ENVIRONMENTAL ASSESSMENT

PALOS VERDES REEF RESTORATION PROJECT

February 22, 2017

LEAD AGENCY: USDC National Oceanic and Atmospheric Administration

LOCATION: Los Angeles County, California

ABSTRACT: The National Oceanic and Atmospheric Administration (NOAA) proposes to implement an offshore rocky-reef habitat restoration project in the vicinity of the City of Rancho Palos Verdes, Los Angeles County, California. The restored reef would compensate for effects of past wastewater discharges of DDTs and PCBs on fish habitats on the Palos Verdes Shelf. The reef restoration project would involve the placement of 70,300 tons of quarry rock on 40 acres of sandy ocean bottom within a 69-acre site located 0.3 miles offshore of the City of Rancho Palos Verdes in the vicinity of Bunker Point.

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ENVIRONMENTAL ASSESSMENT

PALOS VERDES REEF RESTORATION PROJECT
LOS ANGELES COUNTY, CALIFORNIA

CHAPTER 1 PROPOSED ACTION AND PURPOSE OF AND NEED FOR ACTION

1.1 Proposed Action

The National Oceanic and Atmospheric Administration (NOAA) proposes to create 69 acres of rocky-reef habitat on submerged lands located offshore of the City of Rancho Palos Verdes, California (Figure 1-1). This proposed action is referred to as the Palos Verdes Reef Restoration Project. The submerged lands to be used by the project are owned by the State of California and administered by the California State Lands Commission. The rocky-reef habitat will be created through the placement of 70,300 tons of quarried rock on 40 acres of sandy ocean bottom within a 69-acre project site. The quarry rock will be transported to the site via tugboat and barge from existing quarries on Catalina Island, Los Angeles County, California.

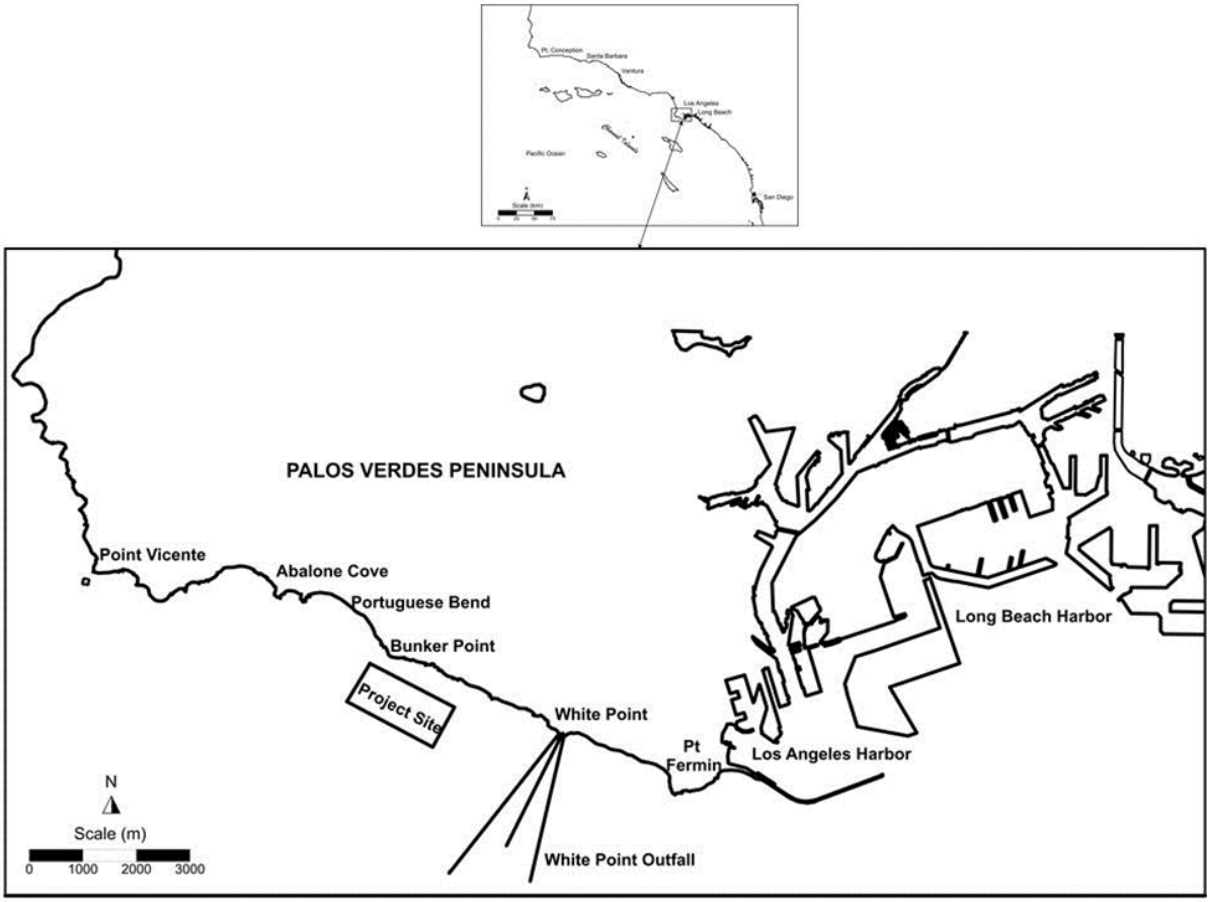

Figure 1-1. Location of proposed site for the Palos Verdes Reef Restoration Project, showing major landmarks in the area.

Two Catalina Island commercial quarries, Pebbly Beach Quarry and Empire Quarry, will supply the quarried rock. The individual rocks used for the project will range from approximately 0.25 to 3.0 tons each. The rock will be clean and free of contaminants per the California Department of Fish and Wildlife's (CDFW) material specification guidelines (Wilson et al., 1990), which include being durable in seawater and having a specific gravity greater than 2.2. Testing performed by an independent laboratory will assure the size, specific gravity, durability, purity, water absorption, and abrasion resistance of the quarry rock used for the project. Inspections of the quarried rock will be conducted to ensure conformance with the specification guidelines.

The two commercial quarries are located within 0.25 miles of Catalina Island loading docks and have direct marine access for the loading of quarried rock. Dump trucks will be used to carry the quarried rock from the excavation sites to the loading docks. The dump trucks will have an approximate capacity of 22 tons and therefore approximately 3,200 round-trips are expected between the excavation sites and the loading docks.

Cranes and front-end loaders will be used to load the quarry rock onto 2,000 ton capacity flat-deck supply barges. The supply barges will be towed by a tug boat, two at a time, approximately 30 miles to the project site. Since each trip will transport about 4,000 tons of quarry rock, a total of 18 trips from Catalina Island to the project site will be required to complete the project. The trip from Catalina Island to the project site is estimated to take approximately 3.5 hours, using an assumed average speed of 9.3 miles per hour.

Figure 1-2 shows a schematic of the construction method and equipment, including the derrick barge, the flat-deck supply barge, GPS markers, anchoring points, rock placement lines, and front-end track loader. A "push off" construction method using a front-end track loader will be used to place the quarry rock within the 69 acre project area. The front-end track loader will be lowered via crane from the derrick barge to the flat-deck supply barge so that boulders can be pushed over the side. The winch operator will maneuver the edge of the flat-deck supply barge to the required position (e.g., at the first line) by winching "in" or "out" on six anchor cables connected to their respective anchors. The derrick-barge winch operator will use a computer monitor displaying the triangulated data to assist in locating the edge of the supply barge at the exact line of deployment. Two differential GPS (DGPS) receivers will be mounted on the derrick barge to keep the barge accurately positioned as it moves along the lines. Positional accuracy of the DGPS system will be estimated at one to two feet, and the software acceptance limits will be set at six feet, meaning that the winch operator will hold position to within a tolerance of six feet. Appendix A contains the proposed anchoring plan.

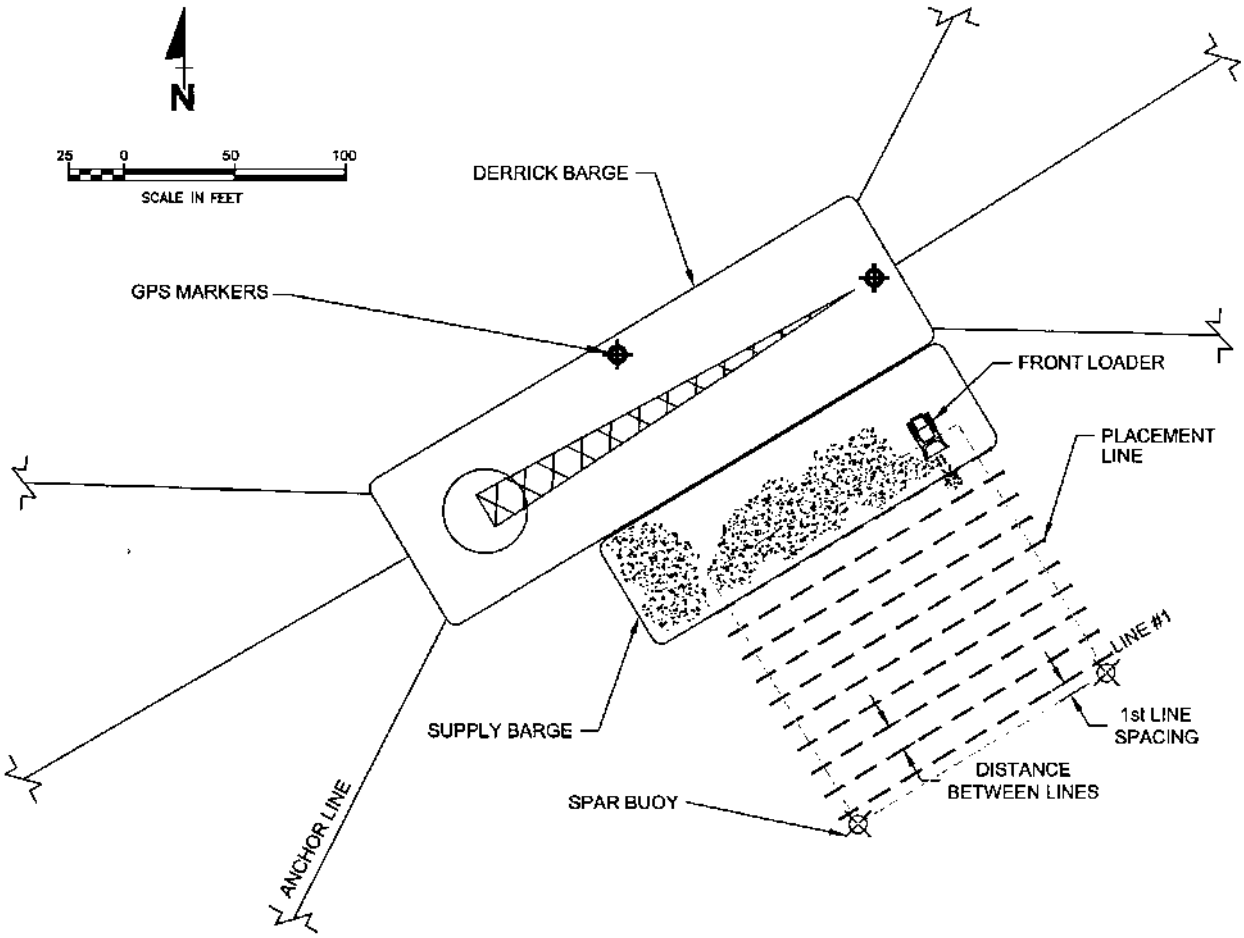

Figure 1-2. Construction method schematic showing derrick barge, supply barge, front-loader, rock placement lines, and six-anchor positioning.

The construction will be carried out by an eight person crew that includes a crane operator, foreman, crane oiler, deck engineer, barge-hand, loader operator, superintendent, and project manager. Appendix B contains the proposed oil spill contingency plan.

The construction activities are proposed to take place between May 1 and September 30 to avoid the lobster-fishing season and to utilize the calm weather conditions that are typical of this time of year in southern California. The pace of the construction is expected to be determined by the pace of quarrying, which is expected to produce about 1,725 tons of rock per day, and by the weather conditions at the project site. This calculates to a minimum of about 40 days of construction to place 70,300 tons of rock. In order to allow for delays caused by mechanical problems and adverse weather conditions, the construction period is estimated as a minimum of 40 days and a maximum of up to 60 days. The construction will be carried out during daylight hours six days a week (Monday through Saturday) except on holidays and during inclement weather (no construction will be performed if the wave height is larger than four feet). The onsite work will begin no earlier than 7:00 am and will be halted no later than 7:00 pm. The average work day placing quarry rock

at the project site is expected to be about ten hours. Eighteen tugboat and barge round trips to and from the quarry site and project site are expected and will include nighttime hours.

1.2 Purpose and Need

The purpose of the Palos Verdes Reef Restoration Project is to restore historic rocky reef habitat that was buried by sedimentation from nearby landslides, thereby providing essential fish habitat and substrate for kelp, other marine algae, and marine invertebrates, creating a productive rocky-reef ecosystem in an area with limited hard substrate. This reef restoration project will compensate for biological resource losses caused by contaminated sediments from the Palos Verdes Shelf Superfund Site as identified in the Montrose Settlements Restoration Program (MSRP) Phase 2 Restoration Plan. NOAA is the lead federal agency on the MSRP Trustee Council. The MSRP Trustee Council also includes the United States Fish and Wildlife Service (USFWS), National Park Service (NPS), California Department of Fish and Wildlife (CDFW), California State Parks (CSP) and California State Land Commission (CSLC).

CHAPTER 2 ALTERNATIVES TO THE PROPOSED ACTION

2.1 Introduction

The range of reasonable alternatives considered in this EA include four locations within the geographic area affected by White Point outfalls, four reef designs requiring different amounts of quarry rock and different construction periods, and the No Action Alternative. The geography of the area that would benefit from restoration is relatively confined and this was an important factor in identifying a range of reasonable alternatives. In fact, there were no reasonable alternatives identified by NOAA that were eliminated from further consideration in this EA. NOAA's preferred alternative is the placement of 70,300 tons of quarry rock on 40 acres of submerged lands in shallower depths within the West Area. The screening criteria used in selecting the agency's preferred alternative are described in the following.

2.2 Screening Criteria

The several alternatives were evaluated individually and screened in considering the Purpose and Need of the proposed action and the relative environmental benefits and adverse effects of each alternative. The limits on available funding and the geography of the area historically impacted by wastewater discharges and sedimentation were important factors in identifying the range of reasonable alternatives. The water depths suitable for kelp forest delineated a zone parallel to the coastline where ecosystem restoration could be considered. No alternative that could reasonably achieve the Purpose and Need was eliminated from consideration in this EA. The screening criteria used in this evaluation focused on achieving the greatest environmental benefits in terms of extent, numbers, and diversity of restored organisms, while minimizing the potential adverse effects on other environmental resources, as follows.

- Proximate to White Point outfalls
- Scale of construction consistent with available funding
- Degraded habitat that would benefit from restoration
- Suitable depths for kelp forest establishment
- Absent or minimal fine-grained bottom sediments
- Low turbidity to assure quarry rock resists burial
- Other conditions favoring diverse ecosystem restoration
- Low potential for adverse effects on range of environmental resources

2.3 Location Alternatives

2.3.1 Introduction

Four locations were considered for the proposed action, including areas referred to as the West and East Areas, and then two different depths within the West Area. The shallower location within the West Area was selected as the preferred location for the proposed action. Each alternate location is briefly described in the following.

2.3.2 West and East Areas

Two different general locations were considered for the proposed reef, one referred to as the West Area, which was selected as the location for the proposed action, and the other referred to as the East Area (Figure 2-1). These locations were considered reasonable alternatives because they are on opposite sides of the White Point Outfalls, sufficiently far away to not affect the integrity of the outfalls during construction, and both possess the general physical characteristics necessary for reef and reef-related resource restoration.

