrophication, in the lagoon.

The main channel would be redirected just west of I-5 and extended farther into the east basin. The channel in the east basin would be widened from 130 to 261 feet and the CDFW dike and weir would be removed; combined, this would promote more tidal exchange east of I-5. The tidal prism of Alternative 1B would be substantially increased compared to existing conditions. Several areas of transitional habitat above tidal elevations would be created in the central basin to supplement the natural transitional habitat that extends around the perimeter of the lagoon. These areas would also offer refugia from sea level rise.

Alternative 1B would result in an increase in open water/tidal channels, low-marsh, mudflat, and created transitional habitat compared to existing conditions. Most of the increase in open water/tidal channels and mudflat habitat would occur in the central and east basins, and would result in a corresponding decrease in mid-marsh, salt panne, and freshwater/brackish marsh habitats. Mudflat soils would consist of native soils lowered slightly in elevation or soils removed from shallow excavation and placed on top of the overdredge pit sand cap. The open freshwater ponds currently maintained by the CDFW weir would be converted to open water/tidal channels and low-marsh habitat.

Alternative 1B assumes bridge improvements at the I-5 crossing, as planned by Caltrans, which would result in the channel under the I-5 bridge being lengthened and deepened. The existing bridges at Coast Highway 101 and the NCTD railroad would remain in place, although the channels underneath would require deepening for improved hydraulics as part of the LOSSAN project (planned for implementation by others, as described in Table ES-1). The seismically deficient existing Coast Highway 101 bridge structure would be retrofitted to current seismic standards, as analyzed in this document. Retrofit work may be implemented by others but is evaluated as part of this project (different than Alternative 2A, which would implement Coast Highway 101 bridge reconstruction). The existing seismic deficiencies of the Coast Highway 101 bridge would not be affected by implementation of Alternative 1B, nor would the bridge's condition have an effect on the project (M&N 2013; TY Lin 2011). Rock armoring would be



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installed at all three features, in compliance with the owners' design standards, to provide channel bank and bridge abutment protection and prevent undermining by increased tidal/fluvial flows.

Alternative 1B would involve creation of an overdredge pit to provide larger-grained material suitable for reuse within the littoral zone. It is anticipated that approximately 1.2 mcy of material would be exported from the overdredge pit in the central basin for reuse for the initial implementation of Alternative 1B. Similar to Alternative 2A, Alternative 1B would fill the former sewage settling pond in the central basin and cap it with sand and crushed shell for use as a nesting area.

Table ES-1
Overview of Project Elements and Responsible Parties for Construction

Project Element	SELC	Caltrans	NCTD	Other (TBD)
Lengthen I-5 bridge over San Elijo Lagoon		X		
Lengthen railroad crossing over San Elijo Lagoon			X	
Coast Highway 101 bridge (new inlet)	X (Alt. 2A only)			
Seismic retrofit of Coast Highway 101 (existing inlet)				X
Dredge lagoon	X			

Inlet maintenance would require the removal of approximately 40,000 cy of sediment annually, utilizing the same approach as existing inlet management. That maintenance is anticipated to occur in spring (typically April) and require approximately 4 weeks.

Alternative 1A

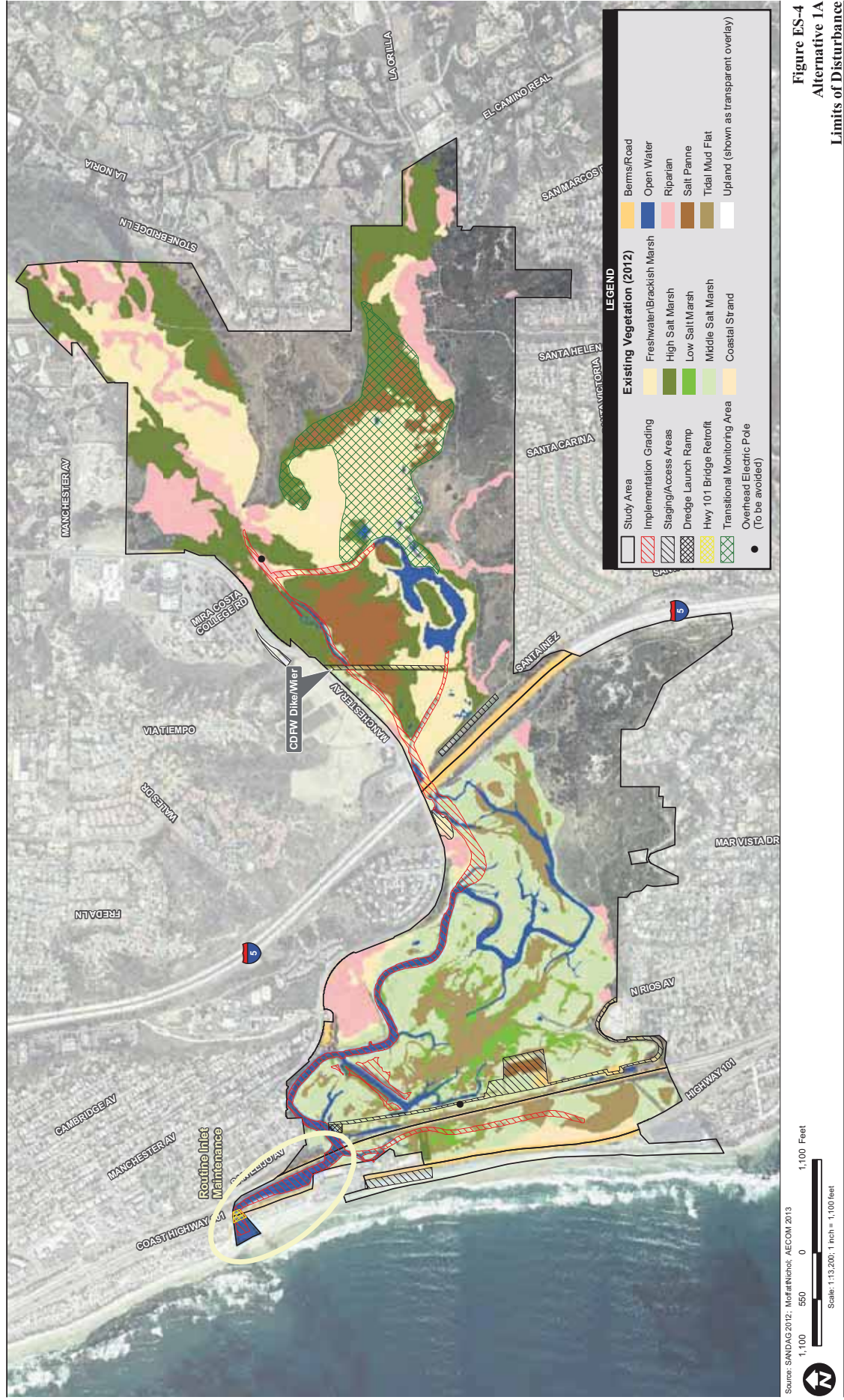
Alternative 1A, shown in Figure ES-4, would implement the least physical changes to the lagoon. The main feeder channel throughout the site would be enlarged and redirected just west of I-5. The main tidal channel would be extended farther into the east basin, and existing constricted channel connections would be cleared and enlarged. The existing CDFW dike would be left in place, but two new openings would be created through it to allow tidal and fluvial connections. The tidal prism of Alternative 1A would be slightly increased compared to existing

conditions. Existing habitat areas would essentially remain intact, although current conversion trends from unvegetated intertidal habitats to vegetated intertidal habitats would be expected to continue. High-nutrient sediment removal would primarily be limited to the main channel. Some freshwater habitat areas in the east basin are anticipated to convert to more saltwater-based communities due to enhanced tidal influence and the resulting changes in inundation frequencies. One small area of transitional habitat would be constructed in the northwest portion of the central basin.

Alternative 1A habitat distribution would result in a high proportion of mid- and high-marsh habitat. There would be a decrease of mudflat, open water/tidal channels, and freshwater/brackish marsh and an increase of low-marsh and high-marsh habitat compared to existing conditions. This alternative allows the continued conversion of mudflats to low-marsh and some existing freshwater marsh would be converted to high-marsh and open water/tidal channel habitat. Water quality impairments due to nutrient-rich sediments and limited circulation would also continue to occur.

Channels under I-5 and the railroad bridge would be deepened for improved hydraulics (planned for implementation by others). The channel under Coast Highway 101 would also be widened slightly, but replacement of the bridge structure would not be necessary. The existing seismically deficient Coast Highway 101 bridge would be retained and retrofitted to meet current seismic safety standards. Retrofit work may be implemented by others but is evaluated as part of this project (different than Alternative 2A, which would implement Coast Highway 101 bridge reconstruction). All three bridge features would be armored to prevent undermining. Whether or not the bridge is retrofitted to address its existing seismic deficiency, activities associated with the SELRP would have no effect on the bridge itself, nor would the bridge's condition have an effect on the project (M&N 2013; TY Lin 2011).

Approximately 160,000 cy of material would need to be exported to LA-5 for the implementation of Alternative 1A. Preliminary soil investigations and coordination with the Corps and U.S. Environmental Protection Agency (EPA) suggest the material would be appropriate for disposal at LA-5; however, additional Tier 3 testing and approval from the Corps and EPA would be required prior to disposal. Because dredging would be primarily limited to improving or connecting existing channels under this alternative, no areas large enough to accommodate an overdredge pit would be disturbed and no overexcavation would occur in this scenario. Without an overdredge pit, no large-grained material would be available from dredging and only material unsuitable for reuse as beach or littoral cell nourishment (e.g., fine-grained) would be generated. Alternative 1A would also utilize some material removed from the site to fill the former sewage settling pond in the central basin (approximately 35,000 cy) and cap it with sand and crushed shell for use as a nesting site.



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Inlet maintenance would continue to be performed via existing methods. Approximately 35,000 cy per year would be removed from the inlet and placed either on the adjacent beach or in the nearshore. The process would take approximately 2 weeks and would be anticipated to occur in spring (typically April).

No Project/No Federal Action Alternative

Under this alternative, there would be no dredging or excavation to improve water quality, tidal circulation, channel clearing, or other comprehensive actions to improve tidal exchange or conveyance of freshwater in high flow conditions. The lagoon inlet would remain in its existing location. The present spectrum of environmental constraints would continue to limit the quality and productivity of the lagoon.

Under the No Project/No Federal Action Alternative, conversion from subtidal and mudflat habitat to a system dominated by salt marsh and riparian habitat would continue. This conversion would continue to occur fairly rapidly. Current functioning mudflat is an artifact of past freshwater impoundment and is not at a natural elevation for self-sustainable mudflat. Ultimately, the conversion of another 34 acres of mudflat is anticipated as the lagoon moves toward a state of equilibrium with current water levels and inundation frequencies. In addition, mid-marsh habitat would convert to high-marsh habitat and there would be a loss of open water habitat throughout the lagoon compared to existing conditions. While allowing the lagoon to revert to a more frequently closed-inlet condition could slow or halt this conversion, water quality would then be expected to continue to deteriorate.

Under the No Project/No Federal Action Alternative, no materials would be dredged from the lagoon for the purpose of restoration. However, the practice of active management at the lagoon inlet is expected to continue to maintain tidal exchange with the ocean and allow fluvial flows to exit the lagoon. This exchange, although limited by the existing hydraulic constraints in the lagoon, maintains more acceptable water quality levels in the lagoon than would occur under no management.

Alternatives Comparison

The following tables provide a comparison of alternative characteristics relative to habitat distribution (Table ES-2), material removal volumes (Table ES-3), and materials disposal/reuse location scenarios (Table ES-4).

Table ES-2
Habitat Distribution Comparison for the Alternatives

Habitat Type	Habitat Distribution (acres) ¹				
	Existing	Proposed ²			
		Alternative 2A	Alternative 1B	Alternative 1A	No Project/No Federal Action
Avian Islands	0	2	2	2	0
Mudflat	63	102	71	25	29
Low-Marsh	13	23	51	44	51
Mid-Marsh	141	124	98	140	107
High-Marsh	120	107	124	145	167
Saltpan	37	17	30	35	37
Freshwater/Brackish Marsh	132	96	99	121	131
Open Water/Tidal Channels and Basins	40	74	67	34	24
Riparian	72	67	67	70	71
Coastal Strand	5	5	5	5	5
Upland & Others	299	292	295	299	299
Beach	15	14	15	15	15
Berms and Roads	23	24	24	24	23
Transitional (created)	0	12	12	2	0
Total³	960	960	960	960	960

¹ Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.

² The proposed habitat distribution acreages represent the proposed post-project condition that would result from the implementation of each alternative, and do not take into account future sea level rise.

³ Totals may not add due to rounding.

Source: Nordby and M&N 2013

Table ES-3
Materials Removal and Periodic Maintenance Comparison for the Alternatives

	Alternative 2A	Alternative 1B	Alternative 1A	No Project/No Federal Action
Initial Amount of Material Removed	1.4 mcy	1.2 mcy	160,000 cy	0
Estimated Post-construction Periodic Volume Dredged	300,000 cy	40,000 cy	35,000 cy	25,000 cy
Estimated Post-construction Periodic Maintenance Frequency	Every 3 to 4 years	Annually	Annually	Annually

mcy = million cubic yards

cy = cubic yards

Table ES-4
Materials Disposal and Beneficial Reuse Scenarios

Approximate Net Quantity of Material: Alternative 1A = 160,000 cy of relatively poor-quality material that is only suitable for offshore disposal at LA-5 Alternative 1B = 1.2 mcy (overdredging would occur to generate appropriate material for beneficial reuse) Alternative 2A = 1.4 mcy (overdredging would occur to generate appropriate material for beneficial reuse)			
Type of Materials Placement	Potential Disposal Locations	Maximum Volumes Proposed for Placement by Site	
		Alternative 2A and Alternative 1B (cy)	Alternative 1A (cy)
Offshore Disposal	LA-5	0	160,000
Offshore Stockpiling (outside littoral cell)	SO-5/SO-6	1,000,000	0
Nearshore (inside littoral cell)	Cardiff	Alternative 2A	Alternative 1B
		500,000	300,000
Onshore (beach placement)	Cardiff	300,000	0
	Leucadia	117,000	0
	Moonlight Beach	105,000	0
	Solana Beach	146,000	0
	Torrey Pines	245,000	0

Notes:

1. Nearshore materials placement quantity at Cardiff is greater in Alternative 2A because a new inlet would require construction of a prefilled ebb bar (Section 2.4).
2. Materials placement quantities exceed amount to be disposed of, or reused, to allow flexibility at individual placement sites.
3. Onshore beach sand placement sites are consistent with the 2012 RBSP (SCH #2010051063) with the exception of Cardiff, which would extend slightly farther north and south along the coastline. Refer to Figure 2-11 for the proposed project's sand placement sites. While 2012 RBSP sites are proposed for use, the SELRP would obtain permits for placement, since the 2012 RBSP was a one-time project implemented in 2012.
4. Sand Compatibility and Opportunistic Use Programs (SCOUP) sites are not included as an option for materials placement in this EIR/EIS because the existing SCOUPs assume construction methods and other conditions that are not consistent with the SELRP (e.g., daytime construction only).

cy = cubic yards

mcy = million cubic yards

Alternative 2A was identified as the proposed project in the Draft EIR/EIS because it would result in the largest level of disturbance. The preliminary Least Environmentally Damaging Practicable Alternative (LEDPA) has been identified as Alternative 1B – Refined, as described in the Preface to this EIR/EIS through the Draft Section 404(b)(1) Alternatives Analysis, which is attached to this Final EIR/EIS as Appendix O. This alternative also represents the CEQA Agency Preferred Alternative and NEPA Environmentally Preferred Alternative subject to a final LEDPA determination that will be in the Record of Decision (ROD) issued by the Corps as part of its review of the project. This Final EIR/EIS continues to evaluate alternatives at an equal level of detail in the event the Final 404(b)(1), Alternatives Analysis, which will be included in the ROD, determines a different LEDPA from Alternative 1B – Refined.

ES-6 OVERVIEW OF AFFECTED ENVIRONMENT

San Elijo Lagoon

San Elijo Lagoon is a coastal wetland with ecological resources that are important to the region, as well as a recreational and visual amenity for the community. The lagoon and adjacent uplands in the Reserve provide habitats that support sensitive species. The lagoon study area is biologically rich with over 20 species of fish, over 20 species of reptiles and amphibians, 24 species of mammals, and over 295 bird species (including 65 nesting), in addition to a complex suite of terrestrial and marine invertebrates. Included are six federally threatened and endangered birds, such as light-footed Ridgway's rail (*Rallus obsoletus levipes*) and least Bell's vireo (*Vireo bellii pusillus*). Biological surveys of the lagoon study area identified one federally listed plant species, Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*); one state-listed plant species, Orcutt's goldenbush (*Hazardia orcuttii*); and 20 additional special-status plants. A mosaic of habitat and ecosystems occurs, from open water to dense freshwater marsh. The existing habitat is linked directly to tidal inundation and frequency.

Materials Disposal/Reuse Areas

In addition to the lagoon study area, the geographical scope of this document includes areas outside of the lagoon that are proposed to be used as disposal/reuse areas for materials excavated from the lagoon, as described below. To date, the proposed disposal/reuse areas have not been approved by the Corps or EPA; however, a Sampling and Analysis Plan (SAP) was prepared for the SELRP (Appendix A). Both the Corps and EPA determined that the testing in the SAP is consistent with the Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual (Inland Testing Manual) testing procedures, which address lagoon-dredged material-placement options such as nearshore and onshore placement, direct lagoon placement, or offshore stockpiling at borrow sites within the 3-mile limit from the shore. Additional Tier 1–4 testing may be required prior to Corps and EPA approval of the SAP Results Report. Testing in accordance with the Evaluation of Dredged Material Proposed for Ocean Disposal (Ocean Disposal Manual) has not been completed. Additional Tier 3 testing would be required prior to EPA and Corps approval of any offshore disposal to ensure that the material is suitable and is in compliance with the U.S. Ocean Dumping Regulations.

Offshore Disposal

LA-5 is an ocean disposal site designated by EPA that can be used for the disposal of dredged material from federal projects. It is located in the Pacific Ocean approximately 10 nautical miles offshore and southwest of San Diego Bay.

Offshore Stockpiling

There are two potential offshore placement sites for the proposed project, SO-5 and SO-6. A portion of SO-6 is within 4,000 feet of shore, close enough for material to be delivered to the site via pipeline. While closer to land than LA-5, SO-5 and SO-6 are outside the “depth of closure,” meaning material placed in these offshore locations will not return to the shoreline via natural ocean processes.

Nearshore and Onshore

Cardiff: Sand placement is proposed both in the nearshore ocean and onshore at Cardiff. The Cardiff site onshore is characterized by cobble beaches south of Restaurant Row. The site abuts Coast Highway 101 and is backed primarily by the lagoon. In its entirety, Cardiff State Beach stretches from Cardiff reef south to Seaside reef, encompasses approximately 25 acres, and has 6,550 feet of ocean frontage. The waters off of Cardiff State Beach include popular surf spots and also support commercial fishing, as well as potential kelp harvesting areas.

Leucadia: The beach at this placement site extends approximately 0.5 mile from just south of the Grandview access stairs to Jasper Street. Adjacent land uses are predominantly residential, with some commercial uses along Coast Highway 101. This state beach is operated by the City of Encinitas. Popular and often crowded surf spots are found near the placement site and rocks are a hazard.

Moonlight Beach: The proposed Moonlight Beach placement site is located at the foot of B and C streets at Moonlight State Beach. The proposed site is approximately 770 feet long. Moonlight State Beach is operated by the City of Encinitas and has a wide variety of recreational facilities. The southern part of the site abuts the Encinitas City Marine Life Refuge (California Fish and Game Code Section 10913). Residential uses occur adjacent to the site, to the north and south. The beach area is relatively flat but quickly slopes up to the east, north, and south with multiple popular surf breaks along this reach.

Solana Beach: The proposed placement site in the City of Solana Beach is located just north of Estrella Street and extends approximately 4,700 feet (0.9 mile) south. Steep cliffs abut the placement site and the area consists of a gently sloping sand beach with scattered rocks and cobbles. Residential development and some commercial uses exist along the bluffs above the placement site. The bluffs and beach are severely eroded, and numerous efforts to slow erosion, such as riprap, the filling in of sea caves, engineered in-fills, sea walls, and other revetments occur along the bluffs and beach. Surfing can be popular at this location depending on offshore sand, swell, and tides.

Torrey Pines: The proposed Torrey Pines placement site is located within the jurisdiction of the City of San Diego and California Department of Parks and Recreation. The site stretches for approximately 1,620 feet and is located on Torrey Pines State Beach adjacent to North Torrey Pines Road. Nearby land use includes the open space of Torrey Pines State Beach/Reserve and Los Peñasquitos Lagoon. Riprap has been placed along North Torrey Pines Road to protect it from eroding further. Popular surf breaks in the vicinity are scattered beach breaks of variable quality along Torrey Pines State Beach.

ES-7 ENVIRONMENTAL CONSEQUENCES

The discussion of environmental consequences in this EIR/EIS provides independent analyses of the two project components: lagoon restoration and materials disposal/reuse under both CEQA and NEPA. The four lagoon restoration alternatives and each of the materials disposal/reuse locations are analyzed at an equal level of detail. CEQA conclusions below are identified as significant impacts, while those referencing NEPA conclusions are identified as substantially adverse.

Under CEQA, resources that would result in less than significant or significant impacts that can be mitigated and reduced to less than significant for all alternatives include land use and recreation; hydrology; oceanography/coastal processes; water and aquatic sediment quality; geology and soils; cultural resources; paleontological resources; public services and utilities; and hazards and public safety.

Under NEPA, resources that would result in no substantial adverse effect include land use and recreation; hydrology; oceanography/coastal processes; water and aquatic sediment quality; geology and soils; cultural resources; paleontological resources; air quality; noise; socioeconomics and environmental justice; public services and utilities; and global climate change and greenhouse gases. Substantial adverse impacts would occur to biological resources; visual resources; traffic, access, and circulation; and hazardous materials and public safety.

Table ES-5 at the end of this Executive Summary summarizes the potential effects under each alternative for both CEQA and NEPA and identifies whether those effects can be mitigated.

Significant Unavoidable and Substantial Adverse Impacts

Under both CEQA and NEPA, significant unavoidable and substantial adverse impacts would result to biological resources due to temporary habitat loss, habitat loss effects on Belding's savannah sparrow (under Alternative 2A and Alternative 1B), and construction noise effects on

bird species (under Alternative 2A, Alternative 1B, and Alternative 1A). Mitigation is provided but would not reduce impacts to less than significant.

Under both CEQA and NEPA, significant unavoidable and substantial adverse impacts would result to visual resources due to temporary construction activities throughout the lagoon under Alternative 2A and Alternative 1B. Mitigation is provided but would not reduce impacts to less than significant. Permanent significant unavoidable and substantial adverse impacts due to placement of CBFs (Alternative 2A only) would also result, and feasible mitigation is not available.

Under both CEQA and NEPA, significant unavoidable and substantial adverse impacts would result temporarily to traffic conditions on segments of Coast Highway 101 and Lomas Santa Fe Drive due to Coast Highway 101 bridge construction (under Alternative 2A) or retrofitting activities (under Alternative 1B and Alternative 1A). Mitigation is provided but would not reduce impacts to less than significant.

During construction, under CEQA, significant unavoidable air quality impacts would result from equipment emissions for Alternative 2A, Alternative 1B, and Alternative 1A. Significant unavoidable air quality impacts would result from operational maintenance activities associated only with Alternative 2A. Mitigation is provided but would not reduce impacts to less than significant.

Under CEQA, significant unavoidable nighttime noise impacts would result from dredging and materials placement activities proposed 7 days a week, 24 hours a day. Noise thresholds limiting sound levels to 75 A-weighted decibels equivalent noise level during a 24-hour period would not be exceeded. However, due to proposed dredging outside of permitted daytime hours, variances would be required from the cities of Encinitas and Solana Beach and the County. With issuance of a variance, 24-hour operations could occur. Feasible mitigation is not available.

Under NEPA, the new inlet and associated CBFs would be a permanent project feature onshore and nearshore along Cardiff State Beach and persons who stray too close to these areas may result in injury should they be thrown against the CBFs or swept into the inlet or rip current. Impacts would be significant and substantially adverse. Mitigation is provided to minimize the public safety hazard.

Significant unavoidable CEQA impacts for Alternative 2A, Alternative 1B, and Alternative 1A would result from construction activities to global climate change and greenhouse gas (GHG) emissions. Mitigation is provided but would not reduce impacts to less than significant.

Cumulative Effects

Under CEQA, significant cumulative impacts were identified for six topic areas. Mitigation is proposed where feasible but would not reduce impacts to below a level of significance. Cumulative effects would result to biological resources, visual resources, traffic, air quality, noise, and global climate change and GHG emissions.

Under NEPA, substantial cumulative short-term adverse effects would result for biological resources, visual resources, and traffic.

The majority of the cumulative effects would persist only throughout the duration of the construction period as they are a result of construction-specific actions. Ultimately, these short-term effects would cease to contribute to a cumulative impact. Examples of cumulative effects that would end after construction include disturbance of bird species due to construction noise, nighttime construction noise, visual impacts of construction equipment in the lagoon, traffic congestion due to Coast Highway 101 bridge work, and construction-related pollutant emissions. Permanent cumulative effects would include the ongoing air quality emissions that would result from maintenance activities, under CEQA for Alternative 2A only.

For GHG emissions due to construction disturbance and equipment, the project adds a considerable contribution to cumulative global climate change. While a single project is unlikely to have a significant impact on global climate change, the cumulative effects of worldwide GHG emissions have been clearly linked to changes in the atmosphere and identified as the main cause of global climate change. The GHG emissions from construction and maintenance activities associated with lagoon restoration and materials disposal/reuse for Alternative 2A and Alternative 1B exceed the significance threshold of 900 metric tons of carbon dioxide equivalent (MT CO₂e) per year used for analysis of this project. Mitigation is provided, but it would not reduce the project's contribution impacts to less than significant. Construction and maintenance GHG emissions for Alternative 1A would not exceed the recommended level of significance.

Table ES-5
Summary of Environmental Effects

	Alternative 2A	Alternative 1B	Alternative 1A	No Action/No Project Alternative	Mitigation Measure	CEQA Level of Significance after Mitigation
Land Use and Recreation						
<i>Lagoon Restoration</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	None required	N/A
Hydrology						
<i>Lagoon Restoration</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	No impact	No impact	No impact	No impact	None required	N/A
Oceanography/Coastal Processes						
<i>Lagoon Restoration</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	None required	N/A
<i>Materials Disposal</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	None required	N/A
Water and Aquatic Sediment Quality						
<i>Lagoon Restoration</i>	CEQA: Because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging operations would be considered a potentially significant impact. NEPA: Not substantially adverse	CEQA: Because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging operations would be considered a potentially significant impact. NEPA: Not substantially adverse	CEQA: Because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging operations would be considered a potentially significant impact. NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 2A, Alternative 1B, and Alternative 1A</i> Water Quality - 1: All additional conditions, BMPs, and requirements that are identified by regulatory agencies prior to project initiation as part of the permitting process for the project, including Section 404 permit, Coastal Development Permit, Section 1601 permit, Section 401 Water Quality Certification, and the NPDES MS4 permit must be implemented. Compliance with those permit conditions would be monitored through the construction monitoring program and the contractor shall certify to the engineer of record that they have been completed. <i>Required (CEQA) for Alternative 2A and Alternative 1B.</i> Water Quality - 2: Turbidity levels shall be actively managed by using a cutterhead dredge and/or temporarily closing the lagoon inlet. The overedge pit shall be capped with sand and material to encapsulate material and prevent it from introducing turbidity or pollutants into the water column or released into the environment. The contractor shall certify to the permit holder that the dredge operations are not responsible for release of sediments into the water column at levels resulting in increased downstream sedimentation. None required	CEQA: Less than significant
<i>Materials Disposal</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	None required	N/A
Geology and Soils						
<i>Lagoon Restoration</i>	CEQA: The proposed bridge improvement and channel-deepening portions of Alternative 2A could result in significant impacts from liquefaction, erosion, settlement, and other unstable geologic conditions that could result in a significant geologic impact. NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: No impact NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 2A.</i> Geology-1: The proposed bridge improvement and channel-deepening portions of the project could result in significant impacts from liquefaction, erosion, settlement, and other unstable geologic conditions. The mitigation of performing geotechnical investigations and implementing site-specific measures recommended in the engineering study to ensure appropriate design for structural stability and reducing unstable geologic conditions is required to reduce impacts to less than significant. After implementation of the measures identified to remediate potentially unstable geologic conditions, certification shall be provided by a California Registered Professional Engineer or Certified Engineering Geologist that states that the measures are in place and the identified liquefaction, erosion, settlement, or other unstable geologic conditions have been adequately remediated to mitigate the potential impact.	CEQA: Less than significant
<i>Materials Disposal</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: No impact NEPA: Not substantially adverse	None required	N/A

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	Alternative 2A	Alternative 1B	Alternative 1A	No Action/No Project Alternative	Mitigation Measure	CEQA Level of Significance after Mitigation
Biological Resources <i>Lagoon Restoration</i>	CEQA and NEPA: Construction would result in greater than 50 percent temporal loss of sensitive habitats including coastal salt marsh (low- and mid-), open water, salt panne/open water, and tidal mudflats and a significant and substantially adverse short-term direct impact and cumulative impact would result.	CEQA and NEPA: Construction would result in greater than 50 percent temporal loss of sensitive habitats including coastal salt marsh (low- and mid-), open water, salt panne/open water, and tidal mudflats and a significant and substantially adverse short-term direct impact and cumulative impact would result.	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	<i>Required for Alternative 2A and Alternative 1B.</i> Feasible mitigation not available.	CEQA: Significant and unavoidable
	CEQA and NEPA: Belding's savannah sparrow is a year-round resident that would experience temporary loss of greater than 50 percent of their nesting habitat. This would result in a significant and substantially adverse short-term direct impact.	CEQA and NEPA: Belding's savannah sparrow is a year-round resident that would experience temporary loss of greater than 50 percent of their nesting habitat. This would result in a significant and substantially adverse short-term direct impact result.	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	<i>Required for Alternative 2A and Alternative 1B.</i> Feasible mitigation not available.	CEQA: Significant and unavoidable
	CEQA and NEPA: Construction noise could negatively affect breeding and foraging behavior and would result in a significant and substantially adverse direct and cumulative impact.	CEQA and NEPA: Construction noise could negatively affect breeding and foraging behavior and would result in a significant and substantially adverse direct and cumulative impact.	CEQA and NEPA: Construction noise could negatively affect breeding and foraging behavior and would result in a significant and substantially adverse direct and cumulative impact. CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	<i>Required for Alternative 2A, Alternative 1B, and Alternative 1A.</i> Feasible mitigation not available.	CEQA: Significant and unavoidable
	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	None required.	N/A
Cultural Resources <i>Lagoon Restoration</i>	CEQA: Accidental disturbance to nearby cultural resources could occur during construction use of the existing access road near sites CA-SDI-13903 and CA-SDI-20,816 and result in a potentially significant impact. NEPA: Not substantially adverse	CEQA: Accidental disturbance to nearby cultural resources could occur during construction use of the existing access road near sites CA-SDI-13903 and CA-SDI-20,816 and result in a potentially significant impact. NEPA: Not substantially adverse	CEQA: Accidental disturbance to nearby cultural resources could occur during construction use of the existing access road near sites CA-SDI-13903 and CA-SDI-20,816 and result in a potentially significant impact. NEPA: Not substantially adverse	No impact	<i>Required (CEQA) for Alternative 2A, Alternative 1B, and Alternative 1A.</i> Cultural-5: Exclusionary fencing shall be used to avoid inadvertent disturbance of cultural resources in proximity to the API, staging areas, and access roads. The temporary exclusionary fencing shall be placed parallel to, but outside of the APE, staging areas, or the access road's existing limits of disturbance in locations where within 15 feet. Specifically, exclusionary fencing shall be placed parallel to existing access roads used for construction access near sites CA-SDI-13903 and CA-SDI-20,816.	CEQA: Less than significant
	CEQA: Accidental disturbance of unknown buried human remains during ground disturbance would result in a potentially significant impact. NEPA: Not substantially adverse	CEQA: Accidental disturbance of unknown buried human remains during ground disturbance would result in a potentially significant impact. NEPA: Not substantially adverse	CEQA: Accidental disturbance of unknown buried human remains during ground disturbance would result in a potentially significant impact. NEPA: Not substantially adverse	No impact	<i>Required (CEQA) for Alternative 2A, Alternative 1B, and Alternative 1A.</i> Cultural-4: If human remains are encountered during the proposed project: • Work at that location will be suspended and redirected elsewhere. • Corps and County DPR will be immediately notified of the discovery. • Remains will be left in place and exclusionary fencing will be placed in a 50-foot radius around the discovery. • Under the provisions of the California PRC Section 7050.5, the County Coroner will be notified in the event of discovery of human remains. • If the remains are either determined to be or there is reason to believe they are Native American, the coroner will notify the NAHC within 24 hours. • Disposition of Native American human remains on non-federal lands is within the jurisdiction of the NAHC. The Corps and County DPR, as lead agencies for the proposed project, will initiate consultation with the NAHC. As part of the consultation process, the NAHC will notify persons most likely to be descended (MLD) from the remains. No ground-disturbing work will occur in the location of the remains until consultation between the NAHC, MLD, Corps, and County DPR has been completed, and notification by the Corps and County DPR that construction activities may resume. • If the remains are discovered in situ, they will be left in place and covered with weather-proof materials such as a tarp or plywood. If they are discovered in spoils, the remains will be placed in a labeled bag and, on approval by the MLD, transported to a secure locked container. An osteologist or a forensic anthropologist will, in consultation with the MLD, inspect fragmentary bones that are suspected to be human but cannot be identified as such in the field.	CEQA: Less than significant
	CEQA: Ground-disturbing excavation at the new Coast	CEQA: Less than significant NEPA: Not substantially	CEQA: Less than significant NEPA: Not substantially	No impact	<i>Required (CEQA) for Alternative 2A only.</i>	CEQA: Less than significant

	Alternative 2A Highway 101 bridge and inlet where there is the possibility for unknown buried cultural resources in stable sediments could result in a potentially significant impact NEPA: Not substantially adverse	Alternative 1B adverse	Alternative 1A adverse	No Action/No Project Alternative	Mitigation Measure	CEQA Level of Significance after Mitigation
					Cultural-1: Implementation of Alternative 2A requires that an Archaeological Monitoring and Discovery Plan shall be prepared and implemented prior to the start of ground-disturbing activities at the new Coast Highway 101 bridge and inlet to identify areas with the potential for intact cultural deposits and provide protocols in the event archaeological material is encountered during construction of the project. If previously unknown resources are identified during construction, the lines of communication and measures outlined in the Monitoring and Discovery Plan would be followed, including applicable late discovery protocols per Section 106. These measures would include of the NHPA. The Archaeological Monitoring and Discovery Plan shall include but is not limited to the following measures: - Ground-disturbing construction activity shall be temporarily halted by the project archaeologist and/or Native American monitor at the location of the find and redirected elsewhere until the find is assessed by a qualified archaeologist for eligibility to the NRHP and CRHR. - If the find is determined by the project archaeologist in consultation with the Native American monitor to be potentially eligible for the NRHP or CRHR: - On stable surfaces, an exclusionary zone would be set up around the find and marked (e.g., lath and flagging or silt fencing). - The cultural resources principal investigator would contact the Corps and County DPR to formulate a plan for evaluation or avoidance through redesign. - Dredging or mechanical ground-disturbing activities would not resume in that location until the principal investigator is notified by the Corps and County DPR that activities may resume. - If the resource is located on state lands, the California SLC Assistant Chief Counsel will be informed of the discovery. Evaluation procedures would include: - subsurface excavation (in stable sediments), - cataloging and laboratory analysis of recovered cultural materials, - curation of the artifact collection at an approved regional facility, - preparation of a draft and final technical report pursuant to CEQA and NEPA documenting the discovery and addressing regional research issues, and - consultation with local Native Americans in accordance with Section 106 regarding the significance and treatment of any cultural resources encountered. If any human remains are discovered, the Property Owner or their representative shall contact the County Coroner, the Corps, and the County DPR. Upon identification of human remains, no further disturbance shall occur in the area of the find until the County Coroner has made the necessary findings as to origin. If the remains are determined to be of Native American origin, the Most Likely Descendant (MLD), as identified by the NAAHC, shall be contacted by the Property Owner or their representative in order to determine proper treatment and disposition of the remains. The immediate vicinity where the Native American human remains are located is not to be damaged or disturbed by further development activity until consultation with the MLD regarding their recommendations as required by Public Resources Code Section 5097.98 has been conducted. Public Resources Code §5097.98, CEQA §15064.5 and Health & Safety Code §7050.5 shall be followed in the event that human remains are discovered. Cultural-2: Implementation of Alternative 2A requires that cultural resources monitoring shall be required during mechanical excavation associated with the Coast Highway 101 bridge and inlet. A qualified archaeological monitor and Native American representative shall be present during all mechanical excavations in sediments with the potential for NRHP- or CRHR-eligible cultural resources. Cultural-3: Implementation of Alternative 2A requires that a training session for project construction personnel shall be conducted by a qualified archaeologist prior to the start of ground-disturbing activities at the Coast Highway 101 bridge/inlet. The training session shall include a review of required monitoring locations and communication protocols, types of cultural resources that might be encountered, cultural resources responsibilities, protection procedures, and avoidance measures. Cultural-4: If human remains are encountered during the proposed project: - Work at that location will be suspended and redirected elsewhere. - Corps and County DPR will be immediately notified of the discovery. - Remains will be left in place and exclusionary fencing will be placed in a 50-foot radius around the discovery. - Under the provisions of the California PRC Section 7050.5, the County Coroner will be notified in the event of discovery of human remains. - If the remains are either determined to be or there is reason to believe they are Native American, the coroner will notify the NAAHC within 24 hours. - Disposition of Native American human remains on non-federal lands is within the jurisdiction of the NAAHC. The Corps and County DPR, as lead agencies for the proposed project, will initiate consultation with the NAAHC. As part of the consultation process, the NAAHC will notify persons most likely to be descended (MLD) from the remains. No ground-disturbing work will occur in the location of the remains until consultation between the NAAHC, MLD, Corps, and County DPR has been completed, and notification by the Corps and County DPR that construction activities may resume. - If the remains are discovered in situ, they will be left in place and covered with weather-proof materials such as a tarp or plywood. If they are discovered in spoils, the remains will be placed in a labeled bag and, on approval by the MLD, transported to a secure locked container. An osteologist or a forensic anthropologist will, in consultation with the MLD, inspect fragmentary bones that	

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	Alternative 2A	Alternative 1B	Alternative 1A	No Action/No Project Alternative	Mitigation Measure	CEQA Level of Significance after Mitigation
					are suspected to be human but cannot be identified as such in the field.	
<i>Materials Disposal</i>	No impact	No impact	No impact	No impact	Cultural-5: Exclusionary fencing shall be used to avoid inadvertent disturbance of cultural resources in proximity to the APE, staging areas, and access roads. The temporary exclusionary fencing shall be placed parallel to, but outside of the APE, staging areas, or the access road's existing limits of disturbance in locations where they are within 15 feet. Specifically, exclusionary fencing shall be placed parallel to existing access roads used for construction access near siteless CA-SD1-13903 and CA-SD1-20816.	N/A
Paleontological Resources	CEQA: Accidental disturbance of paleontological resources could occur during construction in areas with subsurface potential and is a potentially significant impact. NEPA: Not substantially adverse	CEQA: Accidental disturbance of paleontological resources could occur during construction in areas with subsurface potential and is a potentially significant impact. NEPA: Not substantially adverse	CEQA: Accidental disturbance of paleontological resources could occur during construction in areas with subsurface potential and is a potentially significant impact. NEPA: Not substantially adverse	CEQA: No impact NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 2A, Alternative 1B and Alternative 1A.</i> Paleo-1: A monitoring program during grading, trenching, or other excavation into undisturbed substratum or deeper bedrock beneath the soil horizons and a fossil recovery program shall be implemented per County mitigation standards for excavation equal to or greater than 2,500 cy in high or moderate potential areas. A County-approved paleontologist shall be contracted to perform paleontological resource monitoring and a fossil recovery program if significant paleontological resources are encountered during grading, trenching, or other excavation into undisturbed rock layers beneath the soil horizons in proximity to the Delmar Formation along the North Ros Avenue access road. The following shall be completed: A County-approved paleontologist shall perform the monitoring (and recovery, if necessary, and report preparation) duties pursuant to the most current version of the County of San Diego Guidelines for Determining Significance for Paleontological Resources. The contract provided to the County shall include an agreement that the grading/trenching/excavation monitoring will be completed. The contract shall include a cost estimate for the monitoring work and reporting. The cost of the monitoring shall be bonded. Paleo-2: A final Paleontological Resource Mitigation Report that documents the results, analysis, and conclusions of all phases of the Paleontological Monitoring Program shall be prepared, if excavation into the Delmar Formation occurs and monitoring is required.	CEQA: less than significant
<i>Materials Disposal</i>	No impact	No impact	No impact	No impact	None required	N/A
Visual Resources	CEQA and NEPA: Construction activities would result in a direct temporary and cumulative significant and substantial adverse impact to the visual quality and character of the lagoon. CEQA and NEPA: CBFs would introduce a built linear feature and the contrast would be strong for some beach users. Although efforts would be made to soften the appearance via naturalized finish and partial to full burial of the feature, the contrast would remain substantial. Impacts would be significant and substantially adverse. CEQA: Less than significant NEPA: Not substantially adverse	CEQA and NEPA: Construction activities would result in a direct temporary and cumulative significant and substantial adverse change in the visual quality and character of the lagoon. No impact	CEQA: Less than significant NEPA: Not substantially adverse	No impact	<i>Required for Alternative 2A and Alternative 1B.</i> Visual-1: Temporary screening would be placed around construction areas that are secured with a chain-link fence (such as booster pumps, staging areas, etc., as shown in Figure 2-15) to provide visual screening of the equipment located within the secured area. Screening could be brown or green mesh or other similar screening material attached to the fencing that would visually hide or obscure the interior of the fenced areas. The screening would extend as high as the chain-link fence, which would range from approximately 6 to 10 feet depending on the area being secured. <i>Alternative 2A only:</i> No feasible mitigation measures available.	CEQA: Significant and unavoidable CEQA: Significant and unavoidable
<i>Materials Disposal</i>	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	No impact	None required	N/A
Traffic and Circulation	CEQA and NEPA: Bridge replacement construction activities would result in a substantially adverse and significant temporary direct and cumulative traffic impact due to capacity reductions causing traffic operations to degrade from LOS A to LOS F on a segment of Coast Highway 101, south of Chesterfield	CEQA and NEPA: Bridge retrofiting activities would result in a substantially adverse and significant temporary direct and cumulative traffic impact due to capacity reductions causing traffic operations to degrade from LOS A to LOS F on a segment of Coast Highway 101, south of Chesterfield	CEQA and NEPA: Bridge retrofiting activities would result in a substantially adverse and significant temporary direct and cumulative traffic impact due to capacity reductions causing traffic operations to degrade from LOS A to LOS F on a segment of Coast Highway 101, south of Chesterfield	No impact	<i>Required for Alternative 2A, Alternative 1B, and Alternative 1A.</i> Traffic-1: Prepare work zone traffic control plans for lane closures and related construction along Coast Highway 101. The work zone traffic control plans shall be prepared in accordance with the California Manual of Uniform Traffic Control Devices (CA MUTCD), Caltrans Standard Plans (2010), and current standards and best practices of the reviewing and approving agencies. These plans are intended to accommodate workers within the roadway, while facilitating continued circulation for road users (motorists, bicyclists, and pedestrians including persons with disabilities in accordance with the ADA) through the work zone. Traffic-2: Provide advanced notification to motorists that delays and traffic congestion will occur during bridge construction and retrofiting activities to encourage avoidance of the construction area. This notification may be accomplished through various measures such as information and detour routes included on the project website; traffic details included in all notifications sent to local residents; traffic and	CEQA: Significant and unavoidable

	Alternative 2A 101 south of Chesterfield Drive.	Alternative 1B Drive.	Alternative 1A Drive.	No Action/No Project Alternative	Mitigation Measure alternative route information published in local media; and physical traffic control measures, such as temporary signage located at various distances from the construction area.	CEQA Level of Significance after Mitigation
	CEQA and NEPA: Bridge replacement construction activities would result in a substantially adverse and significant direct and cumulative traffic impact due to reduction in capacity and the subsequent redistribution of northbound traffic to I-5 via Lomas Santa Fe Drive, causing traffic operations to degrade from LOS E to LOS F on a segment of Lomas Santa Fe Drive from Solana Hills Drive to I-5.	CEQA and NEPA: Bridge retrofit activities would result in a substantially adverse and significant direct and cumulative traffic impact due to reduction in capacity and the subsequent redistribution of northbound traffic to I-5 via Lomas Santa Fe Drive, causing traffic operations to degrade from LOS E to LOS F on a segment of Lomas Santa Fe Drive from Solana Hills Drive to I-5.	CEQA and NEPA: Bridge retrofit activities would result in a substantially adverse and significant direct and cumulative traffic impact due to reduction in capacity and the subsequent redistribution of northbound traffic to I-5 via Lomas Santa Fe Drive, causing traffic operations to degrade from LOS E to LOS F on a segment of Lomas Santa Fe Drive from Solana Hills Drive to I-5.	No impact	See Traffic-1 and Traffic-2.	CEQA: Significant and unavoidable
Materials Disposal	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	No impact	None required	N/A
Air Quality						
Lagoon Restoration	CEQA: Construction-generated ROG and NO _x emissions would exceed applicable mass emission thresholds and result in a significant direct and cumulative impact. NEPA: Not substantially adverse	CEQA: Construction-generated ROG and NO _x emissions would exceed applicable mass emission thresholds and result in a significant direct and cumulative impact. NEPA: Not substantially adverse	CEQA: Construction-generated ROG and NO _x emissions would exceed applicable mass emission thresholds and result in a significant direct and cumulative impact. NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 2A, Alternative 1B, and Alternative 1A</i> AQ-1: Off-road construction diesel engines not registered under ARB's Statewide Portable Equipment Registration Program that have a rating of 50 horsepower (hp) or more, shall meet, at a minimum, the Tier 3 California Emissions Standards, unless such an engine is not available for a particular item of equipment. Tier 2 engines will be allowed on a case-by-case basis when the Contractor has documented that no Tier 3 equipment or emissions equivalent retrofit equipment is available for a particular equipment type that must be used to complete construction. Documentation shall consist of signed written statements from at least two construction equipment rental firms. AQ-2: Harbor craft with a Category 1 or 2 marine engine, such as tugboats used for materials disposal, shall meet, at a minimum, EPA Tier 2 marine engine emission standards. AQ-3: Dredging equipment shall be electric, if determined by the contractor to be feasible, based on availability and cost. AQ-4: Contractors shall use alternative fueled (e.g., compressed natural gas [CNG], liquefied natural gas [LNG], propane), or electric-powered construction equipment where, if determined by the contractor to be feasible, based on availability and cost. AQ-5: The following measures shall be implemented by the construction contractor to reduce fugitive dust emissions associated with off-road equipment and heavy-duty vehicles: • Exposed surfaces (e.g., unpaved access roads) shall be watered, as necessary, to control fugitive dust. • Sweepers and water trucks shall be used to control dust and debris at public street access points. • Dirt storage piles shall be stabilized by chemical binders, tarps, fencing, or other suppression measures. • Provide sufficient perimeter erosion control to prevent washout of silt material onto public roads. • Cover haul trucks or maintain at least 12 inches of freeboard to reduce blow-off during hauling. • Enforce a 15-mph speed limit on unpaved surfaces. <i>Alternative 2A only (CEQA).</i> See AQ-1 through AQ-5	CEQA: Significant and unavoidable
Materials Disposal	CEQA: NO _x emissions associated with ongoing operational maintenance activities would exceed the applicable mass emission threshold and result in a significant direct and cumulative impact. NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant NEPA: Not substantially adverse	N/A	N/A
Noise	CEQA: Noise impacts associated with nighttime dredging would be significant. NEPA: Not substantially adverse	CEQA: Noise impacts associated with nighttime dredging would be significant. NEPA: Not substantially adverse	CEQA: Noise impacts associated with nighttime dredging would be significant. NEPA: Not substantially adverse	No impact	No feasible mitigation measures available.	CEQA: Significant and unavoidable

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	Alternative 2A	Alternative 1B	Alternative 1A	No Action/No Project Alternative	Mitigation Measure	CEQA Level of Significance after Mitigation
<i>Materials Disposal</i>	CEQA: Noise impacts associated with nighttime material placement would be significant. NEPA: Not substantially adverse	CEQA: Noise impacts associated with nighttime material placement would be significant. NEPA: Not substantially adverse	CEQA: Noise impacts associated with nighttime material placement would be significant. NEPA: Not substantially adverse	No impact	No feasible mitigation measures available.	CEQA: Significant and unavoidable
Socioeconomics and Environmental Justice						
<i>Lagoon Restoration</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	No impact	None required	N/A
<i>Materials Disposal</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	No impact	None required	N/A
Public Services and Utilities						
<i>Lagoon Restoration</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	No impact	None required	N/A
<i>Materials Disposal</i>	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	No impact	None required	N/A
Hazardous Materials and Public Safety						
<i>Lagoon Restoration</i>	CEQA and NEPA: The new inlet and associated CBFs would be a permanent project feature onshore nearshore along Cindiff State Beach and persons who stray too close to these areas may result in injury should they be thrown against the CBFs or swept into the inlet or rip current. Impacts would be significant and substantially adverse.	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	<i>Required for Alternative 2A only</i> HAZ-1: The project applicant shall continue coordination with California Department of Parks and Recreation to relocate the mobile lifeguard tower (State Lifeguard Tower No. 6) closer to the new inlet location. HAZ-2: The project applicant shall install signs at the new inlet to enhance public awareness to avoid potential safety hazards associated with the new inlet location and associated CBFs.	CEQA: Less than significant
<i>Materials Disposal</i>	CEQA: Unforeseen wastes and hazardous materials could be dredged from the lagoon and create a public health hazard from management or disposal and result in a significant impact. NEPA: Not substantially adverse	CEQA: Unforeseen wastes and hazardous materials could be dredged from the lagoon and create a public health hazard from management or disposal and result in a significant impact. NEPA: Not substantially adverse	CEQA: Unforeseen wastes and hazardous materials could be dredged from the lagoon and create a public health hazard from management or disposal and result in a significant impact. NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 2A, Alternative 1B, and Alternative 1A.</i> HAZ-3: A sediment management plan will be developed and implemented to test dredged materials for proper placement in the overdrudge pit or for off-site transport and proper disposal and to be in compliance with local, state, and federal regulations. The plan shall specify that if unknown contamination or other buried hazards are encountered during dredging, procedures must be carried out according to applicable regulations. Any material encountered that appears to contain contaminants will be handled in accordance with local, state, and federal guidelines, and permit conditions.	CEQA: Less than significant
Global Climate Change and Greenhouse Gas Emissions						
<i>Lagoon Restoration</i>	CEQA: Construction-related and operational GHGs would exceed the recommended level of significance and result in a significant and adverse cumulative impact. NEPA: Not substantially adverse	CEQA: Construction-related GHG emissions would exceed the recommended level of significance and result in a significant and adverse cumulative impact. NEPA: Not substantially adverse	CEQA: Construction-related GHG emissions would exceed the recommended level of significance and result in a significant and adverse cumulative impact. NEPA: Not substantially adverse	CEQA: Less than significant adverse NEPA: Not substantially adverse	<i>Required (CEQA) for Alternative 2A, Alternative 1B, and Alternative 1A.</i> GHG-1: On-site material hauling shall be performed with trucks equipped with on-road engines to the extent practicable. GHG-2: Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours to the extent practicable. GHG-3: Restrict material hauling on public roadways to off-peak traffic congestion hours to the extent possible. During construction scheduling and execution minimize, to the extent possible, uses of public roadways that would increase traffic congestion. GHG-4: Use high-efficiency lighting and Energy Star-compliant heating and cooling units. Implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.	CEQA: Significant and unavoidable
<i>Materials Disposal</i>	Considered together with Lagoon Restoration	Considered together with Lagoon Restoration	Considered together with Lagoon Restoration	Considered together with Lagoon Restoration	N/A	N/A

CHAPTER 1.0

INTRODUCTION

1.1 PROJECT OVERVIEW

This joint Environmental Impact Report/Environmental Impact Statement (EIR/EIS) analyzes the potential environmental consequences associated with implementation of the San Elijo Lagoon Restoration Project (SELRP or proposed project). The SELRP has two components: the restoration of San Elijo Lagoon and the disposal or reuse of materials excavated as part of that restoration. The SELRP would restore ecological functions in San Elijo Lagoon (lagoon) within the San Elijo Lagoon Ecological Reserve (Reserve). The lagoon is located in the city of Encinitas, San Diego County, California (Figure 1-1). The study area is focused on the restoration areas and is composed of approximately 960 acres, primarily within the Reserve, including the lagoon. The lagoon is separated into four areas: the east basin, central basin, west basin, and coastal area (Figure 1-2). The Reserve is owned and managed by the California Department of Fish and Wildlife (CDFW), formerly the California Department of Fish and Game (CDFG) – 348 acres; County of San Diego Department of Parks and Recreation (County DPR) – 567 acres; and the San Elijo Lagoon Conservancy (SELC) – 62 acres.

Restoration of the lagoon has the potential to generate more than 1 million cubic yards (mcy) of excess material; various options are proposed for disposal or reuse of that material (e.g., offshore ocean and/or upland disposal, offshore stockpiling for future use, placement on the beach or nearshore, reuse on-site), depending on its characteristics and suitability. On-site reuse of materials would occur for construction of transition and nesting areas. Construction of an on-site overdredge pit is also evaluated under alternatives where a large enough area would be disturbed to allow for it. An overdredge pit would provide sand for off-site reuse within the coastal area, or littoral cell, while accommodating disposal of finer-grained material on-site. A secondary study area encompasses off-site locations that have been identified for potential materials disposal or reuse (Figure 1-3).

The lagoon is a regionally important coastal wetland with substantial human and environmental resources. It provides habitat for federally listed threatened and endangered species, as well as other sensitive plants and wildlife, and offers recreation opportunities within the Reserve. Lagoon functions have become compromised over time, as development and infrastructure constraints have affected the ecosystem and the gradient of habitats within the lagoon (e.g., between unvegetated and vegetated intertidal habitats). The SELRP is an effort to restore

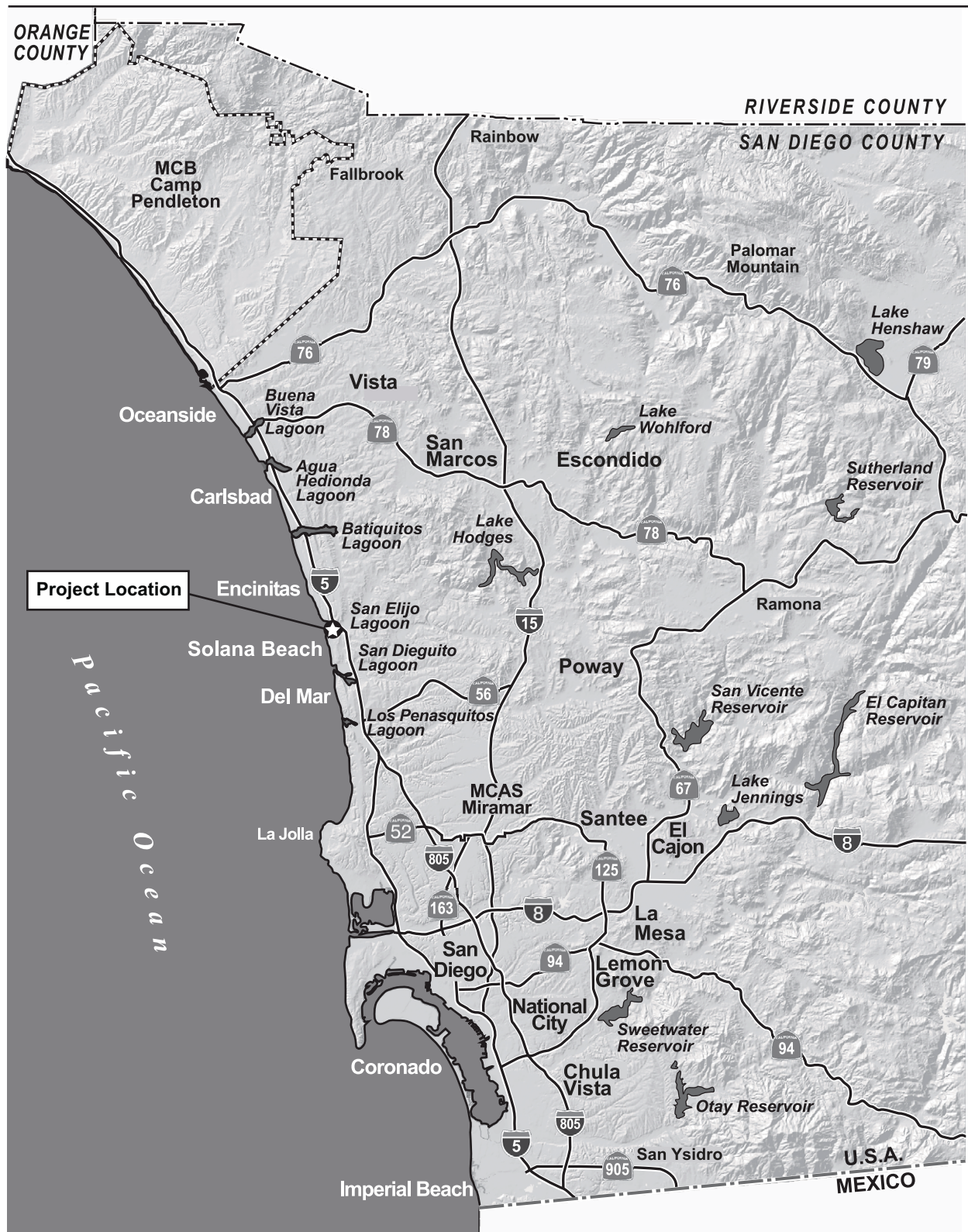
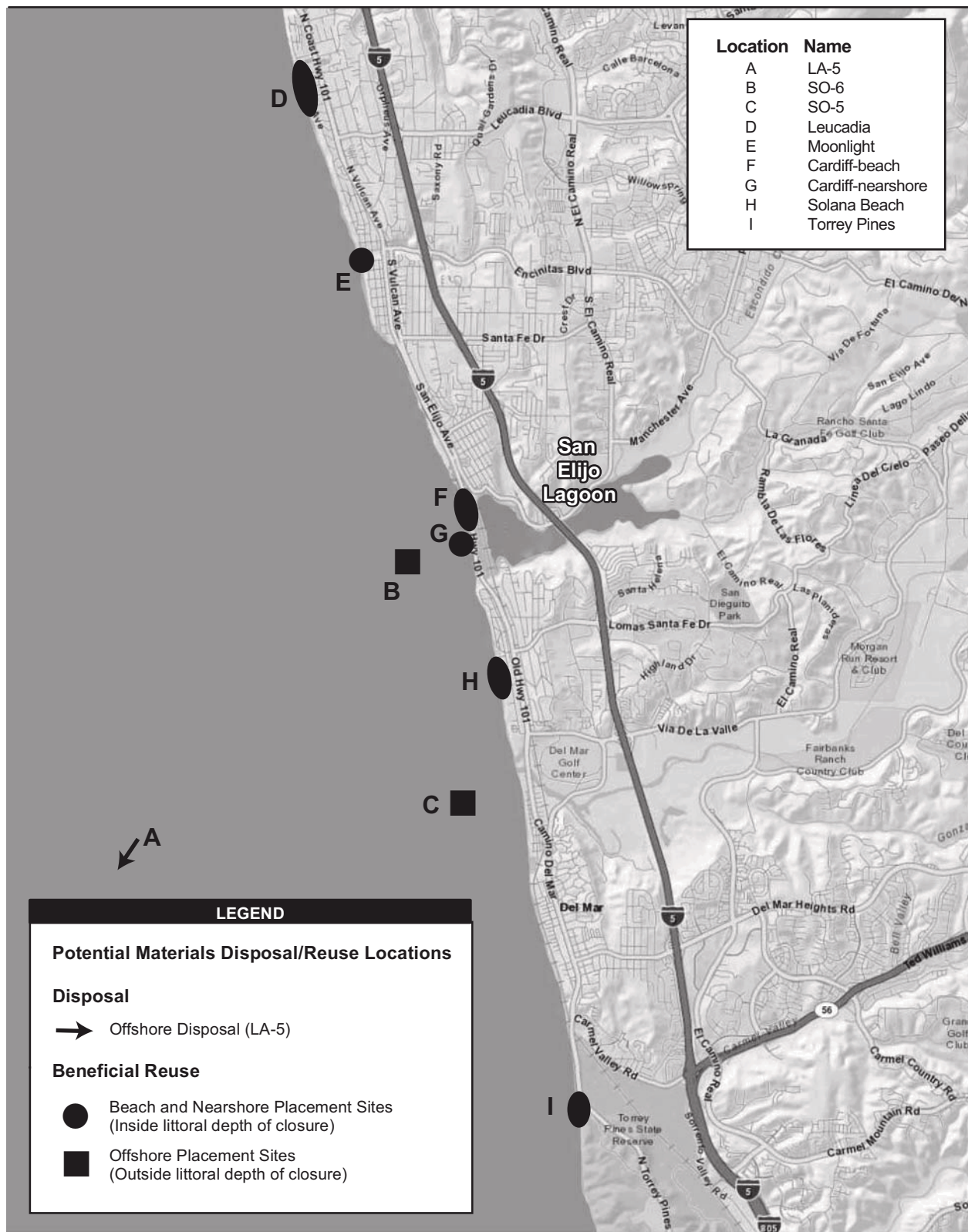


Figure 1-1
Regional Map



Source: ESRI; SANGIS; AECOM 2012



1 0.5 0 1 Miles

Scale: 1:24,000; 1 inch = 2,000 feet

Figure 1-3
SELRP Materials Disposal/Reuse Study Areas

lagoon functions and services to the extent practicable given the current constraints of surrounding development and activities. The proposed project aims to improve water quality and enhance tidal exchange of the lagoon with the ocean by removing nutrient-rich sediments and modifying existing constraints, such as a limited channel network and infrastructure due to Coast Highway 101, the North County Transit District (NCTD) railroad, Interstate 5 (I-5), and a weir owned by CDFW. Habitat distributions proposed by the SELRP would represent a more connected gradient of balanced habitat types that would provide both nesting and foraging habitats for different bird species. Increased habitat heterogeneity would also support reptiles, amphibians, mammals, and invertebrates. The project aims to create a more resilient ecosystem that can accommodate future climate change scenarios, including sea level rise. The project incorporates periodic maintenance and monitoring, as well as an adaptive management component, to provide for maintenance of enhancements made as part of the SELRP into the future.

Restoration of the lagoon will require issuance of permits from the U.S. Army Corps of Engineers (Corps) and San Diego Regional Water Quality Control Board (RWQCB) pursuant to Sections 404 and 401 of the Clean Water Act (CWA), respectively, for the discharge of fill material into “waters of the U.S.,” as well as a permit from the Corps pursuant to Section 10 of the Rivers and Harbors Act (RHA) for work in, over, or under waters of the U.S. In addition, a permit consistent with Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) may be required for ocean disposal, depending on the alternative chosen. The Corps is required to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for potential impacts on federally endangered or threatened species, and with NMFS pursuant to the Magnuson-Stevens Act for potential impacts to Essential Fish Habitat (EFH). Accordingly, these regulatory and wildlife entities have key interests in the proposed project.

This EIR/EIS has been prepared in accordance with the California Environmental Quality Act (CEQA) of 1970 (Public Resources Code [PRC] Section 21000 et seq.) and the Guidelines for Implementation of CEQA published by the Resources Agency of the State of California (California Administrative Code Section 15000 et seq.). The document also meets the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [USC] Section 4321 et seq.) in conformance with the Council for Environmental Quality’s (CEQ) Regulations for Implementing NEPA (40 Code of Federal Regulations [CFR] Part 1500 et seq.) and the Corps’ NEPA Implementation Procedures (33 CFR Part 325, Appendix B).

County DPR is part owner of the Reserve and manages it in coordination with the SELC and CDFW. As owner, County DPR will issue a right of entry permit for implementation of the project on the County’s land and will certify the EIR in compliance with CEQA. Upon

certification, County DPR will adopt Findings and a Statement of Overriding Considerations, as necessary, and will file a Notice of Determination (NOD).

A permit application for the discharge of dredged and/or fill material into jurisdictional waters of the U.S. and work in waters of the U.S. was submitted to the Corps on August 2, 2012. It is anticipated that a long-term Department of the Army (DA) standard individual permit pursuant to Section 404 of the CWA and Section 10 of the RHA for the SELRP and adaptive monitoring and maintenance program will be issued. If offshore disposal is also required, a DA permit pursuant to Section 103 of the MPRSA will also be requested. Pursuant to NEPA, this EIR/EIS fulfills the Corps' responsibility to document a reasonable range of project alternatives, and provide full and fair discussion of anticipated environmental impacts within the Corps' NEPA scope of analysis. The Corps will also use this document in its permit evaluation process, which incorporates factors indicated in 33 CFR Section 320.4: public interest review; effects on wetlands; fish and wildlife; water quality; historic, cultural, scenic, and recreational values; consideration of private ownership; effects on coastal zones; and other federal, state, or local requirements.

A Sampling and Analysis Plan (SAP) has been prepared for the SELRP to provide a preliminary evaluation of the suitability of material underlying the lagoon for beneficial reuse within the littoral zone (e.g., beaches, nearshore, or for offshore stockpiling for future use in the littoral zone) or disposal at LA-5, a current U.S. Environmental Protection Agency (EPA)-approved ocean disposal site located off San Diego. The May 2013 report summarizing the SAP for the SELRP is included as Appendix A.

Project alternatives evaluated in this document and the analysis of environmental impacts also fulfill the Corps' responsibility to ensure compliance with the CWA Section 404(b)(1) Guidelines. The Section 404(b)(1) Guidelines state that no discharge of dredged or fill material will be permitted if there is a practicable alternative to the proposed discharge that would have a less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant environmental consequences (40 CFR Section 230.10[a]). Temporary and permanent impacts to the physical and biological attributes of the aquatic environment are evaluated by the Corps in the Draft Section 404(b)(1) Alternatives Analysis in accordance with the Section 404(b)(1) Guidelines. The Draft Section 404(b)(1) Alternatives Analysis identifies the preliminary Least Environmentally Damaging Practicable Alternative (LEDPA), and is provided in this Final EIR/EIS as Appendix O. The final Section 404(b)(1) Alternatives Analysis will be provided with the Corps' Record of Decision (ROD). The ROD will document the Corps' decision on the proposed project, including issuance, issuance with special conditions, or denial of the DA permit.

1.2 PROJECT PURPOSE AND NEED, CORPS BASIC AND OVERALL PURPOSE, AND CEQA PROJECT OBJECTIVES

Implementing regulations for NEPA published by CEQ states that the Purpose and Need section in an EIS “shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action” (40 CFR Section 1502.13). In addition to defining the purpose of the proposed project pursuant to NEPA, the Corps must evaluate the proposed discharge of dredged or fill material for its compliance with the CWA Section 404(b)(1) Guidelines (40 Part 230). A critical initial part of evaluating this compliance is identifying the basic and overall purposes of the proposed project. The basic project purpose comprises the fundamental, essential, or irreducible purpose of the proposed action and is used by the Corps to determine whether an applicant’s project is water dependent (i.e., whether it requires access or proximity to or siting within a special aquatic site). If a project is not water dependent, practicable alternatives that do not involve a discharge of dredged and/or fill into special aquatic sites are presumed available, unless clearly demonstrated otherwise. This is often referred to as the rebuttable presumptions. Section 15124[b] of the CEQA Guidelines requires that the project description contain a statement of objectives, including the underlying purpose of the proposed project.

This section of the EIR/EIS provides the Purpose and Need (NEPA and Corps 404(b)(1) and the CEQA project objectives for the proposed project. Purpose and Need are discussed separately to satisfy regulations.

Need for the Project

San Elijo Lagoon is a coastal wetland with substantial biological and ecological resources that are important to the region. It is located at the terminus of the Escondido Creek and La Orilla Creek at the Pacific Ocean. The lagoon and adjacent uplands compose the Reserve, which provides habitats that support sensitive species, including federally threatened and endangered plants and animals, and resident and migratory wildlife. As typical of coastal lagoons in southern California, San Elijo Lagoon has a relatively narrow connection to the ocean and a confluence of freshwater flows from upstream. Various transportation infrastructures that traverse the lagoon inhibit freshwater flow to the ocean and tidal flow into the lagoon. A mosaic of habitat and ecosystems occurs, from open water to dense freshwater marsh. The habitat is linked directly to tidal inundation and frequency. The species that utilize this mosaic vary by habitat. In addition, the Reserve provides recreational opportunities, including more than 7 miles of public hiking trails.

Over the past several decades, the lagoon system has gradually degraded due to the expansion of urban development within the upstream watershed. This development has altered the hydrology and, subsequently, the physical and biological functions of the lagoon system. Water quality has decreased due to nutrient accumulation in lagoon sediments, lack of circulation in the lagoon, and sedimentation in areas of impounded water. Habitats within the lagoon have been rapidly converting to a habitat mosaic with less heterogeneity and/or greater freshwater influence. Mechanical breaching of the ocean inlet is routinely performed to maintain a predominantly open inlet and tidal flushing within the lagoon. That activity has subsequently lowered overall average water levels in the lagoon, allowing unvegetated areas to become vegetated. While an open inlet allows freshwater to exit the lagoon and salt water exchange to occur more frequently, severe tidal muting¹ occurs. Muted tidal conditions, changes in inundation frequency, and increasing freshwater inputs from upstream development have resulted in the proliferation of freshwater marsh habitat dominated by cattail (*Typha* spp.) and the expansion of low- and mid-marsh at the expense of mudflat areas. If measures are not taken to improve lagoon water quality and hydrology, muted tidal exchange and restricted water circulation will continue to degrade the physical and biological functions of the lagoon. Freshwater marsh and higher elevation saltmarsh habitats will likely continue to expand and dominate the system, at the expense of more rare intertidal habitats. Water quality issues will continue to cause eutrophication and low dissolved oxygen conditions during certain periods of the year. Threatened, endangered, and sensitive plant and animal species currently dependent on the aquatic and intertidal habitats within the lagoon would be adversely affected by these conditions.

NEPA Purpose of the Project

The purpose of the project is to enhance and restore the physical and biological functions and services of San Elijo Lagoon by increasing hydraulic efficiency in the lagoon, addressing existing water quality impairments, and halting ongoing conversion of unvegetated wetland habitats to support a more connected gradient of balanced habitat types.

Overall and Basic Project Purposes (Corps' Section 404(b)(1))

The basic project purpose of the SELRP is environmental restoration of a coastal lagoon; this is, by definition, a water-dependent activity. Although special aquatic sites would be impacted by the proposed project, because the activity is water dependent, the applicant does not need to rebut the presumption that a practicable alternative exists that does not involve discharge into a special aquatic site. However, the applicant must rebut the presumption that there is not a

¹ Tidal muting refers to a tide range that is lower in one area (e.g., wetland) than an adjacent tidal water body (e.g., ocean) due to structures or other hydrologic characteristics that inhibit the exchange of water between the two.

LEDPA. The overall project purpose serves as the basis for the Corps' Section 404(b)(1) Alternatives Analysis and is determined by further defining the basic project purpose in a manner that more specifically describes the applicant's goals for the project. The overall project purpose allows for a reasonable range of alternatives to be analyzed. For this proposed project, the NEPA purpose is also the Corps' overall project purpose.

CEQA Goals and Objectives

The overarching goal, or purpose, of the proposed project is to protect and restore, then maintain via adaptive management, the San Elijo Lagoon ecosystem and its adjacent uplands to perpetuate native flora and fauna characteristics of southern California, and restore and maintain estuarine and brackish marsh hydrology. This goal can be further refined into four categories of objectives:

1. Physical restoration of lagoon estuarine hydrologic functions
2. Biological restoration of habitat and species within the lagoon
3. Management and maintenance to ensure long-term viability of the restoration efforts
4. Maintenance of recreational and educational opportunities

These four categories of objectives are further defined below.

1. Physical Objectives

- A. Open the lagoon mouth regularly, or create a permanently open mouth, to maximize the overall functions and services of the lagoon in light of existing and future constraints.
- B. Expand the acreage of tidal habitats by enlarging the tidal prism, grading appropriate elevations and contours to support a diversity of desired tidal habitats, and managing freshwater inputs.
- C. Improve water quality by removing high-nutrient sediments, restoring tidal circulation, and reducing high bacteria counts and the potential for mosquito-borne disease.
- D. Ensure that no adverse change to current flood protection occurs as a result of the project, specifically to existing or proposed infrastructure and adjacent development.
- E. Minimize the disturbance of cultural resources.

2. Biological Objectives

- A. Provide a natural gradient of habitats that considers climate change, anticipated sea level rise, heterogeneity of habitats, and tidal channels of various orders.

- B. Enhance habitats for native species, including rare and federally listed and state-listed threatened and endangered species, to maintain species diversity that is appropriate to habitat distribution and regional needs.
- C. Provide long-term protection of the functions and services of the Reserve from adjacent recreational and other anthropogenic land uses.

3. Management and Maintenance Objectives

- A. Develop a cost-effective management and maintenance plan for supporting the proposed habitat enhancements, curtailing growth and expansion of exotic species, and maintaining regular tidal flow.
- B. Design and implement a biological and hydrological monitoring program to assess the success of restoration efforts and to inform adaptive management decisions.

4. Recreational Access and Education Objectives

- A. Minimize impacts to recreational opportunities.
- B. Maintain public access to the lagoon and educational opportunities that are consistent with resource protection needs and requirements.

1.3 LEAD, RESPONSIBLE, AND TRUSTEE AGENCIES

Because of federal and local discretionary actions, the proposed project requires evaluation pursuant to both NEPA and CEQA. Under CEQA, a lead agency is any public agency that is principally responsible for carrying out or approving a project. County DPR is the lead agency responsible for compliance with CEQA. Under NEPA, a lead agency is the agency preparing or having taken primary responsibility for the preparation of an EIS. The Corps is the federal lead agency responsible for compliance with NEPA. Given the proposed project's complexity and range of potentially significant issues, an EIR is being prepared. An EIS is required under NEPA because preliminary assessment of the project identified significant impacts to resources, including air quality and biological resources. The Corps and County DPR have agreed to jointly prepare this EIR/EIS to address the federal, state, and local requirements for environmental analysis and permitting.

Several other agencies have special roles with respect to the proposed project and may use this EIR/EIS as the basis for their decisions to issue approvals and/or permits that might be required. Section 15381 of the CEQA Guidelines defines a responsible agency as follows:

... a public agency which proposes to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or negative declaration. For the purposes of CEQA, the term ‘responsible agency’ includes all public agencies other than the lead agency which have discretionary approval power over the project.

Additionally, Section 15386 of the CEQA Guidelines defines a trustee agency as follows:

... a state agency having jurisdiction by law over natural resources affected by a project which are held in trust for the people of the state of California.

Responsible and trustee federal, state, and local agencies that may rely on this EIR/EIS in a review capacity or as a basis for issuance of a permit for the proposed project include the following:

- U.S. Fish and Wildlife Service (USFWS)
- National Marine Fisheries Service (NMFS)
- Environmental Protection Agency (EPA)
- U.S. Coast Guard (USCG)
- California Coastal Commission (CCC)
- California Department of Fish and Wildlife (CDFW)
- California Regional Water Quality Control Board (RWQCB)
- California Department of Transportation (Caltrans)
- California Department of Conservation (DOC)
- California Department of Boating and Waterways (DBW)
- California State Parks
- State Lands Commission (SLC)
- State Water Resources Control Board (SWRCB)
- State Historic Preservation Officer/Tribal Historic Preservation Officer (SHPO/THPO)
- State Mining and Geology Board (SMGB)
- San Diego Association of Governments (SANDAG)
- North County Transit District (NCTD)
- San Diego Air Pollution Control District (SDAPCD)
- City of Encinitas
- City of Solana Beach

1.4 SCOPING PROCESS, PUBLIC INVOLVEMENT, AND ISSUES

Throughout the environmental process and during the preparation of this EIR/EIS, County DPR and the Corps have solicited input on key issues and concerns from public agencies, stakeholder and interest groups, and the general public. The public scoping process was designed to help determine the range of issues addressed in the EIR/EIS. Additional stakeholder meetings assisted in defining concerns about the proposed project. The different aspects of public scoping discussed in this section include the Notice of Preparation (NOP) consistent with CEQA and Notice of Intent (NOI) consistent with NEPA, public scoping meetings, and stakeholder coordination. Early and open consultation with relevant agencies, organizations, and individuals assisted in defining the scope of this EIR/EIS.

Notice of Preparation and Notice of Intent

The County DPR and the Corps initiated the scoping process on November 3, 2011, through the circulation of an NOP and NOI. The NOP was received by the State at the California Office of Planning and Research (OPR) on November 4, 2011. The Clearinghouse is responsible for monitoring compliance of state agencies. The Clearinghouse assigned state identification number SCH #2011111013 to this EIR/EIS. The NOI was received by the Office of the Federal Registrar (OFR) National Archives and Records Administration (NARA) on November 3, 2011, and was published in the Federal Register, Vol. 76, No. 215 on November 7, 2011. The scoping period extended through December 18, 2011, exceeding the 30-day period requirement by law.

The NOP and NOI provide formal notification to federal, state, and local agencies involved with funding or approval of a project, and to other interested organizations and members of the public, that an EIR/EIS will be prepared. The NOP and NOI are intended to encourage interagency communication concerning a proposed project and provide sufficient background information so that agencies, organizations, and individuals can respond with specific comments and questions on the scope and content of the EIR/EIS. A copy of the NOP and the NOI are provided in Appendix B, as well as the written comments received during the public scoping period.

Public Scoping Meetings

Three public scoping meetings were held to provide additional opportunities for agency and public interaction and input. These meetings, identified in Table 1-1, were held during the public scoping period at various times and locations to encourage public input.

**Table 1-1
Scoping Meeting Dates and Locations**

Date	Time	Location
November 15, 2011	1 p.m.	U.S. Fish & Wildlife Service, Conference Room 1 6010 Hidden Valley Road, Suite 101 Carlsbad, CA 92011
November 29, 2011	6 p.m.	City of Encinitas Community Center 1140 Oakcrest Park Drive Encinitas, CA 92024
December 1, 2011	6 p.m.	Holiday Inn Express Meeting Room 621 South Coast Highway 101 Solana Beach, CA 92075

General verbal and specific written comments were accepted at these meetings. Additionally, written comments were accepted via email and mail throughout the scoping period.

Stakeholder Coordination

A series of stakeholder meetings were held to encourage input from regulatory agencies and interested organizations during the planning process for the proposed project. These meetings were initiated during the alternatives development and planning phase of the proposed project to ensure that relevant issues and concerns were incorporated into project design. Focused meetings continue to be held to ensure agency stakeholder coordination through the environmental review process. In addition to the lead agencies and the project applicant, project stakeholders include representatives from various agencies and organizations, including those listed in Section 1.3, above.

Comments Received during Scoping Process

Comments received during the EIR/EIS scoping period included general verbal comments from scoping meetings as well as written comments from the scoping meetings and in separate responses to the NOP and/or NOI. Numerous interested parties provided input on the proposed project, including federal, state, and local agencies; local stakeholder groups; and individuals. A copy of written comments submitted as part of the scoping process is included in Appendix B. The main issues raised during the scoping process are summarized by issue area in Table 1-2.

Table 1-2
Summary of Public Comments Received during the SELRP EIR/EIS Scoping Process

Public Comments by Environmental Topic or Issue Area	Section Where Addressed in EIR/EIS
<i>Aesthetics/Visual Impacts</i>	
For project alternatives, analyze the visual impacts and long-term implications of structures needed to implement each alternative.	Section 3.9; Section 4.3
<i>Air Quality/Greenhouse Gas Emissions/Sea Level Rise</i>	
Evaluate the effects of climate change and sea level rise not only within the project area, but also the impact along the shoreline and Coast Highway 101 to determine how the project will affect the Coast Highway, State Parks land, and the existing inlet.	Section 3.16; <i>Sea Level Rise Analysis</i> (M&N 2010)
Using the three sea level rise curves required to be evaluated for federal projects (refer to Corps Shoreline Project for Solana Beach and Encinitas) [currently known as the Storm Damage Reduction and Beach Nourishment Project], include a wave run-up and tsunami inundation and damage analysis for each wave energy scenario for each project alternative.	Tsunami/coastal damage is addressed in Section 3.3 and sea level rise is addressed in Section 3.16; this specific requirement is not applicable to the SELRP.
Analyze objectionable odors caused by low tides.	Section 3.11
<i>Biological Resources</i>	
Provide an explanation of habitat transition occurring within the lagoon over the last several decades and the impact on lagoon resources.	Section 1.2; Section 2.1; Section 3.6
Address concern about the use and introduction of invasive plants (e.g., ice plant).	Section 2.11; Section 3.6
Discuss the existing freshwater and saltwater habitat within the project area and what it will consist of after project implementation.	Section 2.1; Section 3.6
Analyze potential impacts to offshore biological resources (e.g., eel grass, reefs, marine life).	Section 3.6
Discuss the project's impact on insect life, specifically reduction of mosquitoes and flies.	Section 3.15
Discuss the regional perspective of existing amounts of estuarine and brackish marsh habitat and the ability of the project to meet regional needs for these habitat types.	Section 1.2 describes the purpose and objectives of the project.
Analyze the project's impacts and benefits in the context of the goals of Natural Community Conservation Program (NCCP) planning efforts.	Section 3.6
Explain how the project will avoid and/or minimize short-term and long-term impacts to Belding's savannah sparrow and light-footed Ridgway's rail.	Section 3.6; Section 3.6
Prepare a jurisdictional delineation and include mitigation measures to compensate for impacts to wetlands and jurisdictional waters.	Section 3.6; Appendix G
Disclose project impacts to the following California Endangered Species Act-listed species, and provide mitigation and monitoring that meet the requirements of an incidental take permit (ITP): coastal California gnatcatcher (<i>Poliptila californica californica</i>), Belding's savannah sparrow (<i>Passerculus sandwichensis beldingi</i>), light-footed Ridgway's rail (<i>Rallus obsoletus levipes</i>), least Bell's vireo (<i>Vireo bellii pusillus</i>), California least tern (<i>Sterna antillarum browni</i>), and southwestern willow flycatcher (<i>Empidonax traillii extimus</i>).	Section 3.6
Pursuant to Section 3511 of the California Fish and Game Code, the California Endangered Species Act-listed light-footed Ridgway's rail and California least tern are also designated as State Fully Protected species. This designation prohibits "take" or possession of these species at any time; that is, there is no take authorization available from CDFW.	Section 3.6
Provide a complete assessment of flora within and adjacent to the project area following Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities, as prepared by the California Natural Resources Agency and CDFW.	Section 3.6
Provide a discussion of direct, indirect, and cumulative impacts anticipated to biological resources.	Section 3.6; Section 5.3

Public Comments by Environmental Topic or Issue Area	Section Where Addressed in EIR/EIS
Include mitigation and minimization measures for impacts to biological resources as provided by CDFW.	Section 3.6.5
<i>Construction Methods: Grading, Dredging, and Materials Placement</i>	
Provide a discussion of construction methods in the project description.	Section 2.10
Include a discussion of a dredging plan that provides details and requirements for ongoing dredging and maintenance activities, and analyze impacts associated with these ongoing activities.	Sections 2.4, 2.5, 2.6; Section 2.11; Chapter 3
Prepare a grading plan and include an erosion and sediment control plan and program in compliance with the latest State Construction Permit.	This requirement is discussed in Section 3.2 and Section 3.4; actual preparation of the plan occurs once the contractor has been identified.
Discuss placement of dredged materials that are considered compatible for placement on the nearby beaches, and analyze impacts of beach sand placement on the nearshore environment.	Section 2.2; Section 2.9; Chapter 3
Consider phasing construction of the project to minimize impacts related to sensitive species.	Section 2.10
<i>Cultural Resources</i>	
Engage in early consultation with Native American tribes to identify the potential for cultural resources to be present within the project area.	Section 3.7
<i>Geotechnical/Seismic Hazards and Public Safety</i>	
The existing Coast Highway 101 Bridge (San Elijo Lagoon Bridge No. 57C-210) is susceptible to collapse in a seismic event. Dredging beyond what is currently performed at the bridge increases the likelihood of structural failure. This should be analyzed for each project alternative.	Section 3.5
Consider fire dangers to surrounding structures when choosing plant life for the project.	Section 3.15
National Flood Insurance Program (NFIP) floodplain management building requirements must be adhered to if structures are built within a Regulatory Floodplain.	Section 3.2
Explain the project's impacts with respect to erosion at San Elijo State Beach campgrounds, access to Cardiff State Beach, and potential effects to public safety and aquatic resources.	Section 3.2; Section 3.3
<i>Hydrology and Water Quality</i>	
Prepare a hydrology study that includes an HEC-RAS analysis, modeling the upstream and downstream flood water elevations.	The RMA 2 model was used; it is discussed in Section 3.2.
Analyze project impacts related to the hydrology of the lagoon, currently identified and emergent water quality pollutants of concern, impacts on the larger watershed, and overall coastal water quality.	Section 3.2; Section 3.3
Analyze impacts to water quality from pet waste, agricultural runoff, and freeway runoff.	NA
<i>Land Use</i>	
Demonstrate consistency with existing local land use plans and identify inconsistencies, if any.	Section 3.1
<i>Noise</i>	
Analyze noise effects on surrounding land uses due to use of heavy equipment operation during project implementation.	Section 3.12
<i>Permitting</i>	
Adhere to encroachment permitting process for work performed in the Caltrans right-of-way.	Chapter 1
Coordinate with San Diego Gas & Electric (SDG&E) and the California Public Utilities Commission to address required permitting or permit exemptions if relocation of SDG&E facilities is needed.	Section 3.14

Public Comments by Environmental Topic or Issue Area	Section Where Addressed in EIR/EIS
Complete written notification to CDFW for determining need of Lake and Streambed Alteration Agreement.	Section 3.6
Permit required from USCG if alterations are needed to bridges in/over/on navigable waters of the U.S. (permitting process time is 9 to 12 months).	Chapter 1
<i>Project Description and Design</i>	
Describe the approach to determining inlet location and design for project alternatives.	Section 2.2; Section 2.4; Section 2.5; Section 2.6
Incorporate sea level rise estimates into project design.	Chapter 1; Chapter 2
Consider removing the dike in the east basin.	Chapter 2
Consider removing the settling pond in the central basin.	Section 2.4; Section 2.5; Section 2.6
<i>Project Schedule and Implementation Coordination with Other Projects</i>	
Describe the anticipated project schedule, duration of dredging, and maintenance activities.	Section 2.10
Describe the relationship between the project's implementation and the implementation of larger transportation projects (i.e., improvements to I-5, Coast Highway 101, and double-tracking of the Coaster).	Section 2.3
Consider the timing of the Corps' Solana Beach and Encinitas Shoreline Protection Project and analyze whether the dredged material from the lagoon could be suitable for beach placement to supplement the volumes that would otherwise be excavated from an offshore borrow site.	Section 2.2; Chapter 5
<i>Public Services and Utilities</i>	
Coordinate with SDG&E regarding closures, alterations, or changes to existing access roads, pads, or other supporting rights-of-way needed.	Section 3.14
Conduct engineering evaluation to identify issues and protection measures to address how the change in tidal flushing or enhancements may cause structural integrity issues to SDG&E facilities.	Section 3.14
Ensure the protection of utilities (i.e., overhead utilities lines and existing buried electronic distribution lines) during and after project construction.	Section 3.14
Maintain access to pump stations and force mains for maintenance during and after project construction.	Section 3.14
Consider impacts to the pipeline and associated appurtenances crossing the lagoon to the San Elijo Ocean Outfall from dredging and restoration activities.	Section 3.14
Consider existing SDG&E high-pressure gas lines and electric transmission lines present within the project area; consider undergrounding power lines across the central basin portion of the lagoon.	Section 3.14
Consider impacts to existing pipeline and associated appurtenances, and establishment of access road to existing pipeline for maintenance.	Section 3.14
<i>Recreation/Community Access</i>	
Analyze potential impacts related to surfing, fishing, boating, and surfing-related tourism; running/walking; and birding.	Section 3.1
Analyze impacts to Cardiff Reef as they relate to surfing and surf quality.	Section 3.1
Surf monitoring should be considered post-project for at least 5 years.	Section 3.1
Consider potential impacts associated with removal of the dike in the east basin and the effects of removal related to community access.	Section 3.1
Consider implementation of upland buffer (minimum 100 feet) as measured from the edge of the natural and revegetated wetland habitat within the project footprint with public access and development restrictions.	Section 3.6
Consider establishment of an access road or walking trail along existing wastewater treatment pipeline to provide better access for maintenance of the outfall infrastructure and to enhance the overall walkability of lagoon.	Chapter 2; Section 3.1
Analyze impacts to beach access and trail system access.	Section 3.1

Public Comments by Environmental Topic or Issue Area	Section Where Addressed in EIR/EIS
Consider recreational enhancements such as fishing opportunities and kayaking within the lagoon.	This issue is not addressed; these activities are specifically prohibited within the lagoon by law.
Assess impacts of the removal of the existing cement land bridge on community access.	Section 3.1
Analyze impacts to pedestrian access for each project alternative and consider the inclusion of a safe and visually attractive pedestrian walkway from the beach to Coast Highway 101.	Section 3.1
Consider the addition of trail across the central basin (north/south).	Section 3.1
Consider the elevation of trails to boardwalks to reduce impacts to wetlands, where feasible.	This issue is discussed in Section 3.1; new trail segments would be elevated.
Evaluate the project's compatibility with CDFW's Marine Protected Areas.	Section 3.1
<i>Suggested Project Alternatives</i>	
Discuss the range of reasonable alternatives, including the No Project/No Federal Action Alternative.	Section 2.3 Chapter 4
Consider a project alternative, such as Alternative 1A, but also with these additional options in the central basin and one in the east basin: • use the existing tidal inlet • create a north-south-trending tidal channel in the west basin • enlarge the channel linking the central basin and east basin beneath I-5 • enhance existing tidal channels in the east basin • enhance existing tidal channels in the central basin • restore nonvegetated tidal mudflat habitat in the central portion of the central basin by removal of vegetation and reduction of substrate elevation to that necessary to maintain a nonvegetated intertidal state • enhance drainage and management capabilities in the east basin by replacing and adding additional flood gate valves and culverts to the existing dike.	Chapter 2
<i>Transportation</i>	
Discuss the need for road improvements to off-set increased traffic volumes and discuss the on- and/or off-site impacts to sensitive species or habitats as a result of necessary road improvements.	Section 3.10
Include a description of access routes to construction and staging areas.	Section 2.10
Consider traffic management during construction.	Section 3.10
Include double-tracking of the Coaster concurrently with the project.	Chapter 1; Section 5.2
<i>Other Issues</i>	
If an offshore mitigation reef is determined to be a necessary project component, placement of this reef is suggested in an area offshore and down the coast of the lagoon.	NA
Describe lead agencies' roles and responsibilities.	Section 1.3
Add USCG as a cooperating agency under NEPA and include in scoping correspondence.	Section 1.3

Areas of known controversy include maintaining and/or enhancing overall biological health of the lagoon, loss of existing habitat, addressing circulation and water quality concerns, beach and trail access changes, and potential impacts of materials placement to nearshore biological resources.

1.5 REGULATORY OVERVIEW, COMPLIANCE WITH APPLICABLE STATUTES, AND PERMIT REQUIREMENTS

One of the objectives of the CEQA/NEPA process is to ensure that a proposed project and its alternatives are consistent with relevant regulations, policies, and plans. Various approvals and permits would be necessary for implementation of the proposed project. Table 1-3 lists the applicable statutes and permit or approval requirements. Those policies and regulations that require specific actions, permits, or consultation by the lead agencies or project proponent are further discussed following the table and describe the process needed to meet requirements.

Full descriptions of regulatory laws, statutes, policies, and plans and the issue area to which they are applicable are included in Appendix C. The specific analysis of how each regulation, policy, or plan applies to the proposed project and its alternatives is included in each appropriate individual resource discussion in Chapter 3.

**Table 1-3
Federal, State, and Local Project Approvals and Permits Required**

Agency	Permit/Approval
<i>Federal</i>	
U.S. Army Corps of Engineers (Corps)	• DA Permit under Section 404 of the Clean Water Act, 33 United States Code (USC) Section 1344 • DA Permit under Section 10 of the Rivers and Harbors Act of 1899, 33 USC Section 403 • DA Permit under Section 103 of the Marine Protection, Research, and Sanctuaries Act, 33 USC Section 1413 (Alternative 1A only) • Issue Record of Decision • Coordination under the Fish and Wildlife Coordination Act, 16 USC Sections 661–666
National Marine Fisheries Service	• Consultation with the Corps pursuant to Magnuson-Stevens Fishery Conservation and Management Act, as amended 1996 (Public Law 104-267); • Consultation with the Corps under Section 7 of the Endangered Species Act, 16 USC Sections 1531–1544, and issuance of a Biological Opinion (BO) lead agency
State Historic Preservation Officer/Tribal Historic Preservation Officer (SHPO/THPO)	• Consultation with the Corps under Section 106 of the National Historic Preservation Act of 1966(36 Code of Federal Regulations [CFR] Part 800)
United States Coast Guard/Department of Transportation	• Navigation Permit pursuant to 33 CFR 66
U.S. Fish and Wildlife Service	• Consultation with the Corps under Section 7 of the Endangered Species Act, 16 USC Sections 1531–1544, and issuance of a BO lead agency
Federal Emergency Management Agency	• Approval of Conditional Letter of Map Revision and Letter of Map Revision

Agency	Permit/Approval
State	
California Coastal Commission	- Coastal Development Permit - Consistency Certification, Section 30600(a) of the California Coastal Act, or Waiver of Federal Consistency Provisions
California Department of Fish and Wildlife	- Streambed Alteration Agreement, Section 1601 of the California Fish and Game Code - California Endangered Species Act Section 2081 Incidental Take Permit
California State Parks	Use Permit(s) for construction activities
California Department of Transportation District 11	- Encroachment Permit for access to Interstate 5 - Approval of plans and construction of Coast Highway 101 improvements
Regional Water Quality Control Board	Water Quality Certification under Section 401 of the Clean Water Act
State Lands Commission	Lease for access
State Mining and Geology Board	Surface Mining and Reclamation Action exemption
Regional/Local	
San Diego Air Pollution Control District	Authority to Construct/Permit to Operate
Director of Parks and Recreation	- Certify Environmental Impact Report - File Notice of Determination - Issue Right of Entry
Director of Public Works	NPDES MS4 Permit for Priority Development Project
City of Encinitas	- Encroachment and grading permits - Storm water permits - Approval of Coast Highway 101 bridge plans and/or implementation of Coast Highway 101 retrofit - Local Coastal Plan (LCP) coastal development permit - Noise variance or exemption letter
City of Solana Beach	- Encroachment and grading permits - Storm water permits - LCP development permit - Noise variance or exemption letter
North County Transit District	Encroachment permit for access to railroad right-of-way

California Endangered Species Act (CESA)

CESA (Fish and Game Code Section 2050 et seq.) prohibits the “take” (defined as “to hunt, pursue, catch, capture, or kill”) of state-listed species except as otherwise provided in state law. CESA, administered by CDFW, is similar to the federal ESA, although unlike the federal law, CESA applies incidental take prohibitions to species currently petitioned for state-listing status (i.e., candidate species). State lead agencies are required to consult with CDFW to ensure that their authorized actions are not likely to jeopardize the continued existence of any state-listed species or result in the degradation of occupied habitat.

Under Section 2081, CDFW authorizes “take” of state-listed endangered, threatened, or candidate species through incidental take permits or memoranda of understanding if (1) the take

is incidental to otherwise lawful activities, (2) impacts of the take are minimized and fully mitigated, (3) the permit is consistent with regulations adopted in accordance with any recovery plan for the species in questions, and (4) the applicant ensures suitable funding to implement the measures required by CDFW.

Regulatory Action: Prior to implementation of the SELRP, the SELC would be required to initiate formal consultation with CDFW in accordance with Section 2081 to obtain an Incidental Take Permit, if required.

California Environmental Quality Act

CEQA is a California statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. CEQA applies to certain activities of state and local public agencies. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a “project.” A project is an activity undertaken by a public agency or a private activity that must receive some discretionary approval (meaning that the agency has the authority to deny the requested permit or approval) from a government agency that may cause either a direct physical change in the environment or a reasonably foreseeable indirect change in the environment. The environmental review required imposes both procedural and substantive requirements. At a minimum, an initial review of the project and its environmental effects must be conducted. Depending on the potential effects, a further, and more substantial, review may be conducted in the form of an EIR. A project may not be approved as submitted if feasible alternatives or mitigation measures are able to substantially lessen the significant environmental effects of the project.

Regulatory Action: This EIR documents the County DPR’s compliance with the requirements of CEQA for the SELRP. The County DPR is the lead agency responsible for certifying the Final EIR and filing the NOD. The County DPR will make a decision whether to issue a right of entry permit for project implementation, and through that discretionary action certify the document. Certification will also include issuance of Findings and a Statement of Overriding Considerations, as required, as well as filing of the NOD. The certification of the EIR by the County DPR would occur prior the issuance of a ROD by the Corps.

California Coastal Act

The CCC was established in 1972 by voter initiative via Proposition 20. The California Coastal Act of 1976 tasked the agency with protection of coastal resources. The state authority controls construction along the state’s 1,100 miles of shoreline through the issuance of Coastal Development Permits (CDPs). The CCC assists local governments in implementing local coastal

planning and regulatory powers. Under the Act, local governments are encouraged to adopt Local Coastal Plans (LCPs) within their jurisdictions. The LCP consists of a Land Use Plan (LUP) with goals and regulatory policies as well as a set of Implementing Ordinances. Even with an approved LCP, the state CCC occasionally retains jurisdiction over some lands and continues to issue permits in those “retained jurisdictional” areas. The cities of Encinitas, Solana Beach, and San Diego have approved LCPs that address potential materials placement sites. Relevant policies specific to each LCP are discussed below under each jurisdiction. San Elijo Lagoon is located within retained jurisdiction and is not addressed by a local LCP.