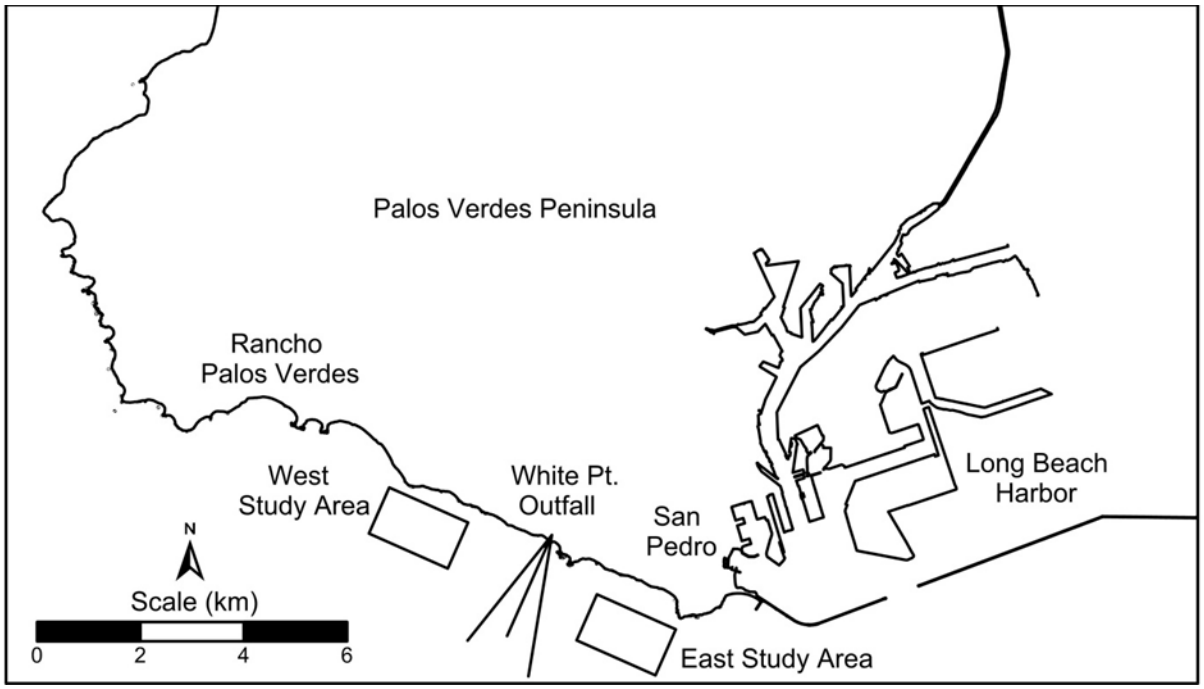

Figure 2-1. East and West location alternatives for the proposed Palos Verdes Reef Restoration Project.

The West Area and East Area are physically similar in terms of the potential for restoration. However, the West Area was selected for the proposed action because the fine-grained bottom sediments are thinner within the depths most suitable for reef construction. The relative absence of fine-grain sediments means the quarry rock would be less likely to sink into or otherwise be covered by sediments. The quarry rock needs to remain uncovered to allow kelp to become established and to survive over time.

There are minor differences between the West Area and East Area in considering the effects of the proposed action on environmental resources. The East Area project site is approximately one mile closer to the Port of Los Angeles and therefore somewhat more accessible in terms of crew and equipment travel time. The shorter travel distance would conserve a small amount of fuel and labor resources, and avoid a small amount of air emissions. The distance to/from the Catalina Island quarries would be the same for both project sites, and the related air emissions would take place within the South Coast Air Basin (SCAB) for either site. The East Area is located offshore of the City of San Pedro, the coastal zone which, like the City of Rancho Palos Verdes, is occupied by residences and open space recreation areas. The beaches and coastal zone adjacent to both sites are used for recreation by residents and visitors, with the beaches being somewhat more accessible in the City of San Pedro. For this reason, concerns over visual and noise effects on residents and visitors are slightly less in the West Area.

These differences in effects between the West Area and East Area are considered minor and offsetting. The East Area's small fuel/labor/emissions advantage in access to the Port of Los Angeles are considered offset by a somewhat more accessible beach area and potential exposure of greater numbers of people to construction-related visual and noise effects. In assessing the minor trade-offs, the greater likelihood of restoration success and of satisfying the purpose of and need for the proposed action are considered compelling reasons to select the West Area for project implementation.

2.3.3 West Area Depth Alternatives

Two locations within the West Area were considered for the proposed action, on either side of a linear outcrop of hard substrate that approximately parallels the shoreline. Both alternatives would involve placing quarry rock on 40 acres within a 69-acre project site. Both alternatives would be built out as 40 acres total of low relief (about 3.2 feet or 1 m) rocky-reef habitat and high relief rocky-reef habitat with heights varying between 2m and 4m (about 6 to 12 ft). Each depth alternative is briefly discussed in the following.

2.3.3.1 Shallower Location – 49 to 68 feet deep (15 – 21 m)

The 69-acre restoration project site in this location would have an elongated footprint about 600 feet (183 m) wide and extending about 1.2 miles (1.9 km) approximately parallel to the shoreline (Figure 2-2). The reef would be constructed in relatively shallow water depths (49 to 68 feet or 15 to 21 m) shoreward of an existing linear outcrop of hard substrate that approximately parallels the shoreline, and adjacent to existing nearshore kelp beds. This 69-acre area includes a patchwork of hard substrate between the more extensive sandy-bottom areas where the quarry rock would be

placed. The sediment depths in the sandy-bottom areas are relatively shallow, 80 percent of the area surveyed has sediment depths less than 3.2 feet (1 m) thick.

This location was selected for the proposed action for several reasons. Higher densities of important fish species are found at these depths on comparable natural reefs. Kelp recruitment in the constructed rocky-reef habitat would be facilitated by the proximity of the existing kelp beds. The constructed reef would also effectively expand the footprint of the existing kelp beds instead of creating a reef island, and thereby have synergistic benefits. In addition, the shallower sediment depths in this area (less than 3.2 feet or 1 m) favor rocky-reef habitat creation because the quarry rock will be less likely to sink into and be buried by sediment. The presence of a patchwork of existing hard substrate would facilitate kelp recruitment over the entire 69-acre site. For these reasons, this location is considered to have the highest potential for restoration benefits and success.

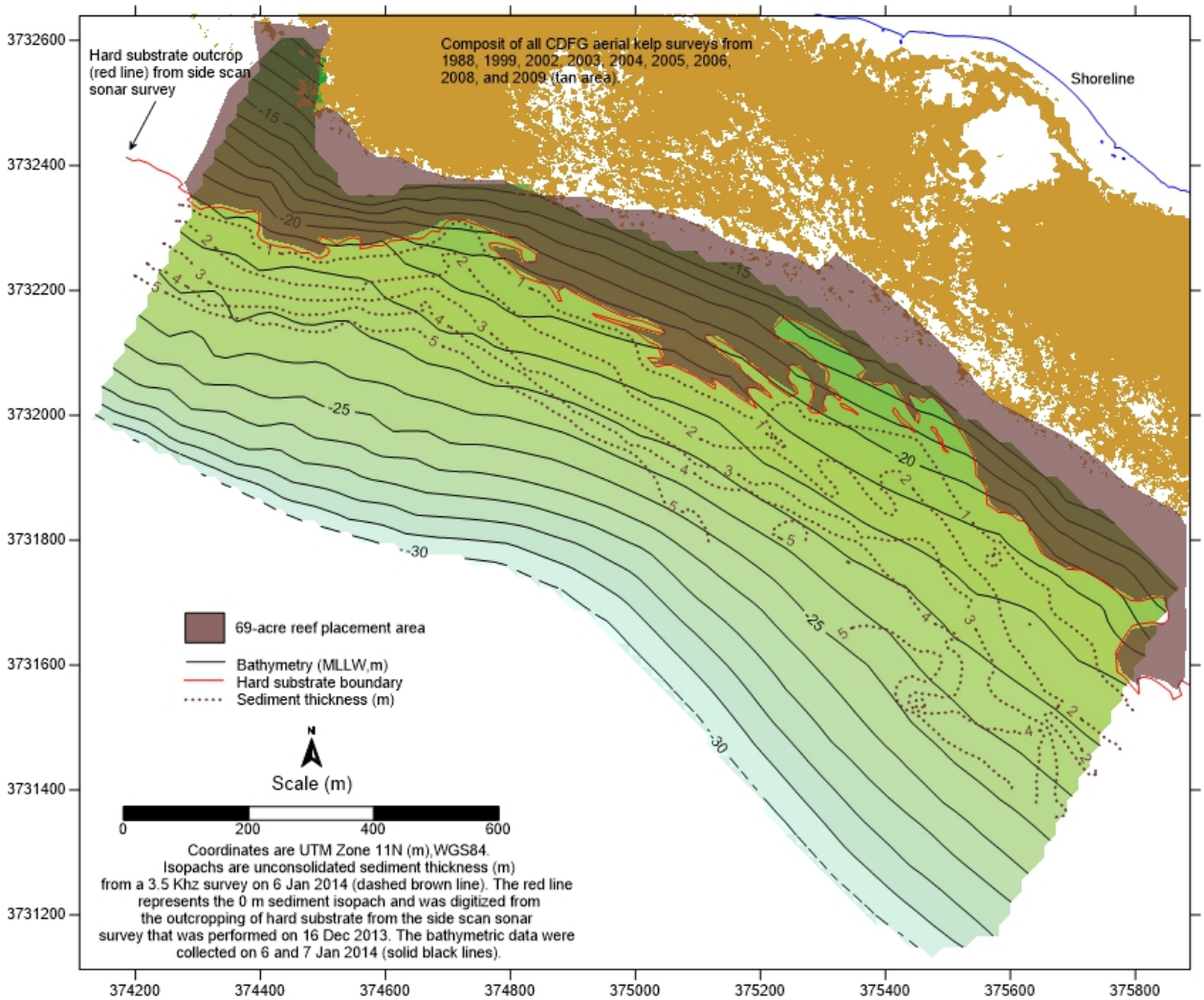

Figure 2-2. Relatively shallow area between the line of hard substrate (red line) and the kelp canopy at the West Area selected for reef construction.

2.3.3.2 Deeper Location – 65 to 82 feet deep (20 - 25 m)

A 69-acre restoration project site in this location would have an elongated footprint about 600 feet (183 m) wide and extending about 1.2 miles (1.9 km) approximately parallel to the shoreline. The reef would be constructed in relatively deep water depths (65 to 82 feet or 20 to 25 m) seaward of an existing linear outcrop of hard substrate that approximately parallels the shoreline. The restoration area would be located about 0.5 to 0.6 miles (0.8 to 1.0 km) offshore. This 69-acre area is almost exclusively sandy-bottom habitat, with a relatively thick cover of sediments, 3.2 to 17 feet (1 to 5 m) thick.

This alternative site is considered to have less potential for restoration benefits and success than the shallower water location described above. Kelp recruitment would be less likely because of the reduced light conditions in deeper water and distance from the existing nearshore kelp beds. The quarry rock would also be more likely to sink into and be covered by the existing, thicker bottom sediments. Furthermore, greater turbidity in this area due to the proximity of the Port of Los Angeles and the Los Angeles River might also inhibit the establishment of kelp. The resulting rocky-reef habitat in this location would function as a reef island and have fewer synergistic benefits than would occur in the shallower alternate location. Under this alternative, the productivity of the reef may be greatly reduced.

These two locations would have minor differences with respect to environmental effects. There would be virtually identical fuel/labor/emissions effects in the two locations. The shallower location would be slightly closer to the shoreline and therefore expose residents and visitors to slightly more proximate construction-related visual effects and noise. The shallower water location contains more hard-bottom habitat, and therefore, there is the potential for greater effects upon existing bottom-dwelling organisms than in the deeper water location. On the other hand, the proposed action includes measures to avoid or minimize effects to hard-bottom habitat. Furthermore, the hard-bottom habitat is relatively degraded and restoring ecological diversity in this habitat by creating adjacent rocky-reef habitat is a purpose of and need for the proposed action. Given the thinner bottom sediments and more favorable lighting conditions for kelp, the likelihood of restoration success is much higher in the shallower location. Therefore, in assessing the minor trade-offs, the greater likelihood of restoration success and of satisfying the purpose of and need for the proposed action are considered compelling reasons to select the shallower location for project implementation.

2.4 Design Alternatives

Four design alternatives were considered in developing the proposed action, which varied in the amount of quarry rock to be placed in the project site from 64,200 to 70,300 tons. The highest amount of quarry rock, 70,300 tons, was selected for the proposed action because it is believed this density of quarry rock placement would result in optimum resource enhancement and thereby best achieve the project purpose and need. The smaller footprint alternatives, 69,300, 69,200 and 64,200 tons, would proportionately reduce the environmental effects of the proposed action. These design alternatives, which vary by up to 6,100 tons of quarry rock, are scaled to a critical mass level that helps assure restoration will be successful and substantial. The variability in the amount

of rock to be used reflects four different configurations, including variations in vertical relief to promote the restoration of different species mixes and abundances. The selected amount, 70,300 tons, would be used to create a rocky-reef habitat structure that would be the most abundant and ecologically diverse.

In assessing the environmental effects, these design alternatives affect the total numbers of round trips between the quarries on Catalina Island and also the duration of the construction period. The reductions from 70,300 tons to either 69,300 or 69,200 tons would amount to small reductions in construction time of 1.4 and 1.6 percent respectively, or perhaps one day or less. The number of round trips to/from Catalina Island would likely not be affected because the reduction would be less than 2,000 tons. Under the assumed construction parameters, the last trip to the project site would be a half load of 1,000 tons, and about one half day of construction would be avoided.

The reduction from 70,300 tons to 64,200 tons would amount to a 6,100 ton or 8.7 percent reduction in the amount of rock to be transported to and placed within the project site. This would reduce the numbers of round trips to/from Catalina Island by about three, from 18 to 15 trips. Using the assumed construction parameters, this would reduce the required construction time from 60 days to 55 days, a reduction of five days. Therefore, this alternative would reduce emissions, fuel consumption, labor expenditures, visual effects, and noise effects by about 8.7 percent.

Selecting the smaller footprint alternatives would mean that fewer resources would be committed including quarry rock, fuel, and labor. There would be less air emissions, the time required for construction would be reduced and minor effects relating to biological resources, air quality, visual aesthetics, and noise would be slightly reduced. However, the result of implementing a smaller footprint design would be a less abundant and less ecologically diverse biological community. For this reason, the 70,300 ton design alternative is considered to best meet the purpose of the proposed action and to best satisfy the need for the project. In addition, as discussed further in this EA, several measures are available and being considered that would help reduce the identified minor effects associated with the 70,300 ton design alternative.

2.5 No Action Alternative

Under the No Action Alternative, NOAA would not implement the Palos Verdes Reef Restoration Project. Quarry rock would not be transported to the proposed project site and would not be placed on the project site in order to enhance environmental resources and compensate for the negative effects of past discharges of DDTs and PCBs. There would be savings of quarry rock, construction-related fuel would be conserved, air emissions would not occur, and no project-related construction equipment would be visible during the period May 1 to September 30. Minor effects on biological resources, air quality, visual aesthetics, and noise would be avoided. At the same time, however, the resource enhancement objectives of the proposed action would not be achieved. As such, the No Action Alternative would not address the purpose of and need for the proposed action.

CHAPTER 3 NEPA REQUIREMENTS, SCOPE OF ANALYSIS, AND PUBLIC INVOLVEMENT

This National Environmental Policy Act (NEPA) Environmental Assessment (EA) evaluates the environmental effects of restoring rocky-reef habitat through the placement of 70,300 tons of quarry rock on 69 acres of submerged lands offshore of the City of Rancho Palos Verdes, Los Angeles County, California. In developing the proposed action and this EA, NOAA consulted with a number of agencies and interested parties in the vicinity of the project area, as follows.

- U.S. Army Corps of Engineers
- California Coastal Commission
- California Department of Fish and Wildlife
- California State Lands Commission
- City of Rancho Palos Verdes
- Regional Water Quality Control Board – Los Angeles Region
- South Coast Air Quality Management District
- The Bay Foundation
- Santa Monica Bay Restoration Commission
- Los Angeles County Sanitation District

NOAA has prepared this EA to assist in determining whether the direct, indirect, and cumulative impacts of the proposed rocky-reef habitat restoration project are likely to result in significant impacts to the human environment. The EA also contains information and analyses designed to help assure compliance with the California Environmental Quality Act (CEQA), pursuant to Section 15221 of the CEQA Guidelines.

NOAA understands that the State of California has several discretionary decisions to make in connection with the proposed action, and that CEQA compliance is required for this decision-making. The California State Lands Commission (CSLC) will be making a discretionary decision on whether to approve a lease for the 69 acres of submerged lands to be used for the project, and is the Lead Agency for CEQA. NOAA consulted with the CSLC in preparing this EA and has included the additional information and analyses identified in Guidelines Section 15221 as necessary for CEQA compliance. Appendix C contains the Initial Study and Environmental Checklist prepared by CSLC for this proposed project.

NOAA Administrative Order 216-6 (NAO 216-6) established agency procedures for complying with NEPA and the implementing regulations issued by the President's Council on Environmental Quality (CEQ). Consistent with the intent of NEPA and the direction in NAO 216-6 to involve the public in NEPA decision-making, NOAA is circulating this EA and requesting public and agency comments on the contents of this EA. Comments received will be considered by NOAA in making a final determination on this proposed action.

(3/1/2018 UPDATE TO ENVIRONMENTAL ASSESSMENT - OUTCOME OF PUBLIC INVOLVEMENT)

Throughout the Natural Resource Damage Assessment (NRDA) process, and in accordance with NEPA and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations, the Trustees have made information available to the public. Two public meetings were held for the PVSRRP (March 2, 2017 and October 11, 2017). In addition, the Draft EA was made available for public comment through a 30-day posting on the NOAA Damage Assessment, Remediation, and Restoration Program's Montrose case webpage. Several comments on the PVSRRP were submitted by the public. These comments are addressed in the Responses to Public Comments section (Appendix D) of the Final EA. The comments received from the public did not result in any substantive changes to the project or the Final EA.

CHAPTER 4 APPLICABLE LAWS, FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

4.1 Introduction

Other federal agencies that have environmental review or permitting responsibility for this project include:

- U.S. Army Corps of Engineers (USACE)
- U.S. Environmental Protection Agency (EPA)
- U.S. Fish and Wildlife Service (USFWS)
- National Marine Fisheries Service (NMFS)
- National Ocean Service (NOS)
- U.S. Coast Guard (USCG)

The jurisdictional authority and other applicable requirements and policies for the placement of artificial reefs are as follows.

- National Environmental Policy Act
- Rivers and Harbors Act
- Clean Water Act
- Coastal Zone Management Act
- Endangered Species Act
- Marine Mammal Protection Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Fish and Wildlife Coordination Act

4.2 National Environmental Policy Act

NEPA's Environmental Impact Statement (EIS) requirement is applicable to all "major" federal actions with the potential to significantly affect the quality of the human environment. Major federal actions include activities that are fully or partially funded, regulated, conducted, or approved by a federal agency. NOAA prepared this EA to assist in determining whether an EIS is necessary for the proposed action.

4.3 Rivers and Harbors Act

Under Section 10 of the Rivers and Harbors Act, any construction affecting navigable waters, including filling, requires a permit from the US Army Corps of Engineers.

4.4 Clean Water Act

The purpose of the Clean Water Act (CWA) is to "Restore and maintain the chemical, physical, and biological integrity of the nation's waters through prevention and elimination of pollution." This act is applicable to any discharge of a pollutant into waters of the United States. Under Section 404 of the Clean Water Act, a permit is required by the US Army Corps of Engineers to regulate the discharge of dredged or fill material into waters of the United States. This project will require CWA authorization.

4.5 Coastal Zone Management Act

The purpose of the Coastal Zone Management Act is to" Preserve, protect, develop, and where possible, restore and enhance resources of the coastal zone." This act is applicable for all federal development activities and development requiring federal permits or funding affecting land or water areas or resources within the coastal zone. Section 307 of the act (16 U.S.C. § 1456), requires that federal agencies proposing activities, including artificial reefs, conduct activities in a manner consistent to the policies of a state's federally approved coastal management program. The Trustee's consistency determination and Coastal Development Permit Application have been submitted to the California Coastal Commission.

4.6 Endangered Species Act

Under the Endangered Species Act (16 U.S.C. §1531-1543), the conservation of endangered and threatened species and the ecosystems they depend upon are mandated. Section 7 of the Act requires federal agencies to insure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or their critical habitats. Potential adverse impacts from this project to federally-listed species are not anticipated (see Sections 5.3.4, 6.1.3 and 6.1.4), but the lead federal action agency will still need to confirm this. If the lead federal action agency determines its proposed action may have an adverse impact on federally-listed species, a biological assessment will be prepared and a Section 7 consultation must be completed. A consultation's effects analysis would consider project materials, possible exposure to contaminants, or physical/mechanical characteristics that may affect listed species.

4.7 Marine Mammal Protection Act

Under the Marine Mammal Protection Act (16 U.S.C. §1361-1421h), the federal responsibility to conserve marine mammals is established. This Act allows for incidental harassment authorizations of marine mammals as long as there is no mortality or serious injuries to marine mammals under the utilization of mitigation measures. The lead federal action agency has determined that the proposed action will have no impact on marine mammals. This is discussed in section 6.1.3.1.

4.8 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act, National Marine Fisheries Service (NMFS) has the responsibility to rebuild, restore, and maintain fishery resources in exclusive economic zones (EEZ). Under this act, NMFS must develop guidelines on essential fish habitat. Artificial reefs may be designated as essential fish habitat. Ongoing consultation with NMFS combined with established best management practice (Section 6.1.2) will minimize adverse impacts to designated Essential Fish Habitat (EFH). The project area contains EFH for for a variety of fish species that are managed under Coastal Pelagic Species (CPS), Groundfish, and Highly Mighly Migratory Species management plans (see Section 5.3), including two Habitats Areas of Particular Concern (HAPC), rocky reef and canopy kelp. Potential adverse impacts may be associated with the anchors and anchoring systems (Section 6.1.2), which would be ameliorated by predeterming anchoring sites on sandy areas in the mapped reef habitat, and only allowing operation under acceptable swell and wind conditions. Adhering to this will minimize this potential impact as much as possible, and we do not expect any adverse impacts to the site.

4.9 Fish and Wildlife Coordination Act

Under the Fish and Wildlife Coordination Act (16 U.S.C. §§661-666c), fish must receive equal consideration with respect to other aspects of water resource development. This is achieved by consulting with the USFWS, NMFS, and appropriate state agencies, whenever a body of water is proposed to be modified in a way that a federal permit or license is required. These agencies determine: 1) the possible harm to fish and wildlife resources; 2) the measures needed to both prevent the damage to and loss of these resources; and 3) the measures needed to develop and improve the resources, in connection with water resource development. This project is anticipated to improve resources for fish and we do not anticipate detectable or significant impacts during construction. Ongoing consultation with USFWS and NMFS will insure no adverse impacts occur to fish during this project.

CHAPTER 5 AFFECTED ENVIRONMENT

5.1 Introduction

The scope of this EA is based on field data collection and analysis, research of the environmental records of similar southern California reef restoration projects, consultation with affected agencies and known interested parties, a review of the Council on Environmental Quality (CEQ) Guidelines and State of California Environmental Quality Act (CEQA) Guidelines, and coordination with the CSLC in their preparation of a CEQA Initial Study (IS) and Environmental Checklist (Appendix C). Effects on biological resources, air quality, land use, recreation, aesthetics, and noise were determined to be areas of potential concern and will be discussed at some length. Several other potential effects were considered, addressed, and then eliminated from further detailed analysis. A general description of the physical environment of the project site is provided first, followed by individual descriptions of the several components of the affected environment.

5.2 Physical Environment of the Project Site

5.2.1 Geophysical Survey

A geophysical survey was undertaken in order to provide data to assess the suitability of reef construction within the West and East Areas, the two location alternatives. This survey included acquisition of bathymetry, shallow sub-bottom profiling, and side-scan sonar data. These data sets allowed for the definition of suitable areas for reef placement based on appropriate depths of 39 to 98 feet (12-30 m), preferred shallow sediment thickness of less than 3.2 feet (1 m), and the distribution of outcroppings of hard substrate. Surveys were performed from the seaward edge of the existing nearshore kelp beds out to the 98 foot (30 m) isobaths. The side-scan survey was used to map the distribution and roughness of various seafloor substrate types. Sub-bottom profiling was performed to determine the thickness of areas covered by unconsolidated sediments. Bathymetric surveys were performed to determine the water depths and bathymetrical features within the surveyed areas (Figures 5-1 and 5-2).

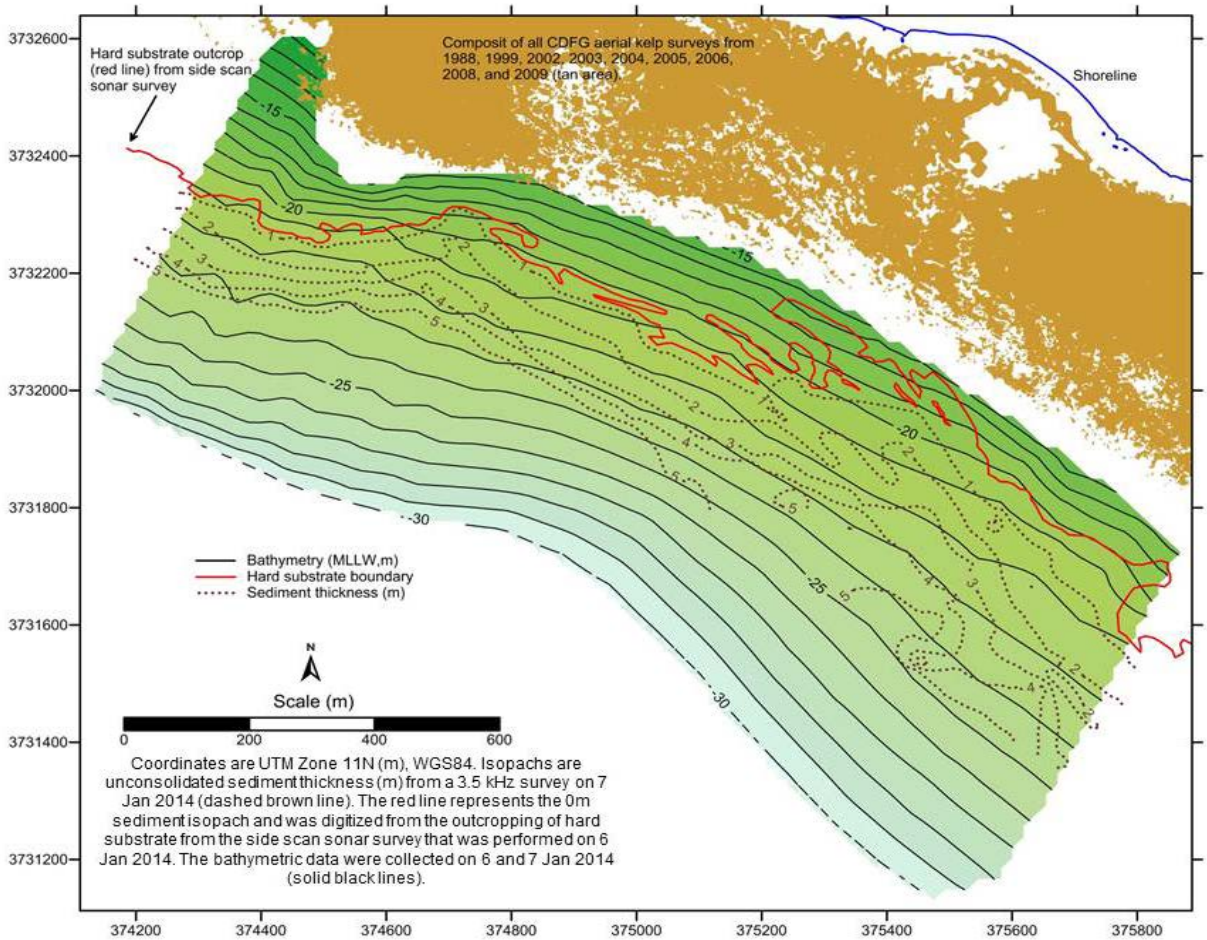

Figure 5-1. Composite of the West Area isobaths, showing the offshore boundary of hard substrate, isopach of sediment thickness, and kelp canopy distribution.

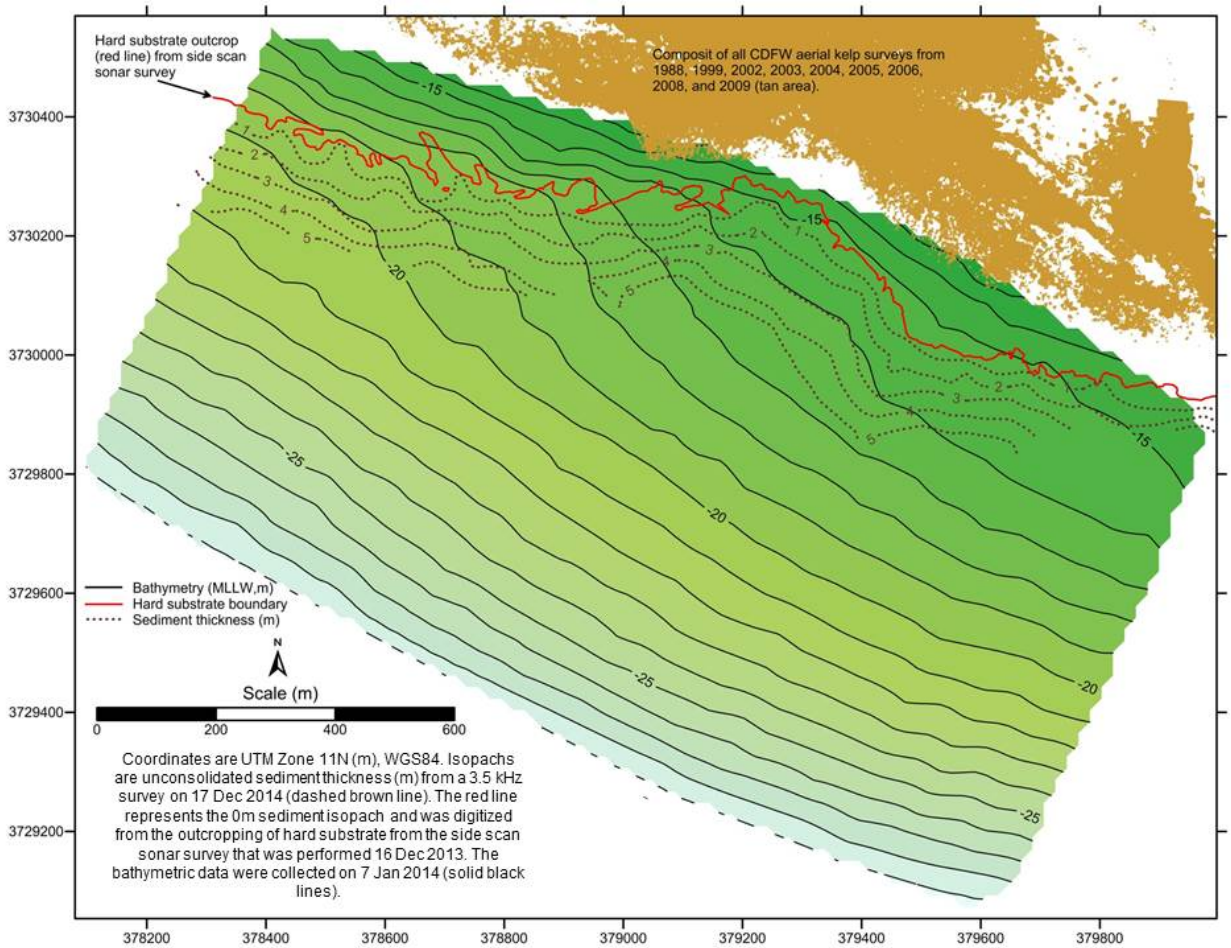

Figure 5-2. Composite of the East Area isobaths, showing the offshore boundary of hard substrate, isopach of sediment thickness, and kelp canopy distribution.

5.2.2 Diver-Based Inspections

Diver-based ground-truthing was performed in March-April 2014 by the Vantuna Research Group in the East and West Areas between the line of hard substrate and the kelp canopy in an effort to determine the suitability of this region for reef placement. Sixteen 650-foot long transects were evaluated in all, eight at each site. The collected data included: 1) video documentation; 2) sediment cores; 3) sediment depth readings via jet probes; and 4) estimations of percent hard substrate at transect points. Video documentation taken during this survey showed that this region contains a mixture of mostly sandy-bottom and some low-relief hard substrate. Sediment confirmed the predominance of sandsized sediments. Jet probes showed that sand cover thickness is somewhat less in the West Area than in the East Area. In the West Area, 80 percent of the sand areas were determined to have sediment depths less than 3.2 feet (1 m), versus 71 percent in the East Area.

5.2.3 Light Attenuation

Light attenuation studies performed by the Los Angeles County Sanitation District (LACSD) along the Palos Verdes Shelf have shown average ranges of 82-88 percent light transmittance in the 3.2 to 328 feet (1-100 m) depth range (EPA, 2007). At the Bunker Point station (near the West Area), the percent of surface light reaching the bottom, up to 65 foot (20 m) depths, ranged from two to 66 percent (Pondella et al., 2012a). According to Luning (1981), the lower depth limit of light irradiance for giant kelp is one percent that of the water's surface (*In:* Foster and Schiel, 1985). This indicates that the Bunker Point area has sufficient light up to 65 foot (20 m) depths to support the growth of giant kelp. Additionally, the CDFG (2009) has stated that the LACSD studies showed that the euphotic zone in this area reached up to 59 feet (18 m), which indicates that sufficient light is reaching depths that can sustain kelp growth.

5.3 Biological Resources

5.3.1 Introduction

The proposed action would involve the placement of quarry rock in a 69-acre area that consists of about 60 acres (87 percent) of subtidal sandy, soft-bottom habitat, and about 9 acres (13 percent) subtidal rocky, hard substrate habitat. Each of these habitats is described in the following.

5.3.2 Soft-Bottom Habitat

Soft bottom habitats consist of sand or sand interspersed between boulders, rocks, and cobbles. The most common type of marine species found in the subtidal sand-bottom habitat are bottom-feeding (benthic) fish and infaunal and epifaunal invertebrates (EPA, 2003; Allen et al., 2011). This habitat also contains plankton suspended in the water column as well as some algal species.