Several sections of the California Coastal Act focus on shoreline construction, specifically Sections 30235, 30233, and 30706. All of these sections contain an element pertaining to the protection of existing structures and the protection of public beaches in danger of erosion. Under these sections, construction will be allowed through revetments, breakwaters, groins, or other means that alter natural shoreline processes; dredging of open coastal waters, lakes, wetlands, and other areas will be permitted only where less feasible environmentally damaging alternatives are not available. In particular, in Section 30233, dredging and spoils disposal, planned to avoid significant disruption to marine and wildlife habitats and water circulation, is allowed for restoration purposes. Section 30233 states further that dredge spoils suitable for beach replenishment should be transported to appropriate beaches or into suitable longshore current systems.

Regulatory Action: Prior to implementation of the SELRP, but after certification of the EIR component of this document by the County, the CCC would determine whether to approve a CDP for both the lagoon restoration and materials disposal component of the project, as applicable. It is anticipated the CCC would approve a consolidated CDP addressing the project as a whole; it is possible that the project could obtain a permit from the CCC for work within the lagoon, and individual permits from the cities of Encinitas and Solana Beach for potential sand placement on city beaches.

California Fish and Game Code

Pursuant to California Code of Regulations, title 14, section 630(b)(103), the State Fish and Game Commission declared the property owned by the County and the State to be the San Elijo Lagoon Ecological Reserve.

Under Sections 1601–1603 of the Fish and Game Code, agencies are required to notify CDFW prior to implementing any project that would divert, obstruct, or change the natural flow or bed, channel, or bank of any river, stream, or lake.

Section 1602 – Streambed Alteration

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW under Fish and Game Code Section 1602. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying CDFW:

- substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The Fish and Game Commission defines “stream” as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. CDFW’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. In practice, CDFW typically extends its jurisdictional limit to the top of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider. Riparian habitats do not always have identifiable hydric soils, or clear evidence of wetland hydrology as defined by the Corps. Therefore, CDFW wetland boundaries often include, but extend beyond, Corps wetland boundaries. Jurisdictional boundaries under Fish and Game Code Sections 1600–1616 (CDFW’s Lake and Streambed Alteration Program) may encompass an area that is greater than that under the jurisdiction of CWA Section 404. Therefore, jurisdictional waters of the state include jurisdictional waters of the U.S.; federal and state jurisdictions do overlap, but would remain distinct for regulatory administration and permitting purposes. A CDFW Streambed Alteration Agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

Regulatory Action: Prior to implementation of the SELRP, CDFW would determine whether to approve a Section 1602 Streambed Alteration Agreement.

California State Lands Commission Public Trust Doctrine

The California SLC has exclusive jurisdiction over all of California’s tide and submerged lands and the beds of naturally navigable rivers and lakes, which lands are sovereign lands, and swamp and overflow lands and State School Lands (proprietary lands). The SLC has statutory authority (Division 6 of the California Resources Code) to approve appropriate uses of state lands under its jurisdiction and is the administrator of the Public Trust Doctrine over sovereign lands.

Sovereign lands may only be used for purposes consistent with this public trust; uses include commerce, navigation, fisheries, open space, wetlands, and other related trust uses. The SLC has an oversight responsibility for tide and submerged lands legislatively granted in trust to local jurisdictions (PRC Section 6301), extending to activities within submerged lands (from mean high tide line) and those within 3 nautical miles offshore.

Regulatory Action: After certification of the EIR, but prior to implementation of the SELRP, the SLC would determine whether to issue a lease to the SELC for activities below the mean high tide line (MHTL), including dredging in the lagoon and for materials disposal/reuse of excavated materials.

Clean Water Act

The principal law that serves to protect the nation's waters is the Federal Water Pollution Control Act, which was originally enacted in 1948. This legislation, more commonly referred to as the Clean Water Act or CWA, underwent significant revision when Congress, in response to the public's growing concern of widespread water pollution, passed the Federal Water Pollution Control Act Amendments of 1972. The 1972 legislation established two fundamental, national goals: eliminate the discharge of pollutants into the nation's waters and achieve water quality that is both "fishable" and "swimmable." The 1972 amendments to the CWA also prohibited the discharge of any pollutant to "waters of the U.S." from any point source (e.g., a discharge pipe) unless the discharge was authorized by a National Pollutant Discharge Elimination System (NPDES) Permit. CWA Section 402 sets forth regulations that prohibit the discharge of pollutants into waters of the U.S. from any point source without first obtaining a NPDES Permit.

CWA Section 303 requires states to adopt water quality standards for all surface waters of the U.S. Under CWA Section 303(d), states, territories, and authorized tribes are required to develop a list of water bodies that are considered to be "impaired" from a water quality standpoint and develop action plans, referred to as Total Maximum Daily Loads (TMDLs), to improve water quality. TMDL refers to the amount of a specific pollutant that a river, stream, or lake can assimilate and still meet federal water quality standards as provided in the CWA. TMDL accounts for all sources of pollution, including point sources, nonpoint sources, and natural background sources.

Relative to water quality protection and management for the proposed project, several sections of the CWA are important and are fully described in Appendix C:

- Section 303(d) – TMDLs

- Section 401 – Water Quality Certification
- Section 402 – NPDES Program – Municipal Permit
- Section 404 – Discharge of Dredged and/or Fill Material

Regulatory Action: After consultation and issuance of agency permits, the Corps would determine whether to issue a DA permit pursuant to Section 404 of the CWA (33 USC Section 1344). The ROD would document the permitting decision by the Corps.

Regulatory Action: After certification of the EIR, but prior to implementation of the SELRP, the RWQCB would determine whether to issue a State Water Quality Certification in accordance with CWA Section 401, in connection with the Corps' DA permits for the discharge of dredged and/or fill material.

Regulatory Action: San Elijo Lagoon is 303(d) listed as impaired by eutrophication, indicator bacteria, and sedimentation/siltation. The potential sources of the impairments are point and nonpoint sources. The TMDL action plans have not been completed yet and have RWQCB estimated completion dates in 2015 for indicator bacteria and 2019 for eutrophication and sedimentation/siltation. The SELRP could improve conditions currently contributing to the impairments identified in the 303(d) list. No regulatory action is needed at this time.

Regulatory Action: After certification of the EIR, but prior to implementation of the SELRP, the Cities of Encinitas and Solana Beach would be required to comply with the Municipal NPDES Permit Order No. R9-2013-0001, and would design and implement requirements of the Hydromodification Management Plan and low-impact development best management practices (BMPs) to reduce storm water runoff from project sites by promoting infiltration and minimizing impervious areas. Each of the three alternatives has an associated increase in impervious surfaces and dry construction areas. A Compliance Plan will describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule.

Coastal Zone Management Act (CZMA)

In 1972, U.S. Congress passed the CZMA to manage the nation's coastal resources. The CZMA is administered by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management. The CZMA balances competing land and water issues in coastal zones through the National Coastal Zone Management Program. Its goal is to preserve, protect, develop, and, where possible, restore or enhance the resources of the nation's coastal zone. Federal activities within or affecting the

coastal zone must, to the maximum extent practicable, be consistent with the state's coastal management program.

Regulatory Action: After certification of the EIR, the SELC would request a consistency determination from the CCC, prior to the Corps issuing the ROD.

Endangered Species Act

The federal ESA of 1973 (16 USC Sections 1531 et seq.) directs USFWS and NMFS (the Services) to identify and protect endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. Section 9 of the ESA makes it unlawful for a person to take a listed animal without a permit. "Take" is defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (16 Section 1532(19)). Through regulations, the term "harm" is interpreted to include actions that modify or degrade habitats to a degree that significantly impairs essential behavioral patterns, including breeding, feeding, or sheltering.

Section 7 of the ESA directs the Services to use its existing authority to conserve threatened and endangered species and, in consultation with federal agencies, ensure that any action authorized, funded, or carried out by such agency does not jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but would be needed for its recovery. Section 7(a)(2) requires federal agencies to consult with the Services to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species. In consultation for those species with critical habitat, federal actions must also ensure that activities do not adversely modify critical habitat to the point that it would no longer aid in the species' recovery.

Regulatory Action: Prior to the issuance of the ROD, the Corps would initiate and complete formal consultation with the Services in accordance with 16 USC Sections 661–666, as needed.

Federal Emergency Management Agency – Conditional Letter of Map Revision and Letter of Map Revision

Executive Order 11988 directs federal agencies to avoid, to the extent practicable and feasible, short- and long-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever a

practicable alternative exists. Furthermore, Executive Order 11988 requires the prevention of uneconomic, hazardous, or incompatible use of floodplains; protection and preservation of natural and beneficial floodplain values; and consistency with the standards and criteria of the National Flood Insurance Program (NFIP). The basic tools for regulating construction in potentially hazardous floodplain areas are local zoning techniques and Federal Emergency Management Agency (FEMA) floodplain mapping. The Federal Insurance Rate Map (FIRM) is the official map created and distributed by FEMA and NFIP that delineates Special Flood Hazard Areas (SFHAs)—areas that are subject to inundation by a base flood—for every county and community that participates in the NFIP.

For projects that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source, and thus would result in the modification of the existing regulatory floodway, effective Base Flood Elevations, or an SFHA, a Conditional Letter of Map Revision (CLOMR) could be necessary. A CLOMR is FEMA's comment on a proposed project that would make such hydrologic modifications. A Letter of Map Revision (LOMR) is FEMA's modification to an effective FIRM based on the implementation of physical measures that affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway.

Regulatory Action: A CLOMR and LOMR must be prepared by the City of Encinitas and approved by FEMA before beginning any project construction activities, if applicable.

Magnuson-Stevens Fishery Management and Conservation Act, as amended 1996 (Public Law 104-267)

Federal agencies must consult with NMFS on actions that may adversely affect EFH, which is defined as those “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” NMFS encourages streamlining the consultation process using review procedures under NEPA, Fish and Wildlife Coordination Act, CWA, and/or FESA provided that documents meet requirements for EFH assessments under Section 600.920(g). EFH assessments must include (1) a description of the proposed action, (2) an analysis of effects, including cumulative effects, (3) the federal agency's views regarding the effects of the action on EFH, and (4) proposed mitigation, if applicable.

Regulatory Action: Prior to the issuance of the ROD, the Corps would initiate and complete consultation with NMFS regarding EFH assessment, as needed.

Marine Protection, Research, and Sanctuaries Act (MPRSA)

In 1972, Congress enacted the MPRSA (also known as the Ocean Dumping Act) to prohibit the dumping of material into the ocean that would unreasonably degrade or endanger human health or the marine environment. MPRSA regulates the ocean dumping of all material beyond the territorial limit (three miles from shore) and prevents or strictly limits dumping material that “would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities.” Virtually all material ocean dumped today is dredged material (sediments) removed from the bottom of waterbodies in order to maintain navigation channels and berthing areas. Other materials that are currently ocean disposed include fish wastes, human remains, and vessels. Ocean dumping cannot occur unless a permit is issued under the MPRSA. Section 103 of MPRSA authorizes the Corps to issue permits, subject to EPA approval, for transport and disposal of dredged material (i.e., material excavated from navigable U.S. waters) at designated ocean disposal sites (e.g., LA-5). For other materials, EPA is the permitting agency. EPA is also responsible for designating recommended ocean dumping sites for all types of materials. This act would only be applicable to Alternative 1A as it is the only alternative that proposes ocean disposal of dredged material.

Regulatory Action: If Alternative 1A were selected for implementation, the Corps would determine whether to issue a DA permit pursuant to Section 103 of the MPRSA.

National Environmental Policy Act, *as amended*

NEPA established a U.S. national policy promoting the enhancement of the environment and also established the President’s CEQ. NEPA requires federal agencies to conduct an interdisciplinary analysis of the environmental consequences of their actions early in the decision-making process. NEPA is to ensure that environmental factors are weighted equally when compared to other factors in the decision-making process undertaken by federal agencies. CEQ regulations (40 CFR Parts 1500–1508) set the standard for NEPA compliance. They also require agencies to create their own NEPA implementing procedures. These procedures must meet the CEQ standard while reflecting each agency’s unique mandate and mission. Consequently, NEPA procedures vary from agency to agency. Further procedural differences may derive from other statutory requirements and the extent to which federal agencies use NEPA analyses to satisfy other review requirements.

Regulatory Action: This EIR/EIS documents Corps compliance with the requirements of NEPA for the SELRP. The Corps is the federal lead agency responsible for conducting the NEPA process and issuing the ROD. The issuance of a ROD by the Corps would occur after consultation and issuance of agency permits.

National Historic Preservation Act (NHPA)

The NHPA, as amended (16 USC Sections 470–470w), is the fundamental law concerning the protection of cultural resources on federal land, or cultural resources that may be affected by an undertaking that requires federal financial assistance, or a federal permit, license, or approval. Under the NHPA, its amendments, and its implementing regulations, federal agencies are required to responsibly manage federally owned or controlled cultural resources. Federal agency requirements pertinent to the SELRP are addressed in Section 106 of the NHPA and its implementing regulations.

Section 106

Section 106 of the NHPA requires federal agencies to take into consideration the potential effects of their undertakings on historic properties, and is generally applicable when an undertaking is the type of activity that has the potential to affect such properties. Federal undertakings include federal projects, permits, grants, and loans. The purpose of Section 106 is to avoid unnecessary impacts to historic properties from federal undertakings. The Section 106 review process is described in the Advisory Council on Historic Preservation (ACHP) regulations (36 CFR Part 800, as amended August 5, 2004) and Corps implementing regulations at 33 CFR Part 325, Appendix C. Section 106 regulations (36 CFR Section 800.16[1]) define historic properties as any prehistoric or historic district, site, building, structure, or object included, or eligible for inclusion, in the National Register of Historic Places (NRHP) (36 CFR Section 60).

Typically, to be eligible for listing in the NRHP, a property must be at least 50 years old, or have reached 50 years old by the project completion date and retain a high level of integrity of those attributes that contribute to the property's qualifications for the NRHP.

Section 106 and the Corps' implementing regulations provide a systematic mechanism for taking into account the effects on NRHP-eligible resources from actions that are federally sponsored, funded, or licensed. It requires that the SHPO and Native American tribes with historic ties to the area (and possibly other parties) be afforded an opportunity to comment on the undertaking. The SHPO and Native American consultation to comply with Section 106 requirements will be conducted by the Corps.

Regulatory Action: Prior to issuance of the ROD the Corps would complete consultation with tribes and the SHPO in accordance with 33 CFR 325, Appendix C, and Section 106 requirements.

Rivers and Harbors Act, Section 10

Section 10 of the RHA, administered by the Corps, requires DA authorization for all structures (such as riprap) in or over any navigable waters of the U.S. or the accomplishment of any other work (such as dredging) affecting the course, location, condition or capacity of navigable waters of the U.S.

Regulatory Action: The Corps would determine whether to issue a permit for applicable structures and activities. The ROD would document the permitting decision by the Corps.

Surface Mining and Reclamation Act of 1975 (SMARA)

SMARA (PRC Sections 2710–2796) provides a comprehensive surface mining and reclamation policy with the regulation of surface mining operations to ensure that adverse environmental impacts are minimized and mined lands are reclaimed to a usable condition. SMARA also encourages the production, conservation, and protection of the state’s mineral resources. PRC Section 2207 provides annual reporting requirements for mines in the state, under which the State Mining and Geology Board is also granted authority and obligations.

Regulatory Action: It is anticipated that the State Mining and Geology Board would issue an exemption from the requirements of SMARA under PRC Section 2714.

A number of infrastructure improvements are planned within the lagoon by other agencies. These include double-tracking the railroad tracks extending through the lagoon as part of the Los Angeles to San Diego Proposed Rail Corridor Improvements (LOSSAN) project and replacement of the I-5 bridge as part of the North Coast Corridor Project, proposed by the San Diego Association of Governments (SANDAG) and the California Department of Transportation (Caltrans), respectively. A Public Works Plan (PWP)/Transportation and Resource Enhancement Program (TREP) is being prepared by Caltrans and SANDAG to address comprehensive, system-wide improvements in this coastal corridor. As mitigation for corridor improvements, regional habitat enhancements to lagoons could be implemented as identified in the PWP/TREP, including the SELRP. The SELRP will therefore be designed to be consistent with the parameters of the North Coast Corridor Project Restoration and Mitigation Enhancement Program (REMP). Senate Bill 468 mandates that transportation improvements and regional habitat enhancements within the north coast corridor occur concurrently, unless construction in phases would result in an environmentally superior alternative to concurrent construction. Consistent with Senate Bill 468 (Kehoe), I-5 and railroad bridges over the lagoon would occur concurrently with the SELRP. These bridges are not part of the lagoon restoration project and the environmental analysis for

these project proposed (and constructed) by others is addressed in other documents (SCH #2002031067/SCH #2004101076).

1.6 EIR/EIS SCOPE, CONTENT, AND ORGANIZATION

EIR/EIS Scope and Content

The scope of analysis and the content for this EIR/EIS were established based on the professional judgment regarding the nature of the SELRP, Appendix G of the CEQA Guidelines, the Corps' standard NEPA practices, and comments received during the NOP/NOI review process as detailed in Section 1.4.

The CEQA scope of analysis for the EIR/EIS addresses the proposed restoration project, including materials disposal and/or reuse, and is primarily based on thresholds of significance as identified in the CEQA Guidelines, Appendix G. For some issue areas, these thresholds were modified or supplemented to accommodate project-specific conditions. Because the SELRP is water dependent and cannot be implemented outside of the Corps' geographic jurisdiction, the NEPA scope of analysis also includes the complete restoration project as proposed within this EIR/EIS. The Corps generally has not adopted the CEQA thresholds of significance and has applied additional federal requirements, as appropriate, into this EIR/EIS.

This EIR/EIS evaluates the direct, indirect, permanent, temporary, and cumulative effects of the proposed SELRP and alternatives, and proposes mitigation measures to minimize those effects, as feasible. The following issues were determined to be potentially significant and are, therefore, evaluated in Sections 3.1 through 3.16 of this EIR/EIS:

- Land Use/Recreation
- Hydrology
- Oceanography/Coastal Processes
- Water and Aquatic Sediment Quality
- Geology/Soils
- Biological Resources
- Cultural Resources
- Paleontological Resources
- Visual Resources
- Traffic, Access, and Circulation
- Air Quality
- Noise

- Socioeconomics/Environmental Justice
- Public Services and Utilities
- Hazardous Materials and Public Safety
- Global Climate Change and Greenhouse Gas Emissions

The analysis focuses on the substantial adverse or significant environmental effects and their relevance to the decision-making process for the proposed project and its alternatives. NEPA requires the federal lead agency to rely on a “scientific and analytical basis for the comparison of alternatives” (40 CFR Section 1502.16) in making its decisions. Environmental impacts, as defined by CEQA, include physical effects on the environment. In this document, the term is used synonymously with environmental effects, or impacts, under NEPA. The CEQA Guidelines (Section 15360) define the environment as follows:

The physical conditions which exist within the areas which will be affected by a proposed project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.

This definition does not include economic impacts or social impacts, although NEPA does require an evaluation of socioeconomics and environmental justice. Therefore, these sections are included in this EIR/EIS.

EIR/EIS Organization

This EIR/EIS is organized so the reader can obtain fundamental information about the proposed project and its specific impacts. Impacts are described under each of the environmental resource areas in Sections 3.1 through 3.16. Detailed technical and additional background information is provided in the appendices. Each of the chapters in this document is briefly described in Table 1-4. Locations of CEQA required EIR components are provided in Table 1-5.

**Table 1-4
Organization and Contents of EIR/EIS**

EIR/EIS Chapter/Section		Content Description
ES	Executive Summary	Provides an overview of the project alternatives. Summarizes major findings and conclusions of the environmental analysis. Discusses areas of controversy and issues to be resolved.
1.0	Introduction	Provides a brief overview of the proposed project. Outlines the purpose, need, and objectives of the proposed project. Identifies the lead, responsible, and trustee agencies. Outlines the scoping process and comments received. Discusses compliance with other applicable statutes and permit requirements. Summarizes the scope, content, and organization of the document.

EIR/EIS Chapter/Section		Content Description
2.0	Description of the Proposed Project and Alternatives	Provides a detailed description of the project alternatives, including proposed materials disposal/reuse scenarios. Describes the alternatives development process and screening criteria for the selection of alternatives carried forward for detailed analysis in this EIR/EIS. Summarizes construction methods, project design features and minimization measures, and plans for future monitoring and maintenance.
3.0	Affected Environment and Environmental Consequences Introduction	Describes CEQA and NEPA baseline conditions used to determine the degree of environmental impacts for each issue area in Sections 3.1–3.16. Outlines the organization of each section.
3.1–3.16	Resource Analyses	Describes, for each environmental resource area, the affected environment/existing conditions (including the baseline conditions), the criteria for judging whether an impact is significant under CEQA, the impact assessment methodology, the environmental consequences that would result from each alternative, the applicable mitigation measures that would eliminate or reduce significant impacts as defined under CEQA and substantial adverse effects under NEPA, and mitigation monitoring requirements. Subsections for Affected Environment and Environmental Consequences in each resource discussion are consistent with NEPA terminology but correspond to Existing Conditions and Impact Analysis under CEQA.
4.0	Comparison of Alternatives	Provides a comparison of the project alternatives, summarizing the key differences between each alternative.
5.0	Cumulative Impacts	Provides an analysis of cumulative impacts under CEQA and NEPA to determine whether each alternative contributes to an incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.
6.0	Other CEQA and NEPA Considerations	Includes a discussion of significant, irreversible changes to the environment from project implementation; growth-inducing impacts; and the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity.
7.0	List of Preparers	Lists the individuals involved in preparing this EIR/EIS.
8.0	Agencies and Individuals Consulted	Lists the agencies and individuals consulted during the preparation of this EIR/EIS.
9.0	Literature Cited	Identifies the documents used in preparing this EIR/EIS.
10.0	Abbreviations	Provides the full names for acronyms and abbreviations used in this document.
Appendices (separately bound document)		Present additional background information and technical detail for several of the resource areas.

**Table 1-5
Location of Required EIR Components**

Required EIR Section	Location in document
Table of Contents and Index	Table of Contents Chapter 11.0, Index
Summary	Chapter ES, Executive Summary
Project Description	Chapter 2.0, Description of Project Alternatives
Environmental Setting	Section 2.1.1, Project Location and Environmental Setting; Section 2.1.2, Lagoon Overview and Wetland Characteristics; Section 2.9, Material Disposal Sections 3.X.1, Affected Environment, of each analysis topic in Chapter 3.0
Environmental Impacts	Chapter 3.0, Affected Environment and Environmental Consequences; Table ES-4, Summary of Environmental Effects
Significant Environmental Impacts	Chapter 3.0, Affected Environment and Environmental Consequences; Table ES-4, Summary of Environmental Effects
Mitigation Measures Proposed	Sections 3.X.4 of each analysis topic in Chapter 3.0; Table ES-4, Summary of Environmental Effects
Alternatives to the Proposed Project	Chapter 2.0, Description of Project Alternatives; Chapter 4.0, Comparison of Alternatives
Effects Found Not to be Significant	Section 6.4, Effects Found Not to be Significant
Significant Irreversible Environmental Changes	Section 6.1, Significant Irreversible Changes to the Environment or Irretrievable Commitments of Resources
Growth Inducing Impacts	Section 6.2, Growth Inducement
Cumulative Impacts	Chapter 5.0, Cumulative Impacts
Organizations and Persons Consulted	Chapter 8.0, Agencies and Individuals Consulted

1.7 AVAILABILITY OF THE DRAFT EIR/EIS

The Draft EIR/EIS was available at the County Department of Parks and Recreation offices located at 5500 Overland Avenue, Suite 410, San Diego, CA 92123, and online at http://www.co.san-diego.ca.us/parks/public_review.html for a 60-day public review period from August 1, 2014 through September 29, 2014.

The Draft EIR/EIS was also available at the following locations:

Cardiff-by-the-Sea Branch Library
2081 Newcastle Avenue
Cardiff-by-the-Sea, CA 92007

Solana Beach Branch Library
157 Stevens Avenue
Solana Beach, CA 92075

San Elijo Lagoon Nature Center
2710 Manchester Avenue
Cardiff-by-the-Sea, CA 92007

Comments from agencies and individuals were invited regarding the information contained in the Draft EIR/EIS. Where possible, those responding were to provide the information they felt was lacking in the Draft EIR/EIS or indicate where that information may be found. Written comments regarding the Draft EIR/EIS were directed to the following:

Ms. Megan Hamilton
County of San Diego Department of Parks and Recreation
5500 Overland Avenue, Suite 410
San Diego, CA 92123
megan.hamilton@sdcounty.ca.gov

or

Ms. Meris Bantilan-Smith
U.S. Army Corps of Engineers
Los Angeles District, Regulatory Division
Carlsbad Field Office
5900 La Place Court, Suite 100
Carlsbad, CA 92008
Meris.Bantilan-Smith@usace.army.mil

Following the 60-day period of circulation and review of the Draft EIR/EIS, written comments and responses to the comments were incorporated into this final EIR for certification. The Final EIS will be circulated again for 30 days prior to the Corps' issuance of a ROD.

CHAPTER 2.0

DESCRIPTION OF PROJECT ALTERNATIVES

2.1 PROJECT BACKGROUND

2.1.1 PROJECT LOCATION AND ENVIRONMENTAL SETTING

San Elijo Lagoon is located in the city of Encinitas, San Diego County, California (Figure 1-1). The lagoon is the terminus of Escondido Creek and La Orilla Creek at the Pacific Ocean. The lagoon study area is composed of approximately 960 acres, primarily within the Reserve, and separated into four areas: east basin, central basin, west basin, and coastal area (Figure 1-2). In addition to the lagoon study area, the geographical scope of this document also includes areas outside of the lagoon that could be used as disposal/reuse areas for materials excavated from the lagoon. These potential materials disposal/reuse areas are identified in Figure 1-3.

2.1.2 LAGOON OVERVIEW AND WETLAND CHARACTERISTICS

The lagoon is a coastal wetland with substantial biological and ecological resources. It includes habitat for sensitive, threatened, and endangered plants and animals, including resident and migratory wildlife. Recreational opportunities for the public are also provided within the Reserve, including more than 7 miles of public hiking trails.

San Elijo Lagoon is an open system, meaning that outside influences such as tides, stream flow, sediment input, weather, and development have affected the various vegetation communities and processes within the lagoon, particularly its aquatic processes. The historical ecological condition of the lagoon has varied dramatically in response to long-term wet and dry precipitation cycles and inlet management. In addition, the ecological capacity of the lagoon to maintain itself is being challenged due to encroachment by development adjacent to the lagoon and upstream within the 84.5-square-mile Escondido Creek watershed.

Habitat Distribution

Historically, the Southern California Bight contained much more coastal estuarine habitat than it does at present. Since the mid-1800s, a loss of approximately half of that habitat has occurred. While vegetated estuarine habitats have undergone the most loss in terms of absolute area, the largest proportional loss has occurred in unvegetated estuarine habitats, which have decreased by 78 percent (Stein et al. 2014).

One of the key recommendations of recent historic ecology studies is to use historic information as a foundation for framing current restoration efforts. This is not necessarily to recreate past conditions, but to preserve remnant habitats where possible and provide for flexible management processes, while taking into consideration current pressures, land use patterns, and potential future climate change (Stein et al. 2014; Beller et al. 2014). While a return to historic conditions is not the purpose of the SELRP, historic lagoon environment can provide a basis for understanding potential enhancement activities. In the 19th century, San Elijo Lagoon consisted primarily of salt flats (more than 50 percent), with a smaller proportion of open water and mudflats (Beller et al. 2014). Many of the pressures the lagoon faces today result from conditions that did not occur in the distant past. Watershed processes such as water and sediment delivery, constraints such as linear infrastructure, and past activities such as waste discharge into the lagoon substantially changed the current landscape compared to prior conditions. Overall, the total area of vegetated salt marsh has not decreased substantially. The distribution of that habitat has shifted, however, as increased freshwater volumes were impounded within the lagoon, creating mudflats and converting salt flats to salt and freshwater marsh.

Habitat distributions proposed by the SELRP are focused on providing a more connected gradient of balanced habitat types in the lagoon compared to existing conditions. Historic conditions indicate that, regionally, lagoons have shifted from a habitat distribution that favored vegetated (40 percent) and unvegetated (25 percent) estuarine over subtidal (35 percent) habitats, to a much more subtidal habitat mix, with 71 percent subtidal, 19 percent vegetated, and 10 percent unvegetated estuarine habitats (Stein et al. 2014). In San Elijo Lagoon, habitat distributions have actually shifted toward a more vegetated estuarine habitat distribution. Historically, the lagoon was composed of approximately 43 percent salt marsh and 57 percent unvegetated tidal area (salt panne and mudflats) (Beller et al. 2014). More recent data, however, show 75 percent of the wetland area now consists of vegetated marsh habitat, only 18 percent of unvegetated tidal area (e.g., salt panne and mudflats), and 7 percent of subtidal/open water. This shift to a more vegetated habitat distribution is ongoing, with vegetated marsh continuing to expand throughout the central basin. Each of the project alternatives considered by the SELRP considers both historic and current distributions, but is designed to provide a more connected gradient of those vegetated estuarine habitats integrated with unvegetated estuarine and open water habitats. Restoration of salt panne is complex, but remnant areas of historic salt panne would be maintained and unvegetated intertidal foraging opportunities provided by an increased emphasis on mudflats compared to existing conditions.

Hydrology and Water Quality

Historic evidence suggests that San Elijo Lagoon was once a perennially open system, prior to substantial man-made modifications. However, under the more developed conditions that

characterize the lagoon currently, the negative effects of inlet closure have been documented (similar to many southern California lagoons and estuaries). Therefore, for the SELRP, high estuarine productivity has been identified as being dependent upon tidal influence. As stated in *The Ecology of Southern California Salt Marshes: A Community Profile*: “Because tides are so important in providing moisture for coastal salt marshes, any interruption in tidal circulation can have drastic effects on these communities....The extent to which these embayments closed prior to changes brought about by man is difficult to determine, but local geologists seem to agree that closure of smaller lagoons was a natural phenomenon. Man’s intervention has no doubt increased the tendency for closure as well as the persistence of sand bar blockage” (Zedler 1982). Based on this information, San Elijo Lagoon appears to have been a perennially open system with a thriving molluscan fauna and these functions have disappeared through repeated, prolonged inlet closure, regardless of the mechanism of closure.

Urbanization within the Escondido watershed has accelerated freshwater storm flows, generated year-round urban runoff, and increased chemical contaminant and nutrient loads within the lagoon. The ecological effects of increased runoff have been compounded by obstructions to flow to the Pacific Ocean caused by an inefficient channel system and the three major transportation corridors that traverse the lagoon: Coast Highway 101, the NCTD railroad, and I-5. In addition, a weir managed by CDFW extends across the east basin, further restricting freshwater flows from exiting the lagoon. These constraints on the hydraulic connection between the ocean and lagoon affect tidal exchange and drainage of freshwater flows. As a result of these inefficiencies and the lack of inlet maintenance in the past, water surface elevations in the lagoon are not the same as those of the ocean, and habitat distribution and quality have been adversely affected. Such factors, as well as historic waste discharge into the lagoon, have led to a consistent degradation of water quality (e.g., elevated bacteria levels) in the lagoon and adjacent to the lagoon mouth, leading to problems such as beach closures during moderate to large storm events that flush accumulated bacteria to the ocean. Water quality within the lagoon is currently identified under CWA Section 303(d) as impaired for eutrophication, indicator bacteria, and sedimentation.

Before San Elijo Lagoon was primarily managed as a perennially open system, many of its ecological functions were degraded. Prolonged mouth closure led to impoundment of freshwater and high biological oxygen demand, which resulted in mass die-offs of fish and invertebrate populations from osmotic shock and low dissolved oxygen. Prolonged submergence of salt marsh plant species led to their repeated temporary demise and promoted the establishment and spread of freshwater species. Management of the tidal inlet has increased stability in the system, which now supports a more balanced assemblage of plants and animals (although habitat conversion continues).

Restoration of tidal influence to the lagoon and enhancing freshwater fluvial flows out of the lagoon, in conjunction with removal of sediments with historically accumulated nutrients, would restore the physical (soils and hydrology) and biological (biogeochemical/water quality and habitat) functions and services that have been degraded over the years. For the estuarine environment to be highly productive, it must be continually replenished with water and nutrients from the ocean. Regular tidal action also promotes high water quality. The moderating influence of ocean waters prevents extreme fluctuations in salinity and temperature, and maintains high levels of dissolved oxygen. Generally, the amount of time that portions of wetlands are submerged or exposed due to tidal fluctuation is referred to the “inundation frequency,” and results in a zonation typical of tidal wetlands. The extent of each wetland zone within a lagoon is dependent on tidal influence and the relative water elevation. The term “refugia” describes the area that is preserved (not impacted) for species to retreat to during construction or sea level rise. Each general wetland zone is described below, including typical tidal inundation frequencies associated with each habitat type:

Subtidal: Subtidal habitats are areas that are always submerged (inundated 100 percent of the time). Subtidal areas provide permanent habitat for fish and aquatic invertebrates. Subtidal areas may be vegetated by eelgrass, a highly productive, marine flowering plant that typically supports a rich fish and invertebrate community. Subtidal areas are used for feeding and resting by a variety of water-associated birds, including waterfowl, loons, grebes, pelicans, cormorants, gulls, and terns.

Intertidal Mudflats: Intertidal mudflats are the lowest in elevation of the intertidal habitats (submerged 100 to 40 percent of the time). Intertidal mudflats are gently sloping areas of soft mud inundated typically twice per day by tides. Mudflats may support mats of algal growth, providing food for mollusks, crustaceans, and burrowing worms. Mudflats are primary feeding areas for shorebirds and dabbling ducks. Fish forage on the mudflats when they are covered by the tides.

Low-Saltmarsh: Vegetated saltmarsh is inundated less frequently and for shorter periods of time than mudflats (submerged 40 to 20 percent of the time). Low-saltmarsh is dominated by California cordgrass (*Spartina foliosa*). Cordgrass is found at elevations above mean sea level where it is submerged regularly during high tides. Therefore, cordgrass is submerged for long periods, which few other plant species can tolerate. Cordgrass provides critical nesting and breeding habitat for the endangered light-footed Ridgway’s rail.

Mid- and High-Saltmarsh: Saltmarsh occurs at elevations that are only submerged during higher tides (submerged 20 to 6, or 6 to 0 percent of the time for mid- and high-saltmarsh, respectively). These areas typically are dominated by Pacific pickleweed

(*Sarcoconia pacifica*). Pickleweed has the broadest elevational range of any southern California marsh plant and can survive in areas without tidal exposure. Pickleweed is tolerant of soils high in salinity. High-quality pickleweed marsh is critical breeding habitat for the state-listed endangered Belding's savannah sparrow.

Transitional: The transitional zone is used to describe the area, or ecotone, between the upper limit of the estuarine wetland (often bound by mid- and high-marsh) and the adjacent upland and freshwater wetland habitat. A natural transitional zone already exists on-site, generally represented by the 2-foot elevation band immediately above the existing high tide line. These areas currently include upland and freshwater wetland plant communities depending on their location on-site. Transitional areas provide refuge for lagoon-dependent wildlife during periods of extensive inundation and extreme tides. It should be noted that restoration would create "man-made transitional habitat" where fill is placed strategically in the central and east basins to facilitate refugia opportunities as sea level rises. Thus, transitional can refer to both this existing natural ecotone at the edges of the lagoon as well as the refugia opportunities resulting from strategic elevational increases.

Efforts have been made since the mid-1990s to actively manage the lagoon. The San Elijo Lagoon Enhancement Plan, prepared by County DPR in 1996, identified several opportunities for enhancement and restoration, mostly by reducing sedimentation and improving tidal exchange and circulation. A long-term financial endowment was established in the late 1990s to actively fund maintenance of tidal flushing. As a result of this endowment, the SELC has actively opened the mouth of the lagoon on at least an annual basis for more than 10 years, and the lagoon mouth has remained open over 80 percent of the time over that period. Inlet management currently allows for cycles of inlet closure and opening, taking into account the pressures of existing conditions at the lagoon. The inlet is kept open most of the time but is allowed to close during the winter season. The inlet is maintained open to the extent possible during the breeding season to avoid inundating breeding bird nests and during warm months when extended eutrophic conditions are a concern. These management efforts have improved habitat and water quality relative to the stagnant conditions that previously developed when the inlet was closed for prolonged periods. Other efforts involving removal of invasive species also resulted in some improvement to habitat quality. Although important, these efforts do not remedy the underlying water quality impairments, hydraulic inefficiencies, or loss of functional mudflat within the lagoon.

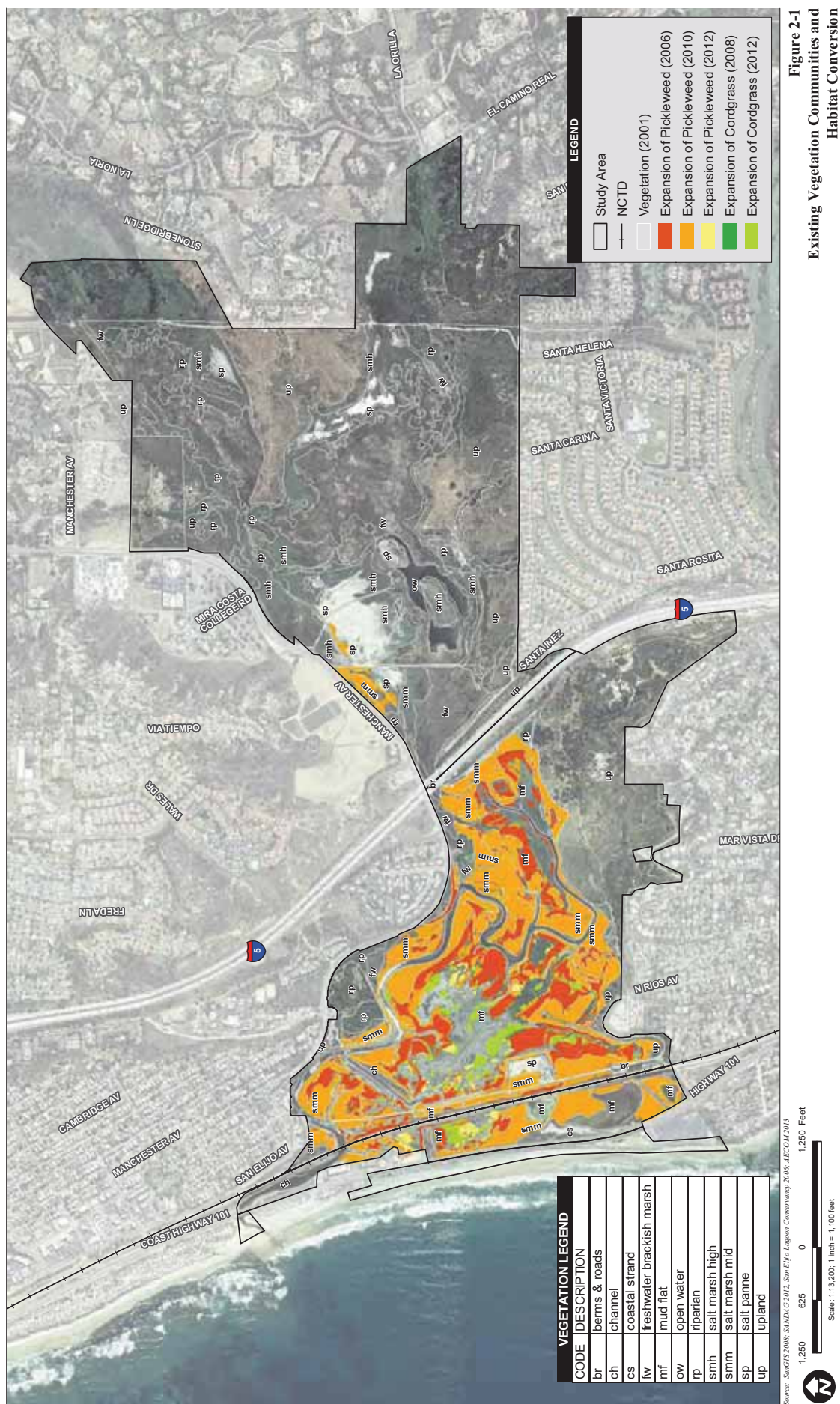
Actively maintaining a lagoon mouth that is more regularly open to the ocean has resulted in a change in circulation patterns, including a decrease in relative water elevations and inundation frequencies. Habitat has been distributed throughout the lagoon at elevations and locations that

are related to relic, closed-inlet conditions. Much of the functional mudflat habitat within San Elijo Lagoon is a result of higher water levels associated with historically impounded water due to a constricted hydraulic connection to the ocean. When the mouth of the lagoon is opened through active maintenance activities, the lagoon is able to drain more efficiently and areas that were historically under water the majority of the time are now exposed more frequently. These areas are becoming vegetated and ceasing to function as mudflats because they are not inundated by tides for long enough to restrict vegetation growth. Due to a change in inundation frequency, habitat within San Elijo Lagoon is rapidly converting from mudflat to low- and mid-marsh, as shown in Figure 2-1. The rapid and ongoing expansion of two key species, cordgrass and pickleweed, has been documented through focused vegetation mapping since 2001. If no action is taken to restore the lagoon's water quality and tidal regime, coupled with proper elevation for mudflats, the loss of ecologically valuable mudflat habitat would continue. Emerging salt marsh habitats are also ecologically valuable to species within the lagoon, but decreasing mudflats affect the balance of suitable foraging and nesting habitats (e.g., to the detriment of migratory and resident shorebird populations). Habitat gradients that balance both vegetated and unvegetated intertidal areas are critical to enhance and restore wetland functions and services at the lagoon level.

2.1.3 STAKEHOLDER INVOLVEMENT/COORDINATION

The SELRP brings together various public and private entities that share responsibility to protect, manage, and regulate the lagoon. The landholders are the nonprofit SELC, County DPR, and CDFW, and they work in coordination to co-manage the lagoon. Since late 2007, a group of stakeholders has met regularly to guide the development of the lagoon restoration with a holistic approach. The stakeholder group consists of representatives of the agencies/entities listed in Section 1.3. The SELRP has been largely driven by this group of stakeholders, and the project alternatives analyzed in this EIR/EIS are a result of collaborative and iterative processes to incorporate stakeholder input into project design. The stakeholder group includes not only resource and regulatory agencies, but also responsible agencies under CEQA, such as Caltrans.

Coordination has also been ongoing with various public utilities and service providers to ensure impacts to existing services and facilities are minimized. Meetings with SANDAG and Caltrans have also been held to facilitate coordination between the various proposed infrastructure improvement projects within the lagoon.



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2.1.4 SUMMARY OF PREVIOUS RESTORATION PLANNING EFFORTS

The SELRP has evolved over a number of years and has involved many lagoon stakeholders, as described above. Consequently, a number of documents and studies have been completed that focus on various aspects related to improving the water quality, biological, and hydrologic functions of the lagoon since the mid-1990s. While each of these efforts provided valuable information to address restoration of the lagoon, when viewed collectively, they resulted in a dispersed set of planning and reference documents without a comprehensive approach to overall lagoon restoration.

In 2007, lagoon stakeholders reinvigorated efforts to develop a comprehensive approach to address restoration. The initial step was consolidation of previous studies and evaluation of available information to identify data gaps, coastal engineering and environmental studies needed, and anticipated regulatory requirements. That effort was documented in the *Final San Elijo Lagoon Restoration Project Data and Information Gap Analysis Summary Report* (Gap Analysis) (EDAW 2008).

The Gap Analysis identified the need for lagoon stakeholders to document and agree upon conceptual alternatives to be carried forward for further study. While various interested parties had devised restoration concepts and considered alternative configurations of key infrastructure, no single document was prepared to identify these concepts for further study. The *Final San Elijo Lagoon Restoration Project Alternatives Development Report* (EDAW 2009) summarizes efforts made over the last two decades to develop viable project alternatives to restore the lagoon. The Alternatives Development Report also formally documents the conceptual alternatives identified by lagoon stakeholders in late December 2008 for future study.

Since that time, the environmental and engineering studies identified as necessary have been initiated. This EIR/EIS reflects the results of those efforts. Studies completed for the SELRP include the following, in addition to technical studies included as appendices to this EIR/EIS:

- Sediment Characterization Study – Presents existing information of soils within the project area and analyzes the data for compatibility with the littoral zone. Recommends additional studies that were completed by URS in 2012 (Moffatt and Nichol [M&N], July 2010).
- Sea Level Rise Analysis – Summarizes the status of sea level projections and agency guidance to date, and recommends a design horizon for sea level at San Elijo Lagoon of 2 feet, assumed to occur in approximately 2065 (M&N, February 2010).

- Ebb Bar and Flood Shoal Study – Presents analyses of potential shoaling in the lagoon and nearshore ocean from proposed alternatives (M&N, July 2011).
- Tidal Muting Study – Presents analyses of potential tidal muting caused by shoaling for proposed alternatives, effects on tidal ranges and inundation frequency, and effects to habitat (M&N, November 2011).
- San Elijo Lagoon Bridge Optimization Study – Presents analyses of potential environmental effects of new bridge structures across San Elijo Lagoon (M&N, April 2012).
- Tidal Inlet Stability Study – Presents analyses of the stability of the tidal inlets for the proposed alternatives (M&N, July 2012).
- Shoreline Morphology Study – Presents proposed sediment beneficial re-use options, and analyses of shoreline morphology related to proposed alternatives (M&N November 2012).
- Revised Preliminary Draft Construction Methods Report – Presents proposed construction methods for each alternative (M&N, January 2013).

2.1.5 PROJECT SUMMARY

The proposed project and alternatives have been developed from past efforts in response to the need to improve and restore the water quality, biological, and hydrologic functions of the lagoon. Each of the alternatives evaluated within this document proposes actions that would enhance existing lagoon functions and services through dredging and grading activities. The range of alternatives developed for the SELRP reflect differing patterns and levels of dredging and material removal, as well as resulting habitat distribution. As a result of dredging and grading activities proposed under each of the alternatives, material would be generated necessitating disposal/reuse. Dependent upon the suitability of the material, material removed from the lagoon could include disposal at offshore ocean and/or upland locations, beneficial reuse of the material through placement on the beach or nearshore, or reuse of the material on-site. Appropriate infrastructure improvements are also included in the proposed project and alternatives as necessary. Upon selection of a project alternative as part of this EIR/EIS process and the 404(b)(1) Alternatives Analysis, permits would be obtained and final design completed for the project.

If considered only in isolation, it can appear that certain goals or objectives of the project are solely for the benefit of one element of the lagoon, such as water quality or biology. However, lagoon functions, including water quality, hydraulic function, and biology, are interrelated and dependent upon each other. Project goals and objectives were developed together to result in a

healthy and improved overall lagoon ecosystem. For example, to maintain healthy habitats that can support wildlife species throughout the lagoon, it is imperative to improve water quality and reduce eutrophication. Similarly, water quality and hydraulic function are critical to the survival of species in the lagoon ecosystem, such as fish that cannot survive the eutrophic conditions that occur when the inlet closes and benthic species that provide a foraging base for shorebirds. The lagoon system is an interrelated and connected ecosystem that should be restored through improvements to the suite of lagoon functions.

Implementation of the SELRP would result in certain trade-offs in terms of temporary impacts as described throughout this EIR/EIS necessary to achieve the positive long-term benefits of improved lagoon functions and services. For example, certain vegetation and habitats are growing successfully in the high-nutrient sediments currently in the lagoon. However, the presence of the high-nutrient levels is detrimental in multiple ways, such as degraded water quality, which contributes to a 303(d) listing for eutrophication under the CWA. Eutrophication leads to fish kills during warm weather, and potentially limits the ecological health of species and habitats within the lagoon. While restoration activities would temporarily affect emerging habitats (e.g., low-marsh in the central basin), long-term water quality benefits would improve lagoon function as a whole and ultimately result in a connected gradient of balanced habitat types that can be maintained for the long term; improved lagoon hydraulics, such as decreased water residence time resulting in decreased bacterial levels; hydrologic connectivity and sediment budget for the nearshore littoral zone; and others.

2.2 ALTERNATIVES DEVELOPMENT

NEPA and CEQA require the objective evaluation of a “reasonable” range of alternatives. Through comparison of these reasonable alternatives to a proposed project, the advantages of each can be weighed and analyzed. Under NEPA, reasonable alternatives are those that are practical or feasible from a technical and economic perspective, and based on common sense (46 Federal Register 18026, as amended; 51 Federal Register 15618). Section 15126.6 of the CEQA Guidelines requires that an EIR “describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project, but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives.” Factors used to determine feasibility include site suitability, economic limitations, availability of infrastructure, consistency with local plans and policies, other plan or regulatory limitations, and jurisdictional boundaries.

The process of defining, evaluating, screening, and ultimately selecting a reasonable range of alternatives for detailed evaluation in this EIR/EIS involved government agencies, nonprofit organizations, the public, and other lagoon stakeholders. A broad range of alternative concepts

were developed and considered. In 2008, a broad suite of alternatives were evaluated to narrow this range of alternatives to a reasonable number for more detailed engineering and environmental study. Based on subsequent evaluation through preliminary engineering and stakeholder coordination efforts, those alternatives were further refined to generate the proposed project and two alternatives that are evaluated in this document. As noted in the 2009 Alternatives Development Report, some alternatives considered the entire lagoon and other alternatives focused on key infrastructure elements (i.e., inlet and roadway/railroad choke points) or evaluated a single concept (avoid or reduce flooding on Manchester Avenue) (EDAW 2009).

The general alternatives screening process for lagoon restoration alternatives is provided below. Section 2.3 notes the alternatives carried forward in 2009, based on the Alternatives Development Report, summarizes the alternatives eliminated in later years based on subsequent evaluation, and lists the alternatives carried forward for further analysis. Since restoration of the lagoon could generate a substantial amount of dredged material to be disposed of and/or reused beneficially, Section 2.3 also discusses alternatives for materials disposal/reuse/beneficial reuse.

2.2.1 LAGOON RESTORATION ALTERNATIVES SCREENING PROCESS

The Alternatives Development Report (EDAW 2009) described the screening process for lagoon restoration alternatives as follows:

Step 1: Generation of Alternative Concepts

- Describe alternative's basic characteristics
- Rationale for alternative

Step 2: Preliminary Screening of Alternative Concepts (Basic Fulfillment of Purpose and Need)

- Would the alternative maximize opportunities, such as the following:
 - Maximize tidal flushing
 - Enlarge tidal prism
 - Restore tidal circulation
 - Enhance and/or maintain species diversity
 - Improve water quality
- Would the alternative avoid or minimize constraints, such as the following:
 - Not worsen existing flood conditions at lagoon crossings (i.e., east of I-5 at Manchester Avenue)
 - Construction and long-term maintenance costs
 - Excessive sediment deposition
 - Impacts to offshore reef

- Impacts to surf breaks and other recreational resources
- Impacts to endangered species in upland areas
- Impacts to riparian habitat
- Disturbance of cultural resources

Step 3: Refinement of Conceptual Alternatives and Continued Feasibility Analysis

- Engineering feasibility
- Economic feasibility
- Environmental constraints

Step 4: Identification of Alternatives to Carry Forward for Detailed Analysis

Four conceptual alternatives, plus the No Project/No Federal Action Alternative, were carried forward for detailed analysis in 2009 (Section 2.3). Based on new information from subsequent engineering and environmental studies, these alternatives were screened again via the process above. One of the 2009 recommended alternatives was subsequently eliminated, and the remaining alternatives were renamed. This is described in Section 2.3. For the purposes of the Draft EIR/EIS, the alternative resulting in the largest level of impact was identified as the proposed project. This designation was made for procedural purposes and did not reflect a predisposition for implementation of that alternative. Alternative 1B-Refined is identified as the Agency Preferred Alternative in this Final EIR/EIS based on information in this document, and is identified as the LEDPA in the Draft 404(b)(1) Alternatives Analysis attached as Appendix O. Final Corps determination on the LEDPA will be made in the ROD.

2.2.2 PROJECT ALTERNATIVES CONSIDERED BUT REJECTED

Over the life of the project, various options for restoration of the lagoon have been considered. More recently, various options for disposal of material dredged from the lagoon have also been considered. However, the focus of the proposed project is lagoon restoration, as documented in the Purpose and Need, so while there may be varying benefits associated with various disposal options, the key selection criteria remain linked to the restoration element. The following sections highlight the lagoon restoration alternatives and the material disposal alternatives that were considered but have been rejected from further analysis.

Lagoon Restoration Alternatives Considered but Rejected

Lagoon restoration alternatives considered but rejected as part of the 2009 Alternatives Development Report are described in detail in that document. Table 2-1 provides a brief

Table 2-1
Alternatives Considered and Recommendations per 2009 Alternatives Development Report

Name of Alternative (from Source Document)	Brief Description	Channel Width Measurements			Relocate Inlet?	Carried Forward or Eliminated?
		I-5 Bridge	NCTD RR	PCH & Inlet		
No Action (Required per CEQA and NEPA)	Existing conditions remain. No dredging, excavation, or modifications to channel widths would occur.	130 feet	130 feet	105 feet	No	Carried forward.
Alternative 1 (2009 Alternatives Development Report)	Retain existing inlet location but increase width of channel openings for the PCH bridge and railroad trestle. Includes the creation of a sediment trap and avian islands, and the grading of various basins within the lagoon. Approximately 160,000 cubic yards would be exported from the lagoon and disposed offshore.	130 feet	490 feet	130 feet	No	Carried forward.
Alternative 2A (2009 Alternatives Development Report)	Retain existing inlet location but increase width of channel openings for the PCH bridge, Interstate 5 (I-5) bridge, and railroad trestle. Includes the creation of a sediment trap and avian islands, and the grading of various basins within the lagoon. Approximately 1.2 million cubic yards (mcy) would be generated for disposal/reuse by the alternative.	260 feet	490 feet	130 feet	No	Carried forward.

Name of Alternative (from Source Document)	Brief Description	Channel Width Measurements			Relocate Inlet?	Carried Forward or Eliminated?
		I-5 Bridge	NCTD RR	PCH & Inlet		
Alternative 2B (2009 Alternatives Development Report)	Construct a new inlet south of the restaurants and close the existing inlet. Increase width of channel openings for the PCH bridge and railroad trestle. Includes the creation of a sediment trap and avian islands, and the grading of various basins within the lagoon. Approximately 1.4 mcg would be generated for disposal/reuse by this alternative.	260 feet	590 feet	200 feet	Yes	Carried forward.
Alternative 3 (2009 Alternatives Development Report)	Construct a new inlet south of the restaurants and close the existing inlet. Increase width of channel openings for the PCH bridge, I-5 bridge, and railroad trestle. Also includes creation of a sediment trap and avian islands, and the grading of various basins within the lagoon.	260 feet	590 feet	200 feet	Yes	Carried forward in 2009, but eliminated in 2011. <i>Significant ecological impacts without substantial hydraulic/ecological benefit</i> – This alternative would have created subtidal basins extending through most of the central basin and a large portion of the east basin. While additional tidal prism could be achieved with this alternative, less extensive changes were shown to provide a tide range approximating the open ocean, and impacts to existing sensitive habitat would have been substantial. Resulting habitat distribution would have been decreased overall compared to other alternatives, and would not have achieved the project objectives in that respect.
Alternative 2 – Culvert (2006 Optimization Study)	Move inlet south of restaurants; close existing inlet and create a parallel culvert under I-5 bridge.	130 feet	590 feet	200 feet	Yes	Eliminated. <i>Too expensive without significant ecological benefit</i> – The addition of a culvert under I-5 would not achieve a substantial hydrologic benefit within the lagoon and would incur a substantial cost for construction.

2.0 Description of Project Alternatives

Name of Alternative (from Source Document)	Brief Description	Channel Width Measurements			Relocate Inlet?	Carried Forward or Eliminated?
		I-5 Bridge	NCTD RR	PCH & Inlet		
Alternative 2 – Max (2006 Optimization Study)	Complete removal of I-5 berm within the lagoon boundary, replacing the berm with habitat (likely unvegetated due to shade impacts from structure).	n/a	590 feet	200 feet	No	Eliminated. <i>Too expensive without significant ecological benefit</i> – The removal of the I-5 berm completely within the lagoon boundary would primarily increase the area available for wetland/aquatic habitat within the lagoon (by approximately 9 acres). The hydrologic benefit to the lagoon would be minimal, as hydraulic studies indicate that fluvial muting is minimized by a structure measuring 80 meters in length (as proposed in Alternatives 2A and 2B). Substantial design and construction costs would have been incurred with construction of a raised bridge structure across the lagoon.
Location 2 (Old Alt 2) (2001 Feasibility Study)	Move inlet to north of Charlie's/restaurants.	n/a	n/a	n/a	Yes	Eliminated. <i>Significant ecological impacts without removing hydrologic inefficiencies</i> – Would provide more of a straight channel for the lagoon to help promote tidal flushing. Inlet closure issues would still be anticipated, however, because the majority of the existing sinuous channel would remain and would continue to slow outflow. In addition, an offshore reef is located in this location and would continue to prevent larger tidal prism and sediment transport offshore. Channeling through the reef was briefly considered as part of this alternative to allow for sand transport offshore; however, this alternative would create a number of ecological and community issues without solving the hydrologic inefficiencies within the lagoon itself. Inlet maintenance dredging would still be needed to keep the inlet mouth open. In addition, the inlet location would be too constrained in size for locating a sedimentation basin.

Name of Alternative (from Source Document)	Brief Description	Channel Width Measurements			Relocate Inlet?	Carried Forward or Eliminated?
		I-5 Bridge	NCTD RR	PCH & Inlet		
Alternative 3b: Location 3 (2003 Corps Meeting Series)	Move inlet south of restaurants but no sedimentation basin.	n/a	n/a	n/a	Yes	Eliminated. <i>Decreased sediment flushing and increased maintenance</i> – Relocation of the inlet to south of the existing restaurants would enhance hydrologic functioning within the lagoon and would provide a natural channel for offshore sediment transport. Eliminating the construction of a sedimentation basin within the lagoon would substantially reduce the ability of the lagoon to flush accumulated sediments during ebbing tides. Associated maintenance with keeping the inlet open without frequent maintenance dredging would increase long-term costs.
Alternative 4a: Submerged Pipeline (2003 Corps Meeting Series)	Submerged pipeline with improving existing inlet.	n/a	n/a	n/a	No	Eliminated. <i>Would not accomplish overall purpose of the project</i> – Would not solve hydraulic inefficiencies within the lagoon because it would maintain the existing inlet, which does not allow for adequate sediment transport due to small tidal prism and tidal muting. Although existing inlet would be improved, maintenance would still be required due to sinuous water channel. Additional pipeline would provide only localized benefit and would not alter sedimentation within the lagoon or habitat transition.
Alternative 4b: Submerged Pipeline (2003 Corps Meeting Series)	Submerged pipeline without improving existing inlet.	n/a	n/a	n/a	No	Eliminated. <i>Would not accomplish overall purpose of the project</i> – Would not solve hydraulic inefficiencies within the lagoon because it would maintain the existing inlet, which does not allow for adequate sediment transport due to small tidal prism and tidal muting. Frequent maintenance would be required due to sinuous water channel and tidal muting. Additional pipeline would provide only localized benefit and would not alter sedimentation within the lagoon or habitat transition.

2.0 Description of Project Alternatives

Name of Alternative (from Source Document)	Brief Description	Channel Width Measurements			Relocate Inlet?	Carried Forward or Eliminated?
		I-5 Bridge	NCTD RR	PCH & Inlet		
Alternative 5 (2008 Stakeholder Meetings)	Reduce elevation of mudflats and dredge some subtidal areas in the west and central basins.	n/a	n/a	n/a	No	Eliminated as a stand-alone alternative but carried forward as design feature. <i>Would not solve tidal prism issues</i> – This alternative would include dredging within the lagoon itself to create more mudflats and subtidal areas within the west and central basins.
Dual Inlets (2003 Corps Meeting Series)	Create a second inlet in a second location and maintain/improve existing inlet location.	n/a	n/a	n/a	No	Eliminated. <i>Too expensive with extensive maintenance issues and no significant ecological benefits</i> – This alternative would not solve existing maintenance issues at the existing inlet, and it may exacerbate sedimentation within the existing inlet if tidal muting is increased even further by less outflow during ebbing tides. Creation of the second inlet would incur substantial costs but, by splitting the flow between two locations, may not result in as much benefit hydraulically as allowing a single inlet to be maintained.
Long Jetties (2003 Corps Meeting Series)	Construct a short jetty at inlet mouth.	n/a	n/a	n/a	n/a	Eliminated. <i>Would not accomplish overall purpose of the project</i> – Construction of jetties would slow the accumulation of sand and cobble in the inlet and decrease the amount of maintenance required to keep the inlet open; however, construction of long jetties extending into the surf zone may change the shoreline and the character of the surf break that occurs in the area. Construction of jetties may also create impacts to the visual environment and create restrictions to access.

n/a = not applicable

NCTD RR = North County Transit District railroad

PCH = Pacific Coast Highway (i.e., Coast Highway 101)

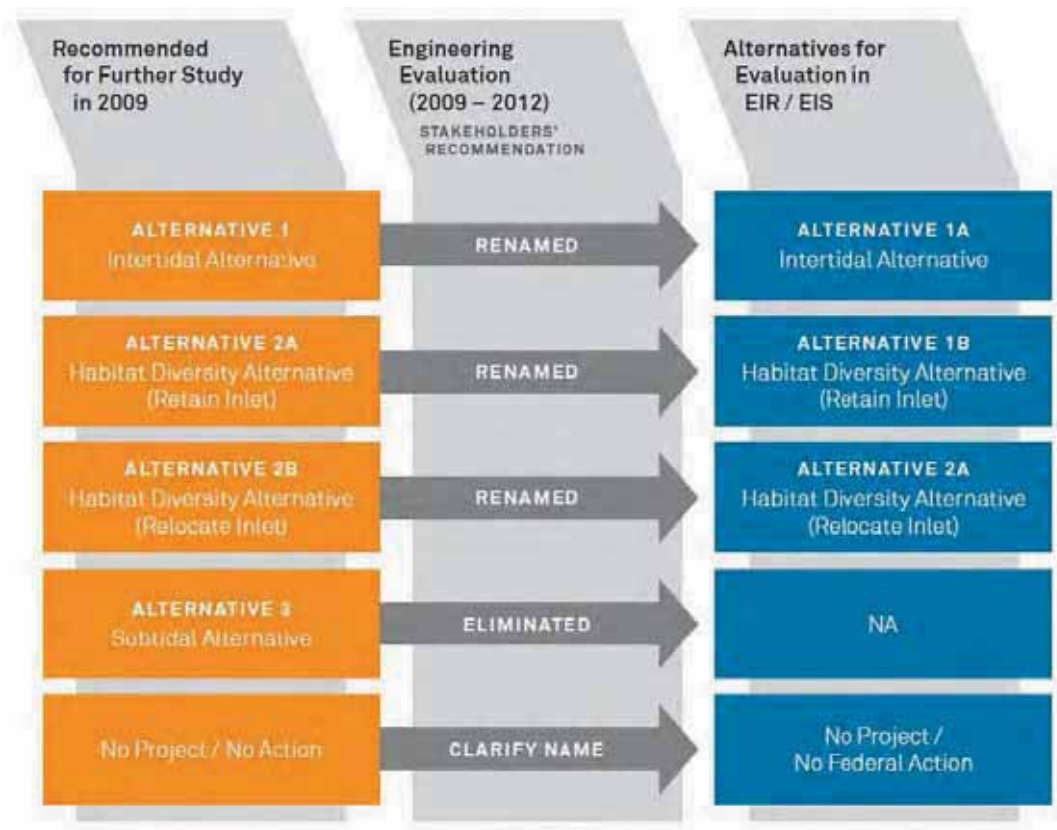
Corps = U.S. Army Corps of Engineers

description of alternatives brought forth in a variety of studies and states recommendations from the time of development. Due to the range of sources these alternatives were derived from, the numbering and naming conventions in Table 2-1 do not follow a cohesive pattern.

Alternatives 1, 2 (with variations A and B), 3, and the No Project/No Federal Action Alternative were carried forward into subsequent study, primarily engineering studies and discussion with the stakeholder group (from 2009 through 2012). Specifically, these alternatives were evaluated for sediment characterization, resilience to sea level rise, hydraulic improvements, water quality characteristics, ebb bar and flood shoaling, tidal muting, shoreline morphology effects, inlet stability, surfing impacts, maintenance dredging requirements, materials disposal/reuse opportunities and constraints, and construction methods.

At a stakeholder meeting on September 6, 2011, Alternative 3 was eliminated because it would result in significant ecological impacts without substantial hydraulic/ecological benefits. Also, the numbering/naming convention was modified. Figure 2-2 provides a schematic of the alternatives screening/name changes.

Figure 2-2
2009–2012 Alternative Screening Flowchart



Continued refinement of the alternatives has occurred based on agency and stakeholder input. Over the course of the multi-year planning process, efforts have also been made to modify alternatives to minimize impacts to habitat even as that habitat continues to transition.

Materials Disposal Alternatives Considered but Rejected

The proposed project and alternatives would generate up to 1.4 mcy of excess material that must be disposed to achieve lagoon restoration, as detailed in Table 2-1. Table 2-2 describes the potential materials disposal locations. SANDAG, as well as state and local agencies, has identified reuse of such disposal material for littoral cell nourishment (this encompasses the onshore and nearshore sand as it cycles seasonally, and is further described in Section 3.3) as a priority when of suitable quality; therefore, the SELRP evaluates both disposal and reuse options. A construction approach creating an on-site overdredge pit would enable the project to provide suitable material for reuse, while allowing for on-site disposal of material that would otherwise have to be disposed of off-site. This approach essentially overexcavates deeper, coarse-grained sandy material from a pit within the site for reuse on beaches and in the nearshore. That pit can then provide an on-site disposal site for finer-grained material produced from more shallow grading and dredging. The screening process used to develop materials disposal/reuse alternatives is described in the following steps:

- Step 1: Identify Potential Disposal Locations
 - Upland
 - Offshore Disposal
- Step 2: Consider Beneficial Reuse Options that support the goals of the Coastal Regional Sediment Management Plan (RSM Plan) implemented by SANDAG and has potential to comply with the Inland Testing Manual (ITM) and Ocean Disposal Manual (ODM).
 - Nearshore Placement
 - Onshore Placement at Previously Evaluated/Permitted Sites
 - Sand Compatibility and Opportunistic Use Program (SCOUP)
 - Regional Beach Sand Project (RBSP)
 - Corps' Encinitas-Solana Beach Coastal Storm Damage Reduction and Beach Nourishment Project
 - Offshore Placement in Designated Placement Sites for Future Stockpile Resource
 - Reuse for Construction Fill
- Step 3: Evaluate Constructability
 - Proximity
 - Cost

Table 2-2
Potential Locations for Materials Disposal

	Potential Disposal Locations	Reasoning for Location Selection
Offshore	LA-5	Some dredged material would be fine grained and therefore not of suitable quality for beneficial reuse. This EPA-designated disposal location is intended for disposal of such material. ³
	SO-5/SO-6 ¹	Stockpiling of materials outside littoral zone as a sediment source for future beneficial reuse (e.g., beach nourishment).
Nearshore	Cardiff	Materials placement inside littoral zone for indirect beach nourishment.
Onshore ² (beach placement)	Cardiff	Proximity to the project area; specific placement site boundaries not previously identified as part of previously approved or planned beneficial reuse project/program (overlapping but larger than previously used Regional Beach Sand Project [RBSP] sites).
	Oceanside	Sand Compatibility and Opportunistic Use Program (SCOUP) receiver sites.
	Carlsbad	
	Encinitas – Moonlight	
	Encinitas – Batiquitos	
	Solana Beach	
	Oceanside	RBSP receiver sites.
	North Carlsbad	
	South Carlsbad North	
	Batiquitos	
	Leucadia	
	Moonlight Beach	
	Cardiff	
	Solana Beach	
	Torrey Pines	
	Encinitas	Encinitas-Solana Beach Coastal Storm Damage Reduction and Beach Nourishment Project receiver sites.
	Solana Beach	
Onshore (non-beach)	Various locations near lagoon (e.g., railroad trestle, I-5, or Coast Highway 101 construction needs)	Reuse as fill for the proposed project or other infrastructure improvements or construction of transition and nesting areas.
	Landfill	Disposal at upland landfill.

Note: Any placement of material within the littoral zone, including offshore stockpiling, nearshore, or onshore beach placement, would require creation of an over dredge pit on-site as part of the disposal strategy

¹ SO-5 and SO-6 are designated placement sites located in the ocean outside the littoral depth of closure, or sand supply seasonally cycling between the nearshore and beaches. These sites were identified in the RBSP Environmental Impact Report and Environmental Assessment (SANDAG 2001, 2011) as sand sources for beach nourishment; approval to utilize the sites for offshore stockpiling for future projects would be obtained by the SELC as part of the permitting process associated with the proposed SELRP. As part of placement authorization by the Corps and EPA, additional testing may be conducted to ensure that the site would not be degraded. If authorization is not obtained, this location would not be used for placement.

² Most north county coastal cities have adopted a SCOUP to allow opportunistic, beach-quality material to be placed at identified receiver sites. The cities of Oceanside, Carlsbad, Encinitas, and Solana Beach have approved CEQA documents and necessary permits for SCOUP. SANDAG's RBSP was implemented in fall 2012 and placed 1.4 mcy of sand on eight receiver sites between Oceanside and Imperial Beach. It is like the first RBSP in 2001 that placed 2.1 mcy on 12 receiver sites in similar footprints. Both projects had approved CEQA/NEPA documents and permits that addressed one-time placement; approval to utilize these sites for the SELRP would be obtained by the SELC as part of the permitting process associated with the proposed project. The Storm Damage Reduction Project proposes to place up to approximately 1.4 mcy of material on beaches in these two cities. Current status of that project is discussed in Chapter 5.

³ LA-5 is one of 12 existing EPA-designated ocean disposal sites for dredged material in Region 9. Each site is managed according to a Site Management and Monitoring Plan. Preliminary coordination with the Corps and EPA indicates that the material appears to be suitable for disposal at LA-5. If Alternative 1A is selected for implementation, additional testing in accordance with ODM and coordination would be conducted prior to authorization for disposal at the site.

Table 2-2 identifies the potential disposal and beneficial reuse locations and provides further reasoning for location selection.

With the potential locations for materials disposal/reuse and beneficial reuse identified, a number of preliminary disposal scenarios were developed. Table 2-3 describes the preliminary disposal scenarios and states whether scenarios were carried forward or eliminated from further analysis. Additional ITM and/or ODM testing may be required prior to Corps and EPA approval of the materials disposal/reuse scenarios.

Table 2-3
Preliminary Materials Disposal/Reuse Scenarios Considered

Scenario	Description	Carried Forward or Eliminated
LA-5 Disposal	Material would be primarily disposed of offshore in LA-5. Minimal amounts would be placed in the nearshore at Cardiff. No onshore sand placement would occur.	Selected components carried forward. ODM Tier 3 testing would be completed, as needed.
Landfill	Material would be disposed of in an upland landfill.	Eliminated: Material would require dewatering and over 15,000 truck trips to haul off-site.
SCOUP Receiver Sites and Nearshore Cardiff	Material would be placed onshore within approved Sand Compatibility and Opportunistic Use Program (SCOUP) receiver sites closest to the project site, including Oceanside, Carlsbad, Moonlight Beach, Batiquitos, and Solana Beach. Material would also be placed nearshore at Cardiff.	Eliminated: Currently authorized SCOUPs are too restrictive to allow effective construction (e.g., delivery from sea; nighttime construction).
RBSP Receiver Sites and Nearshore Cardiff	Material would be placed onshore within previously permitted RBSP receiver sites closest to the project site, including North Carlsbad, South Carlsbad North, Batiquitos, Leucadia, Moonlight Beach, Solana Beach, and Torrey Pines. Material would also be placed onshore and nearshore at Cardiff.	Selected RBSP receiver sites carried forward with a combination of nearshore and onshore at Cardiff.
Encinitas-Solana Beach Coastal Storm Damage Reduction and Beach Nourishment Project Receiver sites and Nearshore Cardiff	Material would be placed onshore at planned Shoreline Protection Project receiver sites in Encinitas and Solana Beach. Materials would also be placed nearshore at Cardiff.	Eliminated: Although project has been conceptually approved, funding has not been identified, and uncertainty of implementation in current fiscal environment makes consideration of this scenario too speculative at this time.
Borrow Site Stockpile	Material would be placed in sites SO-5 and SO-6 previously used as borrow sites for the 2001 and 2012 RBSPs and nearshore at Cardiff.	Carried Forward

Scenario	Description	Carried Forward or Eliminated
Reuse for Fill	Material would be reused as fill for construction projects near the lagoon, such as infrastructure improvement to the North County Transit District railroad and Coast Highway 101. Construction of Interstate 5 is not anticipated to require fill.	Eliminated: Although the project may generate some material appropriate for reuse as fill, volumes would be small and establishing a batch plant to process the material into fill would not be efficient.

The scenarios carried forward in Table 2-3 were then refined to reflect constructability, defined primarily by proximity to the lagoon and associated lower transport cost. A refined materials disposal and reuse approach was defined, as outlined in Table 2-4, that would accommodate volumes of material anticipated to be produced by the SELRP for modeling and engineering purposes. Maximum potential placement volumes have been identified for each site based on historic project site boundaries from RBSP or specific SELRP needs. These maximum volumes are addressed in this EIR/EIS for disclosure of potential effects associated with materials placement at each site, but it is anticipated less volume would be placed at some locations because the overall capacity exceeds disposal volume needs.

Table 2-4
Materials Disposal and Beneficial Reuse Alternatives
Carried Forward for Further Analysis

Type of Materials Placement	Potential Disposal Locations
Offshore Disposal	LA-5
Offshore Stockpiling (outside littoral cell)	SO-5/SO-6
Nearshore (inside littoral cell)	Cardiff
Onshore (beach placement)	Cardiff
	Leucadia
	Moonlight Beach
	Solana Beach
	Torrey Pines

2.3 PROJECT ALTERNATIVES CARRIED FORWARD

An EIR is required to evaluate the effects of a proposed project and its alternatives on the environment. An EIS is required for major federal actions significantly affecting the human environment and discloses those significant impacts. The SELRP was designed by a stakeholder-driven process. The analysis within this document and associated stakeholder/public input through the environmental process will drive selection of the Agency Preferred Alternative and the Environmentally Preferred Alternative. Based on the iterative screening process described in

Section 2.2.1, three project alternatives were identified and recommended for detailed evaluation in this EIR/EIS. The preliminary LEDPA has been identified as Alternative 1B – Refined through the Section 404(b)(1) Alternatives Analysis, as described in the Preface of this EIR/EIS and attached as Appendix O. This alternative also represents the CEQA Agency Preferred Alternative and NEPA Environmentally Preferred Alternative, subject to a final LEDPA determination in the Corps’ ROD. All alternatives identified in the Draft EIR/EIS were analyzed at an equal level of detail to facilitate identification of the LEDPA and ultimate selection of an alternative for implementation. This Final EIR/EIS continues to evaluate alternatives at an equal level of detail in the event that the Final 404(b)(1), which will be included in the ROD, determines a different LEDPA from Alternative 1B – Refined. The alternatives addressed in this EIR/EIS include:

- Alternative 2A
- Alternative 1B
- Alternative 1A
- No Project/No Federal Action Alternative

The project involves several design elements/considerations common to each alternative, although the degree to which each element is included in each alternative may differ (e.g., acreage of dredging or grading); an overview of the common elements is provided in Table 2-5. Detailed information about Alternative 2A is contained in Section 2.4. Sections 2.5 through 2.7 provide information about Alternative 1B and Alternative 1A, plus the No Project/No Federal Action Alternative. Section 2.8 provides a comparison of the project alternatives.

Table 2-5
Overview of Design, Construction, Post-Construction Elements Common to the
Project Alternatives (Excluding No Project/No Federal Action)

Habitat Changed due to Dredging/Grading Activities	
Direct dredging or grading for habitat conversion/creation	The SELRP ¹ would reconfigure the lagoon to remove high-nutrient sediments that cause eutrophication in the lagoon. In the process of sediment removal, the project would create elevations with appropriate inundation frequencies to support specific habitat types. Generally, habitats range in elevation from mid- to high-saltmarsh (pickleweed dominated), to low-saltmarsh (cordgrass dominated), to intertidal mudflats, and finally to subtidal (submerged) lands.
Habitat impacts through extended flooding/inundation	Alternative 2A and Alternative 1B would flood portions of the lagoon in order to complete dredging activities within specific areas designated for shallow dredging. This inundation of habitat could result in habitat impacts that would require time for recovery.

Habitat Changed due to Dredging/Grading Activities (Cont'd.)	
Creation of nesting and transitional habitats	Each of the project alternatives incorporates the strategy of utilizing dredged materials to create man-made transitional areas to supplement existing natural transitional areas located around the lagoon perimeter. This creation helps increase the lagoon's resiliency to sea level rise in the future. Additionally, some excavated material would be used on-site to create a nesting area adjacent to the NCTD access road in the central basin, in the location of the former sewage ponds.
Indirect habitat conversion/creation	Even where the SELRP would not have direct changes to the lagoon, there may be changes to inundation frequency from enhanced tidal influence or freshwater drainage that may change habitat types.
Changes to the Existing Channels/Inlet Configurations	
Changes to bridge structures or channel deepening (I-5 and NCTD railroad); changes to the ocean inlet and Coast Highway 101.	Each alternative incorporates increases in cross-section dimensions at existing or proposed bridge crossings by lengthening the span and/or deepening channels beneath the structure. Specific channel dimensions for each alternative and identified in the I-5 North Coast Corridor Project EIR/EIS (SCH #2004101076). Dimensions are discussed in Sections 2.4 through 2.7. Channel bank and bridge abutment protection would be required to protect channels and structures from possible undermining due to ongoing erosion during severe storm flow events. Rock armoring would be placed directly along the toe of bridge abutments and would "wrap" around the end of the earthen berms supporting each bridge. This armoring would be completed at each of the bridge crossings as part of this project, including Coast Highway 101, the NCTD railroad, and I-5.
I- 5 Freeway Bridge over San Elijo Lagoon	Caltrans plans to improve I-5 from La Jolla Village Drive in San Diego to Harbor Drive in Oceanside and the I-5 bridge over San Elijo Lagoon would be modified with a length that could accommodate lagoon restoration by that project, as determined by a bridge optimization study conducted by Caltrans (M&N2012). The I-5 North Coast Corridor Project Draft EIR/EIS was released for public review in July 2010 (SCH #2004101076). A Supplemental Draft EIR/EIS was released in August (Caltrans 2012) and the Final EIR/EIS was issued in October 2013 to support selection of the Locally Preferred Alternative. Construction is anticipated to begin in 2016. The bridge facility is part of the I-5 North Coast Corridor Project and is not evaluated as part of the SELRP.
NCTD Railroad	Railroad improvements are being planned and implemented by SANDAG, in partnership with NCTD, to accommodate double tracking of the rail line. In San Elijo Lagoon, a new bridge would be constructed at a higher elevation or retained by that project, depending on the SELRP alternative selected for implementation. Impacts associated with implementation of the NCTD railroad improvements are disclosed in the 2007 Final Program EIR/EIS for the Los Angeles to San Diego Proposed Rail Corridor Improvements (LOSSAN) (SCH #2002031067) and are not evaluated as part of the SELRP. Construction of railroad improvements is anticipated to begin in 2016.

Changes to the Existing Channels/Inlet Configurations (Cont'd.)	
Coast Highway 101/San Elijo Lagoon Inlet	There is an existing bridge on Coast Highway 101 that crosses the existing lagoon inlet. Alternative 2A requires a new inlet and a new bridge for Coast Highway 101. For Alternative 1B and Alternative 1A, the inlet and bridge would remain in place. In its current condition, the existing bridge is seismically inadequate and should be retrofitted. Seismic retrofits would be constructed by others; however, potential environmental impacts associated with this change to Coast Highway 101 are evaluated in this document.
CDFW Weir and Dike	There is an existing weir east of I-5 and a north-south earthen berm/dike on either side that provides a trail to cross the lagoon. The dike has two gated culverts that were historically used to control water levels in the east basin; these gates are currently left open, however, and active management of water levels does not occur. Under Alternative 2A and Alternative 1B, that dike/weir would be removed as part of this project. In Alternative 1A, the dike would remain with two new openings to allow tidal and fluvial connections. Improvement of the channel in this location would reduce sedimentation east of the CDFW dike.
Sea Level Rise Resiliency	
Increase in sea level incorporated into planning to allow for long-term resiliency of the lagoon.	State-funded projects are advised to plan for conditions consistent with those specified in the California State Coastal Conservancy's (SCC) Guidance for Addressing Climate Change in California Coastal Conservancy Projects (SCC 2012). These are assumed to be: • 60 centimeters or 24 inches (2 feet) by Year 2065 (50 years after construction) • 139 centimeters or 55 inches (4.6 feet) by Year 2100 The restoration project strives to create a system that is resilient to different sea level elevations over time, given appropriate adaptive management strategies.
Materials Disposal/Reuse	
Lagoon sediment characteristics	San Elijo Lagoon contains an approximately 3-foot layer of fine sediment overlying a much coarser sand base. The fine sand is not appropriate for beneficial reuse, but the coarse sand is. The fine material is also difficult to dispose of off-site in a cost-effective manner. Both state and local coastal policies encourage the reuse of suitable material to nourish littoral systems.
Engineering solutions	A typical approach in lagoon restoration projects is to overexcavate a basin to create a large pit. The coarse sand from the pit is likely suitable for reuse. The finer sediments that are not of suitable quality (grain size too small) to be beneficially reused are then backfilled into the pit. The pit is capped with a layer of coarse sandy material. This method avoids removal of the fine materials onto adjacent lands, storage for dewatering, and then trucking for upland disposal. Depending on the volume of fines, the amount of land needed for dewatering, and the number of truck trips can render this option highly problematic. The overexcavation approach is most feasible for the quantities associated with this project and is incorporated into the construction strategy for Alternative 2A and Alternative 1B. This approach would also enable the project to remove nutrient-rich sediments in the lagoon. Additional on-site disposal options would also be implemented, including the use of sediments for the creation of man-made transitional and nesting areas, as described above.

Relocation, Protection, and Management of Recreational Uses	
Reserve has 7 miles of trails as well as a Nature Center.	Restoration of the lagoon would reroute some of the existing trails in the east basin and may require temporary closures in other areas during construction to maintain public safety. Throughout construction, alternative access would be maintained to the beach and areas adjacent to the lagoon.
Long-Term Maintenance and Adaptive Management	
Inlet and Channel Maintenance	The inlet is currently opened via mechanical means, typically annually. In the long term, maintenance of the inlet, subtidal/sedimentation basin, and channels would be required, as well as invasive species removal in restored areas. To minimize sediment escaping the basin and channels and settling in restored habitat, dredging or manual excavation of the inlet and sedimentation basin or channels would be conducted once the sedimentation basin's capacity is reached or the inlet's ability to remain open is compromised. Additional channel maintenance may also be required in the future to remove sedimentation and vegetation.
Adaptive Management	Systematic long-term monitoring would occur to track changes to the lagoon in the context of the physical and biological objectives outlined in Section 1.2. An overview discussion of long-term maintenance and adaptive management is provided in Section 2.11, and anticipated areas that may require adaptive management and maintenance activities are identified. That plan is best finalized once the Agency Preferred Alternative is selected.

¹ The SELRP refers to each of the project alternatives (e.g., Alternative 2A, Alternative 1B, and Alternative 1A) unless otherwise specified.

2.4 ALTERNATIVE 2A HABITAT DIVERSITY (RELOCATED INLET)

The proposed project in the Draft EIR/EIS, Alternative 2A, would improve tidal action by constructing a new inlet south of the existing feature. This inlet would require stabilization through the incorporation of cobble blocking features (CBFs) at the beach and development of a “prefilled ebb bar” in the nearshore outside the new outlet location. A new bridge along Coast Highway 101 would also be constructed to span the proposed new inlet location, and would incorporate a dedicated pedestrian sidewalk to ensure uninterrupted pedestrian access along the shoreline. The increased tidal action from the new inlet would also create a more connected gradient of balanced habitat types than currently exists. Figure 2-3 illustrates the conceptual plan under Alternative 2A.

With this alternative, a new subtidal basin would be created just landward of the new inlet in the west and central basins to capture sediment entering the lagoon. The main tidal channel would be widened and redirected just west of I-5, and would then extend into the east basin. The existing channel in the east basin would be widened substantially and the existing weir would be removed. These actions would promote more tidal exchange east of I-5 and allow more freshwater flows to exit the lagoon. Dredging, particularly in the central basin, would remove

nutrients bound in lagoon sediments that can lead to eutrophication. A utility pole located just east of the railroad track would be relocated to accommodate the sedimentation basin. The existing trail along the weir would be replaced with a pedestrian bridge under I-5, which would allow for connections between existing trails along the east side of I-5. Some nontidal habitat areas would remain in the east basin, including the “island” of freshwater/brackish marsh in the center of this basin. Man-made transitional habitat would be created by filling on top of, and alongside, the remnants of the weir. This habitat is intended to provide refugia, an area that is preserved (not impacted) for species to retreat to, in the form of continually transitioning habitat over time as sea level rises. Three other areas of man-made transitional habitat above tidal elevations would be created in the central basin. Together, these would supplement the natural transitional habitat occurring in a band around the perimeter of the lagoon.

2.4.1 HABITAT DISTRIBUTION

A proposed habitat distribution plan was developed for Alternative 2A to provide a connected gradient of balanced habitat types that would remain relatively stable through time, assuming consistent maintenance, as described in Section 2.11. Table 2-6 identifies the habitat distribution that is projected under Alternative 2A.

Table 2-6
Alternative 2A –Habitat Distribution

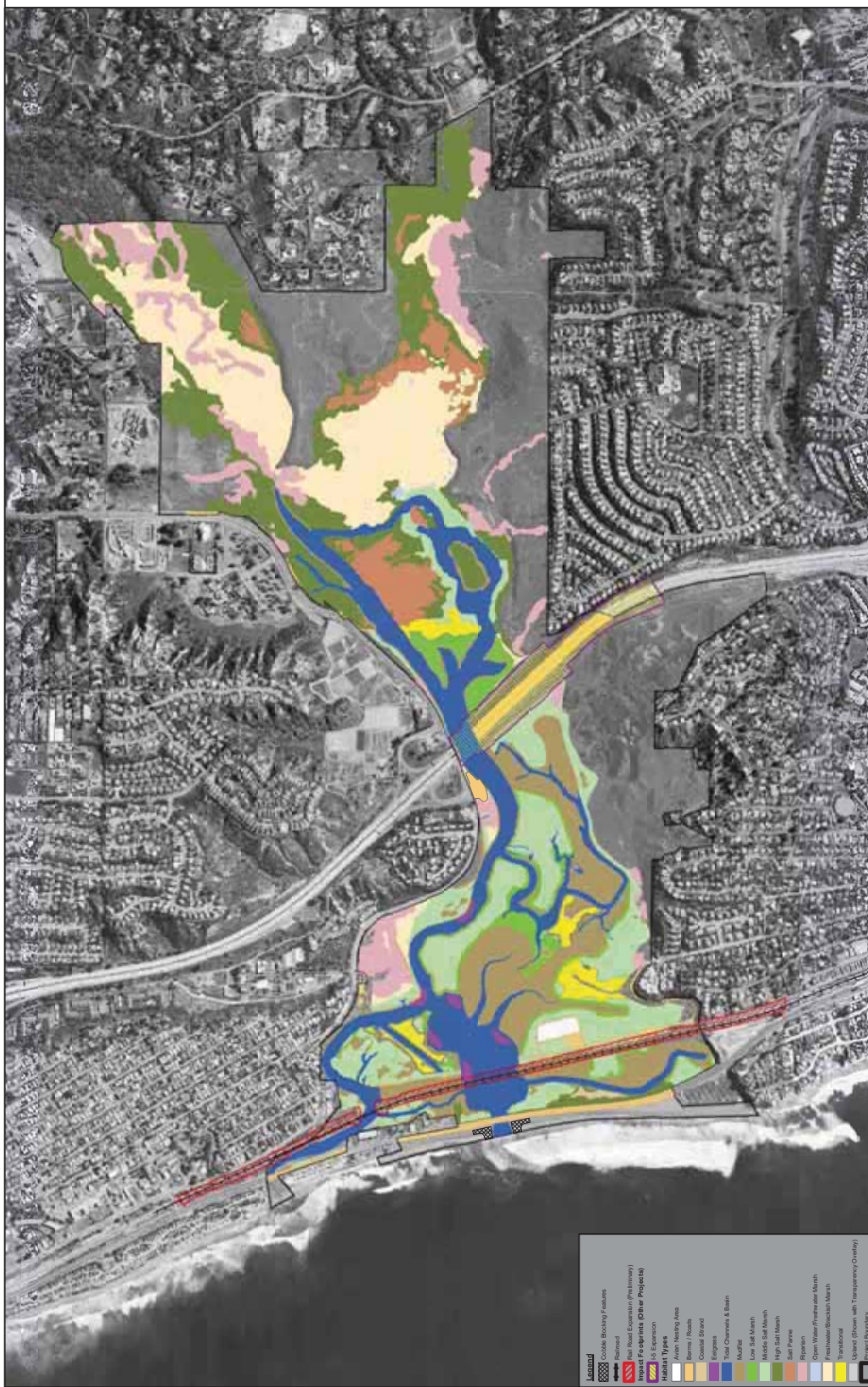
Habitat Type	Habitat Distribution (acres)		Habitat Type	Habitat Distribution (acres)	
	Existing ¹	Proposed		Existing ¹	Proposed
Avian Nesting Areas	0	2	Open Water/Tidal Channels and Basins	40	74
Mudflat	63 ²	102	Riparian	72	67
Low-Marsh	13	23	Coastal Strand	5	5
Mid-Marsh	141	124	Upland & Others	299	292
High-Marsh	120	107	Beach	15	14
Salt Panne	37	17	Berms and Roads	23	24
Freshwater/Brackish Marsh	132	96	Transitional (man-made)	0	12

¹ Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.

² Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at a natural elevation for self-sustainable mudflat.

Source: Nordby and M&N 2012

The primary change in habitat distributions under Alternative 2A would be an increase in open water areas/tidal channels and mudflat habitat within the lagoon compared to existing conditions.



0	275	550	1,100 Feet



**Figure 2-3
Alternative 2A**

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Open water areas and tidal channels would be increased in all three lagoon basins compared to existing conditions. Mudflat and open water/tidal channels would be actively created throughout the central basin and replace existing mid-marsh and low-marsh habitat. Soils within proposed mudflat areas would be either native soils lowered slightly in elevation or soils slurried from shallow excavation of the lagoon basins and placed on top of the sand cap on the overdredge pit in the central basin. In both cases, the exposed mudflat soils would consist of native marsh soils that contain native infauna that would serve as seed for a diverse benthic assemblage and provide suitable foraging for shorebirds. Similarly, open water/tidal channels and low-marsh would be actively created in the east basin where freshwater/brackish marsh currently exists. Increases to estuarine habitat (low, mid, and high-marsh) may also occur as a result of conversion of salt panne and freshwater/brackish marsh in the far east basin as tidal expression increases. It is anticipated that, with the creation of a new inlet, the existing inlet would eventually close due to sand and cobble from nearshore littoral transport and would not be actively filled by the project. Therefore, a minimal change of beach habitat would result.

This alternative also includes the creation of 12 acres of man-made transitional habitat in both the east and central basins. In addition to transitional habitat intentionally created by fill from this project, the modified hydrology resulting from grading and the removal of the CDFW dike would result in the expansion of the natural transition zone throughout the site but particularly in the east basin. This alternative would fill a former sewage settling pond in the central basin and cap it with 2 feet of sand topped with crushed shell to enhance opportunities for California least tern nesting. Final design of the nesting area would be determined in consultation with state and federal wildlife agencies and may include additional sculpting, provision of signs deterring access topped with anti-perch devices to reduce the potential for perching diurnal and nocturnal raptors, details for substrate requirements and coloration, evaluation of fencing, and direct continuity to nonvegetated mudflats (where possible).

2.4.2 CHANNEL AND INFRASTRUCTURE IMPROVEMENTS

As noted in Table 2-5, Alternative 2A would result in changes to existing channel and inlet configurations at the existing inlet, Coast Highway 101, the NCTD railroad tracks, and the I-5 bridge. Changes to the I-5 and NCTD crossings would be implemented by others, but changes to Coast Highway 101 are included in the proposed project. Table 2-7 lists the existing and proposed dimensions for each.

Table 2-7
Alternative 2A –Inlet and Channel Dimensions

	Coast Highway 101/Inlet		Railroad Trestle		I-5 Bridge	
	Bottom Width (feet)	Invert (feet, NGVD)	Bottom Width (feet)	Invert (feet, NGVD)	Bottom Width (feet)	Invert (feet, NGVD)
Existing	105	-0.87	187	-0.87	130	0.74
Alternative 2A	200 ¹	-6.5	590	-7	261	-6.5

¹ The 200-foot-wide channel would be located south of the current channel. A new bridge on Coast Highway 101 would be necessary. The existing channel would not be maintained and would eventually close naturally. The existing Coast Highway 101 bridge would remain.

NGVD = National Geodetic Vertical Datum

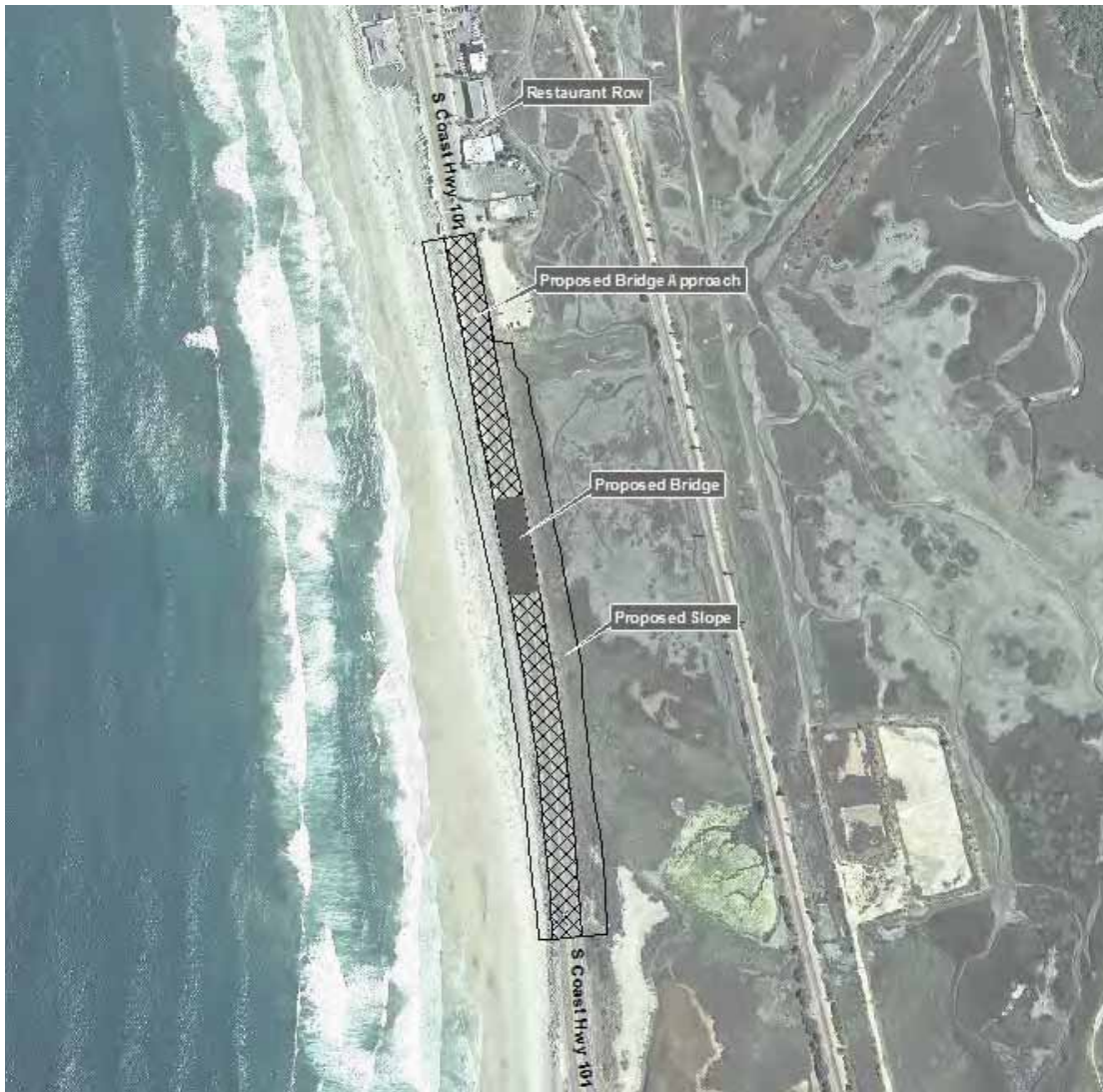
Source: M&N 2012

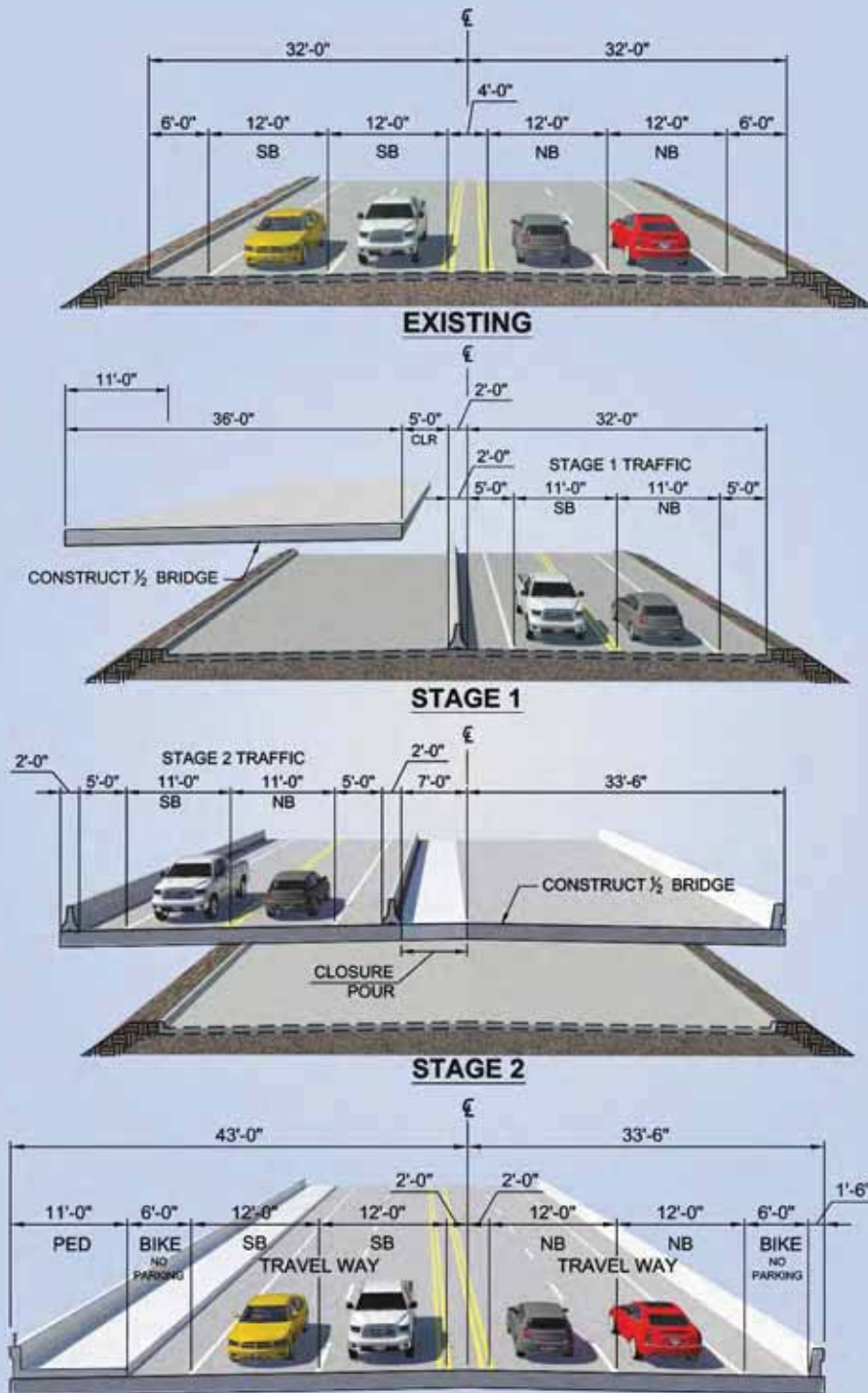
In particular, Alternative 2A would require a new Coast Highway 101 bridge at the new inlet location farther south. The existing Coast Highway 101 is shown in Figure 2-4 with the proposed bridge and roadway improvements. The proposed cross sections for Coast Highway 101 are shown in Figure 2-5. The new bridge would not increase vehicular capacity along Coast Highway 101 but it would include a separated pedestrian walkway and Class 2 bike lane on the west side of the structure to ensure north-south pedestrian and bicycle access. To raise the roadbed to span the proposed inlet at the required bridge height, a bridge approach would be required extending both north and south of the actual proposed bridge structure. The approach would begin approximately 650 feet north of the proposed bridge near the stop light south of Restaurant Row and would extend approximately 360 feet south of the 285-foot-long bridge structure.