Because of their low productivity, subtidal sand-bottom communities are often considered to be less important than more productive rocky reef environments, which promote increased species richness and biological productivity. Subtidal sand-bottom environments provide habitat for sanddollars (*Dendraster* spp.), sand stars (*Astropecten* spp. & *Luidia* spp.), sea pens (*Stylatula* spp.), as well as many species of polychaetes, crustaceans, gastropods, rays, and flat fishes. Subtidal sand-bottom environments are also economically important to nearshore fisheries, which trawl for white croaker, and various flatfish.

5.3.3 Hard-Bottom Habitat

About 13 percent of the project site (about nine acres) consists of hard substrate and is characterized by a degraded hard-bottom community. Video documentation taken in March and April 2014 at the project site showed that giant kelp was absent in the area between the line of hard substrate and the existing kelp canopy. Gorgonians, algae, and sea urchins were seen in the areas with hard substrate. The surveys determined that marginally suitable habitat exists for a federally Endangered species, white abalone (*Haliotis sorenseni*) and two NMFS Species of Concern, pink abalone (*Haliotis corrugata)*, and pinto abalone (*Haliotis kamtschatkana)*, but none occurs within the project site.

5.3.4 Rare, Threatened, or Endangered Species

Information on the biological resources within the proposed project site was collected by Cooperative Research and Assessment of Nearshore Ecosystems program (CRANE), a statewide research program that provides a long-term collaborative research study of the nearshore rocky reefs in Santa Monica Bay and the Southern California Bight. A list of species identified and their abundance are presented in Tables 5-1 to 5-3. These data were analyzed to determine the potential occurrence of rare, threatened, or endangered species of plants and animals at the project site and within a one-mile radius of the project site.

A review of the State of California state and federally endangered and threatened animals and plant database (http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/) did not indicate that any animals or plants observed during the CRANE surveys were listed as State or federally endangered species. No plants were observed at all. The special status species that could potentially occur in the region of the project site are provided in Table 5.4, which lists each species and its status. After intensive surveys we have determined that none of these species occur in the study site. In addition, *Caulerpa* sp., a known problematic invasive algae also is not present in the study site.

Table 5-1. Algal densities in the inner, middle, and outer reef in the vicinity of the project site based on CRANE surveys.

Species	**Inner Reef[1]**	**Middle Reef[2]**	**Outer Reef[3]**
	Density/100m^2	Density/100m^2	Density/100m^2
Cystoseira osmundacea	35.3	33.8	12.5
Egregia menziesii	32.3	0.0	0.2
Laminaria farlowii	0.3	9.3	26.7
Macrocystis pyrifera	26.2	15.0	12.8
Pterygophora californica	32.2	111.5	46.0
Sargassum spp.	1.3	0.0	0.0

[1] Inner reef = 5m
[2] Middle reef = 10m
[3] Outer reef = 15m

Table 5-2. Fish abundances in the inner, middle, and outer reef in the vicinity of the project site based on the CRANE surveys.

Species	Inner Reef[1]	Middle Reef[2]	Outer Reef[3]
	Abundance Mean/100m^2	Abundance Mean/100m^2	Abundance Mean/100m^2
Anisotremus davidsonii	5.0	45.0	70.0
Atherinops affinis	0.0	0.0	30.0
Atherinopsis californiensis	0.0	535.0	0.0
Atractoscion nobilis	10.0	0.0	0.0
Brachyistius frenatus	205.0	425.0	0.0
Chromis punctipinnis	300.0	1,110.0	480.0
Damalichthys vacca	25.0	10.0	5.0
Embiotoca jacksoni	220.0	275.0	60.0
Girella nigricans	25.0	430.0	320.0
Halichoeres semicinctus	25.0	110.0	30.0
Hermosilla azurea	0.0	5.0	0.0
Heterostichus rostratus	15.0	0.0	0.0
Hypsurus caryi	230.0	125.0	20.0
Hypsypops rubicundus	80.0	465.0	55.0
Medialuna californiensis	0.0	15.0	20.0
Micrometrus minimus	5.0	0.0	0.0
Oxyjulis californica	420.0	4,020.0	1,115.0
Oxylebius pictus	0.0	15.0	15.0
Paralabrax clathratus	115.0	295.0	390.0
Paralabrax nebulifer	0.0	25.0	80.0
Phanerodon furcatus	0.0	0.0	5.0
Rhacochilus toxotes	0.0	15.0	65.0
Rhinogobiops nicholsii	5.0	5.0	80.0
Sebastes atrovirens	0.0	30.0	0.0
Sebastes mystinus	0.0	10.0	5.0
Semicossyphus pulcher	35.0	360.0	230.0
Trachurus symmetricus	0.0	0.0	2,400.0

[1] Inner reef = 5m
[2] Middle reef = 10m
[3] Outer reef = 15m

Table 5-3. Invertebrate densities in the inner, middle, and outer reef in the vicinity of the project site based on the CRANE surveys.

Species	Inner Reef[1]	Middle Reef[2]	Outer Reef[3]
	Density/100m^2	Density/100m^2	Density/100m^2
Anthopleura Artemisia	0.0	1.7	0.2
Anthopleura elegantissima	6.5	2.7	0.0
Anthopleura sola	3.2	24.5	0.2
Centrostephanus coronatus	0.0	0.0	0.3
Craniella arb	0.0	0.0	0.3
Crassedoma giganteum	0.2	0.0	0.0
Flabellina iodine	0.5	0.7	0.2
Kelletia kelletii	1.8	5.3	4.2
Leptogorgia chilensis	0.0	0.2	0.0
Megastraea undosa	0.7	0.5	0.0
Megathura crenulata	3.0	1.0	0.2
Muricea californica	0.0	10.3	54.0
Muricea fruticose	0.0	0.2	1.7
Octopus bimaculoides	0.0	0.3	0.0
Ophioplocus esmarki	0.0	0.2	0.0
Pachycerianthus fimbriatus	0.0	0.3	4.7
Panulirus interruptus	1.0	0.3	0.0
Parastichopus parvimensis	1.8	6.7	6.7
Patiria miniata	0.2	3.2	11.3
Pisaster brevispinus	0.0	0.3	0.0
Pisaster giganteus	9.2	10.5	5.2
Pisaster ochraceus	2.3	0.2	0.8
Pycnopodia helianthoides	0.0	0.0	0.2
Strongylocentrotus franciscanus	20.2	58.7	23.8
Strongylocentrotus purpuratus	228.3	24.7	4.0
Styela montereyensis	0.0	0.7	2.8
Tethya californiana	0.0	0.2	4.8
Urticina lofotensis	0.0	0.7	0.0

[1] Inner reef = 5m
[2] Middle reef = 10m
[3] Outer reef = 15m

Table 5-4. Federal and state listed endangered, threatened, and species of concern that could potentially occur near or at the project site.

Common Name	Scientific Name	Status
Invertebrates		
Pink abalone	*Haliotis corrugata*	NMFS SC
Pinto abalone	*Haliotis kamtchatkana*	NMFS SC
White abalone	*Haliotis sorenseni*	FE
Reptiles		
Green sea turtle	*Chelonia mydas*	FT
Leatherback sea turtle	*Dermochelys coriacea*	FE
Loggerhead sea turtle	*Caretta caretta*	FT
Olive ridley sea turtle	*Lepidochelys olivacea*	FT
Pacific Hawksbill Sea Turtle	*Eretmochelys imbricata*	FE
Birds		
Black Storm Petrel	*Oceanodroma melania*	CSC
California Gull	*Larus californicus*	CSC
California Least Tern	*Sterna antillarum browni*	SE,FE
Common Loon	*Gavia immer*	CSC
Double-crested Cormorant	*Phalacrocorax auritus*	CSC
Elegant Tern	*Thalasseus elegans*	CSC/FSC
Western Snowy Plover	*Charadrius lexandrines nivosus*	CSC/FT
Mammals		
Sei whale	*Balaenoptera borealis*	FE
Blue whale	*Balaenoptera musculus*	FE
Fin whale	*Balaenoptera physalus*	FE
Humpback whale	*Megaptera novaeangliae*	FE
Right whale	*Eubalaena japonica*	FE

FE – Federally Endangered FSC – Federal Species of Concern SE – State Endangered
FT – Federally Threatened CSC – California Species of Concern
NMFS SC – National Marine Fisheries Service Species of Concern

5.4 Air Quality

5.4.1 Air Pollutants

Air quality is measured as the relative degradation of ambient air quality standards (AAQS), which are set by state and federal agencies. An air quality standard defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health. The national ambient air quality standards (NAAQS) represent the maximum acceptable concentrations that may not be exceeded more than once per year, with the exception of the annual standards, which may never be exceeded. The California ambient air quality standards (CAAQS) represent the

maximum acceptable pollutant concentrations that may not be equaled or exceeded, as established by the California Air Resources Board (CARB).

Criteria air pollutants are defined as those for which a state or federal ambient air quality standard has been established to protect public health (Table 5-5). These include:

- Nitrogen oxides (NO_x)
- Sulfur dioxide (SO2)
- Carbon monoxide (CO)
- Ozone (O3)
- Volatile organic compounds/reactive organic compounds (VOCs/ROCs)
- Particulate matter less than or equal to 10 microns (µm) in diameter (PM10)

Nitrogen oxides and VOCs/ROCs interact in the presence of solar radiation to form secondary pollutants such as ozone.

5.4.2 Primary Pollutants

Air pollutants are broken down into primary and secondary sources. Primary pollutants are those that are derived directly from a point source into the atmosphere. Secondary pollutants are derived from primary pollutants and are produced through chemical reactions and phase transformations that occur in the atmosphere. The primary pollutants associated with the proposed action are as follows:

- Sulfur dioxide (SO2), derived from the burning of fossil fuels that contain sulfur compounds;
- Fine particulate matter (PM) composed of either natural or artificial solid particles or aerosols present in the atmosphere; and
- Toxic air contaminants (TACs). These airborne chemicals are present in marine diesel and are known or suspected to cause cancer and other serious ailments.

5.4.3 Secondary Pollutants

Secondary air pollutants result from the chemical and photochemical reactions of primary pollutants within the earth's atmosphere. Those pertinent to the proposed action are as follows:

- Nitrogen dioxide (NO2) is derived from Nitrogen oxide (NO), which is produced during the combustion of fossil fuels in motor vehicles and industrial equipment. NO2 is one of the main precursors to ozone and can be a source of fine particulate matter.
- Sulfates (SO4) are compounds in particulate aerosol derived from sulfur dioxide that can create pulmonary and respiratory problems, reduce visibility, and cause damage to vegetation.
- Ozone (O3) is derived from two main precursors, NO_x and reactive organic compounds (ROCs), which form ozone when exposed to ultraviolet radiation.

Table 5-5. State and federal Ambient Air Quality Standards (AAQS) and averaging times.

Ambient Air Quality Standards						
Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM10)[8]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[8]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[9]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[10]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[10]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[10]	—	
Lead[11,12]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[13]	8 Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[11]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

5.4.4 Greenhouse Gases and Climate Change

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). GHGs are emitted by natural processes as well as by human activities. Examples of GHGs that are produced by both natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs that are created and emitted primarily as the result of human activity include fluorinated gases (hydrofluorocarbons [HFCs] and perfluorocarbons [PFCs]) and sulfur hexafluoride (SF6).

Each GHG has a varying global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. By convention, CO_2 is assigned a GWP of 1. By comparison, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. N_2O has a GWP of 310, which means that it has a global warming effect 310 times greater than CO_2 on an equal-mass basis. To account for their GWPs, GHG emissions are often reported as a CO_2 equivalent (CO2e). The CO2e is calculated by multiplying the emission of each GHG by its GWP, and adding the results together to produce a single, combined emission rate representing all GHGs (portoflosangeles.org). The SCAQMD posts a significance threshold of 10,000 MT/yr of CO2e emissions per year for industrial projects, 3,000 MT/yr for commercial projects, and 1,100 MT/yr for mixed projects where the SCAQMD is the lead agency (www.aqmd.gov).

The accumulation of GHGs in the atmosphere regulates the earth's temperature. Without these natural GHGs, the earth's surface would be approximately 61 degrees (°) Fahrenheit (F) cooler (AEP, 2007). GHGs differ from criteria pollutants in that GHG emissions do not cause direct, adverse human health effects. Rather, the direct environmental effect of GHG emissions is an increase in global temperatures, which in turn has numerous indirect effects on the environment and humans (POLA, 2008).

5.4.5 Regulatory Setting

The proposed action would take place within the South Coast Air Basin (SCAB), which is one of 15 jurisdictional air basins within California. The SCAB is affected by temperature inversions and stagnant wind conditions, which prevent the breakdown of inversion layers and limit the movement of air pollutants. While air quality has improved in recent years in the SCAB, this basin exceeds standards for one or more air pollutants. State law requires air basins to be designated as in attainment, nonattainment, or as unclassified for each State standard. If the hourly parts per million (ppm) levels for individual criteria pollutants exceed State or federal standards, it is considered to be in nonattainment. The attainment status of criteria pollutants in the SCAB is presented in Table 5-6.

Table 5-6. Attainment status of criteria pollutants in the South Coast Air Basin.

Pollutant	State	Federal
O_3 – 1-hour	Extreme Nonattainment	No Federal Standard
O_3 – 8-hour	Extreme Nonattainment	Severe-Nonattainment
PM_{10}	Serious Nonattainment	Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
CO	Attainment	Attainment
NO_2	Nonattainment	Attainment/Maintenance
SO_2	Attainment	Attainment
Pb	Nonattainment (LA County only)	Nonattainment (LA County only)
All others	Attainment/Unclassified	Attainment/Unclassified

Source: California Air Resources Board (CARB) 2013.

The South Coast Air Quality Management District (SCAQMD) regulates air emissions within the SCAB from stationary emissions sources, including boats and other equipment used for the construction of the proposed rocky-habitat reef. This includes idling tugboats and the equipment used during the loading and unloading of the barges. It does not include the trucks used to haul the quarry rock nor the tugboats while underway to and from the project site. NOAA consulted with SCAQMD staff in evaluating the emissions and assuring compliance with the relevant permitting processes and requirements. No permits are required for the proposed action. Nevertheless, this EA includes an evaluation of the emissions from both stationary and mobile sources, along with measures to reduce the emissions (See Chapter 10).

5.5 Land Use, Recreation, Aesthetics, and Noise

5.5.1 Introduction

The potential effects on land use, recreation, aesthetics, and noise are considered together because they all involve the effects of the proposed action upon people who either live along the coast adjacent to the project site and/or use the coastal waters, nearby beaches and other coastal areas for recreation. The scoping process identified several issues that required further detailed evaluation. The potential issue for land use involves a determination of the consistency of the proposed action with existing local and regional plans for the utilization of the project site. The use of tugboats, a crane, barges, an off-loading bulldozer, and other boats and equipment 0.3 miles offshore has the potential to negatively affect coastal residents and visitors in terms of visual aesthetics and noise. This has the potential to interfere with recreational opportunities and uses. An additional issue for recreation involves determining whether the proposed rocky-reef habitat might affect surfing opportunities and use along the shoreline.

5.5.2 Land Use

The project site is located 0.3 miles offshore from the City of Rancho Palos Verdes and 1.3 miles from the City of San Pedro coastline. More than three-fourths of the immediate City of Rancho Palos Verdes coastline is open space or vacant and about one-fourth is devoted to single-family residential land use. Directly inshore of the project site is the Trump National Golf Course and the Ocean Trails Reserve. To the northwest of the project site is a large open space, occupied by

the Abalone Cove Preserve and the City of Rancho Palos Verdes' Abalone Cove Shoreline Park. The City of San Pedro coastal zone is also devoted to residential and open space uses. Open space areas in the City of San Pedro include the White Point Nature Preserve and the Point Fermin Park.

Because of its natural character and location near a large metropolitan complex, the City of Rancho Palos Verdes coastal area is a popular area for recreation. The open space areas contain trails and roads, and some allow access to the beaches through trails that lead down the coastal bluffs. Abalone Cove Reserve, Ocean Trails Reserve, White Point Nature Reserve, and Point Fermin Park all feature parking areas and hiking trails that enable recreational users to access the beaches. These access points allow for multiple recreational purposes, including surfing, diving, and fishing.

The closest residential communities to the project site are located approximately 0.4 miles and 0.9 miles to the northeast in the City of Rancho Palos Verdes. Many of the homes in these residential areas as well as the beaches and open space recreational areas have views of the project site and the surrounding waters.

5.5.3 Recreation

Many of the recreational activities near the project site are aquatic-based and include activities such as surfing, diving, fishing, and boating. Popular activities on or near the beach include tide pool viewing, hiking the bluffs, and wildlife viewing, as described in the following.

5.5.3.1 Surfing

The Rancho Palos Verdes coastline is a highly regarded area for surfing. There are many attractive surfing locations (breaks) in the area due to rock points and the Redondo Submarine Canyon, which funnels the swells toward the coastline. There are three recognized surfing breaks in the vicinity of the project site, as follows.

Japan Cove, the closest surfing break to the project site, is located just northeast of the site. It can be accessed from the Royal Palms/White's Point County Beach parking area or from a trail originating at the Ocean Trails Reserve. This surfing break has the best waves when the swell direction is from the south/southeast.