Alternative 2A would also deepen the channels under these longer bridges and armor the slopes at the bridge base with rock.

Some level of shoaling inside the new inlet is anticipated due to sand entrainment from the littoral zone. That sand material would be captured in the sediment basin east of the railroad tracks and removed via routine maintenance. The nearshore zone off San Elijo Lagoon contains a high volume of cobbles. These cobbles are more difficult to remove than sand during maintenance activities; therefore, the proposed new inlet would minimize cobble migration into the lagoon through the use of CBFs. Cobble can be blocked from entering an inlet more effectively than sand because it comprises a smaller volume of material than sand. It also typically “hugs” the shore and forms a deposit below the summer beach profile that becomes exposed in winter. The CBFs would be two relatively short, low rock features along the outer reach of the tidal inlet channel, smaller in scale than jetties. Figure 2-6 shows the CBF concept plan view.

Figure 2-4
Existing Coast Highway 101 and Proposed Improvements





Source: Moffat & Nichol



NO SCALE

Figure 2-5
Highway 101 Existing and Future Cross Sections

Figure 2-6
CBF Concept Plan View

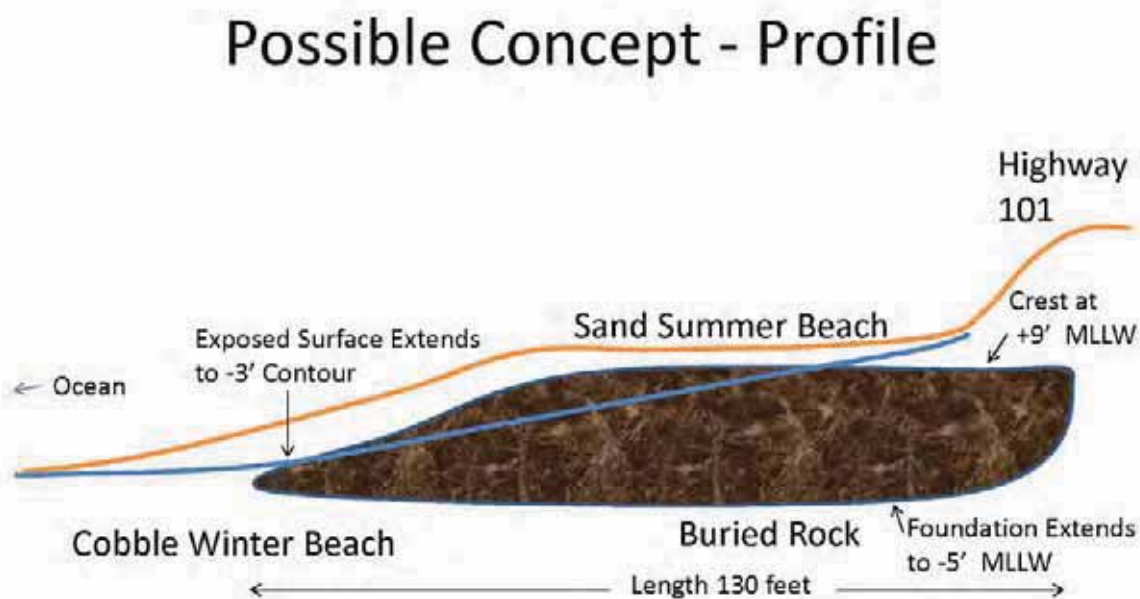


The CBFs at San Elijo lagoon would be attached to the proposed Coast Highway 101 bridge abutments and extend seaward (perpendicularly) approximately 130 feet to the -5-foot mean lower low water (MLLW) contour on the beach. The CBFs would be approximately 100 feet wide at the seaward edge and extend laterally along the highway bridge approach for a distance of approximately 220 feet. These features would be constructed of riprap large enough to be stable during extreme storm wave events. The exposed “face” of the CBFs along the inside bank of the tidal inlet channel could be treated to look like natural bedrock, sandstone, or other sedimentary features, similar to the treatment on the seawall at south Cardiff State Beach shown in Figure 2-7. The CBFs are anticipated to be slightly visible above the beach profile (approximately 1 foot exposed) in winter and then naturally buried by sand in summer, as shown in Figure 2-8.

Figure 2-7
Example of Naturalized Bedrock Faux Finish on a Coastal Structure



Figure 2-8
Cobble Blocking Feature Concept Profile



2.4.3 MATERIALS REMOVAL AND PERIODIC MAINTENANCE

Alternative 2A would involve overexcavation of the proposed sedimentation basin (to create an overdredge pit) so that poor-quality (e.g., fine-grained) material could be buried in the pit and covered with a sand cap. The good-quality (e.g., larger-grained) material from the overdredge pit in the central basin would then be available for beneficial reuse off-site, as approved by the Corps and EPA. A SAP has been prepared for the SELRP (Appendix A). Additional materials testing in accordance with the ITM may be conducted prior to Corps and EPA approval of the Final SAP Results Report and proposed reuse sites. The SAP indicates that materials excavated from the overdredge pit location (below approximately 2–3 feet below ground surface [bgs]) are likely suitable for placement on beaches or in the nearshore based on physical properties related to grain size. These materials consist, on average, of 10 percent fines and are classified as sand. The age of this sediment layer suggests it has been removed from modern sources of pollution. It is anticipated that approximately 1.4 mcy of material would be exported for reuse for the initial implementation of Alternative 2A. Approximately 500,000 cubic yards (cy) of this sand material from the overdredge pit would be placed in the nearshore off the proposed inlet location of which approximately 200,000 cy would be used to prefill the anticipated ebb bar that would form off the inlet. Table 2-8 identifies volumes that are proposed to be excavated from each basin for placement back into the overdredge pit under the proposed project. A portion of the sand dredged from the west basin (approximately 35,000 cy) would be used to fill the eastern half of the former sewage pond up to an elevation of +13 feet NGVD to create a 2-acre nesting site.

The frequency and anticipated volumes associated with maintenance dredging in the lagoon are also identified in Table 2-8. Maintenance dredging for Alternative 2A would occur within the subtidal basin that would be created in the west and central lagoon basins, shown in Figure 2-12 as “Routine Inlet Maintenance.” Approximately 300,000 cy is anticipated to be dredged from the basin every 3 to 4 years, and the material is planned for placement on Cardiff Beach south of the tidal inlet. Maintenance dredging is anticipated to require approximately 5 months to complete.

Other activities associated with long-term maintenance and adaptive management activities are discussed in Section 2.11.

Table 2-8
Alternative 2A – Materials Removal and Periodic Maintenance

	Alternative 2A
Initial Amount of Material Removed – Total	1.4 million cubic yards
<i>Coastal Area</i>	<i>50,000 cubic yards</i>
<i>West Basin</i>	<i>200,000 cubic yards</i>
<i>Central Basin</i>	<i>400,000 cubic yards</i>
<i>East Basin</i>	<i>750,000 cubic yards</i>
Estimated Post-construction Periodic Volume Dredged	300,000 cubic yards
Estimated Post-construction Periodic Maintenance Frequency	Every 3 to 4 years

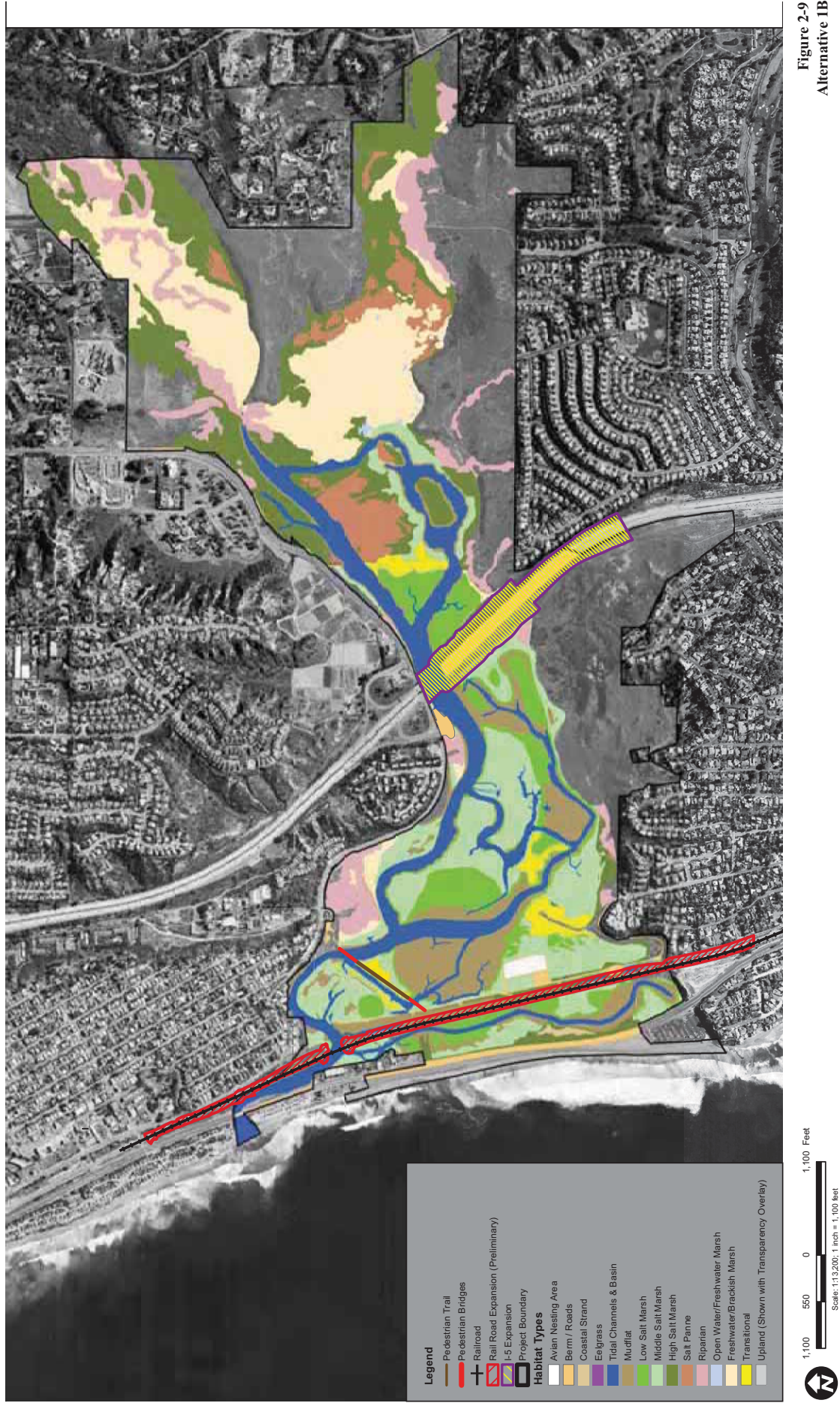
Source: Nordby and M&N 2012

2.5 ALTERNATIVE 1B – HABITAT DIVERSITY ALTERNATIVE

Alternative 1B would create a more connected gradient of balanced habitat types relative to existing conditions through modifications to channels and habitat areas within the lagoon (Figure 2-9). The existing tidal inlet would remain and no CBFs would be required. The existing Coast Highway 101 bridge structure would be armored against ongoing scour. In addition, the bridge would be seismically retrofitted by others. The main tidal channel would be extended and a mix of mudflats and secondary channels created south of the main channel in the central basin. Existing emergent low-marsh would be retained to the extent possible to create a connected gradient of balanced habitat types in the basin. Retention of emergent low-marsh would be balanced with the need to remove high-nutrient sediments that currently cause water quality issues, such as eutrophication, in the lagoon. The main channel would be redirected just west of I-5 and extended farther into the east basin. The channel in the east basin would be substantially enlarged and the CDFW dike and weir would be removed; combined, this would promote more tidal exchange east of I-5. The tidal prism of Alternative 1B would be substantially increased compared to existing conditions. Nontidal habitat areas would still exist in the east basin, although with the passage of time, natural habitat conversion may occur due to proposed changes in inundation frequencies as tidal influence is extended. Several areas of man-made transitional habitat above tidal elevations would be created in the central basin to supplement the natural transitional habitat that extends around the perimeter of the lagoon. These transitional habitat areas would also offer refugia for sea level rise.

2.5.1 HABITAT DISTRIBUTION

A proposed habitat distribution plan was developed for Alternative 1B to provide a connected gradient of balanced habitat types that remains relatively stable through time, assuming consistent maintenance as described in Section 2.11. Table 2-9 identifies the habitat distribution projected under Alternative 1B.



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Table 2-9
Alternative 1B Habitat Distribution

Habitat Type	Habitat Distribution (acres)		Habitat Type	Habitat Distribution (acres)	
	Existing ¹	Proposed		Existing ¹	Proposed
Avian Nesting Areas	0	2	Open Water/Tidal Channels and Basins	40	67
Mudflat	63 ²	71	Riparian	72	67
Low-Marsh	13	51	Coastal Strand	5	5
Mid-Marsh	141	98	Upland & Others	299	295
High-Marsh	120	124	Beach	15	15
Salt Panne	37	30	Berms and Roads	23	24
Freshwater/Brackish Marsh	132	99	Transitional (man-made)	0	12

¹ Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.

² Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at a natural elevation for self-sustainable mudflat.

Source: Nordby and M&N 2012

Alternative 1B would result in an increase in open water/tidal channels, low-marsh, mudflat, and man-made transitional habitat compared to existing conditions. Proposed low-marsh acreage under this alternative reflects the predicted increase in emergent low-marsh that would occur. Most of the increase in open water/tidal channels and mudflat habitat would occur in the central and east basins, and would result in a corresponding decrease in mid-marsh, salt panne, and freshwater/brackish marsh habitats. Soils within proposed mudflat areas would be native soils lowered slightly in elevation or soils slurried from shallow excavation of the lagoon basins and placed on top of the sand cap on the overdredge pit in the central basin. In both cases, the exposed mudflat soils would consist of native marsh soils that contain native infauna that would serve as seed for a diverse benthic assemblage. The open freshwater ponds currently maintained by the CDFW weir would be converted to open water/tidal channels and low-marsh habitat.

This alternative includes the creation of 15 acres of man-made transitional habitat in both the east and central basins. In addition to man-made transitional habitat, the modified hydrology resulting from grading and the opening of the CDFW dike would result in expanding the natural transition zone throughout the site. This natural (passive) transition area begins at the high-tide line and continues up an additional 2+ feet in elevation. Similar to Alternative 2A, Alternative 1B would fill a former sewage settling pond in the central basin and cap it with 2 feet of sand topped with crushed shell to enhance opportunities for California least tern nesting. Additional features may be incorporated into the nesting area through consultation with state and federal wildlife agencies, such as sculpting, provision of signs deterring access topped with anti-perch devices to reduce the potential for perching diurnal and nocturnal raptors, details for substrate requirements

and coloration, evaluation of fencing, and direct continuity to nonvegetated mudflats (where possible).

2.5.2 CHANNEL AND INFRASTRUCTURE IMPROVEMENTS

Alternative 1B would require bridge improvements at the I-5 crossing, as planned by Caltrans, to lengthen the channel opening (Table 2-10). The channel would also be deepened below the new bridge as illustrated by the negative invert measurement in Table 2-10. The existing bridges at Coast Highway 101 and the NCTD railroad would remain in place, although the channels underneath would require deepening for improved hydraulics. The existing Coast Highway 101 bridge structure would be retrofitted to current seismic standards by others, with no changes to the roadway alignment proposed. Rock armoring would be installed at all three features to provide channel bank and bridge abutment protection and prevent undermining by increased tidal/fluvial flows (M&N 2012).

Table 2-10
Alternative 1B Inlet and Channel Dimensions

	Coast Highway 101/Inlet		Railroad Trestle		I-5 Bridge	
	Bottom Width (feet)	Invert (feet, NGVD)	Bottom Width (feet)	Invert (feet, NGVD)	Bottom Width (feet)	Invert (feet, NGVD)
Existing	105	-0.87	187	-0.87	130	0.74
Alternative 1B	130	-4	187	-5.5	261	-6

NGVD = National Geodetic Vertical Datum
Source: M&N 2012

2.5.3 MATERIALS REMOVAL AND PERIODIC MAINTENANCE

Alternative 1B would involve creation of an overdredge pit to provide material suitable for reuse within the littoral zone. A SAP has been prepared for the SELRP (Appendix A). Additional materials testing in accordance with the ITM may prior to Corps and EPA approval of the Final SAP Results Report and proposed disposal/reuse sites. The SAP (Appendix A) indicates that materials excavated from the overdredge pit location (below approximately 2–3 feet bgs) are likely suitable for placement on beaches or in the nearshore based on physical properties related to grain size. These materials consist, on average, of 10 percent fines and are classified as sand. The age of this sediment layer suggests it has been removed from modern sources of pollution. It is anticipated that approximately 1.2 mcy of material would be exported from the overdredge pit in the central basin for reuse for the initial implementation of Alternative 1B. Table 2-11 identifies volumes that would then be excavated from each basin and placed in the overdredge

pit under this alternative. Alternative 1B would fill the former sewage settling pond in the central basin and cap it with sand for use as a nesting site.

Inlet maintenance would also require the removal of approximately 40,000 cy annually, utilizing the same land-based approach and occurring in the same location as existing inlet management (Table 2-11). Maintenance would extend from Highway 101 to the channel curve just downstream of the railroad bridge. That maintenance is anticipated to occur in April and require approximately 4 weeks. Activities associated with long-term maintenance and adaptive management are discussed in Section 2.11.

Table 2-11
Alternative 1B Materials Removal and Periodic Maintenance

	Alternative 1B
Initial Amount of Material Removed	1.2 million cubic yards
<i>Coastal Area</i>	<i>0 cubic yards</i>
<i>West Basin</i>	<i>50,000 cubic yards</i>
<i>Central Basin</i>	<i>400,000 cubic yards</i>
<i>East Basin</i>	<i>750,000 cubic yards</i>
Estimated Post-construction Periodic Volume Removed	40,000 cubic yards
Estimated Post-construction Periodic Maintenance Frequency	Annually

Source: Nordby and M&N 2012

2.6 ALTERNATIVE 1A – INTERTIDAL ALTERNATIVE

Alternative 1A would implement the least physical changes to the site. The main feeder channel throughout the site would be enlarged and redirected just west of I-5 (Figure 2-10). The main tidal channel would be extended farther into the east basin, and existing constricted channel connections would be cleared and enlarged. The existing CDFW dike would be left in place, but two new channels would be created through it to allow tidal and fluvial connections. The tidal prism of Alternative 1A would be slightly increased compared to existing conditions. Existing habitat areas would essentially remain intact, although current conversion trends from unvegetated intertidal habitats to vegetated intertidal habitats would be expected to continue. High-nutrient sediment removal would primarily be limited to the main channel. Some freshwater habitat areas in the east basin are anticipated to convert to more saltwater-based communities due to enhanced tidal influence and the resulting changes in inundation frequencies. One small area of transitional habitat (refugia above tidal elevations) would be constructed in the northwest portion of the central basin.

2.6.1 HABITAT DISTRIBUTION

The proposed habitat distribution for Alternative 1A from dredging and grading activities is summarized in Table 2-12. This assumes consistent maintenance, as described in Section 2.11.

Table 2-12
Alternative 1A Proposed Habitat Distribution

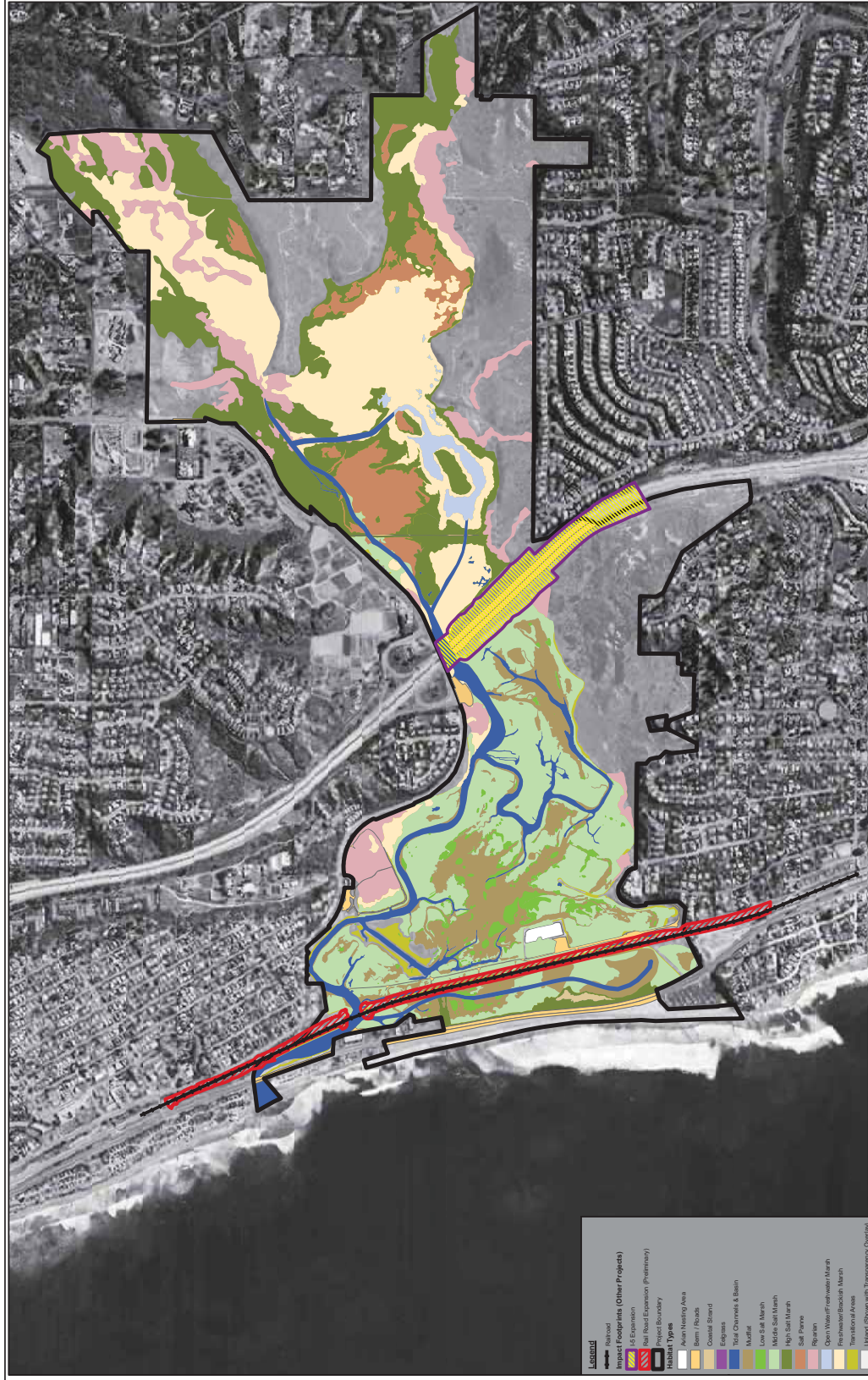
Habitat Type	Habitat Distribution (acres)		Habitat Type	Habitat Distribution (acres)	
	Existing ¹	Proposed		Existing ¹	Proposed
Avian Nesting Areas	0	2	Open Water/Tidal Channels and Basins	40	34
Mudflat	63 ²	25	Riparian	72	70
Low-Marsh	13	44	Coastal Strand	5	5
Mid-Marsh	141	140	Upland & Others	299	299
High-Marsh	120	145	Beach	15	15
Salt Panne	37	35	Berms and Roads	23	24
Freshwater/Brackish Marsh	132	121	Transitional (man-made)	0	2

¹ Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.

² Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at a natural elevation for self-sustainable mudflat.

Source: Nordby and M&N 2012

Alternative 1A habitat distribution would result in a high proportion of mid- and high-marsh habitat. There would be a decrease of mudflat, open water/tidal channels, and freshwater/brackish marsh and an increase of low-marsh and high-marsh habitat compared to existing conditions. This alternative allows the continued conversion of mudflats to low-marsh and some existing freshwater marsh would be converted to high-marsh and open water/tidal channel habitat. Currently, there is a shortage of subtidal channels to convey sea water and an abundance of freshwater/brackish marsh.



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Approximately 2 acres of man-made transitional habitat would be created in the northern portion of the central basin. In addition to man-made transitional habitat, the modified hydrology resulting from grading and the opening of the CDFW dike would result in the expansion of the natural transition zone throughout the site. This natural (passive) transition area begins at the high-tide line and continues up an additional 2+ feet in elevation. Like the other two alternatives, Alternative 1A would fill a former sewage settling pond in the central basin and cap it with 2 feet of sand topped with crushed shell to enhance opportunities for California least tern nesting. Additional features may be incorporated into the nesting area through consultation with state and federal wildlife agencies, such as additional sculpting, provision of signs deterring access topped with anti-perch devices to reduce the potential for perching diurnal and nocturnal raptors, details for substrate requirements and coloration, evaluation of fencing, and direct continuity to nonvegetated mudflats (where possible). Salt panne habitat in the east basin could support avian nesting.

2.6.2 CHANNEL AND INFRASTRUCTURE IMPROVEMENTS

Alternative 1A would not require infrastructure improvements at I-5 or the railroad bridge, but the channels under those features would be deepened for improved hydraulics (Table 2-13). The channel under Coast Highway 101 would also be widened slightly, but replacement of the bridge structure would not be necessary. The existing Coast Highway 101 bridge would be retained and retrofitted by others to meet current seismic safety standards. No changes to the existing roadway alignment are proposed. All three features would be armored to prevent undermining (Table 2-5). The existing CDFW weir would remain in place, but two gaps would be created to improve tidal connection with the east portion of the basin. It is possible NCTD or Caltrans would implement bridge improvements for their projects even if this restoration alternative is implemented. Channel improvements would increase channels to at least the depth and widths shown in Table 2-13, unless those projects also include channel work. If additional improvements occur to the channels, the alternative as analyzed in this document would not be substantially affected.

Table 2-13
Alternative 1A Inlet and Channel Dimensions

	Coast Highway 101/Inlet		Railroad Trestle		I-5 Bridge	
	Bottom Width (feet)	Invert (feet, NGVD)	Bottom Width (feet)	Invert (feet, NGVD)	Bottom Width (feet)	Invert (feet, NGVD)
Existing	105	-0.87	187	-0.87	130	0.74
Alternative 1A	115	-4	187	-5.5	130	-6

NGVD = National Geodetic Vertical Datum
Source: M&N 2012

2.6.3 MATERIALS REMOVAL AND PERIODIC MAINTENANCE

Approximately 160,000 cy of material is proposed to be exported to LA-5 for the implementation of Alternative 1A, with the majority in the west and central basins (Table 2-14). This would primarily be material from existing channels as they are deepened and widened to improve tidal movement. That material would not be suitable for reuse as beach or littoral cell nourishment because of the relatively fine grain size. Given the relatively modest amount of material and because there is no large area proposed for disturbance that could accommodate an overdredge pit in the central basin, no overexcavation would occur in this scenario.

Additionally, this alternative would not remove much of the high-nutrient sediments currently causing eutrophic conditions in the lagoon. Alternative 1A would utilize some material removed from the site to fill the former sewage settling pond in the central basin (approximately 35,000 cy) and cap it with sand for use as a nesting site, but additional material would be exported for disposal.

LA-5 is one of 12 existing EPA-designated ocean disposal sites for dredged material in Region 9. Each site is managed according to a Site Management and Monitoring Plan. Preliminary coordination with the Corps and EPA indicates that the material appears suitable for disposal at LA-5. If Alternative 1A is selected for implementation, additional Tier 3 testing in accordance with ODM and coordination would be conducted prior to authorization for disposal at the site. Should the materials be determined not suitable for disposal at this location, the material would be sequestered on-site in built transitional or nesting areas in the same location and method as described for Alternative 1B. Inlet maintenance would use the same land-based approach and would occur in the same area as existing management, would require approximately 2 weeks, and would generate sand suitable for placement within the littoral zone, either on the beach or in the nearshore. Maintenance would extend from Highway 101 to the channel curve just downstream of the railroad bridge. The sand quantity removed would be approximately 35,000 cy per year for Alternative 1A and would be anticipated to occur in April. Activities associated with long-term maintenance and adaptive management are discussed in Section 2.11.

Table 2-14
Alternative 1A Materials Removal and Periodic Maintenance

	Alternative 1A
Initial Amount of Material Removed	160,000 cubic yards
<i>Coastal Area</i>	<i>0 cubic yards</i>
<i>West Basin</i>	<i>50,000 cubic yards</i>
<i>Central Basin</i>	<i>75,000 cubic yards</i>
<i>East Basin</i>	<i>35,000 cubic yards</i>
Estimated Post-construction Periodic Volume Removed	35,000 cubic yards
Estimated Post-construction Periodic Maintenance Frequency	Annually

Source: Nordby and M&N 2012

2.7 NO PROJECT/NO FEDERAL ACTION ALTERNATIVE

CEQA requires analysis of a No Project alternative in which the proposed project would not occur. Evaluation required under NEPA of the No Federal Action alternative evaluates the possibility of no federal permit issuance, but allows for some components of the project outside federal jurisdiction to be implemented. Because the SELRP is water dependent and cannot be implemented outside of Corps jurisdictional waters, the NEPA scope of analysis includes the complete restoration project as proposed within this EIR/EIS. No components of the project could be implemented without approval of the Corps; therefore, the No Project/No Federal Action Alternative is evaluated as a single alternative in this document. Under this alternative, there would be no dredging or excavation to improve water quality or tidal circulation, channel clearing, or other comprehensive actions to improve tidal exchange or conveyance of freshwater in high flow conditions. The lagoon inlet would remain in its existing location. Currently, management of the lagoon involves mechanical excavation to maintain an open inlet condition, as funding allows. This is assumed to continue into the future. The present spectrum of environmental constraints would continue to limit the quality and productivity of the lagoon. Under the No Project/No Federal Action Alternative, conversion from subtidal and mudflat to a system dominated by saltmarsh and riparian habitat would continue. This conversion would continue to occur fairly rapidly. Water quality impairments due to nutrient-rich sediments and limited circulation would also continue to occur.

2.7.1 HABITAT DISTRIBUTION

Historically, high water elevations resulting from frequent mouth closures and water impoundment in the lagoon have resulted in mudflat and open water/tidal channels habitats. Over the last decade, active management of an open lagoon mouth has been implemented, which has resulted in rapid habitat conversion. Specifically, the existing mudflat is converting to low-marsh habitat and portions of mid-marsh are anticipated to convert to high-marsh. The rapid conversion of mudflat was observed between 2010 and 2012, with a gain of 13 acres of low-marsh

(cordgrass dominated) habitat and a direct loss of mudflat. Ultimately, the conversion of another 34 acres of mudflat is anticipated as the lagoon moves toward a state of equilibrium with current water levels and inundation frequencies. This conversion is anticipated to occur within 5–10 years if current rates continue.

The practice of active management at the lagoon mouth is expected to continue under this alternative to maintain consistent tidal exchange with the ocean and allow fluvial flows to exit the lagoon. This exchange, although limited by the existing hydraulic constraints in the lagoon, maintains more acceptable water quality levels in the lagoon. When the inlet closes to tidal flushing, depending on seasonal conditions, the lagoon water quality rapidly deteriorates due to the nutrient load stored in the existing sediments and the impoundment of freshwater from the watershed.

Therefore, under this alternative, open water/tidal channels would continue to decrease as would mudflats and mid-saltmarsh habitat (Table 2-15). Low- and high-saltmarsh habitat would continue to increase. Currently, no tidally influenced high-saltmarsh is on the site as the existing high-saltmarsh is located upstream of the current extent of tidal influence due to historic water impoundment behind the CDFW dike. Maintaining existing tidal influence would increase tidally influenced high-marsh and preserve brackish and freshwater high-marsh.

Table 2-15
No Project/No Federal Action Alternative Habitat Distribution

Habitat Type	Habitat Distribution (acres)			Habitat Type	Habitat Distribution (acres)		
	Existing ¹	Predicted ³	Change		Existing ¹	Predicted ³	Change
Avian Nesting Areas	0	0	0	Open Water/Tidal Channels and Basins	40	24	-16
Mudflat	63 ²	29	-34	Riparian	72	71	-1
Low-Marsh	13	51	+38	Coastal Strand	5	5	0
Mid-Marsh	141	107	-34	Upland & Others	299	299	0
High-Marsh	120	167	+47	Beach	15	15	0
Salt Panne	37	37	0	Berms and Roads	23	23	0
Freshwater/Brackish Marsh	132	131	-1	Transitional (man-made)	0	0	0

¹ Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.

² Current functioning mudflat is an artifact of past freshwater impoundment and is converting to low- and mid-marsh because it is not at a natural elevation for self-sustainable mudflat. The decrease in mudflat reflects the remaining mudflat after predicted conversion has occurred.

³ Under the No Project/No Federal Action Alternative, current habitat conversion would continue until equilibrium is reached. Equilibrium is expected to occur within 5–10 years if existing conversion rates continue.

Source: Nordby and M&N 2012

The No Project/No Federal Action Alternative would not maximize the opportunity to implement a comprehensive restoration project for the entire lagoon. However, any one of the management/owner entities (SELC, CDFW, and/or County) may incrementally implement restoration, enhancement, and creation projects on a smaller scale through the use of other funding sources. These smaller efforts would require a separate CEQA/NEPA and permit process. If lagoon conditions persist and no restoration is initiated, lagoon habitat would continue to convert, resulting in the loss of mudflat and the increase of low- and high-marsh in the central basin. As noted above, current functioning mudflat is an artifact of past freshwater impoundment and is not at a natural elevation for a self-sustaining mudflat. The decrease in mudflat for this alternative reflects remaining mudflat in the equilibrium condition (after predicted conversion has occurred). In addition, mid-marsh habitat would convert to high-marsh habitat and there would be a loss of open water habitat throughout the lagoon compared to existing conditions. While allowing the lagoon to revert to a more frequently closed-inlet condition could slow or halt this conversion, water quality would then be expected to deteriorate and result in extended eutrophic conditions.

2.7.2 CHANNEL AND INFRASTRUCTURE IMPROVEMENTS

Under the No Project/No Federal Action Alternative, no changes to existing channels within the lagoon would occur as part of this project (i.e., widening or deepening to improve hydraulics). Infrastructure improvements to the NCTD railroad and I-5 could continue to move forward independently, as described in Table 2-5. Seismic improvements to Coast Highway 101 may occur in the future; however, those improvements would not be completed under a lagoon restoration program.

2.7.3 MATERIALS REMOVAL AND PERIODIC MAINTENANCE

Under the No Project/No Federal Action Alternative, no materials would be dredged from the lagoon for the purpose of restoration. However, the existing inlet would continue to be opened annually, with excavated material deposited on the beach near the mouth. Based on the continuation of current efforts, the frequency and anticipated volumes associated with inlet maintenance in the lagoon under the No Project/No Federal Action Alternative are identified in Table 2-16. No other programmatic long-term maintenance or adaptive management activities would occur.

Table 2-16
No Project/No Federal Action Alternative Materials Removal and Periodic Maintenance

	No Project/No Federal Action Alternative
Initial Amount of Material Removed	0 cubic yards
Estimated Periodic Volume Removed	25,000 cubic yards
Estimated Periodic Maintenance Frequency	Annually

Source: Nordby and M&N 2012

2.8 COMPARISON OF ALTERNATIVE CHARACTERISTICS

It is informative to compare the various characteristics of each alternative to each other to see the relative differences. Table 2-17 provides a comparison of the habitat distribution for the proposed project and alternatives. Table 2-18 provides a comparison of the inlet and channel dimensions for the proposed project and alternatives. Table 2-19 provides a comparison of the materials removal and periodic maintenance requirements.

Table 2-17
Habitat Distribution Comparison for the Project Alternatives

Habitat Type	Habitat Distribution (acres) ¹							No Project/ No Federal Action	
	Existing	Proposed Distribution (and net acreage change) ²							
		Alternative 2A		Alternative 1B		Alternative 1A			
Avian Nesting Areas	0	2 (+2)		2 (+2)		2 (+2)		0 (0)	
Mudflat	63	102 (+39)		71 (+8)		25 (-38)		29 (-34)	
Low-Marsh	13	23 (+10)		51 (+38)		44 (+31)		51 (+38)	
Mid-Marsh	141	124 (-17)		98 (-43)		140 (-1)		107 (-34)	
High-Marsh	120	107 (-13)		124 (+4)		145 (+25)		167 (+47)	
Salt Panne	37	17 (-20)		30 (-7)		35 (-2)		37 (0)	
Freshwater/Brackish Marsh	132	96 (-36)		99 (-33)		121 (-11)		131 (-1)	
Open Water/Tidal Channels and Basins	40	74 (+34)		67 (+27)		34 (-6)		24 (-16)	
Riparian	72	67 (-5)		67 (-5)		70 (-2)		71 (-1)	
Coastal Strand	5	5 (0)		5 (0)		5 (0)		5 (0)	
Upland & Others	299	292 (-7)		295 (-4)		299 (0)		299 (0)	
Beach	15	14 (-1)		15 (0)		15 (0)		15 (0)	
Berms and Roads	23	24 (+1)		24 (+1)		24 (+1)		23 (0)	
Transitional (man-made)	0	12 (+12)		12 (+12)		2 (+2)		0 (0)	
Total ³	960	960	0	960	0	960	0	960	0

¹ Existing habitat acreages are from 2012 mapping efforts and reflect habitat distributions at that time.

² The proposed habitat distribution acreages represent the proposed immediate post-project condition that would result from the implementation of each alternative, and do not take into account future sea level rise.

³ Totals may not add due to rounding.

Source: Nordby and M&N 2013

Table 2-18
Inlet and Channel Dimensions Comparison for the Project Alternatives

	Coast Highway 101/Inlet		NCTD Railroad Trestle		I-5 Bridge	
	Bottom Width (feet)	Invert (feet, NGVD)	Bottom Width (feet)	Invert (feet, NGVD)	Bottom Width (feet)	Invert (feet, NGVD)
Existing	105	-0.87	187	-0.87	130	0.74
Alternative 2A	200	-6.5	590	-7	261	-6.5
Alternative 1B	130	-4.0	187	-5.5	261	-6.0
Alternative 1A	115	-4.0	187	-5.5	130	-6.0
No Project/ No Federal Action	105	-0.87	187	-0.87	130	0.74

NGVD = National Geodetic Vertical Datum
Source: M&N 2012

Table 2-19
Materials Removal and Periodic Maintenance Comparison for the Project Alternatives

	Alternative 2A	Alternative 1B	Alternative 1A	No Project/No Federal Action
Initial Amount of Material Removed	1.4 mcy	1.2 mcy	160,000 cy	0
Estimated Post-construction Periodic Volume Removed	300,000 cy	40,000 cy	35,000 cy	25,000 cy
Estimated Post-construction Periodic Maintenance Frequency	Every 3 to 4 years	Annually	Annually	Annually

mcy = million cubic yards
cy = cubic yards

2.9 MATERIALS DISPOSAL

Depending upon the alternative, anywhere from 160,000 cy to 1.4 mcy of excavated or dredged materials would need to be disposed of and/or reused as part of restoration implementation. This is in addition to the vegetative material removed as part of clear and grub activities, which is discussed further in Section 2.10. As discussed in Section 2.2.2, specific locations have been carried forward for potential materials disposal/reuse. A matrix describing each of the materials disposal/reuse scenarios and maximum capacity per site is provided in Table 2-20 and shown in Figures 1-3 and 2-11. Alternative 2A and Alternative 1B have a variety of options. However, under Alternative 1A, material would be relatively fine-grained and is proposed to be disposed of in the offshore disposal site currently designed and permitted for such usage (LA-5).

The materials disposal/reuse scenarios described in Table 2-20 reflect a maximum volume that could be placed at a variety of locations and the total available capacity exceeds the amount of material needed to be disposed/reused for the construction of Alternative 2A or Alternative 1B. Thus, only a portion of these disposal/reuse sites, or a portion of the volume (and footprints) identified in Table 2-20, may actually be used for materials placement under those alternatives. Inlet maintenance would also result in materials to be disposed of, but material removed from the inlet is anticipated to be sandy and disposed of on the adjacent beach/nearshore, and is not taken into account in Table 2-20, which focuses on the one-time disposal needs associated with initial project implementation. To provide full public disclosure and maximum flexibility during construction, all disposal/reuse scenarios are evaluated in this EIR/EIS. Direct linkage occurs between Alternative 1A and the necessary disposal site. For the other two action alternatives, several options are available. Therefore, the materials disposal/reuse scenarios are evaluated independently throughout the document.

Table 2-20
Proposed Materials Disposal and Beneficial Reuse Scenarios

Approximate Net Quantity of Material: Alternative 1A = 160,000 cy of relatively poor-quality material that is only suitable for offshore disposal at LA-5 Alternative 1B = 1.2 mcy (overdredging would occur to generate appropriate material for beneficial reuse) Alternative 2A = 1.4 mcy (overdredging would occur to generate appropriate material for beneficial reuse)			
Type of Materials Placement	Potential Disposal Locations	Maximum Volumes Proposed for Placement by Site	
		Alternative 2A and Alternative 1B (cy)	Alternative 1A (cy)
Offshore Disposal	LA-5	0	160,000
Offshore Stock-piling (outside littoral cell)	SO-5/SO-6	1,000,000	0
Nearshore (inside littoral cell)	Cardiff	Alternative 2A	0
		500,000	
Onshore (beach placement)	Cardiff	300,000	0
	Leucadia	117,000	0
	Moonlight Beach	105,000	0
	Solana Beach	146,000	0
	Torrey Pines	245,000	0

Notes:

General – The disposal/placement sites have not yet been approved. The disposal/reuse scenario will be identified once the final SAP is reviewed and approved by the Corps and EPA.

1. Nearshore materials placement quantity at Cardiff is greater in Alternative 2A because a new inlet would require construction of a prefilled ebb bar (Section 2.4).
2. Materials placement quantities exceed amount to be disposed of, or reused, to allow flexibility at individual placement sites.
3. Onshore beach sand placement sites are consistent with the 2012 RBSP (SCH #2010051063) with the exception of Cardiff, which would extend slightly farther north and south along the coastline. Refer to Figure 2-11 for the proposed project's sand placement sites. While 2012 RBSP sites are proposed for use, the SELRP would obtain permits for placement, since the 2012 RBSP was a one-time project implemented in 2012.
4. Capacities for each site are defined differently, as described below:
 - LA-5 is typically limited by the Corps and EPA to receiving 700,000 cy of disposal material per year.

- SO-5 and SO-6 capacities are approximately 1.5 mcy and 400,000 cy, respectively. These capacities represent the volumes removed during previous projects (e.g., 2001 and 2012 RBSPs).
 - Onshore and nearshore capacities for Cardiff were defined as volumes modeled that did not predict long-term impacts to sensitive nearshore resources, as discussed in Section 3.6 of this EIR/EIS.
 - Onshore placement sites (other than Cardiff) were limited to capacities similar to those included in the previously implemented 2001 and 2012 RBSPs.
5. Sand Compatibility and Opportunistic Use Programs (SCOUP) sites are not included as an option for materials placement in this EIR/EIS because the existing SCOUPs assume construction methods and other conditions that are not consistent with the SELRP (e.g., daytime construction only).
- cy = cubic yards
mcy = million cubic yards

2.10 CONSTRUCTION METHODS, SCHEDULE, AND PROJECT DESIGN FEATURES

The SELRP would be constructed over several phases and require unique approaches and equipment. This section provides a description of possible construction methods associated with both the lagoon restoration and materials disposal/reuse components of the proposed project. In addition, potential phasing and scheduling features are identified. Specific project design features that have been incorporated into the project design to minimize or avoid potential effects to resources are also detailed in this section. Construction may be accomplished using various methods; this section of the EIR/EIS presents a conservative scenario for disclosure purposes, but the actual construction approach may be refined during final design and/or in the contractor bid phase.

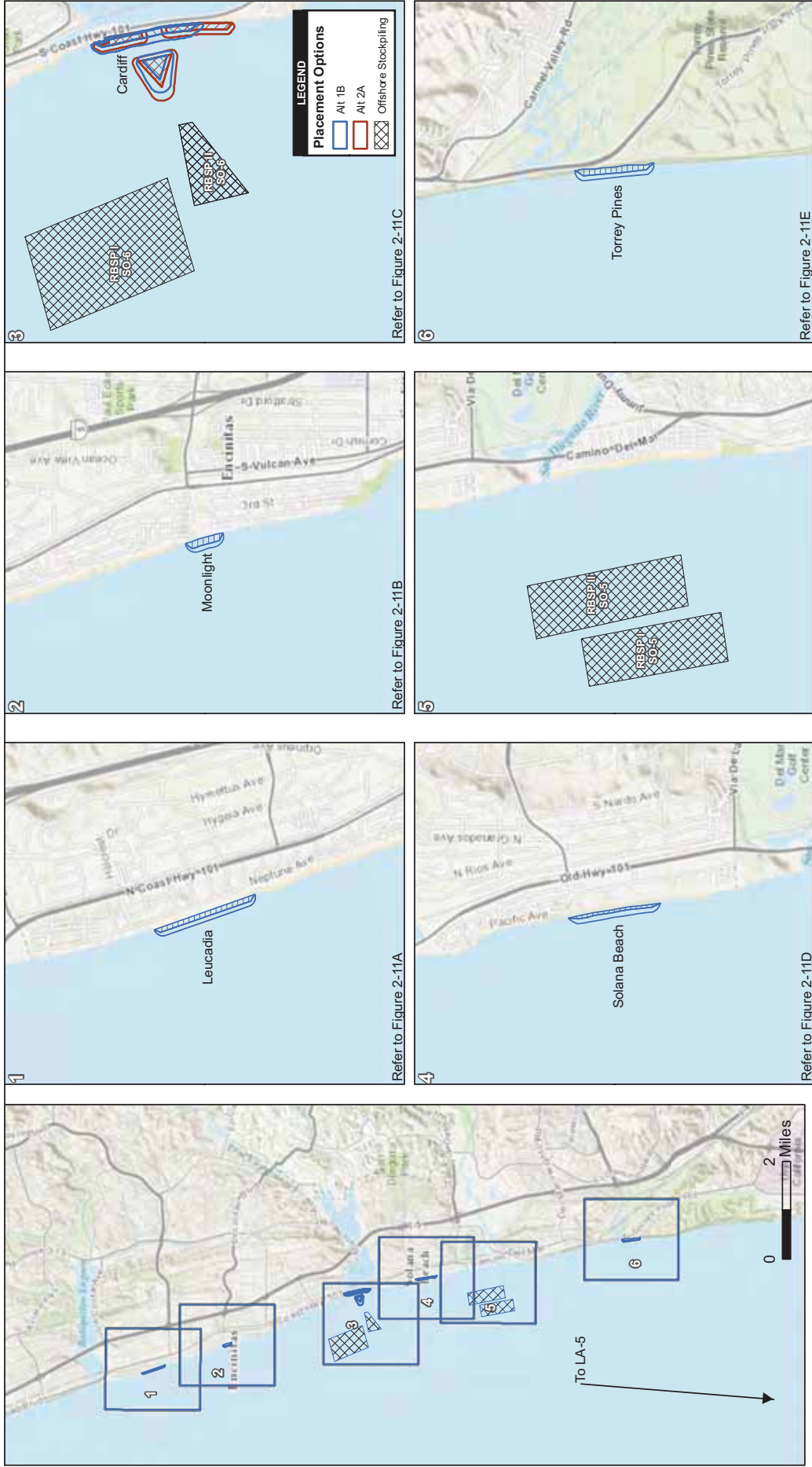
Project construction is assumed to occur concurrently with construction of two other projects at the lagoon to minimize overall environmental impacts and the duration of disturbance within the lagoon, as required by Senate Bill 468 (see Section 1.5). The two projects are the I-5 bridge replacement proposed by Caltrans as part of the I-5 North Coast Corridor Project improvements and the LOSSAN Project proposed by SANDAG. Both of these projects are corridor-wide program planning efforts and are undergoing separate environmental review. Responsibility for the construction of each of these projects is summarized below in Table 2-21. Though independent projects, coordination is ongoing with them to maximize the efficiency and environmental sensitivity of overall construction activities in the lagoon. The I-5 and LOSSAN infrastructure projects will be constructed under a Construction Manager/General Contractor (CM/GC) approach. The CM/GC approach is a contractual mechanism to provide coordination between multiple projects for implementation and inclusion of detailed contract methods is not necessary for the analysis of an environmental document. The CM/GC would address issues such as schedule, phasing, work areas, sharing resources, per the collaboration called for by the Kehoe bill (SB 468). For evaluation purposes, each is considered as a cumulative project in Chapter 5 of this EIR/EIS.

Generally, construction would consist of:

1. Dredging and grading within the lagoon to raise or lower elevations to create a diverse mosaic of habitats that remains resilient through time.
2. Modifications to the existing lagoon inlet to enhance tidal flow in and out of the lagoon, and internal lagoon bathymetric modifications to increase the tidal prism within the lagoon basins and the rate of water transfer between the ocean and lagoon.
3. Infrastructure improvements and protection, as necessary, including bridge retrofitting or construction along Coast Highway 101.
4. Disposal of sediments excavated from the lagoon to different locations, as identified for materials disposal/reuse, including offshore disposal areas, offshore placement sites, nearshore areas, nearby beaches, and/or on-site placement. Two of the project alternatives would allow for construction of an overdredge pit within the lagoon to provide on-site disposal of fine material. This approach would also generate material that could potentially be beneficially reused in the littoral system.
5. Restoration of graded areas within the lagoon to facilitate recovery of habitat.

Construction in a lagoon environment is challenging and can be complex. Several methods are typically required to coordinate working with dredges over water and earthmoving equipment over land. Often a combination of approaches is utilized, particularly in a large site such as San Elijo Lagoon. Construction scenarios proposed under each alternative are presented below, along with general information about the timing and duration of anticipated activities. This discussion provides a construction approach for Alternative 2A, and then provides information for Alternative 1B and Alternative 1A, which would generally result in incrementally less effort including duration and/or phasing. Figures 2-12 through 2-14 show potential disturbance limits for each alternative, while Figure 2-15 shows access and staging areas for each of the build alternatives and illustrates the system of dikes that would be constructed to allow flooding of specific areas while retaining refugia in other parts of the lagoon. These dikes are required to control flooding necessary to conduct dredging throughout the lagoon.

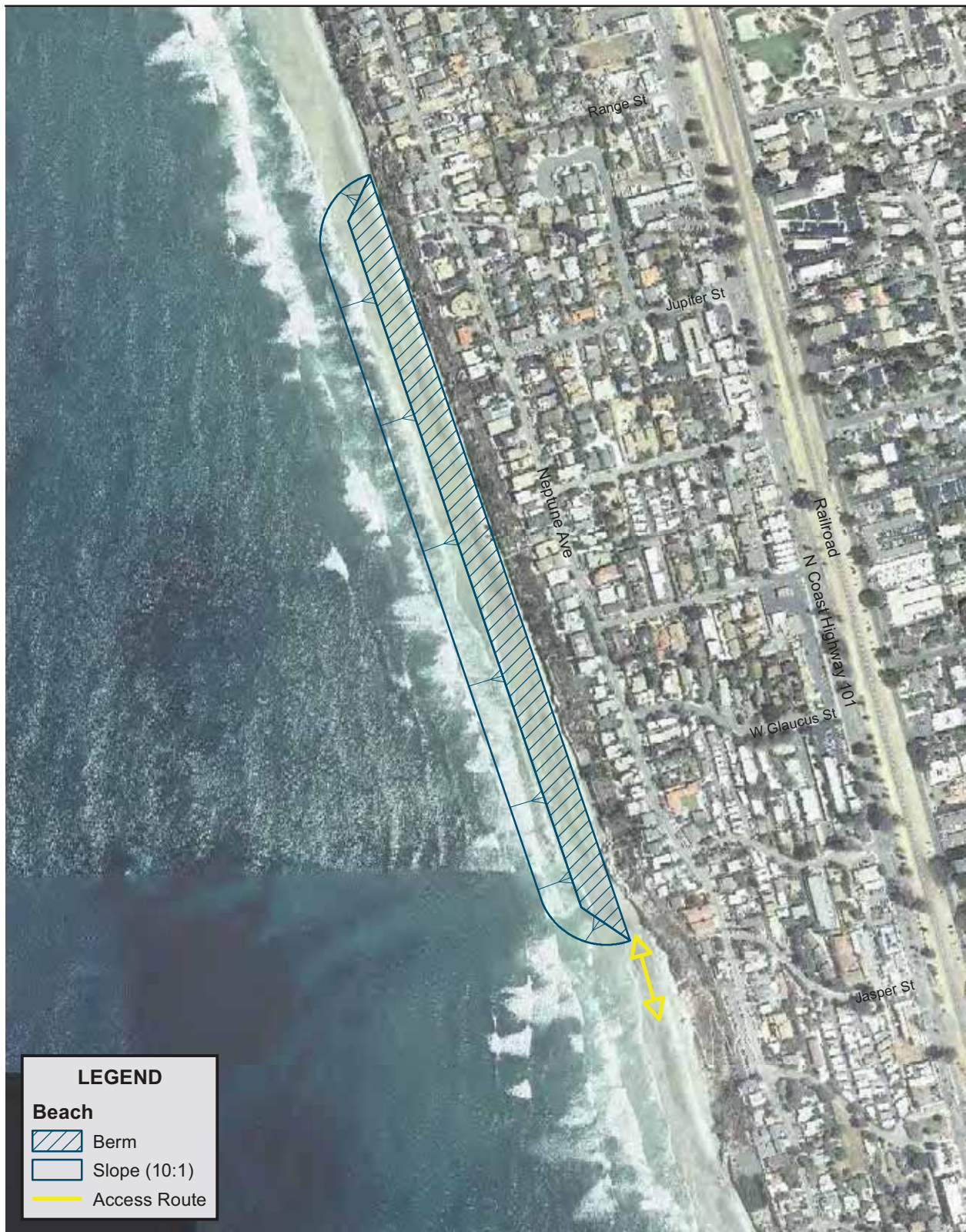
Construction is anticipated to start in January 2016, but this schedule may change based on approvals and authorizations needed for project implementation. A period of up to approximately 36 months of active construction is anticipated for project implementation. Work would generally consist of site preparation and mobilization, construction of dikes to contain and limit flooding needed to conduct dredging, flooding of specific basins and areas while dredging occurs, and draining of flooded areas to allow basins to begin recovery and provide refugia while



Sources: Sources: Esri Data, NAVTEQ, TomTom, Intermap, Inc., GEBCO, USGS, FAO, NPS, NRCAN, GEBCO, Esri, Japan, METI, Esri China (Hong Kong), Swisstopo, and the GIS User Community, SandS 2012, MetInfoNet 2012

Figure 2-11
Potential Offsite Materials Placement Sites

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Source: SANDAG 2012; MoffattNichol; AECOM 2014

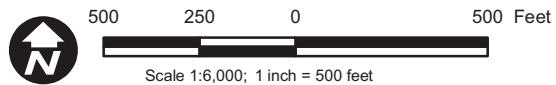
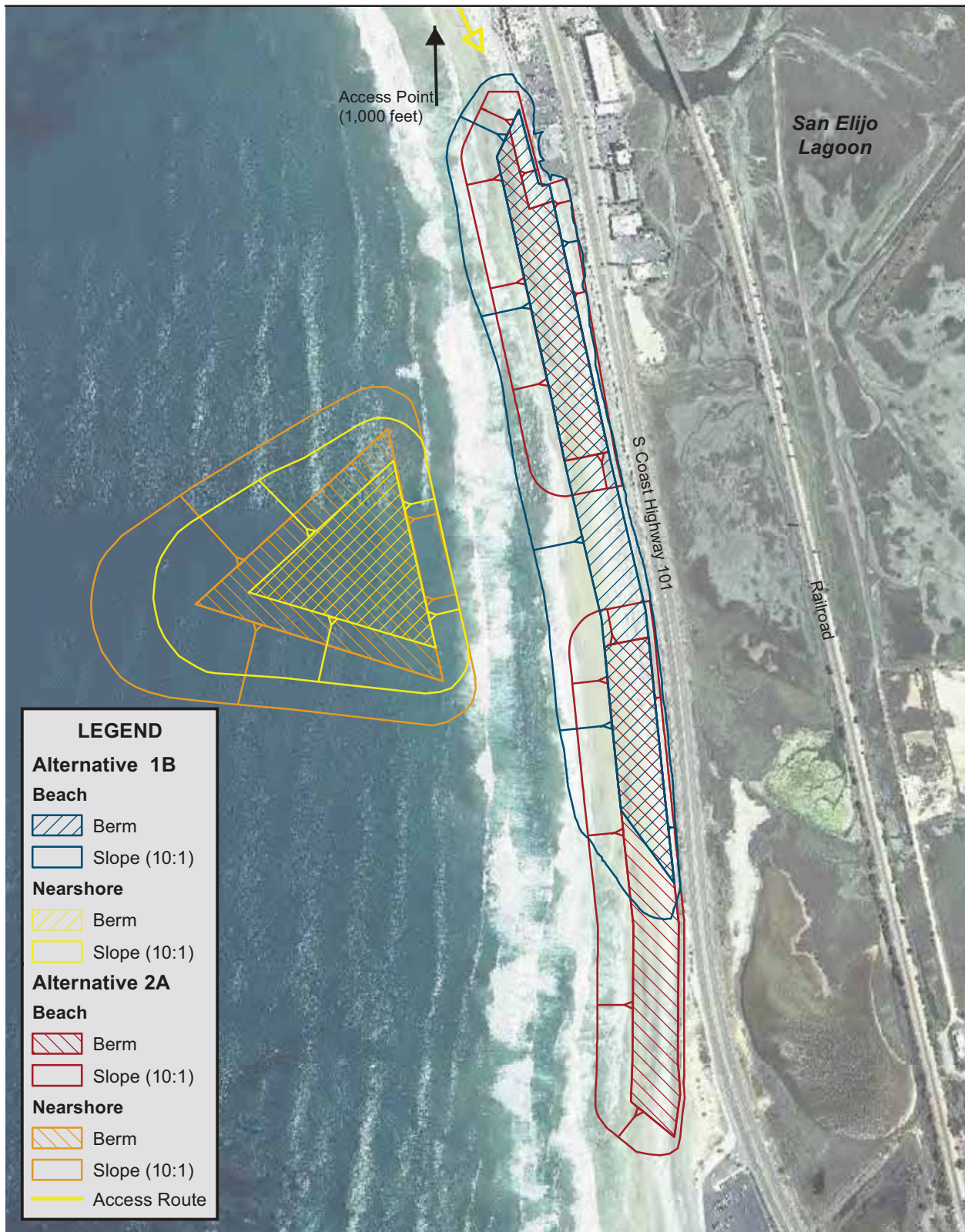


Figure 2-11A
Materials Placement Site
Leucadia



Figure 2-11B
Materials Placement Site
Moonlight Beach



Source: SANDAG 2012; MoffattNichol; AECOM 2014

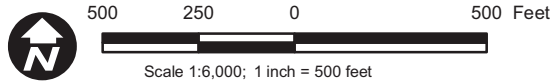


Figure 2-11C
Materials Placement Site
Cardiff Alternatives 1B, 2A

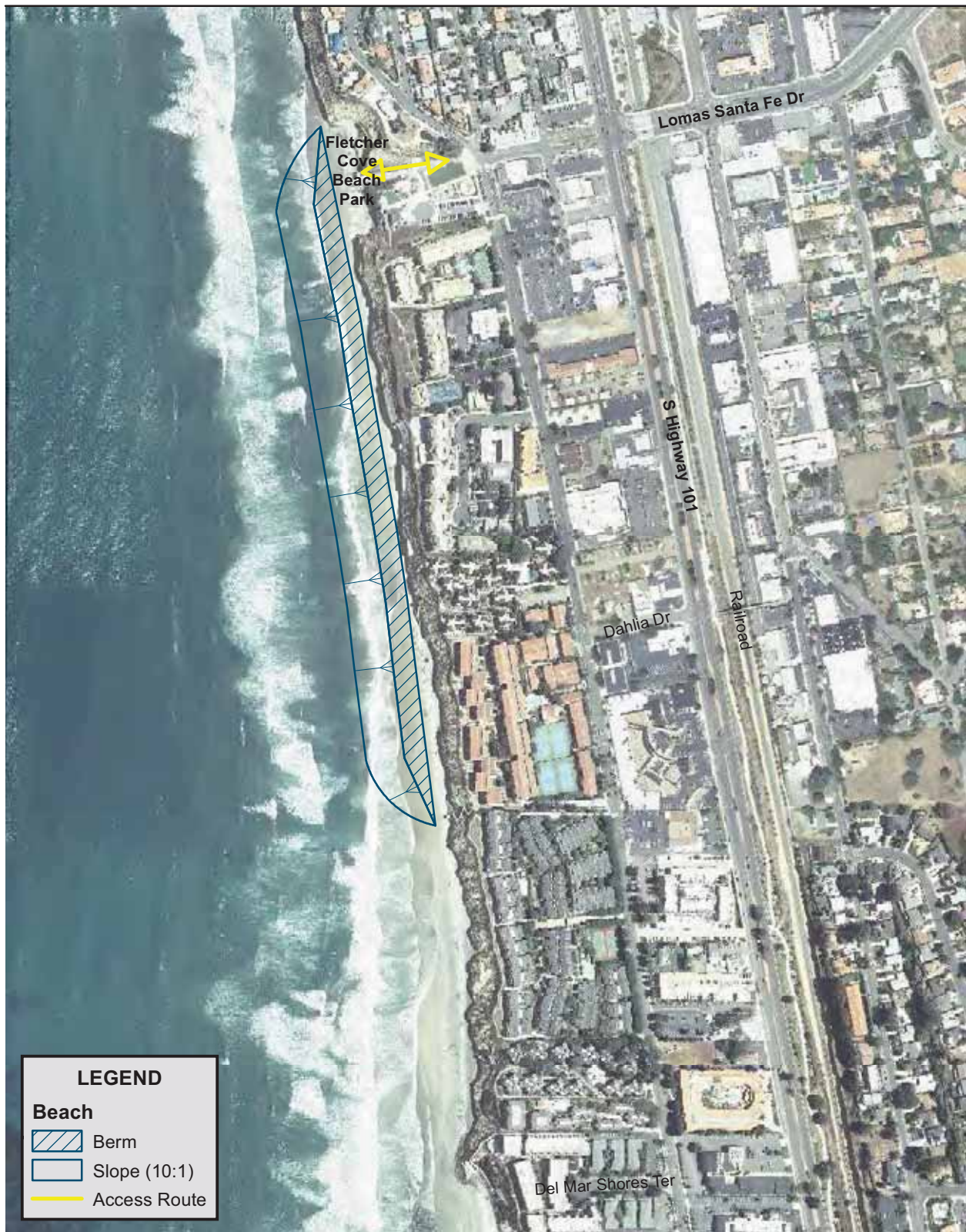


Figure 2-11D
Materials Placement Site
Solana Beach



Figure 2-11E
Materials Placement Site
Torrey Pines

other basins are under construction. Although the work would generally occur in sequenced phases, it is anticipated that construction would occur year-round and these phases would be implemented without pause. Figures 2-16 and 2-17 illustrate the proposed construction phasing and sequencing for Alternative 2A and Alternative 1B, respectively. Some construction activities would be restricted to daytime hours, but some activities require 24 hours a day of operation to remain efficient (e.g., dredging and materials disposal/placement activities). Additionally, some activities such as materials delivery may be scheduled for nighttime hours to minimize additional effects, such as traffic or circulation (e.g., movement of pedestrians and motorized and/or nonmotorized vehicles) during summer hours. These nighttime activities may require limited temporary lighting for safety purposes. Phasing would allow the SELC to incorporate restrictions on specific construction activities to minimize effects to sensitive resources within the lagoon. For example, clearing and grubbing of habitat areas would be restricted to outside of the bird breeding season to limit effects to breeding bird populations. Other examples are outlined in the project design features table at the end of this section (Table 2-26).

Table 2-21
Overview of Project Elements and Responsible Parties for Construction

Project Element	SELRP	Caltrans	SANDAG/NCTD	Other (TBD)
Lengthen I-5 bridge over San Elijo Lagoon		X		
Lengthen railroad crossing over San Elijo Lagoon			X	
Coast Highway 101 bridge (new inlet)	X (Alt. 2A only)			
Seismic retrofit of Coast Highway 101 (existing inlet)				X
Dredge and replant lagoon	X			

2.10.1 CONSTRUCTION APPROACH

Alternative 2A

Construction Phasing and Sequencing

Table 2-22 outlines the anticipated sequence of activities and general durations for each phase of implementation of Alternative 2A. Construction of Alternative 2A could take up to approximately 36 months. This alternative would require construction of a bridge along Coast Highway 101 at the new inlet location, which would occur concurrently with lagoon enhancement work. Figure 2-12 shows potential disturbance limits for Alternative 2A. Phasing and sequencing for the proposed project related to specific areas designated for flooding and dredging are illustrated in Figure 2-16.

Alternative 2A would allow for construction of an overdredge pit within the central basin to provide on-site disposal of fine material removed from shallow cuts throughout the central, east, and west basins. These fine materials are not suitable for beneficial reuse through placement on beaches or in the littoral zone. Materials dredged from the overdredge pit would be from deeper, more coarse-grained sediments that are anticipated to be suitable for beneficial reuse in the littoral system based on soil investigations (M&N 2013). Phase 1 would create the pit by removing up to 1.4 mcy from the proposed overdredge pit area in the central basin (underlying the mudflat/channel area shown in Figure 2-3). The pit would be located in a portion of the lagoon containing nutrient-rich sediments. Removal of these sediments is critical to improve water quality impairments in the lagoon.

The SELRP construction methodology would primarily utilize dredge equipment to remove soils within wetland areas of the lagoon. This construction approach minimizes compaction of wetland soils, which can affect their ability to support wetland vegetation and invertebrate communities after restoration. Work could occur using a cutterhead suction dredge or similar equipment that would likely be mobilized to the site by truck, assembled on-site, and launched into the basin. Sand would be pumped from the lagoon to various placement sites by pipe and/or by a transport vessel located offshore. A diesel or electric dredge could be used; if the dredge is electric, facilities for electrical power would be provided in the form of a small (10 feet by 10 feet and 8 feet high) temporary on-site electrical substation located within staging area 5 (Figure 2-15). This facility is further described in Section 2.10.2 and would only remain on-site during construction.

Table 2-22
Anticipated Construction Phasing Schedule – Alternative 2A

	Phase 1	Phase 2	Phase 3	Phase 4
Activity	Construct dikes (1 & 2) in central basin and confirm/improve CDFW dike (3) to prevent flooding to the east Close dike 1 at low tide to leave dry and create refugia for species Close dike 2 at high tide and perch water elevation up to +6 feet NGVD to launch and float dredge Clear/grub central basin vegetation of 25,000 cy (3 months) in dredge area and export to disposal location through site access (#7) Reopen dike 2 after dredge reaches the overdredge pit location, leaving the lagoon open to tidal action Overdredge pit of 1.4 mcy and pump sand to onshore/nearshore/offshore placement sites (10 months) Complete North Rios access road improvements and other staging/access area preparation (including site 7 with 5,000 cy of imported earth material)	Again, close dike 2 at high tide to perch water at +6 feet NGVD in central basin and west portion of east basin Dredge central basin over 7 months - widespread dredging (650,000 cy) in central basin to overdredge pit - construct central basin transitional areas - clear and grub central basin at channels (60,000 cy) - clear and grub east basin between I-5 and CDFW dike (240,000 cy) Construct dike 4 under I-5 to enable flooding of entire east basin during Phase 3 Release dike 2 and open central basin to tidal action and recovery	Maintain flooding in east basin to +5 NGVD using dike 4 and lower CDFW dike 3 Clear/grub east basin east of CDFW dike (30,000 cy) Dredge east basin to overdredge pit over 7 months (700,000 cy) Construct east basin transitional areas Lower dike 4 under I-5 and open east basin to tidal action and recovery	Build dike 5 and protective dike in west basin (6) Close dike 5 at high tide to flood west basin to +6 feet NGVD Clear/grub west basin (10,000 cy) Dredge to create inlet and subtidal basin (200,000 cy) to overdredge pit, nest site, and/or littoral cell placement sites Open new tidal inlet to ocean Lower dikes, leaving lagoon open to tidal action through new tidal inlet
Flooding Requirements (Duration/Elevation)	After closing central basin dike 2, flood central basin to +6 feet NGVD for up to 3 months (initiate outside of breeding season) to launch dredge and clear and grub central basin, then drain and complete dredging of overdredge pit for 10 months while lagoon is open to tidal action	Flood central basin to +6 feet NGVD for 7 months to allow shallow dredging; flood east basin between I-5 and CDFW dike for clear and grub (6 months); west basin remains open to tidal action	Flood east basin for 7 months to +5 feet NGVD to allow shallow dredging; central and west basins remain open to tidal action	Flood west basin for 4 months to +6 feet NGVD to allow shallow dredging of west basin; remainder of lagoon remains open to tidal action

	Phase 1	Phase 2	Phase 3	Phase 4
Quantity/ Equipment	Clear and grub 25,000 cy with barge and haul trucks Dredge 1.4 mcy with a large dredge Road and staging/access point preparation equipment, such as bulldozers, backhoes, front-end loaders, earthmovers, graders Import of 10,000 cy of gravel from off-site for road/staging sites Import of 5,000 cy of earthen material for site 7 preparation (from I-5 North Coast Corridor Project) Import up to 50,000 cy of material for dike construction (from I-5 North Coast Corridor Project)	Clear and grub 300,000 cy with barge and haul trucks Dredge 650,000 cy with smaller dredge(s)	Clear and grub 30,000 cy with barge and haul trucks Dredge 700,000 cy with smaller/mid-size dredge(s)	Clear and grub 10,000 cy with barge and haul trucks Dredge 150,000 cy with a smaller dredge and place in pit as 50,000 cy of backfill (silts) and cover with up to approximately 130,000 cy sand cap; Excavate inlet under Coast Highway 101 (<50,000 cy of sand) with earthmoving equipment to the nest site and the beach
Coast Highway 101 Work	Start Coast Highway 101 Detouring – Build Bridge and Approaches; construct dike 7 and haul road through southern portion of west basin	Continue Coast Highway 101 Detouring – Build Bridge and Approaches	Complete Coast Highway 101 Detouring – Build Bridge and Approaches	No work on Coast Highway 101
General Timeline	Winter 2016 – Winter 2017	Winter 2017 – Fall 2018	Fall 2018 – Spring 2019	Spring – Fall 2019

Notes:

1. Mobilization of specific equipment would occur prior to each phase. Activities associated with mobilization/demobilization would not occur within lagoon-sensitive habitats outside the proposed disturbance footprint. Areas within the disturbance footprint may experience vegetation clearing and/or grading.
2. These phases anticipate a start date of January 2016. If the schedule is shifted, restrictions on specific activities (e.g., clear and grub and the initiation of flooding would occur outside the breeding season) would continue to be implemented per Table 2-26.

CDFW = California Department of Fish and Wildlife; cy = cubic yards; I-5 = Interstate 5; mcy = million cubic yards;
 NGVD = National Geodetic Vertical Datum

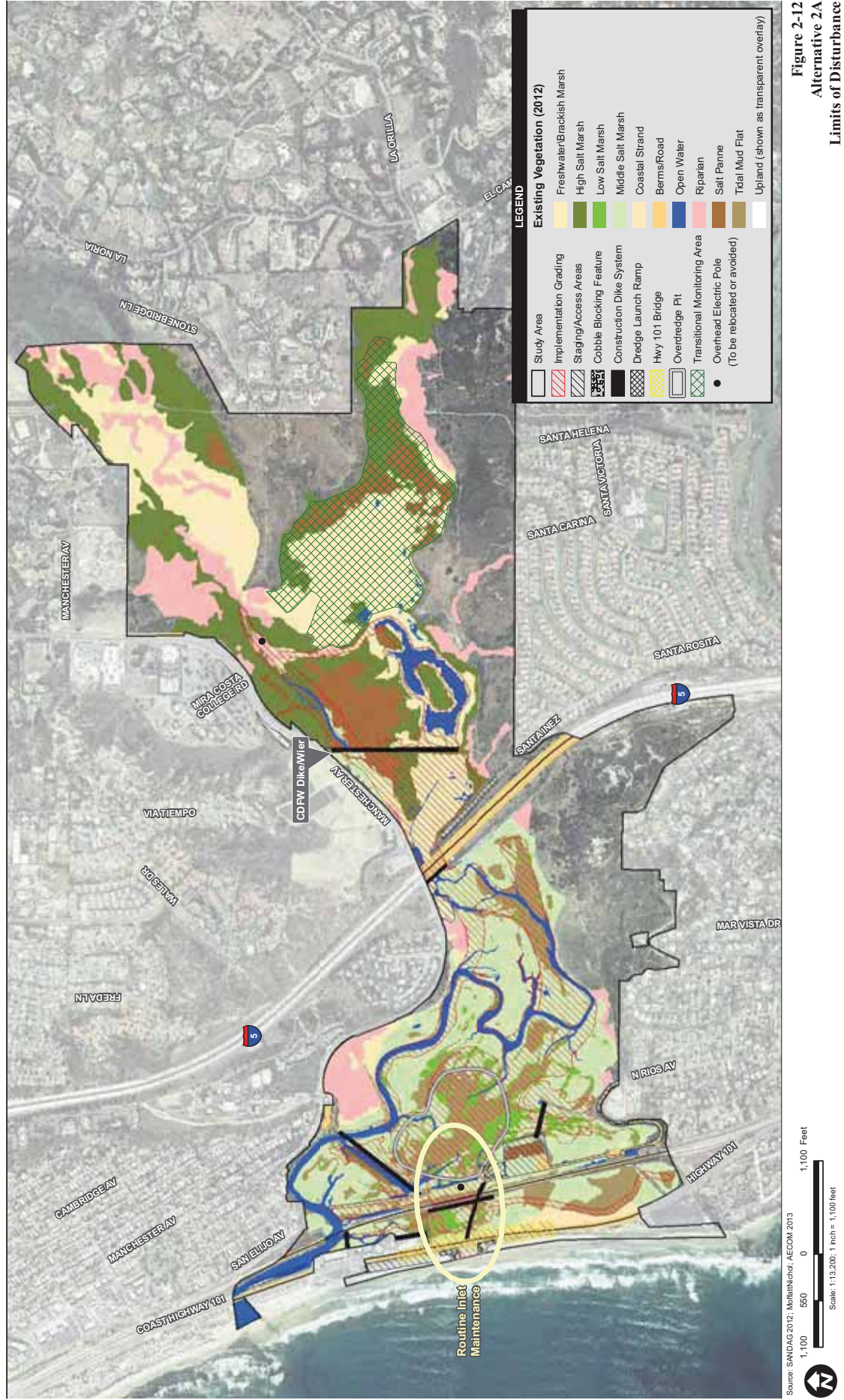
Dredging and Flooding Requirements

The overdredge pit proposed as part of Alternative 2A would be created during Phase 1 of construction to provide a location for finer materials disposal later in the construction process. The location of the overdredge pit is shown in Figures 2-12 and 2-13. The pit size and location

have been designed to accommodate the required capacity of dredging needed, minimize direct impacts to sensitive habitats, and be located in areas designated for removal of high-nutrient sediments causing eutrophication in the lagoon. Phase I also includes clearing and grubbing of the central basin while it is flooded for 3 months. The overdredge pit would be dredged by launching a dredge into the central basin and allowing it to remain in the basin until dredging is complete to provide the required capacity. This dredging procedure does not require flooding of the central basin for an extended period, but only for a time sufficient to launch the dredge, move it to the pit location, and dredge a small subtidal working area to initiate large-scale dredging. Overdredge pit dredging can occur during open lagoon mouth conditions and is expected to take 10 months.

Once creation of the overdredge pit has been completed, shallow dredging of finer materials not suitable for reuse within the littoral zone would occur in specific locations under Alternative 2A and Alternative 1B. This would occur in Phase 2 of the project. Prior to shallow dredging proposed throughout the remainder of the lagoon, portions of the lagoon would need to be flooded with the use of strategically placed dikes to approximately +6 feet NGVD (central basin, and east to the CDFW dike in the east basin) to adequately accommodate a dredge. The west portion of the east basin would also flood back to the existing CDFW dike during this phase. The dike would be left in place and improved, as necessary, to prevent extended inundation of riparian habitat areas east of the dike. The east basin would continue to capture inputs from upstream, and to protect existing sensitive brackish and riparian habitat, water levels east of the CDFW dike would be maintained at elevations less than +5 feet NGVD. Pipes would be placed over the containment dike(s) to allow water to be pumped into or out of the lagoon to maintain a relatively consistent depth (e.g., releasing excess freshwater flows or adding replacement water, as needed, the dredge discharges its slurry outside of the flooded area). After construction of the dikes and water level control equipment, the lagoon could be flooded by closing the dikes at high tide. Shallow dredging throughout the basins could then occur; dredged materials from shallow cuts made within the basin would be placed in the overdredge pit via a temporary pipeline extending through the lagoon.

Three distinct areas have been identified as refugia for sensitive species during flooding, along the northwest side of the central basin, southeast of the former sewage ponds within the central basin, and the west basin itself. Containment dikes would be required to maintain the two refugia areas in the central basin, but the west basin would remain either dry or open to tidal influence until dredging occurs within that basin in Phase 4. Dikes would be constructed using existing access roads. It is not anticipated that earthen material would need to be imported from off-site. Earthen material needed for internal fill for lagoon restoration would come from the I-5 bridge construction project that would yield a high volume of surplus material. Approximately 155,000



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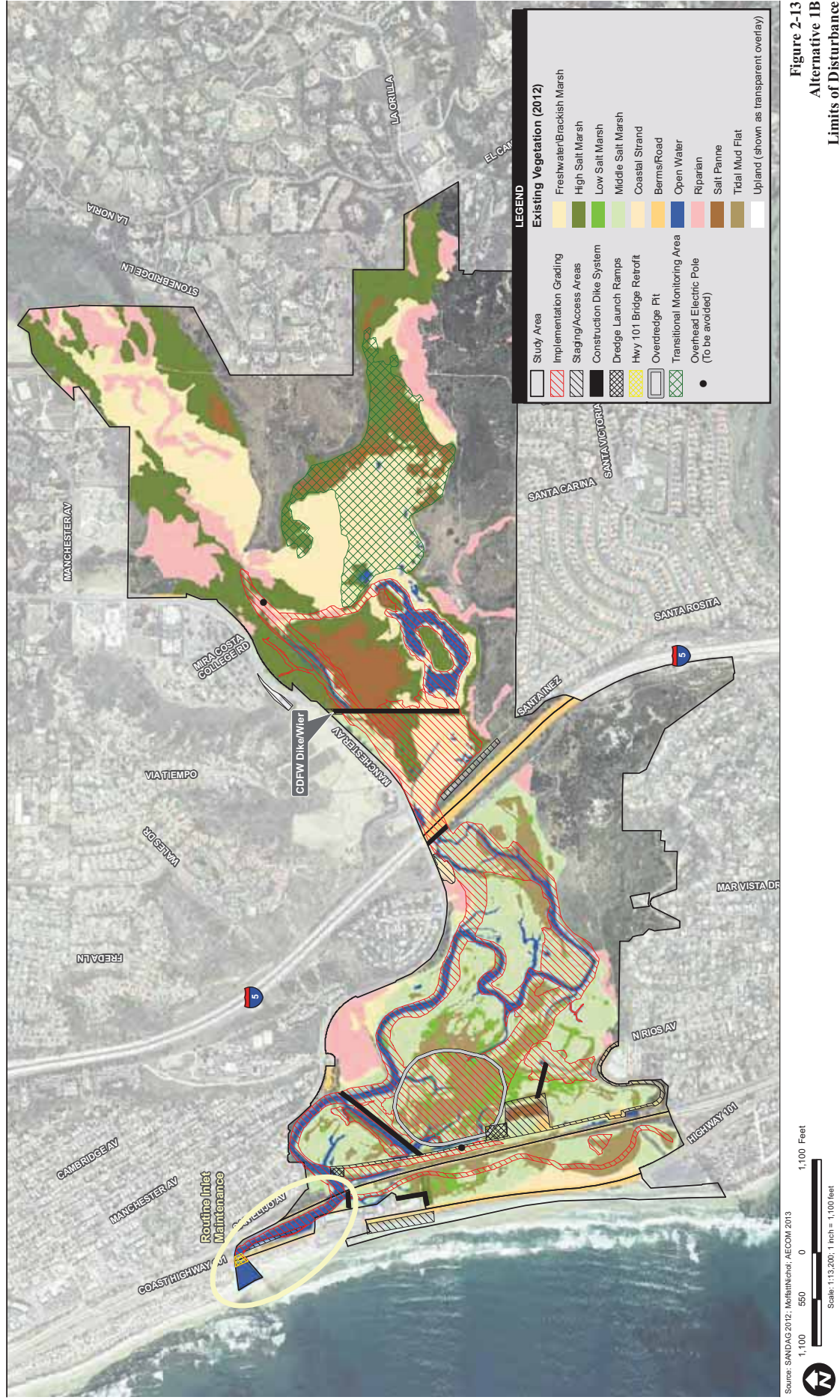
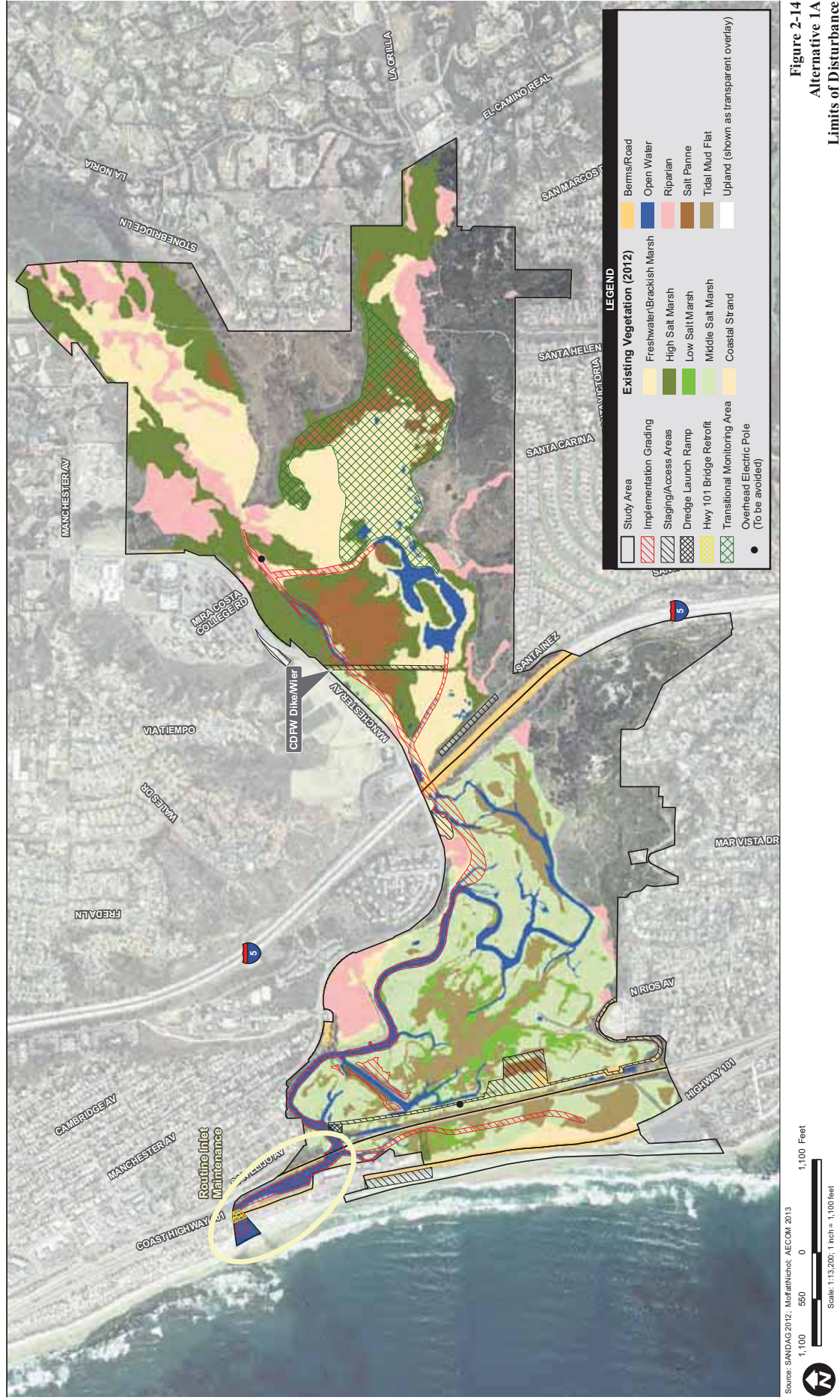


Figure 2-13
Alternative 1B
Limits of Disturbance

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cy of surplus material could be transferred from the I-5 bridge construction site to on-site stockpile staging locations in haul trucks. Approximately 50,000 cy of material would be required to construct the dikes. Earthmoving equipment would utilize existing access roads (e.g., along the railroad) and then begin to construct a raised platform out into the lagoon from those disturbed edges at the proposed locations. Approximately 10,000 cy of gravel would be imported from off-site to improve the internal road network sufficiently to support the work. Another 5,000 cy of material would be imported to prepare site 7 along Manchester Avenue in the central basin.

The containment dike within the southern part of the central basin would be closed off at low tide to reduce the water volume trapped in the refugia area within the southwest part of the central basin. The containment dike within the northern part of the central basin would be closed off at high tide to retain as much water within the dredge area as possible. The two dikes in the central basin would remain closed until the end of Phase 2, with a period of time when the northwest dike 2 would be breached to allow tidal action while the main overdredge pit is being created during Phase 1. In Phase 1, approximately 1.4 mcy of sediment would be dredged and beneficially reused in the littoral zone nearshore and/or onshore placement, or staged immediately outside of the littoral zone (offshore stockpiling). Up to approximately 130,000 cy of sand would be retained to cap the overdredge pit at the end of Phase 4. A sand cap is required for Alternative 2A because the new inlet results in a higher energy condition at the pit location compared to the existing inlet alternative of 1B.

Flooding of the central basin would last up to approximately 3 months in Phase 1, and 7 months in Phase 2, with an interim period of approximately 10 months during Phase 1 when no flooding would be required while the overdredge pit is created. After Phase 2, flooding of the central basin would be released to open the basin to tidal action and allow for habitat recovery to begin.

Phase 2 would dredge approximately 650,000 cy of silts and clays from the central basin and discharge it into the overdredge pit. A small quantity of material (approximately 35,000 cy) would also be placed at three man-made transitional areas within this basin after dewatering in the former sewage ponds (staging area 5 in Figure 2-15). It is anticipated that this work would occur using one or more cutterhead suction dredges. Dredge(s) would be mobilized to the site by truck, assembled on-site, and launched into the basin.

At the end of Phase 2, the east basin would remain flooded at a maximum water elevation of +5 NGVD through construction of a dike at I-5 and removal of the CDFW dike, and shallow dredging within that basin would occur in Phase 3. Dredged materials from that basin would be placed in the overdredge pit via a temporary pipeline extending through the lagoon. Phase 3 would dredge approximately 700,000 cy of silts and clays from the east basin and discharge it

into the overdredge pit, with approximately 10,000 cy being placed at one man-made transitional area after dewatering. It is anticipated this work would also be completed using cutterhead suction dredges. Flooding of the east basin would last up to approximately 7 months for dredging. After Phase 3, containment dike 4 would be removed and flooding released to open the basin to tidal action and allow for habitat recovery to begin.

During Phase 4, the west basin would be flooded by constructing a dike at the channel entrance and allowing a high tide to flood the area or by pumping water into the basin. Additional dikes may be required within the west basin during flooding to protect adjacent low-lying development, as shown in Figure 2-16. Phase 4 would dredge approximately 150,000 cy of silts, clays, and sand from the west basin, and use earthmoving equipment outside of the dredge area to excavate another approximately 50,000 cy of sand from under the new Coast Highway 101 bridge at the proposed tidal inlet location. Silts and clays would be discharged into the overdredge pit. Up to approximately 130,000 cy of sand would be used to cap the pit and approximately 35,000 cy of sand would be placed at the proposed nesting site, with the balance (35,000 cy) going to the beach for onshore or nearshore placement. It is anticipated this work would be completed using a small cutterhead dredge plus excavators, backhoes, scrapers, bulldozers, and possibly offroad trucks for earthmoving activities at the tidal inlet. The proposed inlet would be opened as the last construction task, and the existing inlet allowed to gradually close over time.

Coast Highway 101 Construction Activities

Under Alternative 2A, a new Coast Highway 101 bridge would be constructed over the new inlet as fully detailed in Section 2.10.10. Construction on Coast Highway 101 associated with Alternative 2A would last approximately 18 months and occur concurrently with lagoon restoration activities. Figure 2-5 illustrates the proposed construction approach for the new bridge structure. Work on the west and east halves of the roadway would be conducted sequentially, allowing for one side of the new bridge to be constructed and poured first, while traffic would use the other half of existing Coast Highway 101 to maintain continual access in both directions. Details are provided in Section 2.10.

Alternative 1B

Construction Phasing and Sequencing

Table 2-23 describes generalized construction phases of work for Alternative 1B. This alternative would also include retrofitting the existing bridge along Coast Highway 101, which would occur

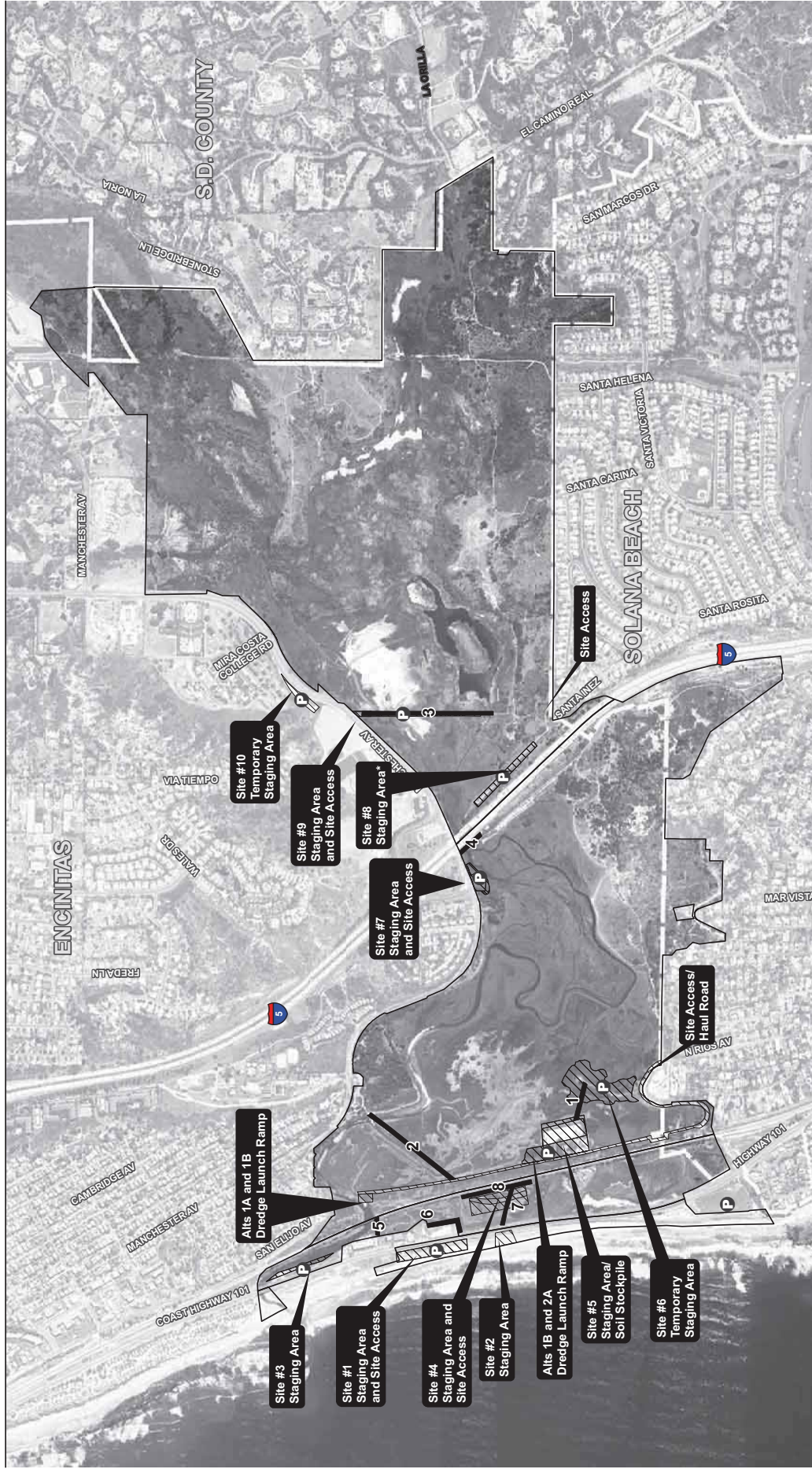


Figure 2-15
Access/Staging Areas and Construction Dike System

Dike Notes:
 Construction Dike System Numbered 1-8
 Dike 3 Utilizes Existing CDFW Dike Prior to Removal/Improvement
 P Indicates employee parking area

Access/Staging Notes:
 Alternative 2A Includes All Sites (1-10)
 Alternative 1B Includes All Sites except for 4
 Alternative 1A Includes All Sites except for 2, 4 and 6
 Site #8 is only conditionally available if work on the I-5 bridge replacement project has not been initiated or has already been completed. Should access may also be appropriate as part of the coordinated CC/CMA approach anticipated for implementation of the SELRP.