TC's is located west of Royal Palms/White's Point Preserve and can be accessed from the Royal Palms/White's Point County Beach parking area. It is the second-most-popular right-handed surfing break on the Palos Verdes Peninsula. This surfing break has the best waves when the swell direction is from the west-northwest.

Pickle's is located just south of White's Point Nature Preserve and can be accessed from a path down the cliffs from Paseo Del Mar. The waves at this surfing break are best when the swell is less than four feet. For surfing, this means the ride will be short and the surfer will be carried over shallow, jagged rocks covered in sea urchins.

5.5.3.2 Diving

The rocky coastline and coastal bluffs of Rancho Palos Verdes provide an attractive area underwater setting for divers. There are several areas near the project site that are suitable and used for free diving and scuba diving. The coastal trails along the open-space areas provide access points for divers. The recognized dive sites in the area are generally rated as more advanced, not because of the technical difficulty of the dive itself, but because of difficult access, including the length of the trail leading to the beach (Pacific Wilderness, Inc., 2007).

Divers are likely to see rock formations due to intense tectonic activity in the region, as well as sand and kelp forests. The region is particularly attractive for the occurrence of invertebrates, including brightly colored Spanish shawl nudibranchs, sea stars, chestnut cowries, sand bass, bat rays, calico bass, white sea bass, tree fish, cabezon, giant kelpfish, blackeye goby, California halibut, California sheephead, senorita, white seaperch, opaleye, horn shark, giant crabs, small reef fish, and an abundance of octopus (Pacific Wilderness, Inc., 2007).

Divers can also access dive spots in the general project vicinity by boat. Many charter boats travel from nearby harbors, such as the Port of Los Angeles, the Port of Long Beach, and Marina Del Rey, to destinations along the Rancho Palos Verdes coastline (Pacific Wilderness, Inc., 2007).

5.5.3.3 Fishing

Because the Rancho Palos Verdes coastline has a predominantly rocky shoreline, access to the beach for fishing is limited (California's Best Beaches, 2014). Therefore, much of the fishing in this area is done from boats. Recreational boaters and commercial passenger fishing vessels originate primarily from King Harbor and Marina del Rey, which are located approximately 12 and 20 miles, respectively, northwest of the project site. A smaller number of fishing vessels originate from the Ports of Long Beach and Los Angeles, approximately four miles south of the project site. The most heavily fished area is from Malaga to Rocky Point, along the northwestern section of the Palos Verdes Peninsula. This is due to the high number of boats departing from King Harbor and the abundant reef and kelp habitat in the area. Rocky Point is the largest reef, and it has the most persistent kelp in the region, making it a very popular fishing destination (Pondella, 2009). Other popular nearshore areas for fishing from vessels include Rocky Point, Point Fermin Reef, Long Point, and Point Vicente Cliffs (Davey's Locker, 2014).

Fishing from the shoreline is also popular, particularly near the public open-space preserve access points or at the Cabrillo Beach Fishing Pier. Some of the species of fish typically caught here are sand bass, calico bass, white sea bass, giant kelpfish, California halibut, senorita leopard sharks, horn sharks, lobsters, and giant crab (California's Best Beaches, 2014).

5.5.3.4 Boating

Boating is a popular activity in the Rancho Palos Verdes coastal area for several reasons: 1) the availability of protected harbors and related facilities; 2) proximity to Santa Catalina Island; and 3) mild weather (San Pedro Peninsula Chamber of Commerce, 2008). In Los Angeles County, approximately 65,000 recreational vessels were registered in 2014 (County of Los Angeles, 2014b). Boating activities include motor boating, sailing, kayaking, and jet skiing.

5.5.3.5 Beach Activities

Recreation visitors participate in a variety of activities along the rocky shoreline and on the coastal cliffs of Rancho Palos Verdes and San Pedro via the numerous city parks, county parks, and open-space reserves. Hiking the coastal trails is popular, along with sunbathing, beach-combing, walking, tide pool viewing, and swimming (California's Best Beaches, 2014).

5.5.4 Land Use Plans and Policies

Several land use plans were reviewed and considered to determine whether the proposed action might be consistent with existing plans and policies. These included the City of Rancho Palos Verdes General Plan the City of San Pedro Specific Plan, and the County of Los Angeles General Plan - Land Use Element, along with several potentially applicable State plans and policies.

5.5.4.1 California Coastal Act

Although the project site is proximate to the City of Rancho Palos Verdes and within the County of Los Angeles, the California State Lands Commission (CSLC) has exclusive jurisdiction over the submerged lands that make up the project site. The CSLC jurisdiction includes submerged lands adjacent to the coast and offshore islands from the mean high tide line to three nautical miles offshore, as set forth in the California Coastal Act of 1976. Since the California Coastal Act was passed, local and regional agency planning has focused on onshore land uses and policies and largely deferred to State and federal agencies for coastal zone management. However, the City of Rancho Palos Verdes Coastal Specific Plan (1978) includes a discussion of the loss of kelp forests along the City's coastline and a City policy to "Protect, enhance and encourage restoration of marine resources of the City through marine resource management and cooperation with other public agencies and private organizations."

Several sections of the California Coastal Act are relevant to the proposed action. Section 30001.5(a) outlines the basic goals for the coastal zone as follows: "protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environments and its natural and artificial resources." Section 30230 states: "Marine resources shall be maintained, enhanced and, where feasible, restored." Section 30231 states the biological productivity and quality of ocean waters should be maintained so that optimum populations of marine organisms vital the protection of human health shall be maintained.

5.5.4.2 California Fish and Game Code

The California Fish and Game Code includes several relevant plans and policies. Policies relating to fish planting and propagation (Chapter 5) promote the placement of artificial reefs in State waters, and include design criteria and requirements for reef siting and placement. Policies relating to the conservation of aquatic resources (Chapter 7) include the following:

"It is hereby declared to be the policy of the state to encourage the conservation, maintenance, and utilization of the living resources of the ocean and other waters under the jurisdiction and influence of the state for the benefit of all the citizens of the state and to promote the development of local fisheries and distant water fisheries based in California in harmony with international law respecting fishing and the conservation of the living resources of the oceans and other waters under the jurisdiction and influence of the state."

5.5.4.3 California Ocean Resources Management Act

The California Ocean Resources Management Act (CORMA), Public Resources Code Section 36002(1), includes the State's policy to: "Assess the long-term values and benefits of the conservation and development of ocean resources and uses with the objective of restoring or maintaining the health of the ocean ecosystem and ensuring the proper management of renewable and nonrenewable resources."

5.5.4.4 California Ocean Plan

The Water Quality Control Plan for Ocean Waters of California (California Ocean Plan) also includes State policies that are relevant to the proposed action. Under the Beneficial Uses section of the California Ocean Plan, marine habitats are identified as a beneficial uses of the ocean:

"The beneficial uses of the ocean waters of the State that shall be protected include industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated Areas of Special Biological Significance (ASBS); rare and endangered species; marine habitat; fish migration; fish spawning and shellfish harvesting."

5.5.5 Noise

Noise is generally defined as an unwanted or objectionable sound. Noise can cause annoyance, interference with communication, sleep disturbance, or in severe cases, hearing impairment. Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale scales the actual sound power levels in order to be consistent with that of human hearing response, since the human ear is not equally sensitive to sound at all frequencies. Table 5-7 outlines common noise terms and their definitions.

Table 5-7. Common noise terms and definitions.

Term	Definition
Decibel (dB)	The unit for measuring the volume of sound, equal to 10 times the logarithm (base 10) of the ratio of the pressure of a measured sound to a reference pressure (20 micropascals).
A-Weighted Decibel (dBA)	A sound measurement scale that adjusts the pressure of individual frequencies according to human sensitivities. The scale accounts for the fact that the region of highest sensitivity for the human ear is between 2,000 and 4,000 cycles per second (hertz).
Equivalent Sound Level (L_{eq})	The sound level containing the same total energy as a time-varying signal over a given time period. The L_{eq} is the value that expresses the time- averaged total energy of a fluctuating sound level.
Maximum Sound Level (L_{max})	The highest individual sound level (dBA) occurring over a given time period.
Minimum Sound Level (L_{min})	The lowest individual sound level (dBA) occurring over a given time period.
Community Noise Equivalent Level (CNEL)	A rating of community noise exposure to all sources of sound that differentiates between daytime, evening, and nighttime noise exposure. These adjustments are +5 dBA for the evening (7:00 PM to 10:00 PM) and +10 dBA for the nighttime (10:00 PM to 7:00 AM).
Day/Night Average (L_{dn})	The L_{dn} is a measure of the 24-hour average noise level at a given location. It was adopted by the U.S. Environmental Protection Agency (EPA) in order to develop criteria for the evaluation of community noise exposure. It is based on a measure of the average noise level over a given time period called the L_{eq}. The Ldn is calculated by averaging the L_{eq}'s for each hour of the day at a given location after penalizing the "sleeping hours" (defined as 10:00 PM to 7:00 AM) by 10 dBA to account for the increased sensitivity of people to noises that occur at night.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.

Source: Harris, 1979.

The sound pressure level is measured on a logarithmic scale with the zero dB level based on the lowest detectable sound pressure level that people can perceive. Based on the logarithmic scale, a doubling of sound intensity is equivalent to an increase in 3 dB, and a sound that is 10 dB less than the ambient sound level has no effect on the ambient noise. In terms of human response to noise, a sound 10 dBA higher than another is judged to be twice as loud. Everyday day sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud).

According to the US Environmental Protection Agency, impairment to the human ear begins at about 70 dBA. Noise levels above 35-45 dBA will disturb a sleeping person, noise between 50-60 dBA can make it difficult to carry on a quiet conversation, and stress reactions can occur with noise levels above 85 dBA (City of Rancho Palos Verdes, 2010). Table 5-8 outlines the sound levels of common noise sources.

Table 5-8. Sound levels of typical noise sources.

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet fly-over at 300 m (1,000 ft)	100	
Gas lawn mower at 1 m (3 ft)	90	
Diesel truck at 15 m (50 ft) at 80 km/hr (50 mph)	80	Food blender at 1 m (3 ft) Garbage disposal at 1 m (3 ft)
Noisy urban area, daytime Gas lawn mower, 30 m (100 ft)	70	Vacuum cleaner at 3 m (10 ft)
Commercial area Heavy traffic at 90 m (300 ft)	60	Normal Speech at 1 m (3 ft)
Quiet urban daytime	50	Large business office Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime	30	Library
Quiet rural nighttime	20	Bedroom at night, concert hall (background)
	10	Broadcasting/recording studio
	0	Lowest threshold of human hearing

Source: Caltrans, 1988.

The completed rocky-reef habitat will be a passive, submerged feature that will not generate noise. However, the tugboats, crane, off-loading bulldozer, small boats, and other equipment used for construction would create noise during the up to 60 days of construction. The construction would be limited to six days per week, Monday through Saturday, and to daylight hours to help reduce the potential for noise effects on people. There are several plans, policies, and regulations pertaining to limiting the noise created during the construction phase of the proposed action, as follows.

5.5.5.1 Federal Guidelines

There are no federal noise standards that directly regulate noise related to construction. The Occupational Safety and Health Administration (OSHA) has regulations under 29CFR1910.120 to protect the hearing of workers from excessive noise levels in the workplace. Permissible noise exposures and duration covered under OSHA are in Table 5-9.

Table 5-9. Occupational Safety and Health Administration (OSHA) permissible noise exposures.

Duration per day, hours	Sound level dBA slow response
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

Source: United States Department of Labor.

5.5.5.2 State of California Guidelines

Noise levels in California are regulated through State, county and municipal standards and regulations. California has required each local government to perform noise studies to implement a noise element as part of their general plan. California Administrative Code, Title 4, has guidelines for evaluating compatibility of various land uses as a function of community noise exposure.

5.5.5.3 California Government Code

California Government Code Section 65302(f) mandates that the legislative body of each county and city adopt a noise element as part of their comprehensive general plan. The local noise element must recognize the land use compatibility guidelines established by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of “normally acceptable,” “conditionally acceptable” and “clearly unacceptable” noise levels for various land use types.

5.5.5.4 California Department of Public Health Services, Office of Noise Control

This State agency provides guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. These guidelines for land use and noise exposure compatibility are shown in Table 5-10 (same data as City of Los Angeles standards). Based on these standards, an exterior CNEL between 50-75 dBA is considered normally acceptable for most land uses, including single family, multi-family, duplexes, and mobile homes without special noise insulation requirements. Noise levels exceeding 70-80 dBA are considered unacceptable levels of noise for most land use structures.

Table 5-10. Los Angeles County noise ordinance construction standards (dBA) for mobile and stationary equipment sources for Residential Structures.

a. Mobile Equipment. Maximum noise levels for nonscheduled, intermittent, short-term operation (less than 10 days) of mobile equipment:

	Single-family Residential	Multi-family Residential	Semi-residential/ Commercial
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	75dBA	80dBA	85dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	60dBA	64dBA	70dBA

b. Stationary Equipment. Maximum noise level for repetitively scheduled and relatively long-term operation (periods of 10 days or more) of stationary equipment:

	Single-family Residential	Multi-family Residential	Semi-residential/ Commercial
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	60dBA	65dBA	70dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	50dBA	55dBA	60dBA

Source: County of Los Angeles, County Code Section 12.08.440.

5.5.5.5 County of Los Angeles

The Los Angeles County General Plan Noise Element (1974) addresses various noises and sources throughout the County, specifically focusing on noise sources such as traffic, railroad, and aircraft. The guidelines used by the County are based on the community noise compatibility guidelines established by the State of California Department of Health Services. Regulations that implement these guidelines are set forth in the Los Angeles County Code.

Section 12.08.440 of the County of Los Angeles Noise Ordinance prohibits construction during weekday evening and nighttime hours of 7:00 p.m. and 7:00 a.m., or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real-property line. The ordinance sets specific limits for allowable construction noise affecting existing structures during daytime the hours of 7:00 a.m. to 8:00 p.m., varying by the day and type of structure (Table 5-10).

5.5.5.6 City of Rancho Palos Verde

Table 5-11 outlines the noise regulations for the City of Rancho Palos Verdes, as outlined in the City of Rancho Palos Verdes General Plan Noise Element (2010). In general, the City limits mechanical equipment noise in residential areas to no more than 65 dBA on Sunday and during nighttime hours (7:00 pm to 7:00 am) Monday through Saturday, as measured at the affected

residential property lines. The City Noise Element allows higher level construction-related noise during 7:00 am to 7:00 pm Monday through Saturday.

Table 5-11. City of Rancho Palos Verdes existing noise regulations.

Code Section	Topic
8.20.120	Noise controls applicable to solid waste collection
10.04.040	Limitation on off-road vehicle operation that disturbs the peace
17.12.030 F.	Limitation on commercial uses regarding deliveries, trash pick-up, parking lot trash sweepers, operation of machinery or mechanical equipment, can exceed sixty-five (65) dBA, as measured from the closest property line, shall only be allowed on commercial properties which abut a residential district between the hours of 7 a.m. and 7 p.m., Monday through Saturday.
17.48.030 E.3. b	65 dB limitation on mechanical equipment at closest property line
17.56.020	Restricts the hours of operation for construction equipment to between the hours of 7 a.m. and 7 p.m. Monday through Saturday. No work is allowed on Sunday. A Special Construction Permit could be obtained to allow work on federal holidays and Sundays during the permitted hours stated above.
17.60.050	Conditional Use Permit standards and conditions to protect against noise impacts
17.62.060	Special Use Permit standards and conditions to protect against noise impacts
17.60.040 G. 4.	Grading Permits and conditions of approval to address noise impacts of grading activities

Source: Rancho Palos Verdes Municipal Code.

According to the Noise Element, ambient noise levels within the City of Rancho Palos Verdes range from 42 to 75 dBA. The sound produced by the ocean surf contributes to the measured noise levels of the coastal zone. The sound of the ocean surf can vary depending on the tides and weather conditions. At a point 50 feet from the surf line, gentle lapping waves could produce about 20 dBA, while large waves and surf could produce about 55 dBA. The nominal value under normal conditions is around 40 dBA. The coastal zone is also affected by community noise, which can include such noise sources as construction activities, heavy trucks, airplanes, and barking dogs. Traffic noise from area roadways is a major source of noise in the City, including along the coastline. Noise from traffic on Palos Verde Drive, which runs along the coastline adjacent to the project site, is considered to be moderate at 70 dBA, with adjacent open space and residential areas experiencing ambient noise levels in the 60 to 65 dBA range.