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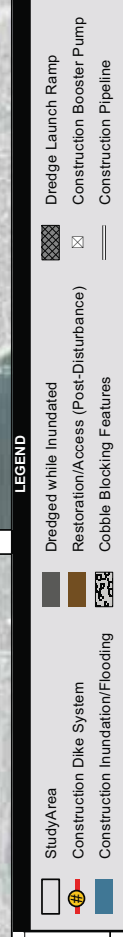
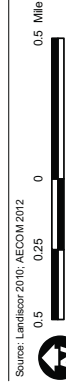
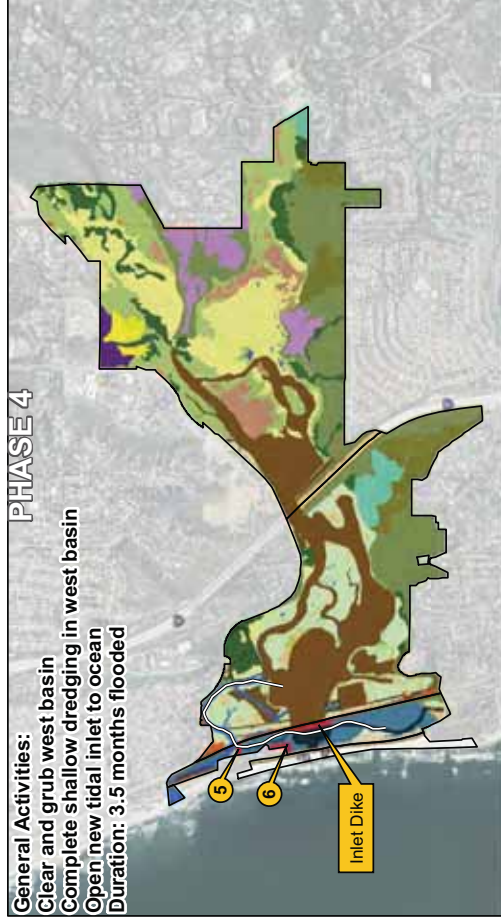
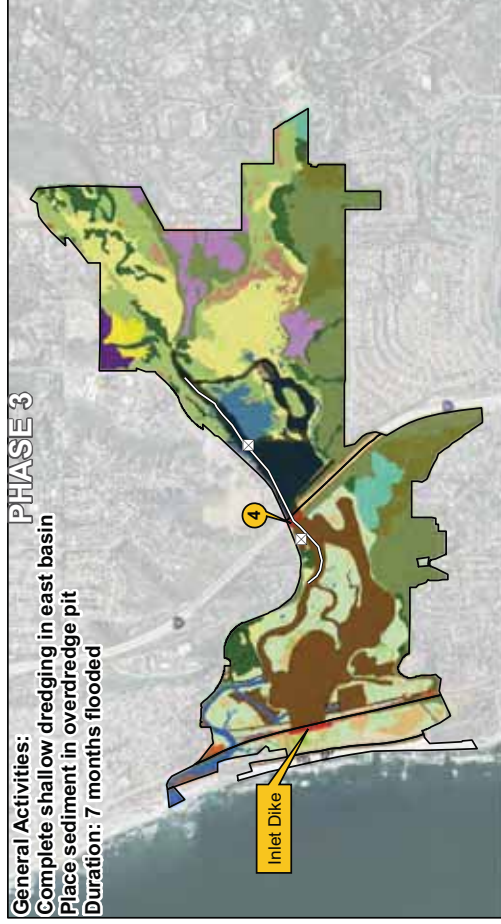
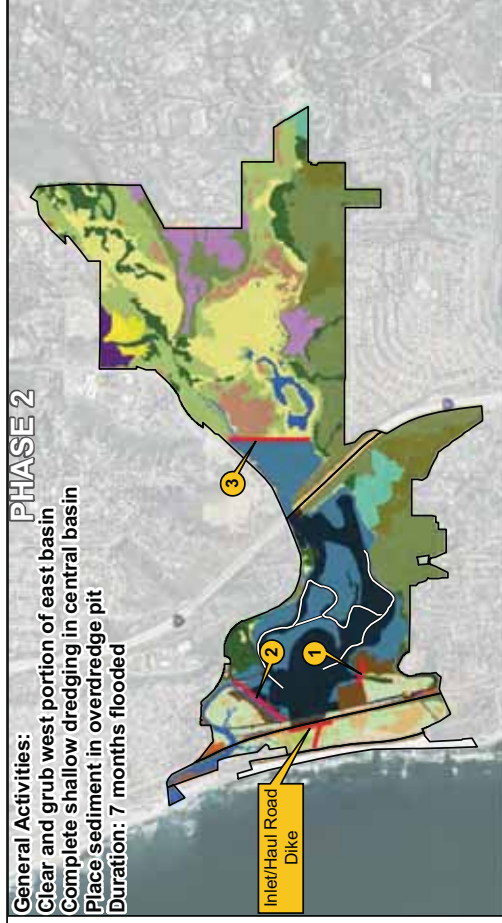
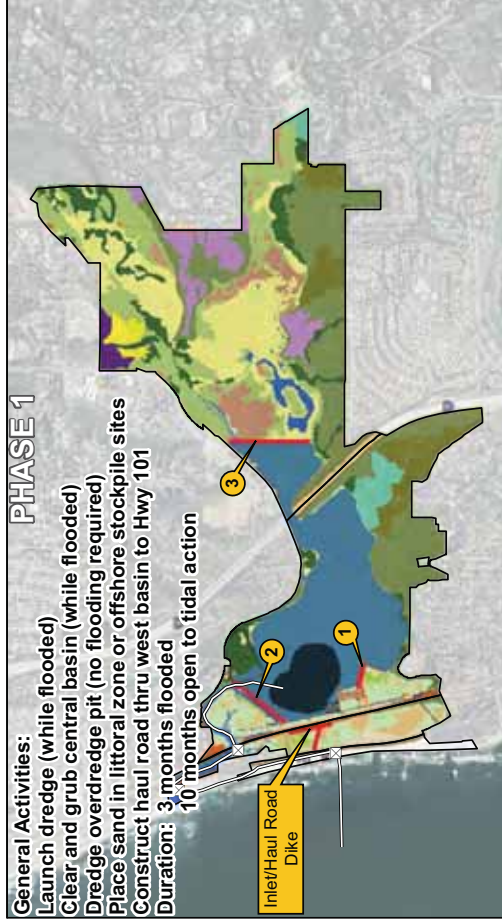


Figure 2-16
Construction Sequence
Alternative 2A

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concurrently with lagoon enhancement work. Figure 2-13 shows potential disturbance limits for Alternative 1B. Phasing for the project related to specific areas designated for flooding and dredging is illustrated in Figure 2-17. Implementation of Alternative 1B would incorporate similar phasing for construction activities as that presented for Alternative 2A.

Table 2-23
Anticipated Phasing Schedule – Alternative 1B

	Phase 1	Phase 2	Phase 3	Phase 4
Activity	Construct dikes (1 & 2) in central basin and confirm/improve CDFW dike (3) to prevent flooding to the east Close dike 1 at low tide to leave dry and create refugia for species Close dike 2 at high tide and perch water elevation up to +6 feet NGVD to launch and float dredge to overdredge pit location Clear/grub central basin vegetation of 25,000 cy (3 months) in dredge area and export to disposal location through site access (7) Reopen dike 2 after dredge reaches overdredge pit location, leaving lagoon open to tidal action Overdredge pit of 1.2 mcy and pump sand to onshore/nearshore/offshore placement sites (10 months) Complete North Rios access road improvements and other staging/access area preparation (including site 7 with 5,000 cy of imported earth material)	Again, close dike 2 at high tide to perch water at +6 feet NGVD in central basin and west portion of east basin Clear and grub channel areas in the CB (60,000 cy) Dredge central basin over 7 months - widespread dredging in central basin to overdredge pit (550,000 cy) - construct central basin transitional areas - clear and grub east basin between I-5 and CDFW dike (240,000 cy) Construct dike 4 under I-5 to enable flooding of entire east basin during Phase 3 Release dike 2 and open central basin to tidal action and recovery	Maintain flooding in east basin to +5 NGVD using dike 4 and lower CDFW dike 3 Clear/grub east basin east of CDFW dike (30,000 cy) Dredge east basin (700,000 cy) to overdredge pit (7 months) Construct east basin transitional areas Lower dike 4 under I-5 and open east basin to tidal action and recovery	Build dike 5 and protective dike in west basin (6) Close dike 5 at high tide to flood west basin to +6 feet NGVD Clear/grub west basin (10,000 cy) Dredge channel network in basin to overdredge pit, nest site, and/or littoral cell placement sites Lower dikes, leaving basin and rest of lagoon open to tidal action Clear tidal inlet and channel to design dimensions
Flooding Requirements	After closing central basin dike 2, flood central basin to	Flood central basin for 7 months to allow	Flood east basin for 7 months to +5	Flood west basin to +6 feet NGVD for

	Phase 1	Phase 2	Phase 3	Phase 4
(Elevation and Duration)	+6 feet NGVD for up to 3 months (initiate outside of breeding season) to launch dredge and clear and grub central basin, then drain and complete dredging of overdredge pit for 10 months while lagoon is open to tidal action	shallow dredging; flood east basin between I-5 and CDFW dike for duration of clear and grub (6 months); west basin remains open to tidal action	feet NGVD to allow shallow dredging; central and west basins remain open to tidal action	up to 4 months to allow shallow dredging of west basin; remainder of lagoon remains open to tidal action
Quantity/ Equipment	Clear and grub 25,000 cy with barge and haul trucks Dredge 1.2 mcy with a large dredge Road and staging/access point preparation equipment, such as bulldozers, backhoes, front-end loaders, earthmovers, graders Import of materials for road/staging sites (10,000 cy) Import of 5,000 cy of earthen material for site 7 preparation Import of material for dike construction (up to 50,000 cy)	Clear and grub 300,000 cy with barge and haul trucks Dredge 550,000 cy with smaller dredge(s)	Clear and grub 30,000 cy with barge and haul trucks Dredge 700,000 cy with smaller/mid-size dredge(s); cap pit with up to 130,000 cy of sand from the lower layers, allow room for additional backfill and capping in Phase 4.	Clear and grub 10,000 cy with barge and haul trucks Dredge 50,000 cy with a smaller dredge and place in pit as 50,000 cy of backfill (silts), and/or use sand for nesting site.
Coast Highway 101 Work	Potential retrofit activities for Coast Highway 101 initiated – create detours on roadway and drill pilings for retrofit	Continue Coast Highway 101 retrofit activities	Continue Coast Highway 101 retrofit activities	No work on Coast Highway 101
General Timeline	Winter 2016 – Winter 2017	Winter 2017 – Fall 2018	Fall 2018 – Spring 2019	Spring – Fall 2019

Notes:

1. Mobilization of specific equipment would occur prior to each phase. Activities associated with mobilization/demobilization would not occur within lagoon-sensitive habitats outside the proposed disturbance footprint. Areas within the disturbance footprint may experience vegetation clearing and/or grading.
2. These phases anticipate a start date of January 2016. If the schedule is shifted, restrictions on specific activities (e.g., clear and grub and the initiation of flooding would occur outside the breeding season) would continue to be implemented per Table 2-26.

CDFW = California Department of Fish and Wildlife; cy = cubic yards; I-5 = Interstate 5; mcy = million cubic yards;
 NGVD = National Geodetic Vertical Datum

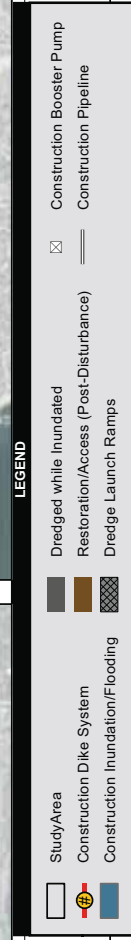
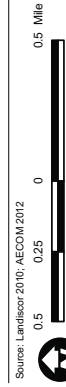
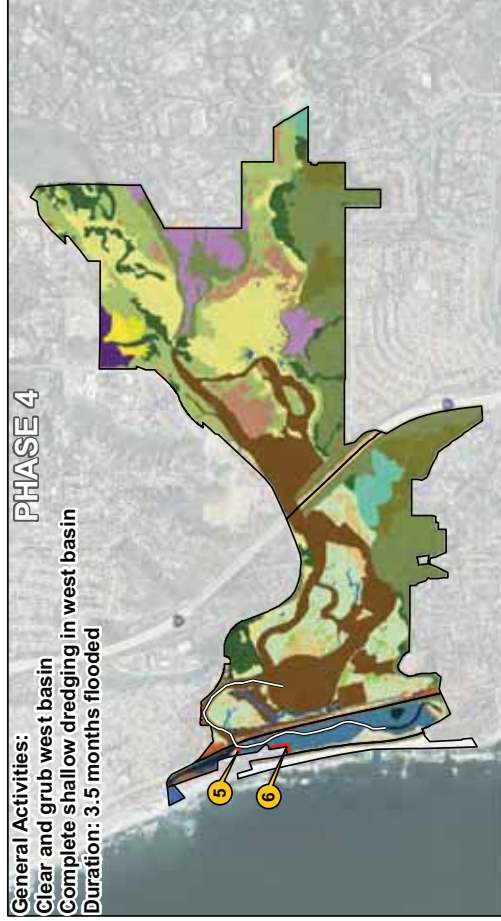
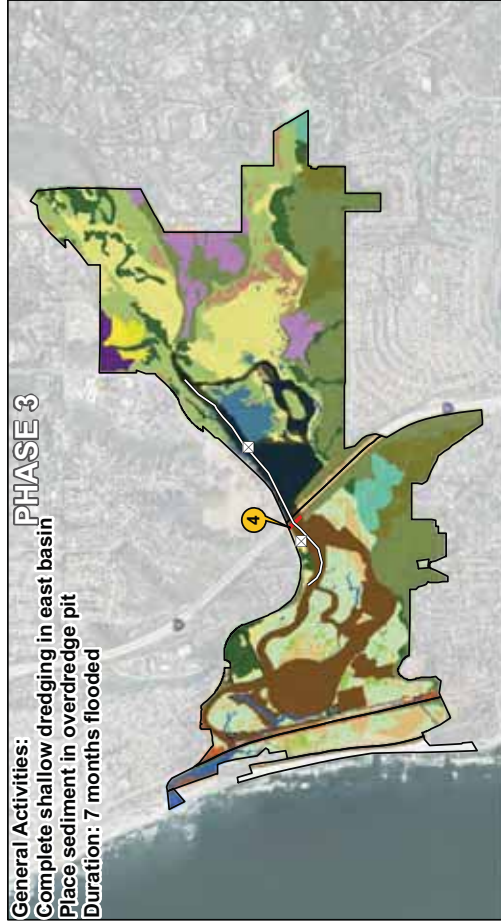
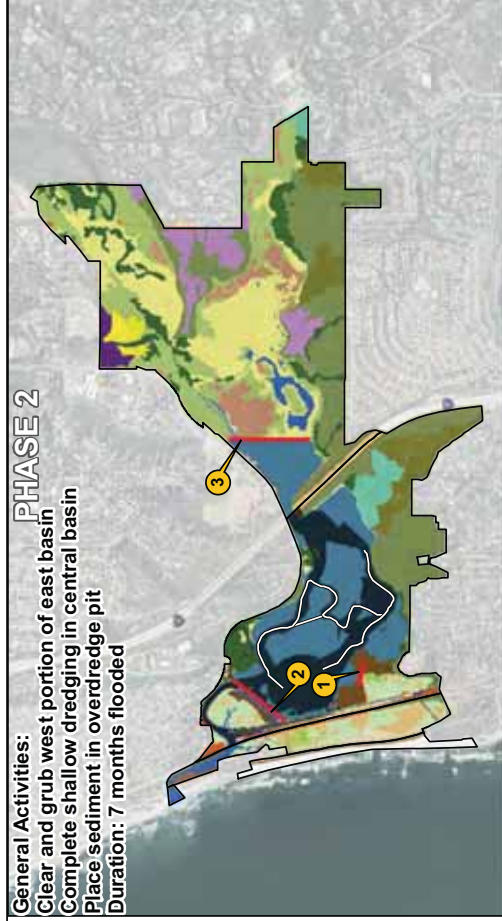
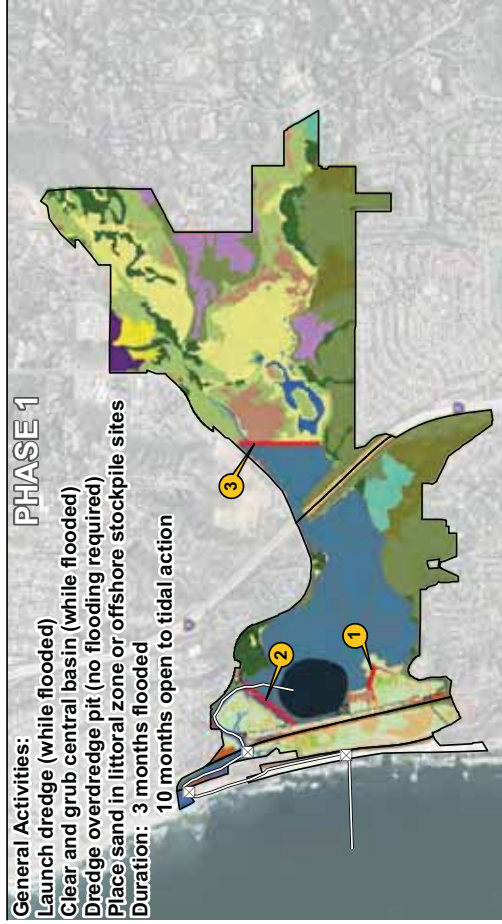


Figure 2-17
Construction Sequence
Alternative 1B

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Similar to Alternative 2A, Alternative 1B would allow for construction of an overdredge pit within the central basin to provide on-site disposal of fine material not suitable for beneficial reuse. Phase 1 would create the pit by removing up to 1.2 mcy from the proposed overdredge pit area in the central basin (underlying the mudflat/channel area shown in Figure 2-17). Similar to Alternative 2A, the overdredge pit size and location have been designed to accommodate material dredged from the lagoon and be located in areas designated for removal of high-nutrient sediments, while minimizing impacts to sensitive habitats to the extent feasible. As with Alternative 2A, work could occur using a cutterhead suction dredge, or similar equipment and sand would be pumped from the lagoon to various placement sites by pipe and/or by a transport vessel located offshore. If the dredge is electric, a small (approximately 10 feet by 10 feet and 8 feet high) temporary on-site electrical substation would be required as described in Section 2.10.2.

Dredging and Flooding Requirements

Similar to Alternative 2A, restoration of the lagoon under Alternative 1B requires dredging an overdredge pit first, with materials placement in various nearby offshore, nearshore, and onshore locations. Creation of the overdredge pit would be followed by shallower dredging of habitat areas, with material disposal into the overdredge pit. The construction approach to create the overdredge pit would be similar to that described for Alternative 2A. Prior to shallow dredging proposed throughout the remainder of the central basin, dike 2 would be closed a second time and the central basin of the lagoon would be flooded to approximately +6 feet NGVD to accommodate a dredge. Similar to the approach described for Alternative 2A, temporary dikes 1 and 2 would be constructed to constrain flooded areas and provide refuge for sensitive resident birds. Dikes would be constructed using existing access roads and material excavated from the lagoon and/or imported from off-site. Approximately 50,000 cy of material would be required to construct the dikes. Earthmoving equipment would utilize existing access roads (e.g., along the railroad) and then begin to construct a raised platform out into the lagoon from those disturbed edges at the proposed locations. Approximately 10,000 cy of gravel would be imported from off-site to improve the internal road network sufficiently to support the work, and 5,000 cy of earthen material may be imported to prepare Site 7 along Manchester Avenue in the central basin.

After flooding the central basin, Phase 2 would dredge approximately 550,000 cy of silts and clays from the flooded area and discharge it into the overdredge pit. A small quantity of material (approximately 35,000 cy) would also be placed at three man-made transitional areas within this basin after dewatering at the former sewage pond site (shown as Site 5 in Figure 2-15). It is anticipated that this work would occur using one or more cutterhead suction dredges. Clearing and grubbing of the east basin west of the CDFW dike would also occur in this phase.

Phase 3 would dredge approximately 700,000 cy of silts and clays from the east basin and discharge it into the overdredge pit, with approximately 10,000 cy being placed at one man-made transitional area after dewatering. Sand from the lower layer of the east basin would cap the overdredge pit with a 3-foot minimum sand cap (up to approximately 130,000 cy). It is anticipated this work would also be completed using cutterhead suction dredges.

Phase 4 would dredge approximately 50,000 cy of silts, clays, and sand from the west basin for use in creating man-made transitional habitat. Silts and clays would be dewatered in the proposed nesting site (site 5 in Figure 2-15) prior to its construction. It is anticipated this work would be completed using a small cutterhead suction dredge. The dredge would then move from the west basin to the tidal inlet channel, and dredge 35,000 cy of sand and pump it to the proposed nest site location to complete that component. Removal of the dikes would also be completed in this phase with a backhoe mounted on a barge or from shore locations using a long-arm backhoe. In addition, two footbridges and a path would be installed over the main channel and the channel just east of the utility road, and along the top of the transition area in the central basin. This path and footbridges would link the visitor center loop trail and the end of the utility corridor road, resulting in a complete loop trail around the central basin. Proposed trail characteristics would include a 4- to 6-foot-wide trail with decomposed granite (2 to 3 inches deep) matching adjacent grade over geotextile and compacted subgrade. In areas where railing may be required, a split three-rail fence would be installed using native, rot-resistant wood or plastic lumber (not wood treated with rot resistant chemicals). Excavating the existing inlet and inlet channel, most likely with land-based earthmoving equipment, to the proposed configuration would be completed as a last task.

Coast Highway 101 Construction Activities

Under Alternative 1B, the existing Coast Highway 101 bridge would be retrofitted by others to increase its seismic stability and correct the existing seismic deficiencies of the structure inlet as fully detailed in Section 2.10.10. Retrofitting of the existing bridge along Coast Highway 101 would last approximately 8 months and could occur at any point in time during the project construction period. Active construction and lane closure along Coast Highway 101 would last approximately 3 months. Retrofit work would likely be phased, and completed under one-half of the existing bridge length while the tidal inlet channel is maintained in position under the other half of the existing bridge. Construction would begin with mobilization of equipment and materials, followed by construction of cast-in-drilled-hole (CIDH) piles, construction of pile caps, and construction of pier walls.

Alternative 1A

Construction Phasing and Sequencing

Table 2-24 illustrates phasing and construction activities associated with Alternative 1A. Construction of this alternative would require approximately 9 months since no overdredge pit would be constructed to provide material suitable for beneficial reuse within the littoral zone. Small volumes of dredged material may be suitable for on-site reuse, but the majority of material would be exported off-site to LA-5 via barge for materials disposal. Figure 2-14 shows potential disturbance limits for Alternative 1A. This alternative would also include retrofitting of the existing bridge along Coast Highway 101, which would occur concurrently with lagoon enhancement work.

Table 2-24
Anticipated Phasing Schedule – Alternative 1A

	Phase 1	Phase 2
Activity	Clear/grub vegetation to be removed along lagoon main channel (if needed); quantity may reach up to 70,000 cy maximum Launch dredge from north end of utility road Dredge in main channel (160,000 cy) and material export/disposal to LA-5	Construct transitional areas Clear tidal inlet and inlet channel to design dimensions and pump sand to nesting area.
Flooding	Not necessary	Not necessary
Quantity/Equipment	Dredge 160,000 cy with a small, medium, or large dredge; 10,000 cy goes to transition area	Dredge 35,000 cy with smaller dredge or equivalent type of equipment
Coast Highway 101 Work	Retrofit activities for Coast Highway 101 initiated – create detours on roadway and drill pilings for retrofit	Continue Coast Highway 101 retrofit activities
General Timeline	Winter 2016 – Winter 2017	Spring 2018

Notes:

1. Mobilization of specific equipment would occur prior to each phase. Activities associated with mobilization/demobilization would not occur within lagoon-sensitive habitats outside the proposed disturbance footprint. Areas within the disturbance footprint may experience vegetation clearing and/or grading.
2. These phases anticipate a start date of January 2016. If the schedule is shifted, restrictions on specific activities (e.g., clear and grub and the initiation of flooding would occur outside the breeding season) would continue to be implemented per Table 2-26.

cy = cubic yards

Small areas would be used for on-site disposal of dredged material to construct the proposed nesting and transition areas (35,000 cy for the nesting area and 10,000 cy for the transition area, respectively). The majority of the material removed from the lagoon would be disposed of offshore at LA-5. Dredging and grading for Alternative 1A would be focused on enlarging the

existing main channel. Limited shallow dredging is proposed, so unlike Alternative 2A and 1B that require extensive flooding of the lagoon basins, no flooding would be required for dredge work for Alternative 1A. Subsequently, no dikes or refugia areas would be needed.

Phase 1 under Alternative 1A would focus on clearing and grubbing the main channel, as needed. The dredge would be launched from the north end of the existing access road within the central basin, and the main channel dredged. Material dredged (approximately 160,000 cy) would be primarily disposed of offshore at LA-5. Phase 2 under Alternative 1A would dredge a small quantity of material (approximately 10,000 cy) to be placed at one man-made transitional area, and 35,000 cy of sand would be placed at the nesting site. It is anticipated that this work would occur using a cutterhead suction dredge. This phase would also clear the tidal inlet and inlet channel to the design dimensions and pump sand to the nesting area.

Coast Highway 101 Construction Activities

Similar to Alternative 1B, no new inlet would be required under Alternative 1A. The existing bridge along Coast Highway 101 would be retrofitted for current seismic deficiencies, however, as described under Alternative 1B. Identical construction methods, equipment, and schedule would be used for Coast Highway 101 retrofitting under Alternative 1A as detailed under Alternative 1B. See Table 2-24 for the general construction timing under Alternative 1A.

2.10.2 CONSTRUCTION EQUIPMENT MOBILIZATION AND DEMOBILIZATION

Construction equipment and support items need to be mobilized, or brought, to the site for construction. The ultimate selection of construction equipment would depend upon the availability of equipment to the contractor at the time of construction. In addition to typical generalized construction equipment, potential equipment anticipated for construction of the SELRP includes the following:

- diesel-powered dredge
- electric-powered hydraulic cutterhead suction dredge as an option
- Up to 10,000 feet of steel pipe (e.g., 40-foot-long segments)
- Up to four booster pumps to transfer material to adjacent onshore, nearshore, and offshore stockpile areas (SO-6)

Typically, equipment would arrive by truck and enter the site through designated construction access points. Rock for CBFs and internal lagoon revetments may be brought over on a barge from Catalina Island to an existing dock yard at the Port of Los Angeles or San Diego and then transported south on I-5 via trucks to the project site. Alternatively, rock for the project may be

delivered by trucks from quarries located in various locations, including Chula Vista and Corona, approximately 30 and 70 miles from the project site, respectively. Up to 60,000 cy of rock, weighing approximately 120,000 tons, could be required for channel and structure protection throughout the site, depending on the alternative selected.

Dependent upon contractor equipment selection, an electric dredge may be used and facilities for electrical power would be provided in the form of a small temporary on-site electrical substation. If necessary, the temporary electrical power site would be located north of the proposed nesting area and within staging area #5. The electrical power site would connect into existing poles and transmission lines adjacent to railroad tracks and would not require permanent new transmission infrastructure. A temporary pole may be necessary between the existing transmission lines to feed the power site. Electrical equipment would be contained within an enclosed metal structure, approximately 10 by 10 feet and 8 feet high. The small enclosure could be painted or fenced. The electrical equipment and enclosure would be removed at completion of construction.

Equipment mobilization could require up to 6 months due to the need for a dredge and associated materials (e.g., discharge pipe). It is anticipated that the initial 2 months would primarily include setting up a trailer on the site and establishing off-site management requirements. After that date, site and access preparation, dredge assembly, and some clear and grub activities would be initiated. Equipment and materials delivered to the site would be staged at designated areas over the duration of their use. Equipment demobilization would occur when construction is complete, and/or when the use of a particular piece of equipment is no longer needed. Equipment demobilization after project completion is typically relatively short as the contractor removes equipment from the site via designated access routes/points.

Alternative 2A

This alternative requires use of multiple suites of equipment for the various project components of dredging, earthwork, and roadwork. Each is listed below. Mobilization for this project would require approximately 6 months total.

Large-scale dredging equipment would be brought to the site, including a 24- to 26-inch dredge, discharge line (10,000 linear feet), crew boat, temporary dock and launch ramp, crane, front end loader, booster pumps (two to four), discharge barge, tug boat, survey boat, fueling drums, electrical power supply equipment, and a clamshell dredge or long-arm backhoe for rock placement along channels (if needed).

Earthwork would require multiple long-arm backhoes, excavators, large off-road trucks, scrapers, and bulldozers.

Roadwork would require demolition equipment such as a pile driver, crusher operation, pneumatic breaker, dump trucks, bulldozers, motor graders, front end loaders, cranes, concrete and asphalt placement equipment (pavers and rollers), a water truck, and forklifts. Crew size could range from five to 15 workers.

On-site materials disposal would utilize equipment described above for the lagoon enhancement component. Off-site materials disposal for Alternative 2A could include placement onshore, nearshore, and/or offshore at Cardiff and onshore placement at other coastal sites. Equipment required for materials transport and placement includes ocean-based equipment such as a monobuoy, pipeline, booster pumps, a barge, tug boat and work boat. Beach working equipment would also be required, including bulldozers, temporary lighting, and a temporary trailer. At other potential beach placement sites, equipment could include the same items.

Alternative 1B

Alternative 1B also requires use of multiple suites of equipment for the various project components of dredging and earthwork. Each is listed below. Mobilization for this project would require up to 6 months.

Large-scale dredging equipment would be brought to the site, including a 24- to 26-inch dredge, discharge line (10,000 linear feet), crew boat, temporary dock and launch ramp, crane, front end loader, booster pumps (two to four), discharge barge, tug boat, survey boat, fueling drums, electrical power supply equipment, and a clamshell dredge or long-arm backhoe for rock placement along channels (if needed).

Earthwork would require multiple long-arm backhoes, excavators, large off-road trucks, scrapers, and bulldozers.

Roadwork and retrofitting activities would require equipment including cranes with drill attachment, concrete mixer trucks, boom pump trucks, loaders, work trucks, forklifts, 10,000-gallon storage tank, and slurry recirculation pump. Crew size could range from five to 15 workers.

Similar to Alternative 2A, on-site materials disposal would utilize equipment described above for the lagoon enhancement component. Off-site materials disposal for Alternative 1B could include placement onshore, nearshore, and/or offshore at Cardiff and onshore placement at other coastal sites. Equipment required for materials transport and placement includes ocean-based equipment such as a monobuoy, pipeline, booster pumps, a barge, tug boat, and work boat. Beach working

equipment would also be required, including bulldozers, temporary lighting, and a temporary trailer. At other potential beach placement sites, equipment could include the same items.

Alternative 1A

This alternative involves a smaller range of construction approaches and therefore requires use of less equipment for project construction. Mobilization for this alternative would require 3 months.

Mid- to small-scale dredging equipment, including a 10- to 24-inch dredge, discharge line (10,000 linear feet), crew boat, temporary dock and launch ramp, crane, front end loader, booster pumps (two minimum and four maximum), discharge barge, tug boat, survey boat, fueling drums, electrical power supply equipment, and a clamshell dredge or long-arm backhoe for rock placement along channels (if needed).

Earthwork would require multiple long-arm backhoes, excavators, large off-road trucks, scrapers, and bulldozers.

The retrofitting of the Coast Highway 101 bridge structure would be the same for Alternative 1A as described for Alternative 1B. Crew size could range from five to 15 workers.

Under Alternative 1A, the majority of material dredged and excavated from the lagoon would be exported offshore to LA-5. Equipment for off-site materials disposal would be focused at Cardiff State Beach and would include ocean-based equipment such as a monobuoy, pipeline, booster pumps, a barge, tug boat, and work boat.

2.10.3 SITE PREPARATION

Site preparation would be initiated during the mobilization period. The project site would be prepared for construction by first surveying and staking the construction area and locations of particular features. Once the project is delineated, “no construction” zones such as sensitive environmental areas would be cordoned off. Specific contractor use areas may also be constructed within identified staging areas, such as laydown pads for staging dredge discharge pipe segments, an electrical power station, and a dredge launch ramp. Installation of a water level control system between the ocean and the lagoon to allow active water level management during dredging activities would also occur, as appropriate. Clear and grub of focused areas of vegetation would also be initiated during site preparation, both onshore and within the lagoon basins.

Alternative 2A

To prepare the site for construction under Alternative 2A, the contractor would create a dredge launch ramp north of the westernmost former sewage pond and place a temporary dock, clear a laydown area, prepare a fueling site, bring a trailer on-site, mobilize the dredge discharge line, install a temporary electrical supply site, clear a parking area, and prepare a project office (trailer). A permanent dredge launch site would be installed at this location to provide for inlet and channel maintenance dredging in the future. The permanent ramp would be approximately 30 feet wide and would likely be constructed of dirt covered with a layer of gravel. Additional scour protection would be incorporated, as needed.

Alternative 1B

As with Alternative 2A, the contractor would create a dredge launch ramp north of the westernmost former sewage pond and place a temporary dock, clear a laydown area, prepare a fueling site, bring a trailer on-site, mobilize the dredge discharge line, install a temporary electrical supply site, clear a parking area, and prepare a project office (trailer). A permanent dredge launch site would be constructed at the north end of the utility road under this alternative to provide for channel maintenance dredging in the future. The permanent ramp would be approximately 30 feet wide and would likely be constructed of dirt covered with a layer of gravel. Additional scour protection along the main channel would likely be required to protect the ramp since it is located where flow velocities are relatively high.

Alternative 1A

For Alternative 1A, the contractor would create a dredge launch ramp at the north end of the utility road to provide for both launching the dredge for construction, as well as for channel maintenance dredging into the future. Similar to 1B, the contractor would also perform other mobilization activities such as clear a laydown area, prepare a fueling site, bring a trailer on-site, mobilize the dredge discharge line, clear a parking area, and prepare a project office (trailer). The permanent ramp would be approximately 30 feet wide and would likely be constructed of dirt covered with a layer of gravel. Additional scour protection along the main channel would likely be required to protect the ramp since it is located where flow velocities are relatively high.

2.10.4 WET AND DRY CONSTRUCTION METHODS

Various methods may be employed to construct the project. Construction methods are largely grouped under the two different types: land-based construction “in the dry” and water-based construction “in the wet.” Different constraints are associated with each type of construction, so

a combination of approaches is anticipated for the SELRP. Wet construction would require flooding areas that can be diked off to provide adequate water depths to float a dredge over portions of the site proposed for shallow dredging. Dry construction in areas with typically wet conditions is difficult due to extremely soft soils that can limit access for equipment with wheels or tracks; thus, dry construction would typically be restricted to areas around the perimeter of the lagoon that can be reached from shore (e.g., within 50 feet of existing disturbed area), adjacent to existing access roads and dry areas, while wet construction would focus on those areas in sensitive habitats that are not proposed for direct grading and the interior of the lagoon basins. A brief description of each construction approach is provided below.

Wet Construction

Wet, or water-based, construction uses equipment in areas inundated during construction. Water-based construction methods can (1) minimize or eliminate site dewatering, and (2) be more environmentally sensitive because construction of access roads and direct grading/compaction of existing habitat areas in the interior of the lagoon are not required. Site dewatering at a lagoon connected to the ocean experiencing daily tides may not be practical. Also, less intrusion onto vegetated areas is required with a dredge compared to land-based equipment (i.e., trucks, earthmovers), which may result in less site damage. Wet construction approaches have specific limitations as well. Since dredges need to float over the area they are accessing, a minimum amount of water depth must be maintained within portions of the lagoon while dredging is occurring. A typical small dredge has a draft (extends below the water surface) of approximately 5 feet. Therefore, to float a dredge over an area, water depth needs to be maintained at approximately 5.5 to 6 feet. In some areas where ultimate depths would exceed 5 feet below grade, normal tidal fluctuations may maintain adequate depth to allow the dredge to work. In areas where ultimate depths would be in less than 5 feet of water, additional water would need to be temporarily impounded in the lagoon to maintain adequate depths for the dredge to work. To achieve sufficient water depth within the lagoon, flooding would occur in specific areas to allow the dredge to make shallow (less than 5-foot) cuts in the lagoon bottom, up to +6 feet NGVD.

Specific constraints would be implemented during wet construction for all alternatives to minimize impacts to sensitive wildlife (e.g., birds). Construction of temporary dikes to create refugia for wildlife during inundation would occur prior to flooding in the central basin to protect habitat throughout construction from both direct impacts associated with grading and/or dredging and indirect impacts due to extended inundation. Flooding in areas designated for inundation as shown in Figures 2-16 and 2-17 would be initiated prior to the breeding season and maintained. Once flooding is allowed to recede, flooding would not be reinitiated in the breeding season. Any area serving as refugia would also be reintroduced to tidal action outside of the breeding season. Additional general project design features have been incorporated into each of the project

alternatives that would minimize effects to other resources, such as water quality, as appropriate. The specific measures described above and these more general measures are identified in Table 2-26 at the end of this section.

Wet construction in lagoons typically relies on dredging equipment, such as hydraulic cutterhead suction dredges, long-arm backhoes mounted on barges, drag-lines, clamshell bucket dredges, and barge-mounted fluidizer pumps. It is anticipated that one or more cutterhead section dredges would be used to construct the SELRP, although specific equipment would be determined by the contractor.

Alternative 2A

Flooding under Alternative 2A\ would be required during dredging of the proposed secondary channels as well as low-marsh and mudflat areas in the central basin, east basin, and west basin. Basins could generally be flooded separately to limit concurrent flooding of sensitive species habitats. Flooding in the central basin and west portion of the east basin could last up to 3 months during Phase 1, and 7 months during Phase 2. Flooding of the east basin would also last up to 7 months during Phase 3, and flooding of the west basin would be less than 4.5 months in Phase 4. Dikes would be constructed in multiple locations to limit flooded areas in the central basin and provide wildlife refugia. Flooding in the east basin would be initially limited by the existing CDFW dike that would be left in place until completion of Phase 3, then a dike would likely be placed at the I-5 bridge crossing during Phase 3 east basin dredging.

Wet sandy material from the overdredge pit created in the central basin would primarily be discharged off-site at an approved placement site, while wet silty/clayey material from the remainder of the site would be generally disposed of on-site in the overdredge pit that would be constructed in the central basin. A small amount of sand would be reused at the proposed nesting site in the central basin, and a small quantity of silts/clays could be reused on-site for construction of man-made transitional areas. Some material could also be used for aggregate during Coast Highway 101 bridge and roadway construction.

Alternative 1B

Flooding under Alternative 1B would also be required during dredging of the proposed secondary channels as well as the low-marsh and mudflat areas in the central basin, east basin, and west basin. The basins would be diked off and flooded separately to limit concurrent flooding of sensitive species habitats, similar to Alternative 2A. Flooding in the central basin and west portion of the east basin could last up to 3 months in Phase 1, and 7 months during Phase 2. Flooding of the east basin could also last up to 7 months during Phase 3, and flooding of the west

basin would be less than 4.5 months in Phase 4. Dikes would be constructed to limit flooded areas in the central basin, while flooding in the east basin would initially be limited by the existing CDFW dike that would be left in place until after Phase 3 is complete. A dike would then be placed at the I-5 bridge crossing during Phase 3 east basin dredging.

Wet sandy material from the overdredge pit created in the central basin would primarily be discharged off-site at an approved placement site, while wet silty/clayey material from the remainder of the site would be generally disposed of on-site in the overdredge pit. A small amount of sand would be reused at the proposed nesting site in the central basin, and a small quantity of silts/clays could be reused on-site for construction of man-made transitional areas.

Alternative 1A

Flooding would not be required under Alternative 1A, which would focus dredging activity in channels within the lagoon that generally exceed 5 feet in depth and do not require additional water to dredge those areas.

As discussed in Section 2.9, Alternative 1A would not provide material of suitable quality for reuse within the littoral zone. As a result, material dredged as part of that alternative would be used either on-site (e.g., 10,000 cy at man-made transitional areas, 35,000 cy of sand at the nesting site) or would be disposed of at LA-5.

Dry Construction

Dry, or land-based construction within lagoons typically uses earthmoving equipment accessing a site from the beach, shore, or access roads into the site. For all alternatives, the SELRP envisions only a modest amount of dry construction compared to wet construction. Due to the sensitive habitat within San Elijo Lagoon and the extremely soft soils, construction of access roads for dry construction would be restricted to the shoreline in the vicinity of existing roads (i.e., utility roads in the central and east basins) or areas proposed for grading. Dry construction would likely include clearing tules and other emergent aquatic vegetative growth along the edges of the central and east basins to prepare the site for dredging, and excavation under Coast Highway 101 for the proposed tidal inlet.

2.10.5 SITE ACCESS AND STAGING AREAS

Site Access

The access points for each alternative, illustrated in Figure 2-15, are generally sited at existing access points and existing disturbed areas. According to basin, the general anticipated access points include:

- west basin – off Coast Highway 101, both north and southbound lanes
- central basin – from the north end of North Rios Avenue in Solana Beach to the on-site utility road at the south side of the lagoon, and from Manchester Avenue at the north side of the lagoon
- east basin – from the north end of Santa Ynez Street in Solana Beach to the on-site utility road at the south side of the lagoon, and from Manchester Avenue at the north side of the lagoon

Larger pieces of equipment, such as dredges, may be transported to the site on trucks during the late evening to early morning hours (between 9 p.m. and 6 a.m.) to minimize potential traffic disruption. The inlet and Coast Highway 101 bridge construction equipment and materials are anticipated to arrive via I-5 to Coast Highway 101.

The access road from North Rios Avenue in Solana Beach to the central basin utility road would require some vegetation clearing, grading, and fill with earth and gravel to widen the road to accommodate construction and maintenance vehicles and equipment. Road improvements would occur on both sides of the hillside access road, resulting in less than 5,000 cy of earth moved. Improvements may also occur lower along the access road and may require up to an estimated 10,000 cy of gravel. The road would require periodic maintenance and dust control by the contractor throughout construction, and would retain improvements after construction.

A permanent access and staging pad is proposed along Manchester Avenue in the central basin. This site would be constructed by importing 5,000 cy of earth from off-site and would be used for construction purposes and for permanent access and maintenance.

Temporary staging and stockpile areas would be returned to pre-construction conditions after the completion of construction. Photographs of the site would be taken and wetland vegetation would be mapped prior to construction. Permanent access and staging areas would remain in place after construction to allow for periodic maintenance and adaptive management activities.

During construction, protection of existing utilities and public safety would occur. A pre-construction survey, mapping of utility lines, mobilization of land-based equipment, and construction of access routes and staging areas for the project would be completed under each of the alternatives. Public safety protection measures would be incorporated, including the use of barriers, signs, flagmen, and fences where applicable. Temporary lighting may also be required during nighttime activities such as dredging and materials delivery. Lighting would be downshielded to minimize light spillover into adjacent habitat and residential areas. These measures are identified in Table 2-26 and would be implemented throughout the construction period, as appropriate, to protect public safety within the lagoon and materials placement/disposal sites.

Specific site information is provided in Table 2-25. This table also provides information on which alternatives are anticipated to require use of each of the different sites. Alternative 2A would utilize all of the proposed access points shown in Figure 2-15, while Alternative 1B would utilize all sites except site 4, and Alternative 1A would not use sites 6, 4, or 2.

Alternative 2A would also require removal and relocation of one pole supporting overhead power lines located directly east of the existing railroad track. Alternative 1B and Alternative 1A would not require the removal of utility poles.

Table 2-25
Staging Areas

Staging Area ID No.	Description	2A	1B	1A
West Basin - Accessed from Coast Highway 101				
1	This beach staging area is required to stockpile and distribute construction materials onto Cardiff State Beach for all alternatives. Disposing of materials to the nearshore zone via hydraulic dredge would require electric power at this location for a temporary booster station needed for conveying the slurry material between the lagoon and the ocean. This staging area would also provide access for a backhoe or a bucket and a crane to mechanically excavate the inlet channel to the desired contours. Dredge discharge pipe may also be staged at this location, as well as quarry stone for the cobble blocking features (CBFs) and internal revetments. All alternatives would station a booster pump at this site for the entire duration of dredging sand from the lagoon to the ocean. - Alternative 2A would use the site to store dredge pipe before and after dredging, for a period of approximately 2 months total. Earthmoving equipment would also be staged on this site intermittently over the project construction period. Rock for CBF materials would be staged on this site for approximately 2 months. - Alternative 1B would use the site to store dredge pipe before and after dredging, for a period of approximately 2 months total.	X	X	X

Staging Area ID No.	Description	2A	1B	1A
	Earthmoving equipment would also be staged on this site intermittently over the project construction period. Rock for revetment materials would be staged on this site for approximately 2 months. Alternative 1A would use the site to store dredge pipe before and after dredging, for a period of approximately 1 month. Rock for revetment materials would be staged on this site for approximately 2 months.			
2	This tidal inlet staging area (Alternative 2A and Alternative 1B) is also suitable for the same equipment and materials to be staged at site 1. This site could also serve as the transition point for an onshore pipeline discharging material to extend offshore to a discharge pipe or monobuoy.	X	X	
3	The existing tidal inlet channel staging area is suitable for quarry stone for the CBFs and internal revetments.	X	X	X
4	The sedimentation basin staging area (Alternative 2A only) is also suitable for the same equipment and materials to be staged at sites 1 and 2.	X		
Central Basin – Accessed from North Rios Avenue and from Manchester Avenue				
5	The former sewage ponds staging area is suitable for the same equipment and materials to be staged at sites 1 and 2. This staging area may be the best location to assemble the dredge due to its relatively large footprint. A small power panel and a dredge launch site would be constructed at the north end of the westernmost former pond. This would facilitate use of an electric dredge and a launch ramp for dredges to construct and maintain the lagoon in the future. This staging area would provide access for assembling and launching dredges from trucked-in components, and would include a yard fuel supply, parking area, office, dock (or platform to tie up the dredge and/or crew boat), and an access dock with a shore-based crane. Temporary power and water would be provided at this location by accessing existing infrastructure located along the access road. Water could be delivered by truck if there is not a water line already in the vicinity. Overhead power exists near the city sewer pump station and would potentially be tapped into for this project.	X	X	X
6	The existing southern access/overlook point (6) would eventually be filled and raised with lagoon material to create a transitional habitat area and, therefore, would be highly disturbed. As such, during construction this site can be leveled and used to stage various types of equipment and materials.	X	X	
7	The site along Manchester Avenue is directly across from the onramp to Interstate 5 south and is suitable for access and staging for clearing and grubbing, and for various pieces of equipment and materials.	X	X	X
East Basin – Accessed from Santa Ynez Street and Manchester Avenue:				
8	The existing utility access road would be available for staging certain equipment and materials that can fit onto the narrow and long surface. This site is only conditionally available if work on the I-5 bridge replacement project has not been initiated or has already been completed. Shared access may also be appropriate as part of the coordinated CM/GC approach anticipated for implementation of the SELRP.	X	X	X
9	The existing dike would be used for staging certain equipment and materials that can also fit onto the narrow and long surface.	X	X	X
10	The existing frontage road near Mira Costa College would be used for staging equipment and materials that can be transported to the lagoon as needed.	X	X	X

Staging Areas and Parking

Potential staging areas for construction access to the project site and storage of equipment and materials are shown in Figure 2-15, and Table 2-25 indicates which sites would be used for each alternative. Each site is identified in the figure by number, corresponding to the discussion in Table 2-25. It is anticipated that construction of the project would require a minimum of two staging areas to serve each lagoon basin, as shown, with the possibility of optional areas depending upon the alternative grading/dredge plans selected for construction.

Daily traffic would consist of personal vehicles owned by construction and construction management personnel, various inspectors, and other representatives from the various agencies and property owners involved with the project (a maximum of 20–40 people per day). Potential parking areas have been identified, including:

- San Elijo State Beach parking lot
- Coast Highway 101 south of the Chart House
- Old sewage basin staging area (within the lagoon)
- Frontage road by Mira Costa College
- Via Pico
- Farin property along Manchester Avenue
- I-5 off-ramp lot
- I-5 and LOSSAN shared right-of-way (ROW) areas
- Cardiff State Beach parking lot

It is anticipated that workers may park at various approved parking areas and then be shuttled to their positions on-site. The contractor would obtain permission or authorization as necessary.

The contractor would contact the appropriate local agency to obtain water and power supplies. Power would be supplied by temporary tie-ins to the existing SDG&E lines and uses would range from power for the construction trailer to power for the dredge. Water would be supplied via temporary connections from the closest water district to each laydown area, which could include the Olivenhain Municipal Water District or San Dieguito Water District.

2.10.6 CLEAR AND GRUB OF VEGETATION

Prior to dredging and grading, specific areas would be cleared of vegetation and the uppermost soil layer in a process called clear and grub. Clear and grub activities would generally occur at areas to be excavated and graded using earthmoving equipment, where accessible. This material

would be exported from the site using trucks hauling it along access roads to disposal sites such as the Miramar Landfill. Clearing of vegetation may also be needed at open water areas proposed for dredging that are filled with high-profile emergent aquatic vegetative growth. This material may be cleared using a backhoe mounted on a barge that removes the material and places it into a second barge. The second barge would transport the material to the shore, then would travel back to the clear and grub site. Vegetation removed would be offloaded along the shore and then hauled to a disposal area off-site. Site 7 along Manchester Avenue west of I-5 would be used for off-loading vegetation removed from the lagoon. Some material may require drying at stockpile sites (staging areas) prior to being hauled off-site. Approximately 365,000 cy of material is anticipated to be removed from the site during clear and grub activities, with 85,000 cy removed from the central basin (60,000 cy from the channel areas and 25,000 cy from the overdredge pit), 270,000 cy from the east basin (240,000 cy from the area west of the existing CDFW dike, and 30,000 cy from the area east of the dike), and 10,000 cy from the west basin. While the majority of vegetation and soil material removed during this clearing process is anticipated to be trucked off-site to a landfill, limited stockpiling of topsoil may occur to cap graded areas proposed to be restored with wetland habitats. In addition, mulching of some “green waste” may occur to allow on-site reuse as appropriate and to reduce off-site hauling. Any clear and grub of sensitive habitat would be restricted to outside the bird breeding season, as identified in Table 2-26.

2.10.7 TRANSITIONAL AREAS/ON-SITE FILL

Each of the project alternatives proposes the use of dredge material on-site for the construction of man-made transitional areas and as fill (e.g., nesting area). Transitional areas would be constructed in various locations within the lagoon basins to augment the existing band of habitat surrounding the lagoon and provide additional refugia to species under future sea level rise. Material for creating transitional areas would be pumped into the east side of the former sewage pond (e.g., proposed nesting area) to dewater. Material would be drained, dried, and stockpiled for subsequent use. The capacity of the former sewage pond at any one time is approximately 30,000 cy of material. In addition, a portion of this material may be used temporarily to create the dikes used for the refugia areas.

Alternative 2A

The capacity of the former sewage pond is sufficient to provide material for Coast Highway 101 (approximately 10,000 cy) and more than half of the volume for the proposed transitional habitat areas (total needed quantity is 35,000 cy in the central basin). This material would be provided during Phase 1 or 2 dredging. The remaining 10,000 cy volume needed for the transitional areas would be provided by a second period of dewatering during Phase 2 or 3 dredging.

Transitional habitat areas would be constructed by either hauling or barging material (depending on their location) from the dewatering site. Two of the three transitional areas to be constructed are located adjacent to the access/utility road extending from the north end of North Rios Avenue down into the lagoon from the south. These two sites, one located along the south edge of the central basin, and one in the northwest portion of the central basin, can be accessed by truck or barge. For work within the northern part of the central basin, work would be timed to be done prior to creation of the subtidal area connecting the central and west basins under the rail line, because the utility road would be eliminated at that stage of construction. Finish grading may be done at this site using bulldozers. The third transitional area is located in the southern portion of the central basin but is surrounded by habitat, and would be accessed by water using a barge and crane to place material in the central basin.

Alternative 1B

As described for Alternative 2A, wet material would be dewatered and staged at the former eastern sewage pond site. This site would stage fill for the transitional areas in two phases, as described above. Construction of transitional areas would be similar to Alternative 2A, as described above. Transitional areas under Alternative 1B could be filled at any time during construction, however, since the utility road would remain through completion of the project.

Alternative 1A

Alternative 1A would involve much less material dewatering and rehandling due to its limited extent of change to the existing lagoon. Only 10,000 cy of material would need to be dewatered and hauled to the proposed transitional area in the northwest portion of the central basin. Only a single dewatering phase is needed, and conveyance could occur by truck along the utility road.

2.10.8 NESTING AREA

After utilizing the former sewage pond as a dewatering basin for dredged material, it would be finished as a nesting area for sensitive birds under each of the alternatives. Sand would be used to fill the eastern half of the former sewage pond up to an elevation of +13 feet NGVD to create the 2-acre nesting site, which would then be topped with crushed shell. Material would be allowed to drain and dry sufficiently for earthmoving to occur using bulldozers to sculpt the site to the appropriate template for use by birds. This site would take up to 35,000 cy of sand to reach its final grade.

Alternative 2A

To build the nest site, sand would be dredged from the west basin and either pumped in from the dredge or driven by truck to the site from Solana Beach.

Alternative 1B

At the end of dredging for restoration, sand would be dredged from the tidal inlet channel and either pumped or driven by truck to the nest site for its creation.

Alternative 1A

Sand dredged from the tidal inlet channel would be either pumped to the nest site or driven by truck to the site and placed.

2.10.9 CHANNEL AND BRIDGE STRUCTURE ARMORING

Each of the alternatives would increase channel cross sections under existing and/or proposed bridge structures. These structures, as well as adjacent channel banks, would require protection using riprap and/or articulated block mats. Access areas for periodic maintenance into the future would also require protection, depending on their location in the lagoon (e.g., permanent dredge launch ramp and access sites along Manchester Avenue).

Riprap would “wrap” around the base of each abutment and extend at least 100 feet upstream and downstream from each abutment. Some reaches near bridges have existing riprap that would be left in place and integrated into new riprap to provide a continuous reach of shore protection under each bridge. The riprap stone would be approximately 1- to 2-ton stone approximately 3 feet in diameter. Riprap exposed to the ocean would need to be larger, approximately 4 feet in diameter, due to larger forces in the ocean. Riprap would be brought to the site by truck and lifted into place using a crane with a long reach. It is anticipated that riprap would be stockpiled at various sites around the lagoon, including sites 1 and 3.

Alternative 2A

Existing structures to remain in place under Alternative 2A include the existing railroad crossing, although an additional railroad bridge would be constructed by others farther south to span the new inlet location. Other existing infrastructure proposed to be replaced/modified by others (I-5 and railroad) would incorporate appropriate protection into design, based on the owners’ design standards. As part of the project, the SELRP would construct a Coast Highway 101 bridge

structure farther south than the existing crossing to span the new proposed inlet location. This structure would incorporate appropriate scour protection into design as well. The existing railroad crossing would not require additional riprap protection. The permanent dredge launch ramp proposed just north of the nesting area and permanent sites identified for periodic future maintenance access would also require protection. Approximately 60,000 cy of riprap or other protection would be required under Alternative 2A.

Alternative 1B

Alternative 1B would retain the existing lagoon inlet location, and the channel extending between Coast Highway 101 and the railroad bridge would require protection. This measure is to protect the channel from erosion due to higher tidal flow velocities caused by the increased tidal prism. Armor stone would be stockpiled and used by the contractor to armor the existing tidal inlet channel during construction. Riprap armor stone would be placed along the west sides of the existing tidal inlet channel from Coast Highway 101 (existing protection along the east side would remain in place). The existing railroad crossing and proposed dredge launch ramp would also require additional riprap protection along the main channel. Permanent sites identified for periodic future maintenance access would also be protected. In addition, protection for the two proposed footbridges and foot path in the northwest portion of the central basin would be required. Alternative 1B would require approximately 60,000 cy of riprap.

Alternative 1A

Alternative 1A would retain the existing lagoon inlet, and the channel extending between Coast Highway 101 and the railroad bridge would require protection similar to Alternative 1B. The existing railroad crossing and proposed dredge launch ramp would also require additional riprap protection along the main channel. Permanent sites identified for periodic future maintenance access would also be protected. Overall, approximately 60,000 cy of riprap would be required for Alternative 1A.

2.10.10 COAST HIGHWAY 101 BRIDGE CONSTRUCTION OR RETROFIT

Alternative 2A

Under Alternative 2A, a new Coast Highway 101 bridge would be constructed over the new inlet as described below.

Coast Highway 101 Construction Activities and Schedule

Construction on Coast Highway 101 associated with Alternative 2A would be initiated in Phase 1 and would last approximately 18 months. The Coast Highway 101 bridge construction detour and bridgework would occur concurrently with dredging of the central basin during Phase 1, including placement of bank protection around new bridge abutments and the fill supporting the new highway alignment and bed scour protection under the proposed bridge (all likely to consist of rock revetment material). Figure 2-5 illustrates the proposed construction approach for the new bridge structure. Work on the west and east halves of the roadway would be conducted sequentially. After the temporary detour is constructed, demolition and pile installation would commence on the other half of the existing Coast Highway 101. The remaining half of the new bridge would be constructed, followed by a final joint pour between the two deck structures.

The new bridge would be built sufficiently high to provide for the appropriate elevation to clear potential storm and tide water levels. Adjacent stretches of the highway would be raised substantially to transition to the higher bridge structure, as shown in Figure 2-5. The highway approaches to the new bridge would be 6 to 8 feet higher than the existing highway at those locations. Approximately 10,000 cy of fill would be required to build the bridge approaches.

Access between the staging area (site 5 in Figure 2-15) and Coast Highway 101 would occur via a haul road extending between the dredge launch site (near the former sewage pond) through the proposed subtidal basin footprint and under a new LOSSAN railroad bridge location to Coast Highway 101. This assumes that the LOSSAN railroad double-tracking project would occur concurrently, as has been indicated by SANDAG in project coordination meetings. The haul road would pass under the new proposed rail bridge and through the west basin to Coast Highway 101. The southern portion of the west basin may need to be closed to the tide at this point (at low tide, leaving the basin relatively dry and still providing refugia for species during flooding in other basins). A dike could be constructed toward the south end of the basin, or the haul road itself could serve as a dike preventing water flow to the southern end of the basin (dike 7 in Figure 2-15). Close coordination with the rail bridge contractor would be required throughout this phase of the project. The portion of the existing Coast Highway 101 roadway within the bridge construction area not open to travel would be demolished and pavement processed into aggregate and reused for road base and asphalt. Remaining construction of the Coast Highway 101 bridge and bridge approaches would occur in Phases 2 and 3. Construction of the new Coast Highway 101 bridge structure would be completed before opening the new tidal inlet, and work would be completed using dry construction techniques. The existing Coast Highway 101 bridge would remain.

Traffic Modifications during Coast Highway 101 Construction Activities

All traffic would be detoured onto a temporary surface of the road on one-half (two lanes) of the existing Coast Highway 101 bridge. One side of the new bridge would be constructed and poured first, while traffic would use the other half of existing Coast Highway 101 to maintain continual access in both directions. Once one side of the new bridge is completed, traffic would then be shifted to the side of Coast Highway 101 with the new bridge while the remaining half of the new bridge would be constructed.

Alternative 1B

Under Alternative 1B, the existing Coast Highway 101 bridge would be retrofitted to increase its seismic stability.

Coast Highway 101 Retrofit Activities and Schedule

Retrofitting of the existing bridge along Coast Highway 101 would be implemented by others and would last approximately 8 months. This work could occur at any point during the restoration project construction period prior to clearing of the tidal inlet channel (anticipated to be a Phase 4 action), so the contractor may choose to delay initiating work along the roadway to another phase. The work would necessitate managing the tidal inlet location to allow retrofit work to be done in dry conditions. Retrofit work would likely be phased and would be completed under one-half of the existing bridge length (e.g., either the south or north end) while the tidal inlet channel is maintained in position under the other half of the existing bridge. When first phase work is complete, the tidal inlet channel would be moved under the other half of the existing bridge (with the completed retrofit) and the second phase of retrofit work would be completed. Construction would begin with mobilization of equipment and materials, followed by construction of CIDH piles, construction of pile caps, and construction of pier walls. Anticipated retrofit work is described below.

A large-diameter concrete shaft (CIDH pile) would be constructed at the ends of each bridge pier and connected to the existing bridge with a concrete grade beam or pile cap. Existing piles not yet been encased in shotcrete would be encased. New shafts would be designed for seismic loads and embedded into competent material by drilling below the loose surficial soils, which are susceptible to liquefaction. The CIDH piles are anticipated to be approximately 5 feet in diameter and 100 feet deep. If existing piles were to fail through shear, or to lose vertical capacity through liquefaction of the soil, the new piles would support the dead load of the bridge and prevent the bridge from collapsing. The above repairs would correct the existing seismic deficiencies of the

structure. It is anticipated the work would be done using dry construction approaches with equipment such as cranes and loaders.

Traffic Modifications During Coast Highway 101 Retrofit Activities

It is anticipated that the CIDH piles would be constructed using a 100-ton crane positioned on the existing bridge deck. This would necessitate closing half the bridge to traffic 24 hours per day for approximately 3 months and traffic detours would be required. For instance, the easterly two lanes would be closed as the CIDH piles on that side were installed, and the two westerly lanes would stay open to two-way traffic. Once the easterly piles were installed, traffic would be moved to the easterly lanes and the operation would move to the westerly side of the bridge. It is anticipated some additional complete night closures and detour of traffic would occur for the installation of the rebar cage for the piles. Remaining work would be accomplished from under the bridge.

Alternative 1A

Under Alternative 1A, the existing Coast Highway 101 bridge would be retrofitted to increase its seismic stability, using the same approach as described above for Alternative 1B.

2.10.11 OPENING THE TIDAL INLET

Under all alternatives, the existing or new inlet would be addressed as one of the final construction activities. Various methods can be used to open a new inlet, or to expand and enlarge the existing inlet. The method proposed for each individual alternative is described below.

Alternative 2A

The new inlet associated with Alternative 2A would be excavated and opened “in the dry.” A typical approach is to erect and maintain a dike separating the inlet from the sea, and work behind the dike with earthmoving equipment to excavate the channel and install bed and bank protection (stone). Once components are installed, the dike at the beach is breached with a backhoe from shore at low tide and the site is allowed to flood on the next incoming tide.

Alternative 1B

The existing inlet would be expanded and enlarged using the same approach that the SELC presently uses to maintain the inlet. This approach is to dike off the inlet and install a temporary

construction road between the internal inlet channel and the beach and a working platform along the internal inlet channel. A backhoe sits on the working platform and excavates sand from the channel and drops it into trucks that carry it to the beach for dumping. The working platform is progressively moved along the length of the inlet channel to enable clearing of the entire channel length.

Alternative 1A

Opening the tidal inlet would be identical to the description provided for Alternative 1B.

2.10.12 INLET, BASIN, AND CHANNEL MAINTENANCE ACTIVITIES

Maintenance activities would require future access for equipment and personnel to areas also delineated in Figures 2-12 through 2-14. Intermittent access, maintenance, and staging areas include needed launch facilities for dredge equipment, staging for equipment, and roadways to access these areas. Some additional maintenance in channels may occur very infrequently (every 10 years) and in focused locations subject to sedimentation, vegetation encroachment, or other adaptive management needs.

Alternative 2A

Maintenance of the sediment basin and inlet would be conducted by dredging. A 10- to 24-inch dredge would be mobilized from the proposed permanent dredge launch ramp near the nesting site, and moved throughout the sedimentation basin to remove sand. Approximately 300,000 cy is anticipated to be dredged from the basin approximately every 3 years, and the material placed on Cardiff Beach south of the tidal inlet. Placement would occur by allowing sand to flow out of the end of the discharge pipe above the mean high tide line (+2 feet NGVD) and below the elevation of the beach berm (+12 feet NGVD). Sand would be conveyed to the beach while waves and tides rework and disperse it, thereby “feeding” the littoral cell. This approach is similar to that employed at Batiquitos Lagoon in 2011 and Bolsa Chica in 2009. Conveyance would occur using a 10- to 24-inch-diameter high-density polyethylene (HDPE) pipe from the dredge to the beach. A temporary electrical power site similar to that discussed for construction may be placed on-site during maintenance activities; no booster pumps would be required. The work may require up to 5 months for completion.

Additional channel maintenance may be required in some of the main and secondary channels, depending on sedimentation and vegetation growth. This type of activity is anticipated to be required approximately every 10 years. For channel maintenance, it is anticipated that a smaller dredge or barge would utilize the dredge launch ramp to access channels through the

sedimentation basin, and then remove sediment or vegetation from focused areas. Depending on the quality of sediment removed, it may be placed on Cardiff Beach (in a process similar to that described above) or dewatered and transported off-site to a landfill. Similarly, vegetation removed during channel maintenance would be disposed of off-site. Material identified for off-site disposal would be transported to shore access locations along Manchester Avenue (for the west, central and east basins) and trucked to I-5 and the designated disposal site. For these activities, a temporary electrical power site similar to that discussed for construction may also be placed on-site.

Alternative 1B

Alternative 1B would require annual inlet maintenance using the same approach as existing conditions. That approach uses earthmoving equipment to clear the existing tidal inlet channel from Coast Highway 101 to approximately the location of Kai's Restaurant, near the location of the first channel bend (west of the railroad line). The contractor would use off-road rear dump trucks, a bulldozer, and a large backhoe to complete the work. As explained above, the contractor would dike off the inlet channel under Coast Highway 101 with a bulldozer to prevent tidal inundation during the channel excavation, and dig a low road under the existing bridge for trucks to drive beneath (the height of the trucks is sufficient to warrant lowering the sand surface under the bridge to provide sufficient clearance). The bulldozer would also be used to build the following:

- a temporary haul road within the inlet channel along Coast Highway 101 that trucks can use to access the backhoe; and
- a sand pad working platform for the backhoe in the channel along Coast Highway 101 that sits above the tide.

The backhoe would work from the pad to dig sand from the channel. The backhoe operator would swivel the backhoe toward Coast Highway 101 and place several bucketfuls of sand in the rear of a dump truck. The truck would then drive north and under the Coast Highway 101 bridge to the beach, south of the restaurants, and place the material on the beach. The truck would then drive back to the inlet channel for another load. This cycle would be repeated with several trucks (approximately three) in a queue. The working pad for the backhoe would progressively move upstream in the inlet channel as the excavation proceeds until it reached its most upstream point. The bulldozer would continually maintain the sand berm across the inlet, the road under the Coast Highway 101 bridge, and the backhoe's working pad during the operation. Approximately 40,000 cy is anticipated to be removed during each annual inlet maintenance cycle, which would require approximately 4 weeks to complete.

Additional channel maintenance may be required in some of the main and secondary channels, depending on sedimentation and vegetation growth, in a manner similar to that described for Alternative 2A. A temporary electrical power site similar to that discussed for construction may be placed on-site during maintenance dredging activities.

Alternative 1A

Alternative 1A would require annual maintenance of the inlet, similar to Alternative 1B. It is anticipated that less material would be excavated with each maintenance cycle. Under Alternative 1A, approximately 35,000 cy is anticipated to be removed during each annual inlet maintenance cycle, which would require approximately 3 weeks to complete.

Additional channel maintenance may also be required in the main channel under Alternative 1A, depending on sedimentation and vegetation growth, in a manner similar to that described for Alternative 2A.

2.10.13 REVEGETATION AND RESTORATION OF HABITAT

After dredging and filling is complete within each basin of the lagoon, recovery of disturbed areas would begin. It is anticipated that, to attain the post-restoration habitat distribution shown in Figures 2-3, 2-9, and 2-10, a combination of natural recruitment and targeted planting would occur. Some wetland habitats are relatively easy to establish through natural recruitment if areas are created at specific elevations and inundation frequencies (e.g., pickleweed/mid-marsh). Other habitat types, such as low-marsh and transitional habitats, do not establish as quickly, and may need to be supplemented with focused planting efforts. Post-restoration habitat distributions are shown in Table 2-17.

A comprehensive restoration plan would be prepared for San Elijo Lagoon once an alternative has been selected. The restoration plan would include plant and soil salvage plans, planting plans, natural recruitment expectations for wetland habitats, measures to promote sensitive species recruitment (wildlife and plant species), quantitative and qualitative success standards, remedial measures, and annual monitoring requirements. Monitoring is expected to include sediment and water quality sampling, as well as a range of biological analysis (e.g., algal, invertebrate, avian, and aquatic species surveys). The restoration plan would be implemented for a minimum of 5 years or until success criteria are met. Following the 5- to 10-year construction maintenance period, long-term monitoring and adaptive management of the lagoon would continue. More details on the construction and long-term and adaptive management of the lagoon are discussed in Section 2.11.3, below.

Target habitat communities and land cover types are noted below for each alternative. Detailed performance criteria would depend on the alternative selected and be both qualitative and quantitative. Regardless of the alternative chosen, performance criterion would be established for improved water quality, hydrologic function, and biological resources to ensure that restoration improvements can be measured and triggers for remedial measures and adaptive management are clear.

2.10.14 MATERIALS DISPOSAL FOR CONSTRUCTION ACTIVITIES

Construction Schedule and Phasing

Materials disposal of sediment removed from the lagoon is a critical component of the proposed project but would occur during focused periods of the overall lagoon restoration. Vegetation removed from the lagoon through clear and grub activities would also be required, as described in Section 2.10.6. This section focuses on the export and disposal or reuse of sediments, which can be complex depending on the quality of the material. A SAP has been prepared for the project to characterize sediment within the lagoon, and provides a preliminary conclusion that sediment within the overdredge pit location is suitable for placement on beaches or in the nearshore, or in offshore stockpile sites (Appendix A). Additional characterization will be required once an alternative has been selected for implementation. Depending on the quality of materials to be exported, a number of different disposal and/or reuse scenarios exist. Each of these could involve different methods. For Alternative 2A and Alternative 1B, material would be reused on-site, placed within the littoral zone, or deposited at SO-5/SO-6. Alternative 1A would not produce suitable material for reuse, and material would be disposed of on-site in transition areas or offshore at LA-5. Depending on the locations and methodologies for disposal/reuse, different construction methods could result in varying durations/timing of disposal.

Under Alternative 2A and Alternative 1B, 13 months is required for Phase 1, 7 months each is required for Phases 2 and 3, and 4.5 months is required for Phase 4, to dredge and transport material to offshore areas, the nearshore, nearby beaches, or adjacent construction sites. Some additional constraints on material transport and placement may be imposed during the permitting phase, such as seasonal or special event restrictions for specific area beaches.

For Alternative 1A, disposal could occur over the construction period of up to 9 months and no schedule restrictions are anticipated on disposal activities. These activities would occur as material is excavated from the top layers of sediment in each lagoon basin.

Export and Sediment Transport Operations

If sediment is being discharged outside of the lagoon (e.g., not in transitional or nesting areas), transporting dredged materials to the ocean is necessary. Transport is anticipated to occur through a pipeline extended from the lagoon, through the lagoon inlet, and directly to the placement site (for placement at portions of SO-6, Cardiff nearshore, and Cardiff Beach) or into a waiting barge (for transport of material to SO-5, portions of SO-6, nearby beaches, or LA-5). An offshore mooring would be located at a temporary monobuoy offshore from site 4 (see Figure 2-15) to provide a relatively stable hook-up location for a barge. Once full, the barge would transport materials to offshore disposal sites (LA-5), designated placement sites outside the littoral zone (SO-6 or SO-5), or beaches located up or down the coast. Disposal/placement once the sand has been transported to the site is described below depending on placement approach.

Up to four booster pumps may be necessary to help convey material to the disposal locations through the dredge pipeline. The booster pumps ensure that the dredged material flows through the pipelines with enough speed and energy so that heavier material does not settle out and clog the pipeline. The booster pumps would be temporary and installed at locations along the dredge pipeline. The booster pumps are generally a large engine with the dredge pipeline entering and exiting from each end. Each booster pump is self-contained, typically on top of temporary skids on a wood or metal floor pad. Because the booster pumps are temporary, they do not require a permanent foundation or pad; rather the pumps can be placed on level areas of gravel or dirt, on the beach, or other stable surfaces. If located outside of the secured construction area, such as on the beach, the booster pump equipment would be fenced for security purposes. The booster pumps must be maintained and are typically visited a couple of times per day. Anticipated pipeline and booster pump locations are shown in Figures 2-16 and 2-17.

Offshore Placement

Both the SO-5 and SO-6 borrow sites dredged for the 2001 RBSP or 2012 RBSP remain as depressions approximately 10 to 15 feet below the adjacent seabed. Materials placement could occur within these sites as part of the SELRP for offshore stockpiling of material suitable for reuse within the littoral zone under Alternatives 2A and 1B. The 2012 SO-6 dredge area is close enough to shore (within 4,000 feet) for sand to be discharged directly through a pipeline extended along the ocean floor from the beach south of the existing restaurants. The discharge line would pass from the lagoon through the existing tidal inlet and along the back of the beach to south of the restaurants, then straight offshore into the placement site. Natural ocean forces would distribute material within the placement site depression. The untended seaward end of the pipe could potentially remain in place. Sand would deposit around and over the pipe in a centralized area. The pipe would be pulled out of the site from its landward end by earthmoving

equipment at project completion. Alternatively, sand would be pumped from the lagoon through a discharge line to a barge over the discharge site with a downspout, then directed downward into the placement site. Material would exit the barge-mounted downspout near the seabed and settle on the seafloor within the placement site. The barge would be repositioned periodically to spread the discharge evenly through the placement site, and natural forces would complete the distribution.

Nearshore Placement

As part of construction, nearshore placement of beach-quality material would occur off Cardiff State Beach, just outside of the surf zone. As part of Alternative 2A, this placement would be a critical component of providing a stable, prefilled ebb bar adjacent to the relocated inlet. A prefilled ebb bar would provide the material needed for the ultimate equilibrium geomorphic formation and thereby minimize beach erosion in the area (M&N 2011). Nearshore placement under Alternative 1B could also occur to supplement the local littoral sand supply. Placement of material in the nearshore would provide a feeder sand bar for nourishment of the littoral zone as a beneficial material reuse action. The sand in the prefilled ebb bar would act as a reservoir of sand for beach nourishment as the bar disperses slowly over time. An additional purpose of a prefilled ebb bar is that it can also serve as a recreational amenity by producing at least a moderate-quality wave, or an even better-quality wave than presently exists for its duration (M&N 2014). Sand placement in the nearshore zone is shown in Figure 2-11 and would consist of pipe placement extending from the lagoon mouth along the ocean floor to the proposed placement location. Material excavated from the lagoon would be directly discharged through that pipeline into the nearshore, and the ebb bar/placement location constructed from the ocean floor up. Alternatively, sand would be pumped from the lagoon through a discharge line to a barge over the discharge site with a downspout, then directed downward into the ebb bar/placement location. Material would exit the barge-mounted downspout near the seabed and settle on the seafloor within the placement location. The barge would be repositioned periodically to spread the discharge evenly, and natural forces would complete the distribution. No beach closure or shore-based activities would occur.

Beach Building

A number of projects have placed sand directly on regional beaches. In fall 2012, SANDAG's RBSP placed sand on eight beaches along the San Diego shoreline from Oceanside to Imperial Beach, including a number of beaches in proximity to San Elijo Lagoon. In 2001, an initial RBSP placed sand on these beaches plus others (total of 12). The sand placement footprints and beach building strategies proposed for the lagoon restoration project would be similar to those utilized for RBSP. Maximum potential beach fill quantities for each beach location are presented

in Table 2-20. Generally, beaches would be formed by transporting sand to the monobuoy off Cardiff, loading a barge, and using that barge to convey the material to a specific placement site. Once at the placement or receiver beach, the barge would connect to another temporary monobuoy. Material would be transported back to the placement beach via a discharge pipeline. The Cardiff placement site is close enough to the lagoon source that the material would be conveyed by pipeline only. Booster pumps may be necessary along the pipeline to ensure the material moves quickly enough to avoid settling and clogging of the pipe.

Sand would be discharged through the discharge pipeline to the beach placement site mixed with a high proportion of water as a slurry. Discharged sand would be initially pumped into a training dike constructed to reduce turbidity and aid in the retention of pumped sand (PDF-51). As slurry is discharged from the pipeline, the dike directs the flow of the discharge and slows the velocity of the slurry, thereby allowing more sediment to settle onto the beach instead of remaining in suspension and being transported into the surf zone. Once discharged onto the beach, sand would be allowed to settle from the water/slurry. The sand would then be graded and spread along the beach using bulldozers to create a larger beach footprint of specific dimensions (elevation, width, and slope). Generally, beaches would be constructed to elevations up to +12 feet above MLLW. The post-construction upper slope would be steeper than the pre-construction profile, but would quickly and naturally evolve toward an equilibrium average nearshore slope, which is a function of sediment grain size and wave characteristics. The beach fill would naturally disperse over a wider portion of the beach and nearshore zone, resulting in a flatter profile. Flattening of the slope and adjustment of the beach profile causes reduction of the berm width from the post-construction profile. As the beach is augmented in one segment, the pipeline is extended to a new portion of the beach, where the same sequence of activities occurs.

Beach placement footprints for this project would be the same as those identified for RBSP at Leucadia, Moonlight, Solana Beach, and Torrey Pines.² The Cardiff placement site for this project would extend farther north and south of the previous footprint used for RBSP.

On-Site Fill Use

Some excavated material would be used on-site as fill to create the transition areas and underlying the nesting area. This material would be piped or barged through the lagoon and would be placed during construction.

² The Torrey Pines site was used as part of 2001 RBSP. As part of 2012 RBSP, the site was evaluated for environmental impacts but not used due to financial reasons.

Offshore Transport to LA-5

Under Alternative 1A, dredged material would not qualify for beneficial reuse (e.g., would be excessively silty or fine-grained). Instead it would be transported to LA-5. This location is one of 12 offshore disposal sites designated by EPA and is located approximately 28 miles southwest of San Elijo Lagoon. This is the closest of the 12 disposal sites to the project. Once material is removed through dredging, it would be transported to a monobuoy temporarily located off the lagoon inlet, then via barge to LA-5. Preliminary coordination with the Corps and EPA indicates the material appears suitable for disposal at LA-5. If Alternative 1A is selected for implementation, additional testing (Tier 3) would be conducted in compliance with the ODM prior to authorization for disposal from the Corps and EPA. Should the materials be determined to be not suitable for disposal at this location, the material would be sequestered on-site in built transition or nesting areas.

2.10.15 PUBLIC SAFETY/BEACH, OCEAN, AND LAGOON CLOSURES

Due to construction activities, limited areas may be temporarily closed to access for public safety reasons. This could include portions of trails within the Reserve. Alternative trail access would remain available throughout construction, however, to maintain public access to the Reserve. Staging and stockpile areas outside of the secured lagoon site, such as beach staging areas, could also be fenced for public safety, as required. These sites could include areas designated for pipe and equipment stockpiling, or maintenance (e.g., washdown or fueling) areas. Such areas may be located around the perimeter of the lagoon or on the beach.

Specific areas of the lagoon, materials placement, and staging/access areas may require temporary lighting to maintain public safety as well. Lighting would be provided during nighttime construction activities such as dredging, placement of dredged materials, and nighttime deliveries. There may also be focused areas requiring lighting to maintain security, such as staging areas outside the larger lagoon site. Night lighting would be limited to those areas required for safety, directed downward, and shielded to minimize light spillover into adjacent areas of sensitive habitat and/or residential development.

For beach placement sites, portions of the beach directly affected by active replenishment and construction activities may be closed temporarily. Adjacent stretches of beach not directly affected by placement activities, such as those areas through which pipeline may extend but where sand is not directly being placed, would remain open to public access and recreational activities. Depending on the beach site and material excavation rates, up to 500 feet of beach may be closed per day in a specific location. As sand placement activities shift along the beach, those areas in which sand placement has been completed would be reopened to public use.

Horizontal access along the back beach would be maintained, with temporary closures occurring as necessary to complete sand placement to the back edge of the beach, particularly where no alternative horizontal access exists (e.g., where a wet beach abuts bluffs). Ocean areas directly adjacent to sand transport/placement equipment and activities may also be temporarily closed to ensure public safety. Buffers around temporary monobuoys and ocean placement sites would be maintained to avoid water recreation users and vehicle safety hazards. Each of these measures is described in Table 2-26.

As part of sand placement on the beach, the SELC would be in consistent communication with local jurisdictions and safety agencies (e.g., lifeguards) to ensure notification and safety measures are implemented. Additionally, notifications in the local media would be placed to help ensure public awareness of the project and potential construction activities. Additional safety measures are described in Table 2-26.

2.10.16 PROJECT DESIGN FEATURES

The SELRP is a restoration project designed to enhance the lagoon system as a whole. Due to the nature of the project, an effort has been made to proactively incorporate measures into each of the alternatives to minimize and avoid, where possible, impacts to resources. These “project design features” represent a commitment by the SELC to construct the project in an

environmentally sensitive way. Some project design features are incorporated to avoid or minimize a potential significant impact proactively through design, but others are additional measures that support the overall restoration objectives of the project without being tied to a specific potential impact. Many features also represent regulatory or code requirements that the project would need to comply with in order to be approved by various agencies and/or implemented legally. These features are committed to by the project applicant and would be implemented by the contractor or other parties before, during, and after construction. Inclusion of these project design features is considered in the determination of CEQA impact significance in Chapter 3. These features are summarized in Table 2-26 and include the purpose, timing, and responsibility for implementation of each project design feature.

Table 2-26
Summary of Project Design Features/Monitoring Commitments and Minimization Measures

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
General						
PDF-1	PDF-1	Implement a public information program to assist nearby residents in understanding the purpose of the project and disseminate pertinent project information.	Reduce impacts related to land use incompatibilities.	Prior to and during construction	SELC	All
PDF-2	PDF-2	Maintain project website with current construction schedule.	Ensure timely public notification; minimize land use conflicts.	During construction	SELC	All
PDF-3	PDF-3	Conduct fueling and/or maintenance activities at designated staging areas and designated fueling areas, and prepare a Spill Prevention, Control, and Countermeasure plan for hazardous spill containment.	Minimize safety hazards associated with release of hazardous materials.	During construction/ Maintenance	Contractor	All
PDF-4	PDF-4	Stake construction areas and no construction zones. Limit construction equipment and vehicles to within these limits of disturbance.	Protect sensitive habitat areas; reduce public safety hazards.	During construction/ Maintenance	Contractor	All
PDF-5	PDF-5	Restrict access to portions of lagoon trails and beaches to maintain public safety.	Reduce risks to public health and safety.	During construction/ Maintenance	Contractor	All
PDF-6	PDF-6	Maintain alternative access to beaches adjacent to placement sites, portions of trails not under active construction, and the Nature Center.	Minimize impact on public access.	During construction	Contractor	All
PDF-7	PDF-7	Shield and direct night lighting toward nonsensitive lagoon areas or the ocean and away from residences and habitat.	Minimize effects on residents and sensitive species.	During construction/ Maintenance	Contractor	All
PDF-8	PDF-8	Equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers.	Minimize noise impacts.	During construction/ Maintenance	Contractor	All
PDF-9	PDF-9	House exposed engines on dredging equipment to the greatest extent possible.	Minimize noise impacts.	During construction/ Maintenance	Contractor	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-10	PDF-10	Contractors will maintain equipment and vehicle engines in good condition and properly tuned per manufacturers' specifications. Idling time for construction equipment will be minimized, as appropriate.	Minimize air quality impacts and greenhouse gas (GHG) emissions.	During construction/ Maintenance	Contractor	All
PDF-11	PDF-11	All storage, handling, transport, emission, and disposal of hazardous materials will be in full compliance with local, state, and federal regulations (Health and Safety Code, Division 20, Chapter 6.95, Article 2, Section 25500-25520)	Avoid impacts associated with hazardous materials.	During construction/ Maintenance	Contractor	All
Lagoon Restoration						
PDF-12	PDF-12	Utilize continuous construction, with internal phases to (1) restrict vegetation clearing and grubbing to outside the breeding season (February 15–September 15) (2) limit active construction to two basins at a time (excludes construction of Coast Highway 101).	Minimize impacts to sensitive wildlife species and their habitats.	During construction	Contractor	All
PDF-13	PDF-13	Have Biological Monitor, experienced with each of the listed species, on-site during construction; frequency may vary depending upon activity but could be daily during breeding season. If California gnatcatcher nests are found and need to be inspected, or if California gnatcatcher calls are required for survey efforts, a Biological Monitor with section 10a1a certification will be used. While clearing and grubbing activities are occurring, walk along the impacted habitat ahead of machinery in an effort to flush the birds and other wildlife.	Confirm implementation of biological permit conditions, design features, mitigation measures, and applicable construction specifications. .	During construction	Qualified biologist	All
PDF-14	PDF-13	Remove sources of impounded water resulting from construction equipment (if any) and confirm compliance with construction specifications regarding no ponding. At the discretion of the Biological Monitor, release	Minimize vector breeding opportunity during construction.	During construction	Qualified biologist/Contractor	All

2.0 Description of Project Alternatives

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-15	PDF-13	water controls during construction as needed to enable tidal exchange and circulation. Ensure no encroachment into sensitive “no construction” zones. Visually inspect construction equipment prior to use for evidence of soils or other material that might contain invasive species. Examine equipment history to ascertain if the equipment has been involved in work within areas known to contain invasive species.	Minimize the potential to introduce aquatic invasive species into the site.	During construction	Qualified biologist	All
PDF-16	PDF-14	Prior to initiating construction, identify sensitive “no construction zones” and fence or flag those areas	Minimize impacts to sensitive habitat areas.	Prior to construction/ Maintenance	Qualified biologist/Contractor	All
PDF-17	PDF-16	Initiate flooding of habitat areas outside of the breeding season. If flooding is reduced and required again within the same year, reinitiation of flooding will occur outside the breeding season as well.	Minimize impacts to breeding bird nests and nesting activity.	During construction	Contractor	Alternatives 2A and 1B
PDF-18	PDF-17	Clear and grub activities will occur in sensitive habitats in flooded areas. If clear and grub is required in dry conditions, a qualified biological monitor will walk ahead of the impact area to flush birds and other wildlife if conditions are appropriate and safe.	Minimize impacts to resident bird species and sensitive wildlife species.	During construction	Contractor/Qualified biologist	All
PDF-19	PDF-18	Controlled inundation will be used prior to clearing and grubbing in low- and mid-marsh habitat to actively encourage wildlife to relocate from vegetation to be cleared to adjacent nonimpacted habitat. After at least 24 hours of consistent inundation, grubbing of vegetation within the grading footprint will occur while still inundated to minimize the likelihood of contacting marsh birds.	Minimize impacts to resident marsh bird species.	During construction	Contractor	Alternatives 2A and 1B
PDF-20	PDF-19	Site staging areas and access roads at existing access points and previously disturbed areas, where feasible.	Minimize impacts to intact habitat and reduce site	Final design	Engineer	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-21	PDF-20	Prepare a targeted habitat enhancement plan for light-footed Ridgway's rail and Belding's savannah sparrow. Enhancement activities will be identified to minimize impacts to these species during construction. Activities will include fencing, public signage, selective vegetation removal (i.e., invasive species or native species not preferred by Belding's savannah sparrow), nesting platforms, perch removal, predator trapping/control, and other techniques to minimize predation and encourage nesting of the species. The plan will be finalized in conjunction with the permitting and approval process for the project in order to incorporate agency and permit conditions. Due to these timing constraints, final plans will not be completed prior to issuance of the Final EIR/EIS, but will be completed prior to project implementation.	Minimize impacts to light-footed Ridgway's rail and Belding's savannah sparrow.	Final design;	Qualified biologist, with approval of the Corps and County.	All
PDF-22	PDF-20	Implement targeted habitat enhancement plan for light-footed Ridgway's rail and Belding's savannah sparrow, specifically within designated refugia areas and other suitable habitat not directly impacted by construction activities.	Provide refugia and promote nesting by light-footed Ridgway's rail and Belding's savannah sparrow during construction in areas not directly impacted by construction activities.	During construction, prior to impacting suitable habitat areas	Qualified biologist	All
PDF-23		Consult with resource agencies, including USFWS, on final nesting area design during the permitting process.	Encourage nesting of special-status species.	Prior to construction	Qualified biologist	

2.0 Description of Project Alternatives

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-24		Where practicable, invasive species will be removed by hand or hand tools rather than chemical means. When necessary, herbicide application will be conducted by personnel with a California Department of Pesticide Qualified Applicators Certificate (QAC) or by personnel under the supervision of a person with a California Department of Pesticide Qualified Applicators License (QAL). All herbicide applied will be consistent with the label, as well as state and local regulations. Any herbicide used will be approved for use in an aquatic environment (i.e., AquaNeat®) as the entire restoration area is within the confines of the lagoon. Herbicide application will be conducted using backpack sprayers and will consist of spot spraying nonnative plant species. Herbicide application will be conducted using methods that limit overspray to adjacent native plant species and will be discontinued when wind speeds are higher than the designated label standard or above 10 miles per hour.	Reduce overspray and drift of herbicides to nontargeted species and areas.	During and after construction	Contractor	All
PDF-25	PDF-21	Prepare a Storm Water Pollution Prevention Plan (SWPPP). Prepare a Storm Water Management Plan (SWMP), a Hydromodification Management Plan (HMP), and Low Impact Development (LID) best management practices in compliance with the County MS4 Permit. The SWPPP and SWMP must be approved by the County and City of Encinitas as appropriate prior to approval of associated grading plans to confirm that the limits of disturbance will be maintained within the identified footprint.	Prevent pollutant discharge.	Prior to construction	Prepared by QSD certified Contractor	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-26		Implement best management practices in compliance with SWPPP, SWMP, HMP and LID.	Prevent pollutant discharge.	During construction and future maintenance activities	QSP certified Contractor on-site	All
PDF-27	PDF-22	Actively manage turbidity by using a cutterhead dredge and/or temporarily closing the lagoon inlet.	Minimize release of disturbed sediment to the coast.	During construction	Contractor	Alternatives 2A and 1B
PDF-28		Cap overdredge pit with sand material to encapsulate material and prevent it from being introduced into the water column or released into the environment.	Minimize sedimentation, turbidity, and potential release of contaminants.	During construction	Contractor	Alternatives 2A and 1B
PDF-29	PDF-23	Coordinate with the utility service provider for relocating and/or avoiding utilities infrastructure.	Reduce and/or avoid impacts to existing utilities infrastructure.	Prior to construction	SELC and Contractor	All
PDF-30	PDF-24	Coordinate with affected utility service provider in the event relocation is required or if maintenance needs for agency-owned structures are identified during SELRP monitoring activities.	Minimize utility service disruptions.	During construction/ Maintenance	Contractor	Alternative 2A
PDF-31	PDF-25	Near Solana Beach sewer pipe or other utilities to be left in place, require dredging and excavation activities to stay above the minimum cover required by the utilities' owner.	Avoid impacts to existing utilities and infrastructure.	Prior to and during construction	Contractor	Alternatives 2A and 1B
PDF-32		Coordinate with NCTD regarding phasing and timing to minimize impacts to the railroad during construction.	Avoid impacts to existing utilities and infrastructure.	Prior to and during construction	Contractor	Alternatives 2A and 1B
PDF-33	PDF-26	Equipment fueling and maintenance will occur at the designated staging areas and designated fueling areas away from publicly accessible areas.	Ensure public safety.	During construction/ Maintenance	Contractor	All

2.0 Description of Project Alternatives

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-34	PDF-27	During off working hours, secure heavy equipment and vehicles in staging area.	Ensure public safety.	During construction/ Maintenance	Contractor	All
PDF-35	PDF-28	Provide fire suppression equipment on board equipment and at the worksite.	Reduce fire hazard risks.	During construction/ Maintenance	Contractor	All
PDF-36	PDF-29	Require heavy equipment operators to be trained in appropriate responses to accidental fires.	Reduce fire hazard risks.	During construction/ Maintenance	Contractor	All
PDF-37	PDF-30	Design recommendations from the San Diego Association of Governments (SANDAG) Sea Level Rise Study (SANDAG 2013) will be incorporated into pile foundation and abutment protection engineering for bridgework.	Ensure structural integrity of proposed structures.	Prior to construction	Engineer	Alternative 2A
PDF-38	PDF-31	The new bridges at the railroad and at Coast Highway 101 under Alternative 2A will possess deep pile foundations and well-protected abutments as engineered per appropriate regulatory safety requirements. Structures will be designed in accordance with applicable local and state engineering and design standards.	Ensure structural integrity of proposed structures.	Prior to and during construction	Engineer, Contractor, and SELC	Alternative 2A
PDF-39		Channel bank and bridge abutment protection will be installed along the inlet channel and at bridge crossings (Coast Highway 101, NCTD railroad, and I-5) to protect channels and structures from erosion during severe storm flow events. Rock armoring will be placed directly along the toe of bridge abutments and will “wrap” around the end of the earthen berms supporting each bridge. Bridge protection will be designed in accordance with design standards of bridge owners (and placed as part of new bridge structures, as applicable).	Minimize erosion and undermining of channels and structures.	During and post-construction	Engineer and SELC	All

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-40		Monitor shoal development semi-annually and remove during regular maintenance or as-needed.	Maintain tidal exchange.	Maintenance	SELC	All
PDF-41	PDF-32	The Coast Highway 101 alignment and bridge approach will conform to California Department of Transportation (Caltrans) standards for sight distance and vertical clearance.	Ensure public safety.	Prior to construction	Engineer	Alternative 2A
PDF-42	PDF-33	Temporary speed limit reduction for the traffic detour approaches and exits will conform to safe highway design speeds.	Ensure public safety.	Prior to construction	Contractor	All
PDF-43	PDF-34	Maintain two-way circulation on public roadways and access to neighboring commercial establishments during project construction.	Minimize traffic conflicts and access issues.	During construction	Contractor	All
PDF-44		Restore roadway capacity upon completion of the new Coast Highway 101 bridge.	Minimize traffic conflicts and access issues.	Post-construction	Contractor	Alternative 2A
:PDF-45	PDF-35	Create a temporary pedestrian walkway/bicycle path on the west side of open lanes of Coast Highway 101 to allow beach users to continue to access the beach to the north and south.	Minimize land use conflicts and access issues.	During construction	Contractor	Alternative 2A
PDF-46	PDF-36	All temporary facilities used for contractor activities will be returned to either original or enhanced conditions upon completion of the project to the greatest extent possible, if not needed for future maintenance activities.	Minimize land use conflicts and access issues.	Post-construction	Contractor	All
PDF-47	PDF-37	Restore North Rios, Solana Hills, and Santa Inez trails and access to them to pre-project conditions after completion of construction use.	Minimize recreational conflicts and access issues.	Post-construction	Contractor	All

2.0 Description of Project Alternatives

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-48	PDF-38	Design cobble blocking features (CBFs) to maximize burial and minimize exposed surface; treat with faux finishes to provide a more “naturalized” appearance.	Minimize contrast of new inlet and CBFs with existing beach environment.	Final design	Engineer	Alternative 2A
PDF-49	PDF-39	Complete Letter of Map Revision (LOMR) to formally modify the Flood Insurance Rate Map (FIRM) and/or Flood Boundary and Floodway map (FBFM), as required by City of Encinitas and FEMA.	Document revised floodway/floodplain boundaries.	Post-construction	Engineer and Contractor	All
PDF-50	PDF-40	Channels and infrastructure improvements (Coast Highway 101/inlet or I-5 bridge) will be reviewed by the County, Caltrans, City of Solana Beach, and City of Encinitas as appropriate prior to approval of associated grading plans.	Ensure structural integrity of proposed structures.	Prior to and during construction	Engineer and Contractor	All
Materials Disposal/Reuse						
PDF-51	PDF-41	Construct longitudinal training dikes at sand placement sites.	Reduce nearshore turbidity.	During construction	Contractor	Alternatives 2A and 1B
PDF-52	PDF-42	Release material at offshore stockpile and nearshore sites close to the ocean floor (e.g., directly from a subsurface pipe or via a vertical pipe extending from the barge downward toward the ocean floor).	Reduce drop height, settling time (and potential sand drift and loss), and surface turbidity at offshore (SO-5 and SO-6) and nearshore (off Cardiff) sites.	During construction	Contractor	Alternatives 2A and 1B
PDF-53	PDF-43	Monitor water quality per RWQCB 401 Certification; if outside parameters then implement operational controls or halt materials placement, as necessary.	Verify permit compliance.	During construction as per RWQCB 401 Certification	Qualified biologist	All
PDF-54	PDF-44	Place material around storm drain outlets to allow continuation of proper drainage.	Continue proper drainage.	During construction	Contractor, in coordination with City Engineer	Alternatives 2A and 1B

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-55	PDF-45	Conduct underwater survey of proposed anchoring, monobuoy, and routes of sinker discharge pipeline to verify absence of sensitive hard-bottom habitat; if found, relocate to avoid impacts.	Avoid direct impacts to sensitive hard-bottom habitats.	Prior to and during construction	Qualified biologist	Alternatives 2A and 1B
PDF-56	PDF-46	Design offshore and nearshore placement sites to avoid artificial reefs, kelp, and other hard-bottom features to the satisfaction of the Corps. Provide a minimum 500-foot buffer zone from kelp beds and potential kelp habitat.	Avoid direct impacts to kelp and sensitive hard bottom habitats.	Final engineering and during materials placement	Engineering contractor and construction contractor	Alternatives 2A and 1B
PDF-57	PDF-47	Assess habitat suitability for grunion spawning prior to construction, if construction is to occur during the spawning season. During the grunion spawning period of March through August, all proposed sand disposal sites will be monitored for grunion runs concurrently, unless the beach consists of 100% cobble (i.e., there is not sand on the beach). Grunion monitoring will be conducted by qualified biologists for 30 minutes prior to and 2 hours following the predicted start of each spawning event. If a grunion run consisting of more than 100 fish is reported, the biologist will coordinate with the resource agencies to determine appropriate avoidance and minimization measures (e.g. relocation/rescheduling of work/equipment or specification of acceptable vehicle routes).	Minimize impacts to grunion.	March through August and per CDFW annual pamphlet <i>Expected Grunion Runs</i> (CDFG 2010a)	Qualified biologist	Alternatives 2A and 1B
PDF-58	PDF-48	A Marine Mammal and Turtle Contingency Plan will be prepared prior to construction approved by National Marine Fisheries Service. A pre-construction contractor training will be conducted by a qualified biologist to educate workers with respect to protected marine species and avoidance measures	Reduce interactions between vessels and protected marine species.	Prior to initiation of construction and during construction	Qualified biological	All

2.0 Description of Project Alternatives

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
		required by the contingency plan. Monitoring during construction will include marine mammal observers on project vessels who will notify the vessel operator if a protected marine species is in the vicinity.				
PDF-59	PDF-49	Coordinate barge operations with the U.S. Coast Guard (USCG).	Minimize restricted areas/durations to maximize fishing opportunities.	Prior to initiation of construction and during construction	Contractor	All
PDF-60	PDF-50	Clearly mark pipelines used during materials transport (including offshore stockpiling efforts), including both floating and submerged, as “navigational hazards.”	Warn recreational users of water-based activities to ensure safety and avoidance.	Before and during activities in the ocean	USCG (via construction contractor)	All
PDF-61	PDF-51	Issue Notice to Mariners and maintain 300-foot buffer around monobuoy.	Warn recreational users of water-based activities to ensure safety and avoidance.	Before and during activities in the ocean	USCG (via construction contractor)	All
PDF-62	PDF-52	Designate a 300-foot buffer around the lane designated for barges to use to reach disposal/reuse sites and track actual routes. Employ Global Positioning System (GPS) tracking on barges to track disposal activity.	Minimize gear loss and fishing conflicts.	During construction	Contractor	All
PDF-63	PDF-53	Restrict public access at sand placement sites, both on the beach and in the nearshore ocean adjacent to the pipeline and monobuoy	Public safety during construction.	During construction	Contractor, in coordination with local lifeguards	Alternatives 2A and 1B
PDF-64	PDF-54	Temporarily relocate mobile lifeguard towers, if necessary	Ensure public safety during construction.	During construction	Contractor, in coordination with local lifeguards	Alternatives 2A and 1B
PDF-65	PDF-55	Place sand to avoid blocking line-of-sight at permanent lifeguard towers. All sight lines from the viewing platforms of the lifeguard towers will be maintained and there will be no interference with views for the lifeguards.	Ensure public safety during construction.	During construction	Contractor, in coordination with local lifeguards	Alternatives 2A and 1B

2.0 Description of Project Alternatives

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-66	PDF-56	Post signs advising the public of the presence of steep sand slopes (e.g., scarps) should they develop on beaches where sand is being placed.	Reduce risks to public health and safety.	During construction	SELC in coordination with Marine Safety departments in the cities of Encinitas, Solana Beach, and San Diego	Alternatives 2A and 1B
PDF-67	PDF-57	Prior to opening areas of beach with placed materials, spread the material and check it for potential hazards (e.g., foreign objects in the sand).	Reduce risks to public health and safety.	During construction	Contractor	Alternatives 2A and 1B
PDF-68	PDF-58	Coordinate the schedule at individual materials placement site to the extent possible to avoid major holidays and special events.	Minimize land use and recreation conflicts.	During construction	SELC	Alternatives 2A and 1B
PDF-69	PDF-59	Dedicated parking lots will be identified for employee parking during peak beach attendance to minimize effects to public parking availability, as necessary. A shuttle will likely be necessary for some of the more distant lots.	Maintain public beach access.	During construction	Contractor	Alternatives 2A and 1B
PDF-70	PDF-60	Maintain horizontal access along the back beach where adjacent vertical access is not available. Where horizontal access is limited, (e.g., where a wet beach directly abuts bluffs), vertical access will remain to allow public access on either side of the active sand placement area as long as public safety is not compromised.	Maintain public beach access.	During construction	Contractor	Alternatives 2A and 1B
PDF-71	PDF-61	Cover discharge pipeline with sand at consistent intervals to facilitate access from the back beach to the water.	Maintain public beach access.	During construction	Contractor	Alternatives 2A and 1B
PDF-72	PDF-62	Notify residents at least 1 week in advance of nighttime construction work within 100 feet of residences; Restrict construction work to no longer than 3 consecutive nights within 100	Notify residents of nighttime noise.	During construction	Contractor	Alternatives 2A and 1B

2.0 Description of Project Alternatives

Updated Project Design Feature ID	Previous Project Design Feature ID	Design Features	Purpose	Timing	Implementation Responsibility	Alternative(s) Project Design Feature Applies To
PDF-73	PDF-63	feet of a specific residence where sleep disturbance may occur. Conduct surf condition monitoring in areas with placement of sand to verify the modeling results and document any changes in coastal conditions.	Ensure no adverse changes to coastal conditions.	Prior to, during, and following construction activities	SELC and Engineer	Alternatives 2A and 1B
PDF-74	PDF-64	Conduct sand placement at the Torrey Pines placement site outside of the bird breeding season (April 1 through September 15, or after August 1 with confirmation of cessation of nesting). Sand placement at Cardiff placement site may happen year round. However, at both placement sites, monitoring shall be conducted during sand placement to avoid impacts to foraging snowy plover. Should foraging plover be present, the monitor will direct sand placement away from the foraging plover to allow time for the bird(s) to leave the site. In addition, night lighting shall be shielded and directed away from the back beaches. Should nesting plover be detected, a buffer around the nest would be established in consultation with the wildlife agencies and sand placement directed away from the nest.	Minimize impacts to snowy plover at placement sites.	During materials placement.	Qualified biologist	Alternatives 2A and 1B

2.11 MONITORING, MAINTENANCE, AND ADAPTIVE MANAGEMENT

Implementation of the SELRP would require a comprehensive monitoring program with multiple components to ensure compliance with regulatory requirements and mitigation measures identified in this EIR/EIS, track project success, and identify adaptive management strategies for use in the future. While it would be premature to develop a detailed monitoring program prior to determination of the Agency Preferred Alternative and LEDPA, this section discusses the framework and approach anticipated for the monitoring program. The comprehensive monitoring program for the SELRP would have three primary components with different goals:

1. Construction monitoring: to minimize and avoid impacts associated with construction
2. Restoration monitoring: to track restoration success
3. Long-term monitoring and adaptive maintenance: to maintain lagoon functions and services into the future

Some overlap between the components is anticipated, and each program component is described in general below. It is anticipated that the three components could be documented in separate plans: one with a focus on construction requirements identified in this EIR/EIS; one to track meeting restoration goals and success criteria; and a longer-term program focused on maintaining the functions and services of the restored lagoon into the future. This third program would focus on monitoring and maintenance with an emphasis on adaptive management strategies as the lagoon evolves under changing future conditions. Some monitoring protocols may overlap between the programs but would be focused on the specific goals of each plan. As construction is completed, the focus would shift to meeting success criteria, then strategies would shift to longer-term restoration monitoring and maintenance objectives. The final details would be determined upon selection of an alternative and identification of permit conditions with the resource agencies. Items such as exact monitoring locations, frequencies, and methodologies would depend on the alternative to be implemented and would be detailed as part of the permitting process.

2.11.1 CONSTRUCTION MONITORING PROGRAM

The construction monitoring program for the SELRP would be compiled from the project design features and mitigation measures identified in this EIR/EIS and designed to minimize and avoid impacts to resources that could occur during construction of the project. The construction monitoring program consists primarily of the Mitigation Monitoring and Reporting Program (MMRP) prepared for this project, but will also include additional permit conditions placed by agencies as part of the final project permitting process. Specific measures to be included in the construction monitoring program are identified within this EIR/EIS in Table 2-26 and as

mitigation measures at the end of each resource analysis in Chapter 3. Further discussion on the intent and components of this program follows.

The program would address potential impacts associated with both construction within the lagoon as well as materials disposal/placement. The SELRP is a restoration project and, as such, has been designed to be proactive in incorporating measures to reduce or avoid impacts to resources where possible. A number of *project design features* have been incorporated into the project to avoid or minimize impacts, as identified in Table 2-26. *Mitigation measures* have also been identified under specific resources to reduce potential significant impacts, as identified throughout Chapter 3. Additional measures could be identified as conditions associated with permits that would be issued by regulatory agencies prior to project initiation. Compliance with these *permit conditions* would also be integral to construction monitoring. The monitoring program for construction would be composed of these different measures.

In general, the anticipated construction monitoring program can be divided into three distinct phases:

1. pre-construction (initiated approximately 1 year prior to construction),
2. during construction (up to approximately 36 months), and
3. post-construction (proposed 5–10 years after construction is complete).

Detailed measures are identified throughout this document, either in Table 2-26 or under specific resource discussions.

Many of the proposed materials placement sites have been identified based on previously authorized projects to minimize potential effects to sensitive resources (2001 and 2012 RBSPs). Since those projects have not resulted in significant environmental impacts, long-term monitoring is not anticipated at those sites, although specific resource agency conditions will be identified as part of the permitting process. Sand volumes proposed for placement at other sites (e.g., Cardiff, which is a previously used site, but would have a larger footprint under the SELRP) have been limited to amounts that are not predicted to result in significant effects to resources by modeling conducted for the project. Long-term monitoring at those sites is not necessarily anticipated, but would be determined through discussions with the various regulatory and resource agencies. Because pre-construction monitoring is designed to minimize construction impacts rather than establish a baseline for post-construction monitoring to determine the success of the restoration itself, it is different from the lagoon restoration component, which is addressed under the lagoon restoration monitoring program discussion below.

2.11.2 LAGOON RESTORATION PLAN

A restoration plan would be implemented to measure the success of the lagoon restoration. A conceptual restoration plan has been prepared and is attached as Appendix Q to this EIR/EIS. The conceptual restoration plan is a component of the project and identifies requirements for pre-, during, and post-construction activities to facilitate restoration (e.g., planting and irrigation), as well as measure the success of the restoration (e.g., monitoring). The plan provides a framework of the monitoring program to enable an analysis of potential impacts associated with its implementation under CEQA and NEPA. Once the final alternative is selected, a final restoration plan will be prepared.

Regardless of the alternative, the restoration plan would include requirements for pre-construction local plant salvage and/or seed collection (particular focus would be given to existing rare and sensitive plants), planting plans, weed abatement, and remedial measures, as well as established annual success criteria.

Monitoring for the lagoon restoration component of the SELRP would be primarily focused on the lagoon itself and would include pre- and post-construction monitoring. The post-construction monitoring phase would identify a 5- to 10-year period that would focus on meeting restoration permit conditions and/or success criteria. Once those criteria are met, monitoring and management would shift over to the more long-term program focused on adaptive management discussed below.

Pre-and post-construction monitoring would be designed to focus on establishing a pre-construction baseline for lagoon conditions and sensitive species, then monitoring and confirming project success criteria are met over the longer term (5–10 years). Post-construction monitoring can also be tied to adaptive management actions that will facilitate project success. While the main components of the pre- and post-construction monitoring program have been identified, a detailed program will be identified after the CEQA Agency Preferred Alternative and LEDPA have been determined as part of the permitting process, and during final engineering of the project. This program will also incorporate permitting conditions identified after the Final EIR/EIS has been certified/approved, but prior to the initiation of construction.

Pre-construction monitoring for the SELRP would focus on establishing a baseline for assessing the success of restoration efforts. Each of the pre-construction surveys conducted for the lagoon restoration itself would have a post-construction component as well. The potential effects of restoration on sensitive bird species is one of the most important aspects of the SELRP. Monitoring bird species would include species-specific surveys and monitoring of the avian assemblage as a whole within the lagoon. Types of surveys anticipated as part of the monitoring

program are identified in Table 2-27, but this program may be altered or augmented based on permit and agency consultation through the permitting process.

Table 2-27
Anticipated Biological Survey Framework for Informing Restoration Success

Type of Survey	Purpose
Benthic Macroinvertebrates	Evaluate the health and functioning of the restored lagoon, due to importance in estuarine food webs. Benthic invertebrates can affect, and be affected by, physical processes, such as erosion, sedimentation, and nutrient cycling. Monitoring would include sampling of both epifauna and infauna.
Fish	Reflect suitability of subtidal habitat as Essential Fish Habitat. As fish are expected to colonize the newly created channels almost immediately, post-construction monitoring for fish in shallow subtidal and intertidal channels would begin immediately following construction.
Light-footed Ridgway's Rail	Light-footed Ridgway's rail utilize many of the habitat types within the lagoon (low and brackish marsh for nesting, in addition to mid- and high-marsh and mudflat for foraging), and the project would affect each of these to different extents. Surveys for this species would inform continued habitat availability for light-footed Ridgway's rail within the restored lagoon.
Belding's Savannah Sparrow	Belding's savannah sparrow currently inhabits all three lagoon basins. Post-construction surveys would be designed to provide information on resiliency and recovery of this species.
Secretive Marsh Bird Surveys	Post-construction surveys are anticipated to demonstrate use of newly constructed low-marsh habitat and well as resiliency and recovery of secretive marsh bird populations.
General Avian Use of the Restored Lagoon	Monitoring of use of the lagoon by water-dependent birds, including shorebirds, waterfowl, gulls, terns and others, is anticipated to be conducted monthly for a period of 5 years to assist in determining if the project has met its goals and objectives for improving habitats for bird species.
Habitat/Species Coverage	The development of planted areas, i.e., saltmarsh and transition habitats, as well as sensitive species being tracked, would be monitored post-construction for 5 years in order to document the success of the restoration project's planting plan and inform adaptive management actions.

Post-construction monitoring of the SELRP would be focused on the lagoon restoration component and designed to document achievement of project goals and objectives, including habitat improvements for plants and wildlife, success of revegetation efforts, use of the site by sensitive species, maintenance of tidal exchange and circulation, water quality improvements, and other measures of lagoon functions and services. This analysis would also be used to inform potential future adaptive management decisions and actions. Post-construction monitoring would document as-built conditions and provide comparison with pre-construction baseline conditions immediately after construction. Intensive short-term monitoring of restoration success is anticipated to continue annually for a minimum period of 5 years after construction. It is more likely the short-term monitoring period would be developed based on 10 years of ecological performance standards; however, if success is achieved prior to 10 years, the site can transition to

the less intensive, less expensive, long-term monitoring and management phase that would adapt to ecological conditions into the future.

General processes to be monitored are identified below and are intended to educate maintenance and adaptive management efforts in addition to documenting success of the project goals and objectives. Specific monitoring protocols would be developed as part of the permitting process in consultation with the resource and permitting agencies. A project monitoring plan would be developed as part of this consultation process to identify the monitoring methods, success criteria, and remediation required, if any, of the program to be implemented as part of the SELRP.

Monitoring the physical parameters of the lagoon following construction is designed to guide short- and long-term management activities such as inlet maintenance dredging or removal of sediment deposition. Monitoring would include developing protocols for the following lagoon surveys. Additional requirements may be identified as part of the permitting and final design process.

2.11.3 MAINTENANCE AND ADAPTIVE MANAGEMENT

After success criteria established in the restoration plan have been met, monitoring at the lagoon would shift to a longer-term strategy to inform the adaptive management component of the SELRP. The maintenance and adaptive management component would include both the anticipated maintenance regime and an adaptive management plan. Long-term monitoring would be an integral part of an adaptive management program established to guide maintenance strategies into the future. Conceptual activities associated with adaptive management are identified in Appendix Q, and summarized below. Development of the detailed adaptive management program would occur after confirmation of the CEQA Agency Preferred Alternative and final Corps determination of the LEDPA, and during the final engineering phase of the project, prior to the initiation of construction.

The maintenance plan would identify those areas of the lagoon that are anticipated to require periodic maintenance, such as inlet or subtidal basin maintenance and/or dredging, or less frequent channel maintenance in other areas of the lagoon. The adaptive management plan would identify remedial measures that may be implemented if success criteria put in place as part of the project or permit conditions are not met or if conditions change during long-term monitoring and need to be addressed. Some of these actions may include, but are not limited to, experimental planting of certain areas, additional dredging, replanting of saltmarsh and transitional habitats, adaptive management strategies in response to fires or floods, and amendment of soils. Detailed plans would be developed as part of consultation with permitting and natural resource agencies

during the permitting approval process; however, it is anticipated that the long-term management plan would be a living document and would be updated regularly, as necessary. General components associated with the adaptive management strategy are described below.

1. **Replacement Planting.** Planted material that fails to become established would be replaced with the same or similar plant species. An assessment to determine potential causes of plant mortality would be performed and additional measures to prevent continued plant mortality would be implemented. Replacement vegetation would be installed between October 1 and March 31, to the extent possible.
2. **Weed Abatement.** Weedy species would be removed from the restoration site frequently so they do not compete with the establishment of native plantings.
3. **Trash Removal.** Trash would be removed and disposed of in an acceptable manner, e.g., trash bins or landfill.
4. **Bank Protection Repair.** Should severe storms or other events result in damage to bridge and channel armor, repairs may be completed. Channels would be monitored for erosion and bank repairs made in the event of damage and/or erosion. Additional hardening or armoring beyond the initial project scope would not occur without consultation and permits from appropriate agencies.
5. **Biological Monitoring and Maintenance of Habitat Quality.** Regular biological monitoring would be conducted to ensure that the lagoon meets biological goals. These activities would include:
 - Fencing to provide habitat protection and posting of No Trespassing signs,
 - Enforcement of regulations associated with the restoration of the wetlands and protection of listed species,
 - control of nonnative invasive plant species by mechanical and chemical means as appropriate, and
 - control of feral/exotic animal species using trapping and barriers as appropriate.
6. **Nesting Areas/Breeding.** A comprehensive program of inspection and maintenance of sensitive species breeding and nesting areas would be included as part of the biological monitoring program. Nesting area management would require both regular control of excessive, especially weedy vegetation (such as those listed as High on the Cal-IPC species list), and of predators in the surrounding urban environment.
7. **Threatened and Endangered Species.** Species-specific monitoring and management objectives will be established in conjunction with the resource agencies for threatened

and endangered resident species. Measures may include ongoing surveys, habitat improvements, predator control, or other activities for the benefit of the species.

8. **Inlet Maintenance.** In addition to potential closure of the inlet by sediment transported during an extreme storm event, the regular flood and ebb currents moving through the inlet would build a flood shoal in the interior of the inlet. These sediment deposits in the flood shoal can change the habitat distribution within the wetlands by reducing the tidal range and/or by raising the elevations. As part of the adaptive management program, criteria establishing thresholds for initiating inlet maintenance would be developed.
9. **Channel Maintenance.** While maintenance of the inlet itself is anticipated to occur as frequently as every year, depending on the alternative, vegetation encroachment or sediment accumulation could occur in portions of lagoon channels over time (e.g., due to storm events). Channels would be monitored for sedimentation and vegetation encroachment that reduces hydraulic capacity, and removal of sediment and/or vegetation may occur. Maintenance of focused areas within lagoon channels is anticipated approximately every 10 years but would be tied to specific thresholds for initiating maintenance activities, which could involve vegetation removal and hauling from the site, or sediment removal through dredging small areas of the lagoon. Dredging beyond the initial channel dimensions would not occur without consultation and permits from appropriate agencies.

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CHAPTER 3.0

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

A total of 16 environmental issue areas are evaluated in this Draft EIR/EIS. Sections 3.1 through 3.16 describe the affected environment, or existing conditions, within the project study area for each issue area, and disclose the environmental consequences associated with implementation of the proposed project, plus alternatives. The organization of each of these sections is described in more detail below.

To determine the environmental consequences, or impacts, for each issue area, the proposed project and its alternatives are compared to a baseline condition. Under CEQA, the difference between the proposed project/alternatives and the baseline is then compared to a threshold to determine if the difference is significant. Under NEPA, this difference is used to discuss the magnitude of the potential effect due to the proposed project/alternatives. CEQA and NEPA may use different baseline conditions. The CEQA and NEPA baselines used to analyze the SELRP are also presented below, following the overview of the organization of each section.

3.0.1 ORGANIZATION OF EACH SECTION

To assist in comparing information about the various environmental issues, each section is linked to an issue area and is organized in the manner outlined in the following paragraphs.

Affected Environment describes the existing conditions for both the lagoon study area (Figure 1-2) and the materials disposal/reuse study area (Figure 1-3). The Affected Environment provides a description of conditions before project implementation and serves as the baseline physical conditions for the analysis of project impacts. More detail regarding the baseline is provided following this overview. This section is consistent with NEPA terminology but corresponds to Existing Conditions under CEQA.

CEQA Thresholds of Significance defines specific criteria used to determine whether an impact is or is not considered to be significant under CEQA. CEQA requires that an EIR include a determination of significant effects and identification of feasible mitigation measures to minimize those effects, while NEPA does not. According to NEPA regulations, a finding of whether a proposed action significantly affects the quality of the human environment is determined by considering the context in which it will occur and the intensity of the action (40 CFR Section 1508.27). Therefore, NEPA uses significance to determine the level of

documentation required for projects. Once a decision to prepare an EIS has been made, the magnitude of impact is evaluated and no further judgment of its significance is required. The thresholds of significance identified in each issue area of this EIR/EIS and the impact determinations are, therefore, directly associated with the analysis under CEQA to determine the potential significant effects of the proposed project and its alternatives. To facilitate review, each CEQA significance criterion is identified with a letter, and conclusions under the analysis refer back to those criteria for each CEQA conclusion. CEQA regulations generally define a significant effect on the environment as a substantial or potentially substantial adverse change in the physical environment (CEQA Guidelines Sections 15064 and 15126.2). Determinations of significance made in this EIR/EIS apply only to CEQA, not to NEPA. The significance thresholds used in this EIR/EIS also encompass the factors taken into account under NEPA to evaluate the context and intensity of the SELRP, but provide a relative context for understanding the magnitude of potential impacts only.

Questions listed in Appendix G of the CEQA Guidelines and thresholds established by the County of San Diego were considered for use as significance thresholds to characterize impacts, although different thresholds are sometimes used in Chapter 3 to reflect the unique and dynamic nature of lagoon enhancement and materials placement activities. Thresholds not developed from Appendix G or the County have been derived from previous enhancement projects involving lagoon enhancement or beach sand replenishment, including the San Dieguito Wetland Restoration Project EIR/EIS (SCH #98061010), the Bolsa Chica Lowlands Restoration Project EIR/EIS (SCH #2000071068), and the 2012 Regional Beach Sand Project EA/EIR (SCH #2020051063).

Environmental Consequences provides independent analyses of the two project components: lagoon restoration and materials disposal/reuse. The four lagoon restoration alternatives and each of the materials disposal/reuse locations are analyzed at an equal level of detail. This approach allows for comparison of the alternatives under each resource area and will facilitate the ultimate selection of an agency-preferred alternative for the Final EIR/EIS. While the analyses for lagoon restoration and materials disposal/reuse are separate, this is not meant to imply there is no connection between activities. There may be occasions when activities would occur in similar locations and/or times, but the analyses have been separated simply to facilitate reading of the document. Consistent with federal and state regulations and guidelines (40 CFR Section 1508.27; CEQA Guidelines Section 15064, 15126.2[a]), direct and indirect impacts are evaluated. Cumulative impacts are evaluated in Chapter 5 of this EIR/EIS. This section is consistent with NEPA terminology but corresponds to Impact Analysis under CEQA.

For the lagoon restoration alternatives, Alternative 2A was identified as the proposed project under the Draft EIR/EIS since it would result in the largest degree of overall impact. As

discussed in Section 2.3, the Draft 404(b)(1) Alternatives Analysis, included as Appendix O to this Final EIR/EIS, identifies Alternative 1B – Refined as the preliminary LEDPA. The identification of Alternative 2A as the proposed project in the Draft EIR/EIS did not reflect a preference for implementation of that alternative. The lagoon restoration evaluations provide a discussion of Alternative 2A first, followed by Alternative 1B, Alternative 1A, and the No Project/No Federal Action Alternative, which represent incrementally lesser overall impacts. The analysis incorporates the implementation of design components, regulations, and proactive design features into the conclusions. Each alternative analysis addresses short-term impacts associated with construction of the lagoon restoration project. Permanent impact analyses address impacts associated with construction, as well as long-term intermittent impacts associated with anticipated periodic maintenance and adaptive management of the lagoon.

For the SELRP, the restoration activities are water dependent and must be conducted within Corps jurisdiction to be effectively implemented. The No Federal Action Alternative, therefore, assumes that no activities would take place within Corps jurisdiction, which encompasses Escondido Creek and adjacent wetlands and riparian areas, the lagoon, and the Pacific Ocean. The only aspects of the project not within Corps jurisdiction are the construction staging and access roads, as well as some portions of Coast Highway 101 and the beach placement sites. Therefore, no restoration activities could occur without a federal action (a DA permit from the Corps) and the No Project Alternative is the same as the No Federal Action Alternative.

The materials disposal/reuse analysis is also organized by lagoon restoration alternative, then by generalized type of placement, as appropriate. Under Alternative 2A—proposed project and Alternative 1B, locations proposed for materials placement include offshore stockpile areas (SO-6 and SO-5), the nearshore zone (Cardiff), beaches (Leucadia, Moonlight, Cardiff, Solana Beach, and Torrey Pines), and on-site use for transition and nesting areas. Construction of Alternative 1A is associated with off-site disposal in LA-5 only, as well as limited on-site use for transition areas and nesting areas. Analysis of the overdredge pit is generally addressed under the lagoon restoration component since it would be located within the dredged area and is encompassed in the basin disturbance footprint. For many issue areas, the effects associated with sand placement would be related to the type of placement rather than specific placement sites. Where the specific locations could result in different effects, the impact analysis is clearly defined by site.

For both the lagoon restoration alternatives and materials disposal/reuse scenarios, the analyses present evidence for the cause-and-effect relationship between the project alternatives and the expected changes in the environment. The magnitude, duration, extent, frequency, range, or other parameters of an impact are identified, to the extent possible, to discuss the magnitude of the potential effect and determine whether impacts would be significant under CEQA, or

substantially adverse under NEPA. All potential effects, including direct effects and reasonably foreseeable indirect effects, are considered. Following the analysis, the level of significance is identified, as defined by CEQA. An impact may be deemed one of the following: no impact, less than significant impact, significant but mitigable impact, or a significant and unavoidable impact. Effects considered substantially adverse under NEPA are also identified. The two conclusions may differ based on different approaches to impact determinations, since NEPA is not specifically threshold-driven for most resources. The definitions of these terms are provided following the more detailed discussion of baselines under CEQA and NEPA in Section 3.0.3.

It should be noted that the structure of Section 3.16 Global Climate Change and Greenhouse Gas Emissions, varies slightly from the format described above. To thoroughly analyze the project's resiliency to sea level rise and extreme events, the proposed project and alternatives have been analyzed for the horizon years of 2065 and 2100, in accordance with guidance set forth by the State Coastal Conservancy (State Coastal Conservancy 2012). This section addresses greenhouse gas emissions as well as effects possibly related to predicted sea level rise.

Mitigation measures identify the means by which impacts could be reduced or avoided in cases where the analysis determines such impacts to be significant or substantially adverse under CEQA or NEPA, respectively. Standard existing regulations, requirements, programs, and procedure, as well as project design features in Table 2-26, are considered in the impacts analysis. It should also be noted that the SELRP is a restoration project, and therefore has proactively incorporated a number of features into design that avoid potentially significant impacts or enhance the ability of the project to successfully restore functions and services of the lagoon system. Specific mitigation measures are tied to a particular significant or substantially adverse impact identified within the analysis and describe additional, potentially feasible actions to minimize adverse impacts or reduce significant impacts to less than significant levels. Upon approval of the EIR/EIS, a mitigation monitoring program would be adopted to ensure implementation of identified mitigation measures. Project design features identified proactively would also be incorporated into final project requirements.

Significance after mitigation identifies the impacts that would remain after application of mitigation measures, and whether the remaining impacts would or would not be considered significant under CEQA. When these impacts, even with the inclusion of mitigation measures, cannot be mitigated to a level considered less than significant, they are identified as "significant unavoidable impacts." Under CEQA, the lead agency must adopt a Statement of Overriding Considerations to approve a project with significant unavoidable impacts. In adopting such a statement, the lead agency finds that it has reviewed the EIR, has balanced the benefits of the project against the significant and unavoidable adverse environmental effects, and has

determined that the benefits outweigh the adverse environmental effects. Thus, the significant and unavoidable environmental effects may be considered “acceptable.”

3.0.2 CEQA AND NEPA BASELINES

As a joint EIR/EIS, this impact analysis considers both the CEQA and NEPA baselines. CEQA requires a project to review its impacts relative to “change from existing conditions,” while NEPA directs that agencies use the process “to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the environment” (40 CFR 1500-2[e]). The baseline for the SELRP is the existing environmental conditions against which impacts of the proposed action and its alternatives can be compared for both CEQA and NEPA. The analysis generally does not provide a separate conclusion distinguishing between the NEPA and CEQA baselines, as defined below.

In accordance with Section 15125 of the CEQA Guidelines, the baseline condition under CEQA is typically defined by the physical environmental conditions in the vicinity of a project as they exist at the time of the NOP, which, for the SELRP, was November 2011. Identifying the baseline condition for most projects is relatively straightforward, since many resources remain relatively static or change slowly over time. This is not the case for the SELRP, given that the conditions at the lagoon are dynamic and the coastal littoral process is seasonally and annually variable, influenced by environmental circumstances such as tidal fluctuations and storm events. Because of the dynamic conditions at the lagoon and along the coast, defining the baseline for the proposed project must consider this fluctuation in “existing conditions.” For the SELRP, the analysis tries to capture rapidly transitioning habitat, for example, in the existing condition. In addition, extensive modeling was required to establish an average condition that realistically reflects existing conditions. The SELC and other agencies have historically gathered a large amount of data on selected topics, i.e., water quality and biology, which provides a large body of information. This provides a broader understanding of baseline than a single point in time. Therefore, some of the analyses within this EIR/EIS are reliant on baseline data that differs from, and is not limited to, the November 2011 issuance of the NOP and NOI. For example, the baseline for biological conditions with respect to species present is defined by historic information from experts. All information at the time of issuance of the NOP was consolidated to provide a cohesive picture of populations in the lagoon. A focused update to include light-footed Ridgway’s rail survey information from 2012 and 2013 was included to capture changes in population that occurred during that time, and reflected conditions prior to public review of the EIR/EIS. Thus, the baseline for biological resources is concurrent with the issuance of the NOP, with the exception of light-footed Ridgway’s rail, for which the baseline is the spring of 2013. Information on the origin and applicability of baseline conditions is included at the beginning of each issue area discussion.

3.0.3 DEFINITION OF KEY IMPACT TERMINOLOGY

Potential direct and indirect, as well as both permanent and temporary, impacts would occur with implementation of the SELRP. These impacts are defined below.

Direct: Direct impacts are caused by the action and occur at the same time and place as the action.

Indirect: Indirect impacts occur later in time or are farther removed in distance but are still reasonably foreseeable and attributable to project-related activities.

Permanent (long-term): All impacts that result in irreversible effects or removal of resources are considered permanent.

Temporary (short-term): Any impacts considered to have reversible effects on resources may be viewed as temporary.

Each impact is also further classified under both CEQA and NEPA. Under NEPA, determination of impacts that would result in substantial adverse effects on the environment is made. One of the following phrases is used to describe each impact as part of the analysis pursuant to CEQA:

No impact: A designation of no impact is given when no adverse changes in the environment are expected.

Less than significant impact: A less than significant impact is identified when the proposed project or alternatives would cause no substantial adverse change in the environment (i.e., the impact would not reach the threshold of significance).

Significant impact: A significant (but mitigable or avoidable) impact is identified when the proposed project or alternative would create a substantial or potentially substantial adverse change in the physical conditions within the affected resource area. Such an impact would exceed the applicable significance threshold established by CEQA, but would be reduced to a less than significant level by application of one or more mitigation measures.

Significant unavoidable impact: A significant unavoidable impact is identified when an impact that would cause a substantial adverse effect on the environment could not be reduced to a less than significant level through feasible mitigation measure(s).

3.1 LAND USE/RECREATION

This section describes existing environmental conditions related to land use and recreation in the area surrounding San Elijo Lagoon and the areas identified for materials disposal/reuse. This section also identifies pertinent policies and regulations governing land use and recreation activities in the designated project areas and evaluates the impacts associated with implementation of the proposed project and its alternatives.

3.1.1 AFFECTED ENVIRONMENT

San Elijo Lagoon

Lagoon Study Area Boundaries and Land Ownership

The lagoon is within the San Elijo Lagoon Reserve in north San Diego County, between the cities of Encinitas and Solana Beach, extending inland to the unincorporated County of San Diego community of Rancho Santa Fe. The Reserve is owned and managed by the SELC, CDFW (generally west of I-5), and County DPR (generally east of I-5). The lagoon study area boundaries generally include publicly owned parcels where restoration activities would occur. The lagoon study area boundary is not necessarily contiguous with the boundaries of the Reserve as the lagoon study area extends west to reflect the project actions at the beach (i.e., new inlet and beach nourishment with dredged material) and does not extend as far east as the Reserve since the focus of the restoration effort is wetlands, rather than uplands. Refer to Figure 1-2 illustrating the lagoon study area boundaries and land ownership.

While the vast majority of the lagoon study area is publicly owned, three privately owned parcels totaling approximately 3 acres are included within the lagoon study area boundaries. These parcels contain both channels and habitat within the lagoon. The water flow in these channels and connectivity to adjacent lagoon lands between Coast Highway 101 and the NCTD railroad are considered integral to restoration success. Thus, these three private parcels are considered part of the study area for restoration planning purposes.

The western extent of the study area includes the beach area west of the lagoon (excluding the parking lot at Cardiff State Beach) and extends into the water at the potential inlet location sites. The beach area west of the lagoon is within the jurisdictional boundaries of Encinitas, but a large stretch of the beach area encompassing Cardiff State Beach is owned by the State of California (see Figure 1-2). The southern extent of the study area includes the public ROW owned by Caltrans adjacent to I-5, but it does not include the private lands located on nearby slopes and uplands west of I-5. The northern boundary essentially coincides with the Reserve boundary and Manchester Avenue, with the addition of acquired mitigation lands in the northeast corner of the study area.

Existing Land Uses

The lagoon, partially located in the Encinitas community of Cardiff-by-the-Sea, is designated as Ecological Resource/Open Space/Park by the City of Encinitas General Plan (City of Encinitas 1989, amended 2003). The beach areas west of Coast Highway 101 are also designated Ecological Resource/Open Space/Park by the City of Encinitas. The lagoon is also officially designated as an Ecological Reserve by CDFW. To the north, surrounding land uses include primarily residential development with higher densities concentrated west of I-5 and a small strip of commercial land use, including “Restaurant Row” located along Coast Highway 101 adjacent to the north end of the lagoon, just south of the existing lagoon inlet. San Elijo State Beach and Cardiff State Beach occupy the coastal areas directly north and south of the existing lagoon inlet. Moving east of I-5, the northern boundary of the lagoon is bordered primarily by single-family residential development. The San Elijo Joint Powers Authority (water reclamation facility) is located north of the lagoon near the intersection of Manchester Avenue and Mackinnon Ranch Road. An area of agricultural uses is also located in this area adjacent to the lagoon along Manchester Avenue between I-5 and El Camino Real. The NCTD railroad ROW traverses the lagoon from north to south.

The lagoon is bordered to the south by the City of Solana Beach. Land uses bordering the lagoon in Solana Beach primarily consist of single-family residential development. An unincorporated area of San Diego County lies east of San Elijo Lagoon. The area is part of the San Dieguito Community Planning Area of the San Diego County General Plan. Currently, the area primarily consists of spaced rural development, agricultural uses, and undeveloped land (County of San Diego 2010). Residential development includes primarily large estate homes.

Existing Recreational Uses

The Reserve is a multiuse recreational area providing opportunities for walking, hiking, running, bird watching, equestrian use (permitted on trails east of I-5 only), nature observation, and photography. Within the Reserve, activities including swimming, wading, diving, fishing, watercraft, and other water-based recreation are not permitted within lagoon waters. Trails are accessible from trailheads located in the central and east basins, providing visitors with 7 miles of designated trails for recreation and exploration. These trails, shown in Figure 3.1-1, include the Nature Center Loop, North Rios Avenue Trail, Holmwood Canyon Trail, Solana Hills Trail, Dike Trail, Santa Inez Trail, Santa Carina Trail, Santa Helena Trail, and La Orilla Trail. The Nature Center Trail is a 0.5-mile Americans with Disability Act (ADA)-accessible loop trail with information panels at the Nature Center. To a great extent, the other identified trails follow old road beds or currently maintained utility roads, which have been in existence for many years. Most of the project area is not fenced but vegetation, topography, and private property limit access



Existing Trails



Alternative 2A



Alternative 1B



Alternative 1A

LEGEND

	Study Area		Existing Trail		Proposed Trail
			Hiking Trail		Bike Trail
			Hiking/Equestrian Trail		Hiking Trail

Figure 3.1-1
 San Elijo Lagoon
 Trail Network by Alternative

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except at designated trailheads. Legal public access to the lagoon is limited to daylight hours. Portions of Manchester Avenue just north of the lagoon are striped for bicycle lanes.

As one of San Diego's largest coastal wetlands, San Elijo Lagoon and the Reserve serve as an outdoor classroom for students of all ages throughout San Diego County. A number of education and service learning programs are available to the public. The SELC, in cooperation with County DPR park rangers, offers volunteer-driven restoration opportunities such as trail maintenance and invasive species removal. The Nature Center is operated by one supervising park ranger, two park rangers, one park attendant, and volunteers with County DPR. The Nature Center hosted some 18,884 visitors in 2011 and the SELC Education Program provided outdoor programs to students and teachers from various parts of San Diego County over that same period (SELC 2012).

San Elijo Lagoon is also designated as a State Marine Conservation Area (SMCA) under the Marine Life Protection Act (MLPA) as shown in Figure 3.1-2 and discussed further in Appendix C. In accordance with California Code of Regulations (CCR) Title 14, Section 632(b)(139), boating, swimming, wading, and diving are prohibited within the San Elijo SMCA.

In the coastal area immediately west of the lagoon, Cardiff State Beach and San Elijo State Beach offer a variety of onshore and offshore activities. Land and recreational uses in this coastal area are discussed in more detail in the *Materials Disposal/Reuse Study Area* section below.

Materials Disposal/Reuse Study Area

Materials placement associated with the lagoon restoration activities could occur offshore, nearshore, or onshore. The Pacific Ocean and its shores are the focus of recreational activity and also define land uses in the project areas. As such, much of this discussion focuses on recreational uses; however, adjacent land uses and the applicable jurisdiction governing each site are identified. Offshore placement sites are described first, followed by onshore and nearshore sites in order from north to south (i.e., Encinitas, Solana Beach, and San Diego).

Information included in the discussion below is referenced from SANDAG's EIR/EA for the 2012 RBSP (SANDAG 2011). Information has been updated as needed with information included in the *San Elijo Lagoon Restoration Project Surfing Study* (Appendix N, M&N 2014).

Offshore Materials Placement Sites

There are two potential offshore placement sites for the SELRP, SO-5 and SO-6. The sites are located along the coast in relative proximity to the onshore materials placement sites but far enough offshore to be outside the littoral cell depth of closure. The offshore materials placement

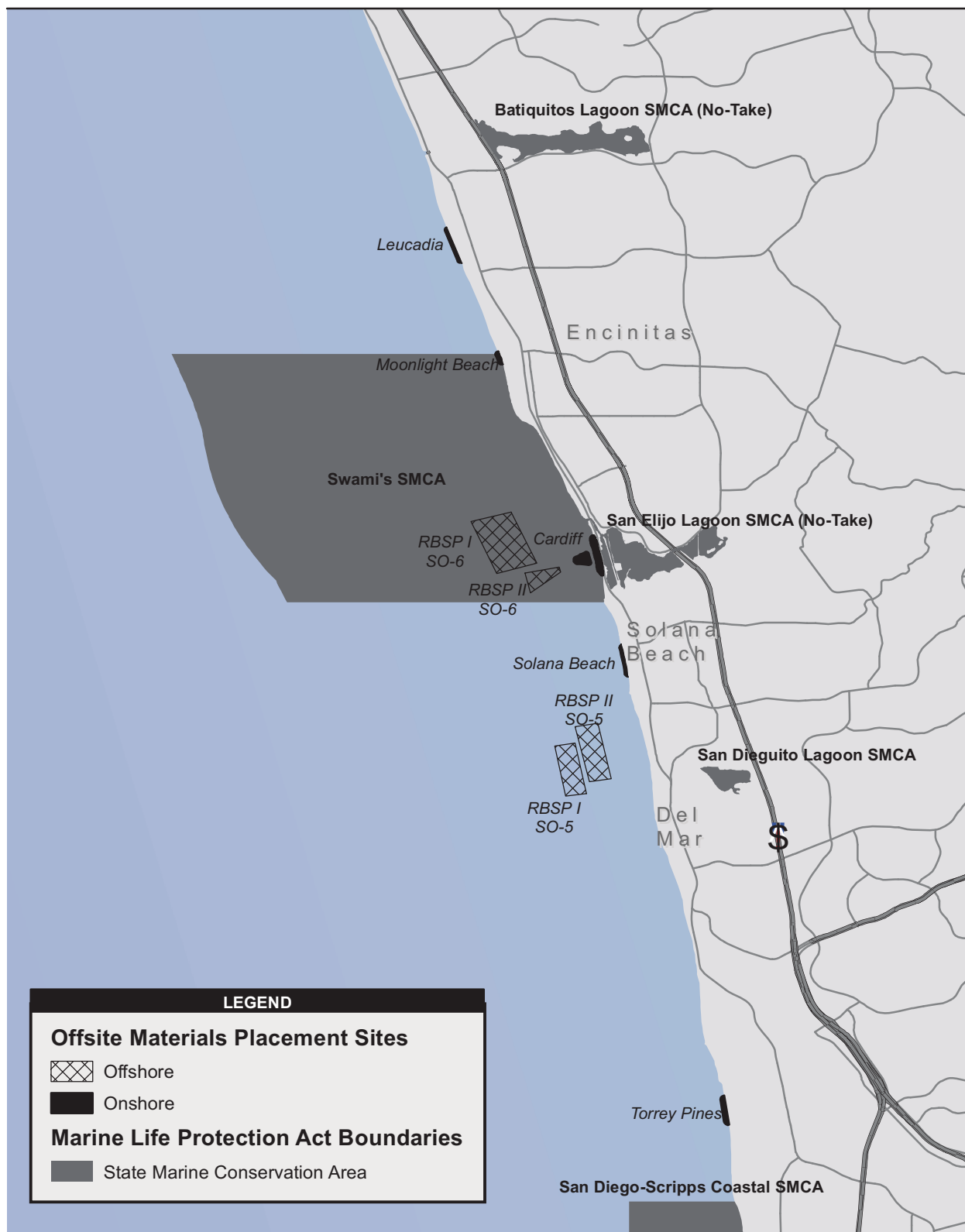


Figure 3.1-2
Marine Preserve Areas

sites are surrounded by ocean water, and recreational activities include diving, sailing, and fishing. Adjacent uses of submerged lands include sewer outfalls, artificial reefs, and underwater parks. Adjacent water uses to the offshore placement sites include kelp harvesting and whale watching. Kelp is gathered by a specially designed ship that cuts the kelp to a depth of approximately 4 feet below the surface. Kelp harvesting in the area is further described in Section 3.13 Socioeconomics/Environmental Justice. Gray whales migrate through San Diego's offshore waters twice a year on their way between summer feeding grounds off Alaska and calving areas in the coastal lagoons of Baja California, Mexico. Private and charter boats venture out to watch the migrating whales. The San Diego-La Jolla Underwater Park is located approximately 4 miles south of SO-6 and 2 miles south of SO-5.

Both SO-6 and SO-5 are located in ungranted sovereign lands under the jurisdiction of the SLC. A lease is required from the SLC for any portion of a project extending into state-owned lands that are under its exclusive jurisdiction. Each placement site is described below.

SO-6: The refined SO-6 materials placement site is shown in Figure 1-3 and is located in the Swami's SMCA (further discussed in Sections 3.1.3, 3.1.4, and Table 3.1-3) west of San Elijo Lagoon and the San Elijo wastewater outfall pipeline. SO-6 is located seaward of a lease to the California DPR from the SLC (PRC 7365) for an underwater recreational park. This lease area extends along the shore from Swami's Point in Encinitas south to Tabletops reef in Solana Beach and it extends seaward approximately 3,500 feet. SO-6's closest boundary is approximately 250 feet away (seaward) from the lease area. The closest artificial reef within the underwater park is located approximately 2,250 feet from SO-6. There are no known shipwrecks within the area of SO-6.

SO-5: The 2012 RBSP SO-5 materials placement site is located offshore of the San Dieguito River, as shown in Figure 1-3. SO-5 is approximately 2 miles north of the San Diego-La Jolla Underwater Park, a recreational area for divers. There are no artificial reefs or known shipwrecks within the area of SO-5.

One more offshore site has been identified for materials disposal activities; LA-5. LA-5 is regulated by EPA and the Corps and is described below:

LA-5: LA-5 is an EPA-designated ocean disposal site located approximately 10 nautical miles offshore, southwest of San Diego Bay. This site can be used for the disposal of dredged material from federal projects. The project must establish that the dredged material would not exceed the capacity of the site and the material is in compliance with the EPA and Corps criteria and regulations prior to approval to dispose of material by EPA and the Corps (EPA 1987).

Because LA-5 is located 10 nautical miles offshore, the discussion of land use and recreation at this location does not apply as the site is surrounded entirely by open ocean. Recreational ocean fishing may occur in locations near LA-5. Ocean uses, such as commercial fishing, are discussed in Section 3.13 Socioeconomics.

Nearshore and Onshore Materials Placement Sites

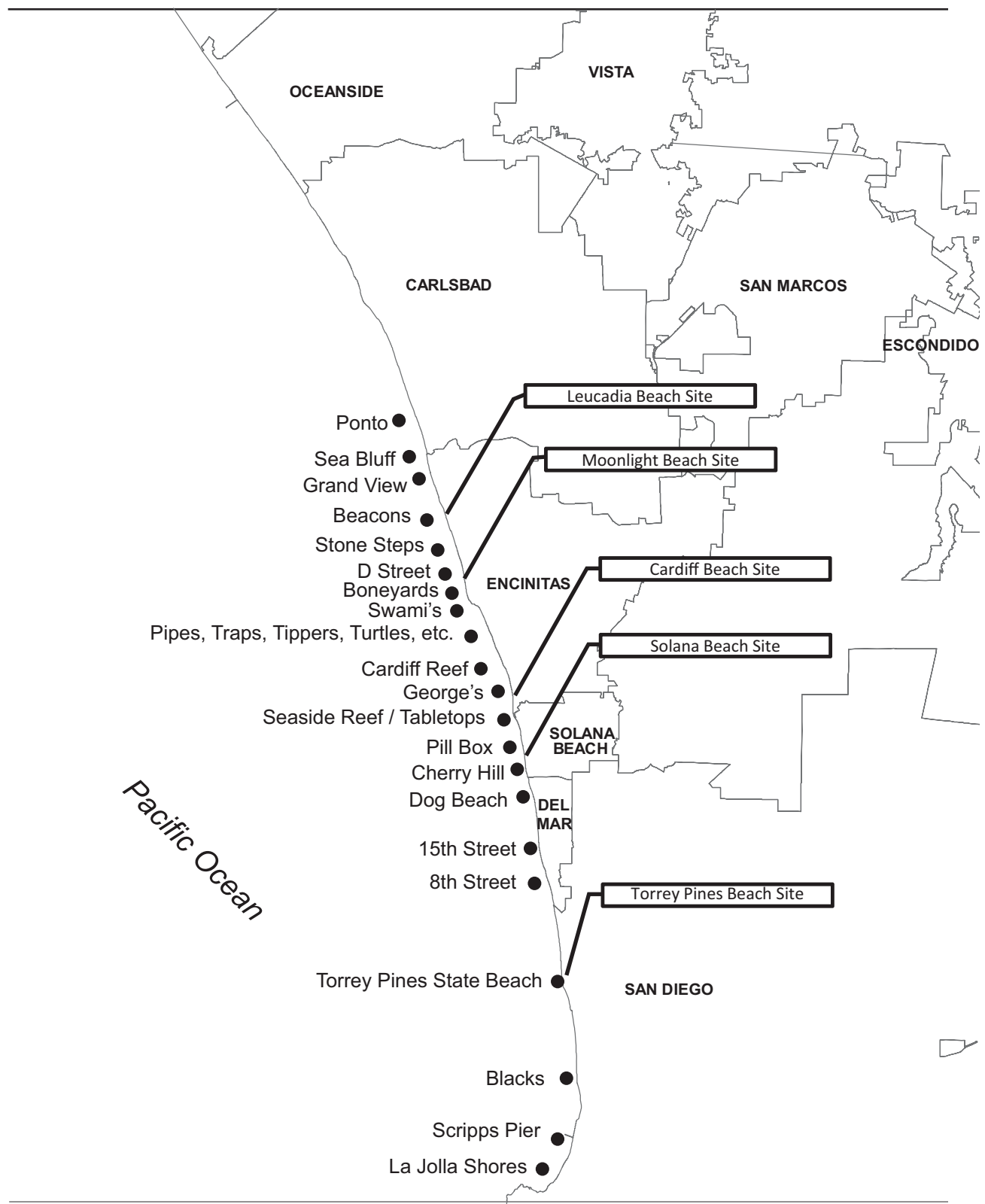
Generally, recreational activities at the nearshore and onshore placement sites include a variety of activities such as walking/jogging, swimming, surfing, stand up paddle boarding, windsurfing, sunbathing, beach combing, fishing, SCUBA and skin diving, hiking, picnicking, boating, sailing, and bicycling. Surfing occurs throughout the project area and within the vicinity of proposed nearshore and onshore materials placement sites. Because surfing conditions are dependent on localized sand movement and sandbar development, surfing is more specific to individual placement sites and is therefore discussed in more detail under each site. Surfing sites in the project areas are shown in Figure 3.1-3.

Each placement site is described from north to south by jurisdiction (i.e., Encinitas, Solana Beach, and San Diego). At proposed on-beach placement sites, most of the same onshore recreational activities occur and are therefore not discussed separately. Unique recreational activities and conditions, such as surfing, are noted under the discussion of that particular beach.

Encinitas

Within the City of Encinitas, there are three proposed materials placement sites: Leucadia, Moonlight Beach, and Cardiff. The SLC has jurisdiction over sovereign land at these sites. Authorization from the SLC would be required for implementation of the proposed materials disposal/reuse action. The proposed Moonlight Beach and Cardiff Beach materials placement sites and the SO-6 site are located within the Swami's SMCA boundary. The Marine Protection Act (MPA) regulations for Swami's SMCA allow sand replenishment and sediment management activities within its boundaries.

Leucadia: The beach at this placement site extends approximately 2,700 feet (0.5 mile) from just south of the Grandview access stairs to Jasper Street. Adjacent land uses are predominantly residential, with some commercial uses along Coast Highway 101. This state beach is a unit of the state park system that is operated by the City of Encinitas. Recreation at the Leucadia site is limited due to difficult access. Public stairways exist at Grandview Street and Leucadia Boulevard (Beacon's), and several private stairways serve existing residences atop the bluff.



Source: Moffet & Nichol



0 2 4 8 Miles

Figure 3.1-3
Surfing Spots near the Project Area

Popular surf spots near the placement site include Grandview and Beacon's (Figure 3.1-3). Beacon's is a reef break and is surfed year-round. The beach breaks offer lefts and rights as well as a right-hand reef break. Beacon's is surfable at all stages of the tide. It is often crowded and rocks are a hazard. Grandview is to the north of Beacon's and is also a reef with sand that provides surfing during most conditions.

Moonlight Beach: The proposed Moonlight Beach placement site is located at the foot of B and C streets at Moonlight State Beach. The proposed site is approximately 770 feet long (0.1 mile). Moonlight State Beach is a unit of the state park system but is operated by the City of Encinitas. Facilities at Moonlight State Beach include two lifeguard towers, volleyball and tennis courts, picnic facilities, recreational equipment rentals, and a snack bar. During the summer, Moonlight Beach is the central point for activities such as Junior Lifeguard programs, surf schools, and YMCA camps. The southern part of the site abuts the Encinitas City Marine Life Refuge (California Fish and Game Code Section 10913). Within the refuge boundaries, it is illegal to take invertebrates or marine life specimens except under a permit. Kelp harvesting, for recreational or commercial use, is prohibited except under a permit.

Residential uses occur adjacent to the site, to the north and south. The beach area is relatively flat but quickly slopes up to the east, north, and south. Public access is found at Moonlight State Beach (B and C streets) and south at the D Street stairway. Popular surf breaks along this reach include Stone Steps, Moonlight Beach, D Street, Boneyards, and Swami's (Figure 3.1-3). Swami's is the most popular spot in the vicinity. Boneyards and Swami's are reef breaks located south of the receiving beach and are bound to the north by scattered beach breaks in the vicinity of D Street and Moonlight Beach. These beach breaks are most popular in the summer and are of variable quality contingent on sandbar, swell, and wind conditions.

Cardiff: Sand placement is proposed both in the nearshore and onshore at Cardiff. The Cardiff site onshore is characterized by cobble beaches south of Restaurant Row. The site abuts Coast Highway 101 and is backed primarily by the lagoon. In its entirety, Cardiff State Beach stretches from Cardiff reef south to Seaside reef, encompasses approximately 25 acres, and has 6,550 feet of ocean frontage. The facility includes two parking lots (at each of the north and south ends of the beach), restrooms, and an emergency vehicle access ramp. The waters off of Cardiff State Beach also support nonrecreational uses, including commercial fishing and kelp harvesting. Commercial fishing generally occurs in the same locations as recreational fishing (refer to Section 3.13 Socioeconomics for further discussion of commercial fishing).

Popular surf breaks in the vicinity of the proposed placement beach are Cardiff reef to the north, George's (located just south of Restaurant Row) within the placement site, and

Seaside reef/Tabletops to the south (Figure 3.1-3). Surf breaks in the region are predominately reef breaks, with the exception of George's, which is a beach break of variable quality. Other notable surf spots in the region exist north of Cardiff reef within San Elijo State Park and include Pipes, Traps, Tippers, Turtles, and others. Surfing is very popular in this reach due to the abundance of spots and wind protection provided by offshore kelp.

North of the Cardiff placement site is San Elijo State Beach, which is a highly used recreational facility. This beach includes approximately 42 acres with 7,190 feet of ocean frontage and is more developed than Cardiff State Beach. Facilities include a 171-unit campground with five comfort stations, an 86-space day use parking lot, a unit office, an entrance station, a concessions building, a lifeguard tower, an informal campground center, and six beach access stairways. In addition to activities commonly encountered at Cardiff State Beach, San Elijo State Beach is also a popular camping spot. The bathymetry along San Elijo State Beach is typified by contours that are straight and aligned parallel to shore, with little variation. As such, waves typically "close out" along this reach of beach and are difficult to ride. This condition can vary, depending on conditions of waves, tides, and wind, but is basically unvarying. Therefore, this is not a primary surfing location under most conditions and can go for long periods of time without producing quality surf to ride.

Solana Beach

The proposed placement site in the City of Solana Beach is located just north of Estrella Street and extends approximately 4,700 feet (0.9 mile) south. Steep cliffs abut the placement site and the area consists of a gently sloping sand beach with scattered rocks and cobbles. Fletcher Cove Beach Park, also known as Pillbox, is the main park within Solana Beach. Residential development and some commercial uses exist along the bluffs above the placement site. The bluffs and beach are severely eroded, and numerous efforts to slow erosion, such as riprap, the filling in of sea caves, engineered in-fills, sea walls, and other revetments occur along the bluffs and beach. A lifeguard station, restrooms, and a public shower are available at Fletcher Cove.

Surfing in the area consists of scattered reef and beach breaks. The reef breaks are the most consistent and hence the most popular for surfing. A small subtidal reef exists immediately north of Pillbox. Surfing can be popular at this reef depending on offshore sand, swell, and tides. Surfing is also popular to the north at Seaside reef/Tabletops and to the south at Cherry Hill. Popular surf spots near the placement site are shown in Figure 3.1-3.

San Diego (Torrey Pines)

The proposed Torrey Pines placement site is located within the jurisdiction of the City of San Diego and California State Parks. The site stretches for approximately 1,620 feet (0.3 mile) and is located on Torrey Pines State Beach adjacent to North Torrey Pines Road. Nearby land use includes the open space of Torrey Pines State Beach/Reserve and Los Peñasquitos Lagoon. Public access is via trails at Torrey Pines State Beach/Reserve and along North Torrey Pines Road. The beach includes lifeguard stations and a 6- to 8-foot sand berm. Riprap has been placed along the west end of North Torrey Pines Road to protect it from eroding further.

As shown in Figure 3.1-3, popular surf breaks in the vicinity are scattered beach breaks of variable quality along Torrey Pines State Beach, reef and beach breaks to the north in Del Mar (i.e., 8th Street and 15th Street), and beach breaks to the south (i.e., Black's, Scripps Pier, and La Jolla Shores). Black's Beach, Scripps Pier, and 15th Street are likely the most popular spots in the area as they provide consistent surf year-round. In addition to the popular recreational activities found on other San Diego beaches, paragliding and parasailing are popular at this site.

The Torrey Pines placement site involves sovereign land granted to the City of San Diego by the SLC pursuant to Chapter 688, Statutes of 1933. As such, permits necessary for the SELRP would be granted by the City, as trustee of these lands.

3.1.2 CEQA THRESHOLDS OF SIGNIFICANCE

A significant impact related to land use and recreation would occur if implementation of the proposed project would:

- A. Result in long-term or permanent conversion of land to other uses that would strain similar, nearby uses in their ability to provide the same level of use as that of existing conditions;
- B. Be incompatible with adjacent land uses as defined by planning documentation;
- C. Conflict with existing or future planned areawide or local policy issues or plans;
- D. Preclude viability of recreational activities, including surfing, during construction (temporary impacts) that result in a major loss of recreational uses; or
- E. Result in permanent and major loss of recreational use areas or major conflicts with adjacent recreational uses, including surfing, in the post-construction period.

The CEQA thresholds of significance for land use and recreation were derived from the thresholds used in the EIR/EIS for the Bolsa Chica Lowlands Restoration Project (SCH #2000071068). These recreational thresholds are specific to the recreational uses that occur within the unique coastal environment in and around the lagoon and materials placement sites.

3.1.3 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences, or impacts, associated with the SELRP related to land use and recreation. Potential adverse, significant, or beneficial direct and indirect impacts are identified as appropriate.

The relevant policies and regulations dictating land use and recreational uses at the project site and materials disposal sites are discussed within this section. A comprehensive description of applicable regulatory laws, plan, policies, and regulations is provided in Appendix C. Additional regulatory requirements pertaining to other specific topic areas, such as noise, air quality, water quality, etc., are discussed in their respective analysis sections.

Certain regulatory actions related to land use and recreation would be required prior to project initiation by various regulatory agencies. County DPR would decide whether to certify the EIR/EIS and approve the appropriate right-of-entry permits, then would issue an NOD and grant right-of-entry permits for work to be performed on County DPR-owned land. After certification of this EIR/EIS by the County DPR, the SELC would need to obtain a CDP from the CCC for both the lagoon restoration and materials disposal component of the project, as applicable. The CCC would also decide whether to issue a Consistency Certification in accordance with the California Coastal Act (CCA) or a Waiver of Federal Consistency Provisions.

The SELC would need to obtain encroachment and grading permits for work within both the cities of Encinitas and Solana Beach within areas not owned by County DPR or CDFW. Work occurring on County- or state-owned land would not require approvals from the City of Encinitas or Solana Beach pursuant to Government Code Sections 53090 and 53091. Additionally, the cities of Encinitas and Solana Beach have approved LCPs that address potential materials placement sites. Thus, the SELC would apply for a CDP for material placement activities. Alternatively, a consolidated CDP could be requested from the CCC.

Encroachment and use permits for construction activities on properties and ROWs for California State Parks, Caltrans, and NCTD would also be required and the SLC would require a lease agreement for access to lands under their jurisdiction (see Section 1.5).

Lagoon Restoration

Alternative 2A

Land Use

The lagoon currently functions as a coastal wetland and open space/reserve area. Alternative 2A would primarily result in changes to existing channels and habitat distributions within the lagoon. Construction activities (i.e., excavation and dredging) would primarily take place within the boundary of the lagoon and would not result in the permanent conversion of the lagoon from a wetland to another land use post-restoration. The overall existing land use of the lagoon would not change; it would remain a coastal wetland and open space/reserve area. With restoration of the lagoon, the continuation of the lagoon land uses would remain compatible with the surrounding areas and not modify land uses in nearby areas.

Alternative 2A would result in construction of a new tidal inlet located south of the existing inlet, as shown in Figure 2-3. Approximately 1,000 feet of beach may be closed during inlet construction, reaching 500 feet north and south, respectively, of the tidal inlet centerline. Direct use of the beach at the new inlet area would be restricted during the period of inlet construction, estimated to be approximately 6 months. The new inlet would require construction of CBFs on both sides that would extend from Coast Highway 101 perpendicularly onto and under the beach. The new inlet and CBFs would modify the existing beach continuity and existing beach use through permanent conversion of this area to a lagoon inlet; however, it would not substantially alter the continued coastal beach land use of the area. This new inlet area would likely be inaccessible to beachgoers, depending on conditions. Therefore, persons walking on the beach would either wade through the inlet, or pass over the inlet over the new Coast Highway 101 bridge. This same type of condition exists at numerous tidal inlets in the region (San Dieguito, Batiquitos, Santa Ana River, Talbert Channel, and Bolsa Chica). Currently, the existing tidal inlet area at San Elijo is used for swimming and wading activities and is also inaccessible during high tides. Under Alternative 2A, the existing inlet would eventually close, leaving this area consistently accessible to beach users. Beach areas around the existing inlet would remain accessible for public use as the inlet fills in and returns to sandy beach conditions. Essentially, the existing and new tidal inlets would switch land uses; the existing tidal inlet would close and return to fully accessible beach use, while the new tidal inlet would become a swimming and wading area with some inaccessibility during high tide. This would be consistent with the current uses of the Cardiff Beach area in this location and would not result in substantial land use changes or incompatibility.

North-south access along the coast would continue to be provided along Coast Highway 101, so beach users that are not able to cross the inlet on the beach during high tides would still be able to access beach areas on either side of the inlet using the proposed separated pedestrian sidewalk on Coast Highway 101, similar to current conditions. Thus, horizontal access across the beach area would be maintained. In addition, the beach areas on either side of the new inlet would have additional material placed from restoration implementation (300,000 cy) and periodic enhancement from maintenance dredging, which could enhance this beach. The new inlet and CBFs would be considered a change from existing conditions; however, sufficient beach area for continued recreational use would be available on both sides of the inlet and north-south access would be maintained both during and after construction. Therefore, overall beach use and access in the area would not be substantially restricted.

A new bridge along Coast Highway 101 would be constructed to span the new inlet location. Construction of the new Coast Highway 101 bridge would result in the temporary closure of two highway lanes. However, roadway capacity would be restored upon completion of the new bridge, and north-south access along the highway and to the neighboring commercial establishments would be maintained during construction (PDF-43, PDF-44 and PDF-45). In addition, upon completion of the new bridge, a pedestrian walkway/bicycle path would be incorporated on the west side of the highway to allow beach users to continue to access the beach both north and south as shown in Figure 2-5.

Railroad operations and service would be maintained throughout construction unless otherwise arranged with NCTD and would not be substantially disrupted by SELRP restoration activities. Restoration and maintenance of the lagoon would not affect future railroad services or operations within the NCTD ROW. This would allow for the continuation of the railroad to provide coastal access in accordance with requirements of Chapter 3 of the CCA.

Construction staging and access areas shown in Figure 2-15 would be returned to their previous conditions after construction (PDF-46). As shown in Figure 2-15, several staging areas would be used for periodic maintenance dredging activities occurring once every 3 to 4 years requiring approximately 5 months to complete. One onshore staging area is located on the west side of Coast Highway 101 (south of The Chart House restaurant). Periodic maintenance activities would require temporary use of this beach area for sand placement; however, no structures or equipment would be left there permanently and the area would be restored to its beach condition upon completion of maintenance activities. Other staging and access areas used for maintenance activities are located within the lagoon and would not permanently change or strain nearby uses. While the land use of these staging areas would be modified during construction or maintenance periods, such as the conversion of beach area to an inaccessible staging area, these temporary construction-related impacts would not result in the permanent conversion of the current use into

a different use or create substantial land use conflicts or inconsistencies. Post-construction impacts related to conversion of land use are also not anticipated as the areas would be restored to their original conditions.

For the reasons detailed above, impacts associated with the permanent conversion of land to other uses that would strain nearby or existing uses would be **less than significant (Criterion A). No substantial adverse impacts have been identified.**

As previously described, restoration activities would not change the existing nature of the lagoon or substantially alter existing land uses in surrounding areas. However, during construction, nearby residences and businesses may experience temporary indirect construction-related impacts associated with traffic and/or noise, which could cause incompatibilities with surrounding land uses (refer to Sections 3.10 and 3.12, respectively, for detailed analysis of these impacts and minimization measures to help address the effects). In addition to the traffic and noise minimization measures, project design features require implementation of a public information program to assist nearby residents in understanding the purpose of the project would help to reduce impacts related to land use incompatibilities during construction (PDF-1). This would include posting aesthetically appropriate signs at several key areas around the lagoon identifying that restoration is in progress, and providing the project's website address so interested parties could learn more about project activities, purpose, and schedule (PDF-2). By providing project information as required in PDF-1 and PDF-2, the public would be able to understand the duration and purpose of the construction and associated impacts; prepare for the disruptions as necessary, such as learn and understand the traffic rerouting prior to implementation; and provide the public with contact information to ask questions or submit suggestions or complaints as the project is ongoing. Providing the public this information would help to minimize potential land use incompatibilities with nearby residential, recreation, and commercial uses during construction. Upon completion, the enhanced and restored wetland would continue to be compatible with adjacent residential uses and the nearby beach and commercial areas. Lagoon restoration would also indirectly benefit surrounding land uses by improving public passive recreational use and educational opportunities through enhancement of the habitat supporting the abundant flora and fauna species within the lagoon; the main attraction for lagoon visitors. **Impacts would be less than significant (Criteria B and C). No substantial adverse impacts have been identified.**

The project area is identified in City and County planning documents as an area to be preserved and protected as open space and passive recreational use. As shown in Table 3.1-1, Alternative 2A would not alter the lagoon's use or function in a manner inconsistent with applicable regulations and laws or existing and future local land use plans. As shown by the laws, plans, and policies listed in Table 3.1-1, many of the land use regulations applicable to the project study

area are geared toward the conservation, preservation, and restoration of the lagoon area and associated coastal, biological, and recreational resources. Alternative 2A would serve to enhance lagoon function and associated flora, fauna, and other recreational assets enjoyed by the public and protected by land use regulations. The overall lagoon restoration resulting from Alternative 2A would not cause conflicts with land use regulations or policies that could result in substantial adverse environmental effects. Thus, **impacts would be less than significant (Criteria B and C). No substantial adverse impacts have been identified.**

Table 3.1-1
Lagoon Restoration: Consistency with Applicable Land Use
Regulations, Plans, or Programs

Applicable Regulation, Law, Plan, or Program	Project Consistency
FEDERAL	
Coastal Zone Management Act	Consistent: Project activities are regulated by Local Coastal Programs implemented by local agencies.
STATE	
California Coastal Act (CCA)	Consistent: In accordance with Section 30233 (a)(6) of the CCA, restoration activities are regulated by Local Coastal Programs implemented by local agencies. Consistency Certification, Section 30600(a) of the CCA, or Waiver of Federal Consistency Provisions would need to be granted by the CCC.
Marine Life Protection Act	Consistent: San Elijo Lagoon is a designated State Marine Conservation Area. Restoration activities are permitted pursuant to California Code of Regulations Title 14, Section 632 subsection (b)(117)(D).
California State Lands Commission Public Trust Doctrine	Consistent: The new tidal inlet and associated cobble blocking features under Alternative 2A would change the beach continuity but would not eliminate public access to the broader beach. An agreement would need to be reached between the SLC and California Department of Parks and Recreation for the portion of the State Beach that would be occupied by the tidal inlet.
California Code of Regulations, Title 14, Section 630(b)(103) - Ecological Reserve	Consistent: The lagoon restoration would not change or modify the lagoon's designation, purpose, or public use as an ecological reserve as designated in Section 630(b)(103) and would be consistent with the general regulations set forth for ecological reserves.
San Diego Coastal State Park General Plan – Cardiff State Beach	Consistent: Cardiff State Beach General Plan supports actions to enhance tidal exchange and ecological functions at San Elijo Lagoon.
LOCAL	
City of Encinitas General Plan and Local Coastal Program Land Use Plan (LCP LUP)	Consistent: San Elijo Lagoon is designated as Ecological Resource/Open Space/Parks. Lagoon restoration activities would not change current use or function or result in incompatibilities with surrounding land use. In addition, the General Plan includes policies that permit dredging of wetlands for restoration purposes (Policy 10.6) and specifically identifies the need to implement an integrated management plan for the long-term conservation and

Applicable Regulation, Law, Plan, or Program	Project Consistency
	restoration of wetland resources at San Elijo Lagoon (Policy 10.10) (City of Encinitas 2009).
City of Solana Beach General Plan and Local Coastal Program Land Use Plan Local Implementation Plan (LCP LUP LIP)	Consistent: Solana Beach General Plan and the LCP LUP LIP encourage and support efforts to restore San Elijo Lagoon in coordination with applicable resource management agencies (Policy 3.59) (City of Solana Beach 2009).
County of San Diego General Plan and San Dieguito Community Plan	Consistent: The San Dieguito Community Plan, part of the San Diego County General Plan, lists San Elijo Lagoon as a Resource Conservation Area and supports its current recreational use. That recreational use would continue with the SELRP and new trail connections would replace the trail on the dike.
Escondido Creek Watershed Restoration Action Plan	Consistent: Achieves the objectives and goals of this plan related to restoration of San Elijo Lagoon.
San Elijo Lagoon Area Enhancement Plan	Consistent: Achieves the objectives and goals of this plan.
San Elijo Lagoon Action Plan	Consistent: Achieves the objectives and goals of this plan.

Recreation

Trails

Existing trails totaling 7 miles are located within the lagoon, as shown in Figure 3.1-1. These trails are used for walking, running, bird watching, nature observations, and educational purposes. During construction, portions of the lagoon would be flooded to mobilize and operate necessary construction equipment within the lagoon and provide adequate water depth for dredge operations (refer to Section 2.10). In addition, certain trails would be used for access to the site and staging areas (Figure 2-15); therefore, public access and use of some trails would be temporarily restricted during construction to maintain public safety (PDF-5). Some existing trail access would remain available throughout construction, however, to maintain public access to the Reserve (PDF-6). Table 3.1-2 describes how each trail would be impacted both during construction and post-project for the proposed project and alternatives.

Table 3.1-2
Trails Impacted during and after Project Construction

Trail Name	2A Construction Impact (Temporary)	2A Post-Project Implementation (Permanent)	1B	1A
Nature Center Loop	Project activities would not occur on this trail. While portions of the lagoon near this trail would be flooded to allow for mobilization and operation of construction	Trail access and condition would remain the same as pre-project. No significant or adverse permanent impacts would occur.	Construction: Same as Alternative 2A. No significant or adverse temporary impacts would	Construction: Same as Alternative 2A; no adjacent flooding would be required. No significant or

Trail Name	2A Construction Impact (Temporary)	2A Post-Project Implementation (Permanent)	1B	1A
	equipment, this trail would remain dry and accessible during project construction. No significant or adverse temporary impacts would occur.		occur. Post-Project: The Nature Center Loop would be connected to the North Rios Avenue Trail in the central basin via a new east-west connection. This would add 0.25 mile of trails to the current system and provide additional connectivity through the lagoon. No significant or adverse permanent impacts would occur.	adverse temporary impacts would occur. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.
North Rios Avenue Trail	Portions of the North Rios Avenue Trail west of the trailhead and parallel to the NCTD railroad would be restricted during lagoon restoration activities as this area would serve as site access during construction. The trail functions currently as a utility access road along the central basin and would be temporarily restricted to maintain public safety. The North Rios overlook that extends into the lagoon would be needed as a construction staging area and would also be temporarily closed throughout the duration of construction (3 years). However, other existing trail access would remain available throughout construction to maintain public access to the Reserve. Thus, this temporary impact is considered less than	A portion of this trail parallel to the NCTD railroad would be permanently eliminated for construction of the new inlet, as shown in Figure 3.1-1. This would remove trail access north of the new inlet area permanently. In addition, the area of the trail/access road that parallels the adjacent homes would be permanently widened as part of the SELRP, but post-project access and use would not be precluded. The remainder of the trail, including the overlook, would be returned to its original condition and access would be restored to pre-project conditions. While the northern end of the trail would be eliminated, a majority of the trail would remain available, including the overlook. Thus, permanent impacts would be less than significant and no adverse impacts would occur.	Construction: Same as Alternative 2A. This temporary impact is considered less than significant and not adverse. Post-Project: The trail, including the overlook, would be returned to its original condition and access would be restored to pre-project conditions. Additionally, this trail would be connected to the Nature Center Loop via a new east-west connection, enhancing trail connectivity through the lagoon. Thus, permanent	Construction: Same as Alternative 2A. Although the overlook would not be required as a staging area during construction of Alternative 1A, access would be temporarily restricted during construction since the trail/access road would be used by construction equipment. This temporary impact is considered less than significant and not adverse. Post-Project: The trail would be returned to

Trail Name	2A Construction Impact (Temporary)	2A Post-Project Implementation (Permanent)	1B	1A
	significant and not adverse.		impacts would be less than significant and no adverse impacts would occur.	its original condition and access would be restored to pre-project conditions. Thus, permanent impacts would be less than significant and no adverse impacts would occur.
Solana Hills Trail	Portions of the Solana Hills Trail along the edge of the flooding boundary just west of I-5, as shown in Figure 3.1-1, would be inundated and access restricted for approximately 12 months during construction. However, the upland portions of the trail would not be impacted and access along the east side of the central basin would be maintained. Thus, this temporary impact is considered less than significant and not adverse.	Trail would be returned to its original condition and access would be restored to pre-project conditions. No permanent loss of recreational uses would occur. No significant or adverse permanent impacts would occur.	Construction: Same as Alternative 2A. This temporary impact is considered less than significant and not adverse. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.	Construction: Flooding would not be required as part of Alternative 1A, and the trail would not be impacted during construction. No significant or adverse temporary impacts would occur. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.
Santa Inez Trail	A portion of the Santa Inez Trail parallel to I-5 in the east basin would be used for construction access and staging activities. Portions of the trail would be restricted for approximately 18 months during construction as shown in Figure 3.1-1. However, other existing trail access would remain available throughout construction to maintain public access to the Reserve. Thus, this temporary impact is	Trail would be returned to its original condition and access would be restored to pre-project conditions. No permanent loss of recreational uses would occur. Permanent impacts would be less than significant and no adverse impacts have been identified.	Construction: Same as Alternative 2A. This temporary impact is considered less than significant and not adverse. Post-Project: Same as Alternative 2A. Permanent impacts would be less than significant and no adverse	Construction: Same as Alternative 2A. This temporary impact is considered less than significant and not adverse. Post-Project: Same as Alternative 2A. Permanent impacts would be less than

Trail Name	2A Construction Impact (Temporary)	2A Post-Project Implementation (Permanent)	1B	1A
	considered less than significant and not adverse.		impacts have been identified.	significant and no adverse impacts have been identified.
Santa Carina Trail	Project activities would not occur on or near this trail and no access restrictions would be needed. No significant or adverse temporary impacts would occur.	Trail access and condition would remain the same as pre-project. No significant or adverse permanent impacts would occur.	Construction: Same as Alternative 2A. No significant or adverse temporary impacts would occur. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.	Construction: Same as Alternative 2A. No significant or adverse temporary impacts would occur. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.
Santa Helena Trail	Project activities would not occur on or near this trail and no access restrictions would be needed. No significant or adverse temporary impacts would occur.	Trail access and condition would remain the same as pre-project. No significant or adverse permanent impacts would occur.	Construction: Same as Alternative 2A. No significant or adverse temporary impacts would occur. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.	Construction: Same as Alternative 2A. No significant or adverse temporary impacts would occur. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.
La Orilla Trail	Project activities would not occur on or near this trail and no access restrictions would be needed. No significant or adverse temporary impacts would occur.	Trail access and condition would remain the same as pre-project. No significant or adverse permanent impacts would occur.	Construction: Same as Alternative 2A. No significant or adverse temporary impacts would occur. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.	Construction: Same as Alternative 2A. No significant or adverse temporary impacts would occur. Post-Project: Same as Alternative 2A. No significant or adverse permanent impacts would occur.

Trail Name	2A Construction Impact (Temporary)	2A Post-Project Implementation (Permanent)	1B	1A
			occur.	occur.
Dike Trail	The Dike Trail would be used as an access and staging area during construction. Access to and use of this trail would be eliminated after Phase 1. However, alternative trail access would remain available throughout construction to maintain public access to the Reserve. Thus, this temporary impact is considered less than significant and not adverse.	The Dike Trail would be removed permanently under Alternative 2A. However, north-south trail access across the east basin from Manchester to the Santa Inez Trail would be restored through efforts underway by Caltrans as part of the construction of an enhanced trail connection for the I-5 North Coast Corridor Project as shown in Figure 3.1-1 and described further in the paragraph below this table. While loss of the Dike Trail would occur, its removal would further expand tidal exchange and enhance the ecological function within the lagoon. Since north-south access would not be precluded through the Reserve due to the enhancements and connection to another nearby trail, Permanent impacts are considered less than significant and not adverse.	Construction: Same as Alternative 2A. This temporary impact is considered less than significant and not adverse. Post-Project: Same as Alternative 2A. Permanent impacts are considered less than significant and not adverse.	Construction: Same as Alternative 2A. This temporary impact is considered less than significant and not adverse. Post-Project: The Dike Trail would remain available for public use. Two cuts in the dike would occur to improve water circulation; however, these cuts would occur below the surface and the trail would remain intact upon completion of restoration activities. Permanent impacts are considered less than significant and not adverse.

As described in Table 3.1-2, construction-related impacts would temporarily restrict access and use of portions of the North Rios Trail and Overlook, Solana Hills Trail, and the Santa Inez Trail. The Dike Trail would be accessible during Phase 1 of construction and then would be eliminated permanently. However, construction of the project could not occur without use of these trail areas, and use and access restrictions are necessary to maintain public safety. Access to portions of these trails that are not being used for construction or staging would be maintained throughout project construction. Additionally, other existing trail access would remain available throughout construction to maintain public access to the Reserve. Access to the Nature Center would be maintained from the existing parking lot (PDF-6). Upon project completion, North Rios, Solana Hills, and Santa Inez trails would be returned to their original condition and access to them would

be restored to pre-project conditions (PDF-47). Thus, temporary impacts related to recreational trail loss are considered **less than significant (Criterion D) and not substantially adverse**.

Indirect impacts to trail recreation could occur during construction activities such as increased dust and noise and the temporary reduction in visible habitat and wildlife species. These types of indirect impacts would be fairly localized in the immediate vicinity of construction activities and would cease with the completion of construction. Trails in various areas of the lagoon would be open for public access throughout the duration of construction, allowing for avoidance of trails that may be near construction areas. In addition, in the long term, the lagoon restoration would result in increased ecological diversity within the lagoon to be experienced by bird watchers, nature enthusiasts, and recreationists. Thus, temporary or permanent indirect impacts related to recreational trail use are considered **less than significant (Criteria D and E) and not substantially adverse**.

Access and use of a portion of the North Rios Avenue Trail north of the new inlet would be permanently lost with implementation of Alternative 2A. Public use of this trail north of the new inlet location would be eliminated to construct the opening for the new inlet, but areas south of the inlet crossing would be restored to public access at the completion of construction.

The Dike Trail would be permanently removed upon project completion. The removal of the Dike Trail would not decrease emergency access, or eliminate an existing emergency access route, as the dike was not constructed to provide vehicle access and, because of the sandy nature of the trails on the south side, would not be suitable for typical emergency vehicles such as fire engines, ambulances, or patrol cars. A variety of existing access points would continue to service the lagoon, including four different entry points on the southern side of the east basin: Santa Inez, Santa Florensia, Santa Helena, and the La Orilla trailheads.

While the Dike Trail would be eliminated, north-south trail access across the east basin from Manchester Avenue to the Santa Inez Trail would be restored through efforts underway by Caltrans as part of the construction of an enhanced trail connection associated with the I-5 North Coast Corridor Project as shown in Figure 3.1-1. Caltrans would construct an enhanced trail connection consisting of streetscape improvements and trail improvements that connect into the existing lagoon trail system. Caltrans and SANDAG would connect the north and south sides of the lagoon via a new bike/pedestrian suspended bridge adjacent to the I-5 highway bridge. Additionally, an improved trail segment underneath the I-5 highway bridge would provide better east-west movement (SANDAG 2013). This improved segment along the south side of Manchester Avenue would include a new pedestrian-friendly streetscape linkage to the proposed pedestrian bridge that would be suspended under the west side of I-5. This bridge would extend north to south and would connect to a new trail under I-5 on the south side of the lagoon that

would provide connection to existing trails on the west and east sides of I-5 (Santa Inez Trail). Additionally, as part of the I-5 North Coast Corridor Project PWP/TREP, the planned I-5 North Coast Bike Trail would be installed along the south side of Manchester Avenue, exiting from the new I-5 bridge to points north of the lagoon. This bike trail would provide bicycle connectivity to the Nature Center (SANDAG 2013). These improvements would serve to complement and enhance the existing trail system within the lagoon and enhance coastal access. Additionally, the Final I-5 North Coast Corridor EIR/EIS states in the land use section that access to existing trailheads and designated trails in the Reserve would be unaffected (Caltrans 2013). While loss of the Dike Trail would occur, north-south access would not be precluded and would be maintained via the aforementioned enhancements as trail users could access the new I-5 bridge trail from Manchester Avenue and link to the Santa Inez trail system that provides connection to trails in the southern portion of the lagoon on both the east and west sides of I-5 as shown in Figure 3.1-1. Thus, permanent impacts related to recreational trail loss are considered **less than significant (Criterion E) and not substantially adverse**.

Beach

As previously described, Alternative 2A would result in construction of a new tidal inlet and supporting CBFs would be needed to maintain inlet stability in this new location. During construction, the beach area approximately 500 feet north and south of the new tidal inlet would be closed to public access and recreation for a 6-month period. While this closure would reduce beach area, other areas of the beach would still be accessible and enough beach space would be available to accommodate the needs of beachgoers (PDF-6). Upon project completion, it is anticipated that no substantial net change in accessible beach area would occur from this alternative because the existing tidal inlet channel would close and be replaced with the new channel, plus nourishment may widen the beach from existing conditions. Maintenance dredging activities may result in closure of a short reach of beach (500 feet) over a period of 5 months every 3 to 4 years for sand placement but adjacent beach areas would remain open. Beach staging areas associated with maintenance activities would be restored to their previous beach condition at the conclusion of the periodic maintenance work. Access conditions would be similar to existing conditions, with the channel shifted south along the beach. Also, as previously described, sufficient stretches of beach would exist on both sides of the inlet so that overall beach use in the area would not be substantially altered. Access to cross over the inlet would be provided by the new Coast Highway 101 bridge, and walking along the water's edge to cross the inlet could still occur depending on tidal conditions. Negative effects related to recreation opportunities are perpetuated by the degradation of water quality (e.g., elevated bacteria levels) in the lagoon and adjacent to the lagoon mouth, leading to beach closures during moderate to large storm events that flush accumulated bacteria to the ocean. Lagoon restoration would reduce the potential for this occurrence. Therefore, **permanent impacts related to recreation loss at**

nearby beach areas would be less than significant (Criterion E). No substantial adverse indirect impacts have been identified.

Temporary staging and stockpile areas may be located around the perimeter of the lagoon or on the beach. These sites could include areas designated for pipe and equipment stockpiling and could also be fenced for public safety, as required. These temporary use areas would not impede the use of surrounding beach areas and would not be of the magnitude to cause a shortage of available beach area for recreationalists. The temporary staging areas would be fully removed when the associated construction activity is complete. Therefore, **temporary impacts related to recreation loss at nearby beach areas would be less than significant (Criterion D). No substantial adverse indirect impacts have been identified.**

Surfing

Popular surfing spots located within the immediate vicinity of the lagoon include George's, Cardiff reef, and Seaside reef. Impacts to the surfing environment associated with constructing a new inlet and associated CBFs, as well as closing the existing inlet, are discussed in detail in the following paragraphs.

Constructing a new tidal inlet and associated CBFs for Alternative 2A would require closure of a working area along Cardiff Beach south of the George's surf spot. The new inlet location is away from existing surf spots and would therefore not impact existing surfing activities during construction. Approximately 1,000 feet of beach total may be closed during the 6-month inlet construction period, reaching 500 feet north and south, respectively, of the tidal inlet centerline (entirely south of George's). Closure of the beach would not preclude surfing off the inlet location, and surfing could still occur along Cardiff Beach. Closure of the 1,000-foot length of beach would temporarily restrict access by foot to the water, but surfers would be able to access the water from both north and south of the inlet construction area.

Another construction-related effect could include turbidity generated during excavation of the inlet. Excavation would be done "in the dry" from land using excavators and can be controlled sufficiently to prevent turbidity from entering the ocean; surfing should not be affected. The actual opening of the inlet would result in short-term water quality changes immediately off of the mouth, which could impact water quality for a very short duration (less than a day) as observed at Bolsa Chica State Beach during inlet opening in 2006 (Webb 2013) and would not cause substantial loss of local surfing opportunity.

Post-construction impacts from the project may include changes to bathymetry; installation of a new channel, CBFs, and an ebb bar; effects to access; and closure of the existing tidal inlet.

Installing a new tidal inlet along Cardiff State Beach could improve surfing conditions at the inlet location after construction is complete. Installing a channel through a straight beach can break up the bathymetry and cause new sand bars to form, thus improving the surf. Closure of the existing inlet should not impact the surf break as the existing mouth was closed throughout the 1980s and 1990s prior to the present maintenance regime, and high-quality surfing remained throughout that time (M&N 2014). Several new inlets have been constructed/enhanced in southern California over the last 30 years, including Bolsa Chica (2006), Batiquitos Lagoon (1996), Huntington Beach Wetlands (1990), and San Dieguito Lagoon (2010). Surfing conditions have improved at several new tidal inlets, with none causing long-term significant impacts to surfing (M&N 2014).

Creating a break (physical gap) for an inlet in the relatively straight-lined bathymetry at this type of site can actually lead to more rideable surf than presently exists. This is evident when considering the other inlets listed above. Each site now is characterized by rideable surf with relatively high-quality surfing under certain conditions. Waves often break toward the inlet channel and can be ridden to the deeper water area off the channel. The offshore extent of the channel can then provide an opportunity to paddle back out to the line-up (area to sit and wait for waves).

In addition, creation of an ebb bar offshore would most likely produce at least a moderate-quality wave, or an even better-quality wave than presently exists. Ebb bars typically form a peak with shoulders for a right and left off of the bar, with the quality dependent on the sand quantity in the bar. The ebb bar would be a permanent feature and would therefore provide a rideable wave potentially throughout the year. Therefore, surfing along Cardiff State Beach could improve at that location from installation of a new tidal inlet and ebb bar.

The CBFs are too short and close to shore to affect surfing because they are on the beach. Surfing would occur offshore of the CBFs, and surfers should not experience interference from the CBFs. The CBFs are designed to not trap sand, but to block cobble, so bathymetry should not change from the CBFs and surfing should also not be affected. Access to the beach by surfers should not be affected by either the tidal inlet or CBFs because access to the surf would be provided up and down the coast on both sides of the inlet.

Potential effects to surfing could occur from ebbing tidal currents from the wetlands to the ocean, as well as rip tides that form along the channel. Ebbing tides would generate relatively strong currents that would interrupt surfing off the mouth during short periods, and would cause an offshore drift that surfers would have to paddle through to pass across the inlet mouth. Surfers may be able to use the ebbing tidal current as enhanced paddle access to the line-up. Surfing near an inlet mouth typically occurs relative to tides, with peak ebbing tides being a time that might

be avoided due to currents. The current would be higher during certain periods (a couple of hours during peak ebb tides twice a month). However, the magnitude of the increase is not sufficient to impact surfing activity, the current is directed away from the primary surf spot, and there is already a high ebbing current under the same conditions. Other periods of the tides can generate relatively good surfing conditions (slack and incoming tides).

Access to surf sites would not be substantially impacted by the project, as parking would be provided along Coast Highway 101 (west shoulder) as exists today, with the exception of on the bridge over the inlet channel. Beach access is provided over the sand, and surfers can fairly easily paddle or wade through the inlet channel, as occurs at the existing tidal inlet channel at the existing tidal inlet. No substantial net change in accessible beach area would occur under this alternative because the existing tidal inlet channel would eventually close under this scenario and be replaced with the new channel and inlet area. Access conditions would be similar to existing conditions, with the channel shifted south along the beach.

Closure of the existing tidal inlet to create a new tidal inlet for Alternative 2A could potentially cause impacts from reduced tidal flow, lack of scour along reef edge, and potential effects on bathymetry. Tidal flow currently issues from the mouth of San Elijo Lagoon just south of the Cardiff Reef and north of George's surf spot. Tidal flow out of the lagoon (ebbing tides) results in a rip current. Current velocities were modeled as part of the SELRP project hydrodynamics study (M&N 2010). Model results show that the velocity of the current is relatively low because tidal flow "fans out" after issuing from the inlet channel into the nearshore ocean. Relatively fine-grained sediment in suspension from the lagoon or inlet may be able to remain in suspension to the nearshore zone, but it eventually settles out or is carried by ocean currents elsewhere. Existing ebb tidal flow velocities in the nearshore are insufficient to suspend sand from the seabed. Sand becomes suspended from the nearshore seabed by forces exerted by breaking waves and wave-driven currents, which would not change from the project due to no change in bathymetry and wave exposure. Existing conditions do not appear to include substantial scour along the south edge of Cardiff Reef under normal conditions. Extreme conditions of high storms draining from the lagoon coincident with ebbing spring tides may result in scour in the beach and nearshore but do not appear to be a controlling factor for existing bathymetry. The wave breaking pattern at Cardiff Reef does not appear different between conditions of a closed and open tidal inlet, as evidenced by historical aerial photographs (M&N 2014). These data support the conclusion that the bathymetry of Cardiff Reef is not controlled or affected substantially by the condition or location of the inlet, but rather by the bedrock foundation of the reef and littoral sand transport patterns. In addition, the position of the ebbing current jet is typically south of the surf spot and not in direct connection with the path of the wave rider. Reducing the ebbing current would not likely affect the bathymetry of Cardiff Reef and surfing. Overall, **surfing-**

related impacts under Alternative 2A would be less than significant (Criteria D and E) and not substantially adverse.

As a project design feature (PDF-73), surf condition monitoring is included in focused areas as part of the project to verify the modeling results and document the anticipated lack of change in surf conditions. The data collected during monitoring would be useful in future analysis of projects that may modify the shoreline and provide baseline information regarding the coastal processes in the Cardiff Reef area.

Alternative 1B

Land Use

Alternative 1B would retain the existing inlet location, and restoration efforts would primarily consist of widening existing channels to improve hydraulic functions and increase habitat distributions within the lagoon. Restoration activities would require staging and access areas as shown in Figure 2-15; however, as stated in the analysis for Alternative 2A, areas used for construction activities would be returned to their previous conditions after construction to the greatest extent possible. These construction activities would be temporary and would not permanently change or strain nearby uses. Alternative 1B would result in improvements to the existing inlet and would not introduce new structures in the onshore environment. No permanent conversion of lands to other uses would occur and the proposed project would not strain or conflict with surrounding land uses. Construction activities may cause temporary incompatibilities with surrounding land uses related to noise and traffic impacts; however, as stated in the analysis for Alternative 2A, those impacts would be addressed by traffic and noise measures as described in Sections 3.10 and 3.12, as well as implementation of a public information program (PDF-1). As shown in Table 3.1-1, restoration activities are consistent with applicable land use regulations and plans and would not cause adverse environmental effects related to land use. Land use impacts resulting from implementation of Alternative 1B **would be less than significant (Criteria A, B, and C) and not substantially adverse.**

Recreation

Trails

Alternative 1B would result in similar impacts to recreation opportunities within the lagoon as described above for Alternative 2A related to trails. Temporary closures of certain trails would occur, and the Dike Trail would be eliminated; however, alternative trail access would remain open and north-south access across the east basin would be restored via improvements made by

the I-5 North Coast Corridor Project. As described for Alternative 2A, temporary impacts related to recreational trail loss are considered **less than significant (Criterion D) and not substantially adverse**.

Implementation of Alternative 1B would include the construction of a new trail in the central basin, as shown in Figure 3.1-1. This trail would establish an east-west connection from the North Rios Avenue Trail that parallels the NCTD railroad (also currently serves as a utility access road) to the Nature Center Loop. This enhancement would also provide for additional north-south access via this trail from the Nature Center Loop to the North Rios trailhead. This would add 0.25 mile of trails to the current system and would provide a link between the south and north sides of the central basin. Upon project completion, impacted trails would be returned to their original condition and access to them would be restored to pre-project conditions, with the exception of the Dike Trail. As described above, north-south access across the east basin would be restored via a pedestrian bridge as part of the I-5 North Coast Corridor Project. **Permanent impacts related to recreational trails under 1B are considered less than significant (Criterion E) and not substantially adverse.**

Similar to Alternative 2A, indirect impacts such as dust, noise, or loss of wildlife observation along trails could occur but would be fairly localized in the immediate vicinity of construction activities and would cease with the completion of construction. In addition, in the long term, lagoon restoration would result in increased ecological diversity within the lagoon to be experienced by bird watchers, nature enthusiasts, and recreationists. Thus, temporary or permanent indirect impacts related to recreational trail use are considered **less than significant (Criteria D and E) and not substantially adverse**.

Beach

Beach use in the area would not be substantially altered under this alternative since the existing inlet would be retained and improvements would be minimal at the inlet. Lagoon restoration would reduce the potential for lost recreation opportunities due to degradation of lagoon water quality and resulting beach closures. **Permanent impacts to beach use would not be substantially adverse and would be less than significant (Criterion E).**

Similar to Alternative 2A, temporary staging and stockpile areas may be located around the perimeter of the lagoon or on the beach. These temporary use areas would not impede the use of surrounding beach areas and would not be of the magnitude to cause a shortage of available beach area for recreationalists. The temporary staging areas would be removed when the associated construction activity is complete and the beach area restored. **Therefore, temporary**

impacts related to recreation loss at nearby beach areas would be less than significant (Criterion D). No substantial adverse indirect impacts have been identified.

Surfing

Alternative 1B would increase the tidal prism of the lagoon and consequential tidal discharge through the inlet. Increasing the tidal discharge via the existing tidal inlet has the potential to cause increased turbulence on the ocean surface at the Cardiff Reef surf spot if the currents interact with waves in a particular manner. Turbulence could be caused if the ebbing current was directed into the wave shoulder, or toward the take-off zone of the wave at Cardiff Reef. The current interaction with the wave could cause chop on the surface and decrease the wave quality. This type of condition exists at certain inlets (e.g., Ocean Beach Jetty in San Diego) under certain spring tidal conditions and can diminish the wave form and shape. However, observations at Cardiff Reef indicate that the ebbing current is directed more to the southwest and away from the surfing shoulder on the right at Cardiff Reef. Also, the variation in tidal current velocities is relatively low and should not change the existing pattern of the ebbing tide. Therefore, it is not anticipated that Alternative 1B would cause different current/wave interaction, and a decrease in the wave form and quality at this reef is not anticipated.

Alternative 1B would not preclude the viability of recreational activities during construction and would not result in a major loss of recreational uses. Alternative 1B would also not result in the permanent and major loss of recreational use areas or major conflicts with adjacent recreational uses in the post-construction period, including surfing. **Recreation impacts related to surfing would not be substantially adverse and would be less than significant (Criteria D and E).**

Alternative 1A

Land Use

Please refer to the land use analysis provided above for Alternatives 2A and 1B. Alternative 1A would require fewer construction or flooding activities, structures such as the bridges would be maintained, and the existing inlet would be retained; thus, there would be minimal potential for land use conflicts or incompatibilities as a result during the temporary construction phases. These construction activities would be temporary and would not permanently change or strain nearby uses. Alternative 1A would not introduce new structures in the onshore environment. Similar to Alternative 1B, land use in the area would not be substantially altered under Alternative 1A since the existing inlet would be retained in its current location and improvements would be minimal at the inlet.

The lagoon would undergo moderate changes and restoration relative to Alternatives 2A and 1B and would result in long-term conditions that are generally similar to the existing conditions. The overall existing land use of the lagoon would not change with implementation; it would remain a coastal wetland and open space/reserve area. As shown in Table 3.1-1, restoration activities are consistent with applicable land use regulations and plans and would not cause adverse environmental effects related to land use. The continuation of the lagoon land uses would remain compatible with the surrounding areas and would not result in a change or modify land uses in nearby areas. **Temporary or permanent land use impacts resulting from implementation of Alternative 1A would be less than significant (Criteria A, B, and C) and not substantially adverse.**

Recreation

Trails

Under Alternative 1A, restoration activities would primarily occur within the main channel. Phased flooding of the lagoon for construction purposes would not occur under Alternative 1A. Two existing trails would require temporary access and use restrictions during construction. The Dike Trail would remain largely intact. Two cuts in the dike would occur to improve water circulation in this area; however, these cuts would occur below the surface and the trail would remain intact upon completion of restoration activities. The dike would be used for construction staging and access may be temporarily restricted during construction. The North Rios Avenue Trail and overlook would be used for site access and staging, so recreation access would be temporarily restricted during construction. Other existing trail access would remain open. Thus, **temporary recreational trail impacts would be less than significant (Criterion D) and not substantially adverse.**

Alternative 1A would not result in the permanent loss of existing trails and **no permanent substantial adverse or significant impacts (Criterion E) would result.**

Beach

Similar to Alternative 1B, beach use in the area would not be substantially altered under Alternative 1A since the existing inlet would be retained and improvements would be minimal at the inlet. **Permanent impacts to beach use would not be substantially adverse and would be less than significant (Criterion E).**

Similar to Alternatives 1B and 2A, temporary staging and stockpile areas may be located around the perimeter of the lagoon or on the beach. These temporary use areas would not impede the use

of surrounding beach areas and would not be of the magnitude to cause a shortage of available beach area for recreationalists. The temporary staging areas would be removed when the associated construction activity is complete. Therefore, **temporary impacts related to recreation loss at nearby beach areas would be less than significant (Criterion D). No substantial adverse indirect impacts have been identified.**

Surfing

Surfing impacts under this alternative would be similar to or less than those described for Alternative 1B. Less tidal flow would occur with Alternative 1A than with Alternative 1B; therefore, the potential for turbulence resulting from ebbing currents would be less. Potential impacts to surfing under Alternative 1A would be less than significant. Alternative 1A would not preclude the viability of recreational activities during construction that result in a major loss of recreational uses. Alternative 1A would also not result in the permanent and major loss of recreational use areas or major conflicts with adjacent recreational uses in the post-construction period. **Recreational surfing impacts would not be substantially adverse and would be less than significant (Criteria D and E).**

No Project/No Federal Action Alternative

Under the No Project/No Federal Action Alternative, no dredging or excavation would occur to improve tidal circulation, clear channels, or improve tidal exchange or upstream flooding. The lagoon inlet would remain in its existing location with ongoing management. No changes to planned land use or incompatibilities with surrounding land uses would occur. Negative impacts related to recreation opportunities could occur under this alternative as no action would perpetuate the degradation of water quality (e.g., elevated bacteria levels) in the lagoon and adjacent to the lagoon mouth, leading to beach closures during moderate to large storm events that flush accumulated bacteria to the ocean. In addition, continued transition of habitats could reduce ecological diversity within the lagoon that is experienced by bird watchers, nature enthusiasts, and recreationists. **Although no new substantial adverse impacts would be anticipated by No Project/No Federal Action Alternative, conditions would continue to decline.**

Materials Disposal/Reuse

Impacts associated with material disposal and reuse would only occur during temporary construction activities. No long-term maintenance or other ongoing activities associated with material disposal would be needed once the material is disposed of or placed for reuse.

Therefore, no long-term or permanent impacts or adverse effects would result from material disposal or reuse.