CHAPTER 6 ENVIRONMENTAL CONSEQUENCES

6.1 Biological Resources

6.1.1 Introduction

The scale and nature of the proposed action are important to understanding the potential effects on biological resources, and are the reasons why several kinds of potential effects were considered but then eliminated from further detailed analysis. While the construction will involve placing quarry rock on 40 acres within a 69-acre project site, the construction activities at any one time will be confined to a much smaller footprint as the barges are moved in by tugs, slowly positioned by anchors for the rock to be off-loaded. The construction will also be of relatively short duration, no more than sixty days. The expected response to the proposed construction activities by fish, birds, turtles, and marine mammals is avoidance and the use of adjacent areas for predation, foraging, and migration. The nature of the proposed action is such that unavoidable effects on the existing bottom habitat and less mobile biological species are expected to be more than offset by the increased biological resources and diversity associated with the created rocky-reef habitat and kelp forest.

6.1.2 Effects on Bottom Species and Habitat

The activities associated with the proposed action that could adversely affect species and habitat at the project site include derrick barge anchoring and the placement of 70,300 tons of quarry rock on the sea floor, as discussed in the following.

Derrick barge anchoring has the potential to affect biological resources at the project site by tearing up and/or crushing bottom community organisms and habitat. Seven-ton anchors and 15-ton concrete blocks will be used to position the barges. The placement of 70,300 tons of quarry rock on project site bottom habitat will crush and bury existing invertebrates and other less mobile and stationary biological resources over a 40-acre area. About 60 acres of the 69-acre project site consists of degraded sandy-bottom habitat with low biological diversity. This is where the quarry rock will be placed. The remaining nine acres is hard substrate bottom. The hard substrate bottom habitat is also degraded and low in biological diversity, but is includes marginal potential habitat for the federally endangered white abalone (*Haliotis sorenseni*), and for two National Marine Fisheries Service (NMFS) Species of Concern, pink abalone (*Haliotis corrugata)*, and pinto abalone (*Haliotis kamtschatkana)*. The quarry rock will be placed to avoid this habitat type.

Forty acres of degraded biological communities within the 69-acre project site will be replaced by rocky-reef habitat and subsequently by kelp forest and a substantially larger, more diverse marine ecosystem. The objective of the proposed action is to replace sandy-bottom habitat with rocky-reef habitat and to avoid coverage of existing hard substrate. For this reason, the proposed action includes positioning the derrick barge to off-load quarry rock on sandy-bottom habitat and to avoid existing hard substrate. In addition, the potential effects of construction will be reduced by implementing a proactive anchoring plan (Appendix A), summarized in the following.

- Avoid anchoring in areas of hard substrate

- Postpone operations during inclement weather to minimize anchor drag
- Minimize anchor drag by system design, monitoring, and timely corrective action

The placement of quarry rock at the project site also has the potential to affect existing biological resources by causing localized and short-term turbidity and sedimentation as the quarry rock impacts the sandy bottom sediments. The resulting effects on marine plants and animals can be both adverse and beneficial. Increased turbidity reduces light penetration, which may reduce primary production and the predation rates of visual predators. High levels of suspended sediments can clog the feeding structures of planktonic and benthic suspension feeders, and the gills of fish and many invertebrates (Sherk et al. 1974; Velagic 1995). Fish eggs and larvae are particularly sensitive to smothering by suspended sediments. The potential benefits of increased turbidity and suspended sediments include higher primary productivity in areas where nutrients are limiting, if the suspended materials contain and release the limiting nutrients (Odum and Wilson 1962). Disturbance of the sediments may also benefit infaunal invertebrates by increasing the availability of detrital food material (VanBlaricom 1982). Reduced light levels help prey species, including early life stages of fish and macroinvertebrates, escape notice by predators.

With respect to the proposed action, neither the adverse nor the beneficial effects are considered major due to the relatively small area affected by construction at any one time and the relatively coarse sediments that would be suspended as a result of the impacts by quarry rock. Coarse sediments stay in suspension a short time and settle out close to their source.

6.1.3 Marine Mammals, Fish, and Birds

The potential effects of the proposed construction activities on marine mammals, fish, and birds were considered and then eliminated from further detailed evaluation because of the small scale of the construction, the capacity of these animals for avoidance, and the availability of extensive suitable habitat adjacent to the project site, as discussed in the following.

6.1.3.1 Marine Mammals

The marine mammals most likely to occur in the vicinity of the project site during the construction period are California sea lions, Pacific harbor seals and bottlenose dolphins (Logomarsino 1997). There are four ways in which these and any other marine mammals present could be affected:

- Collision with water craft
- Direct injury from falling quarry rock
- Injury related to turbidity
- Interference with foraging

Each is discussed in the following.

Tug boats with barges would transport the materials moving at a rate of approximately 9 miles per hour. At this rate, marine mammals within the shipping route would avoid potential collision by moving out of the way of the oncoming barge. The crew vessel that would transport the crew between the derrick barge and the Cabrillo Marina would travel at greater speeds, but the risk of

collision with marine mammals would still be extremely low. Marine mammals are highly mobile and can avoid boat traffic. Marine mammals in the lease area could also be expected to be habituated to boat traffic, since boating is common in the area.

The mobility of marine mammals is also important in addressing concern over direct injury from falling quarry rock, and injuries from turbidity. The construction associated with the Palos Verdes Reef Restoration Project will be localized and limited in extent at any one time. The initiation of construction activities would likely result in a startled response from marine mammals presence in the lease area, and they would be expected to avoid the immediate vicinity of the construction. California sea lions and bottle nose dolphins, however, are generally known to be curious and may investigate the activities, but are likely to keep their distance from falling rocks. Pacific harbor seals are more wary in nature and would likely stay well away from the construction site.

The potential for interference with foraging is considered low because the construction is localized and of short duration and because the degraded sandy-bottom habitat that prevails in the area is a poor source of prey for mammals. More productive areas for foraging will be readily available adjacent to and outside of the construction area.

6.1.3.2 Special-Status Marine Birds

The special-status marine birds most likely to occur in the vicinity of the project site include black storm-petrel, brown pelicans, double-crested cormorants, California gulls, elegant terns and, occasionally, California least terns and common loons. All of these species feed on fish and may occasionally utilize the project site for foraging. No breeding colonies for any of the above listed species exist near the project site. Several of the avian species may be discouraged from foraging in the immediate vicinity of the construction because of noise and human activity. In addition, construction activities may scare prey species away from the project site, reducing feeding success. However, the construction activities will be small scale, localized, and of short duration. Many adjacent, higher quality foraging areas will be readily available to marine birds during the construction period.

6.1.3.3 Migratory Species

Migratory species that may be in the project area include migratory birds, migratory fish species, or migratory marine mammal species. The project site falls within the boundaries of the Pacific Flyway, which is a major north-south migratory fly-way that extends from Alaska to Patagonia. Along their migrations, these birds stop at important rest stops to feed and regain their strength before continuing their migration. Rest areas for migrating birds generally include protected areas with food. Common rest areas include wetlands, agricultural areas, or coastal forested areas. Considering the project site is located over open water, it is most likely not an important rest area for migrating birds. Additionally, since there are ample parks and open spaces inshore of the project site, it would be expected that these areas would be more attractive to migratory birds passing through the area during project construction.

Migratory fish species in California include coastal pelagic (open ocean) species and highly migratory species. Coastal pelagic species include Pacific sardines, Pacific mackerel, market

squid, northern anchovy, jack mackerel, and krill. Highly migratory species include tunas, billfish, and sharks (CDFW, 2015). Most of these species are pelagic, and are thus found farther offshore than the boundaries of this project. The only pelagic species observed near the project site was the jack mackerel (*Trachurus symmetricus*), which was noted just inshore of the project site. These species are adept at avoidance.

During the time frame of construction (May-September), there are three species of migratory whales that may be found in the project area. These include: 1) blue whales; 2) fin whales; and 3) humpback whales. However, these whales are generally found farther from shore than where project construction will occur and are adept at avoidance.

6.1.4 Restoration Effects

The creation of 40 acres of rocky-reef habitat, and the subsequent development of a 69-acre kelp forest, will have beneficial effects upon marine organisms including native and resident migratory fish and wildlife species. Kelp forest communities provides structural diversity, which promotes increased prey availability and variety for avian species. Several specific potential effects were considered as follows:

- Waves and Currents
- Kelp Entanglement
- Food Resources
- Predation
- Marine Mammal Utilization
- Marine Bird Utilization

6.1.4.1 Waves and Currents

The kelp forest that will be produced by the proposed action has the potential to affect waves and currents and thereby affect littoral zone sedimentation processes and beach habitat. The littoral zone extends from the beach to a water depth of less than 32 feet (10 m). It is in this zone where wave energy causes transport of coastal sediments. If waves and currents were altered to such a degree that the project resulted in a substantial changes in beach width or sediment volume in the littoral zone, then the project would be considered to have an impact on the beach community. Elwany et al. (1998) reviewed the potential for offshore reefs to affect littoral zone sedimentation processes and beach habitat and concluded that there would be no substantial effects.

6.1.4.2 Kelp Entanglement

An important factor in the destruction of kelp during storms is the entanglement of broken and detached pieces of kelp with kelp plants that are still attached to the bottom. These entangled masses increase the drag forces and result in further tearing and detachment of kelp plants from bottom substrate. Detached kelp could entangle kelp in the surrounding area, aggravating adverse effects of storm waves on these kelp forests. However any loss of kelp from the surrounding area due to entanglement would be offset by the increased kelp production of the restored reef.

6.1.4.3 Food Resources

The majority of the project site contains sandy bottom habitat and areas of buried reef. Biological surveys conducted at the project site only noted the presence of small amounts of giant kelp. In these sandy bottom communities, which lack a major plant community, much of the detrital food material is exported from other communities by currents. The restoration of hard substrate at the project site is expected to create a habitat conducive to plant communities, specifically giant kelp. This would increase the supply of detrital food material available to the remaining sandy bottom community at the project site, thereby increasing production in this community.

Besides the sandy bottom community, the rocky reef community will also be positively affected by the restoration project. The addition of hard substrate in the project area will provide a substrate for giant kelp, other algae, and invertebrates to become attached. These in turn, will create food items for larger prey species. In addition, the cover created by the algae and invertebrates will create hiding areas for other numerous rocky reef species.

6.1.4.4 Predation

The abundance of predators at the project site following restoration would be expected to be much higher than in the existing sandy bottom community. Fish and invertebrate predators associated with reefs prey to a varying degree on animals living in the surrounding sandy bottom community. However, the sandy bottom organisms that may be affected by increased predation are widely distributed in the SCB.

6.1.4.5 Marine Mammal Utilization

The proposed action has the potential to create 69 acres of kelp forest habitat. Several of the marine mammals that may occur in the project vicinity utilize kelp forest habitat. Pacific harbor seals in particular are known to use kelp forests for foraging and cover. California sea lions and bottlenose dolphins have been observed near kelp forests, although both species tend to prefer pelagic prey. The kelp forest development may increase habitat for some of the prey that dolphins and sea lions would take. Gray whales generally do not forage during their migration, but they have been observed skimming kelp beds for food and utilizing kelp forest for escape cover (Dailey et al. 1993; Foster and Schiel 1985). These areas are believed to be particularly important to cow-calf pairs in the northern migration during late winter and spring. Accordingly, the presence of a kelp reef would have a beneficial effect upon marine mammals.

6.1.4.6 Marine Bird Utilization

The development of a kelp forest associated with the proposed action would provide additional foraging and resting habitat for a number of marine birds. Several special-status species likely to be present in the vicinity of the project site are known to depend on the different sub-habitats that a persistent kelp forest can provide. The kelp forest would increase foraging and resting habitat for brown pelicans, double-crested cormorants, common loons, California least terns and elegant terns. Additionally, the kelp forest community provides structural diversity, which promotes

increased prey availability and variety for avian species. The kelp wrack that washes up on the beaches near kelp forests provides habitat for many of the prey species preferred by shore birds.

6.1.5 Post-Construction Monitoring

The post-construction monitoring activities associated with the proposed action would entail the use of a small vessel (less than 40 feet) to conduct side-scan sonar surveys to confirm the location of rock material and diver surveys to assess the biological community and progress of habitat on the reef.

The post-construction survey operations, including the use of a side-scan sonar system, would operate under the California State Land Commissions Offshore Geophysical Survey Permit Program (OGPP). Through the OGPP, there are several required measures designed to protect marine life. These include:

- Collection of marine mammal and sea turtle presence information from NOAA and local whale watching operations prior to survey operations
- Having marine wildlife monitors onboard the survey vessel during survey operations. If sensitive marine wildlife is observed within the safety zone radius specified in the permit, survey operations must cease until the animal(s) is gone.
- Limits on nighttime survey operations
- Implementation of a soft-start technique
- Strict adherence to equipment manufacturers' guidelines
- Avoidance of pinniped haul-out sites and marine protected areas
- Marine mammal collision reporting requirements
- Implementation of a marine wildlife contingency plan

The diver surveys would be conducted to monitor the biological health of the reef and to confirm the placement of rock material. These surveys would be limited to a small dive survey team using a skiff to access the project site. Surveys will be conducted by two divers following pre-determined transect lines that run in an inshore to offshore orientation. The determined coordinates will be entered into a differential Global Positioning System (DGPS) to be used during the survey aboard the boat A temporary buoy will be placed at each of these coordinates in the field marking the starting point of each transect. One diver will record the presence of substrate types while the second diver will record the number of selected target species along and within a set distance of about six feet (2 m) on either side of the transect line. Impacts from the diver surveys may include the boat anchor for the skiff as well as temporary disturbances to the mobile biological community during diver observations. The boat will be anchored just offshore of the project site, in sandy bottom areas, thus, no rocky reef habitat will be affected. The temporary buoys will be held in place by weights, therefore no anchors will be placed at the project site. Divers will not be collecting any species. Therefore, the effects to the biological community will be limited to temporary avoidance.

6.2 Air Quality

6.2.1 Introduction

The air emissions resulting from the construction of this reef can be traced to the individual construction-related steps involved in the quarrying, the transportation of the quarry rock to the project site, and the placement of the rock on the ocean floor. The quarry business is operated by Connolly-Pacific Co. under existing current permits, and for this reason, was not a part of this air emissions evaluation. The following describes the emissions associated with the proposed action and explains why these emissions are not considered to be major effects.

6.2.2 Daily and Quarterly Emissions

The proposed action includes the placement of 70,300 tons of quarry rock within a 69-acre area. It is estimated that construction will take up to 60 days. It will take 18 round trips (36 one-way trips total) by tugboat to transport all the reef material to the site. Quarterly emissions are estimated by multiplying daily emissions by 36 days for the rock transport and by 60 days for the remainder of the construction components. Since the project will be constructed within a single quarter, the quarterly emissions are the same as the total emissions.

The proposed action will produce the daily and quarterly emissions of CO, ROC, NO_x, SO_x, PM_{10}, and $PM_{2.5}$ shown in Table 6-1. The total daily and quarterly emissions for CO, ROC, SO_x, PM_{10}, and $PM_{2.5}$ are well below the SCAQMD thresholds of significance (Table 6.1). The daily and quarterly emissions for NO_x are near but still below the threshold of significance, at 95 lbs/day and 4,628 lbs/quarter (threshold of significance is 100 lbs/day and 5,000 lbs/quarter). Because the SCAQMD thresholds are not exceeded, the effects on the human environment are considered minor and mitigation measures are not required.

Table 6-1. Total daily and quarterly emissions for criteria air pollutants.

Pollutant	Daily Emissions[1] (lbs/day)	Quarterly Emissions[2] (lbs/qtr)
CO	63.66	2.984.88
ROC/VOC	10.28	495.44
NO_x	95.19	4,628.29
SO_x	3.94	146.69
PM_{10}	3.11	152.89
$PM_{2.5}$[3]	2.92	144.724

[1] Daily emissions include barge loading, workers commuting, tugboat/barge shipping, and material off-loading at project site during one day.

[2] Total of 60 days of construction of reef restoration, all in one quarter, with some components of construction occurring over 36 days. Quarterly numbers were computed by adding quarterly emissions estimates for individual components.

[3] $PM_{2.5}$ estimates were calculated by using updated CEIDARS Table with PM2.5 Fractions.

6.2.3 Daily and Quarterly Greenhouse Gas Emissions (GHG)

Climate change, as it relates to human-made greenhouse gas (GHG) emissions, is by nature a global impact. The cumulative GHG (CO2 and CH4) emissions and computed CO2e values associated with the proposed action are presented in Table 6-2. Total CH4 emissions are 0.047 MT (103.3 lbs) and total CO2 emissions are 347.8 MT (766,843 lbs) (Table 6-3). Thus, the construction of this project would not exceed the SCAQMD threshold of 10,000 MT/yr for industrial projects, 3,000 MT/yr for commercial projects, or 1,100 MT/yr for mixed projects. Because the SCAQMD threshold is not exceeded, the GHG effects are considered to be minor and mitigation measures are not required.

Table 6-2. Total annual Greenhouse Gas (GHG) emissions.