Alternative 2A

Offshore Stockpiling

Land Use

Materials placement offshore at SO-5 and SO-6 would be an ocean-based activity and would not result in the permanent conversion of land, conflict with existing or future planned land uses, or be incompatible with adjacent land uses. As described in Section 3.1.2, activities in offshore areas are subject to federal and state regulations as well as plans and programs implemented at the local level. The offshore materials placement sites are regulated by the SLC, and a lease would need to be granted for materials placement at SO-5 or SO-6. In addition, MPA regulations covering California's South Coast Study Region were adopted in 2010. SO-6 is included in the Swami's SMCA. While activities in this area are strictly regulated, conditions specific to the Swami's SMCA allow beach nourishment and sediment management activities pursuant to CCR Title 14, Section 632(b)(138)(C) and the materials placement activities would be consistent with all applicable regulations. Therefore, offshore materials placement would not create land use conflict or inconsistencies with existing surrounding land uses or applicable planning document, and **impacts would be less than significant (Criteria A, B, and C). No substantial adverse effects have been identified.**

Recreation

Recreational activities in the ocean include seasonal whale watching, recreational fishing and boating, and snorkeling/scuba. While some restrictions would be in place during placement operations at SO-5 and/or SO-6 (i.e., boaters and recreationists would be restricted from areas directly in the vicinity of pipelines and replenishment equipment), these would be relatively short term in nature (6 months or less) and localized. Boating and recreation activities would not be precluded at the San Diego-La Jolla Underwater Park. Therefore, offshore materials placement would not preclude the viability of recreational activities or result in a permanent and major loss of recreational uses, and **impacts would be less than significant (Criteria D and E). No substantial adverse effects have been identified.**

Nearshore and Onshore Placement

Land Use

Materials placement in the nearshore at Cardiff and onshore on the identified beaches would not result in the permanent conversion of land, conflict with existing or future planned land uses, or be incompatible with adjacent land uses. In fact, local jurisdictions and the CCC have adopted policies and goals specifically in support of a regional approach to sand replenishment and erosion control. Table 3.1-3 provides a discussion of applicable land use regulations, laws, and existing and future local plans for the materials placement component of the SELRP. As shown by the laws, plans, and policies listed in Table 3.1-3, many of the land use regulations applicable to material placement specifically permit or allow material placement for the purpose of coastal protection and enhancement of recreational resources. Other policies act to ensure the protection of biological and coastal resources. Alternative 2A would place surplus material at nearshore or onshore locations in a manner consistent with the applicable laws and regulations. While some environmental impacts would result from actions necessary to implement the SELRP, as discussed throughout the analysis sections of this EIR/EIS, the overall material placement associated with Alternative 2A would not cause conflicts with land use regulations or policies that could result in substantial adverse environmental effects. Overall, beneficial reuse of dredged materials would be consistent with applicable regulations and plans, and **impacts would be less than significant (Criteria A, B, and C). No substantial adverse effects have been identified.**

**Table 3.1-3
Materials Placement: Consistency with Applicable Land Use
Regulations, Plans, or Programs**

Applicable Regulation, Law, Plan, or Program	Project Consistency
FEDERAL	
Coastal Zone Management Act	Consistent: Project activities are regulated by Local Coastal Programs implemented by local agencies.
Marine Protection, Research, and Sanctuaries Act (MPRSA, or Ocean Dumping Act)	Consistent: Under Alternative 1A, dredged materials would be of poor quality (i.e., relatively small grain size) not suitable for reuse and would therefore be disposed of in LA-5. LA-5 is an EPA-designated ocean disposal site that allows dumping of materials from projects in adherence to regulations. LA-5 has the capacity to accept the amount of material that would be generated under this alternative (Ross 2012).
STATE	
California Coastal Act (CCA)	Consistent: In accordance with Section 30233 (a)(6) of the CCA, restoration activities are regulated by Local Coastal Programs implemented by local agencies. Section 30233(b) of the CCA specifies that dredge spoils suitable for beach nourishment should be transported for such

Applicable Regulation, Law, Plan, or Program	Project Consistency
	purposes to appropriate beaches or into suitable longshore current systems. Consistency Certification, Section 30600(a) of the CCA, or Waiver of Federal Consistency Provisions would need to be granted by the California Coastal Commission.
Marine Life Protection Act	Consistent: Moonlight Beach and Cardiff onshore placement sites, as well as offshore SO-6, fall within the Swami's State Marine Conservation Area. Beach nourishment and sediment management are permitted pursuant to California Code of Regulations Title 14, Section 632 subsection (b)(138)(C).
California State Lands Commission Public Trust Doctrine	Consistent: Offshore placement sites SO-6 and SO-5, and nearshore site at Cardiff, are located in ungranted sovereign lands under the jurisdiction of the SLC. A lease is required from the SLC for any portion of a project extending into state-owned lands that are under its exclusive jurisdiction.
San Diego Coastal State Park General Plan	Consistent: General Plans for Leucadia, Moonlight, San Elijo, Cardiff, and Torrey Pines State Beaches support shoreline protection activities, including beach replenishment actions.
LOCAL	
City of Encinitas General Plan and Local Coastal Program Land Use Plan (LCP LUP)	Consistent: The SELRP would support the Encinitas General Plan and Draft LCP LUP goals of encouraging measures, which would replenish sandy beaches in order to protect coastal bluffs from wave action and maintain beach recreational resources.
City of Solana Beach General Plan and Draft Local Coastal Program Land Use Plan Local Implementation Plan (LCP LUP LIP)	Consistent: The SELRP would support the Solana Beach General Plan and Draft LCP LUP LIP goals to participate in and encourage other long-term beach sand replenishment and retention programs at the federal, state, and regional levels.
City of San Diego General Plan and Local Coastal Program	Consistent: The Torrey Pines placement site is located within the coastal zone as designated by the City of San Diego General Plan (2008). The City's LCP requires any project occurring within the coastal zone to be reviewed by the City and the CCC. This review would occur as part of the SELRP.
Coastal Regional Sediment Management Plan (RSM Plan) and Shoreline Preservation Strategy	Consistent: The SELRP would support the goals of the RSM Plan by allowing for reuse of beach-quality material along the San Diego coastline.

Recreation

There are a variety of recreational activities at nearshore and onshore materials placement sites including snorkeling/SCUBA, recreational fishing, swimming, and general beach use. No beach trails would be affected during material placement activities. During materials placement operations, temporary beach closures would occur on portions of each site; however, following placement of beach-quality materials, recreational beach area would be increased. Because of public safety concerns associated with heavy equipment operations on the beach (i.e., pipelines and dozers to distribute sand on the beaches), portions of each of the disposal/reuse sites would be closed temporarily to the public during construction (PDF-63). The length of beach closure is anticipated to be 500 feet of beach at a time and closures would shift as activities move along the shoreline. Horizontal access along the back beach would be maintained (PDF-70). Pipeline

segments would be covered at consistent intervals to facilitate access from the back beach to the water (PDF-71). Where horizontal access is limited, (e.g., where a wet beach directly abuts bluffs), vertical access would remain to allow public access on either side of the active sand placement area as long as public safety is not compromised (PDF-70 and PDF-71). Access restrictions would result in a temporary redistribution of beach activities to adjacent areas.

Ocean areas directly adjacent to sand transport/placement equipment and activities may also be temporarily closed during placement activities to ensure public safety and could briefly disrupt recreation such as snorkeling, SCUBA, or fishing activities in that immediate area (PDF-63). For the safety of recreationalists in the area, barge operations would be coordinated with USCG (PDF-59). Buffers around temporary monobuoys and designated barge lanes would be maintained to avoid water recreation users and vehicle safety hazards (PDF-61 and PDF-62). Additionally, pipelines used during materials transport, including both floating and submerged, would be marked as “navigational hazards” (PDF-60). Adjacent areas around the material placement equipment and activities would remain open throughout the construction period. Once material placement is complete, no residual restrictions or closures of the beach or adjacent ocean area would occur and recreation opportunities would not be permanently affected.

As currently planned, the placement of reuse materials would occur in fall/winter so peak periods of summer use would be avoided. The SELC would coordinate the schedule at individual materials placement sites to the extent possible to avoid major holidays and special events (PDF-68). Ultimately, materials reuse would enhance the public’s sandy beach recreational opportunity and this reuse activity would result in **less than significant impacts to recreation (Criteria D and E) and no substantial adverse effects have been identified.**

Onshore and nearshore materials placement could affect surfing through the following: modification of existing sandbars and reefs by sand placement and deposition, access being denied during construction, poor water quality, or by wave backwash generated during and after construction of the beach fill. Potential impacts at each placement site are consolidated in Table 3.1-4. As described in the table, surf sites within the materials placement footprints can expect to have some increased backwash during high tide immediately during and after construction due to the increased steepness of the design berm, with no long-term change in backwash or wave quality. Some surf locations would benefit from the temporary sand deposition because they are sand-bottom breaks and depend on sand bars for wave quality. Generally, long-term conditions at these surf sites would be maintained as the sand continues to disperse more broadly in the littoral cell. There would be **no significant impacts (Criteria D and E) or substantial adverse impacts to surfing as a result of material placement.**

Table 3.1-4
Summary of Surfing Impacts Related to Materials Disposal/Reuse
at Nearshore and Onshore Sites

Site	Modification of Sandbars or Reefs from Sand Deposition	Hindered Access during construction	Reduced Wave Quality from Wave Backwash?
Broad Conclusion	Sand deposition is transient as the transport is constant and the absolute volume of the beneficial reuse material is modest; the long-term impacts would be less than significant and not substantially adverse .	Approximately 1,000 feet of beach total may be closed during fill construction, reaching 500 feet north and south, respectively, of the beach fill template centerpoint. Closure of the beach does not constitute a prohibition to surfing off the placement site location, and surfing could still occur along these beaches. Closure of the 1,000-foot length of beach would partially restrict access by foot to the water, but surfers would be able to access the water from both north and south of the inlet construction area. The location of the landing of the shorepipe would be flagged for people to see and avoid. During installation and removal of the shorepipe, surfers and beachgoers would be restricted from its immediate location for a very short time (several hours). Access restrictions would result in less than significant impacts to surfing and no substantial adverse effects have been identified .	Surf sites within the materials placement footprints can expect to have increased backwash during high tide immediately during and after construction due to the increased steepness of the design berm. Changes in high tide, post-construction backwash are expected to be negligible at surf sites away from the fill sites. In addition, no long-term changes in backwash and other wave parameters (wave breaking intensity and wave vortex ratio) are expected (M&N 2014). Impacts to wave quality would be less than significant and not substantially adverse .
Leucadia	Volume of sand that could deposit at any one area is relatively low given small quantity of sand (approx. 115,000 cy) and length of site (approx. 0.5 mile). Long-term conditions at these sites would be maintained as the sand continues to disperse more broadly in the littoral cell.	See discussion under broad conclusion. Less than significant and not substantially adverse .	Not anticipated at this placement site. Less than significant and not substantially adverse .

3.1 Land Use/Recreation

Site	Modification of Sandbars or Reefs from Sand Deposition	Hindered Access during construction	Reduced Wave Quality from Wave Backwash?
Moonlight Beach	There would be no long-term significant or substantial adverse effects to surfing from beneficial reuse. Volume of sand that could deposit at any one area is relatively low given small quantity of sand (approx. 105,000 cy) and length of site (approx. 0.15 mile). In the short term, the D Street surf site could benefit because it is a sand-bottom break and depends on sand bars for wave quality. Long-term conditions at these sites would be maintained as the sand continues to disperse more broadly in the littoral cell. There would be no long-term significant or substantial adverse effects to surfing from beneficial reuse.	See discussion under broad conclusion. Less than significant and not substantially adverse.	Not anticipated at this placement site. Less than significant and not substantially adverse.
Cardiff	Larger quantity of sand proposed for placement (500,000 cy in nearshore and 300,000 cy onshore) than at other sites. Multiyear monitoring of sand retention after the 2001 RBSP indicated that sand tended to reside longer in the sandy reach between Cardiff and Seaside reefs. This effect could be from the reefs acting as headlands, forming a long “pocket” beach in between. Thus, the project may result in more sand deposition near Cardiff; George’s should benefit from the longer-term sand deposition because it is a sand-bottom break and depends on sand bars for wave quality. The impact would be less than significant and not substantially adverse , with long-term conditions remaining at least as good as existing conditions at these sites over time.	See discussion under broad conclusion. Less than significant and not substantially adverse.	George’s can expect to have a constructed, high tide increase in backwash of approximately 11 percent during each placement construction episode (M&N 2014). Immediately after construction, the beach slope and backwash would start to become milder. By approximately 4 months after construction, the increase in backwash during high tide is expected to be approximately 3 percent. By 6 months after construction, project-induced signals in the profile slopes would be lost in the seasonal profile changes, which become greater than those generated by the project over time. These post-construction changes are expected to occur after each placement interval. This is considered less than significant and not substantially adverse.
Solana Beach	Volume of sand that could deposit at any one area is relatively low given small quantity of sand (approx. 145,000 cy) and length of site (approx. 0.89 mile). In the short term, reef breaks at Pill Box, Cherry Hill, and Rock Pile could break like sand-bottom surf spots. After the 2001	See discussion under broad conclusion. Less than significant and not substantially adverse.	Fletcher Cove can expect a similar one-time increase in backwash of approximately 12 percent during construction and 1 percent lasting for 4 months after placement (M&N 2014).

Site	Modification of Sandbars or Reefs from Sand Deposition	Hindered Access during construction	Reduced Wave Quality from Wave Backwash?
	RBSP, surfing at these sites improved for a short time and then reverted to pre-project conditions (Hopper 2012). The Del Mar River mouth may also benefit from the temporary sand deposition because it is a sand-bottom break and depends on sand bars for wave quality. Long-term conditions at these sites would be maintained as the sand continues to disperse more broadly in the littoral cell. There would be no long-term significant or substantial adverse effects to surfing from beneficial reuse.		This is considered less than significant and not substantially adverse.
Torrey Pines	Absolute volume of sand that could deposit at any one area is relatively low given small quantity of sand (approx. 245,000 cy) and length of site (approx. 0.30 mile). Nearby sites are sand bar breaks (although Black's is significantly-influenced by wave refraction over the Scripps Submarine Canyon) and those breaks may benefit. The Scripps canyon is south of the site and limited quantities from the project would reach sites south of that feature. There would be no long-term significant or substantial adverse effects to surfing from beneficial reuse.	See discussion under broad conclusion. Less than significant and not substantially adverse.	Not anticipated at this placement site. Less than significant and not substantially adverse.

Note: Applicable to Alternatives 2A and 1B only as Alternative 1A would not result in materials disposal/reuse at nearshore or onshore sites

Alternative 1B

Under Alternative 1B, impacts related to land use and recreation would be similar to those described for Alternative 2A. Specifically, materials disposal at this slightly lesser quantity (1.2 mcy) would not result in the permanent conversion of land, conflict with existing or future planned land uses, or be incompatible with adjacent land uses. From a recreation perspective, materials reuse would enhance the public's sandy beach opportunity with short-term inconvenience during the actual material placement activities. Depending on the beach site and material excavation rates, up to 500 feet of beach may be closed per day in a specific location. As sand placement activities shift along the beach, those areas in which sand placement has been completed would be reopened to public use. The same Project design features described for Alternative 2A would be implemented for Alternative 1B. Regarding impacts to surfing, Alternative 1B would result in nearly identical changes to those described above for Alternative 2A and in Table 3.1-4. The volume of material at Cardiff in the nearshore would be less (300,000 cy vs. 500,000 cy) because there would be no new inlet. The reuse materials placed in the nearshore at Cardiff under Alternative 1B could result in a temporary benefit to surfing as it is a sand-bottom break and depends on sand bars for wave quality, but no long-term effects would be anticipated due to complete sand dispersion over time (M&N 2014). As such, a temporary surfing benefit would occur compared to existing conditions. There would be **no significant impacts (Criteria D and E) or substantial adverse impacts to recreation resources as a result of material placement.**

Alternative 1A

Under Alternative 1A, dredged materials would be of poor quality (i.e., fine grain size) not suitable for reuse and would therefore be disposed of in LA-5 as detailed in the SAP (M&N 2013). While Alternative 1A would not institute beneficial beach-placement reuse, it would not be inconsistent with adopted goals and policies for regional sand replenishment since they are linked to "beach-quality" material. Disposal of materials under Alternative 1A would result in **less than significant land use impacts (Criteria A, B, and C) and no substantial adverse impacts have been identified.**

Transport of materials to LA-5 would occur via a monobuoy and barge system, as described in Section 2.10.2. While some restrictions would be in place during disposal operations (i.e., boaters and recreationists would be restricted from areas directly in the vicinity of pipelines and transport equipment), this would be a short-term temporary impact occurring periodically over 9 months. This activity would not preclude recreational fishing in other areas, as restrictions would be localized around the pipeline and monobuoy. For impacts related to commercial fishing, refer to Section 3.13 Socioeconomics. The same ocean safety project design features

described for Alternative 2A would be implemented for ocean transport activities associated with Alternative 1A. Alternative 1A would have no effects on surfing since no materials would be placed in the littoral zone and there would be limited increase in tidal flow from the inlet. Materials disposal activities would not preclude the viability of recreational activities or result in a permanent and major loss of recreational uses. Therefore, Alternative 1A would result in **less than significant recreational impacts (Criteria D and E) and no substantial adverse impacts have been identified.**

No Project/No Federal Action Alternative

No new materials placement activities would occur under the No Project/No Federal Action Alternative. The existing inlet would continue to be opened annually, with excavated material deposited on the beach near the mouth. With no restoration or dredging proposed, this alternative would not generate the opportunity to fulfill the beach nourishment goals and policies of the various general plans and LCPs, nor would additional recreational beach area be created beyond what material is currently placed on the beach near the mouth of the existing inlet. **There would be no land use or recreation impacts (Criteria A, B, C, D, and E) or substantial adverse effects under this alternative.**

3.1.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

The SELRP would not result in significant or substantially adverse land use or recreation impacts; therefore, no mitigation measures are required. Project design features listed in Table 2-26 would help to minimize and avoid potential land use or recreation conflicts. Project design features applicable to land use include the maintenance of north-south access along Coast Highway 101 and neighboring commercial establishments during construction and implementation of a public information program. Recreation-related project design features include temporary restriction of public access, trails, and beach and nearshore ocean areas to maintain public safety, with some trail access and beach/ocean access remaining available throughout construction to maintain public access to the Reserve and beach areas. Project design features also require returning trails and access to pre-project conditions, scheduling material placement the extent possible to avoid major holidays and special events, and surf monitoring. These recreation-related project design features would help to ensure that the current recreational land uses are maintained to the fullest extent possible during construction and that the recreating public remains safe from construction hazards.

3.1.5 LEVEL OF IMPACT AFTER MITIGATION

CEQA: Implementation of Alternative 2A, Alternative 1B, Alternative 1A, and the No Project/No Federal Action Alternative would result in less than significant impacts related to land use and recreation for both lagoon restoration and materials placement project components.

NEPA: Implementation of Alternative 2A, Alternative 1B, Alternative 1A, and the No Project/No Federal Action Alternative would not result in substantial adverse impacts related to land use and recreation for either lagoon restoration or materials placement.

3.2 HYDROLOGY

This section is based primarily on site visits and technical data from engineering studies prepared by Moffatt & Nichol Engineers (M&N); specifically the Amended Hydrology/Hydraulic Study (M&N 2012a; Appendix D) and the Ebb Bar and Flood Shoal Study (2011). From these technical studies, hydrology characteristics within San Elijo Lagoon are discussed relative to the following:

- Water balance and circulation
- Surface hydrology/drainage
- Groundwater hydrology
- Flooding, erosion, and siltation
- Flood control

3.2.1 AFFECTED ENVIRONMENT

The discussion of the affected environment below focuses on the hydrologic features and patterns of the lagoon and associated inland surface waters. The dynamics of the adjacent coastline (i.e., the offshore ebb bar at the lagoon mouth) are discussed in Section 3.3 Oceanography/Coastal Processes, which further describes the effects of storms and waves on the proposed project. Section 3.3 also addresses coastal inlet protection, ocean wave energy effects, and ebb bar formations affecting the lagoon. Off-site materials placement/disposal is proposed for area beaches/nearshore and offshore sites, which are also primarily affected by coastal processes rather than the internal hydrology of the lagoon. Therefore, this section does not address hydrology impacts associated with placement of materials on beaches, in the nearshore, or in the offshore. Also refer to Section 3.4 Water and Aquatic Sediment Quality for a description of the lagoon's water quality characteristics and the potential changes anticipated from the various project alternatives.

San Elijo Lagoon is a coastal wetland that occupies approximately 465 acres, dominated by mudflats. The lagoon is traversed by Coast Highway 101, the NCTD Railroad, I-5, and the CDFW dike, which constrict the hydrology of the lagoon and reduce its hydraulic efficiency. Stormwater and urban runoff enters the lagoon through Escondido Creek, Orilla Creek, and adjacent neighborhoods. The watershed upstream from the lagoon has been urbanized over the last several decades, and as urbanization has increased, urban runoff into the lagoon through these creeks has also increased. Historic sedimentation into the lagoon was relatively high due to an undeveloped watershed. Because much of the lagoon's watershed is now highly urbanized, sediment inflow to the lagoon has been low for many years. Therefore, resident sediment within

the lagoon primarily represents historical deposition that occurred prior to and during early development in the area (USDA 1993).

Historic evidence suggests that San Elijo Lagoon was once a perennially open system (within the last 200 years), prior to substantial man-made modifications. However, under the more developed conditions that characterize the lagoon currently, the negative effects of inlet closure have been documented. Prior to active management of the lagoon inlet, the mouth of the lagoon was closed much of the year due to the accumulation of coarse beach sands brought into the inlet from incoming (flood) tidal flows. These beach sand deposits create a flood shoal inside the inlet that reduces the ability of the lagoon to flush during tidal cycles. Because of these cyclical (yet persistent) depositions, outgoing (ebb) tide velocities are also dampened to the point where they are insufficient to scour or transport deposits back to the coast. As a result, tidal exchange with the lagoon and circulation within the lagoon have been constricted and inefficient for decades at the mouth as well as within the tributary channels in each of the three basins. This reduced tidal exchange (i.e., insufficient tidal prism) has contributed to the historical accumulation of fine sediments in the east and central basins of the lagoon (USDA 1993). Since the 1990s, the SELC has manually opened the inlet at least annually and maintained an open mouth for much of the time. Sediment accumulation inside portions of the lagoon, particularly the west and central basins, has decreased with the open mouth conditions and the urbanization of the upstream watershed, but historic accumulated sediments remain within the lagoon.

Even under open tidal mouth conditions, muted tidal flow throughout the lagoon occurs due to the inlet configuration and channel inefficiencies, particularly in the east basin where flushing is most limited. Manual opening of the tidal inlet conducted by SELC maintains a degree of tidal flushing, but the underlying causes of flood shoal accumulation and inlet closure continue and result in repeated closures.

Water Balance and Circulation

The hydrology within San Elijo Lagoon is largely driven by freshwater supplied from the upstream watersheds and from along the coast via ocean tidal fluctuations. However, the hydrologic water balance and the circulation dynamics of the lagoon are dependent on the surrounding landform topography and the lagoon bathymetry that vary seasonally relative to the following:

- Precipitation (watershed drainage and direct rainfall to the lagoon);
- Tidal prism (seawater/brackish water volume circulating into, within, and out of the lagoon);

- Groundwater level and groundwater/surface flow relationships (e.g., groundwater springs and seepage);
- Urban dry weather runoff;
- Evaporative water loss due to combinations of temperature, humidity, and wind; and
- Aquatic and wetland plant transpiration water loss.

San Elijo Lagoon receives approximately 1 million gallons per day (mgd) of watershed runoff (storm water and urban flows) year-round from Escondido Creek (Gibson 2012). Prior to urbanization, Escondido Creek was an intermittent creek, but it currently behaves as a perennial creek (CWN 2002) due to dry weather urban runoff contributions, causing the water balance to become increasingly dominated by freshwater.

Several human modifications in addition to increased runoff flows affect the water balance and circulation within the lagoon, including Coast Highway 101, the NCTD railroad, the CDFW dike, and I-5. These developments have increased water impounding within the lagoon, thereby increasing water elevations and the resistance to tidal forces. Additionally, the inlet of San Elijo Lagoon is often constricted due to coastal processes (beach sand migration and flood shoal development), which requires manual reopening of the mouth each year to improve tidal flushing and lagoon water quality. A flood shoal modeling study (M&N 2011) was conducted for the SELRP to evaluate the tidal hydrodynamics and ocean waves/currents that manipulate sand bar formation off the lagoon mouth in the ocean (ebb bar) and within the lagoon (flood shoal). Ebb bars can change incoming ocean wave patterns and consequent changes to the shoreline, while flood shoals can mute or dampen the tides in the lagoon and affect hydrology and water quality.

Shoaling at the inlet, coupled with inefficient drainage patterns of the lagoon, suppresses tidal influence on the lagoon, resulting in a muted tide range (M&N 2012a). A muted tide range results from the hydraulic inefficiencies at the inlet in the lagoon, and water fluctuations within the lagoon do not vary as much as the adjacent ocean during a typical tide cycle. In addition to decreased circulation and associated water quality issues, muted tide ranges lead to artificially narrow intertidal habitat bands and can lead to decreased habitat diversity. Tidal influence decreases with distance inland, reducing circulation from the west basin to the east basin.

The hydraulic inefficiencies within San Elijo Lagoon have led to a consistent degradation of water quality in the lagoon and a change in habitat conditions, described in more detail below under surface hydrology. Active maintenance of the lagoon mouth has improved habitat and water quality by improving tidal exchange and circulation; however, muted tidal exchange and poor circulation continue, which affects habitat distribution and quality and reduces inlet

stability. In general, maintaining regular and unmuted tidal exchange improves water circulation throughout water bodies and overall water quality by preventing extreme fluctuations in temperature and salinity. Drainage of freshwater fluvial flows from the upstream watershed also continues to be inefficient due to constrictions at the CDFW dike and I-5. Effects on water quality and biological resources are discussed in more detail in Sections 3.4 Water and Aquatic Sediment Quality and 3.6 Biological Resources, respectively.

Surface Hydrology

San Elijo Lagoon is located within the Escondido Creek Hydrologic Area (HA) of the Carlsbad Hydrologic Unit (HU). Figure 3.2-1 shows the study area within the hydrology of the region. The Carlsbad HU encompasses approximately 210 square miles and extends from the headwaters above Lake Wohlford in the east, to the Pacific Ocean to the west, and from the cities of Vista and Oceanside in the north, to Solana Beach and Escondido in the south. There are numerous important surface hydrologic features within the Carlsbad HU, including four ecologically sensitive coastal lagoons, four creeks, and two large water storage reservoirs (Lake Wohlford and Dixon Lake).

The Carlsbad HU is composed of six HAs: Loma Alta, Buena Vista Creek, Agua Hedionda, Encinas, San Marcos, and Escondido Creek. Most of the Carlsbad HU is urbanized (48 percent), with residential (29 percent), commercial/industrial (6 percent), freeways and roads (12 percent), agriculture (12 percent), and vacant/undeveloped (32 percent) composing the dominant land uses.

The Escondido Creek HA comprises the largest portion (40 percent) of the Carlsbad HU (CWN 2002). Escondido Creek begins in the headwaters of Lake Wohlford in Bear Valley and ends in San Elijo Lagoon. Elevations within the watershed range from sea level to 2,420 feet on the ridges above Bear Valley. Through the City of Escondido, the creek has been channelized but otherwise remains fairly undeveloped. The land uses of the Escondido Creek HA are also dominated by urban areas (44 percent) with rural residential (15 percent), agriculture (10 percent), and open space (31 percent) occupying the rest (McLaughlin 2010).

The lagoon receives runoff from Escondido Creek, its tributaries, and the smaller La Orilla Creek prior to discharge into the Pacific Ocean. Smaller drainage areas on adjacent land also contribute runoff into the lagoon. Average annual precipitation ranges from 11 to 15 inches.



Groundwater Hydrology

San Elijo Lagoon is underlain by the San Elijo Valley Groundwater Basin. The San Elijo Valley Groundwater Basin underlies two southwest-northeast-trending valleys with Escondido Creek flowing through the upper, northeast valley, and discharging into San Elijo Lagoon. The basin is bounded to the north and south by alluvium with the semipermeable marine deposits of the La Jolla Group. The northeastern boundary is defined by contact with impermeable Cretaceous deposits of the Santiago Peak Volcanics (DWR 2004). The western boundary is the Pacific Ocean.

Natural recharge of the alluvial aquifer is primarily from percolation in Escondido Creek, with smaller amounts contributed by direct precipitation and underflow from the surrounding marine sedimentary units. Infiltration from agricultural and residential uses contributes additional groundwater recharge. Groundwater in this basin is unconfined and characterized by exchange with both the overlying lagoon and adjacent ocean waters (DWR 2004).

Seawater affects lagoon circulation by tidal inundation on the surface and upwelling through the groundwater (Corps 2002).

In late 2012, USGS and the Olivenhain Municipal Water District (OMWD) installed a research and monitoring well to assess groundwater underlying San Elijo Lagoon for potential potable use. Testing revealed that the groundwater aquifer may be of sufficient quality and quantity to be used as a source of potable water and/or for groundwater recharge (OMWD 2014). The testing results also indicate that this aquifer is at depths substantially lower than the alluvial aquifer directly underlying the lagoon, and that measurable exchange between the lagoon and groundwater is limited to the alluvial aquifer.

Flooding, Erosion, and Siltation

During large storm events, flood flows from the watershed entering the lagoon can force the inlet open by hydraulic force and/or by overtopping with erosive outflow. However, such natural openings happen infrequently, and throughout most of the year (and often during low-rainfall winter seasons), the mouth of the lagoon would remain closed due to poor tidal flushing (i.e., the hydraulically inefficient channel system and the flood shoal formation that results). The sinuous channel extending east from the inlet currently cannot sustain sufficient water velocities to consistently keep the lagoon mouth open to ocean tidal flushing such that it could counteract the constant longshore transport of beach sand. To minimize water quality, circulation, flooding, and habitat issues exacerbated by closed inlet conditions, particularly during warm weather and the

nesting season, the lagoon inlet is mechanically opened to maintain hydraulic connectivity between the ocean and the lagoon when natural wet-season flows are otherwise ineffective.

With the maintained open inlet, the general water level has been reduced in the lagoon, but the potential for flooding within adjacent areas remains a concern. Formal mapping of the 100-year floodplain is described below, but flooding currently occurs in some areas under much smaller storm events due to the hydraulic constrictions within the lagoon. While the I-5 and NCTD railroad bridges are proposed for improvements by others (Caltrans and SANDAG, respectively) to enhance hydraulic connectivity and decrease the potential for flooding, the CDFW dike and inlet also contribute to existing flooding concerns along Manchester Avenue in particular. Structures within the lagoon are protected against erosion, and flood flows traveling through the lagoon are typically slowed by the infrastructure as they flow through the lagoon toward the ocean. As a result, erosion along adjacent roadways and trails is relatively low.

Another location in which flooding is a concern is along Coast Highway 101 south of the existing lagoon inlet. Wave runup during storm events currently leads to occasional flooding of the roadway, and riprap that protects the roadbed is at risk of being undermined (personal communication Kathy Weldon, 2014). Sand placement as part of the 2012 RBSP provided some additional protection to the roadway, but as the sand is distributed through the littoral system and the beach narrows, flooding along Coast Highway 101 is expected to continue.

Historically, activities occurring throughout the watershed, such as road development, agriculture, and construction, resulted in erosion and consequent sediment transport that settled out in the lagoon. Escondido Creek and, to a lesser extent, La Orilla Creek, are the historic principal transporters of alluvial sediment. Much of the lagoon sedimentation occurred during earlier decades of heightened construction and agricultural activity, and lagoon sedimentation rates have decreased over time due to urbanized buildout, reduced agriculture, and the initiation of conservation practices (County of San Diego 1996). Sedimentation within San Elijo Lagoon continues, albeit at a reduced level, from upland erosion sources and from littoral transport along the beach area that is brought into the lagoon mouth during tidal cycles.

As mentioned earlier, the effects of the channel constrictions at the CDFW dike, Coast Highway 101, and bridges on I-5 and the NCTD railroad continue to cause flow reductions that induce sediment fallout and entrapment in the lagoon. Within the lagoon itself, circuitous channel configurations also reduce flow rates and promote the settling of sediment in the lagoon from both upland and coastal sources. As a result of decades of poor circulation, consistent sediment loading (particularly prior to urbanization of the watershed), and insufficient inlet maintenance, the east and central basins of the lagoon have built up significant deposits of primarily fine sediments. In general, the lagoon consists of a thin layer of fine-grained material (~29 percent

finer) that overlays a thick, relatively homogenous layer of sandy materials (~10 percent fines). The upper layer of material represents a small fraction (approximately 9 percent) (M&N 2013).

According to the Ebb Bar and Flood Shoal Study (M&N 2011), dredge records and modeling indicate that San Elijo Lagoon has a flood shoal volume of 63,300 cy at equilibrium. To maintain the inlet open to tidal flushing, the SELC manually opens the inlet at least annually and removes approximately 30,000 cy of sediment. Refer to Section 3.3 Oceanography/Coastal Processes for additional details on coastal processes and morphology, including information on ebb bar formation in the nearshore area off the inlet. The flood shoal is composed of material entrained in the inlet and is primarily sand. As sand, it has a relatively large grain size and settles out relatively quickly when compared to upland sediment sources that can be much finer-grained silts and clays. Therefore, the flood shoal remains near the inlet location and does not generally result in sedimentation in adjacent habitat areas, making removal through inlet maintenance an effective means of sediment control. When this material is removed as part of inlet maintenance, it is placed on the south side of the inlet in a process known as bypassing. This occurs at a number of lagoons and coastal inlets along the San Diego coastline, and enables sand travelling alongshore in a littoral current to continue to provide material for the littoral sand cycle.

Flood Control

The need for controlling floodwaters is based on geographic flood zone areas that FEMA defines according to varying levels of flood risk. These zones are depicted on FIRM or Flood Hazard Boundary Maps. Each zone reflects the severity or type of flooding in the area. A large percentage of the lagoon and adjacent areas, particularly to the north of the lagoon, are located within the FEMA 100-year or 500-year flood zone. San Elijo Lagoon is a part of the Escondido Creek floodplain. Although located farther upstream in the watershed, Lake Wohlford and Dixon Lake offer some flood control for Escondido Creek and San Elijo Lagoon.

Within the lagoon footprint, the CDFW dike, Coast Highway 101, NCTD railroad, and I-5 have contributed to restricting the movement and release of flood flows through the lagoon to the Pacific Ocean. As these structures were constructed, no formal flood control measures were implemented within the lagoon to compensate for the exacerbation of flood conditions. Low-lying areas along the floodplains of Escondido Creek and its tributaries can experience flooding during severe rain events that are smaller than the 100-year event as well. The current 100-year flood elevations around the east basin and along Manchester Avenue exceed the road elevation by 2 to 4 feet, depending on location and analysis approach, and are often flooded during moderate storms.

3.2.2 CEQA THRESHOLDS OF SIGNIFICANCE

A significant impact related to hydrology would occur if implementation of the SELRP results in substantial negative temporary (construction-related) or permanent (post-construction) effects on:

- A. Lagoon circulation, surface drainage patterns or amount of surface runoff;
- B. Groundwater quality and/or recharge;
- C. The potential for flooding, erosion, or siltation; or
- D. The potential for exposure of people or property to water-related hazards such as flooding

The CEQA thresholds of significance for hydrology were derived from a combination of thresholds listed in Appendix G of the CEQA Guidelines and thresholds used in the EIR/EIS for the Bolsa Chica Lowlands Restoration Project (SCH #2000071068) and the 2012 RBSP EA/EIR (SCH #2020051063). These coastal restoration projects provide additional guidance beyond thresholds suggested by the County, as related to the unique hydrological concerns of coastal restoration and sand placement projects.

3.2.3 ENVIRONMENTAL CONSEQUENCES

The environmental consequences, or impacts, associated with the proposed project on lagoon and inland surface hydrologic patterns are discussed below. Table 3.2-1 presents predicted tidal ranges at several locations within the lagoon for each alternative, and the ocean tidal range for comparison. Each location represents conditions within the lagoon moving eastward from the ocean.

**Table 3.2-1
Predicted Tidal Ranges for Restoration Alternatives**

Alternative	Tidal Range (feet)					
	Ocean	Highway 101	West Basin	Central Basin	I-5	East Basin
Existing	7.97	4.56	3.99	3.85	3.78	3.76
1A	7.97	7.11	5.56	5.26	5.21	5.15
1B	7.97	6.58	5.44	5.42	5.42	5.43
2A	7.97	7.97	7.93	7.92	7.87	7.88

Source: M&N 2012a

Table 3.2-2 illustrates the maximum 100-year flood elevation within the lagoon at various locations for each alternative.

Table 3.2-2
Maximum 100-Year Flood Elevation in the Wetlands (feet, NGVD)
Based on +5.4-Foot NGVD (Recorded Highest) Downstream Tidal Elevation

Virtual Gage Locations	Manchester Avenue Elevation	Existing	Alt 1A	Alt 1B	Alt 2A
Highway 101	N/A	5.3	5.3	5.3	5.3
Railroad	N/A	8.5	7.9	8.1	6.3
Central Basin 1	29.0	8.9	8.4	8.7	6.5
Central Basin 2	9.8	9.0	8.5	8.7	6.7
I-5	12.7	9.4	8.9	8.8	7.3
East Basin 1	12.9	9.8	9.8	8.8	7.5
East Basin 2	9.3	12.3	11.7	9.0	8.1
East Basin 3	10.3	12.4	11.7	9.0	8.3
East Basin 4	10.4	12.3	11.8	9.0	8.4

Source: M&N 2012a

Note: Values in **bold** indicate elevations above the roadway and represent potential flooding.

For each alternative, potential substantial adverse, significant, or beneficial temporary and permanent, direct and indirect impacts are identified below.

Alternative 2A

Temporary

Temporary impacts to hydrology could occur during construction activities, including diking and inundating areas for dredging, grading along the perimeter and access roads, equipment staging, and on-site materials disposal and placement. Construction would be phased as described in Chapter 2, and dry disturbed areas would be generally limited to staging areas, access road improvements, and areas disturbed during bridge construction. Wet disturbed areas would include portions of the lagoon basins dredged to lower elevations or built up as transitional areas. During the construction process, there would be temporary but dynamic changes to the lagoon's water balance (inflow/outflow; depth), circulation, and surface hydrology. As channels, dikes, and the new mouth are formed, water levels would adjust relative to the available cross-sectional area of newly sculpted areas, temporarily reducing water levels in some areas and altering flow regimes as areas are deepened. During periods of inundation within certain areas of the lagoon, water levels within diked off areas would increase relative to existing conditions, altering flow regimes. Inundation would last from 3 to 7 months and amounts would range from +5 to +6 feet

NGVD depending on basin location and phase of construction (see Table 2-22 for length and amounts of inundation that would occur in each basin during phased construction). Inundated areas could be subject to slower velocities as they are separated from main channel and inlet flows, so increased erosion and/or siltation would not be anticipated. In addition, as noted above, sediment entering the lagoon has decreased as the upstream watershed has been developed, so siltation due to incoming runoff would not increase substantially. Some circulation would continue to occur due to dredge and support equipment movement and wind wave-driven circulation. Figure 2-16 shows those areas that, once dredged, would be exposed as open water channels, tidal mudflats, or salt marsh once re-established by marsh vegetation. Dredged areas would be opened to tidal action, and would begin to revegetate immediately through natural plant recruitment reducing the potential for erosion. Additional planting of specific habitat would also occur to facilitate recovery. Periodic maintenance activities would cause temporary dredging of the channels. Since tidal flows in areas subject to erosion/siltation (eastern portions of the project) would remain relatively slow through newly dredged areas, and since areas identified as sensitive to erosion (channel slopes under infrastructure) would be structurally protected as described in Chapter 2, erosion or siltation during construction and maintenance activities would be minimal. See Section 3.4 Water and Aquatic Sediment Quality for a discussion of water quality impacts related to sedimentation/siltation and turbidity.

Compliance with applicable regulations (i.e., Construction General Permit, Municipal Permit) would be required to ensure impacts during construction activities are minimized. Erosion and sediment control would be addressed in the project-specific Storm Water Pollution Prevention Plan (SWPPP) (PDF-25) required under the Construction General Permit to minimize scour, erosion, and impacts on surface drainage patterns and runoff volumes. The SWPPP would be developed and implemented by the contractor in compliance with existing regulations and would include erosion-control BMPs such as riprap, hydraulic mulch, soil binders, and hydroseed. The SWPPP and SWMP, HMP, and LID plans would conform with a variety of federal, state, and local regulatory requirements (e.g., Section 111.5 and Appendix F of the Construction General Permit [Order 2010-0014-DWQ]) and require implementation of construction BMPs to stabilize soils during land-based construction and staging/access to minimize erosion/siltation. Section 3.4 (Water and Aquatic Sediment Quality) identifies specific BMPs that could be implemented as part of the SWPPP and SWMP, HMP, and LID plans.

Dikes would incorporate a mechanism to control water elevations and allow the release of water if runoff into the diked areas raises water levels above 5 or 6 feet NGVD in the east or central and west basins, respectively. Proposed elevations would remain below the 100-year storm water elevation (Table 3.2-2; M&N 2012a). Flooding of adjacent infrastructure and/or roadways would not occur and the potential for exposure of people or property to hazards such as flooding would not be increased over existing conditions. Water level would return to pre-construction elevations

(i.e., approximate mean sea level) once each area is reopened to tidal flow (Table 3.2-1; M&N 2012a). Upon the completion of construction, circulation and surface drainage patterns within the lagoon would be improved. **Temporary impacts would not be substantially adverse and impacts would be less than significant to lagoon circulation and drainage patterns, flooding, erosion or siltation, or increased exposure to water-related hazards (Criteria A, C, and D).**

The lagoon is underlain by an unconfined alluvial groundwater basin that is characterized by exchange with both the overlying lagoon and adjacent ocean waters. Water levels in diked areas of the lagoon would temporarily increase during periods of inundation. Hydrologic connectivity between groundwater and the lagoon would not be expected to change as a result of temporary work activities. No substantial reduction in recharge characteristics would occur during construction. **Impacts from construction activities would be less than significant for altering existing conditions related to the exchange of lagoon and groundwater that could result in substantial impacts to recharge characteristics (Criterion B). No substantial adverse impacts would occur.**

Permanent

Alternative 2A would increase the hydraulic efficiency of San Elijo Lagoon by creating a new, larger, more stable inlet (proposed new inlet channel would increase by nearly 100 feet), increasing and extending the channel network within the lagoon basins (see Table 2-7 for new channel dimensions at infrastructure crossings under Alternative 2A), and improving infrastructure to minimize constrictions at crossings. Drainage patterns and circulation within the lagoon would be altered from existing conditions with increased tidal exchange and improved channel, but would benefit the lagoon overall with respect to biological resources and water quality, in particular. With expanded channels and the new mouth, water levels would vary relative to the expanded cross-sectional area of newly sculpted channels, altering flow regimes in deepened areas. Circulation within the lagoon would increase with the new inlet and improved channel network. Flow volumes and velocities through the lagoon would be expected to increase due to the open tidal inlet. Hydrology throughout the lagoon would be greatly improved through the creation of a new and enlarged inlet mouth and enhanced channel flow regimes that would allow freshwater to flow out of the lagoon and promote improved tidal exchange deeper to the inland areas of the lagoon.

Removal of the CDFW dike and improvements at I-5 (proposed by Caltrans), the railroad (proposed by SANDAG), and Coast Highway 101, as well as straightening and enlarging the main channel, would enable the lagoon to drain incoming freshwater more efficiently reducing flood elevations (Table 3.2-2). The duration of flood drainage (from the upstream lagoon boundary to Highway 101) would be shortened to approximately 14 percent of the duration

under existing conditions (M&N 2012b). Drainage would be more efficient both during dry weather flows that currently support freshwater habitat (e.g., cattails) east of I-5, as well as during storm events, leading to less potential in general for flooding hazards, which are discussed in more detail below. These same improvements to the channel network would increase tidal influence in the east basin of the lagoon.

Tidal influence would also be increased over existing conditions throughout the lagoon by constructing a new, larger, and more stable inlet south of the existing inlet (Table 3.2-1). The new inlet would provide less muted flow directly into lagoon channels. The larger cross-sectional profile area of the dredged channels would offer less resistance to tidal fluctuation and allow a greater volume of tidal exchange, giving the lagoon a greater opportunity to flush more readily than existing conditions. This inlet would provide additional circulation to the east basin, as well as throughout the central and west basins through the extension of the existing channel network. This additional circulation would promote lower residence times and higher water quality conditions throughout the lagoon compared to existing conditions (discussed in 3.4 Water and Aquatic Sediment Quality).

As shown in Table 3.2-1, Alternative 2A would result in a substantially larger tidal range than currently exists in the lagoon, providing a range very close to the open ocean, essentially eliminating the muting effects of the current lagoon inlet (e.g., since the tide range would be very close to open ocean tidal range).

The anticipated increase in tidal range under Alternative 2A would shift the inlet from a flood-dominated system to an ebb-dominated system, leading to a more stable inlet condition. As discussed in 3.3 Coastal Processes, this new ebb bar is predicted to have a volume of approximately 345,000 cy at equilibrium. This is a substantial increase from the existing ebb bar of 3,600 cy at the current inlet. The ebb bar would be larger than the volume of the flood bar (266,000 cy) and the new inlet would result in a more tidally stable ebb-dominated system. This shift to an ebb-dominated system would reduce the entrainment of sand moving along the coast into the inlet, and slow the development of a flood shoal, leading to an inlet that remains open for longer periods of time and maintaining a less muted tide range for longer periods of time. Therefore, although Alternative 2A would involve the largest amount of initial dredging and a greater amount of initial sediment removal, it would require maintenance dredging every 3 to 4 years compared to the annual maintenance currently required. By changing the lagoon to an ebb flow-dominated hydrologic system, the necessity for repeated inlet and/or channel maintenance would be less frequent than the current inlet condition, although volumes removed during each maintenance event are anticipated to be greater.

Alternative 2A would result in a net increase in impervious area of 0.53 acre. Though some concrete would be removed from the CDFW dike in the east basin of the lagoon, a new bridge would be constructed over the new inlet along the existing Coast Highway 101 road segment already traversing the lagoon, and a permanent launch ramp would be built for a dredge in the central basin. The launch ramp is expected to have a small footprint. The 0.53-acre increase is relatively small (0.05 percent increase in impervious area of the total project area). The bridge would require proper drainage designs per applicable regulations (i.e., Standard Urban Storm Water Mitigation Plan [SUSMP], Hydromodification Management Plan [HMP], low impact development [LID] BMPs) to minimize any increase in discharge flow rate, runoff volume, or erosion potential. By complying with the regulatory requirements and properly implementing appropriate BMPs, no significant changes to surface runoff patterns or sedimentation (siltation) loads into the lagoon would occur.

Hydrologic improvements associated with Alternative 2A would improve existing constrictions (e.g., along Highway 101 and I-5) within the lagoon that have contributed to restricting water flow and circulation. This alternative would also improve the ability of the lagoon to drain freshwater currently impounded in the east basin and improve tidal influence throughout the basins. A more stable tidal inlet would also result in longer periods of unmuted tidal exchange between the ocean and lagoon. Alternative 2A, though changing the existing drainage patterns, would restore drainage patterns closer to the lagoons predevelopment state and would result in a beneficial impact on circulation and surface drainage patterns. **The project's impact on surface runoff and drainage patterns would be less than significant. No substantial adverse or significant impacts would occur (Criterion A).**

Alternative 2A would enlarge the tidal channel network throughout the lagoon and enhance the ability of the lagoon to drain incoming freshwater flows currently impounded in the east basin, as described above. Water would continue to be present in all of the basins and would not substantially change. The lagoon is currently underlain by an unconfined alluvial groundwater basin that is characterized by exchange with both the overlying lagoon and adjacent ocean waters. Measurable exchange between the lagoon and groundwater is likely limited to the alluvial aquifer (discussed above under Groundwater Hydrology), and increased tidal circulation within the lagoon would not represent a substantial change to conditions that influence **recharge characteristics; impacts would be less than significant (Criterion B) and would not be substantially adverse.**

Alternative 2A would enhance the ability of the lagoon to drain fluvial flows to the ocean through improvements to the main channel and infrastructure constriction points, as discussed above. Improved drainage would generally reduce the potential for flooding to occur within the lagoon and along adjacent infrastructure during dry weather flows and small storm events. Flow

volumes through the lagoon may increase, creating the potential for erosion in specific locations. As discussed in Chapter 2, infrastructure protection has been incorporated into the project design and these areas would not be susceptible to erosion under higher flow velocities.

Siltation within the lagoon could occur from inputs from upstream fluvial flows, erosion within the lagoon, or sediment entering from the coast. Sediment entering the lagoon has decreased as the upstream watershed has been developed, so siltation due to incoming runoff would not increase substantially under any of the build alternatives. Erosion along the lagoon channels would not be substantial due to protection designed for areas predicted to be susceptible to scour. Directly after construction, there may be exposed soils that could be susceptible to erosion within the lagoon. These areas are anticipated to become vegetated as soils stabilize and natural recruitment or restoration planting occurs, and erosion would be short term and not substantial. The potential for erosion would also be expected to decrease with increased habitat value and soil stability (primarily vegetation) and improved erosion control.

Entrainment of sand from the littoral zone entering the lagoon inlet is discussed above in the context of the flood shoal that would develop between maintenance cycles. Alternative 2A would shift the lagoon from a flood-dominated system to an ebb-dominated system and would result in a relatively slow accumulation of the flood shoal. Sand would continue to enter the lagoon; however, sand is relatively large in grain size and typically settles out of the water column relatively quickly. The creation of a sedimentation basin inside of the inlet and the grain size characteristics of entering sand would limit siltation to within the inlet area, minimizing impacts to surrounding habitat areas. Shoals would be monitored by SELC on a semi-annual basis and removed during regular maintenance or as-needed (PDF-40). **Therefore, impacts to flooding, erosion, and/or siltation would be less than significant (Criterion C). No substantial adverse impacts would occur.**

Existing flood elevations during the 100-year storm event are currently mapped as extending over adjacent Manchester Avenue in the east basin, as identified in Table 3.2-2. Alternative 2A would reduce flood elevations compared to existing conditions with improved lagoon hydrology proposed under this alternative. Proposed elevations would remain below the 100-year storm water elevation (Table 3.2-2). Flood elevations would be reduced to levels below Manchester Avenue along its length due to expanded channel cross-sections under each of the lagoon bridges and improvements to the lagoon channel network and proposed new inlet. Flooding of adjacent infrastructure and/or roadways would not occur and the potential for exposure of people and property to flooding and other such water-related hazards would be decreased over existing conditions. Channel and infrastructure improvements would be reviewed by the County, Caltrans, the City of Solana Beach, and the City of Encinitas, as appropriate, prior to approval of project grading plans (PDF-50).

Once construction is completed, a LOMR would be filed to formally modify the FIRM, or Flood Boundary and Floodway Map (FBFM), or both (PDF-49). This alternative would not require a CLOMR, which is needed if a proposed project causes an increase in flood elevation of greater than 1.00 foot and is within a flood area designated as Zone A. Given the nature of the design under Alternative 2A, the LOMR would recognize the net reduction in Base Flood Elevation (BFE) achieved as a result of the project, which reduces flooding hazard in the project area. **No substantial adverse direct or indirect effects to flooding or other hazards have been identified associated with implementation of Alternative 2A. Impacts would be less than significant (Criterion D). Direct and indirect effects to flooding or other hazards have also been addressed in Section 3.5 Geology/Soils.**

Alternative 1B

Temporary

Temporary impacts as a result of the implementation of Alternative 1B would be similar to those discussed for Alternative 2A. Alternative 1B would require less dredging, grading, and ground disturbance for initial implementation than Alternative 2A, although the general construction approach, including phasing and diking off areas for inundation, would be similar. Construction would be phased, with dry disturbed areas generally limited to staging areas and access road improvements, and wet disturbed areas limited to portions of the lagoon dredged to lower elevations or built up as transitional areas.

Temporary impacts to hydrology could occur during construction activities; during periods of inundation within the lagoon, water levels within diked off areas would increase relative to existing conditions, altering flow regimes. Inundation would last from 3 to 7 months and amounts would range from +5 to +6 feet NGVD depending on basin location and phase of construction (see Table 2-23 for length and amounts of inundation that would occur in each basin during phased construction). As channels are expanded and dikes are formed, water levels would undulate relative to the available cross-sectional area of newly sculpted areas, temporarily altering flow regimes as areas are deepened. Some circulation would continue to occur due to dredge and support equipment movement and wind wave-driven circulation. Water levels would be expected to return to pre-construction elevations once dikes are removed and the lagoon is allowed to fill. Increased erosion and/or siltation would not be anticipated. Figure 2-17 shows those areas that, once dredged, would be exposed as open water channels, tidal mudflats, or salt marsh once re-established by marsh vegetation. Dredged areas would be opened to tidal action, and would begin to naturally revegetate through plant recruitment. Additional planting of specific habitat would also occur, as needed, to facilitate recovery. Periodic maintenance

activities would cause temporary dredging of the channels. Since tidal flows in areas subject to erosion/siltation (eastern portions of the project) would remain relatively slow through newly dredged areas, and since areas identified as sensitive to erosion (channel slopes under infrastructure) would be structurally protected as described in Chapter 2, erosion or siltation during construction and maintenance activities would be minimal; impacts would be less than significant. Erosion and sediment control would also be addressed in the project SWPPP that would be developed and implemented by the contractor in compliance with existing regulations (PDF-25) to minimize scour, erosion, and impacts on surface drainage patterns and runoff volumes.

Dikes would incorporate a mechanism to control water elevations and allow the release of water to avoid flooding of adjacent infrastructure and/or roadways during construction. The potential for exposure of people or property to hazards such as flooding would not be increased over existing conditions. **Temporary impacts would not be substantially adverse and impacts would be less than significant related to lagoon circulation and drainage patterns, flooding, erosion or siltation, or increased exposure to water-related hazards (Criteria A, C, and D).**

The lagoon is underlain by an unconfined alluvial groundwater basin that is characterized by exchange with both the overlying lagoon and adjacent ocean waters. Water levels in diked areas of the lagoon would increase during periods of inundation, and hydrologic connectivity between groundwater and the lagoon would not be expected to change as a result of temporary work activities. Construction activities would not substantially alter existing conditions related to the exchange of lagoon and groundwater that could result in a substantial reduction in recharge characteristics. **Impacts would be less than significant (Criterion B). No substantial adverse impacts would occur.**

Permanent

Alternative 1B would increase the hydraulic efficiency of San Elijo Lagoon to a lesser extent than Alternative 2A. The existing inlet would be retained under Alternative 1B, and improved. There is a rock sill located under the existing inlet, which constrains the degree to which tidal exchange between the lagoon and ocean can be increased. The hydraulic conductivity within the main channel would increase because it would be straightened and enlarged, and the channel network within the lagoon basins would be enlarged and extended to improve circulation into the secondary channel network (see Table 2-10 for new channel dimensions at infrastructure crossings under Alternative 1B). Infrastructure would be improved to minimize constrictions at crossings, including removal of the CDFW dike and improvements at I-5 (proposed by Caltrans) and the railroad (proposed by SANDAG). These improvements within the channel network and at key infrastructure crossings would enable the lagoon to drain incoming freshwater more

efficiently, both during dry weather flows and storm events. These same improvements to the channel network would increase tidal influence in the east basin of the lagoon.

Drainage patterns and circulation within the lagoon would be altered with implementation of Alternative 1B, but would benefit the lagoon overall with respect to biological resources and water quality, in particular. Circulation would increase with the new inlet and improved channel network. Hydrology throughout the lagoon would be improved through the enhancement of the existing lagoon inlet and enhanced channel flow regimes that would allow freshwater to flow out of the lagoon and promote improved tidal exchange deeper to the inland areas of the lagoon.

Tidal influence would be increased throughout the lagoon by improving the existing inlet, although to a lesser extent than Alternative 2A. The improved inlet configuration would provide less muted flow directly into lagoon channels compared to existing conditions although, as shown in Table 3.2-1, tides would become more muted extending east into the lagoon. The increased tide range would give the lagoon a greater opportunity to flush more readily than existing conditions. The improved inlet would provide additional circulation to the east basin, as well as throughout the central and west basins through the extension of the existing channel network. This additional circulation would promote lower residence times and higher water quality conditions throughout the lagoon compared to existing conditions (discussed in Section 3.4 Water and Aquatic Sediment Quality). Upstream sediment that currently has the opportunity to settle out when water backs up behind the CDFW dike would be able to flush from the lagoon and contribute to the littoral zone. Additional tidal exchange and flushing would result in larger and heavier particle size (sand) in the western portions of the channel system where tidal flows may be faster. In the eastern portions of the project where most of the smaller, lighter sediment particles are located, tidal flushing would be slower and channels would also be resistant to tidal erosion. Structures and strategic infrastructure threatened by erosion during stormflow events would be protected throughout the lagoon by shore protection measures, thus managing erosion during higher-velocity storm flows and preventing damage (PDF-39).

As discussed in Section 3.3 Coastal Processes, under Alternative 1B, the flood bar would remain substantially larger than the volume of the ebb bar. The inlet would remain flood dominated, as it is under existing conditions, although in the dredged condition, tidal exchange between the lagoon and ocean would be increased over existing conditions, as discussed above. Sand would continue to be entrained in the inlet in a developing flood shoal that would require removal each year to maintain an open inlet condition with the predicted tide ranges. The necessity for repeated inlet and/or channel maintenance would continue similar to the current inlet condition, although volumes removed during each maintenance event are anticipated to be slightly greater, as noted in Chapter 2.

Alternative 1B would result in a net decrease in impervious area of 0.23 acre due to removal of the CDFW dike. A permanent launch ramp would be built for a dredge in the central basin as part of Alternative 1B, which would slightly increase impervious areas within the lagoon. The CDFW dike would be removed from the east basin of the lagoon and replaced with vegetated transitional habitat. However, because the dike is being removed from an inundated area, there would be no anticipated change in surface runoff amounts in the lagoon. Increases in impervious area would require proper drainage designs per state and County regulations (i.e., SUSMP, HMP, LID BMPs) to minimize any increase in discharge flow rate, runoff volume, or erosion potential. By complying with the regulatory requirements and properly implementing appropriate BMPs, no significant changes to surface runoff patterns would occur.

Hydrologic improvements associated with Alternative 1B would improve existing constrictions within the lagoon restricting water flow and circulation. This alternative would also improve the ability of the lagoon to drain freshwater currently impounded in the east basin and improve tidal influence throughout the basins. Though changing existing drainage patterns, this alternative would result in a beneficial impact on circulation and surface drainage patterns. **The change to the amount of surface runoff would result in less than significant impacts. No substantial adverse or significant impacts would occur (Criterion A).**

Alternative 1B would enlarge the tidal channel network throughout the lagoon and enhance the ability of the lagoon to drain incoming freshwater flows currently impounded in the east basin, as described above. Water would continue to be present in all of the basins and would not substantially change. The lagoon is currently underlain by an unconfined alluvial groundwater basin that is characterized by exchange with both the overlying lagoon and adjacent ocean waters. The increased tidal circulation within the lagoon **would not represent a substantial change to conditions that influence recharge characteristics. Impacts would be less than significant (Criterion B) and would not be substantially adverse.**

Alternative 1B would enhance the ability of the lagoon to drain fluvial flows to the ocean through improvements to the main channel and infrastructure constriction points, as discussed above. Improved drainage would generally reduce the potential for flooding to occur within the lagoon and along adjacent infrastructure during dry weather flows and small storm events. Flow volumes through the lagoon may increase, creating the potential for erosion in specific locations. As discussed in Chapter 2, infrastructure protection has been incorporated into the project design and these areas would not be susceptible to erosion under higher flow velocities.

Siltation within the lagoon could occur from inputs from upstream fluvial flows, erosion within the lagoon, or sediment entering from the coast. Sediment entering the lagoon has decreased as the upstream watershed has been developed, so siltation due to incoming runoff would not

increase substantially under any of the build alternatives. Erosion along the lagoon channels would not be substantial due to protection designed for areas predicted to be susceptible to scour. Directly after construction, there may be exposed soils that could be susceptible to erosion within the lagoon. These areas are anticipated to become vegetated as soils stabilize and natural recruitment or restoration planting occurs, and erosion would be short term and not substantial. Entrainment of sand from the littoral zone entering the lagoon inlet is discussed above in the context of the flood shoal that would develop between maintenance cycles. Alternative 1B would increase the stability of the lagoon inlet but the lagoon would continue to be a flood-dominated system. Sand would continue to enter the lagoon and accumulate into a flood shoal. Sand is relatively large in grain size, however, and typically settles out of the water column relatively quickly. The inlet channel between Coast Highway 101 and the railroad bridge would be protected with riprap along both sides, and would provide a discrete location for the flood shoal to develop without substantially affecting adjacent habitat areas. Shoals would be monitored by SELC on a semi-annual basis and removed during regular maintenance or as-needed (PDF-40).

Impacts to flooding, erosion, and/or siltation would be less than significant (Criterion C). No substantial adverse impacts would occur.

Alternative 1B would provide flood reduction potential compared to existing conditions. The lagoon channel network and infrastructure improvements would enhance hydraulic connectivity between the lagoon and ocean, and allow fluvial flows to drain from the lagoon more efficiently. As shown in Table 3.2-2, Alternative 1B would reduce flood elevations compared to existing conditions, and Manchester Avenue would not be flooded during the 100-year flood. Flooding of adjacent infrastructure and/or roadways would not occur and the potential for exposure of people and property to flooding and other such water-related hazards would not be increased over existing conditions. Channel and infrastructure improvements would be reviewed by the County, Caltrans, the City of Solana Beach, and the City of Encinitas, as appropriate, prior to approval of project grading plans (PDF-50).

Once construction is completed, a LOMR would be filed to formally modify the FIRM, or FBFM, or both (PDF-49). Similar to Alternative 2A, this alternative would not require a CLOMR, which is needed if a proposed project causes an increase in flood elevation of greater than 1.00 foot and is within a flood area designated as Zone A. Given the nature of the design under Alternative 1B, the LOMR would recognize the net reduction in BFE achieved as a result of the project, which reduces flooding hazard in the project area. **No substantial adverse direct or indirect effects to flooding or other hazards have been identified associated with implementation of Alternative 1B. Impacts would be less than significant (Criterion D).**

Alternative 1A

Temporary

Temporary impacts as a result of the implementation of Alternative 1A would be similar to those discussed for Alternative 1B, but Alternative 1A would require less dredging, grading, and ground disturbance for initial implementation than Alternative 1B, and impacts would be less. Construction would be phased, with dry disturbed areas generally limited to staging areas and access road improvements, and wet disturbed areas limited to portions of the lagoon dredged to lower elevations or built up as transitional areas. The construction approach for Alternative 1A is also different than for Alternative 2A and Alternative 1B and would not include temporary inundation of diked off areas. Instead the dredge would remain within the main channel network, limiting bottom sediment disturbance within the lagoon. Increased erosion and/or siltation would not be anticipated because velocities within the channels/lagoon would not substantially change from existing conditions during construction. Erosion and sediment control would also be addressed in the project SWPPP that would be developed and implemented by the contractor in compliance with existing regulations (PDF-25).

The construction approach proposed for Alternative 1A would not alter the current circulation within the lagoon, and the potential for exposure of people or property to hazards such as flooding would not be increased over existing conditions. **Temporary impacts would not be substantially adverse and less than significant impacts would occur to lagoon circulation and drainage patterns, flooding, erosion or siltation, or increased exposure to water-related hazards (Criteria A, C, and D).**

The lagoon is underlain by an unconfined alluvial groundwater basin that is characterized by exchange with both the overlying lagoon and adjacent ocean waters. Hydrologic connectivity between groundwater and the lagoon would not be expected to change as a result of temporary work activities. Construction activities would not substantially alter existing conditions related to the exchange of lagoon and groundwater that could result in a substantial reduction in recharge characteristics. **Impacts would be less than significant (Criterion B). No substantial adverse impacts would occur.**

Permanent

Alternative 1A would increase the hydraulic efficiency of San Elijo Lagoon to a lesser extent than Alternative 2A or Alternative 1B. The existing inlet would be retained under Alternative 1A, and improved. There is a rock sill located under the existing inlet, which constrains the degree to which tidal exchange between the lagoon and ocean can be increased. The hydraulic conductivity

within the main channel would increase because it would be straightened and enlarged, although the secondary channel network within the lagoon basins would not be modified under Alternative 1A, limiting hydrologic improvements to the main channel and adjacent areas. Infrastructure would be improved to reduce constrictions at crossings, including the installation of two culverts through the existing CDFW dike and improvements at I-5 (proposed by Caltrans) and the NCTD railroad (proposed by SANDAG). Improvements within the main channel and at key infrastructure crossings would enable the lagoon to drain incoming freshwater more efficiently compared to existing conditions, both during dry weather flows and storm events. These same improvements would increase tidal influence in the east basin of the lagoon.

Drainage patterns and circulation within the lagoon would be altered with implementation of Alternative 1A, but would benefit the lagoon overall with respect to biological resources and water quality, in particular. Circulation would increase with the new inlet and improved main channel, although benefits would be smaller than those identified under Alternative 2A or Alternative 1B.

Tidal influence would be increased compared to existing conditions by improving the existing inlet, although to a lesser extent than Alternative 1B in the central and east basins. The improved inlet configuration would provide less muted flow although, as shown in Table 3.2-1, tides would become more muted extending east into the lagoon. The improved inlet would provide additional circulation to the east basin, as well as throughout the central and west basins, although these improvements would be primarily limited to the main channel.

As discussed in Section 3.3 Coastal Processes, under Alternative 1A, the flood bar would remain substantially larger than the volume of the ebb bar, similar to existing conditions. The inlet would remain flood dominated, although in the dredged condition, tidal exchange between the lagoon and ocean would be increased over existing conditions, as discussed above. Sand would continue to be entrained in the inlet in a developing flood shoal that would require removal each year to maintain an open inlet condition with the predicted tide ranges. The necessity for repeated inlet and/or channel maintenance would continue similar to the current inlet condition, although volumes removed during each maintenance event are anticipated to be slightly greater, as noted in Chapter 2. As noted above, the CDFW dike would remain in place, with the addition of two culverts to promote fluvial water flow from the watershed to the ocean, resulting in no measurable decrease in impervious surfaces. No structures that would increase impervious area within or adjacent to the lagoon are proposed as part of Alternative 1A. A temporary dredge launch ramp would be installed during construction and would be removed after construction. Alternative 1A would not result in a change in impervious area, and therefore would not substantially affect surface runoff into the lagoon.

Hydrologic improvements associated with Alternative 1A would improve existing constrictions within the lagoon restricting water flow and circulation. This alternative would also improve the ability of the lagoon to drain freshwater currently impounded in the east basin and improve tidal influence throughout the basins. Though changing existing drainage patterns, this alternative would result in a beneficial impact on circulation and surface drainage patterns. **No impact in surface runoff would occur. No substantial adverse or significant impacts would occur (Criterion A).**

Alternative 1A would enlarge the main channel in the lagoon and enhance the ability of the lagoon to drain incoming freshwater flows currently impounded in the east basin, as described above. Water would continue to be present in all of the basins and would not substantially change. The lagoon is currently underlain by an unconfined alluvial groundwater basin that is characterized by exchange with both the overlying lagoon and adjacent ocean waters. Measurable exchange between the lagoon and groundwater is likely limited to the alluvial aquifer (discussed above under Groundwater Hydrology). The increased tidal circulation within the lagoon **would not represent a substantial change to conditions that influence groundwater recharge characteristics, and impacts would be less than significant (Criterion B) and impacts would not be substantially adverse.**

Alternative 1A would enhance the ability of the lagoon to drain fluvial flows to the ocean through improvements to the main channel and infrastructure constriction points, as discussed above. Improved drainage would generally reduce the potential for flooding to occur within the lagoon and along adjacent infrastructure during dry weather flows and small storm events. Flow velocities through the lagoon may increase, creating the potential for erosion/siltation in specific locations. As discussed in Chapter 2, infrastructure protection has been incorporated into the project design and these areas would not be susceptible to erosion under higher flow velocities.

Siltation within the lagoon could occur from inputs from upstream fluvial flows, erosion within the lagoon, or sediment entering from the coast. Sediment entering the lagoon has decreased as the upstream watershed has been developed, so siltation due to incoming runoff would not increase substantially under any of the build alternatives. Erosion along the lagoon channels would not be substantial due to protection designed for areas predicted to be susceptible to scour. Directly after construction, there may be exposed soils that could be susceptible to erosion within the lagoon. These areas are anticipated to become vegetated as soils stabilize and natural recruitment or restoration planting occurs, and erosion would be short term and not substantial. Entrainment of sand from the littoral zone entering the lagoon inlet is discussed above in the context of the flood shoal that would develop between maintenance cycles. Alternative 1A would increase the stability of the lagoon inlet but the lagoon would continue to be a flood-dominated system. Sand would continue to enter the lagoon and accumulate into a flood shoal. Sand is

relatively large in grain size, however, and typically settles out of the water column relatively quickly. The inlet channel between Coast Highway 101 and the railroad bridge would be protected with riprap along both sides, and would provide a discrete location for the flood shoal to develop without substantially affecting adjacent habitat areas. Shoals would be monitored by SELC on a semi-annual basis and removed during regular maintenance or as-needed (PDF-40).

Impacts to flooding, erosion, and/or siltation would be less than significant (Criterion C). No substantial adverse impacts would occur.

Alternative 1A would provide limited flood reduction potential compared to existing conditions. Although the lagoon channel network and infrastructure improvements would enhance hydraulic connectivity between the lagoon and ocean and allow fluvial flows to drain from the lagoon more efficiently, physical constraints with the existing inlet (i.e., long, sinuous, and narrow/shallow channel) would limit flood elevation reductions. As shown in Table 3.2-2, Manchester Avenue would continue to be flooded during 100-year floods in three locations within the east basin (East Basins 2, 3, and 4), although overall flood elevations in those locations would be reduced from existing conditions. No increases in 100-year flood elevation of more than 1 foot would occur. Flooding of adjacent infrastructure and/or roadways would not occur and the potential for exposure of people and property to flooding and other such water-related hazards would not be increased over existing conditions. Channel and infrastructure improvements would be reviewed by the County, Caltrans, the City of Solana Beach, and the City of Encinitas, as appropriate, prior to approval of project grading plans (PDF-50).

Once construction is completed, a LOMR would be filed to formally modify the FIRM, or FBFM, or both (PDF-49). Similar to Alternatives 2A and 1B, this alternative would not require a CLOMR, which is needed if a proposed project causes an increase in flood elevation of greater than 1.00 foot and is within a flood area designated as Zone A. Given the nature of the design under Alternative 1A, the LOMR would recognize the net reduction in BFE achieved as a result of the project, which reduces flooding hazard in the project area. **No substantial adverse direct or indirect effects to flooding or other hazards have been identified associated with implementation of Alternative 1A. Impacts would be less than significant (Criterion D).**

No Project/No Federal Action Alternative

Under the No Project/No Federal Action Alternative, tidal flows would continue to be restricted due to the narrow and meandering channel between Coast Highway 101 and the railroad, and the presence of a sill underlying the inlet. Tidal ranges would continue to be muted for both high and low tides, while progressively increasing from the west basin through the east basin. As a result, poor lagoon circulation (i.e., tidal exchange), surface water drainage, and flood protection would

remain the same as current conditions if no alternative is implemented. There would be no change to surface runoff. No changes to groundwater interaction would occur.

The No Project/No Federal Action Alternative would maintain flood elevations along the east basin and Manchester Avenue that exceed the road elevation by several feet (Table 3.2-2). This is no change from existing conditions; therefore, no additional impact would result to the potential for exposure of people or property to water-related hazards such as flooding. Under the No Project/No Federal Action Alternative, the condition of stormflows being retarded by constricted channels and bottlenecks under Coast Highway 101 and the I-5 bridges would continue, thus elevating water levels more than would occur with restoration. If the I-5 bridge is replaced and the lagoon is not restored, then it is expected that stormflows would drop in elevation east of I-5, but would rise west of I-5.

There is no change from the No Project/No Federal Action Alternative to the potential for erosion and siltation. The lagoon would continue to have restricted circulation due to the hydraulically inefficient channel system with several choke points in the system. In addition, annual maintenance would be required to remove the accumulated flood shoal and keep the inlet open. **No substantial adverse effects would be anticipated under the No Project/No Federal Action Alternative, and impacts would be less than significant, although benefits associated with the build alternatives would not be realized (Criteria A through D).**

3.2.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

Although the project would offer a net benefit to overall lagoon hydrology through the improved channel network, increased tidal exchange, and circulation, construction and post-construction activities would be required to adhere to various federal, state, and local standards. By successfully complying with these measures, impacts associated with construction- and operation-related impacts would be minimized through LID, site design, and/or structural BMPs mandated by these measures. Given the compliance with required stormwater permits, as well as conformance to proper BMP design, implementation, and maintenance mandated by permits and associated regulations, no significant or substantially adverse impacts to hydrology would be expected as a result of SELRP implementation. No mitigation measures are required.

The following measures describe existing policies, regulations, and procedures aimed at reducing potential impacts related to hydrology:

- Implementation of the SELRP would require compliance with the Construction General Permit Order 2009-0009-DWQ (as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ). Under the Construction General Permit, a project-specific SWPPP would be

implemented. The SWPPP would specify measures and would include proper runoff controls and pollutant source controls to avoid or minimize construction-related impacts to surface drainage patterns, amount of surface runoff, erosion, and flooding. Project construction would comply with all provisions described in the Construction General Permit and would strictly follow the SWPPP. The SWPPP would also address the following project-specific practices:

- Clearing and grading of native vegetation would be limited to the minimum amount needed if earthwork is conducted during the wet season.
- Storm water and erosion controls would be installed prior to soil disturbance on the construction site. Where determined necessary, silt fencing, straw wattles, temporary earthen berms, or similar runoff barriers would be placed along the perimeter of the project site using methodologies and orientations appropriate to control erosion. The fence would be buried at the bottom and staked. Points of discharge from these BMPs or other points of concentrated runoff would employ scour/erosion control. Silt fencing, straw wattles, earthen berming, or a similar barrier would be placed around the perimeter of the project site and properly installed and maintained.
- Stockpiles of soil, concrete, and other materials would be covered with a tarp or blanket and/or surrounded with straw wattles or gravel bags. Slopes would be protected with straw wattles or blankets. All straw wattles would be certified as weed-free.
- Whenever possible, grading would be phased to limit soil exposure and minimize potential sediment transport. Finished areas would be revegetated and/or hydroseeded as soon as possible with native species known to exist in the project site.
- Once construction is completed, an operations and maintenance program would be implemented in accordance with Municipal NPDES Permit Order No. R9-2013-0001, which would be implemented for the life of the project to ensure the continued effectiveness of post-construction BMPs. Maintenance activities would vary from area to area depending on the BMPs in place, but would include the following:
 - Mowing and maintaining vegetated BMPs (e.g., maintaining swales and/or detention/retention systems to original cross sections and infiltration rates).
 - Seeding or sodding to restore or maintain ground cover.
 - Repairing erosion areas and stabilizing repairs with additional erosion-control measures.

- Removing and replacing all dead and diseased vegetation as necessary to maintain vegetation coverage and minimize erosion. Replacement vegetation would not include any invasive species.
- The SELRP would implement LID features for the long-term post-construction (operational) phase. Water-quality benefits would be provided through LID designs, source controls, and treatment controls. The following features would be considered:
 - Removing and replacing all dead and diseased vegetation as necessary to maintain vegetation coverage and minimize erosion. Replacement vegetation would not include any invasive species.
 - The SELRP would implement LID features for the long-term post-construction (operational) phase. Water-quality benefits would be provided through LID designs, source controls, and treatment controls. The following features would be considered:
 - Integrating vegetated swales, infiltration strips, or similar earth-based vegetated system for accepting and conveying runoff associated with permanent impervious features.
 - Optimizing the use of suitable pervious materials for hardscaped surfaces where applicable (e.g., porous pavements, gravel walkways, grass pavers).
 - Maximizing soft-bottom areas that are amenable to vegetative planting and natural treatment of runoff.
 - Integrating natural rock or similar material for protection against scour and sediment transport at discharge points and on soft-bottom drainages.

3.2.5 LEVEL OF IMPACT AFTER MITIGATION

CEQA conclusion: Impacts to hydrology would be less than significant due to implementation of the SELRP.

NEPA: No substantial adverse impacts to hydrology have been identified due to implementation of the SELRP.

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3.3 OCEANOGRAPHY/COASTAL PROCESSES

Beaches are dynamic environments subject to seasonal and annual movement of sand offshore and onshore, as well as alongshore within a generally defined littoral cell. Modification of structures or water body connections to the coast (e.g., lagoon inlets) can also influence sand movement, or transport, in a littoral cell.

This section is based largely on information from the SELRP Shoreline Morphology Report (M&N 2012a) and the Coastal Regional Sediment Management Plan (SANDAG 2009). For that report, available literature was reviewed to determine existing conditions within the project area to analyze the fate of the beach fills. The *Coast of California Storm and Tidal Wave Study, San Diego Region* was a source of data on coastal conditions, including waves, the sediment budget, and longshore sediment transport data (Corps 1990, 1991). Other studies include a 1994 Shoreline Erosion Assessment and Atlas of the San Diego Region (California Department of Boating and Waterways and SANDAG 1994, referred to herein as DBW/SANDAG 1994) and a study of littoral cells and sand budgets in California (Patsch and Griggs 2006, 2007). Information from the 2012 RBSP EIR/EA is also referenced, as appropriate.

The function of a complex system like a lagoon is not easily captured in the template of an EIR/EIS. Accordingly, Section 3.2 Hydrology and Section 3.4 Water and Aquatic Sediment Quality address tidal dynamics within the lagoon, as well as tidal exchange between the lagoon and ocean in the context of water quality. Section 3.4 also addresses water quality within the ocean as it relates to placement of disposal/reuse materials. Section 3.6 Biological Resources addresses potential biological impacts associated with the dispersion of sand placed as part of materials disposal/reuse. Long-term sea level rise and potential extreme events associated with climate change are discussed in Section 3.16 Global Climate Change and Greenhouse Gas Emissions of this document.

3.3.1 AFFECTED ENVIRONMENT

This discussion is focused on the Oceanside Littoral Cell, which encompasses San Elijo Lagoon and the onshore and nearshore materials placement sites, and is adjacent to offshore stockpiling sites. Specific conditions at San Elijo Lagoon and the proposed materials disposal/reuse sites follow the broader overview of coastal geomorphology.

Coastal Geomorphology

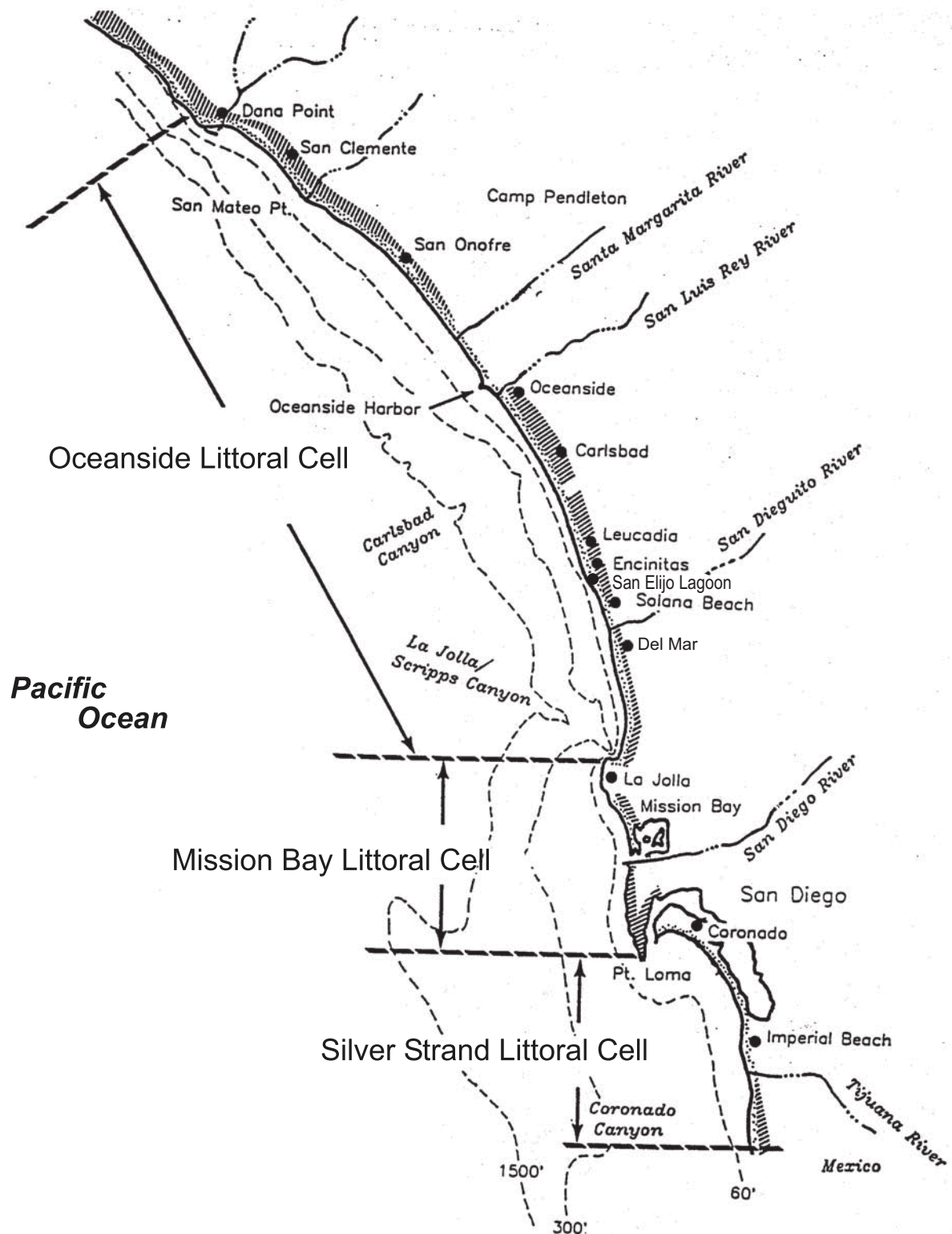
The project study area extends from the City of Encinitas south to the northern end of the City of San Diego, within San Diego County. The coastal area in this portion of the County is

characterized by sandy/cobble beaches that vary in width and sand cover both seasonally and annually. The study area is located entirely within or adjacent to the Oceanside Littoral Cell, with the exception of LA-5, which is located approximately 30 miles south, 6 miles offshore of the Mission Bay Littoral Cell. The southern half of the Oceanside Littoral Cell stretches from Oceanside to La Jolla³ and includes the shorelines of the cities of Oceanside, Carlsbad, Encinitas, Solana Beach, Del Mar, and La Jolla, and encompasses the project study area. The littoral cells located in San Diego County are illustrated in Figure 3.3-1.

A littoral cell is a coastal reach bounded by physiographic features (e.g., submarine canyons, coastal headlands, harbors, etc.) where sediment enters, moves along, and leaves the coast. The littoral cell is a segment of coastline that does not naturally transport or receive littoral sediment to or from another cell in either the “upcoast” or “downcoast” direction (Corps 1991). However, within the cell, a complete cycle of sedimentation exists that can include erosion of highland terrain, fluvial transport to the shoreline, and littoral transport along the shoreline. Once sediment is entrained in the littoral transport system, it can be lost from that system by cross-shore transport offshore or by channeling it into a deep basin via a submarine canyon. Sediment sources to a cell include beaches, rivers, bluffs, offshore deposits, bypassing, and artificial nourishment. Sediment sinks are submarine canyons, offshore deeper-water areas, inland lagoons, and harbors. Beaches and the nearshore zone represent storage areas within a littoral cell. The sediment budget is either in balance with stable beaches, in a surplus with growing beaches, or in a deficit with narrowing beaches. The portion of the Oceanside Littoral Cell encompassing the project study area is in a deficit of nearly 55,000 cubic yards per year (cy/yr), as evidenced by widespread beach retreat since the early 1980s (DBW/SANDAG 1994) into the present (Patsch and Griggs 2006, 2007).

Bounded on one side by the landward limit of the beach and extending seaward beyond the area of breaking waves, the seaward edge of an active littoral cell is defined as its depth of closure. Substantial quantities of sand from coastal littoral cells do not usually travel outside of this depth and into the deeper ocean in large quantities, except during severe coastal storm wave events. Typically in the San Diego region, greater sand movement from the shallow portion of the beach profile to the deeper portion of the profile within the littoral zone occurs in the winter due to large storms and waves, followed by a period of sand gain to the shallow portion of the beach profile during the summer’s more gentle conditions and surf. Thus, the exposed portion of the beach is generally wider in the summer and narrower in the winter. These combined seasonal processes,

³ The northern half of the Oceanside Littoral Cell extends from Oceanside to Dana Point in Orange County.



Source: Moffatt & Nichol Engineers



0 10 Miles

Figure 3.3-1
Littoral Cells in the San Diego Region

including both winter and summer sand shifts, compose a complete cross-shore sedimentation cycle. Longshore sand transport occurs continually and also varies seasonally. Insufficient shoreward energy generally exists to move sand from outside the depth of closure back into the littoral cell. Sand located or carried outside of the depth of closure essentially exits the littoral cell and is no longer available to naturally replenish beaches during the summer. In San Diego, the depth of closure ranges from approximately -13 to -32 feet mean sea level (msl) (Coastal Frontiers 2010b). The proposed offshore stockpile areas of SO-5 and SO-6 are located outside (deeper than) the depth of closure and therefore do not have measurable exchange with the nearshore/beach sand volumes.

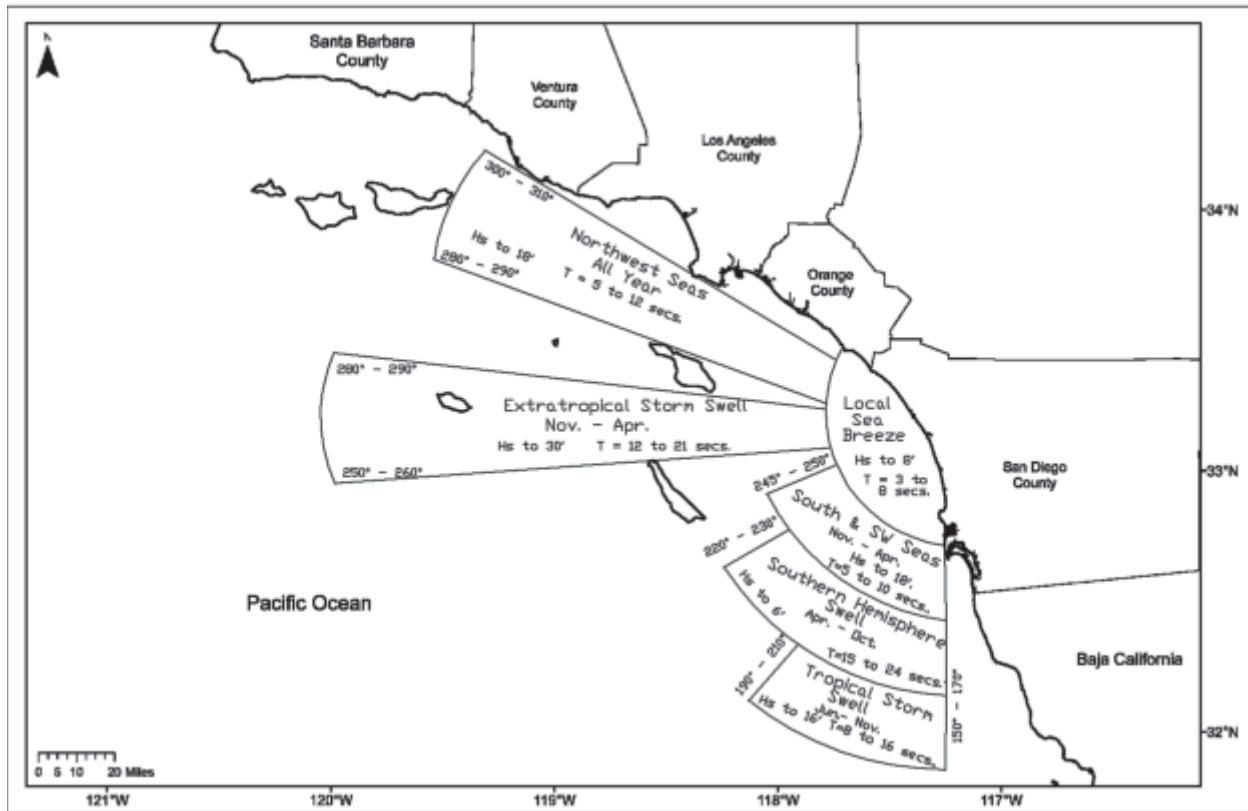
Net sediment transport within the Oceanside Littoral Cell occurs to the south (Corps 1991), with minor seasonal reversals in the dominant sediment transport direction that can extend over longer periods of years. Summer and fall seasons are typically dominated by southern hemisphere swells that generate currents and sediment transport to the north. Winter and spring seasons are typically dominated by northern hemisphere swells that generate currents and sediment transport to the south. The wave exposure window at San Elijo Lagoon is shown in Figure 3.3-2. This winter/spring condition is typified by higher energy waves than summer/fall conditions and so the southern transport tends to be the dominant process over the long term.

Site-specific conditions in the vicinity of San Elijo Lagoon show a higher-than-average occurrence of reversals of the longshore transport and direction due to local bathymetry and wave refraction at Cardiff reef (Coastal Environments 2001). As a result, the net longshore sediment transport rate is reduced in the vicinity of the existing inlet. High volumes of cobble are also contained in the littoral zone adjacent to San Elijo Lagoon. Other site-specific conditions relate to the location of the existing inlet and Coast Highway 101 along the west edge of the lagoon, protecting the interior of the lagoon from intensive wave action during storm events and in the event of tsunami.

San Elijo Lagoon Study Area

The inlet at San Elijo Lagoon is constrained in its location by the existing Coast Highway 101 crossing, then by the railroad trestle located southeast of the inlet. The resulting channel extending east from the inlet is sinuous as it passes under those two infrastructure crossings, and water velocities exiting the lagoon are not sufficient to counteract the offshore longshore sand transport to maintain a stable, open connection with the ocean. There is a rock sill located just offshore under the beach (approximately 4 feet NGVD) at the Coast Highway 101 crossing, which further constrains the ability of the inlet to maintain an open condition once manually opened.

Figure 3.3-2
Wave Exposure Window of San Elijo Lagoon



The inlet is bounded on the north by a small bluff, with an occasional front-beach extending south of the bluff into the channel. South of the inlet, the sandy beach is characterized by varying widths and is backed by a parking lot. Sand dredged from the lagoon inlet during manual maintenance/opening is placed on the beach south of the inlet mouth as part of the sand bypassing process, and results in generally wider beaches for a period after maintenance occurs.

Ebb Bar Development

Longshore transport of sand within a littoral cell results in a “river of sand” moving parallel to the shoreline. As this “river” crosses river and lagoon mouths that are open to tidal action, the cross-current action of an outgoing or incoming tide deflects material from its parallel movement. This leads to sand bar formation either out into deeper water (ebb bar) or into the water body itself (flood shoal).

At San Elijo Lagoon, tidal hydrodynamics and ocean waves lead to both sand bar formation off the lagoon mouth in an ebb bar and within the lagoon in a flood shoal. Ebb bars can cause

changes to incoming ocean waves and consequent changes to the shoreline. Flood shoals can mute tides in a lagoon and result in changes to hydrology affecting habitat and water quality. This section addresses the existing ebb bar located adjacent to the San Elijo Lagoon inlet and ebb bars that may develop as part of project implementation. Section 3.2 Hydrology addresses flood shoal development within the lagoon in the context of hydrology.

The existing ebb bar at San Elijo Lagoon is estimated to be located relatively close to the inlet (at -10 feet NGVD) and contain approximately 3,600 cy of sand (M&N 2012a). Waves typically limit ebb bar growth by resuspending and transporting sediment either into the inlet (i.e., to build the flood shoal) or to the downdrift beach (i.e., bypassing the inlet). The flood shoal is estimated to contain approximately 63,300 cy of material, resulting in a relatively unstable inlet due to a system that is clearly flood-dominated (e.g., more material is entrained into the lagoon inlet than is scoured from the lagoon and inlet by ebb tides).

Inundation Conditions

The interior of the lagoon and structures along its perimeter are currently protected from high wave energy along the beaches during coastal storm wave events. The west and central basins of the lagoon are mapped within the tsunami inundation area by the California Emergency Management Agency (2009). The combined protective effects of a nearly continuous high earthen dike supporting Coast Highway 101 along the entire west boundary of the lagoon, and the relatively narrow tidal inlet mouth and long sinuous inlet channel, shield the lagoon from much of the wave energy associated with large coastal storm wave events.

Materials Disposal/Reuse Study Area

LA-5

LA-5 is located outside of the littoral zone, in approximately 480 to 650 feet of water. The depth of the site results in a relatively undisturbed bottom, regardless of the more surficial current and wave patterns. As a result, it is only slightly affected by the processes that result in sediment transport in the littoral zone.

SO-5/SO-6

SO-5 and SO-6 are outside of the depth of closure in approximately 35 to 56 feet of water. While there may be some sediment movement within and adjacent to the sites, particularly during severe storm events when wave energy is high enough to move sand from the beach/nearshore past the depth of closure, this transport volume is very low. Surveys conducted at SO-5 between

2000 and 2009 indicated that after dredging conducted for 2001 RBSP, the borrow site had accumulated approximately 1 foot of material, but the bathymetric changes remained identifiable 8 years after the material was removed. The bathymetric difference between the borrow sites and adjacent areas is likely to continue in the foreseeable future because the material that would fill the dredge area results from infrequent, powerful storm events (SANDAG 2011).

Beaches and Nearshore

Coastal processes that drive beach conditions within the southern portion of the Oceanside Littoral Cell are generally common to the proposed nearshore and onshore sand placement sites. Leucadia and most of Solana Beach are primarily narrow beaches backed by bluffs that are frequently subjected to direct wave energy. Moonlight, Cardiff, and Torrey Pines beaches, as well as a segment of Solana Beach directly adjacent to Fletcher Cove, are generally slightly wider beaches, with some bluff and/or reef protection that helps support the creation of pocket beaches. In addition, some of these beaches, including Moonlight, Cardiff, and Torrey Pines, benefit from consistent nourishment through either opportunistic placement (Moonlight) or lagoon bypassing, in which sand entrained in lagoons is removed and placed on adjacent beaches downcoast to enable the sand to continue to follow longshore drift patterns (Cardiff and Torrey Pines). While an existing ebb bar is located off of the San Elijo Lagoon inlet, it is relatively small and close to shore, potentially constrained by Cardiff Reef located farther offshore.

Coastal Lagoons/Wetlands

Sand moving alongshore can become trapped behind coastal structures and inlets, leaving less sand downcoast for transport, and potentially creating a flood shoal that can close the mouth, with adverse impacts to the system. Regular maintenance at structures and lagoons minimizes water body closure/constriction at ocean interfaces and replenishes downcoast beaches by bypassing trapped sand. A series of open lagoon mouths exists along the San Diego County coast. There are three lagoons in proximity to the beaches where material dredged from San Elijo Lagoon may be placed for beneficial reuse. These lagoons are:

- Batiquitos Lagoon – This lagoon was restored between 1994 and 1997, with stabilization of the entrance with jetties and dredging of approximately 2 mcy of sand from the wetlands. The ocean inlet remains open continuously and is subject to sedimentation under existing conditions. Maintenance dredging is performed periodically by CDFW, according to available funding and permits, with sand placed mainly south of the entrance channel.

- San Dieguito Lagoon –Creation of coastal wetland habitat occurred by 2009. The mouth is not stabilized by jetties; it is scheduled for annual excavation of sand by Southern California Edison with placement on the beach on both sides of the entrance channel.
- Los Peñasquitos Lagoon – This lagoon mouth is not stabilized by jetties and is subject to closure due to its relatively small tidal prism and frequent blockage by sand and cobbles; it is annually excavated of sand by the Los Peñasquitos Lagoon Conservancy with placement on the beach south of the entrance channel. The amount of excavated material varies up to 35,000 cy (Hastings 2010).

Buena Vista and Agua Hedionda lagoons are farther north from the project area and are not likely to be potentially affected by sand transport from the beneficial reuse, and therefore are not discussed further.

3.3.2 CEQA THRESHOLDS OF SIGNIFICANCE

A significant impact related to oceanography/coastal processes would occur if implementation of the proposed project would substantially:

- A. Increase the erosion rate of beach sediment resulting in long-term loss to area beaches downcoast from the lagoon;
- B. Disrupt the littoral system due to changes in inlet configuration, ebb bar prefilling, maintenance dredging, or sand placement for disposal/reuse;
- C. Increase risks of damage to coastal structures, including inundation by wave refraction seiche, tsunami, or mudflow; or
- D. Increase the volume of area lagoon sedimentation from sand accretion to a level that results in additional maintenance frequency (not removal of larger volumes) compared to historic requirements. This threshold is considered in relation to material reuse only.

The CEQA thresholds of significance for coastal processes were derived from a combination of thresholds listed in Appendix G of the CEQA Guidelines and thresholds used in the EIR/EIS for the San Dieguito Wetland Restoration Project (SCH #98061010) and the 2012 RBSP EA/EIR (SCH #2020051063). Thresholds from these projects were considered in addition to those provided by County CEQA guidance documents in order to consider effects specific to the littoral system, which is unique to coastal projects.

3.3.3 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences, or impacts, associated with the proposed project related to oceanography/coastal processes. Potential adverse, significant, or beneficial direct and indirect impacts are identified as appropriate.

Numerical modeling was used to simulate changes in shoreline morphology from the SELRP project. The project was modeled with the Coastal Engineering Design and Analysis System (CEDAS), which uses a numerical model called GENESIS as a base program for shoreline movement modeling by predicting longshore sediment transport. GENESIS is intended to provide a generalized long-term trend in shoreline response from a specific action or actions. Numerical modeling of shoreline morphology is inherently imperfect because of the complexity of coastal processes. There is no comprehensive numerical model that accounts for the natural processes of coupled longshore and cross-shore sediment transport. To address cross-shore transport for this project, a subsequent beach profile analysis was conducted to convert GENESIS shoreline results into sand thicknesses (depth of sand cover) from project alternatives at specific locations within the project study area. The results anticipate general areas of accretion or erosion rather than predict site-specific increments of shoreline movement over time. In addition, modeling was conducted to estimate ebb and shoal bar development at San Elijo Lagoon under each of the proposed alternatives (M&N 2012a).

Coastal wetlands have the potential to be affected by materials placement within the littoral zone, so that discussion is only included under the Materials Disposal/Reuse analysis.

Lagoon Restoration

Alternative 2A

Construction of a new tidal inlet to San Elijo Lagoon has the potential to change the way in which sand and waves act in proximity to the lagoon. Generally, sand deposited in an ebb bar or flood shoal is removed from littoral drift (at least temporarily, until a flood shoal is bypassed through inlet management) and does not settle on adjacent beaches or in the littoral zone. If the inlet changes substantially enough to modify volumes stored in an ebb bar, sand could be removed from Cardiff Beach to create that bar unless sand is provided by another source. The proposed project would have a larger inlet at a new location. This new ebb bar is predicted to have a volume of approximately 345,000 cy at equilibrium. This is a substantial increase from the existing ebb bar of 3,600 cy at the current inlet.