GHG	Annual Emissions[1] (lbs)	Annual Emissions[2] (MT)
CO_2	766,843.8	347.84
CH_4	103.31	0.047
CO_2e[3]		348.8

Source: CE Reference No. 14-27, Air Quality Technical Report

[1] Summation of all construction components
[2] GHG significance determined by MT/yr (2204.62 lbs in a 1 metric ton)
[3] CO_2e calculated by summing $CO_2 + 21*(CH_4)$

6.2.4 Consistency with Applicable Plans and Policies

Consistency with the following air quality plans and policies was reviewed: 1) the Federal Clean Air Act; 2) State CEQA Guidelines; and 3) SCAQMD significance criteria. Under Section 182(e) of the federal Clean Air Act, the significance level for any proposed project in an area of extreme nonattainment is identified at 10 tons/year (20,000 lbs/yr) of volatile organic gas emissions or 10 tons/year (20,000 lbs/yr) of nitrogen dioxide emissions. For this project, total volatile organic gas emissions were 495 lbs, while nitrogen dioxide emissions were 4,628 lbs. Since California has more stringent standards for certain criteria pollutants, the SCAQMD standards were utilized to determine consistency with plans and policies. None of the construction-related emissions were above the daily or quarterly emission thresholds established by the SCAQMD. For this reason, the proposed action is considered consistent with the applicable plans and policies.

6.3 Land Use Plan Consistency

The proposed action would restore kelp and other marine biological resources in an area where such resources have been diminished over time by the effects of wastewater disposal. The rocky-reef habitat created by the placement of quarry rock would not change the current use of the site, but enhance its biological productivity. The restoration and enhancement of coastal marine biological resources is consistent with the California Coastal Act, the California Fish and Game Code, the California Ocean Resources Management Act, Coastal Zone Management Act, the California Ocean Plan, and the City of Rancho Palos Verdes Coastal Specific Plan. There are no

conflicts with General or Specific Plans or policies adopted by the City of Rancho Palos Verdes, the City of San Pedro, or the County of Los Angeles.

6.4 Visual Aesthetics and Noise

The construction of the rocky-habitat reef would require the use of tugboats, a crane, barges, an off-loading bulldozer, and other boats and equipment 0.3 miles (1,600 feet) offshore for up to 60 days, Monday through Saturday, during daylight hours. These construction boats, equipment, and activities would be visible during the day from residential areas beaches, open space recreation areas, roads, and from boats. At night, navigation lights would be visible. The use of the equipment during the day would produce noise estimated to range from 51 to 60 dBA as measured 1,600 feet away from the project site (Table 6-3). Once the construction has been completed, all of the equipment would be removed. The constructed rocky-reef habitat would be submerged, unobtrusive, and would not produce noise. A small boat with a crew of divers would periodically visit the project site after construction to inspect and monitor the progress of the restoration.

The construction-related effects on visual aesthetics and the noise of the boats, equipment, and activity are unavoidable for this proposed action. However, these effects are not considered to be significant because coastal residents and others who use the beaches and coastal zone for recreation are used to and expect the occasional and temporary offshore presence of tugboats, barges, cranes, boats, and other equipment. Coastal protection projects, dredging, repair and maintenance of discharge and intake facilities, and offshore terminals are ongoing along the southern California coastline. In addition, the noise to be produced by the construction activity is limited to the daylight hours and will be at levels not highly distinguishable from ambient noise levels along the beaches and coastal roads. A planned public outreach program will explain the purpose of the project and the timing and limited duration of construction. This will inform the public that the purpose of the proposed action is ecological restoration and that no permanent structures are being constructed.

Table 6-3. Estimated sound levels (dBA) at various distances, originating from the construction phase of this project.

Operation	Equipment	Hours of Operation	Quantity	Sound Levels at Maximum Engine Power With Mufflers at Indicated Distances (dBA)				
				100 Feet	200 Feet	400 Feet	800 Feet	1600 Feet
Towing barge/ Anchor positioning/ Standby	Tugboats	8	2	84	78	72	66	60
Positioning system	Diesel engine	9	1	81	75	66	60	54
Power-up during operation hours	Generator	9	1	75	69	63	57	51
Scoop and drop rock from barge	Tracked loader	8	1	79	73	67	61	55
Hoist track loader onto rock barge	Derrick cranes	1.5	1	82	76	70	64	58
Maneuver items on derrick barge platform	Bulldozer	1	1	82	76	69	63	57

Sources: Bolt, Beranek, and Newman (1971), the US Army Environmental Hygiene Agency (1991), the Port of Los Angeles (2007), and the United States Department of Transportation, Federal Highway Administration (2009).

6.5 Recreational Opportunities and Uses

The construction boats, equipment, and activity would be visible during the day to people using the nearby beaches and open space recreation areas and by people using the general project area for diving, fishing, or boating. Navigation lights would be visible at night. The construction would take place up to 60 days, during daylight hours, on Monday through Saturday. Noise from the construction would not be highly distinguishable from ambient levels on the beaches or in open space areas, but could be a disruptive factor for boating, fishing, or diving in areas closer to the boats and equipment. These effects are unavoidable, but not considered significant because tugboats, barges, and small-scale construction equipment and activities are common along the southern California coastline. People who are boating, fishing, or diving in the area are used to avoiding moored barges, ships, offshore construction activities, and have access to many nearby alternative locations with similar recreational attributes and opportunities.

An additional issue for recreation involves concern that the proposed rocky-reef habitat and resulting kelp forest might affect surfing opportunities and use along the shoreline by influencing the size, shape, and direction of surfing locations or breaks. These concerns were addressed in a relevant study conducted by Elwany et al. (1998) that concluded that reefs and the associated kelp

forests would not change the measurable attenuation of height or energy of long-period swell waves, nor would they affect the propagation or direction of swell waves. The study also concluded that the construction of a reef would not substantially affect the distribution and transport of sediment in the littoral zone, nor the width of the beach. The study also determined that kelp forests dampen the effects of high-frequency sea waves, which are generated by local onshore winds and result in surface chop or roughness. These rough, choppy conditions are generally not favorable for surfing. The presence of a kelp forest would therefore be expected to reduce these conditions, help foster a smooth, glassy sea surface, and thereby have a beneficial effect on surfing.

6.6 Potential Effects Considered and Eliminated from Further Detailed Analysis

6.6.1 Cultural Resources

The potential effects on cultural resources were considered but eliminated from further detailed consideration for the following reasons. The 69 acre site is located in water depths where the sediment movement is dynamic and the sediment cover is thin. This is not an environment in which cultural materials would be expected to remain in place. Both side-scan radar surveys and visual inspection by divers failed to detect the presence of manmade materials. Furthermore, the construction of the reef does not involve excavation, which might have the potential to disturb any existing resources. Rather, the construction involves the placement of quarry rock covering material, which is protective of buried resources.

6.6.2 Transportation

The potential for transportation-related effects was considered but eliminated from further detailed consideration because the project site is located outside of designated shipping lanes, the numbers of boats and barges to be used is small. Existing navigation lights, aids, and rules are considered sufficient to protect lives and property.

6.6.3 Water Quality

The potential for water quality-related impacts from the placement of quarry rock in the ocean was considered but eliminated from further detailed consideration because the proposed action includes a commitment that the materials will conform to the California Department of Fish and Wildlife's Material Specification Guidelines, as follows.

- The materials shall be clean and free of any contaminants, especially those that could dissolve in seawater (e.g., asphalt, paint, oil, or oil stains).
- All rocks used for the project must be accepted by state and federal agencies in the following respects:
  - Purity: The materials shall be free of contamination and foreign materials.
  - Specific gravity: Shall be greater than 2.2.
  - Durability: Rocks used must remain unchanged after 30 years of submersion in seawater.

Furthermore, the potential for quarry rock to cause turbidity and release of harmful substances upon impact with the ocean bottom was considered but eliminated from further detailed consideration, for two reasons. First, the project site is located in a dynamic environment in which sand and fine sediment are naturally periodically suspended, transported, and deposited. Second, because of the dynamic environment, the project site is known to be free of the contamination from historic White Point Outfalls releases that occurs offshore in much deeper water.

6.6.4 Socioeconomics, Public Services, and Utilities

The proposed action would involve the placement of rock on submerged land in order to restore biological resources. The construction will require a small crew and a small number of tugboats, barges, boats, and other readily available for-hire construction equipment. The occurrence of additional sea habitat, sea life, and 60 days of small-scale construction, would not cause changes in human population numbers, population or housing growth, or the demand for new public services. For these reasons, the effects of the proposed action on socioeconomics, public services, and utilities were considered but eliminated from further detailed analysis.

6.6.5 Geology

The proposed action would involve the acquisition of rock from existing commercial quarries and the placement of the quarry rock on low relief, submerged land 0.3 miles offshore of the City of Rancho Palos Verdes. The objective is to create a hard, rocky substrate upon which kelp will become established. There are no issues in terms of effects on human populations or of exacerbating the risk of landslides, earthquakes, or tsunamis. Furthermore, the project site is not an area of special geologic interest. For these reasons, the effects on geology were considered but eliminated from further detailed analysis.

6.6.6 Energy Use

The proposed action includes the use of diesel fuel powered trucks, tug boats, small service boats, a crane, and an off-loader during 60 days of construction. Up to an estimated 72,000 gallons of diesel fuel is expected to be utilized during this period. There are no standards or thresholds established for fuel use apart from avoiding the wasteful use of energy resources. In fact, the economic feasibility of the proposed action dictates the efficient use of diesel fuel powered equipment and human resources, and energy conserving strategies are included in the proposed action for these reasons. Considering the above, the potential effect on energy use was considered but eliminated from further detailed analysis.

6.6.7 Mineral Resources

The proposed action would involve placing quarry rock on 40 acres of submerged land 0.3 miles offshore to create hard, rocky substrate upon which kelp will become established within a 69-acre project site. Sand is mined offshore in southern California for use as beach replenishment, but the project site was selected because of the relative absence of sand, since sand can cover hard substrate and inhibit the growth of kelp. There has historically been interest in mining nodular phosphorite along the southern California coast to be used to produce fertilizer, but with no

resulting commercial extraction. Offshore oil and gas extraction is also a potential use for the project site. However, the 69-acre project site is not currently being mined for minerals nor used for oil or gas extraction, and there are no known plans for mining or oil or gas extraction on the site. For these reasons, the effect of the proposed action on mineral resources was eliminated from further detailed analysis.

6.6.8 Growth Inducement

An important issue in California is whether a proposed action may directly or indirectly foster population growth and the consequent growth in demand for services and utilities, or may remove an obstacle that clears the path for the implementation of a separate development project. In this case, the proposed action is the restoration of pre-existing offshore biological resources. The type or nature of the proposed action is such that population growth would not be an expected direct or indirect result. The proposed restoration is not associated with a housing development project of any kind or with any project that would provide new services or utilities to facilitate the development of new housing. In addition, the proposed restoration is not an action that will be used as an offset or compensation measure for another proposed action. For these reasons, the potential for growth inducement was considered, but eliminated from further detailed analysis.

CHAPTER 7 UNAVOIDABLE ENVIRONMENTAL EFFECTS

The proposed action includes burial of existing biological habitat and resources within a 40-acre area offshore of the southern California coast in order to create rocky-reef habitat conditions. These rocky-reef habitat conditions are expected to improve and restore the existing biological conditions within a 69-acre project site, resulting in a much larger and more diverse biological community. The loss of the existing resources is an unavoidable effect of the proposed action.

The construction phase of the proposed action will consume fuel and irreversibly commit labor and capital resources. It will also produce emissions that will adversely affect air quality. And, the presence and operation of construction equipment 0.3 miles offshore from the City of Rancho Palos Verdes will cause adverse visual effects and noise. The post-construction phase will involve periodic monitoring using ships and divers. This monitoring will also consume fuel and irreversibly commit labor and capital resources.

All of these effects are unavoidable consequences of the proposed action. The effects, however, are considered minor because of the small scale of the project and the fact that no permanent structures will be visible after the construction 60 day construction period and that no noise will be generated by the rocky-reef habitat.

CHAPTER 8 MITIGATION MEASURES AND MEASURES TO REDUCE ENVIRONMENTAL EFFECTS

8.1 Introduction

All of the environmental effects of the proposed action are considered minor and therefore no required mitigation measures are necessary. There are, however, several measures that could be implemented to further reduce the minor environmental effects, as follows:

8.2 Biological Resources

A preconstruction survey would be carried out within 30 days of the start of construction for white, pink, and pinto abalone. If a white abalone were to be discovered, NOAA would contact the University of California at Davis, which holds permit for collection of white abalone to enhance captive broodstock. The survey would assure the white abalone meets the collection requirement that no other white abalone occurs within a ten-meter radius, and then the white abalone would be collected and transferred to Davis. If a pink or pinto abalone were discovered, or a white abalone that does not meet the collection requirement, NOAA would consult with the State Department of Fish and Wildlife and upon receiving authorization, relocate the animals to suitable habitat on the western side of Palos Verdes Peninsula, outside of the project area.

The post-construction monitoring/survey operations, including the use of a side-scan sonar system, would operate under the California State Land Commissions Offshore Geophysical Survey Permit Program (OGPP). The OGPP includes measures designed to protect marine life.

8.3 Public Outreach

A planned public outreach program will explain the purpose of the project and the timing and limited duration of construction. This will inform the public that the purpose of the proposed action is ecological restoration and that no permanent structures are being constructed. This will include notifying the media and local residents about both the type and duration of construction activities a month prior to beginning construction. Notices will also be placed at parks and nearby viewing stations.

- The Harbor Patrol will be notified two weeks prior to the start of construction activities for the Palos Verdes Reef Restoration Project.
- Local lifeguards will be notified of construction activities so they can help inform the public.
- A Local Notice to Mariners will be submitted to the U.S. Coast Guard Waterways Branch. The notice will include information about the purpose of the project and the location and timing of the construction activities.
- Construction notices targeting divers will be posted at dive forums, local dive shops, and nearby city, county, and open-space recreational areas where divers access dive spots near the project site.

- Construction notices targeting fishing and boating will be posted at the Long Beach and Los Angeles Harbors, the nearest Harbor Patrol office, the Cabrillo boat ramp, and the Cabrillo Pier.
- Recreational fishing and commercial fishing businesses that conduct operations in the project area will be notified of the project-related activities two weeks prior to the onset of construction. Notification will include a map of the project site, hours and duration of operation, and the predicted path of barge travel into and out of the construction site.

8.4 Air Emission Reduction Strategies

- Water sprays will be applied to the quarry rock piles/graveled areas and conveyor belts in the Catalina Island loading area at least twice daily. The frequency of watering will be increased when wind speeds exceed 15 miles per hour.
- The injection timing on diesel engines will be retarded to two degrees Before Top Center (estimated ten percent reduction in NO_x emissions).
- High-pressure injectors will be used on diesel engines to reduce NO_x emissions by approximately 40 percent (not applicable to tugboats).
- A live boating method will be used to off-load material at the reef site to eliminate the use of the crane and derrick barge. As such, the quarry rock will be pushed off the towing barges with a track loader. This will reduce daily and quarterly NO_x emissions.

8.5 Energy Conservation

- Reformulated diesel fuel No. 2 will be used by all of the heavy equipment. Additionally, Tier 2 and Tier 3 diesel-equipped engines, which reduce emissions of nitrogen oxides and particulate matter, will be utilized.
- Contractors will organize the construction activities to make the most efficient use of time, equipment, and materials, which will in turn result in the most efficient use of energy resources. Construction methods, such as towing two barges loaded with quarry rock from the Catalina rock quarry to the project site instead of only one barge, will reduce overall emissions.

8.6 Protecting Water Quality

- The quarry rock will be regularly inspected by an independent laboratory to ensure the materials placed on the project site conform to the California Department of Fish and Wildlife's Material Specification Guidelines and are protective of water quality.

CHAPTER 9 CUMULATIVE EFFECTS

9.1 Introduction

Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR§1508.7). Cumulative impacts may occur when there is a relationship between a proposed action and other actions expected to occur in a similar location or during a similar time period, or when past or future actions may result in impacts that would additively or synergistically affect a resource of concern. These relationships may or may not be obvious. Actions overlapping within close proximity to the proposed action can reasonably be expected to have more potential for cumulative effects on "shared resources" than actions that may be geographically separated. Similarly, actions that coincide temporally will tend to offer a higher potential for cumulative effects.

In considering the proposed action, the restoration of offshore biological resources adjacent to the City of Rancho Palos Verdes, biological resources and air quality would be shared resources of potential concern. In addition, projects or activities in the general vicinity that exacerbate the visual aesthetic and noise effects of the proposed action on residents and people using the adjacent waters and coastal area for recreation would be of potential concern for cumulative impacts.

9.2 Biological Resources

As a principle for cumulative effects, actions that might permanently remove a biological resource would be expected to have a potential to act additively or synergistically if they affected the same population, even if the effects were separated geographically or temporally. In the case of this proposed action, the creation of rocky-reef habitat, biological resources would initially be lost to burial, but would later be replaced by an enhanced and more diverse biological community. For this reason, the potential cumulative effects of the proposed action would be beneficial in the context of ongoing impacts to biological resources from the many existing coastal industrial facilities, including electric power generation, petroleum products and refining, proposed construction projects such as improvements within the Ports of Los Angeles and Long Beach, and several proposed water desalinization projects. Many of these existing and proposed projects are subject to biological resources protection and mitigation requirements, some of which are subject to requirements for biological resources enhancement or restoration. The proposed action, the creation of rocky-reef habitat, would be beneficial and synergistic with the biological protection, mitigation, enhancement, and restoration efforts associated with these projects.