The ebb bar would be larger than the volume of the flood bar (266,000 cy) and the new inlet would result in a more tidally stable ebb-dominated system. The project would “prefill” the ebb bar through the proposed nearshore and onshore placement of material at Cardiff State Beach. This approach is similar to that taken at other coastal lagoon restoration projects (e.g., Bolsa Chica Lowlands Restoration Project). Prenourishing the littoral cell in the vicinity of the site during construction with sufficient sand to offset the total quantities of sand stored in the bars would minimize the effect of the new inlet configuration on beach sand erosion and would result in less than significant effects to beach erosion. Lagoon maintenance dredging and placement of that material downcoast would effectively return that sand to the littoral zone. **This bypassing would offset the effects of sand storage in the flood bar and would result in less than significant impacts to beach erosion downcoast (Criterion A). No substantial adverse impacts would occur to downcoast beach erosion.**

As described above, the littoral zone encompasses the beach and nearshore area along the coast, extending out to the depth of closure located past the surf zone. Sand placement to prenourish the littoral zone onshore at Cardiff would not change the bathymetry of the bottom substantially enough to modify wave patterns, water currents, or sand transport pattern. However, installation of an ebb bar would change bathymetry and wave patterns over a relatively small area of the littoral cell and could provide a surfing benefit. These localized effects are discussed further in Section 3.1 Land Use. Coastal sediment transport systems operate on a large scale and are dominated by wave climate and sediment supply, and the relatively small ebb bar form created off Cardiff is not sufficiently large to modify large-scale coastal currents and sediment transport. Several similar bars have been installed or have formed naturally off other lagoons (i.e., Batiquitos Lagoon, Bolsa Chica, and Huntington Beach Wetlands) and have resulted in relatively small-scale changes to wave breaking patterns, but not large-scale changes to wave-driven current patterns and sediment transport (M&N 2013). Therefore, no changes to littoral processes from the SELRP are anticipated, and **no substantial adverse impacts to the littoral system would occur. Impacts would remain less than significant (Criterion B).**

Sand placement on the beach and in the nearshore is anticipated to result in a wider beach in front of the proposed inlet and along the remainder of Cardiff State Beach on a temporary basis. The proposed project would construct a new inlet with CBFs to enhance inlet stability, and would raise Coast Highway 101 to an elevation that would provide adequate clearance. The raised roadway would be protected on the ocean side with riprap (as presently exists) and designed to resist damage due to extreme storm events (PDF-38 and PDF-39), as required. NCTD is also proposing to raise the existing railroad trestle to accommodate additional flows as part of the double-tracking project, and to potentially allow a dredge to pass beneath the new bridge while performing maintenance dredging.

Ocean waves would propagate through the new tidal inlet and into the lagoon. This process would occur typically at higher tides and/or during high wave events. The CBFs would serve to reduce incoming wave energy by blocking a portion of incident wave energy at the inlet mouth. Wave properties change as they pass from the ocean through the constrained inlet channel and then into the west and central basins. Waves typically diverge, or “fan-out,” as they enter the inlet channel, and then conserve much of their energy while in the channel. Wave divergence results in loss of energy and height from their original ocean condition as they move inland. Waves also lose energy to friction with the inlet bed and banks as they continue to move upstream. Waves would reach the west basin and then diverge further and spread out toward the broader basin boundaries, continuing to diverge as they move toward the central basin. The shape of the west and central basins is intentionally designed as one large oval to maximize wave divergence and energy loss. Waves tend to focus on protrusions into basins and this can cause erosion, so the project design has no protrusions in the basins. As such, ocean waves would become substantially smaller and less energetic as they pass into the basin(s) and should not result in significant erosion. There is a chance that the mudflat area east of the full tidal basin in the central basin may experience some small-scale erosion under certain conditions, but that process would be localized within lagoon habitat areas and would be anticipated to result in shifting of sediment into another portion of the basin, creating similar habitat, so no net loss of habitat is expected. Erosion would not extend into adjacent infrastructure or coastal structures within the lagoon **and significant impacts to coastal structures from inundation through wave refraction would not occur (Criterion C). No substantial adverse impacts are anticipated.**

In the event of tsunamis, additional areas of inundation are not anticipated to occur. Tsunami inundation under Alternative 2A should be the same as for existing conditions, as the wavelength is so long that the relative lengths of both tidal inlet channels would not substantially dampen the water level increase. The greater risk posed by tsunamis is the high velocity of the return flow from the lagoon back to the sea. Scour of bridge piles and abutments occurs from extremely high ebb flows. The new bridges at the railroad and at Coast Highway 101 under Alternative 2B would possess deep pile foundations and well-protected abutments (PDF-38), thus protecting them adequately from scour associated with tsunamis. SANDAG prepared a sea level rise study (SANDAG 2013) for the region with recommendations on pile foundations and abutment protection for bridges spanning County wetlands. These design recommendations would be included in the proposed project bridges (PDF-37). No increased risk of inundation of coastal structures would result from project implementation.

While the raised Coast Highway 101 and railroad bridges would enable additional flow to enter the lagoon, coastal structures within the lagoon are located on the perimeter or farther east, where additional exposure to inundation would not be substantial. Immediately along the beach,

the addition of sand would temporarily provide additional protection to businesses along Coast Highway 101, including Restaurant Row. **No substantial adverse or significant impacts would result with respect to risks of damage to coastal structures (Criterion C).**

Alternative 1B

Alternative 1B would result in an ebb bar at the existing location with a volume of approximately 6,500 cy at equilibrium, increased from the existing 3,600 cy. The flood bar would remain substantially larger than the volume of the ebb bar (up to 93,000 cy if there is no inlet maintenance, but approximately 41,000 cy if maintained annually) under Alternative 1B, and the inlet would remain flood dominated, as it is under existing conditions. The project would account for the relatively small increase in nearshore storage needs in the ebb bar through the proposed nearshore and onshore placement of material at Cardiff State Beach. Prenourishing the littoral cell in the vicinity of the site during construction with sufficient sand to offset the total quantities of sand stored in the bars would minimize the effect of the modified inlet conditions on beach conditions and would result in less than significant impacts to beach erosion. As with Alternative 2A, lagoon maintenance activities and placement of that material downcoast would effectively return that sand to the littoral zone. **This bypassing would offset the effects of sand storage in the flood bar and no substantial adverse impacts would occur. There would be less than significant impacts to beach erosion downcoast (Criterion A).**

As discussed under Alternative 2A, sand placement to prenourish the littoral zone within the nearshore and onshore at Cardiff would not change the bathymetry of the bottom substantially enough to modify wave patterns, water currents, or sand transport patterns. **Therefore, no changes to littoral processes from the SELRP are anticipated, and no substantial adverse or significant impacts to the littoral system would occur (Criterion B).**

Sand placement on the beach and in the nearshore is anticipated to result in a wider beach at Cardiff State Beach on a temporary basis. No new coastal structures would be constructed as part of Alternative 1B, and the addition of sand would temporarily provide additional protection to existing coastal structures, such as businesses along Coast Highway 101, including Restaurant Row. The existing inlet would be improved, but remain in place. Scour of bridge piles and abutments would not increase due to the rock sill underlying the existing inlet, which would protect them from scour associated with tsunamis. No changes to wave refraction or inundation by tsunami or seiche would occur within the lagoon. **Temporary beneficial impacts would result with respect to risks of damage to coastal structures (Criterion C).**

Alternative 1A

Alternative 1A would result in an ebb bar with a volume of approximately 3,900 cy at equilibrium, increased from the existing 3,600 cy. The flood bar would remain substantially larger than the volume of the ebb bar (78,000 cy if there is no inlet maintenance, but approximately 33,000 cy if maintained annually) under Alternative 1A, and the inlet would remain flood dominated, as it is under existing conditions. Accretion of sand within the ebb bar is anticipated to be less than 150 cy within the first year. While this amount of sand may be stored within the nearshore as opposed to the beach, it would not be considered a substantial reduction of sand on the beach, and would be more than offset with the first annual maintenance effort to clear out the lagoon, which anticipates placing up to 25,000 cy on the beach. Therefore, the small increase in nearshore storage needs in the ebb bar would be accommodated the first year through the onshore placement of material at Cardiff State Beach as part of inlet maintenance. Effects to beach erosion would be less than significant. Lagoon maintenance activities and placement of that material downcoast would effectively return that sand to the littoral zone. **This bypassing would offset the effects of sand storage in the flood bar and no substantial adverse or significant impact would result to beach erosion downcoast (Criterion A).**

No sand placement within the nearshore would occur under Alternative 1A, and the bathymetry of the bottom would not be changed substantially by the small increase in ebb bar storage to modify wave patterns, water currents, or sand transport patterns. Therefore, no anticipated changes to littoral processes are anticipated from this alternative. **No substantial adverse or significant impacts would occur (Criterion B).**

No sand placement would occur on the beach as part of Alternative 1A construction, and no new coastal structures would be constructed. Existing coastal structures, such as businesses along Coast Highway 101, including Restaurant Row, would not receive additional short-term protection from damage. The existing inlet would be improved but remain in place, and no changes to wave refraction or inundation by tsunami or seiche would occur within the lagoon. Scour of bridge piles and abutments would not increase due to the rock sill underlying the existing inlet, which would protect them from scour associated with tsunamis. **No substantial adverse or significant impacts would result with respect to risks of damage to coastal structures and no benefit would be received (Criterion C).**

No Project/No Federal Action Alternative

The No Project/No Federal Action Alternative would not change the existing estimated ebb bar volume of approximately 3,600 cy at equilibrium. The flood bar would remain substantially

larger than the volume of the ebb bar (63,400 cy if there is no inlet maintenance, but approximately 25,000 cy if maintained annually), and the inlet would remain flood-dominated, as it is under existing conditions. No changes to existing inlet maintenance are anticipated, and annual maintenance of the lagoon inlet is expected to continue to bypass sand by placing approximately 30,000 cy of material on Cardiff State Beach. **There would be no effect on beach conditions and no substantial adverse or significant impacts to beach erosion at the lagoon or downcoast would occur (Criterion A).**

No sand placement within the nearshore would occur under the No Project/No Federal Action Alternative, and the bathymetry of the sea bottom would not be changed. There would be no anticipated changes to littoral processes from the No Project/No Federal Action Alternative, and **no substantial adverse or significant impacts to the littoral system would occur (Criterion B).**

No sand placement or construction of new coastal structures would occur as part of the No Project/No Federal Action Alternative. Existing coastal structures, such as businesses along Coast Highway 101, including Restaurant Row, would not experience additional risks, nor would they obtain beneficial protection from damage. The existing inlet would remain and no changes to wave refraction or inundation by tsunami or seiche would occur. **No substantial adverse or significant impacts would result with respect to risks of damage to coastal structures (Criterion C).**

Materials Disposal/Reuse

Alternative 2A

Offshore Stockpiling

Sand would be placed within the offshore stockpile areas SO-5 and/or SO-6 (previously dredged areas from the SANDAG RBSPs implemented in 2001 and 2012). The stockpiled material would make minor changes to the bathymetry in these previously borrowed areas. Because SO-5 and SO-6 would be located outside of the closure depth they are, by definition, outside of the zone of substantial wave energy impinging on the seabed. As a result, waves would pass over the seabed unattenuated by the moderate bathymetric changes made by sand placement and no substantial changes to wave patterns, currents, or sand transport would occur. SO-5 and SO-6 are located outside of the littoral zone and do not have substantial sand exchange with beaches within the littoral zone. **No substantial adverse impacts would occur to existing littoral processes, including the rate of erosion on beaches within the littoral zone. Impacts would not be substantially adverse and would be less than significant (Criteria A and B).**

Materials placement at offshore sites would occur entirely under water and would not involve the construction of new coastal structures. Changes to littoral processes, waves and currents, or inundation characteristics are not anticipated; therefore, **risks of damage to coastal structures would not be substantially adverse and would be less than significant (Criterion C).**

Nearshore

Nearshore placement adjacent to Cardiff State Beach is a critical component of the proposed project. This material would pre-nourish the ebb bar to minimize sand erosion on adjacent beaches and is discussed under the lagoon restoration analysis. As analyzed under the lagoon restoration analysis, **no substantial adverse impacts to littoral processes, sand erosion rates, and risk of damage to coastal structures would occur, and impacts would remain less than significant (Criteria A, B, and C).**

Onshore

Materials placement of sand on beaches would temporarily increase widths in the vicinity of placement sites, and sand would then be expected to redistribute as it is influenced by both longshore and cross-shore transport patterns. Predicted changes in shoreline position are shown in Table 3.3-1.

**Table 3.3-1
Predicted Changes to Existing Shoreline with Beach Sand Placement**

Receiver Site (at widest point in the middle of the fill footprint)	Constructed Beach Width (feet)	Post-Project Beach Widths ¹ (in feet)				
		1 Year	2 Years	3 Years	4 Years	5 Years
Leucadia Beach	200	18–15 ²	11	11	11	11
Moonlight Beach	180	38–32	20–18	17–16	16–14	15–14
Cardiff Beach ³	150	35–31	13–12	0–1	13–9	28–27
Solana Beach	70	24–21	15–14	14	14–13	12–10
Torrey Pines Beach	160	41–36	24–22	20–18	17–15	16–14

Notes:

1. GENESIS modeling results predicting general areas of accretion or erosion rather than site-specific increments of shoreline movement over time.
2. Modeling conducted for both calm and high wave conditions to provide a range of potential erosion/accretion trends. Numbers above reflect predictions for calm wave and high wave conditions, respectively.
3. After 3 years, the disposal/reuse material at Cardiff Beach would be negligible. But maintenance dredging would occur so the beach width increases in Year 4. Maintenance would occur approximately every 3 years so material would be replaced about the same time as it would fully accrete.

Several trends are predicted by the modeling of sand movement. Beach fill placement sites would be discernibly larger after nourishment at each placement site. As time passes, exaggerated bulges at beach placement sites would gradually become less pronounced and appear to extend laterally along the coast. As the fill disperses laterally alongshore, beaches between the fill sites would become wider. As a result, several beaches that are not placement sites may experience long-term widening. This condition is anticipated to occur particularly between sites that are in proximity. Sand is predicted to remain evident in the system for at least 5 years (the definition of “long-term” widening) at multiple locations throughout the North County region.

The SELRP would widen beaches at sand placement sites and certain adjacent beaches for up to 5 years. This widening would add material to the littoral system but would not change transport patterns or erosion rates of sand on those beaches. As noted in Table 3.3-1, beach width at Cardiff is predicted to decrease to preexisting conditions 3 to 4 years after initial implementation of the SELRP. Then, the scheduled maintenance dredging would occur and up to 300,000 cy would be placed at that location. Beach width would increase again resulting in more consistent beach width in that location, which otherwise tends to erode. **Beach sand erosion that could result in long-term beach loss would not occur, and no substantial adverse impacts would occur. Impacts would be less than significant (Criterion A).**

Once it is placed, material would migrate cross-shore as well as along the shore, and sometimes accumulate in the nearshore as additional sand volume or sand bars. This accumulation may affect localized wave characteristics temporarily (e.g., surfing) but would not change the underlying littoral processes that drive sand transport, including regional wave patterns and currents. **No substantial adverse or significant impacts to the littoral system would occur (Criterion B).**

No new permanent coastal structures would be constructed as part of materials placement on area beaches, and the addition of sand would temporarily provide additional protection to existing coastal structures on the beach, as well as bluffs that support coastal structures. **Beneficial impacts would result with respect to risks of damage to coastal structures (Criterion C).**

No direct impacts to the three proximate coastal lagoons would occur from the project. Sand placed from the project has the potential to be transported up and down the coast, then entrained within lagoon inlets. Depending on the volume of material transported, this could lead to more frequent inlet closures and declines in lagoon conditions. Ongoing maintenance programs are implemented at the three subject coastal lagoons to remove excess sediment if it results in inlet closure.

Potential sedimentation to adjacent lagoons due to the project has been predicted based on the method used for the 2012 RBSP (SANDAG 2011); specifically,

- Assumptions of the existing rate of sand capture by the lagoon (portion of the existing gross longshore sediment transport rate),
- Quantity of sand volume placed at a site within the vicinity of the lagoon by the SELRP, and
- Net sand transport direction from that site.

It should be noted that the quantity in the second bulleted item above represents the maximum possible placement of material at each disposal/reuse site, and actual volumes could be less depending on the ultimate configuration of the disposal/reuse scenario. The placement of less material at specific sites would result in a corresponding decrease in sedimentation at lagoon inlets; therefore, the analysis represents a worst-case evaluation.

The SELRP proposes a similar set of materials placement sites and volumes as the 2001 and 2012 RBSPs, with certain exceptions (no fills at Del Mar or anywhere north of Leucadia Beach, and slightly less material at Moonlight Beach). Therefore, conditions experienced at lagoon mouths in proximity to those sites after the 2001 RBSP was constructed could represent trends of the potential effects of the SELRP. Comparison to this prior project in terms of sand volumes and past impact to that lagoon provides a “test-based” perspective for consideration, in combination with the model predictions.

Table 3.3-2 identifies predicted contributions of sand through littoral transport to Batiquitos, San Dieguito, and Los Peñasquitos lagoons and an overview of past history based on the 2001 RBSP. Contributions to adjacent lagoon inlets would be minor and would not result in additional frequency of maintenance compared to historic requirements. **The modeling indicates there would be no significant or substantial adverse impact to these lagoons from placement of SELRP material at onshore sites near these three lagoons (Criterion D).** Reviewing the history from the 2001 RBSP suggests the model predictions are valid.

Alternative 1B

Results for Alternative 1B would be similar to Alternative 2A, but slightly decreased (by 200,000 cy overall, from 1.2 mcy for Alternative 1B to 1.4 mcy for Alternative 2A) for a worst-case scenario. The same offshore, nearshore, and onshore material placement sites are identified for both alternatives, although Alternative 1B would place 200,000 cy less material in the

**Table 3.3-2
Potential Sediment Contribution to Lagoons and Comparison to the 2001 RBSP Observations**

Coastal Lagoon	SELRP Beach Fill Volumes (cy)	Predicted Effects from SELRP over 6 Years	Impact Conclusion for SELRP¹	2001 RBSP Beach Fill Volumes at Receiver Sites (cy)	Measurable Effects from 2001 RBSP
Batiquitos	150,000 at Moonlight and 117,000 at Leucadia = 267,000	Minor sedimentation estimated at 9,100 cy total	No substantial adverse or significant impact	South Carlsbad 158,000 Batiquitos 118,000 Leucadia 132,000 Moonlight 105,000 = 513,000 total	None
San Dieguito	150,000 at Solana Beach	Minor sedimentation estimated at 4,200 cy total	No substantial adverse or significant impact	Solana Beach 146,000 Del Mar 183,000 =329,000 total	Closures increased due to effects from beach fill at the Del Mar receiver site (CFC 2010b)
Los Peñasquitos	245,000 at Torrey Pines	Minor sedimentation estimated at 10,200 cy total	No substantial adverse or significant impact	245,000 at Torrey Pines Del Mar 183,000 =428,000 total	Indiscernible, although Los Peñasquitos Lagoon Foundation indicates Del Mar fill was observable (Hastings 2010)

¹ Significance Determination for Criterion D; sand contributions to adjacent lagoon inlets would be minor and would not result in additional frequency of maintenance compared to historic requirements.
cy = cubic yards

nearshore off Cardiff State Beach. Because the placement scenarios are so similar in nature, and no substantial adverse or significant impacts were identified for Alternative 2A, **Alternative 1B is anticipated to also result in less than significant impacts to long-term beach loss, littoral system processes, risks to damage to coastal structures, and coastal wetlands (Criteria A, B, C, and D). No substantial adverse impacts would be anticipated.**

Alternative 1A

As part of Alternative 1A, no sand would be placed within the littoral zone as part of materials disposal/reuse. No changes to SO-5 or SO-6, or the littoral zone would occur.

LA-5

Under Alternative 1A, the only location for off-site materials disposal/reuse would involve disposal of material in LA-5, located outside of the littoral zone approximately 6 miles offshore in relatively deep water. Materials placement within this site would not affect the littoral system, and therefore long-term beach loss, or increase risks of damage to coastal structures. **No substantial adverse or significant impacts would occur to long-term beach loss, littoral system processes, risks to damage to coastal structures, or coastal wetlands due to Alternative 1A (Criteria A, B, C, and D).**

No Project/No Federal Action Alternative

Under the No Project/No Federal Action Alternative, no material would be removed from San Elijo Lagoon or require disposal. Therefore, **no substantial adverse or significant impacts to beach erosion or long-term beach loss, the littoral system, risks of damage to coastal structures, or coastal wetlands would occur (Criteria A, B, C, and D).**

3.3.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

No substantial adverse or significant impacts have been identified; therefore, no mitigation measures are required.

3.3.5 LEVEL OF IMPACT AFTER MITIGATION

CEQA: No significant impacts have been identified for coastal processes due to implementation of the SELRP.

NEPA: No substantial adverse impacts would occur to coastal processes due to implementation of the SELRP.

3.4 WATER AND AQUATIC SEDIMENT QUALITY

This section addresses water and aquatic sediment quality based on site visits and various technical studies. Most recent are studies completed by Moffatt & Nichol (M&N) for this restoration effort including the Water Quality Study (M&N 2012b; Appendix E), Sediment Characterization Study (M&N 2010), and SAP (M&N 2013; Appendix A). In addition, monitoring data collected by the SELC (2002)) and MACTEC Engineering (2009) were also evaluated. Water quality within the lagoon during restoration, as well as nearshore and offshore water quality in the ocean during materials disposal/placement activities, is addressed within this section. The aquatic sediment quality analysis addresses the suitability of material for disposal/placement at proposed sites from both a contamination and grain size perspective. To characterize chemical suitability of the project sediments, National Oceanic and Atmospheric Administration (NOAA) numerical sediment quality guidelines (SQGs) for aquatic sediment were used as an informal, interpretive tool, which include two SQG concentrations thresholds:

- “Effects Range-Low” (ERL), where adverse effects were not likely with concentrations below this level; and
- “Effects Range-Median” (ERM), concentrations above which adverse effects were more likely.

The SQGs do not suggest that no effects would occur below the ERL or that adverse effects would occur above the ERM. They are intended to establish statistical guidelines that can be used to rank and prioritize sites of concern and chemicals of concern (NOAA 1999). The SQGs are lengthy and applicable; ERL and ERM for trace metals and organic compounds are contained in technical reports bound separately.

Some discussion provided in this section overlaps slightly with Section 3.2 Hydrology, such as salinity, and references are made to that section where appropriate.

3.4.1 AFFECTED ENVIRONMENT

San Elijo Lagoon Study Area

As discussed in Section 3.2 Hydrology, San Elijo Lagoon is a coastal wetland traversed by various transportation infrastructure, leading to hydraulic inefficiencies, and is affected by urban runoff from a primarily urbanized watershed.

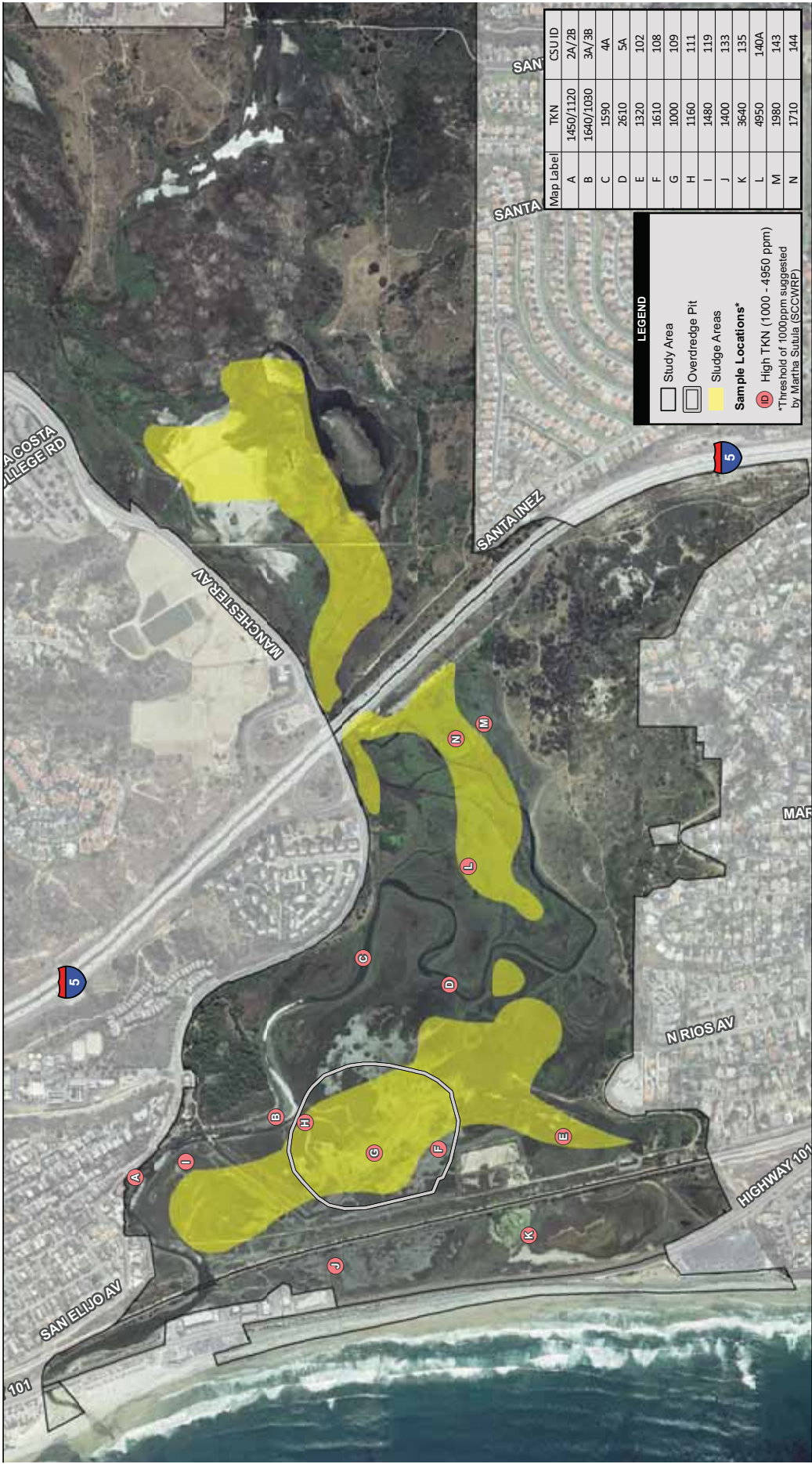
Prior to active management of the lagoon inlet, the mouth of the lagoon was closed much of the year due to the hydraulic inefficiencies of the current channel network and inlet configuration. As a result, tidal exchange has been limited within the lagoon, resulting in the historical accumulation of fine sediments in the east and central basins of the lagoon (USDA 1993) and water quality issues in the lagoon. Although the SELC currently maintains a predominantly open inlet condition, muted tidal flow that occurs even under open inlet conditions contributes to decreased water quality and near-stagnant conditions, particularly in the east basin where flushing is most limited. The manual opening of the tidal inlet conducted by the SELC maintains a degree of tidal flushing; however, poor circulation and water quality issues within the lagoon still exist, particularly if the inlet closes. When the inlet closes, the water column within the lagoon can become eutrophic within a 24-hour period under certain conditions due to the high nutrient load in the historic sediments (McLaughlin 2010).

Much of this high-nutrient sediment lies in “sludge beds” created by past waste discharges into the lagoon, which were mapped in 1966. The same study recorded Total Kjeldahl nitrogen (TKN) of up to 6,200 ppm in the lagoon (Environmental Engineering Lab Inc. 1966). In a 2014 study, researchers found that sediment with TKN values above 1,000 ppm can lead to algal blooms and poor benthic habitat quality (Sutula 2014). A 2002 study conducted on San Elijo Lagoon by California State University Fullerton reexamined TKN levels in the soil and found that high-nutrient soils exceeding the 1,000 ppm threshold can still be found throughout the lagoon, often in areas correlated to the previously mapped “sludge beds” (Laton 2002). These sample locations and their relation to the historic sludge bed are shown in Figure 3.4-1.

Beneficial Uses

The RWQCB defines beneficial uses of water bodies within the San Diego basin in the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) (RWQCB 1994). Beneficial uses form the cornerstone of water quality protection under the Basin Plan. Based on beneficial use designation, water quality objectives are established to help maintain or enhance water quality to support these uses for the long term. Beneficial uses of San Elijo Lagoon are listed in the Basin Plan (RWQCB 1994) and include contact and noncontact water recreation plus support for estuarine, wildlife, and marine habitat. Beneficial uses of the Pacific Ocean within the Carlsbad Hydrologic Unit include recreation and numerous elements to support wildlife and marine habitat, plus navigation and fishing/shellfish harvesting.

Beneficial uses of the San Elijo Groundwater Basin include agricultural supply, industrial service supply and municipal supply (potential) (RWQCB 1994). It should be noted, however, that beneficial uses of the groundwater aquifer west of I-5 are affected by seawater intrusion, which



Source: UC Fullerton 2002; SANDAG 2012; Moffatt/Khor, AECOM 2013

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Scale: 1/8,000; 1 inch = 750 feet

750 375 0 750 Feet

Figure 3.4-1
Sediment Nutrient Levels

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decreases quality and potential use for the activities described above. Furthermore, previous studies indicate that there is no substantial hydraulic interaction between the deeper groundwater aquifer and the lagoon. Measurable exchange between the lagoon and groundwater is limited to the shallow alluvial aquifer (OMWD 2014). As with the hydrology analysis in Section 3.2 Hydrology, the topic of groundwater is not discussed further.

Water and Sediment Quality Objectives and Criteria

Water quality objectives (WQOs) related to bacteria are shown in Table 3.4-1. The beneficial uses of the lagoon include contact recreation and noncontact recreation. Because the adjacent ocean waters are designated for shellfish harvesting, the most stringent limit applies.

**Table 3.4-1
Applicable Water Quality Objectives for Bacteria**

Water Quality Objectives	Concentrations			
	Individual Sample	10% of Samples	20% of Samples	Average
Contact Recreation	NA	400/100 ml	NA	200/100 ml
Noncontact Recreation	NA	4,000/100 ml	NA	2,000/100 ml
Bays and Estuaries	10,000/100 ml	NA	1,000/100 ml	1,000/100 ml
Shellfish Harvesting	NA	230/100 ml	NA	70/100 ml

ml = milliliters; NA = not applicable.

Source: RWQCB 1994

The following WQOs also apply to the proposed study area (RWQCB 1994):

- Lagoon dissolved oxygen (DO) levels cannot be less than 5.0 milligrams per liter (mg/L) and the annual mean concentration cannot be less than 7 mg/L more than 10 percent of the time. Ocean waters cannot have DO levels less than 10 percent from the normal.
- Changes in normal ambient pH levels cannot exceed 0.2 units in the lagoon.
- Oil and grease cannot be visibly present on surface waters.
- Pesticides cannot be present in the water column, sediments, or biota at concentrations that adversely affect beneficial uses or human health, wildlife, or aquatic organisms.
- Radionuclides cannot be present in concentrations that are deleterious to human, plant, animal, or aquatic life and cannot result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

- The suspended sediment load and suspended sediment discharge rate of surface waters cannot be altered in a manner that would cause nuisance or adversely affect beneficial uses.
- Waters cannot contain suspended and settleable solids that cause nuisance or adversely affect beneficial uses.
- The natural temperature of a receiving water body cannot be altered unless the alteration can be shown to not adversely impact beneficial uses.

The Basin Plan also states that water should be maintained free of toxic substances in concentrations that are toxic to, or produce negative physiological responses in, human, plant, animal, or aquatic life. A list of toxic substances and their numerical limits is provided in 40 CFR 131.36, which includes polychlorinated biphenyls (PCBs) and the pesticides DDT, DDE, and DDD.

According to the CWA Section 303(d) list of impaired water bodies, San Elijo Lagoon is listed as being impaired (or polluted) by eutrophic conditions (oversaturated nutrients), indicator bacteria, and sedimentation/siltation (SWRCB 2011). These conditions have originated from unspecified point and nonpoint sources (e.g., pipe discharges and runoff, respectively). The Pacific Ocean shoreline near the mouth of the lagoon is listed for total coliform bacteria.

Salinity

Salinity levels in San Elijo Lagoon can fluctuate during storm events, with levels ranging from an ocean salinity concentration of 34 parts per thousand (ppt) to freshwater conditions of less than 5 ppt. These fluctuations and the resulting low salinity conditions in the lagoon can impact salt marsh habitats that typically depend on higher salinity levels. According to the Water Quality Study (M&N 2012b), the east basin can completely fill with freshwater during a storm event and freshwater conditions can remain for approximately 1 week following the storm. This is due to poor water circulation and drainage out of the lagoon caused by flow constrictions at the I-5 bridge and the tidal inlet at Coast Highway 101. The central basin can also fill with freshwater during a storm event; however, the western portion of the basin is closer to the ocean and experiences greater tidal influence, receiving regular mixing between ocean and freshwater during incoming and outgoing tides. The west basin, closest to the tidal inlet, experiences the greatest tidal influence and maintains higher salinity levels during and after storm events due to limited circulation within the basin. Overall, salinity levels in the lagoon depend on efficient tidal exchange, with better circulation resulting in more rapid salinity recovery.

Based on a 24-hour SELC salinity study in 2002 (SELC 2002) with freshwater urban runoff input, salinity is less stratified at stations near the ocean inlet and more stratified upstream near the I-5 bridge. The study revealed the following:

- Salinity of the freshwater input to the lagoon's east basin (through the culvert in the CDFW dike) was consistently 1.2 ppt at the surface and bottom of the water column.
- Average salinity in the lagoon was approximately 15 ppt.
- Salinity in the offshore area and the ocean boundary was 34 ppt.

Nutrients

Excessive concentrations of nutrients such as nitrogen and phosphorus can lead to algal blooms that in turn promote eutrophication and hypoxia (depressed DO) that can stress aquatic organisms and cause unpleasant odors. The WQOs set by the Basin Plan (RWQCB 1994) are 0.025 mg/L for ammonia and an allowable exceedance of 10 percent for nitrite and nitrate (N+N), total nitrogen (TN), and total phosphorus (TP). Chlorophyll 'a' has a water quality related benchmark of 20 micrograms per liter (µg/L).

A 2009 study was conducted to measure nutrients in and around the lagoon at the following locations (MACTEC 2009):

- Segment 1 of the lagoon near the I-5 overpass
- Segment 2 near the visitor's center
- Lagoon inlet
- Escondido Creek at the Camino del Norte Bridge mass emission station

At the Escondido Creek mass emission site upstream from the lagoon, monitoring results indicate the following:

- TN, TP, and ammonia for both dry and wet weather conditions exceeded their respective WQOs for nutrients/eutrophication.
- The mean concentration of chlorophyll 'a' during the dry period did not exceed the benchmark; chlorophyll-a was not analyzed during storm events.
- N+N concentrations did not exceed the WQO in any sample.

At the lagoon sites, monitoring results indicate that:

- The mean ammonia concentration exceeded the WQO under both wet and dry weather conditions. Mean concentrations during wet weather were 0.04 mg/L at all three lagoon sampling sites. During dry weather, mean concentrations were 0.12 mg/L at Segment 1 and 0.05 mg/L at both Segment 2 and the lagoon inlet. In total, during dry weather, 90 percent and 55 percent of samples exceeded the WQO at Segments 1 and 2 and the lagoon inlet, respectively.
- The mean concentration of chlorophyll 'a' did not exceed the benchmark during wet weather. Mean concentrations were 17.8 µg/L at Segment 1, 13.7 µg/L at Segment 2, and 11.2 µg/L at the lagoon inlet. The mean concentration of chlorophyll 'a' did not exceed the benchmark at Segment 1 or the lagoon inlet during dry weather, with mean concentrations of 16.9 µg/L and 10.2 µg/L, respectively. However, the mean concentration exceeded the benchmark at Segment 2 during dry weather with a concentration of 31.5 µg/L. Of the samples in total from all three lagoon sampling sites, 17 percent exceeded the benchmark during dry weather.
- Zero percent of N+N samples exceeded the WQO under both wet and dry weather conditions.
- Between 13 to 83 percent of samples at the three sampling stations under both wet and dry weather conditions exceeded the WQO for TN. During wet weather, 83 percent of samples exceeded at Segment 1, and 33 percent exceeded at Segment 2 and the lagoon inlet. During dry weather, 58 percent of samples exceeded at Segment 1; 27 percent exceeded at Segment 2, and 13 percent exceeded at the lagoon inlet.
- Between 27 to 100 percent of samples at each site under both weather conditions exceeded the WQO for TP. During wet weather, 100 percent of samples exceeded at all three lagoon sampling sites. During dry weather, 92 percent exceeded at Segment 1; 54 percent exceeded at Segment 2, and 27 percent exceeded at the lagoon inlet.

The mean concentrations of these constituents were, with some exceptions, only slightly greater than WQOs. In some instances, the mean concentration was lower than the WQO, but several samples that exceeded the WQO resulted in an exceedance rate that was slightly greater than the 10 percent allowable exceedance frequency. Additionally, concentrations for TN and TP in San Elijo Lagoon were below historical concentrations (M&N 2012b).

Nutrient levels affect the DO levels in the water column, which are an important parameter for sustaining aquatic life. High nutrient levels can cause algae growth; algae can affect DO by releasing oxygen during the day, and by respiring and pulling DO out of the water column at

night, thus lowering DO levels. Studies within the lagoon have shown that historically accumulated nutrients in the sediment are one of the primary causes of eutrophication and low DO levels in the water column (McLaughlin et al. 2010). Algae are also a sign of poor circulation and potentially compromised water quality for organisms. San Elijo Lagoon had a DO level that fell below the single sample minimum concentration (5 mg/L) between 30 and 50 percent of the time. Most of the DO concentrations that fell below the single-sample minimum occurred during the summer and fall (M&N 2012b).

Coliform Bacteria

Bacteria can be harmful to the health of organisms and humans. For indicator bacteria, including coliform and *Enterococcus*, MACTEC monitoring results indicate:

- For wet weather conditions, all three indicator bacteria (fecal and total coliform and *Enterococcus*) concentrations at the mass emission station (Camino del Norte Bridge) exceeded Assembly Bill (AB) 411 water quality standards for body contact. Bacteria results within the lagoon also exceeded the standard during the wet weather conditions, although the concentrations are lower than those at the mass emission site.
- For dry weather conditions, *Enterococcus* concentrations exceeded the AB 411 standard at both the mass emission station and lagoon sites, fecal coliform exceeded the standard at the mass emission station and Segment 1 downstream of I-5 Bridge, and there were no exceedances for total coliform. Dry weather periods do not generally appear associated with beneficial use impairments from bacteria for San Elijo Lagoon.

Wet weather water samples had higher bacterial concentrations than dry weather samples, suggesting that nonpoint sources are the primary contributors to elevated bacteria concentrations and annual loadings to the lagoon. Also, as wet weather flows contribute between 84 and 98 percent of the total annual flow volume, nearly all of the bacteria loadings into the lagoon are during wet weather storm events. Within the lagoon, concentrations during the winter were the highest. The highest exceedance frequencies were associated with *Enterococcus* and fecal coliform (M&N 2012b).

Sediment

Sediment can also degrade water quality if present in sufficient concentrations. The lagoon is listed as impaired for sedimentation/siltation. Sediment in the water column is referred to as total suspended solids (TSS), which can indicate available solids that are in suspension that can deposit in the lagoon (or elsewhere) when water conditions are suitable (i.e., slower velocities).

In 2009, TSS was measured during both wet and dry weather at San Elijo Lagoon (MACTEC 2009). At the inflow measurement point in Escondido Creek (mass emission site), TSS mean concentrations were highest during high flow wet weather conditions. During winter dry weather conditions, the mean concentrations were the lowest of all periods of the year. Spring season TSS mean concentrations were higher than TSS mean concentrations during other seasons (M&N 2012b).

Wet weather samples from Escondido Creek were also analyzed for grain size distribution. More than 80 percent of the samples had silt/clay grain sizes (M&N 2012b). Smaller suspended particles (<10 microns [μm]) generally remain suspended in the water column and do not settle out as fast, as opposed to larger suspended particles that settle fairly quickly. Sediment in the lagoon from upstream sources is predominantly fine material.

At the lagoon sites, TSS concentrations did not appear to correlate to particular sample times during any of the three monitored events. TSS mean concentrations at the lagoon sites are greater than that of the mass emission station farther upstream during dry weather conditions (M&N 2012b). Sediment near the lagoon inlet is a result of flood shoaling from tidal waters. The flood shoal constricts the inlet and prevents further tidal intrusion and flushing.

A chemical analysis of sediments in San Elijo Lagoon has been conducted in accordance with the ITM as discussed in the SAP (M&N 2013; Appendix A). A total of 55 subsurface explorations (borings) were performed in the east, central, and west basins. The borings took samples from upper and lower layers of sediments and were characterized by shallow and deep borings. Boring depths were located based on the proposed depth of cut in the area being sampled. Shallow borings extended approximately 8 feet below ground surface (bgs) and deep borings extended to a depth of 30 feet bgs. The chemical analysis showed that most of the tested analytes fell below their respective ERLs. The analytes that met or exceeded their ERL and/or ERM are shown in Table 3.4-2.

Only the concentration for DDT in the upper layer of the overdredge pit location in the central basin exceeded its ERM. This material would not be used for the materials reuse component of the proposed project, but would be disposed of off-site at LA-5 (Alternative 1A) or on-site in the overdredge pit created in the central basin (Alternative 2A and Alternative 1B). Following on-site placement of this material, the overdredge pit would be capped by sand material removed from the proposed inlet location, which would encapsulate the material and prevent it from being introduced in the water column or released into the environment (M&N 2013).

Table 3.4-2
Sediment Contaminant Concentrations (M&N 2013)

Area of Lagoon	Sample Composite ID	Contaminant	ERL (µg/kg)	ERM (µg/kg)	Sample Concentration (µg/kg)
West Basin	WB-COMP-SB-Upper	4,4'-DDE	2.2	27	2.2
Central Basin	CB-COMP-South-Upper	4,4'-DDE	2.2	27	6.5
Central Basin	CB-COMP-NW-Upper	4,4'-DDE	2.2	27	3.1
Central Basin	CB-COMP-NW-Upper	4,4'-DDD	2.0	20	2.8
East Basin	EB-COMP-North-Upper	Aroclor PCBs	22.7	180	39
East Basin	EB-COMP-South-Lower	Aroclor PCBs	22.7	180	92
Overdredge Pit	WB/CB-COMP-D-Upper	4,4'-DDD	2	20	3.9
Overdredge Pit	WB/CB-COMP-D-Upper	4,4'-DDE	2.2	27	5.7
Overdredge Pit	WB/CB-COMP-D-Upper	4,4'-DDT	1	7	12.6

µk/kg = micrograms per kilogram

Materials Disposal/Reuse Locations

Areas available for materials disposal/reuse are located on-site, and at onshore, nearshore, or offshore sites (Figure 1-3). Water quality for ocean waters tends to be more homogenous than fluvial waters due to the dilution effect of the ocean.

Beneficial Uses

Beneficial uses for the Pacific Ocean are broad (RWQCB 1994) and include contact and noncontact water recreation, commercial and sport fishing, preservation of biological habitats of special interest, spawning, reproduction and early development, and shellfish harvesting.

Water Quality Objectives

Both the SWRCB and the California Department of Public Health (DPH) have established standards to protect water contact recreation in coastal waters from bacterial contamination. The SWRCB and DPH water contact bacterial objectives are as follows (SWRCB 2012):

- 30-day Geometric Mean
 - Total coliform shall not exceed 1,000 per 100 milliliters (ml);
 - Fecal coliform density shall not exceed 200 per 100 ml; and
 - *Enterococcus* density shall not exceed 35 per 100 ml.
- Single Sample Maximum
 - Total coliform density shall not exceed 10,000 per 100 ml;
 - Fecal coliform density shall not exceed 400 per 100 ml;

- *Enterococcus* density shall not exceed 104 per 100 ml; and
- Total coliform density shall not exceed 1,000 per 100 ml when the fecal coliform/total coliform ratio exceeds 0.1.

The Water Quality Control Plan for Ocean Waters of California (Ocean Plan) (SWRCB 2012) outlines the following narrative WQO for the physical characteristics of ocean waters in California:

- No floating particulates and grease and oil can be visible.
- The discharge of waste cannot cause aesthetically undesirable discoloration of the ocean surface.
- Natural light cannot be significantly reduced at any point outside the initial dilution zone as the result of the discharge of waste.
- The rate of deposition of inert solids and the characteristics of inert solids in ocean sediments cannot be changed such that benthic communities are degraded.

The Ocean Plan (SWRCB 2012) outlines the following narrative WQO for the chemical characteristics of ocean waters in California:

- DO concentration cannot be depressed more than 10 percent from that which occurs naturally from the discharge waste materials.
- The pH cannot be changed more than 0.2 units from that which occurs naturally.
- Dissolved sulfide concentration of waters in and near sediments cannot be significantly increased above that present under natural conditions.
- The concentration of substances in Chapter II, Table B, in marine sediments cannot degrade indigenous biota.
- The concentration of organic materials in marine sediments cannot degrade marine life.
- Nutrient materials cannot cause objectionable aquatic growths or degrade indigenous biota.

The quantitative WQOs for chemical constituents can be found in Table B of the Ocean Plan (SWRCB 2012).

As noted in the introduction of this section, NOAA uses numerical ERL and ERM SQGs for aquatic sediment as concentrations that can be used to rank and prioritize sites of concern and chemicals of concern.

Areas of Special Biological Significance

Two Areas of Special Biological Significance (ASBS) sites are in the vicinity of the project: the La Jolla ASBS #29 and the Scripps ASBS #31. In 1983, the SWRCB Ocean Plan officially prohibited polluted runoff and discharges into an ASBS by requiring that runoff and discharge sources be located a sufficient distance to maintain natural water quality conditions. Stormwater runoff and coastal river discharges can cause large turbidity plumes and reduce near-surface salinity up to several miles, while adding suspended sediments, nutrients, bacteria/pathogens, and chemical contaminants to nearshore waters during storm events. The Torrey Pines materials disposal/reuse site is approximately 2 miles north of the Scripps ASBS and the La Jolla ASBS is farther.

Physical Parameters

During late spring through fall, solar heating of the ocean surface creates temperature gradients in the water column (thermocline) that induce correlating density gradients (pycnocline), which can restrict vertical mixing of most water quality parameters (SANDAG 2011). During winter and early spring, thermoclines are weakest in response to reduced insolation (solar heating) and increased mixing from winter storm activity and upwelling of deeper ocean waters.

Seasonal upwelling and downwelling affect marine water quality along the San Diego coast. Upwelling is initiated when wind patterns displace surface waters offshore, resulting in an upward replacement of colder, deeper waters with lower DO concentrations, and higher salinity and nutrient concentrations. Upwelling is generally present from late March through July in the San Diego County area. Downwelling occurs when wind forces surface water onshore and forces it downward, causing warmer temperature and lower salinity in deeper waters.

Temperature

Surface water temperature along the coast of San Diego varies seasonally with solar heating, upwelling, and climatic conditions, ranging from approximately 53.6 degrees Fahrenheit (°F) in winter to 69.8°F in summer. Temperatures of bottom waters in the project area range from approximately 48.2°F to 60.8°F. Waters are stratified during the summer and early fall, unstratified during the winter, and transitional (e.g., stratification weakening or increasing) in late fall and spring.

Salinity

Salinity in nearshore portions of the Southern California Bight is fairly uniform, ranging from approximately 32 to 34 ppt. Salinity tends to be homogenous throughout the water column, with differences between the surface and the bottom typically less than 1 ppt. Some seasonal and/or spatial differences in salinity may reflect upwelling of denser, more saline bottom waters or discharges of freshwater runoff from coastal wetlands and creeks (SANDAG 2011).

pH

Typical pH values for nearshore coastal waters range from 7.7 to 8.4. Slightly higher pH values may occur during May through September when water temperatures are warmer. Depth-related changes in pH typically are minimal.

Sediment/Turbidity

The clarity of nearshore coastal waters is dependent on localized and temporal changes induced by coastal river and lagoon discharges (normal tidal exchange and/or urban/stormwater runoff), and plankton blooms. Waters may be more turbid in the winter due to greater wave energy, surface runoff, and river discharges, although seasonal patterns are also subject to considerable variation in storm magnitude and duration. Runoff-related discharges and associated natural turbidity tend to occur in pulses rather than as continual discharges or consistent seasonal inputs. Water clarity in spring and summer also may reflect plankton blooms (e.g., red tides) and suspended particles concentrating near the thermocline.

Rip currents also influence nearshore turbidity by transporting higher turbidity water beyond the surf zone. TSS concentrations of more than 1,000 mg/L were measured in rip currents off Imperial Beach (SANDAG 2011). Generally, rip currents are more pronounced during high wave conditions associated with higher tides, high winds, and/or storm swells. In general, water clarity and light transmittance tend to increase with distance from shore.

Similar to transmissivity values, TSS concentrations typically are relatively lower offshore than nearshore. TSS concentrations ranged from <1 to 47 mg/L offshore of Carlsbad over a 13-year monitoring period, with highest concentrations recorded after storm events or occasionally in the summer (probably due to phytoplankton blooms) (SANDAG 2011).

Turbidity levels may be substantially higher near the mouths of coastal lagoons due to river discharges, storm runoff, and/or algal blooms. TSS concentrations of 100 mg/L were recorded

just inside Batiquitos Lagoon at the same time that concentrations of 20 mg/L were recorded in the adjacent nearshore zone during a non-storm period (SANDAG 2011).

Nutrients

Nutrient concentrations for coastal waters typically are higher near the bottom than near the surface, except during upwelling periods. Nearshore nutrient concentrations may be elevated in areas of wastewater discharge and near the outlet of rivers, lagoons, bays, and harbors. Nitrate levels in nearshore surface waters may vary from 0.1 mg/L to >8 mg/L during upwelling, and phosphate levels may range from 0.5 to 0.8 mg/L (SANDAG 2011).

Contaminants

The quality of nearshore ocean water within the project area is generally good, and water quality parameters are within Basin Plan limits. However, conditions in some areas are affected by local stormwater runoff discharges. In general, bacterial levels along the beaches in San Diego County are elevated occasionally by stormwater runoff.

3.4.2 CEQA THRESHOLDS OF SIGNIFICANCE

A significant impact related to water and aquatic sediment quality would occur if implementation of the SELRP would result in:

- A. Changes in hydrological conditions causing sedimentation in downstream areas and/or alterations in circulation patterns that substantially inhibit vertical mixing of water or promote stagnation (lagoon restoration only);
- B. Pollutants generated or released to the environment in violation of applicable federal or state standards, hazardous to human health, or deleterious to biological communities; or
- C. Disposal of dredged sediments/excavated soils that would cause substantial adverse changes to water or sediment quality, toxicity or bioaccumulation of contaminants in aquatic biota, or declines in wildlife habitat (materials disposal/reuse only).

The CEQA thresholds of significance for water and aquatic sediment quality were derived from thresholds used in the EIR/EIS for the San Dieguito Wetland Restoration Project (SCH #98061010). These thresholds were utilized because County guidance documents do not specifically address water quality issues unique to coastal restoration. Thresholds associated with currently listed 303(d) water bodies, which indicate impaired waters pursuant to the San Diego

Basin Plan, and with sediment removal/dredging were developed because these issues are not addressed in County thresholds but have the potential to impact water quality.

3.4.3 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences, or impacts, associated with the proposed project related to water and aquatic sediment quality. Potential adverse, significant, or beneficial direct and indirect impacts are identified as appropriate.

Lagoon Restoration

Alternative 2A

Temporary

There is the potential for temporary water quality impacts to occur during construction activities, including dredging. Construction activities associated with Alternative 2A have the potential to impact water quality through the release of pollutants such as sediment, soil stabilization residues, oil and grease, and trash and debris. Soil disturbance would expose soil to erosion from wind and water that could also result in sedimentation to receiving surface waters. Temporary construction activities could cause significant adverse impacts to water or sediment quality. The project would be required to comply with applicable regulations (e.g., Municipal Permit, Construction General Permit) to minimize pollutant transport during construction activities. As discussed in Section 3.2 Hydrology, the Construction General Permit requires the development of a project SWPPP identifying BMPs that would be used to protect water quality, minimize erosion and pollutant discharge, and avoid sediment transport during construction (PDF-25). Through development and implementation of the SWPPP, BMPs would provide protection of lagoon waters. BMPs, such as silt curtains, flocculants, and jute netting, would be implemented during dredging to control turbidity and sedimentation within the water column. Erosion- and sediment-control BMPs such as fiber rolls, silt fences, gravel bag barriers, hydraulic mulch, soil binders, and stabilized access roads and construction entrances would also be implemented during construction activities to minimize sediment disturbance and erosion potential. In addition, as discussed in Section 2.10, several construction methods would be employed that would minimize water quality impacts. For instance, actively managing water levels by temporarily diking off portions of the lagoon being actively dredged would help to prevent release of disturbed sediment to the coast (PDF-27). This strategy would control the flow of turbid, disturbed waters and allow for some settling of sediment and other potential pollutants. A cutterhead suction dredge would be used, which would avoid/minimize the generation of turbidity at the location of the dredge (PDF-27). In addition, following on-site placement of the overdredge material, the

overdredge pit would be capped by sand material removed from the proposed inlet location, which would encapsulate the material and prevent it from being introduced in the water column or released into the environment (M&N 2013) to help minimize sedimentation and turbidity impacts and the potential release of contaminants (PDF-28).

Although turbidity within the lagoon would be expected during active construction (e.g., during temporary flooding and dredging), the generation of turbidity would be minimized through the construction approach proposed for the project, as described above. Localized turbidity could occur during the placement of fine material at the overdredge pit during construction phases 2, 3, and 4, or when flow is released into the ocean. Nutrients could potentially become suspended within these areas of localized turbidity, temporarily increasing the potential for eutrophic conditions to develop within the lagoon. Outside of the lagoon inlet, the nearshore area is shallow and naturally turbid due to wave and wind action; turbidity would dissipate quickly from mixing and dilution. **However, because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging operations, would be considered a potentially significant impact under CEQA (Criterion A). No substantial adverse impacts would occur under NEPA due to PDFs and regulatory requirements that would be met.**

The vertical (depth-related) extent of plumes depends on the initial displacement of bottom sediments, physical characteristics and settling velocities of the sediment particles, and vertical mixing characteristics of the water column. For example, the vertical distribution of sand-sized particles disturbed by a cutterhead dredge may be confined to the near-bottom water layer once it is discharged from the dredge pipe, particularly when the bottom sediments consist of coarse-grained, rapid-settling particles and a natural density gradient is present in the water column that limits vertical mixing. In contrast, disturbed fine-grained sediments may remain suspended and distributed throughout the water column for long periods, particularly during winter (unstratified) conditions. The estimated plume distance on any given day would vary according to the grain size characteristics of the material, turbulence, current speed, and to what depth in the water column the particles are resuspended.

There is also the potential for temporary sediment quality impacts to occur as a result of the release of pollutants (e.g., oil and grease, nutrients, pesticides, PCBs, metals) from dredging, which could adhere to lagoon sediments. Based on the SAP (Appendix A), as discussed above, the majority of pollutants analyzed were below their respective ERLs. Only the DDT concentration in the upper layer of sediment of the overdredge pit location in the central basin exceeded its ERM. Implementation of BMPs to protect water quality by controlling pollutant discharge from land-based construction areas (e.g., spill prevention and control, stockpile management) would reduce/minimize potential impacts to sediment quality during construction

activities. In addition, pollutant release associated with localized temporary turbidity caused by dredge equipment would be minimized through implementation of aquatic-based BMPs (e.g., flocculants, silt curtains in tributary channels). As a result of BMP implementation required in compliance with the General Permit and the County MS4 Permit, as well as any additional specific conditions that would be identified as part of the 401 permit process with the RWQCB to address 303(d) impairments, temporary construction activities are not anticipated to impact sediment quality beyond existing conditions.

As discussed in Section 3.2 (Hydrology), the Construction General Permit requires the development of a project SWPPP that identifies BMPs that would be used to prevent pollutant discharge. In addition, a SWMP would be prepared in compliance with the County MS4 Permit (PDF-25), and specific BMPs may also be incorporated as conditions of the 401 permit process with the RWQCB. Per the County MS4 Permit, storm water discharges from the site would not be allowed to contain sediments that differ in composition or in amounts in excess of the sediments that would have been discharged from the site in an undisturbed condition. Through implementation of the SWPPP, SELC would provide protection of the grading perimeter and environmentally sensitive areas. Protection would be accomplished through use of such BMPs as filtration devices, silt fencing, fiber rolls, gravel bag barriers and check dams, and/or gravel inlet filters. Capture of sediment and dust would be accomplished through use of storm-drain inlet protection and construction access road stabilization. Sediment movement would be minimized from unpaved to paved areas by limiting access into/out of dirt areas; implementing stabilized construction entrances (coarse gravel, steel shaker plates, etc.); and installing fiber rolls, silt fences, or other devices approved under the County permit. In addition, since San Elijo Lagoon is listed as impaired by eutrophic conditions, indicator bacteria, and sedimentation/siltation (CWA Section 303[d]), specific BMPs may also be incorporated as conditions of the 401 permit process with the RWQCB to target construction-related sources of nutrients and bacteria, while also minimizing the effects of sediment disturbance (e.g., erosion). See Table 3.4-3 for typical BMP types that would be used during construction activities.

Table 3.4-3
Potential Construction-Phase BMPs

Type of BMP	Description and Purpose
Turbidity Control	
Flocculant	Promotes the coagulation of suspended particles to induce settling and decrease turbidity. Nontoxic polyacrylamide flocculants would be based on site-specific lagoon soil and water samples to maximize effectiveness. Application would be as close to the area of disturbance as possible. Flocculant would be used in tandem or combination with other BMPs presented in this table.
Jute Netting	Captures suspended sediments in the water column when used in conjunction with flocculant polymers to enhance coagulation of suspended particles directly on webbing. Jute netting is an organic product.

Type of BMP	Description and Purpose
Temporary Dikes	Help to minimize the impact of dredge-related turbidity within a localized work area. Implementation would depend on contractor preference. Used for short-term control as tidal conditions allow.
Silt Curtains	Allow suspended sediment to settle out of the water column in a controlled area, to minimize the area affected by potential increased suspended sediment within the water column. Silt curtains are an impermeable barrier constructed of a flexible reinforced thermoplastic material. Provides similar temporary turbidity control where tidal surge is minimal. If used, they would likely be most effective in smaller tributary channels far from the lagoon mouth (i.e., higher in the watershed).
Filtration Device (gunderbooms)	Allows water to flow through the curtain while filtering suspended dredged sediment from the flow. Gunderbooms extend from the water surface to the bottom. Gunderbooms are permeable geotextile fabrics.
Sediment Control	
Silt Fence	Detains sediment-laden water, promoting sedimentation behind the fence. Suitable for use at edge of disturbance areas; around temporary stockpiles; along the perimeter of a site; below areas where sheet flows discharge from the site; below the toe or downslope of exposed and erodible slopes.
Fiber Rolls	Intercept runoff, reduce flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). Suitable for use along the perimeter of a site; downslope of exposed soil areas; around temporary stockpiles.
Gravel Bag Berm/Sand Bag/Straw Bale Barrier	Intercepts and ponds sheet flow runoff, allowing sediment to settle out. Suitable for use along the perimeter of a site; below the toe of slopes and erodible slopes; downslope of exposed soil areas; around temporary stockpiles; at the top of slopes to divert runoff away from disturbed slopes.
Biofilter Bags	Detain flow and allow a slow rate of discharge through the wood media; remove suspended sediment through gravity settling of the detained water and filtration within the bag. Suitable for use along the perimeter of disturbed sites; around temporary stockpiles; below the toe of slopes and erodible slopes; downslope of exposed soil areas.
Erosion Control	
Hydraulic Mulch	Sprayed onto soil surface to provide a layer of temporary protection from wind and water erosion. Suitable for disturbed areas that require temporary stabilization to minimize erosion or prevent sediment discharges until permanent vegetation is established. Can be applied in combination with seeding/planting efforts.
Soil Binders	Soil stabilizer applied to the soil surface to temporarily prevent water- and wind-induced erosion of exposed soils. Suitable for disturbed areas requiring temporary erosion and sedimentation protection until permanent vegetation is established. Can be applied in combination with seeding/planting efforts.
Straw/Wood Mulch	Reduces erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff. Suitable for disturbed areas requiring temporary erosion and sedimentation protection until permanent vegetation is established. Can be applied in combination with seeding/planting efforts.
Hydroseeding	Seed applied to soil surface to temporarily protect exposed soils from water and wind erosion. Suitable for disturbed areas requiring temporary erosion and sedimentation protection until permanent vegetation is established. Can be used to apply permanent stabilization. Hydraulic seed should be applied with hydraulic/straw mulch for adequate erosion control.
Materials Management	
Spill Prevention and Control	Prevent or reduce the discharge of pollutants to watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, and properly disposing of spill materials. Cover and berm outdoor storage/equipment areas, store spill cleanup materials in clearly marked locations, and clean spills immediately. Suitable for pollutants including sediment, nutrients, trash, metals, and oil and grease.
Stockpile Management	Reduce stormwater pollution from stockpiles by locating stockpiles as far away as possible from stormwater flows, watercourses, and inlets, and covering stockpiles. Protect stockpiles from stormwater runoff using temporary perimeter sediment barriers such as silt fences, fiber rolls, sandbags, gravel bags, or biofilter bags.

Type of BMP	Description and Purpose
Solid Waste Management	Prevent or reduce the discharge of pollutants from solid waste by providing waste collection areas and an adequate number of containers, arranging for regular disposal, collecting site trash daily, and cleaning up spills immediately. Suitable for construction and domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes. Targeted pollutants include sediment, nutrients, bacteria, trash, oil and grease, and metals.
Housekeeping Practices	Maintain clean and orderly work sites; dispose of wash water, sweepings, and sediments properly; recycle or dispose of fluids properly; and train contractors in BMPs and pollution prevention. Targeted pollutants include sediment, nutrients, bacteria, trash, oil and grease, and metals.

In addition, with the required implementation of construction BMPs identified in the project SWPPP aimed at preventing or minimizing sediment and pollutant discharge, temporary impacts to additional parameters, including temperature, salinity, and pH, are not anticipated to occur. As part of compliance with the Municipal Permit, the project SWPPP, and Section 401 water quality certification required from the RWQCB, water quality would be protected and monitoring would be conducted to verify that water quality standards are met (PDF-53). As discussed in Section 3.15 Hazardous Materials and Public Safety, a sediment management plan would be implemented to verify that sediments being transported and deposited are not in violation of applicable federal or state standards, hazardous to human health, deleterious to biological communities, or cause substantial adverse changes to water or sediment quality (HAZ-3).

Temporary diking and inundation of specific areas during phased construction of Alternative 2A could lead to changes in circulation that promote stagnation or reduce vertical mixing of water within the lagoon. However, the lagoon is currently densely vegetated and has obstructions to flow (e.g., CDFW dike) that inhibit circulation and contribute to stagnant water conditions. During construction, localized circulation would increase for a number of reasons. As flooding is initiated and vegetation removed from the basins, the water elevation would increase and surface area would expand. The fetch across impounded areas would increase, promoting circulation and turnover. In addition, some increases in localized circulation would occur due to dredge and support equipment movement and wind wave-driven circulation. Increased erosion and downstream sedimentation would not be anticipated during construction activities as inundated areas would be subject to slower velocities as they are generally separated from inlet flows. As construction progresses and impounded areas are released and opened to tidal action, those areas would have less vegetation and greater tidal exchange, increasing circulation, mixing, and turnover compared to existing conditions.

As described above, a number of BMPs would be required in order to protect water quality and minimize turbidity and pollutant discharge in compliance with existing regulations (e.g., Construction General Permit, Municipal Permit). In addition, the construction approach employed for the project would minimize water quality impacts, including the use of a cutterhead suction dredge to minimize the generation of turbidity during dredging and the use of

temporary dikes during dredging to prevent release of disturbed sediment. With implementation of the construction methods and BMPs, pollutants would not be generated or released to the environment that are in violation of applicable federal or state standards, hazardous to human health, or deleterious to biological communities. Changes in hydrologic conditions during construction would not cause sedimentation in downstream areas or result in alterations in circulation that would inhibit vertical mixing or promote stagnation.

With a combination of physical and regulatory measures, Alternative 2A would result in less than significant temporary impacts from target pollutants generated or released to 303(d) waters (Criteria A and B), with the exception of the impact related to turbidity. As described above, since the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, potentially significant temporary impacts could occur under CEQA due to an increase in turbidity during construction activities that could result in increased downstream sedimentation (Criterion A). One of the project objectives is to improve overall water quality and the hydrology functions of the lagoon. The temporary construction and maintenance impacts to water and aquatic sediment quality, which would be minimized through a number of physical and regulatory measures, would not be substantially adverse under NEPA.

Permanent

Alternative 2A would construct a new tidal inlet to improve hydraulics and water quality compared to existing conditions. Alternative 2A would provide a long-term water quality improvement throughout the lagoon by permanently increasing circulation and tidal exchange. Alternative 2A would have the greatest beneficial impacts to the lagoon since it would promote the best circulation scenario by allowing the greatest tidal influence and improving the ability to transport sediment from the lagoon to the coast. Sedimentation, one of the water quality impairments identified for the lagoon on the Section 303(d) list, would be reduced under this alternative. Additionally, Alternative 2A would remove a large area of high-nutrient sediments shown in Figure 3.4-1, including within the boundary of the overdredge pit and shallow dredge areas throughout the central basin. Removal of this high-nutrient sediment would help address water quality issues within the lagoon associated with eutrophication. Eutrophication is one of the water quality impairments identified on the Section 303(d) list, and removal of high-nutrient sediments is critical to addressing the impairment.

As shown in Table 3.4-4, Alternative 2A would decrease the existing water residence time of the east basin from 15 days to 4 days, and reduce elevated bacteria concentrations in the nearshore area from approximately 9 days to 1 day. During storm events, bacteria concentrations in the nearshore area near the existing inlet would only exceed the criterion briefly. The duration of the

exceedance would be substantially shorter and overall water quality at the nearshore locations would be substantially better than existing conditions (M&N 2012b). Under Alternative 2A, the speed of transport of pollutants through the lagoon may be increased compared to existing conditions; however, the volume and concentration of pollutants are dependent on the watershed upstream from the lagoon and would not change due to the project.

Table 3.4-4
Water Quality Indicators for the Alternatives

Alternative	Residence Time in the East Basin (days)	Elevated Bacteria Concentration near Inlet (days)
Existing	15	9
1A	13	8
1B	8	6
2A	4	1

Source: M&N 2012b

Through the improved circulation gained by the new inlet, Alternative 2A would substantially reduce excessive sedimentation and recurrent inlet closures, substantially help to reduce the ongoing and future impacts from sedimentation/siltation blockage in the lagoon, and greatly improve tidal exchange and sediment transport to the ocean (i.e., beach sand replenishment). Flood drainage from the lagoon would occur much more rapidly with the new inlet than with the existing inlet due to significantly improved hydraulics, leading to less opportunity for sedimentation. The duration of flood drainage (from the upstream lagoon boundary to Highway 101) would be shortened to approximately 20 percent of the duration under existing conditions (M&N 2012b). Additional tidal exchange and flushing would result in larger and heavier particle size (i.e., sand) in the western portions of the channel system where tidal flows may be faster. In the eastern portions of the project where most of the smaller, lighter sediment particles are located, tidal flushing would be slower and the channels would be more resistant to tidal erosion and resulting turbidity. This alternative would require relatively infrequent intermittent inlet maintenance (i.e., every 3–4 years) to remove accumulated sediment near the inlet and maintain improved hydraulics. The amount of material removed would be 300,000 cy and would require approximately 5 months to complete. Currently, 30,000 cy is dredged annually from the lagoon inlet over a 2-week period. Alternative 2A would require less-frequent maintenance, but the volume of sediment removed and time required would be greater. Each maintenance dredging event would have the potential for intermittent or periodic water quality impacts such as turbidity, but **these impacts would be reduced to less than significant with implementation of physical and regulatory measures, including PDFs and BMPs, as discussed above**

(Criterion A). No substantial adverse effects would occur associated with maintenance activities.

Overall, Alternative 2A would provide the most beneficial impact on water and sediment quality. As a result of the increased tidal exchange, improved circulation and drainage pathways, and reduced sedimentation and inlet closures, Alternative 2A would greatly improve water quality and sediment conditions in the lagoon. Stagnant water conditions, which are currently contributing to the elevated bacteria concentrations in the lagoon, would be improved with implementation of Alternative 2A. The greater mixing potential (increased tidal exchange and improved circulation) in the lagoon would reduce bacteria concentrations by allowing greater seawater influence and improving brackish conditions higher in the back waters of the lagoon. In addition, nutrient load would be reduced as a result of the new tidal inlet and removal of large areas of high-nutrient sediments, which would reduce eutrophication within the lagoon. Sediment exchange between the ocean and lagoon would stabilize, and pollutants settling in the sediment would have less potential to accumulate. The result would be a beneficial impact to water and sediment quality through compliance with applicable federal or state standards, and a reduction in potential hazards to human health and biological communities.

Beneficial impacts to water and sediment quality would be expected with implementation of Alternative 2A as circulation and tidal exchange are improved and sedimentation is reduced. Stagnant water conditions would be improved with increased mixing potential, and bacteria concentrations and nutrient load would be reduced. Pollutants would not be generated or released to the environment that are in violation of applicable federal or state standards, hazardous to human health, or deleterious to biological communities. Additionally, changes in hydrologic conditions during construction would not cause sedimentation in downstream areas or result in alterations in circulation that would inhibit vertical mixing or promote stagnation. **Long-term impacts would be less than significant under CEQA (Criteria A and B) and would not be substantially adverse under NEPA.**

Alternative 1BTemporary

The temporary impacts associated with the implementation of Alternative 1B would be similar, but slightly less than, those discussed for Alternative 2A. Construction activities associated with the proposed development have the potential to impact water quality through the release of pollutants such as sediment, soil stabilization residues, oil and grease, and trash and debris. Soil disturbance would expose soil to erosion from wind and water that could result in sedimentation to receiving surface waters. Increased turbidity could occur during construction activities

(i.e., dredging). However, Alternative 1B would require less dredging, grading, and ground disturbance than Alternative 2A, resulting in less temporary impacts (e.g., turbidity, disturbed soil area, and erosion potential). Similar to Alternative 2A, actively managing water levels by temporarily diking off portions of the lagoon being actively dredged would help to control the flow of turbid, disturbed waters and allow for some settling of sediment and other potential pollutants (PDF-27). A cutterhead dredge would be used, which would avoid/minimize the generation of turbidity at the location of the dredge (PDF-27). In addition, following on-site placement of the overdredge material, the overdredge pit would be capped with sand material removed from the proposed inlet location, which would encapsulate the material and prevent it from being introduced into the water column or released into the environment (PDF-28) (M&N 2013) to help minimize sedimentation and turbidity impacts and the potential release of contaminants.

Similar to Alternative 2A, temporary diking and inundation of specific areas during phased construction of Alternative 1B would increase circulation during construction. In impounded areas, the water elevation would increase and surface area would expand. The fetch across impounded areas would increase and dredge equipment movement would provide mechanical circulation, promoting localized lagoon circulation and turnover. Increased erosion and downstream sedimentation would not be anticipated during construction activities, because inundated areas would be subject to slower velocities as they are generally separated from inlet flows. As construction progresses and impounded and dredged areas are opened to tidal action, those areas would have less vegetation and greater tidal exchange, increasing circulation over existing conditions.

BMPs required by the Construction General Permit and County stormwater and MS4 permitting, such as the use of a cutterhead suction dredge to minimize the generation of turbidity during dredging and the use of temporary dikes during initial and maintenance dredging, would also apply. Overall, through the implementation of project design features and state and locally regulated BMPs, Alternative 1B would not result in changes to hydrologic conditions that would cause sediment or inhibit mixing and **would result in less than significant temporary impacts from pollutants generated or released to the environment in violation of applicable federal or state standards, or that would be hazardous to human health or deleterious to biological communities (Criterion B).**

Because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the potential temporary turbidity that could be generated by lagoon restoration activities, most specifically the dredging operations, would be considered a potentially significant impact (Criterion A). No substantial adverse impacts would occur under NEPA due to PDFs and regulatory requirements that would be met.

Permanent

Alternative 1B would slightly improve flood hydraulics when compared to existing conditions, with correspondingly less sedimentation predicted to occur under the typical and 100-year flood scenarios (M&N 2012b). This alternative would moderately improve water quality conditions by decreasing the existing east basin water residence time from 15 days to 8 days (Table 3.4-4) and improve the ability to move sediment through the lagoon. As described under Alternative 2A, the increased speed of pollutant transport through the lagoon as a result of the project would not result in increases in pollutant levels at the lagoon outlet. However, existing high bacteria concentrations in the nearshore area would not be improved relative to existing conditions (Table 3.4-4) because, unlike Alternative 2A, Alternative 1B does not include the construction of a new tidal inlet to improve ebb/flood water flow, which would result in reduced bacteria concentrations. Elevated bacteria concentrations near the inlet would be slightly improved as compared to existing conditions, lasting approximately 7 days (Table 3.4-4).

Similar to Alternative 2A, Alternative 1B would address listed water quality impairments for both sedimentation and eutrophication. Sedimentation would be reduced under this alternative through increased hydraulic efficiency, allowing fluvial flows to maintain velocities as the lagoon drains. Additionally, Alternative 1B would remove a large area of high-nutrient sediments shown in Figure 3.4-1, including within the boundary of the overdredge pit and shallow dredge areas throughout the central basin. Removal of this high-nutrient sediment would help address water quality issues within the lagoon associated with eutrophication.

Annual inlet maintenance under Alternative 1B would occur. Sediment removal during intermittent maintenance would be conducted using land-based construction equipment similar to current methods and would create similar intermittent or periodic short-term water quality impacts in the lagoon and beach environments. The volume of removed sediment would be slightly larger at 40,000 cy and would require 4 weeks to complete as opposed to 2 weeks, currently. However, it is anticipated that larger grain-sized sediments would be removed, which would be expected to settle out relatively quickly, thereby minimizing water quality impacts related to sedimentation/turbidity.

Alternative 1B would result in a beneficial impact to hydrology by moderately improving lagoon circulation and decreasing stagnation. Stagnant water conditions would be improved and nutrient load would be reduced compared to existing conditions as a result of increased circulation and removal of high-nutrient sediments, which would reduce eutrophication within the lagoon. Sediment exchange between the ocean and lagoon would be improved from existing conditions. Overall rates of sedimentation would be lower than those under existing conditions due to

improved flow conveyance (M&N 2012b). The result would be a beneficial impact to water and sediment quality through improved circulation and a reduction in potential hazards to human health and biological communities over the long term. With the incorporation of appropriate and maintained BMPs that are mandated during these maintenance events, **water and sediment quality impacts would be less than significant (Criteria A and B). No substantial adverse indirect impacts to water and sediment quality have been identified associated with implementation of Alternative 1B.**

Alternative 1A

Temporary

Temporary impacts from implementing Alternative 1A would be similar to those discussed for Alternative 1B; however, Alternative 1A would involve less dredging, grading, and ground disturbance (i.e., reduced turbidity, less disturbed soil area, and less erosion potential) than Alternative 2A and Alternative 1B; therefore, temporary impacts would be less at the time of construction. Similar to Alternative 2A and Alternative 1B, construction activities associated with Alternative 1A have the potential to impact water quality through the release of pollutants such as sediment, soil stabilization residues, oil and grease, and trash and debris. Soil disturbance would expose soil to erosion from wind and water that could result in sedimentation to receiving surface waters. Increased turbidity could occur during construction activities (i.e., dredging). Under Alternative 1A, areas would not be actively diked off, and the majority of dredging would occur in existing active channels, which are characterized by less silty sediments than those in small tributary channels or densely vegetated areas. In addition, a cutterhead dredge would be used, which would avoid/minimize the generation of turbidity at the location of the dredge (PDF-27). Alternative 1A, like the others, would require a project SWMP and SWPPP and protective BMPs, as described above.

No temporary dikes would be used under Alternative 1A. Circulation would not be affected by Alternative 1A during construction, other than as areas are dredged they would become more exposed to tidal exchange and circulation would be gradually increased throughout the construction process. In addition, some minor increases in localized circulation would occur due to dredge equipment movement. Stagnant water conditions would not increase over existing conditions as a result of construction activities. Only minor changes in circulation would occur, so increased downstream sedimentation would not be anticipated during construction activities.

BMPs required by the Construction General Permit and County stormwater and MS4 permitting, such as the use of a cutterhead suction dredge to minimize the generation of turbidity during dredging and the use of temporary dikes during initial and maintenance dredging, would also

apply. Overall, through the implementation of project design features and state and locally regulated BMPs, Alternative 1B would not result in changes to hydrologic conditions that would cause sediment or inhibit mixing and **would result in less than significant temporary impacts from pollutants generated or released to the environment in violation of applicable federal or state standards, or that would be hazardous to human health or deleterious to biological communities (Criterion B).**

However, because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the potential temporary turbidity that could be generated by lagoon restoration activities, most specifically the dredging operations, would be considered a potentially significant impact (Criterion A). No substantial adverse impacts would occur under NEPA due to PDFs and regulatory requirements that would be met.

Permanent

Alternative 1A would change water quality conditions in the lagoon by providing marginal improvements in circulation and tidal exchange. It would decrease the residence time in the lagoon by 2 days compared to existing conditions, but would not substantially improve high bacteria concentrations in the lagoon (Table 3.4-4). Elevated bacteria concentrations in the nearshore area near the inlet would be slightly improved as compared to existing conditions, lasting approximately 8 days. The existing inlet would likely continue to be subjected to sedimentation and recurrent closures to ocean exchange. As discussed under Alternative 2A, increases in pollutant transport speed from the project would not result in an increase in nearshore pollutant concentration levels. Alternative 1A would primarily remove sediments from the main channel, which contains some areas of high nutrients, as shown in Figure 3.4-1. This alternative would not extend sediment removal into the majority of the central basin, however, and would leave the majority of high-nutrient sediments intact. Eutrophication is one of the water quality impairments identified on the Section 303(d) list, and removal of high-nutrient sediments is critical to addressing the impairment. Therefore, Alternative 1A is not anticipated to result in substantial benefits to eutrophication that currently occurs in the lagoon.

Alternative 1A would not substantially improve lagoon water quality when compared to existing conditions (M&N 2012b), although assuming the current inlet maintenance program is continued, no substantial additional deterioration of water quality conditions beyond existing conditions would be expected. As a result of conversion continuing to occur in the central basin from mudflats to a more densely vegetated area, tidal exchange and circulation in that focused area may decrease, leading to additional sedimentation and water quality issues. Enlarging the main channel through the basins would enhance the ability of the lagoon to drain fluvial flows and sediments, but not substantially. Therefore, sedimentation in the east basin is not anticipated

to be substantially decreased from existing conditions. Existing elevated bacteria concentrations within the lagoon would also be expected to continue due to continued stagnant water conditions that would not be eliminated by this alternative. Under Alternative 1A, the water quality impairments identified on the Section 303(d) list would not be addressed. In terms of long-term intermittent or periodic maintenance, Alternative 1A would be similar to current maintenance with annual sediment removal of approximately 35,000 cy using land-based equipment and taking 2 weeks to complete. Accordingly, **Alternative 1A would have a less than significant impact to lagoon water and sediment quality, but would not alleviate lagoon water quality impairments (Criteria A and B). Substantial adverse indirect impacts to water and sediment quality under NEPA would not occur with implementation of Alternative 1A.**

No Project/No Federal Action Alternative

The No Project/No Federal Action Alternative would enable existing conditions to continue. High-nutrient sediments would remain in place in the lagoon, and eutrophication concerns would continue. Tidal flows would continue to be restricted due to the narrow and meandering channel between Coast Highway 101 and the NCTD railroad, resulting in continued sedimentation in the east basin. Tidal ranges would remain substantially muted for both high and low tides, which would continue to be increasingly and progressively muted from the west basin through the east basin. Under the No Project/No Federal Action Alternative, water quality impairments identified on the Section 303(d) list would not be addressed. The need for maintenance intervals and inlet opening would continue to occur annually, removing 30,000 cy of sediment and taking 2 weeks to complete. These maintenance intervals would also be expected to temporarily increase localized turbidity, similar to existing conditions. However, larger grain-sized sediments would be removed during maintenance intervals, which would settle out relatively quickly, minimizing water quality impacts related to sedimentation/turbidity. No additional benefit to lagoon water and sediment quality would be provided. No new impacts would be anticipated by the No Project/No Federal Action Alternative; however, conditions would remain unchanged and a degraded lagoon environment would continue to decline. **No substantial adverse effects would be anticipated under the No Project/No Federal Action Alternative, and impacts would be less than significant (Criteria A and B).**

Materials Disposal/Reuse Study Area

The disposal and/or reuse of dredged sediments/excavated soils during construction for the three alternatives considered is addressed below. The No Project/No Federal Action Alternative is not discussed further since it would not involve the disposal of dredged sediments outside of the EPA-approved LA-5 site. Materials placement required as part of inlet maintenance is discussed above under permanent impacts for each of the alternatives. Criterion A is not discussed in this

section as materials disposal and/or reuse would not alter hydrologic conditions or circulation patterns that would inhibit mixing or cause sedimentation.

Alternative 2A

Alternative 2A would involve placement of material on-site, and could include placement at offshore, nearshore, and/or onshore sites along the neighboring coast. Lagoon sediments have been tested and found to consist of two stratigraphic layers, as described below.

The uppermost layer is relatively thin and composed of silts, clays, and organic matter. Evidence from sediment testing shows that some areas within this layer contain some harmful chemicals (i.e., DDD, DDE, and PCBs). Sediment testing found low levels of Aroclor PCBs in upper and lower layers within the east basin. These values were found to be above their respective ERL screening levels (M&N 2013). This fine organic upper-layer material is not suitable for beach reuse and would require disposal. Under Alternative 2A, this material would be disposed of in the overdredge pit proposed in the central basin, based on initial coordination with the Corps and EPA. Following placement of the silty upper material, the overdredge pit would be capped by material dredged from the proposed inlet location, which would encapsulate the material and prevent it from being introduced in the water column, essentially isolating it from the water column and preventing it from causing water quality impacts.

The lower layer (approximately 2 to 3 feet bgs) in the central basin is primarily sand with approximately 10 percent fines and is at least 80 feet thick (M&N 2010). The age of the sediment layer suggests that anthropogenic sources of harmful chemicals are not contained in these alluvial deposits. This material has been analyzed compliant to Corps and ITM requirements and has been found suitable for reuse on beaches (M&N 2013). Chemistry data was collected from the proposed beneficial reuse placement sites as a component of the SAP. The sediment quality of the placement sites was determined to be chemically compatible with the source site. The upper layer of sediment within this area has been identified as having DDT levels above the ERL threshold, and would be sequestered within the overdredge pit, as discussed above. Since deeper material has been determined suitable for reuse and the poorer quality material would be safely sequestered on-site, **less than significant impacts from its disposal/reuse would be expected (Criterion C). No substantial adverse impacts would occur under NEPA.**

Up to 1.4 mcy of material would be placed in various potential locations on-site, offshore, nearshore, and onshore (see Table 2-21). When depositing material, some sediment fraction would remain suspended in the water column for various lengths of time depending on particle size and water movement. There would also be a degree of sediment resuspension in the water column of the deposition area, as well as the area of the seafloor where resident sediments would

be physically disturbed and dislodged for a short period. Using a construction strategy that creates an overdredge pit would enable the majority of material produced by the project to be used beneficially as littoral cell nourishment, while providing a location on-site for materials unsuitable for beneficial reuse (either due to contamination or grain size).

Sediment plumes associated with placing material at reuse or disposal sites in the ocean would be subject to dispersion and dilution by ambient currents, wind, and wave action. The behavior and fate of suspended sediment plumes would vary substantially depending on the nature of the deposition operations, characteristics of the bottom sediments, and current patterns and oceanographic conditions. Regardless, the areas affected can be characterized in three ways:

- *Initial mixing zone*: the area where deposition operations dominate the process and induced currents are more important than ambient currents;
- *Near-field zone*: the area where the plume area is characterized by rapid particle settling and changes in suspended sediment concentrations with distance from the deposition; and
- *Far-field zone*: the area where the total load in the plume is slowing and diffusion is the same order of magnitude as particle settling.

In general, the initial mixing zone is associated with the area in the immediate vicinity of the point of placement (in nearshore or offshore sites), whereas the transition between the near-field to the far-field zones typically occurs within several hundred feet of the point of placement. The location in the far-field zone at which the plume is no longer distinguishable from background conditions would vary in relation to the differences in turbidity and suspended sediment levels in the plume and adjacent receiving waters.

The vertical (depth-related) extent of plumes depends on the initial displacement of bottom sediments, physical characteristics and settling velocities of the sediment particles, and vertical mixing characteristics of the water column. For example, the vertical distribution of sand-sized particles disturbed when disposed material strikes the bottom may be confined to the near-bottom water layer, particularly when the bottom sediments consist of coarse-grained, rapid-settling particles and a natural density gradient is present in the water column that limits vertical mixing. In contrast, disturbed fine-grained sediments may remain suspended and distributed throughout the water column for long periods, particularly during winter (unstratified) conditions. Similarly, plumes generated by placement activities can extend throughout the water column as particles settle at varying rates depending on particle size and depth-varying current speeds.

The elevated suspended solids concentrations in turbidity plumes reduce water clarity/light transmittance, and increase discoloration. Table 3.4-5 shows the estimated sediment plume

length expected to occur from depositing spoils at disposal/reuse sites in onshore, nearshore, and offshore locations (Merkel 2014; Appendix H). These estimates assume a median particle size of 0.20 millimeter (mm), as determined through sediment characterization (M&N 2010) and a settling velocity of 0.08 feet per second (ft/s), which is the material anticipated for Alternative 1B and Alternative 2A. For Alternative 1A, where fines would be deposited at LA-5, a smaller median grain size was used.

Table 3.4-5
Estimated Sediment Plume Length at Potential Disposal/Reuse Sites

Disposal/Reuse Location	Current Velocity (knots)	Depth (ft)	Plume Length (ft)
Onshore	1.5–3.0	10	313–625
Nearshore	1.5–3.0	15	469–938
Offshore	0.5–1.5	25	781–1563
Offshore*	0.5–1.5	25	2,083–4,166

*assumes median particle size of 0.10 mm and a settling rate of 0.03 ft/s (WEF 1991)

Source: Merkel 2014 (Appendix H)

The estimated plume distance on any given day would vary according to the grain size characteristics of the material, turbulence, current speed, and to what depth in the water column the particles are resuspended. Use of the overall mean grain size diameter indicates average plume extent. Silt/clays resuspended during dredging may travel longer distances than indicated in the table.

The primary changes to water quality expected from materials placement associated with Alternative 2A would be temporary and localized increases in turbidity and suspended sediment concentrations. With a settling velocity of 0.08 ft/s, a sediment particle would settle to the ocean floor in approximately 5 minutes at a depth of 25 feet. However, for the deepest locations offshore (SO-5 and SO-6), this alternative would involve placing materials via a vertical pipe extending from the barge downward toward the ocean floor to reduce the drop height and settling time (and potential sand drift and loss) (PDF-52). The estimates in Table 3.4-5 (Merkel 2014: Appendix H) are expected to represent worst-case scenarios. Resuspension of sediments can also affect other water quality parameters such as DO and pH within the zone of influence. As noted above, this depends on numerous environmental factors, although it is anticipated effects would be short term and localized. Therefore, no long-term reductions in water quality would be anticipated due to the diluting capacity of the ocean, localized nature of the turbidity plumes, and rapid dissipation once placement operations ceased. In addition, as part of compliance with the Section 401 water quality certification required from the RWQCB, water quality monitoring would be conducted to ensure water quality standards are met (PDF-53).

With use of the overdredge pit for retaining fine-grained material on-site, releasing material toward ocean floor, the temporary and localized nature of turbidity plumes and rapid dissipation, and water quality monitoring, the disposal of dredged sediments/excavated soils would not generate or release pollutants that are in violation of applicable federal or state standards, hazardous to human health, or deleterious to biological communities, and would not cause substantial adverse changes to water or sediment quality, toxicity or bioaccumulation of contaminants in aquatic biota, or declines in wildlife habitat. **Impacts would be less than significant under CEQA (Criteria B and C) and not substantially adverse under NEPA.**

Alternative 1B

The impacts related to this alternative would be slightly less than those associated with Alternative 2A. This alternative would dispose/reuse approximately 1.2 mcy of material dredged from the lagoon. This alternative would also utilize a construction strategy creating an overdredge pit and providing material for littoral cell nourishment, similar to Alternative 2A. Potential sites for placement and construction methods would be the same as those for Alternative 2A, and water quality monitoring in compliance with the water quality certification will be required (PDF-53). Under Alternative 1B, the disposal of dredged sediments/excavated soils would not generate or release pollutants that are in violation of applicable federal or state standards, that are hazardous to human health, or are deleterious to biological communities. Alternative 1B would not cause substantial adverse changes to water or sediment quality, toxicity or bioaccumulation of contaminants in aquatic biota, or declines in wildlife habitat. **Impacts would be less than significant under CEQA (Criteria B and C) and not substantially adverse under NEPA.**

Alternative 1A

Alternative 1A would not produce material suitable for reuse within the littoral zone and up to 160,000 cy of silty surface material would require disposal at the offshore disposal site, LA-5. An overdredge pit would not be constructed for on-site disposal. Dredged material would have a high proportion of fines, ranging from approximately 20 percent to 78 percent from the west to the east basin of the lagoon, respectively. The SAP (Appendix A) showed that some areas within the upper layer of fine material have pesticide (i.e., DDD and DDE) contamination and PCB levels that meet or exceed their ERLs (Table 3.4-2). These results indicate that this material may be suitable for use at LA-5. If Alternative 1A is selected for implementation, additional Tier 3 testing would be required prior to Corps and EPA approval of the proposed disposal. Should the materials be determined to be not suitable for disposal at this location, the material would be sequestered on-site in built transition or nesting areas.

Since the upper strata material dredged from the lagoon would be discharged near the surface of the ocean (i.e., without the benefit of a vertical discharge pipe used for the more valuable beach sand spoils), the resulting plume would be expected to remain suspended in the water column for a much longer period of time (i.e., hours) than that for the deeper, heavier material dredged in Alternative 2A and Alternative 1B (Appendix H). The plume's travel distance and dilution would depend on ambient currents, wind, and wave action existing at the time of disposal.

Assuming offshore maximum expected water current speeds from 0.5 to 1.5 knots at LA-5 at the time of disposal, the plume would be visible for approximately 13 minutes and travel approximately 2,000 to 4,000 feet (Appendix H); however, the anticipated turbidity is not expected to occur for extended periods of time. Material disposed at LA-5 would have to comply with the requirements set by the Corps and EPA (EPA 1998), and, as noted above, preliminary coordination with the Corps and EPA indicates that the level of contamination appears appropriate for disposal at LA-5 (M&N 2013). If approval is not obtained from the Corps and EPA for disposal at this location, the material would be sequestered on-site. As a result, under Alternative 1A, the disposal of dredged sediments/excavated soils would not generate or release pollutants that are in violation of applicable federal or state standards, hazardous to human health, or deleterious to biological communities, and would not cause substantial adverse changes to water or sediment quality, toxicity or bioaccumulation of contaminants in aquatic biota, or declines in wildlife habitat. **Impacts would be less than significant under CEQA (Criteria B and C) and not substantially adverse under NEPA.**

3.4.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

A number of project design features that minimize erosion and the release of pollutants into the environment have been incorporated into the project, including use of a cutterhead suction dredge and capping the overdredge pit, when applicable.

However, the following mitigation measures are required for CEQA significant impacts related to turbidity.

Mitigation measure Water Quality-1 would be required under CEQA for implementation of Alternative 2A, Alternative 1B, and Alternative 1A. Mitigation measure Water Quality-2 would be required under CEQA for implementation of Alternative 2A and Alternative 1B.

Water Quality-1 All additional conditions, BMPs, and requirements that are identified by regulatory agencies prior to project initiation as part of the permitting process for the project, including Section 404 permit, Coastal Development Permit, Section 1601 permit, Section 401 Water Quality Certification, and the NPDES

MS4 permit, must be implemented. Compliance with those permit conditions shall be monitored through the construction monitoring program and the contractor shall certify to the engineer of record that they have been completed.

Water Quality-2 Turbidity levels shall be actively managed by using a cutterhead dredge and/or temporarily closing the lagoon inlet. The overdredge pit shall be capped with sand material to encapsulate material and prevent it from introducing turbidity or pollutants into the water column or released into the environment. The contractor shall certify to the permit holder that the dredge operations are not responsible for release of sediments into the water column at levels resulting in increased downstream sedimentation.

3.4.5 LEVEL OF IMPACT AFTER MITIGATION

CEQA conclusion: Impacts to water quality associated with turbidity would be reduced to less than significant with implementation of the mitigation measures above.

NEPA conclusion: No substantial adverse impacts associated with water or sediment quality have been identified due to implementation of the SELRP.

3.5 GEOLOGY/SOILS

This section is derived from a number of existing documents, including the Geotechnical Data Report for the SELRP (URS 2012, Appendix M), the SAP (M&N 2013, Appendix A), the 2012 RBSP EA/EIR (SANDAG 2011), and the *San Elijo Lagoon Enhancement Plan* (County of San Diego 1996). Section 3.3 (Oceanography/Coastal Processes) addresses beach conditions and sand transport, including erosion of beach sand; so these are not addressed here.

3.5.1 AFFECTED ENVIRONMENT

The project study area is located within the coastal plain of the Peninsular Ranges Geomorphic Province and consists of marine and nonmarine terraces dissected by San Elijo Lagoon. Coastal bluffs extending north and south of the lagoon range up to 100 feet in height and can be steeply sloped cliffs along the coast in a series of wave-cut terraces.

San Elijo Lagoon Study Area

Historic Geologic Setting

San Elijo Lagoon was formed during a period of sea level lower than present day, when the shoreline was farther to the west, and rivers and creeks in the San Diego area cut channels downward and extending offshore. This formed steep canyons and, as sea level rose through the Holocene period, rivers backfilled their channels. San Elijo Lagoon is within the backfilled former channel of Encinas Creek. Present sediments within the lagoon were deposited within a shallow intertidal setting with some alluvial deposition during floods or other periods of high runoff from the surrounding valleys. At the inlet of the lagoon, a sill of rock of the Delmar Formation influences shoaling, inlet stability, and tidal exchange between the ocean and lagoon (URS 2012).

Steep bluffs border the lagoon on the north and south sides. These bluffs are generally composed of tertiary marine deposits of the Delmar and Torrey sandstone formations, topped by Lindavista red sandstone formations (County of San Diego 1996). The Delmar Formation is generally described as dusky yellowish-green sandy claystone interbedded with medium-gray coarse-grained sandstone (California Department of Conservation, Division of Mines and Geology 1996). The San Elijo Lagoon Enhancement Plan identifies this stratum as overlain by a 5- to 25-foot layer of mudstone, with a number of fossiliferous (brackish water mollusks) beds occurring near the lagoon toward the top of the formation. The Torrey Sandstone Formation overlays the Delmar Formation, and is white to light brown in color and medium- to coarse-grained in

texture. The Lindavista Formation caps the terraces and is a reddish brown, interbedded sandstone and conglomerate.

Generally, sediment in the lagoon is characterized as alluvium and colluviums (California Department of Conservation, Division of Mines and Geology 1996), consisting of unconsolidated silt, clay, sand, and gravel. The Natural Resources Conservation Service (NRCS) Soil Survey classifies the majority of the west and central lagoon basins as lagoon waters (LG-W). Other NRCS soil classifications located throughout the southern edge of the lagoon and the east basin generally include (NRCS 2014):

- Chino silt loam (CkA), saline, 0–2 percent slopes
- Corralitos loamy sand (CsC), 5–9 percent slopes
- Corralitos loamy sand (CsD), 9–15 percent slopes
- Huerhuero loam (HrE2), 15–30 percent slopes, eroded
- Loamy alluvial land Huerhuero complex (LvF3) 9–50 percent slopes, severely eroded
- Terrace escarpments (TeF)
- Tidal flats (Tf)

Cretaceous metavolcanic and granitic rock underlay the lagoon, with approximately 150 feet of alluvial clay and silts overlaying this foundation (County of San Diego 1996). Sand is also mixed in with this sedimentary layer. Specific soils testing of the lagoon sediments was conducted to determine the specific extent of clays and silts compared to sand in order to identify potential materials disposal needs and reuse opportunities. These studies are described in more detail below.

Subsurface Testing

Subsurface explorations at the lagoon were conducted between fall 2011 and spring 2012 to help determine the most effective materials disposal scenario and the potential for beneficial reuse of materials from the SELRP. The results of this effort are detailed in the Geotechnical Data Report (Appendix M) and the SAP Report and are summarized below. The SAP (Appendix A) indicates that material excavated from the overdredge pit location (below approximately 2–3 feet bgs) is likely suitable for placement on beaches or in the nearshore based on physical properties related to grain size and material chemistry based on information generated to date. These materials consist, on average, of 10 percent fines and are classified as sand. The age of this sediment layer suggests it has been removed from modern sources of pollution. Additional evaluation of the preferred alternative and placement option with these agencies may be required to obtain a final compatibility determination if changes to the project or to on-site conditions occur prior to

construction, or if significant time delays occur in project processing. Additional evaluations would consist of supplemental geotechnical borings and testing for material grain size and chemistry.

Other samples collected show two distinct sedimentary layers generally extending through the lagoon basins, including (1) a relatively thin clay/silt layer extending from the ground surface to average depths of approximately 2 to 4.5 feet bgs, and (2) silty sand to poorly graded sand to the maximum depth of the borings. The silty clay to clayey silt layer was mostly classified as CH (clay, high plasticity) and ML (silt, low plasticity) type soils, according to the Unified Soil Classification System. This layer was generally continuous through the lagoon, but varied in thickness and depth, extending to approximately 9 feet thick in the east basin and thinning out substantially toward the west, even disappearing completely in parts of the west basin. Below this clay/silt layer, loose to medium dense, grey to dark grey silty sand to poorly graded sand was encountered to depths up to approximately 31.5 feet bgs. These sandy deposits were primarily fine-grained sand with a small percentage of medium-grained sand and are classified as SM (silty sand), SM-SP (poorly graded sand), and SP type soils. Shell fragments and sparse pebbles and gravel were observed in some of the borings. No hard substrate was encountered (e.g., gravel or bedrock) in any of the boring locations (URS 2012).

Faulting and Seismicity

The project study area is located in a moderately active seismic region of southern California subject to ground-shaking from nearby fault zones. The Rose Canyon fault zone is an active offshore/onshore fault capable of generating an earthquake of magnitude 7.2 on the Richter scale (Ninyo & Moore 2012). The fault zone lies partially offshore as part of the Newport/Inglewood fault zone and parallels the northern coastline of the San Diego region within approximately 2 to 6 miles until coming ashore near La Jolla Shores. The onshore segment trends through Rose Canyon, through Old Town San Diego, and appears to die out in San Diego Bay (Abbott 1989). In the event of an earthquake, the Rose Canyon fault zone, which occurs at a distance of approximately 2.5 miles from the study area, can result in moderate to severe groundshaking in the coastal area of northern San Diego County.

The project area is not located within a Fault-Rupture Hazard Zone as delineated by the California Geological Survey under the Alquist-Priolo Earthquake Fault Zoning Act (California Department of Conservation 2012).

The existing Highway 101 bridge structure is seismically deficient and currently subject to collapse during a seismic event due to a shear failure in the pile extensions beneath the pier wall repairs (TY Lin 2011). The structure was originally constructed in 1934 and subsequently

widened in 1953. Repairs have been made to the bridge pile extensions at various times, and recommendations were made that the City of Encinitas pursue the development of a seismic retrofit strategy.

Liquefaction

Liquefaction occurs primarily in saturated, loose, fine- to medium-grained soils in areas where the groundwater table is generally 50 feet or less below the surface. When these sediments are shaken during an earthquake, a sudden increase in pore water pressure causes the soils to lose strength and behave as a liquid. The soils and geologic conditions associated with San Elijo Lagoon are susceptible to liquefaction due to seismic shaking (Ninyo & Moore 2012).

Erosion

Historically, activities occurring throughout the watershed, such as roads, agriculture, and construction, resulted in erosion and suspended solids in runoff. These solids subsequently settled out as sedimentation in the lagoon. Escondido Creek and, to a lesser extent, La Orilla Creek, are the historic principal transporters of alluvial sediment. Erosion of gullies also provided a substantial historic source of sediment for the lagoon. Much of the sediment delivered to the lagoon due to erosion was from past activities when construction and agricultural activities were high. The rate of sedimentation has decreased with buildout of the watershed and agricultural areas, as well as the initiation of conservation practices (County of San Diego 1996).

Materials Disposal/Reuse Study Area

The geology of the individual materials disposal/reuse sites is described below. Beach placement sites are generally cobble to sandy beaches that vary in width, depending on the annual and seasonal variability in the littoral cell coastal processes, as described in Section 3.3 Oceanography/Coastal Processes.

The *Coast of California Storm and Tidal Waves Study* (CCSTWS) concluded that the future condition of the beaches in northern San Diego County would be governed by cycles of accretion and erosion similar to those of the past 50 years, with accelerated trends toward erosion due to the following conditions: (1) reduction of riverborne sediment due to impoundment by dams, (2) influence of Oceanside Harbor, and (3) increase in the rate of sea level rise (Corps 1991). The EIR/EA for the 2012 RBSP (SANDAG 2011) discusses sediment supply patterns in the Oceanside Littoral Cell. The discussion identified historical sources of sediment for beaches within the littoral cell as bluffs, rivers, streams, and lagoons. However, since the 1950s, dams and construction of Oceanside Harbor have substantially reduced these sediment sources and

urbanization has accelerated the erosion rate of coastal bluffs and decreased the rate of sediment reaching the ocean through coastal lagoons. Thus, current sources of onshore littoral material primarily include rivers, bluffs, and artificial fills.

Cardiff

Cardiff State Beach consists of a rocky (cobble) beach that lies on a shallow, wave cut platform. Beach characteristics differ based on seasonal and annual variability, and the beach occasionally becomes stripped of most of its sand from large waves that generally occur during the winter months. Portions of the site have had sand placement in the past as part of beach nourishment projects. Riprap extends along the northern extent of the beach to protect existing commercial buildings (Restaurant Row). The proposed onshore placement site is located directly seaward of San Elijo Lagoon and south of the existing lagoon mouth, extending to the Seaside Parking Lot at the south end of Cardiff State Beach. The nearshore placement site offshore of Cardiff State Beach would be located offshore of the beach within the littoral zone, as described in Section 3.3 Oceanography/Coastal Processes. The ocean floor at the placement site is predominantly sandy material, and is bounded by hard substrate on the north and south sides. Sand moves through the site naturally, influenced by littoral processes discussed in Section 3.3.

Leucadia

The Leucadia placement site is located on a low terrace, which lies in front of coastal cliffs that characterize Leucadia's beaches. The steep coastal cliffs in this area directly abut the back beach and have been continually forming due to wave action cutting against the marine terrace. The existing placement site comprises the flat, rocky, shallow part of the shoreline visible during periods of low tide.

Moonlight Beach

The Moonlight Beach placement site was formed from sand and rocks that originated from upland erosion. The placement site consists of a relatively thin sand layer, which varies in width and lies on a shallow rock platform. The placement site is relatively wide although beach widths decrease to the north and south, where coastal bluffs line the coast. Sand is placed on this beach by the City of Encinitas and was also a placement site for the 2012 RBSP. Riprap is located at the northern extent of the placement site to protect residential uses.

Solana Beach

The Solana Beach placement site consists of a low tide terrace (wave-cut platform), which lies in front of coastal cliffs south of San Elijo Lagoon. The steep coastal cliffs in this area directly abut the back beach and have been continually forming from wave action cutting against the marine terrace. This process has occurred since the last relative still-stand of sea level, approximately 6,000 years ago (FRH 1997). The proposed placement site received sand from the 2012 RBSP and consists of a variable layer of sand cover over scattered rocks and cobbles visible during low tide in the flat, rocky, shallow part of the shoreline.

Torrey Pines

The Torrey Pines placement site is located on a low tide terrace, which lies in front of coastal cliffs to the north and south of Los Peñasquitos Lagoon. The steep coastal cliffs in this area have been continually forming from wave action cutting against the marine terrace. The existing placement site is characterized by a variable layer of sand cover over the flat, rocky, shallow part of the shoreline visible during low tide, depending on littoral processes and sand placement associated with intermittent inlet maintenance of Los Peñasquitos Lagoon.

Similar to other lagoons in the region, Los Peñasquitos Lagoon was formed in the geologic past when the sea level was lower, the shoreline was farther to the west, and existing streams quickly eroded the exposed marine terraces. Los Peñasquitos Lagoon is an intermittent tidal lagoon due to occasional lagoon closures from sediment accretion at the channel inlet (see also Section 3.3 Oceanography/Coastal Processes).

SO-5/SO-6

Marine geophysical surveys and vibracore investigations were conducted at SO-6 and SO-5 for the RBSPs. The SO-6 site is located in the Swami's SMCA offshore of San Elijo Lagoon and extends both north and south of the San Elijo wastewater outfall pipeline. The SO-6 stockpile areas yielded good-quality coarse sand, but contained some areas of hard-bottom areas as well as bedrock. SO-5 is located offshore of San Dieguito Lagoon, in the paleochannel of the San Dieguito River. Marine surveys conducted for the 2012 RBSP indicated that the deepest portion of the paleochannel appears to be in the northern portion of SO-5, with the seafloor texture appearing to be sandy.

LA-5

LA-5 is an offshore sediment disposal site located approximately 6 nautical miles from the San Diego coastline. The site depth ranges from 460 to 660 feet with a 6,000-foot diameter (Corps 2010). The regional seaward features of the San Diego area are a submerged extension of the Peninsular Ranges. The irregular topography of the basins and ridges parallel the structural orientation of the onshore ranges. The mainland shelf seaward of the San Diego Harbor consists mainly of tightly folded late Beogene sandstone and shale, covered extensively with Quarternary sands and muds (EPA 1987). As described in the EIS prepared for the use of the LA-5 location for sediment disposal, samples of bottom sediment were generally sandy-silt and averaged 3 percent gravel, 52 percent sand, 33 percent silt, and 12 percent clay (EPA 1987).

3.5.2 CEQA THRESHOLDS OF SIGNIFICANCE

A significant impact related to geology/soils would occur if implementation of the proposed project would:

- A. Expose people or structures to substantial adverse effects involving slope instability/landslides;
- B. Result in substantial soil erosion or the loss of topsoil;
- C. Expose people or structures to substantial adverse effects involving seismically induced ground shaking causing liquefaction, settlement, ground rupture, or lateral spreading and damage; or
- D. Result in the destruction or modification of any unique geologic or physical features.

These CEQA thresholds were derived from a combination of sources, including Appendix G of the CEQA Guidelines and the County Guidelines for Determining Significance for Geologic Hazards.

3.5.3 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences, or impacts, associated with the proposed project related to geology/soils. Potential adverse, significant, or beneficial direct and indirect impacts are identified.

Multiple transportation infrastructure and bridge projects are currently planned within the lagoon. Structural integrity is a critical component for all bridges, and there are engineering

standards/codes that dictate design standards and reviewing entities that ensure standards are met. The I-5 bridge widening over the lagoon is proposed by Caltrans and would be implemented as part of the I-5 North Coast Corridor improvements. The double-tracking project through the lagoon is proposed by the LOSSAN Rail Corridor Agency and would be implemented by SANDAG/NCTD. Each implementing agency would perform internal quality reviews of engineering design to confirm that applicable regulatory safety requirements and engineering/building codes are satisfied. Each agency employs qualified experts to perform design and quality assurance. For instance, Caltrans' Division of Design and/or Division of Engineering Services would provide review and approval, as appropriate, for the I-5 bridgework. Improvements proposed to Coast Highway 101 as part of the restoration effort would also be required to meet these engineering design standards/building codes. Coast Highway 101 was part of the State Highway system, but is now under the ownership of the City of Encinitas. Any bridge improvements would be checked for standard/code compliance by the City of Encinitas, at a minimum, and possibly also by Caltrans. All of these entities have professional engineering staff and required review procedures to confirm that engineering/design standards/codes would be implemented for bridge/infrastructure improvements.

Lagoon Restoration

Alternative 2A

Restoration activities within the lagoon would require the dredging, removal, and backfill of large quantities of material. Approximately 1.4 mcy would be removed from the lagoon basins and tidal channels. The extent of dredging and other ground disturbance for Alternative 2A can be seen in Figure 2-12. The conceptual layout has been prepared to provide adequate hydraulics for the conveyance of tidal and flood flows and varies in dimension depending on the location. Slopes were selected to mimic the current stable shorelines. The currently designed side slopes vary from 5:1 (horizontal to vertical) for the larger open channels and overdredge pit, 3:1 for the smaller channels, and 2:1 at the temporary basin and bridge restrictions. Between habitat areas throughout the lagoon basins, slopes would be flatter and vary throughout the lagoon depending on area and geometry.

The overdredge pit has been specifically designed with appropriate distance from the NCTD railroad embankment so that even if the pit unexpectedly collapsed and it assumed a slope equal to its angle of repose, the railroad embankment stability would be unaffected. At the currently designed side slopes of 5:1, there would be a distance of approximately 145 feet from the top edge of the overdredge pit to the railroad embankment toe, and a distance of approximately 350 feet from the overdredge pit toe to the railroad embankment toe. The proposed 2:1 (horizontal to vertical) railroad embankment fill slope would be covered with riprap. The presence of the

dredge pit should not cause lateral slope stability or deformation of the 2:1 fill embankment (Ninyo & Moore 2014). If the overdredge pit slope were to become unstable during a strong earthquake, there would be sufficient distance between the overdredge pit and the railroad berm to preclude impacts to the berm from the pit due to the relatively flat 5:1 slope across 350 feet. Thus, the potential for seismically induced lateral spread into the dredge pit is considered negligible (Ninyo & Moore 2014).

Potential for pit slope instability only exists when the pit is empty (i.e., before the pit is filled with dredge material from the lagoon), which would be for a relatively short time of several months. As detailed in the reports prepared regarding stability and geologic hazards related to the LOSSAN Double Track Project (Ninyo & Moore 2012, 2014), a 100-year earthquake event would not be strong enough to trigger significant liquefaction of the on-site soils. However, liquefaction could be triggered by a 475-year seismic event, but, in that event, all train activity on the LOSSAN would stop and the potential of a train being in the exact location of the track adjacent to the overdredge pit during a 475-year seismic event is highly unlikely.

Any utilities that pass through or near the overdredge pit area, such as the Solana Beach sewer pipe or electrical lines would be identified and coordination with the appropriate utility provider would occur as further described in Section 3.14.

While it is not possible to fully eliminate all risk associated with natural seismic events, the size of event that would have to occur during the several-month period of an empty overdredge pit along with the specific timing of a train on the track adjacent to the overdredge pit renders the possibility of resulting hazards very low. The very low risk of this significant seismic event, combined with the short period when the pit would be empty (2 to 3 months) and adequate distance between the overdredge pit and railroad embankment (to minimize the potential for structural damage if soils were to become unstable), **result in the potential risk for geologic hazards to be considered at an acceptable level that would be less than significant (Criteria A and C). No substantial adverse impacts would occur.**

Long-term maintenance would include dredging of the inlet and subtidal/sedimentation basin. Adaptive management may result in channel maintenance or refinements in the future. However, no permanent structures would be built in the lagoon. Because the removal and or placement of sediment and other material from the generally flat lagoon basins would not occur in locations that provide stability for other natural features such as slopes or hillsides, the removal of materials for restoration and ongoing maintenance purposes would not create increased slope instability, landslides, or other adverse geologic hazards. No change to existing soil types would result as the project does not involve import of fill materials. **A less than significant direct or**

indirect impact would result due to increased slope instability, landslides, or other adverse seismic-induced geologic hazards (Criteria A and C).

Lagoon restoration activities would typically be performed during dry weather conditions but within wet or fairly saturated soil conditions. As dredging would largely be confined to the interior lagoon areas and within the channels, the exposure and potential for erosion would be limited. Dredging activities would occur within areas that have been diked off and flooded to support the water depth necessary for the dredge. This would confine the area of turbidity caused by dredging activities to a limited area and disturbed sediments would have opportunity to settle out within the diked area prior to release of flood waters. Additionally, the type of dredging proposed (hydraulic cutterhead suction) is not the type that generates significant turbidity (such as a clamshell dredge). Further, particularly during construction of the overdredge pit and areas closer to the ocean (west and central basins) material being dredged would have a larger grain size, would settle relatively quickly, and would not migrate to areas of concern (e.g., tidal inlet). For these reasons, turbidity associated with the dredging activities would not be of the magnitude or severity to cause substantial effects. See Section 3.4 Water and Aquatic Sediment Quality for a discussion of turbidity impacts relative to water quality.

Prior to dredging, the lagoon would be temporarily inundated. This process would not result in high-velocity water flow or other factors that typically cause erosion or sedimentation, and no substantial erosion or other adverse geologic hazards would occur within the temporarily elevated water line. Project-specific permit(s) would be required under the NPDES Permit to the County for the MS4s implemented by the County's Watershed Protection Ordinance (WPO), and to the RWQCB for the California Construction General Permit implemented by a project-specific SWPPP (PDF-25). The County's permit requires a Stormwater Management Plan (SWMP), a Hydromodification Management Plan, and low-impact development BMPs to eliminate pollutants from leaving the project/construction site and to require project operations to eliminate any added downstream sedimentation or runoff. The state-required SWPPP mandates the implementation of sediment- and erosion-control BMPs in construction and post-construction phases to minimize impacts on surface drainage patterns and the amount of surface runoff.

Also, PDF-27 requires that turbidity be actively managed by using a cutterhead dredge and/or temporarily closing the lagoon inlet to minimize release of sediment to the coast, as well as capping the overdredge pit with sand material to encapsulate material and prevent it from being introduced into the water column to minimize release of disturbed material that could cause sedimentation or turbidity.

Wind erosion would be negligible due to the saturated soil conditions, and minor bank erosion (caused mostly by rainfall) would mostly be captured within the lagoon interior tributaries.

Natural erosion is an expected process with dredging projects as it contributes to softening the sculpted or scarified surfaces caused by dredging activities. This, along with acceptable sloughing and rounding of underwater contours, would be part of the naturalizing process as the lagoon's affected areas respond and regain a natural appearance following construction. **For the reasons outlined above and with implementation and maintenance of appropriate BMPs and PDFs, erosion and sedimentation potential would be properly managed in the lagoon basin, and direct or indirect geologic impacts would be less than significant (Criteria A and B). No substantial adverse impacts would occur.**

Access roads and staging areas located at the lagoon edges would be on drier upland areas where ground surface disturbance would have a greater potential for erosion. Generally, disturbance associated with upland access roads and staging area preparation and use would include some amount of vegetation clearing, grading, and/or fill with earth and gravel to accommodate construction and maintenance vehicles, equipment, and materials. Ground disturbance in these upland areas with drier soils and more varied topography would be susceptible to wind and water erosion and resulting downgradient sedimentation. However, as described in Section 3.2 Hydrology, project-specific permits would be required under the County and state NPDES Permits. BMPs would be developed specifically for the conditions of each access road or staging area location, and could include measures such as vegetated drainage swales, requirements to cover and secure earthen stockpiles, use of runoff dissipaters, use of gravel or other ground covers, and other appropriate erosion-control measures (PDFs 25 and 26). **With the implementation and maintenance of mandated BMPs, erosion and sedimentation potential would be managed in the upland areas, and related direct or indirect geologic impacts would be less than significant (Criteria A and B). No substantial adverse impacts would occur.**

Alternative 2A would improve tidal flow by constructing a new, more stable lagoon inlet south of the existing inlet. A Tidal Inlet Stability Study was prepared for the project to analyze the proposed tidal inlet concept for their stability (M&N 2012c). Based on its findings, the study recommended moving forward with the proposed concept design tidal inlet dimensions for each alternative. As recommended by the study, periodic dredging to remove sand and short and low CBFs have been incorporated into the project for Alternative 2A to increase inlet stability by reducing cobble input into the inlet. As described in Section 2.10.12, a long-term maintenance program is proposed as part of the project and would be included as part of the restoration plan. CBFs would be constructed on either side to block cobble from entering the lagoon to the extent possible and minimize maintenance costs to eventually remove the cobble. These features would also minimize the potential for the inlet to experience substantial erosion due to tidal flow and scouring, and wave-induced scour by blocking direct wave impact on bridge abutments. **CBFs would help to minimize potential erosion-related soil instability and would not create**

additional geologic hazards. Lagoon turbidity would be actively managed by temporarily closing the lagoon inlet, which would minimize released sediment along the coast and allow settlement of materials (PDF-27). Direct or indirect impacts to geologic resources would not be substantially adverse and would be less than significant (Criterion B).

Under Alternative 2A, a new Coast Highway 101 bridge would be built to span the new inlet location. Construction of this bridge would potentially occur within soil types subject to liquefaction, erosion, settlement, or other unstable geologic conditions, and this would be a potentially significant CEQA impact. Although the bridge would be designed in accordance with applicable current state and federal guidelines that address geologic hazards, seismic codes, geotechnical conditions, and loading criteria (PDF-38), mitigation would be required. Alternative-specific geotechnical studies are required to engineer the final pile and foundation design and establish whether piles would be driven to bedrock. The size and number of piles would be determined at the time of design and could use the friction from the pile surface to counter the loading. Seismic-induced liquefaction would have the highest potential to occur at the bridge abutments, where the fill material next to the bridge could liquefy if not appropriately treated with site-specific measures such as vibro-replacement (rock columns), cement mixing, or installing several shallow piles.

The channel under the new I-5 bridge planned by Caltrans would require substantial deepening for improved hydraulics (from 0.74 to -6.5 feet NGVD), and a new NCTD bridge structure would be constructed by NCTD with a channel extending beneath it as part of the LOSSAN double-tracking project. The channel deepening also may enter potentially liquefiable alluvial units, requiring mitigation and armoring at the bridge footings to minimize potential for scour and erosion of the new channel. **Thus, direct or indirect impacts related to the exposure of people or structures to increased risk due to seismically induced ground shaking causing liquefaction, settlement, ground rupture, lateral spreading and damage, or other geologic hazard would result in a potentially significant geologic hazard impact under CEQA (Criteria A and C). No substantial adverse impacts would occur under NEPA due to engineering codes, regulations, and requirements that would be met.**

The lagoon is a unique geologic feature in that it is rare and it is the mouth of Escondido Creek. The topography of the project area, which is the lagoon surface and inundated area, is generally level. Steep bluffs, which also qualify as a unique geologic feature, border portions of the lagoon to the north and south. These bluffs are outside of the construction area and would not be modified or changed by the project. No actions of the project within the lagoon basin would result in adverse changes to the geology or stability of the bluffs. The restoration project includes actions within the lagoon that would enhance the long-term viability of the lagoon's unique geology as a tidally influenced estuary. **A less than significant direct or indirect impact would**

result (Criteria A and B). No substantial adverse effect would occur to unique geologic or physical features being altered or destroyed through restoration or ongoing maintenance activities (Criterion D).

Alternative 1B

Similar to Alternative 2A, restoration activities and ongoing maintenance within the lagoon would require excavation of large quantities of material, approximately 1.2 mcy, from the lagoon basins and tidal channels. The extent of dredging and other ground disturbance for Alternative 1B can be seen in Figure 2-13 and conceptual slopes and terrain modification would be similar to that described for Alternative 2A. Also, dredging activities would occur within areas that have been diked off and confine the area of turbidity, the disturbed sediments would have opportunity to settle out within the diked area prior to release of the flood waters, the type of dredging proposed does not generate substantial turbidity, and the type of material being dredged would be of a grain size that settles out of the water column relatively quickly, particularly near the inlet. See Section 3.4 Water and Aquatic Sediment Quality for a discussion of turbidity impacts relative to water quality.

As with Alternative 2A, an overdredge pit is proposed in the design. The overdredge pit was specifically designed with appropriate distance from the NCTD railroad embankment so that, even if the pit unexpectedly collapsed, the railroad embankment stability would be unaffected. At the currently designed side slopes of 5:1, there would be a distance of approximately 145 feet from the top edge of the overdredge pit to the railroad embankment toe, and a distance of approximately 350 feet from the overdredge pit toe to the railroad embankment toe. The proposed 2:1 (horizontal to vertical) railroad embankment fill slope would be covered with riprap. The presence of the dredge pit should not cause lateral slope stability or deformation of the 2:1 fill embankment (Ninyo & Moore 2014). If the overdredge pit slope were to become unstable during a strong earthquake, there would be sufficient distance between the overdredge pit and the railroad berm to preclude impacts to the berm from the pit. The potential for seismically induced lateral spread into the dredge pit is considered negligible (Ninyo & Moore 2014).

While it is not possible to fully eliminate all risk associated with natural seismic events, the size of event that would have to occur during the several-month period of an empty overdredge pit along with the specific timing of a train on the track adjacent to the overdredge pit renders the possibility of resulting hazards very low. As described for Alternative 2A, the very low risk of this significant seismic event, combined with the short period when the pit would be empty (2 to 3 months) and the adequate distance between the overdredge pit and railroad embankment (to minimize the potential for structural damage if soils were to become instable) **result in the**

potential risk for geologic hazards to be considered at an acceptable level that would be less than significant (Criteria A and C). No substantial adverse impacts would occur.

Because the removal and/or placement of sediment and other material from the generally flat lagoon basins would not occur in locations that provide stability for other geologic formations or natural features such as slopes or hillsides, the removal of materials for restoration and ongoing maintenance purposes **would not create increased slope instability, landslides, or accelerated erosion. A less than significant direct or indirect impact would result (Criteria A and B). No substantial adverse effect would occur.**

Alternative 1B would retain the existing Coast Highway 101 bridge and would seismically retrofit the existing structure due to the current seismic safety deficiencies, as described under existing conditions. The bridge retrofit activities would not exacerbate or increase geologic risk, but would reduce risk caused by the existing seismic deficiency of the bridge (M&N 2013). **Final retrofit design for the bridge would be reviewed by appropriate regulatory agencies (such as the City of Encinitas and Caltrans) prior to construction, and would adhere to existing laws and regulations. Impacts would be less than significant as related to the exposure of people to increased risk due to seismically induced ground shaking causing liquefaction, settlement, ground rupture, lateral spreading and damage, or other geologic hazard owing to the Coast Highway 101 bridge retrofit (Criterion C). No substantial adverse impacts would occur.**

Channels underneath the existing Coast Highway 101, I-5, and NCTD railroad bridges would require substantial deepening (by approximately 5 feet, 7 feet, and 6 feet, respectively) for improved hydraulics and necessitate appropriate design standards and protection. Analyses conducted for the SELRP indicate that no increase in scour depth would occur under the bridge from channel deepening. This means that channel deepening would occur in materials that are resistant to scouring and that the hydraulics of the channel flow would be stable and non-erosive at its depth. This conclusion is supported by the bedrock sill existing west of the bridge (M&N 2013). The hydraulic analyses of cross-sections of the existing Coast Highway 101 bridge indicate that, for Alternatives 1A and 1B, the hydrology over time would widen rather than deepen the channel to convey greater tidal flow volumes (M&N 2013). For the reasons described above and detailed in the December 2013 Memorandum addressing Highway 101 Bridge over San Elijo Lagoon (Cr No. 57C-0210) – Seismic Retrofit (M&N 2013), the existing seismic deficiencies of the Coast Highway 101 bridge would not be affected by implementation of Alternative 1B.

The channel deepening and resulting protection design would be engineered in accordance with applicable current state and federal guidelines (such as the UBC, CBC, regulations required by

Caltrans' Division of Design and/or Division of Engineering Services, and/or engineering standard/code compliance with the City of Encinitas) that are required to address erosion hazards, seismic codes, geotechnical conditions, and loading criteria. As described at the start of this analysis, each appropriate reviewing entity would review and verify that structural stability standards are met. These structural regulations are designed to reduce geologic hazards to the fullest extent through structure and site-specific engineering; thus, adherence to applicable codes, requirements, and regulations would minimize potential geologic risk associated with bridge work. **Impacts would be less than significant as related to the exposure of people to increased risk due to seismically induced ground shaking causing liquefaction, settlement, ground rupture, lateral spreading and damage, or other geologic hazard owing to channel deepening activities associated with each of the bridges (Criterion C). No substantial adverse impacts would occur.**

Similar to the discussion provided for Alternative 2A, a project-specific SWMP (with a Hydromodification Management Plan and low-impact development) and SWPPP would be developed that mandates the implementation of construction and post-construction sediment and erosion control BMPs (PDF-25). BMPs could include measures such as vegetated drainage swales, requirements to cover and secure earthen stockpiles, use of runoff dissipaters, use of gravel or other ground covers, and other appropriate erosion control measures. Specific BMPs would be developed once the project alternative has been selected through the permitting process with review and approval by the RWQCB for the SWPPP and the County for the SWMP to ensure that the BMPs would be the most effective and minimize potential for sedimentation and erosion, **The potential for increased erosion, direct or indirect destruction of a unique geologic or physical feature, or other resulting geologic hazards would not be substantially adverse and would remain less than significant (Criteria A, B, C, and D).**

Alternative 1A

Restoration activities and ongoing maintenance within the lagoon would require excavation of material, approximately 160,000 cy, from the lagoon basins and tidal channels. The extent of dredging and other ground disturbance for Alternative 1A can be seen in Figure 2-14. Because this alternative does not use an overdredge pit and results in the removal and/or placement of sediment and other material from the generally flat lagoon basins, **it would not create increased slope instability, landslides, or other geologic hazards. No substantial adverse impacts would occur, and a less than significant direct or indirect impact would result (Criteria A and B).**

As described for Alternative 1B, Alternative 1A would also retain and retrofit the existing Coast Highway 101 bridge and would require deepening of channels underneath the existing Coast

Highway 101, I-5, and NCTD railroad bridges. The existing bridge structure on Coast Highway 101 would be seismically retrofitted. The other existing bridges would need appropriate protection. The bridge retrofit and channel excavations would not exacerbate or increase geologic risk caused by the existing seismic deficiency of the bridge (M&N 2013). Analyses conducted for the SELRP indicate that scour depth would not be increased under the bridge from channel deepening and the cross-section under existing Coast Highway 101 bridge would widen rather than deepen to convey greater tidal flow volumes (M&N 2013). Thus, the existing seismic deficiencies of the Coast Highway 101 bridge would not be affected by implementation of Alternative 1A. The deepening and resulting protection design would be engineered in accordance with applicable current state and federal guidelines (such as the UBC, CBC, regulations required by Caltrans' Division of Design and/or Division of Engineering Services, and/or engineering standard/code compliance with the City of Encinitas) that are required to address geologic hazards and must consider seismic codes, geotechnical conditions, and loading criteria. As described at the start of this analysis, each appropriate reviewing entity would review and verify that structural stability standards are met. These structural regulations are designed to reduce geologic hazards to the fullest extent through structure and site-specific engineering; thus, adherence to applicable codes, requirements, and regulations would minimize potential geologic risk associated with bridge work. **Impacts would be less than significant as related to the exposure of people to increased risk due to seismically induced ground shaking causing liquefaction, settlement, ground rupture, lateral spreading and damage, or other geologic hazard owing to channel deepening activities associated with each of the bridges (Criterion C). No substantial adverse impacts would occur.**

Similar to the discussion provided for Alternative 2A, project-specific SWMP (with Hydromodification Management Plan and low-impact development) and SWPPP would be developed that mandate the implementation of construction and post-construction sediment and erosion control BMPs (PDF-25). BMPs could include measures such as vegetated drainage swales, requirements to cover and secure earthen stockpiles, use of runoff dissipaters, use of gravel or other ground covers, and other appropriate erosion control measures. Specific BMPs would be developed once the project alternative has been selected through the permitting process with review and approval by the RWQCB for the SWPPP and the County for the SWMP to ensure that the BMPs would be the most effective and minimize potential for sedimentation and erosion. **The direct or indirect potential for increased erosion, destruction of a unique geologic or physical feature, or other resulting geologic hazards would not be substantially adverse and would remain less than significant due to implementation of Alternative 1A (Criteria A, B, C, and D).**

No Project/No Federal Action Alternative

The No Project/No Federal Action Alternative would not result in modifications to the lagoon and there would be no adverse change to geologic conditions or resources. **No impact would result (Criteria A, B, C, and D).**

Materials Disposal/Reuse

It is anticipated that material placed as part of materials disposal/reuse could be deposited on existing beaches and the ocean floor, and would ultimately be spread alongshore, cross-shore, and across the ocean floor through natural littoral transport.

The SAP (Appendix A) has been reviewed by EPA and the Corps. Initial SAP work involved analysis of materials for suitability for placement on the beach, in the nearshore zone, at offshore former SANDAG borrow sites and into the proposed overdredge pit in the lagoon for Alternatives 1B and 2A. The analysis indicated that materials excavated from the overdredge pit location (Alternatives 2A and 1B) are likely to be suitable for placement on beaches or in the nearshore. Additional evaluation of the preferred alternative and placement option with these agencies would be required to obtain a final compatibility determination.

Preliminary soil investigations included in the SAP also suggest the material would be suitable for disposal at LA-5 as proposed in Alternative 1A; however, a formal determination from EPA and the Corps would be required prior to disposal. Discussions in the SAP regarding offshore disposal at LA-5 occurred for background and to understand its capacity limitations, but formal submittals requesting authorization to place sand would be made upon selection of a final alternative. If disposal at LA-5 were part of the selected alternative, then supplemental Tier 3 analysis would be required.

Alternative 2A

Offshore Stockpiling

Seismic activity occurring at offshore locations, such as SO-5 and SO-6, or nearshore at Cardiff would not result in typical geologic hazards generally associated with onshore locations, such as ground failure or liquefaction. Offshore seismic activity would be more likely to result in hazards such as ocean waves or a tsunami, rather than geologic hazards that could directly or indirectly affect people or structures. The placement of materials at offshore locations would not increase or create potential for geologic conditions that could expose people to seismically induced adverse geologic hazards and impacts to seismically induced ground shaking, ground rupture,

and liquefaction. **There would be no impact (Criterion C). No substantial adverse effects would occur.**

Sand placed at offshore locations outside the depth of closure (SO-5, SO-6, and LA-5) would not be substantially affected by sand transport processes as described in Section 3.3 Oceanography/Coastal Processes. **No impacts to slope instability, landslides, or substantial erosion would occur (Criteria A and B). No substantial adverse effects would occur.**

The placement of materials at offshore locations would be below the surface of the ocean and in areas designated for and currently used as materials disposal/placement locations. Thus, no unique geologic feature would be destroyed by offshore materials placement and **no impact would result (Criterion D). No substantial adverse effects would occur.**

Nearshore

People in the nearshore are typically in boats or personal watercraft. The placement of materials on the ocean floor at nearshore locations would not increase or create potential for geologic conditions that could expose people to seismically induced geologic hazards. **There would be no substantial adverse impacts associated with seismically induced ground shaking, ground rupture, or liquefaction at this location. Impacts would remain less than significant (Criterion C) and no substantial adverse effects would occur.**

The addition of structures along the shoreline within a littoral cell can modify littoral processes in that cell, and can affect beach width by increasing erosion or beach sand loss from onshore. To minimize shoreline changes in the vicinity of the new inlet, Section 3.3 Oceanography/Coastal Processes discussed the creation of a prefilled ebb bar. Construction of the ebb bar at this location simultaneously with the new inlet would prevent excessive erosion at Cardiff State Beach. The remainder of materials placement is intended to supplement material in the littoral system and would not affect erosion patterns at area beaches. In fact, onshore placement would be a benefit in the near term. **No significant impacts to slope instability, landslides, and substantial erosion are anticipated (Criteria A and B). No substantial adverse effects would occur.**

Similar to the discussion of offshore placement, the placement of materials within the nearshore would be below the surface of the ocean. Thus, **no unique geologic feature would be destroyed by offshore materials placement and no impact would result (Criterion D). No substantial adverse effects would occur.**

Onshore

For proposed onshore materials placement sites, seismic activity associated with the Rose Canyon or other nearby faults may lead to liquefaction, ground failure, sand volcanoes, or seaward slumping of beach material. These conditions exist currently, and the placement of additional material onshore in the proposed locations would not affect these processes. The adverse direct or indirect exposure of people or structures to seismically induced ground shaking causing liquefaction, settlement, ground rupture, or lateral spreading and damage would not be affected by onshore materials placement, and **impacts to seismically induced ground shaking, ground rupture, and liquefaction would be less than significant (Criterion C). No substantial adverse impacts would occur.**

The placement of sand at onshore locations, such as the proposed beach sites, would not cause geologic hazards as a result of ground instability or erosion. Placed material would supplement existing beach material that already exists in these locations. The placement of materials at some onshore locations may reduce the potential for geologic hazards as it would protect against the undercutting or erosion of cliffs or other areas subject to wave-induced erosion, thus reducing slope instability and landslide potential. As discussed in Section 3.3 Oceanography/Coastal Processes, littoral transport in the Oceanside Littoral Cell causes sand movement onshore/offshore, as well as alongshore, depending on seasonal and annual variations in wave direction and energy. Beaches in the project study area tend to be relatively narrow and backed by bluffs or infrastructure (e.g., roads, restaurants), with slightly wider sand platforms in summer compared to winter. Materials placed at the proposed onshore locations would eventually be moved as part of the littoral cell process but would not increase or accelerate this natural sand transport process. **No substantial adverse impacts to slope instability, landslides, and substantial erosion are anticipated, and impacts would remain less than significant (Criteria A and B).**

Beaches in the study area are typically overlain by a layer of sand varying in thickness depending on the littoral processes described in Section 3.3 Oceanography/Coastal Processes. Sand bar thickness in the nearshore areas adjacent to littoral zone placement sites may increase temporarily with the placement of additional material in the system. The material would remain in the mobile overlying layer of the littoral zone and would not affect the underlying geologic characteristics of the region. Material proposed for reuse (e.g., in the location of the overdredge pit in the central basin) has been confirmed to be compatible with existing sand in the system and would not affect the overall characteristics of the littoral cell.

Alternative 1B

Materials placement for Alternative 1B is similar to that proposed for Alternative 2A. Sand placement at area beaches, in the nearshore, and in the offshore, as described for Alternative 2A, could still occur. Material placement would supplement sand already in the system and would not increase erosion along the coastline. Similar to Alternative 2A, **less than significant impacts to geology/soils would occur (Criteria A, B, C, and D). Impacts would not be substantially adverse.**

Alternative 1A

Under Alternative 1A, minimal beneficial reuse of material is anticipated. The majority of material would be exported offshore to the current approved ocean disposal site at LA-5 for disposal with a small volume being reused on-site for the nesting and transitional areas. Material deposited in LA-5 may redistribute slightly over time due to water currents but is anticipated to remain relatively undisturbed due to its depth and location outside of the littoral zone. The placement of materials at LA-5 would be below the surface of the ocean and in an area designated for, and currently used as, a materials disposal/placement location, with no adverse effects to geologic hazards or features. While initial testing suggests the material would be suitable for disposal at LA-5, supplemental Tier 3 analysis would be conducted to verify material meets criteria for LA-5 disposal prior to placement by EPA and the Corps in compliance with the ODM. **Less than significant impacts to geology/soils would occur (Criteria A, B, C, and D). No substantial adverse impacts would result.**

No Project/No Federal Action Alternative

The No Project/No Federal Action Alternative would not result in nourishment of area beaches or the nearshore. **No adverse direct or indirect impacts to geologic conditions or resources would result, and no positive benefits to the littoral zone with respect to the sand nourishment identified as a component of the RSM Plan would occur (Criteria A, B, C, and D).**

3.5.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

Impacts on geologic hazards from construction of the overdredge pit, tidal inlet, and bridge for Alternative 2A, and overdredge pit for Alternative 1B are less than significant due to project design features and engineering standards/codes that dictate design standards (such as the UBC, CBC, regulations required by Caltrans' Division of Design and/or Division of Engineering Services, and/or engineering standard/code compliance with the City of Encinitas), plus

appropriate reviewing entities that ensure standards are met to avoid or minimize geologic impacts.

The following mitigation measures are required for CEQA significant impacts. Mitigation measure Geology-1 would be required under CEQA for implementation of Alternative 2A.

Geology-1 The proposed bridge improvement and channel-deepening portions of the project could result in significant impacts from liquefaction, erosion, settlement, and other unstable geologic conditions. The mitigation of performing geotechnical investigations and implementing site-specific measures recommended in the engineering study to ensure appropriate design for structural stability and reducing unstable geologic conditions is required to reduce impacts to less than significant. After implementation of the measures identified to remediate potentially unstable geologic conditions, certification shall be provided by a California Registered Professional Engineer or Certified Engineering Geologist that states that the measures are in place and the identified liquefaction, erosion, settlement, or other unstable geologic conditions have been adequately remediated to mitigate the potential impact.

Project design features also incorporate project engineering and design measures necessary to meet regulatory requirements and standards to ensure geologic safety. Project design features addressing geologic hazards include implementation of an approved SWMP, Hydromodification Management Plan, and low-impact development BMPs to eliminate pollutants from leaving the project/construction site and to require project operations to eliminate any added downstream sedimentation or runoff, and implementation of a state-required SWPPP for sediment and erosion control BMPs in construction and post-construction phases with BMPs to minimize impacts on surface drainage patterns and the amount of surface runoff. In addition, active management of the tidal inlet to allow for settlement of sediments and minimization of release of disturbed sediment to the ocean, pile and abutment design requirements, and incorporation of recommendations related to sea level rise from SANDAG would be required. Mitigation and project design features have been incorporated throughout the project to minimize and avoid geologic hazards.

3.5.5 LEVEL OF IMPACT AFTER MITIGATION

CEQA: Potential impacts related to geology/soils would be mitigated to less than significant.

NEPA: No substantial adverse direct or indirect impacts associated with geology and soils have been identified due to implementation of the SELRP.

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3.6 BIOLOGICAL RESOURCES

Information in this section is derived from three key sources: the Biological Resources Technical Report (BTR) focusing on the lagoon (Appendix F), a Jurisdictional Delineation Report or JDR (Appendix G), and a Biological Technical Report addressing disposal and nearshore marine resources (Appendix H). Substantial data have been collected by a wide variety of technical specialists regarding biological resources in the lagoon over the past decade, including monthly bird counts, sensitive species surveys, invertebrate and fish surveys, and vegetation surveys. This information is incorporated into the BTR as well as this section.

This evaluation was drafted to satisfy CEQA and NEPA requirements, as well as support preparation of the 404(b)(1) alternatives analysis and DA permit. Subsequent to CEQA/NEPA approval, and the Corps determination of the final LEDPA, it is anticipated that USFWS would amend the Biological Opinion for the I-5 North Coast Corridor Project or issue a project specific Biological Opinion through the Section 7 consultation process (USFWS 2012a).

This evaluation is based on findings from previously conducted surveys, plus surveys and research by AECOM and Merkel & Associates biologists. The LA-5 disposal site is a permitted disposal site and has been evaluated in an approved EIS (EPA 1987) and material would be placed consistent with EPA-mandated conditions for use. Thus the biological conditions associated with this offshore location and impacts associated with disposing of material into this site have been evaluated. In addition, material proposed for disposal at LA-5 would be required to comply with quality requirements for that site. Preliminary coordination with the Corps and EPA has indicated that the material appears to be suitable for disposal at LA-5. If Alternative 1A is selected for implementation, additional testing (e.g., Tier 3 testing) would be required to obtain final authorization for disposal. Potential biological impacts from disposal at LA-5 are not discussed further.

3.6.1 AFFECTED ENVIRONMENT

The SELRP restoration project is driven by the need to modify the existing lagoon hydrology and prevent further degradation to physical and biological functions of the lagoon (Section 1.2). Restoration would also result in direct changes to the lagoon and to specific sites where excavated materials may be disposed of and/or reused. This section provides separate descriptions of both study areas: the lagoon and the various materials disposal/reuse sites (offshore, nearshore, and onshore). The lagoon study area is referred to as the Biological Study Area (BSA) throughout this section and includes the approximately 960-acre San Elijo Lagoon. The materials disposal/reuse study area discussion addresses beach, and nearshore and offshore areas that may be affected by materials disposal.

San Elijo Lagoon Biological Study Area

San Elijo Lagoon is a coastal estuary that represents a unique ecosystem where marine and terrestrial ecosystems meet. The lagoon currently supports a variety of habitats and a diverse suite of plants and wildlife, including more than 300 species of plants, more than 20 species of fish, more than 20 species of reptiles and amphibians, 24 species of mammals, and more than 295 bird species (including 65 nesting), in addition to a complex community of terrestrial and marine invertebrates.

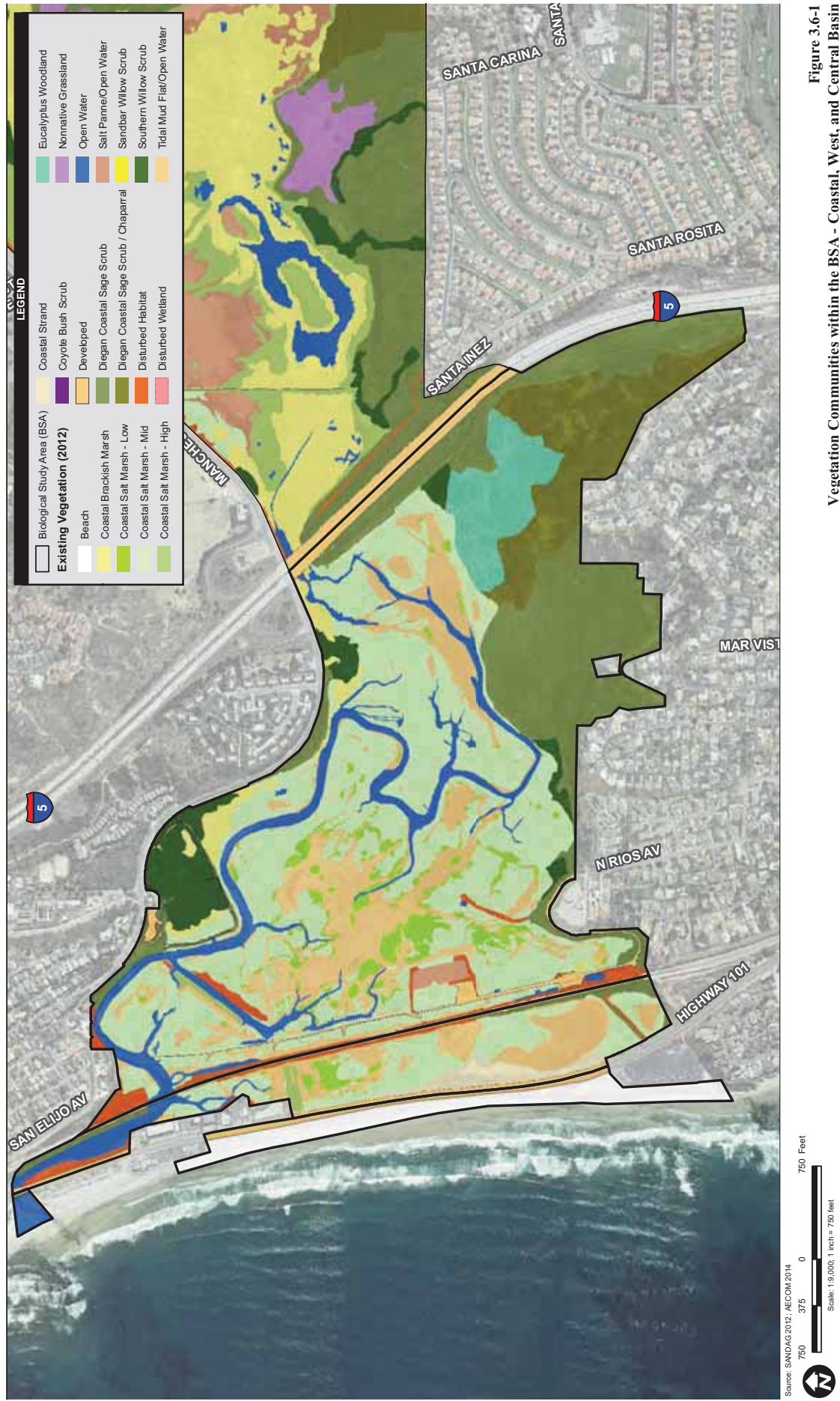
San Elijo Lagoon receives salt water from the Pacific Ocean and freshwater from a 77-square-mile watershed with two main tributaries, Escondido Creek and Orilla Creek. For the estuarine environment to be highly productive, it must be continually replenished with water and nutrients from the ocean, as well as periodic pulses of freshwater associated with the fluvial processes and rainfall.

The relationship between freshwater inflows and salt marsh dynamics is complex. Timing and duration of freshwater inflows can result in a broad range of effects that correlate with the degree of change in soil salinity. The timing of freshwater inflows, the amount of freshwater, and the inflow duration plays an important part in the response of the normally hypersaline salt marsh.

Regular tidal action also provides high water quality, prevents extreme fluctuations in salinity and temperature, and maintains high levels of dissolved oxygen. Due to existing constraints on the lagoon ecosystem, including regular mouth closures, high-nutrient sediments, impounded freshwater and salt water, muted tides, and poor circulation, San Elijo Lagoon is functioning in a degraded state. Improvement of the hydraulic efficiency of the lagoon through widening and creation of new channels proposed under the SELRP restoration alternatives would allow for periodic, short-term freshwater pulses while managing potentially damaging long-term salinity reduction.

Vegetation Communities

Vegetation communities are assemblages of plant species that usually coexist in the same area and provide habitat for wildlife species. The classification of vegetation communities is based upon the life form of the dominant species within that community and the associated flora. Field surveys were performed by AECOM in spring 2010 and 2012. Accordingly, three generalized categories characterize the land cover types observed during vegetation mapping: riparian and other wetlands, uplands, and other cover types. Within these three categories are 10 riparian and wetland communities, six upland communities, and three other cover types (Figures 3.6-1 and 3.6-2). The acreages of each vegetation community and cover type within the BSA are provided



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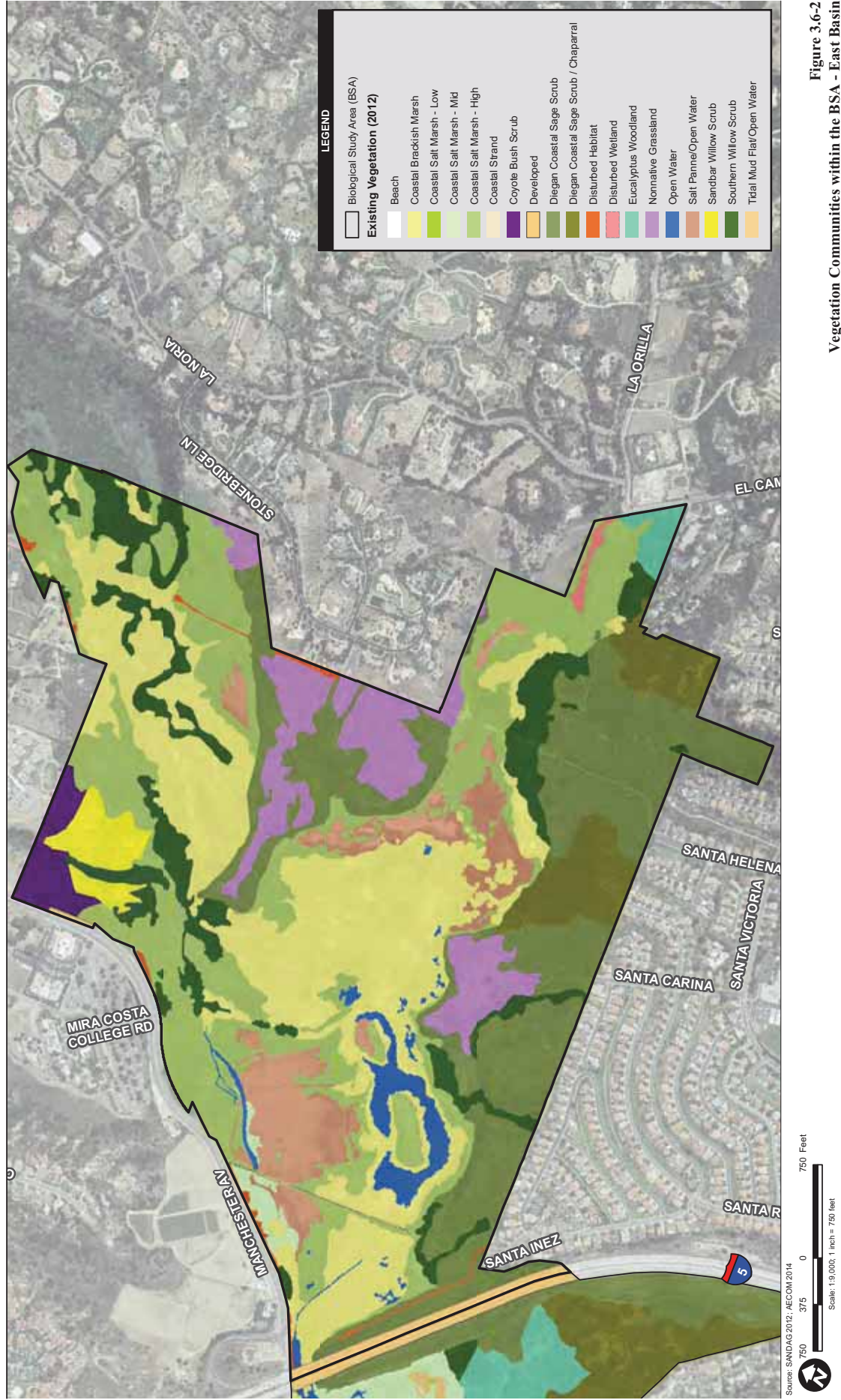


Figure 3.6-2
Vegetation Communities within the BSA - East Basin

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in Table 3.6-1. All of the vegetation communities and land cover types identified are considered sensitive, with the exception of eucalyptus woodland, developed areas, and disturbed habitats, due to their ecological function and ability to support sensitive species. For a complete description of each vegetation community, refer to the BTR in Appendix F.

**Table 3.6-1
Vegetation Communities and Other Cover Types within the Survey Area (Acres)**

Vegetation Communities and Other Cover Types¹	Coastal Area	West Basin	Central Basin	East Basin	Total
Riparian and Wetlands					
Coastal Brackish Marsh			6.1	125.4	131.5
Coastal Salt Marsh – High Littoral Zone		0.8	0.7	118.5	120.0
Coastal Salt Marsh - Mid Littoral Zone		16.7	121.3	3.4	141.4
Coastal Salt Marsh - Low Littoral Zone		1.5	11.8		13.3
Disturbed Wetland ²				1.1	1.1
Open Water (Tidal Channels & Basin)	1.5	4.3	23.7	10.6	40.1
Salt Panne/Open Water			1.5	35.4	36.9
Sandbar Willow Scrub ²				9.0	9.0
Southern Willow Scrub ²			14.4	47.0	61.4
Tidal Mud Flat/Open Water		13.8	49.3		63.1
Subtotal Riparian and Wetlands	1.5	37.1	228.8	350.4	617.8
Uplands					
Coyote Bush Scrub				7.5	7.5
Diegan Coastal Sage Scrub		3.1	67.0	108.0	178.1
Diegan Coastal Sage Scrub/Chaparral			27.7	21.6	49.3
Eucalyptus Woodland			15.7	3.4	19.1
Nonnative Grassland				33.0	33.0
Subtotal Uplands	0	3.1	110.4	173.5	287.0
Other Cover Types					
Beach	15.0				15.0
Coastal Strand		5.0			5.0
Developed (Berm Roads)	3.0	5.2	10.4	4.9	23.5
Disturbed Habitat		2.5	6.7	2.6	11.8
Subtotal Other Cover Types	18.0	12.7	17.1	7.5	55.3
TOTAL	19.5	52.9	356.3	531.4	960.1

¹ In accordance with the *Draft Vegetation Communities of San Diego County* (Oberbauer et al. 2008), based on the *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986).

² Disturbed Wetland, Sandbar Willow Scrub, and Southern Willow Scrub are combined into a riparian vegetation community when discussing impacts and alternatives.

Designated Critical Habitats

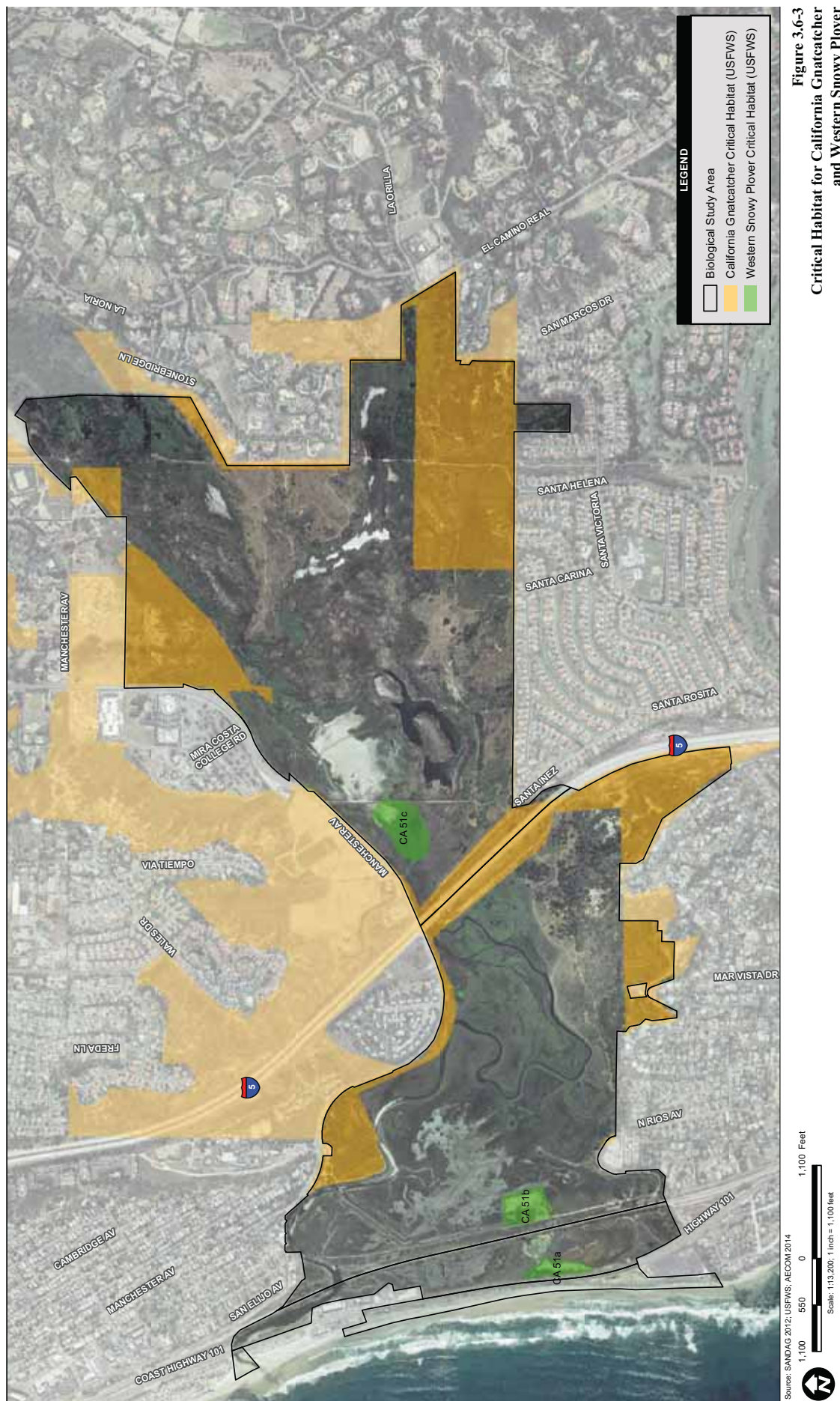
In addition to sensitive habitats, certain habitats receive special designation by USFWS and NMFS. Below is a discussion of designated critical habitats within the survey area.

USFWS Critical Habitat and Primary Constituent Elements

USFWS designates critical habitat for federally threatened and endangered species. It is a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. An area is designated as “critical habitat” after USFWS publishes final boundaries of the critical habitat area in the *Federal Register*. The areas shown on critical habitat maps are often large, but it is important to note that the entire mapped area may not be considered critical habitat. Only areas that contain the primary constituent elements (PCEs) required by the target species are considered critical habitat. PCEs are the elements of physical or biological features that, when laid out in the appropriate quantity and spatial arrangement to provide for a species’ life-history processes, are essential to the conservation of the species. PCEs may include, but are not limited to, (1) space for individual and population growth and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing (or development) of offspring; and (5) habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species (USFWS 2011).

Of the federally listed species known to occur within San Elijo Lagoon, two have designated critical habitat mapped within the BSA, including the coastal California gnatcatcher and western snowy plover. Coastal California gnatcatcher critical habitat was originally proposed in 2000 and subsequently revised in 2007 by USFWS (72 FR 72009). Approximately 205 acres of coastal California gnatcatcher critical habitat occurs within the BSA, but it is primarily within the coastal sage scrub and chaparral upland habitats surrounding the lagoon (Figure 3.6-3). The coastal California gnatcatcher critical habitat within the BSA (205 acres) represents 1 percent of the 17,325-acre unit (Unit 3). PCEs for the California gnatcatcher include dynamic and successional sage scrub habitats that provide adequate space for population growth, normal behavior, breeding, reproduction, nesting, dispersal, and foraging. PCEs may also include non-sage scrub habitats (e.g., chaparral, grassland, and riparian areas) in proximity to sage scrub habitats that provide space for dispersal, foraging, and nesting.

Western snowy plover critical habitat was originally proposed in 1995 but was not finalized until 1999 (USFWS 1999). It was subsequently revised as part of the final rule in 2005 (USFWS 2005). In 2012, the critical habitat was once again updated and, at that time, approximately 15 acres was identified within San Elijo Lagoon and the BSA. The snowy plover critical habitat within the BSA represents 100 percent of the unit (Unit 51). The new designation of critical habitat within San Elijo Lagoon is a direct result of the SELRP restoration planning effort, and the identified critical habitat subunits for western snowy plover correspond to the potential future nesting sites identified in the restoration alternatives.



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The critical habitat within the lagoon was divided into three potential nest sites or subunits, labeled CA 51A, CA 51B, and CA 51C (USFWS 2012b) (Figure 3.6-3). PCEs for western snowy plover currently exist on-site within these subunits, and include sandy beaches and tidally influenced estuarine mud flats (PCE 2) with tide-cast organic debris supporting small invertebrates (PCE 3). Although not discretely mapped by USFWS, the following four PCEs have the potential to occur within each of the three subunits, either individually or together:

- PCE 1 – Areas that are below heavily vegetated areas/developed areas and above the daily high tides
- PCE 2 – Shoreline habitat areas for feeding with no or very sparse vegetation that are between the annual low tide or low-water flow and annual high tide or high-water flow, subject to inundation but not constantly under water, that support small invertebrates that are essential food sources such as crabs, worms, flies, beetles, spiders, sand hoppers, clams, and ostracods
- PCE 3 – Surf- or water-deposited organic debris such as seaweed (including kelp and eelgrass) or driftwood located on open substrates that supports and attracts small invertebrates described in PCE 2, provides cover or shelter from predators and weather, and assists in avoidance of detection (crypsis) for nests, chicks, and incubating adults
- PCE 4 – Minimal disturbance from the presence of humans, pets, vehicles, or human-attracted predators and provide relatively undisturbed areas for individual and population growth and for normal behavior

At this time, these three subunits and PCEs associated with western snowy plover are in a degraded state and have not supported nesting plover since 2005. As noted in the Federal Register, restoration of degraded habitat within these three subunits will improve the habitat (USFWS 2012b).

No critical habitat for other federally listed species occurs within the BSA.

Essential Fish Habitat

As described in the Regulatory Section in Section 1.5 and Appendix C, EFH is defined as those “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The coastal waters of southern California are designated as EFH, which are managed by NMFS. Estuaries are considered a Habitat Area of Particular Concern (HAPC), which is a subset of EFH. Estuaries (as mapped by NOAA) are considered an important habitat in the lifecycle of many fish as they often support the early larval and juvenile stages of development when

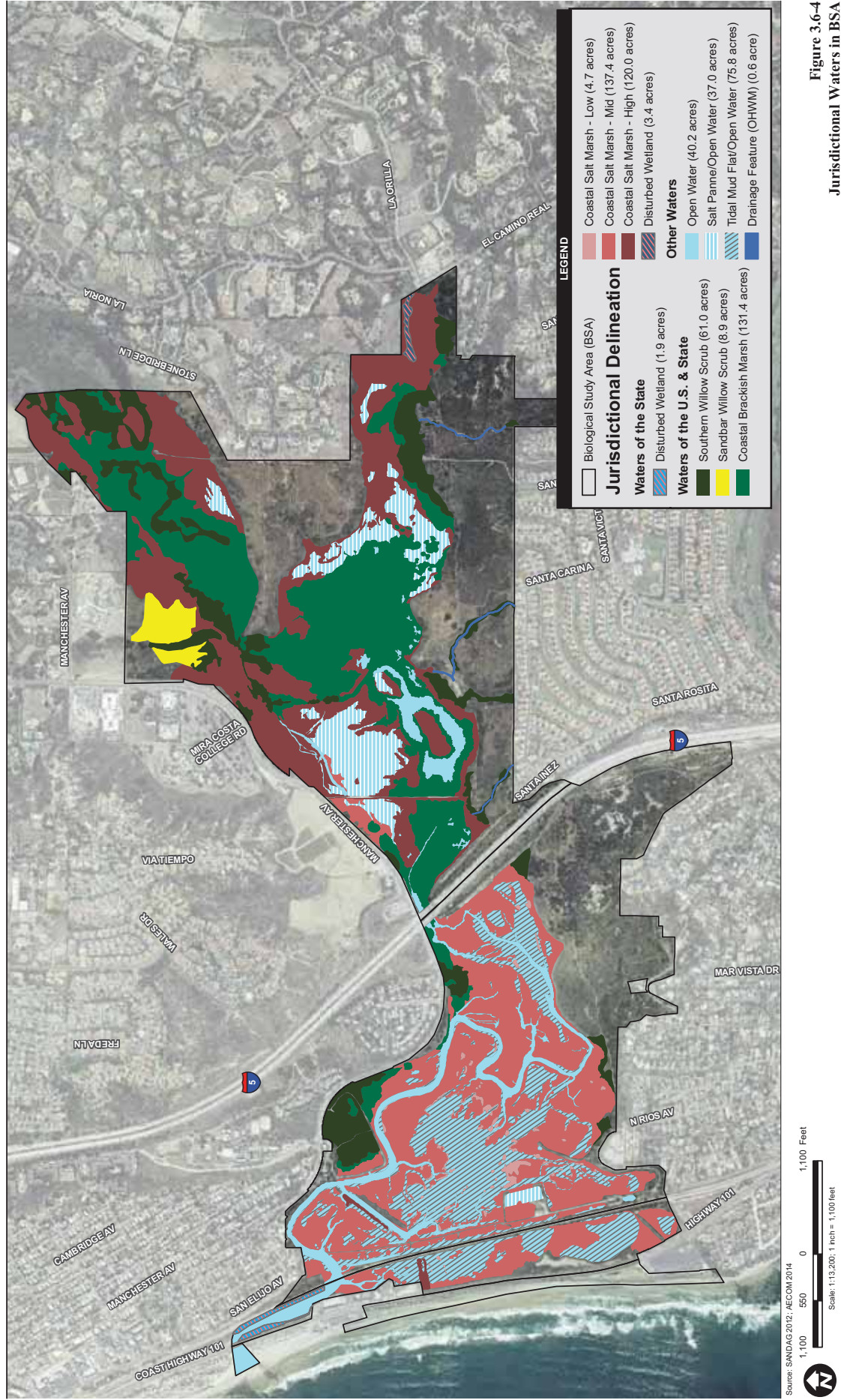
adequate habitat structure is present. San Elijo Lagoon is mapped as EFH both for groundfish and as estuarine HAPC. As San Elijo Lagoon does not support substantial subtidal habitat, it is likely that the lagoon is currently not playing a critical role in sustaining nearshore fish populations. However, the connection of the protected open water and tidal channels in the lagoon to the open ocean may still play some role in supporting local fish populations.

When the lagoon mouth is open, the project area is likely suitable for four species of finfish, Pacific sardine, Pacific (chub) mackerel, northern anchovy, and jack mackerel; and market squid. Juvenile sardine and anchovy may venture into or be transported to the project area with tidal waters. Highly migratory species, such as tuna, swordfish, and sharks, are not expected to occur in the project area. Local populations of leopard shark and rays may be present as mudflats provide potentially suitable foraging habitat for these bottom feeding species.

Jurisdictional Waters and Wetlands

As described in detail in Appendix G, a jurisdictional delineation (including verified Preliminary Jurisdictional Determination form) was completed for the BSA in 2010. A total of 620.1 acres of potential jurisdictional waters and wetlands occurs within the BSA (Figure 3.6-4). Of these acres, 618.2 acres is considered potential waters of the U.S. and state. An additional 1.9 acres is considered potential waters of the state only.

Total jurisdictional waters of the U.S. and state are listed for each wetland habitat and other waters of the U.S. (in the form of wetlands, tidal waters, or nonwetland waters/ordinary high water mark) in Table 3.6-2. Vegetation is classified by habitat type using both the San Diego Regional Holland Code Classification System and *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). A summary of the jurisdictional waters of the U.S. and state, with the corresponding regulatory authority, occurring within the survey area, is provided in Table 3.6-3.



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Table 3.6-2
Potential Waters of the U.S. and State Occurring within the BSA

Type of Jurisdictional Waters of the U.S. and State	Type of Habitat (Holland et al. 1986, 1996, 2006, 2008) ¹	Type of Habitat (Cowardin et al. 1979)	Area of Aquatic Resource (acres)
Jurisdictional Waters of the U.S.			
Wetland	Southern Coastal Brackish Marsh (52200)	Estuarine; Intertidal; Emergent, Persistent, Regularly Flooded, Mesosaline	131.4
Wetland	Southern Coastal Salt Marsh (52120)	Estuarine; Intertidal; Emergent, Persistent, Regularly Flooded, Mixohaline	262.1 ²
Wetland	Disturbed Wetland (11200)	Palustrine; Scrub/Shrub Broad-leaved, Deciduous, Seasonally Flooded, Fresh	1.2
Wetland	Sandbar Willow Scrub (63000)	Palustrine; Scrub/Shrub Broad-leaved, Deciduous, Seasonally Flooded, Fresh	8.9
Wetland	Southern Willow Scrub (63320)	Palustrine; Scrub/Shrub Broad-leaved, Deciduous, Seasonally Flooded, Fresh	61.0
Other Waters	Drainage Features/ Nonvegetated Channel (64200)	Riverine; Unconsolidated Bottom, Sand, Intermittently Flooded, Fresh	0.6 (3,640 linear feet)
Tidal Waters	Open Water/Subtidal Estuary (64131)	Estuarine; Subtidal; Unconsolidated Bottom, Mud, Mixohaline	40.2
Other Waters	Open Water/Salt Panne (64300)	Palustrine; Unconsolidated Bottom; Mud, Temporarily Flooded Saturated, Hyperhaline	37.0
Tidal Waters	Open Water/Tidal Mudflat (64200)	Estuarine; Subtidal; Unconsolidated Bottom, Mud, Regularly Flooded, Mixohaline	75.8
<i>Subtotal Jurisdictional Waters of the U.S.</i>			<i>618.2</i>
Jurisdictional Waters of the State			
Riprap Banks (Tidal Inlet Banks)	Disturbed Wetland (11200)	Riverine; Tidal; Artificial Substrate Irregularly Exposed, Mixohaline	1.9
<i>Subtotal Jurisdictional Waters of the State</i>			<i>1.9</i>
Grand Total Jurisdictional Waters			620.1

¹ The *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986) does not provide classifications for abiotic features. These habitat codes are in accordance with the *Draft Vegetation Communities of San Diego County* (Oberbauer et al. 2008), based on the *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986). Disturbed habitats are included as jurisdictional aquatic features.

² The 262.1 acres of southern coastal saltmarsh is composed of three components or saltmarsh zones: low coastal saltmarsh (4.7 acres), middle coastal saltmarsh (137.4 acres), and high coastal saltmarsh (120.0 acres).

Table 3.6-3
Summary of Jurisdictional Waters of the U.S. and State Occurring within the BSA

Type of Jurisdictional Waters of the U.S. and State	Regulatory Authority	Area (acres)
Jurisdictional Waters of the U.S.¹		
Other Waters	CCC, CDFW, RWQCB, and Corps	37.6
Tidal Waters	CCC, CDFW, RWQCB, and Corps	116.0
Wetland	CCC, CDFW, RWQCB, and Corps	464.6
<i>Subtotal Jurisdictional Waters of the U.S.</i>		<i>618.2</i>
Jurisdictional Waters of the State		
Tidal Inlet Bank	CCC, CDFW, and RWQCB	1.9
<i>Subtotal Jurisdictional Waters of the State Only</i>		<i>1.9</i>
Grand Total Jurisdictional Waters		620.1

¹ Jurisdictional waters of the U.S. include jurisdictional waters of the state and are under the purview of the Corps, RWQCB, and CDFW. Of the 618.2 acres of waters of the U.S., approximately 71.7 acres are non-RHA Section 10 waters (e.g., nontidal waters) and are regulated, at the federal level, under Section 404 of the CWA. Therefore, the remaining 546.5 acres of waters of the U.S. are regulated under both Section 10 and Section 404. See the Appendix G, Attachment B (Preliminary JD Form) for the location and area of each non-RHA Section 10 water of the U.S.

Rare, Threatened, or Endangered Species

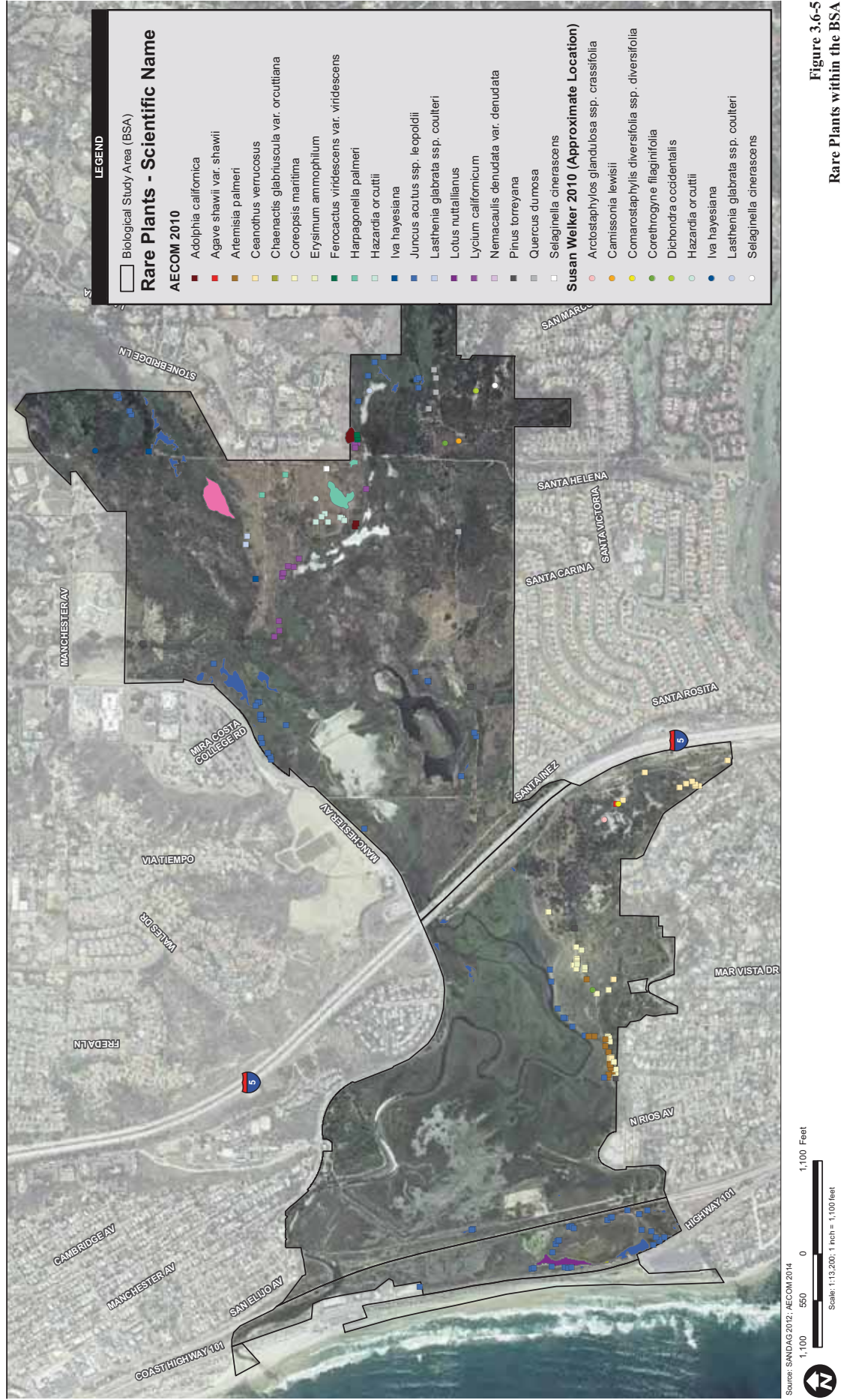
This section summarizes the sensitive flora (plants) and fauna (animals) known to occur, or with the potential to occur, within the BSA.

Flora

The BSA is biologically diverse with over 300 species of plants. As described in the BTR, 32 sensitive plant species (three federally listed) were determined to have some potential to occur in the BSA based on habitat conditions and regional location. Of these, 22 sensitive plant species were detected within the BSA during the 2010 botanical surveys. These 22 sensitive plant species and their locations are mapped in Figure 3.6-5 and identified below, organized by federally listed, state-listed, and nonlisted plant species. There is one federally listed plant species and one state-listed plant species; the remaining 20 are special-status, but not listed. Although discussed further in the BTR and impact section, it is important to note that no federally listed or state-listed rare, threatened, or endangered plant species occur within the areas proposed for restoration.

Federally Listed Plant Species

Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *Crassifolia*) was the only federally listed plant species found present within the BSA. Within San Diego County, this evergreen shrub is only found from Torrey Pines State Reserve north to Encinitas. Del Mar manzanita occurs in



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chaparral, often with chamise and wart-stemmed ceanothus (*Ceanothus verrucosus*) on eroding sandstone. Del Mar manzanita is found in the Diegan coastal sage scrub/chaparral community in the southern central portion of the BSA, just west of I-5.

State-listed Plant Species

Orcutt's goldenbush (*Hazardia orcuttii*) was the only state-listed plant species found present within the BSA. Orcutt's goldenbush is found from San Diego County south to Baja California, Mexico. Open chaparral with chamise and Diegan coastal sage scrub is the preferred habitat of this species (Reiser 2001). Approximately 25 Orcutt's goldenbush individuals are found in nonnative grassland Diegan coastal sage scrub in the eastern portion of the BSA.

Nonlisted Special-Status Plant Species

Under CEQA, special-status plant species are considered sensitive by the California Native Plant Society (CNPS) in Lists 1, 2, 3, or 4 (Appendix F). Of the 28 nonlisted sensitive plant species considered possible, 20 were found present within the BSA as shown in Figure 3.6-5. Nonlisted sensitive plant species detected on-site include spineshrub (*Adolphia californica*), San Diego sagewort (*Artemisia palmeri*), Lewis's evening-primrose (*Camissonia lewisii*), wart-stemmed ceanothus (*Ceanothus verrucosus*), Orcutt's pincushion (*Chaenactis glabriuscula* var. *orcuttiana*), summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*), sea dahlia (*Coreopsis maritima*), western dichondra (*Dichondra occidentalis*), coast wallflower (*Erysimum ammophilum*), coast barrel cactus (*Ferocactus viridescens* var. *viridescens*), Palmer's grapplinghook (*Harpagonella palmeri*), San Diego marsh-elder (*Iva hayesiana*), southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*), Coulter's goldfields (*Lasthenia glabrata* ssp. *Coulteri*), Nuttall's lotus (*Lotus nuttallianus*), California desert thorn (*Lycium californicum*), coast woolly-heads (*Nemacaulis denudata* var. *denudata*), Torrey pine (*Pinus torreyana* var. *torreyana*), Nuttall's scrub oak (*Quercus dumosa*), and mesa spike-moss (*Selaginella cinerascens*).

For detailed population information for nonlisted plant species, refer to the BTR (Appendix F).

Fauna

The BSA is biologically rich with over 20 species of fish, over 20 species of reptiles and amphibians, 24 species of mammals, and over 295 bird species (including 65 nesting), in addition to a complex suite of terrestrial and marine invertebrates. As discussed in the BTR, 94 special-status wildlife species have potential to occur within the BSA (CDFG 2011; BioBlitz 2009; Patton 2010; SELC 2011; MEC 2002). Of these 94 special-status species, seven federally listed and/or state-listed species and 13 rare nonlisted species were detected during studies and

are considered resident/breeding within the BSA. Location data that were available for special-status wildlife species detected in the BSA are shown in Figures 3.6-6 through 3.6-8. Detailed discussions of federally and state-listed special-status wildlife species detected during studies and considered resident/breeding within the BSA are provided below. Nonlisted special-status species with potential to occur, but considered migrants/nonbreeding season residents (no suitable breeding habitat is present on-site), are discussed only in Appendix F.

Federally Listed Species

The following six species listed as federally threatened or endangered were detected on-site during previous studies and are considered resident/breeding within the BSA:

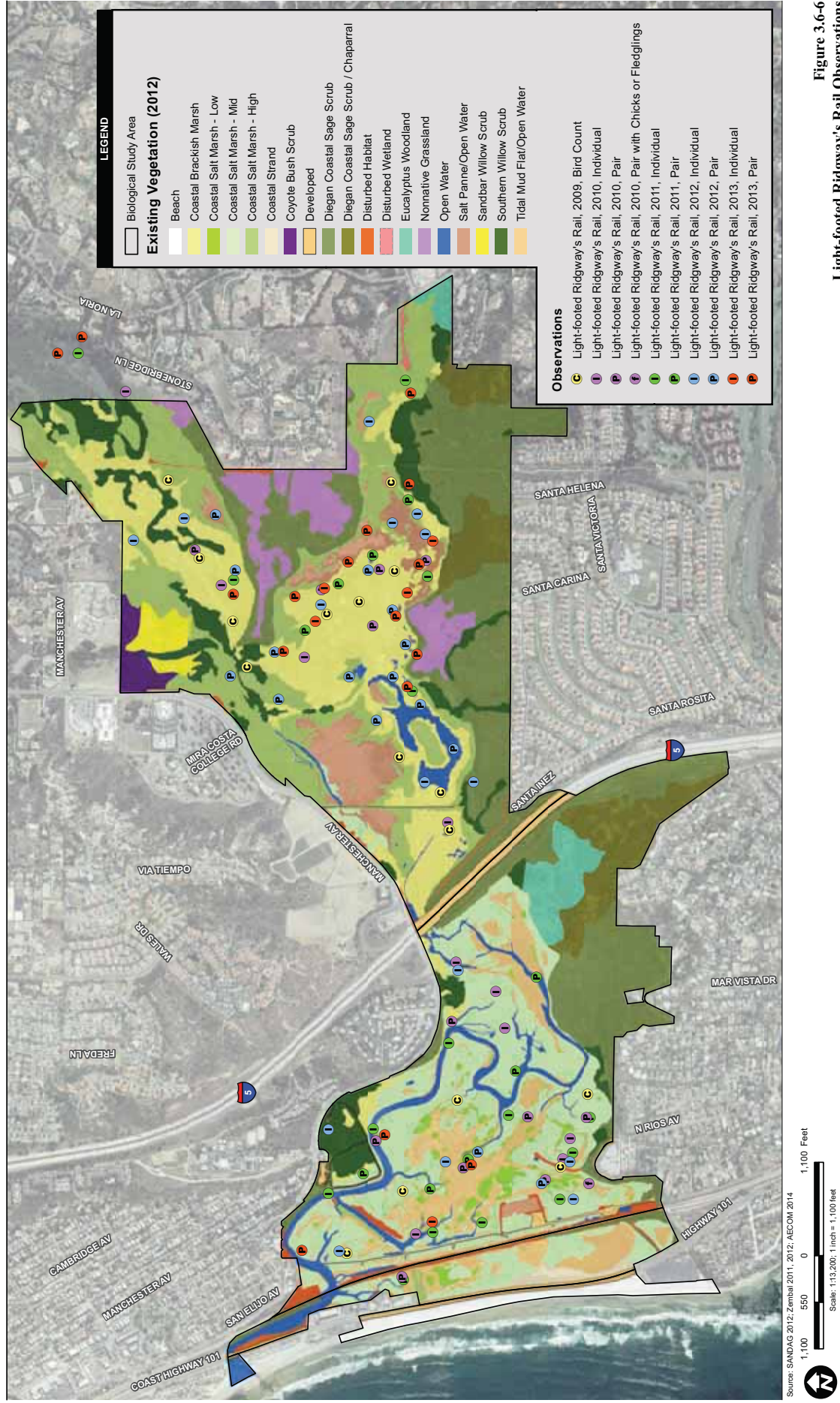
- light-footed Ridgway's rail (*Rallus obsoletus levipes*)
- western snowy plover (*Charadrius alexandrinus nivosus*)
- California least tern (*Sternula antillarum browni*)
- southwestern willow flycatcher (*Empidonax traillii extimus*)
- least Bell's vireo (*Vireo bellii pusillus*)
- coastal California gnatcatcher (*Poliopitila californica californica*)

Detailed information on the life history of these species is provided in Appendix F; a brief description of each species and their occurrence within the BSA is provided below.

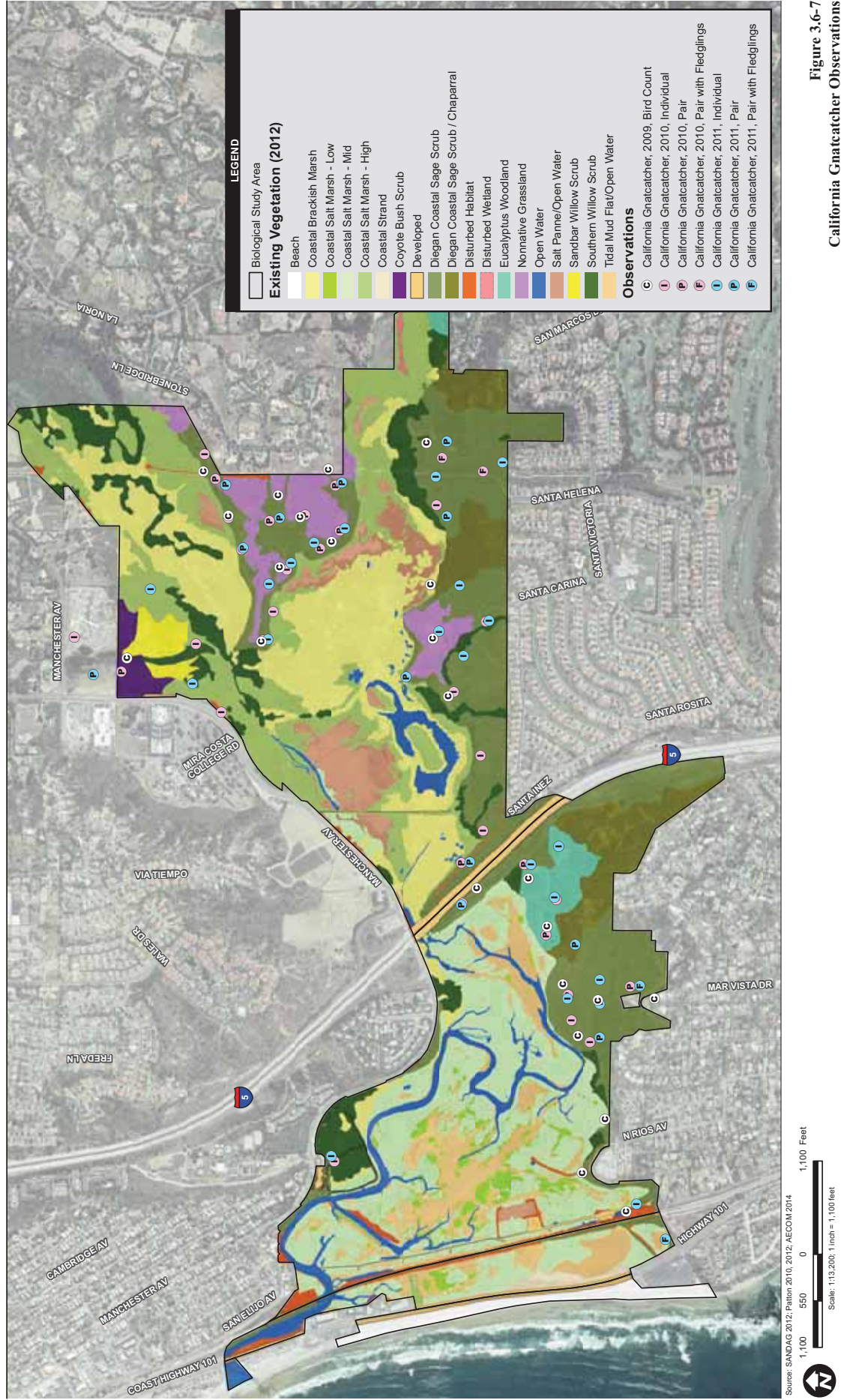
LIGHT-FOOTED RIDGWAY'S RAIL

The light-footed Ridgway's rail is federally and state listed as endangered. The species is restricted to coastal salt marshes in Southern California where vegetation is dominated by cordgrass (*Spartina foliosa*) and pickleweed (*Salicornia* sp.). It can also be found in brackish and freshwater marshes with cattails and bulrushes. Light-footed Ridgway's rail is a reclusive species and will nest and utilize relatively small patches of its preferred habitat when isolated from external anthropogenic disturbances (Zembal and Hoffman 2012).

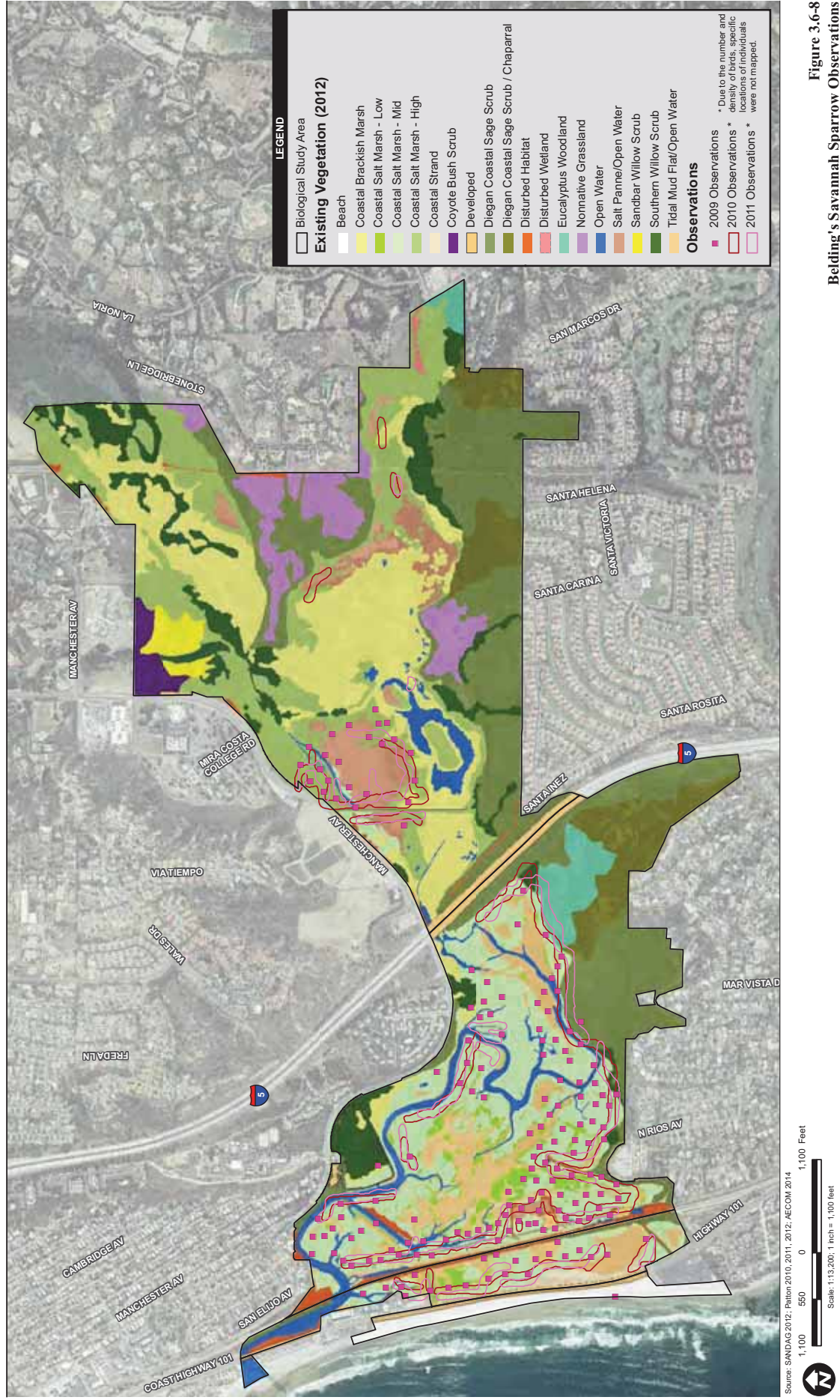
Within the BSA, the light-footed Ridgway's rail is a year-round resident at San Elijo Lagoon and can be heard calling in the evening, although it is rarely seen. Total number of breeding pairs in the lagoon has ranged from six to 31 over the past 5 years, with 15 breeding pairs recorded both in 2010 and 2011 (Zembal et al. 2011), 31 pairs detected in 2012, and 20 pairs recorded in 2013 (Zembal et. al 2013). Breeding territories are usually focused in brackish marsh adjacent to saltmarsh, flats, and channels in the central basin north of the end of North Rios Avenue and adjacent to the Nature Center, and in the east basin between the CDFW dike and I-5, east of the



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south end of the dike, north of Santa Carina Street, and along Escondido Creek west of the power lines. In 2013, two pairs were detected in the west and central basins, and the remaining 18 pairs were detected in the eastern basin within the brackish marsh. Further counts detected light-footed Ridgway's rail in 16 locations throughout the BSA (Figure 3.6-6).

WESTERN SNOWY PLOVER

The western snowy plover is listed as federally threatened and a species of special concern by the state. Western snowy plover occurs along the Pacific coast from southern Washington to Baja California. It is a common winter migrant, winter visitor, and a declining and local resident in San Diego County. It nests on undisturbed, flat areas with loose substrate, such as sandy beaches and dried mudflats along the California coast. Western snowy plovers forage primarily on the wet sand at the beach-surf interface, where they feed on small crustaceans, marine worms, insects, and amphipods.

Within the BSA, western snowy plovers are regularly spotted foraging and roosting within mudflats and on the beach. Up to 76 western snowy plover individuals were recorded within the lagoon and adjacent beach area on September 29, 2011 (Patton 2012a). Historically, plovers were recorded nesting within the BSA on the east basin islands and east basin dike. Postbreeding and wintering roosting flocks have been documented at Cardiff State Beach, which is adjacent to the BSA. Roost sites have varied but have included both sides of the mouth of the lagoon. No breeding has been recorded within the lagoon since 2002 (Patton 2010).

CALIFORNIA LEAST TERN

The California least tern is federally and state-listed as endangered. The species breeds from San Francisco Bay south to Baja California. In San Diego County, it is a fairly common summer resident from early April to the end of September (Unitt 2004). Wintering areas are thought to be along the Pacific coast of South America. The species historically nested colonially on beaches that are undisturbed, sparsely vegetated, flat areas with loose, sandy substrate. Few beach nesting areas remain and least terns are now found in varied habitats ranging from mudflats to airports. Adults roost primarily on the ground. They typically forage in areas with water less than 60 feet in depth and within 2 miles of roosting sites although they are considered opportunistic often shifting their behavior in response to local prey patterns (Atwood and Minsky 1983). The species nests in loose colonies in areas relatively free of human or predatory disturbance. Nests are on barren to sparsely vegetated sites near water, usually with a sandy or gravelly substrate.

Within the BSA, the least tern is a common migrant and has been observed foraging. Records indicate that this species historically had a breeding population within the BSA. They have

nested in colonies on salt panne, patches of sand on alluvial fans and channel edges, and on the two islands in the east basin north of Santa Carina Street that were constructed by CDFW and County Department of Public Works in 1981. Changes in inundation patterns and habitat quality may have had a negative effect on breeding success within the BSA. No breeding has been documented since 2002 (Patton 2010).

Least terns were observed in very limited numbers and only relatively late in the season in 2011. Two to three were reported on June 12 and five to seven on July 11 foraging throughout the lagoon and nearshore waters and roosting on mudflats in the lagoon. One fledgling was observed along the beach on July 22 and two adults on August 8. No nests were documented in 2011 and no on-ground tern activity was observed on the salt panne east of the CDFW weir or in other potential nesting areas (Wolf 2011).

SOUTHWESTERN WILLOW FLYCATCHER

The southwestern willow flycatcher, a subspecies of willow flycatcher (*Empidonax traillii*), is a federally endangered species (USFWS 1995). The southwestern willow flycatcher was federally listed as endangered in 1995 and state listed as endangered in 1990.

The southwestern willow flycatcher is a summer breeding resident in riparian habitats in southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and northwestern Mexico (USFWS 1995). In San Diego County, only two breeding populations are known to remain along the Santa Margarita River and the upper San Luis Rey River. The southwestern willow flycatcher is restricted to dense riparian woodlands of willow, cottonwood, and other deciduous shrubs and trees. In general, the riparian habitat of this species tends to be rare, isolated, small, and/or in linear patches, separated by vast expanses of arid lands.

Within the BSA, this species was observed in the riparian habitat near the Nature Center in the northwestern central basin in May and June of 2002, two in the same area on May 30, 2004, and one individual on June 3, 2007. An individual was also observed along a trail west of El Camino Real on June 11, 2007 (Patton 2010) and one individual was reported along the La Orilla Trail west of El Camino Real on May 15, 2010 (Patton 2012b).

LEAST BELL'S VIREO

The least Bell's vireo was federally listed as endangered in 1986 and state listed as endangered in 1980. Least Bell's vireo breeding season extends from March through September. During the breeding season, the least Bell's vireo is restricted to riparian woodland and riparian scrub. In

San Diego County, it occurs mainly in the coastal lowlands, rarely up to 3,000 feet elevation. Territory size ranges from 0.5 to 7.5 acres and there is evidence of high site fidelity among adults (Kus 2002). Early to midsuccessional riparian habitat is typically used for nesting by this species because it supports the dense shrub cover required for nest concealment as well as a structurally diverse canopy for foraging (Kus 2002).

Within the BSA, this species has been recorded within southern willow scrub habitat. Observations of this species within willow scrub near the Nature Center were documented in 2007 (Patton 2010). In addition, breeding pairs were detected upstream of the La Bajada bridge in 2009 (Bache 2009). In 2011, breeding pairs were recorded adjacent to Escondido Creek and Lux Canyon Drainage (Patton 2012b).

COASTAL CALIFORNIA GNATCATCHER

The coastal California gnatcatcher was listed as federally threatened in 1993 and is a state species of special concern. Habitat preferences in San Diego County consist of Diegan coastal sage scrub dominated by California sagebrush and flat-topped buckwheat, which are the primary plants used by coastal California gnatcatchers when foraging for insects (RECON 1987; ERCE 1990). The species inhabits coastal sage scrub vegetation below 2,500 feet elevation in Riverside County and generally below 1,000 feet elevation along the coastal slope in San Diego County; it generally avoids steep slopes above 25 percent and dense, tall vegetation for nesting.

Within the BSA, the coastal California gnatcatcher is known to occur within the coastal sage scrub located on the slopes of the BSA. In 2009, gnatcatchers were recorded from 23 locations from within the BSA (Patton 2010). In 2010, gnatcatchers were recorded from 35 locations in the central and east basins (Patton 2012b). In 2011, gnatcatchers were recorded from 35 locations within the BSA (Patton 2012b) (Figure 3.6-7).

State-Listed Species

Of the 94 special-status species with potential to occur within the BSA, five species were listed as state threatened or endangered, were detected during previous studies, and are considered resident/breeding within the BSA: California least tern, least Bell's vireo, light-footed Ridgway's rail, southwestern willow flycatcher, and Belding's savannah sparrow (*Passerculus sandwichensis beldingi*). The California least tern, least Bell's vireo, light-footed Ridgway's rail, and southwestern willow flycatcher are also federally listed and were discussed above. The Belding's savannah sparrow is discussed in detail below.