The proposed action would also be synergistic with other efforts to protect, enhance, and restore biological resources along the southern California coast. This includes the several elements of the Montrose Settlements Restoration Program, which seeks to achieve long-term net improvements in fish and wildlife habitat, the restoration of ecological balance in areas where contamination and other human-caused disturbances have led to adverse impacts on sensitive native species, and improvement in the human use and non-use services provided by fish and wildlife in the region. The proposed action would also be synergistic with: 1) the California Marine Life Protection Act

Initiative, which is involved in designing and managing a network of marine protected areas to protect marine life, habitats, and ecosystems. And, 2) the Montrose Settlements Restoration Program (MSRP) Phase 2 Restoration Plan. NOAA is the lead federal agency on the MSRP Trustee Council.

9.3 Air Quality

Along with the biological resources benefits of the proposed action, there are also emission-related effects on air quality from the construction of the rocky-reef habitat. These effects are minor and unavoidable if the proposed action is implemented. The evaluation of cumulative effects focuses on whether the effects should be considered major or significant when combined with other existing and future emissions in the area. The potential concern for cumulative effects for this particular proposed action is alleviated due to the small scale and timing of the project and has been addressed in considering the SCAQMD emissions permitting thresholds. Specifically, the proposed action requires the operation of two tugboats, barges, a crane, an off-loading bulldozer, several other small boats and pieces of equipment. The emissions released from operating these boats and pieces of equipment for up to 60 days are infinitesimally small when compared with the total emissions generated within the SCAB during this period and would not reasonably cause basin wide emissions thresholds to be exceeded. The emissions from the proposed action fall below the permitting thresholds established by the SCAQMD.

9.4 Visual Aesthetics and Noise

The construction of the proposed rocky-reef habitat would require the presence and operation of boats, barges, a crane, other small boats and equipment for up to 60 days in a location 0.3 miles offshore of the City of Rancho Palos Verdes. The construction would be visible to coastal residents and people using the beaches and other recreation facilities in nearby waters and along the adjacent coastline. The sound of the construction activities would typically blend in with the ambient noise along the coast, but might momentarily be distinguishable from other sources of noise, particularly on the water close to the construction site. Similar construction activities occur frequently along the southern California coastline and 60 days of construction 0.3 miles offshore from the City of Rancho Palos Verdes is be considered a minor effect both because of the small scale of the activity and the fact that no permanent structures will be visible following the end of the construction period.

Cumulative effects would occur if there were one or more other construction projects planned in the immediate project area during the 60 days of construction, and/or planned to occur soon before or after the proposed action. However, no such projects were identified during the site selection process for the proposed action or during consultation with the California State Lands Commission, the State agency with permitting jurisdiction over submerged lands in the vicinity of the project site.

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APPENDIX A

ANCHORING PLAN

PALOS VERDES REEF RESTORATION PROJECT

APPENDIX A

ANCHORING PLAN

An anchoring plan is necessary to assure the quarry rock is placed as precisely as possible in the design locations, to avoid placing rock on hard substrate areas, and to avoid anchor drag that might damage hard substrate. Figures A-1 and A-2 show the derrick barge and offloading operations. Figure A-3 is a schematic showing the operations including the placement of anchors.

The derrick barge will be moored by six anchor cables attached to winches on the barge. During rock placement, the barge will be located at the required position by winching on the six cables connected to the respective anchors. The anchors are designed to minimize possible drag on the bottom. This will be achieved by connecting each offshore anchor to a ten-ton concrete block located on the ocean floor and by connecting the cable from the barge to each concrete block via a foam-filled can (surge-can), as shown in Figure A-3. Anchors will be placed on sandy-bottom areas or on areas with less than 30 percent coverage of hard substrate.

Each anchorage location will allow a maximum coverage of 2,000 ft by 800 ft. The anchors will be located based on (a) the ocean bottom topography; (b) the existing potential for environmental harm to existing habitat as a result of the placement of anchors, chains, buoys, and/or cables; (c) and the weather conditions.

Figure A-1. Derrick barge.

Figure A-2. Rock placement method; front-end loader/flat supply-barge "push off" method.

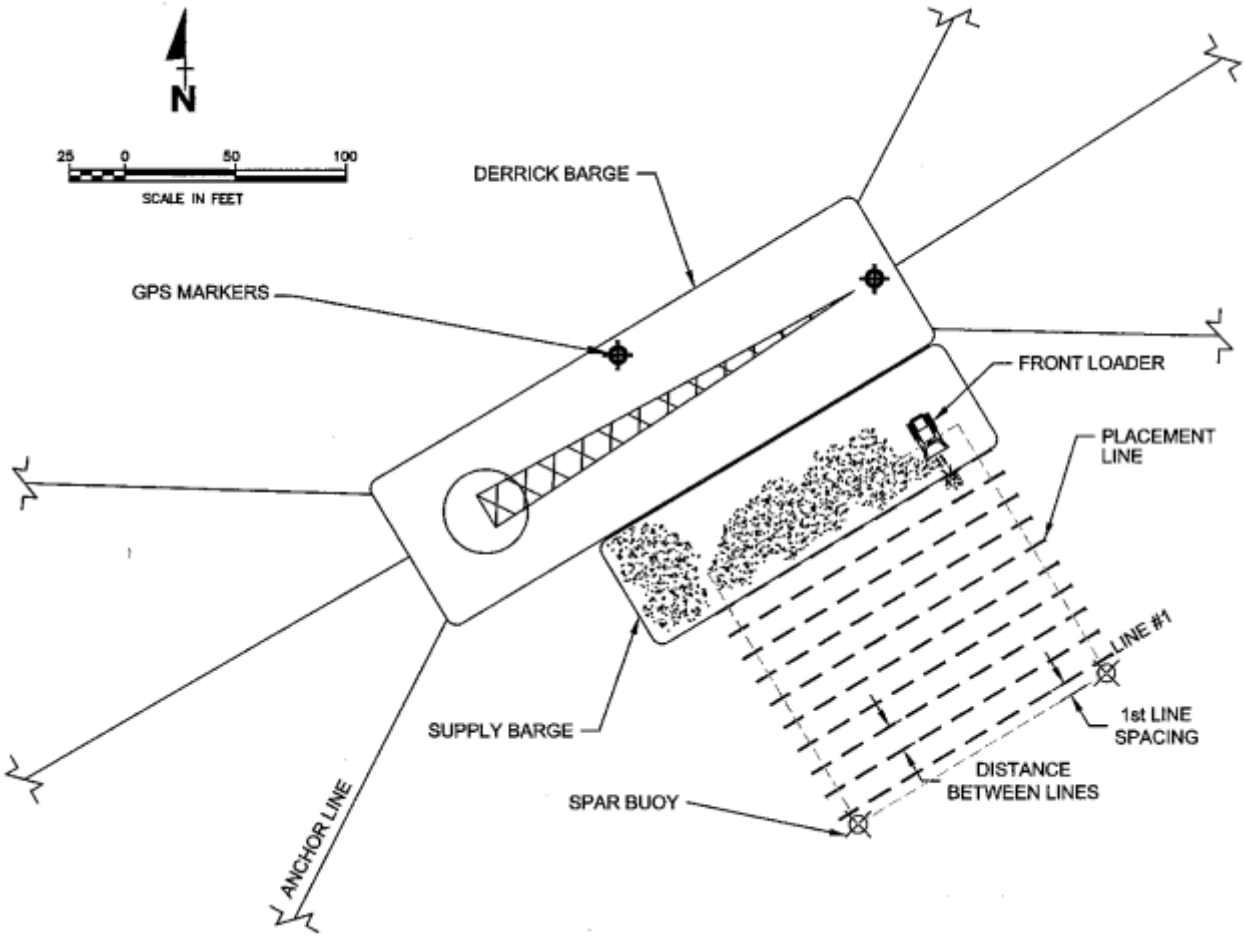

Figure A-3. Construction-method schematic showing derrick barge, supply barge, front-loader, rock placement lines, and six-anchor positioning.

APPENDIX B

OIL SPILL CONTINGENCY PLAN

PALOS VERDES REEF RESTORATION PROJECT

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OIL SPILL CONTINGENCY PLAN

PALOS VERDES REEF RESTORATION PROJECT

1.0 INTRODUCTION

At the initiation of each project or project phase, a spill management review will be conducted by the vessels captain who is in all cases the responsible authority. It should be pointed out that any oil spill in United States (U.S.) marine waters shall be reported immediately (on the same day). Reporting information is stated in Section 7.0.

2.0 OPERATIONAL SPILLS

Operational spills might involve one or more of the following substances carried on board the vessel: (i) diesel fuel; (ii) lube oil; (iii) hydraulic oil; or (iv) waste oil.

(i) Diesel fuel:

A spill kit shall be available for use in the event of a spill. If the fuel is spilled on the deck, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel foreman shall notify the Coast Guard and port facility.

(ii) Lube oil:

A spill kit shall be available for use in the event of a spill. If the oil is spilled on deck or in the machinery space, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel foreman shall notify the Coast Guard and port facility.

(iii) Hydraulic oil:

A spill kit shall be available for use in the event of a spill. If the oil is spilled on deck or in the machinery space, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel foreman shall notify the Coast Guard and port facility.

(iv) Pipe leakage:

The vessel foreman shall check the piping and rubber hose daily for leakage. Where leakage is found, it shall be repaired immediately. In the event of leakage, the vessel deck engineer shall secure valve(s) at the appropriate tank before repairing the leak. Spilled fuel on the vessel shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel foreman shall notify the Coast Guard and port facility.

3.0 SPILLS RESULTING FROM CASUALTIES AND VESSEL PROBLEMS

In the event of a casualty, the vessel foreman's first priority is to ensure the safety of the vessel's personnel and to initiate actions that may prevent escalation of the incident and marine pollution.

(i) Grounding:

The likelihood of grounding, although remote, could occur when the vessel is working near shore. Should an unforeseeable grounding event occur that causes a spill, the vessel foreman shall immediately report the accident to the Coast Guard and port facility. It is mandatory that the survey company immediately report the incident to the California Office of Emergency Services ("OES").

(ii) Fire or explosion:

If a fire or explosion occurs, the Coast Guard and port facility will be notified immediately by the vessel foreman. While awaiting a response from the USCG or local fireboat agencies, all crewmen shall report to the foreman for a head count. In the event that one or more crewmen are missing, the vessel foreman shall so notify the site safety officer and direct a search for the missing crew where practical. If one or more crewmen are injured, the foreman shall render first aid with the assistance of available crewmen. The foreman shall also notify the site safety officer of any injuries sustained as a result of the fire or explosion.

The crew will fight the fire with portable fire extinguishers if this can be done safely. The foreman shall determine if the fire or explosion warrants abandoning the vessel. If it is determined that the vessel is to be abandoned, the crew shall don life vests and safely enter the water or available life raft.

If there is a spill as a result of the fire or explosion, the vessel foreman shall immediately report the incident to the Coast Guard and port facility. It is mandatory that the survey company immediately report the incident to the OES.

(iii) Collision:

A collision is unlikely to cause a spill unless the vessel sinks or the fuel tank is "holed." If it is determined that the vessel is to be abandoned, the crew shall don life vests and safely enter the water or available life raft.

If the collision causes a spill from the fuel tank, the foreman shall immediately report the incident to the site safety officer, Coast Guard, and port facility. It is mandatory that the survey company immediately report the incident to the OES.

(iv) Vessel submerged/foundered:

If the vessel is submerged or foundered to the extent that it, or parts of it, is submerged, all measures shall be taken to evacuate all persons on board. Avoid contact with any spilled oil. Alert

other vessels/vessels and/or the nearest coastal state for assistance in rescuing lives and the vessel as far as possible.

4.0 PRIORITY ACTIONS TO ENSURE PERSONNEL AND VESSEL SAFETY

Safety of vessel personnel and the vessel are paramount. In the event that a crewman's injuries require outside emergency assistance, the site safety officer shall be contacted immediately and emergency personnel contacted. While awaiting emergency assistance, the survey company's vessel personnel will render first aid and/or CPR.

5.0 MITIGATING ACTIVITIES

If safety of both the vessel and the personnel has been addressed, the vessel foreman shall care for the following issues:

- Assessment of the situation and monitoring of all activities as documented evidence.
- Care for further protection of the personnel, use of protective gear, assessment of further risk to health and safety.
- Containment of the spilled material by absorption and safe disposal within leakproof containers of all used material onboard until proper delivery ashore, with due consideration to possible fire risk.
- Decontamination of personnel after finishing the cleanup process.

All personnel shall refer to the MSDS's on board for additional information.

6.0 MEASURES TO BE TAKEN IN THE EVENT OF CASUALTY

(i) Response to collision

The vessel foreman and crew shall ensure that the following actions are taken.

- When there is no immediate danger to their own vessel and crew, rescue crew of the other vessel.
- Investigate the damaged area of the vessel and the ingress of water and take emergency measures to prevent the damage from becoming worse.
- When ingress of water is found as a result of damage investigation, take necessary measures to prevent water from coming in, or pump out the water already taken in, according to the position and amount of water taken in. Such measures include the closing of water-tight doors, inserting wooden plugs, use of collision mats, cement box, strengthening of bulkhead, and use of water discharge pumps.
- When water penetration is severe even after countermeasures are taken and there is a danger of the vessel sinking, consider intended grounding on an appropriate shore.

(ii) Response to grounding

If the vessel runs aground, the vessel foreman and crew shall muster and the following steps should be taken immediately.

(1) Eliminate all avoidable sources of ignition and ban all smoking on board.

Further actions:

(1) Carry out a visual inspection of the vessel to determine the severity of the situation.
(2) Take soundings around the vessel to determine the nature and gradient of the seabed.
(3) Check difference in the tidal ranges at the grounding site.
(4) Evaluate tidal current in the grounding area.

Having assessed the damage that the vessel has sustained, and taking into account the effects of hull stress and stability, the foreman should decide whether any action can be taken to avoid further spillage, such as:

(1) Transfer of cargo and bunkers internally. If the damage is limited—for example, to one or two tanks—consideration should be given to transfer of liquid from damaged to intact tanks.
(2) Review existing and forecasted weather conditions to see if they will adversely affect the vessel.
(3) Evaluate the possibility of transferring cargo to barges or other vessels, and request such assistance accordingly.
(4) Trim or lighten the vessel sufficiently to avoid damage to intact tanks, thereby avoiding additional pollution from spillage of oil or noxious liquid substance.

The foreman should obtain information about the situation, including the following.

(1) Tides and currents
(2) Weather, including wind, state of sea and swell.
(3) Any weather forecast changes.
(4) Nature of the bottom.
(5) Depth of water around the vessel, the calculated buoyancy needed to refloat, draught, and trim after refloating.
(6) Condition of the vessel, including stresses on the hull.

Strict safety precautions should be taken before entering any empty space, in order to avoid any risks from toxic fumes or oxygen deficiency.

Soundings should be taken around the vessel to determine the extent of the grounding/stranding as accurately as possible. If the sea is too rough for accurate sounding, it may be possible to measure the distance from the seabed to the main deck. By marking this on a longitudinal section from the general arrangement drawings, the extent of grounding can be determined.

If the vessel is structurally intact, an immediate attempt may be made to refloat her with or without assistance. In deciding whether to make an immediate attempt to refloat, the foreman should consider the use of the tugs and ground tackle as well as the possible damage that might be caused to the vessel.

Immediate refloating may be the best course to adopt even if the vessel has sustained bottom damage. However, if there are signs of excessive hogging, sagging or of undulations in the sides of the hull, more careful consideration is required before attempting to refloat the vessel. In these circumstances, lightening of the vessel may reduce the risk of further damage and pollution.

(iii) Response to submerged/foundered

The vessel foreman and crew shall muster and ensure that the following actions are taken immediately.

- If the vessel is wrecked to the extent that it or parts of it are submerged, take all measures to evacuate all persons on board.
- Avoid contact with any spilled oil.
- Alert other vessels and/or the nearest coastal state for assistance in rescuing lives.
- All openings in hull and superstructures are to be checked for watertight integrity. Ensure that all water doors, sewage and other relevant damage control valves are closed.
- Fill bottom tanks with ballast low side first.
- Should the situation appear to be deteriorating, urgency or distress messages should be dispatched as appropriate.

7.0 REPORTING AN OIL SPILL TO STATE AND FEDERAL AGENCIES

Any oil spill in U.S. marine waters shall be reported immediately (on the same day) to the state and federal phone numbers below:

West Coast Oil Spill hot-line	800-OILS-911, *or*
Department of Fish and Game CalTIP	888-CFG-CALTip
(Californians Turn In Poachers & Polluters)	(888-334-2258). *and*
U.S. Coast Guard National Response Center	800-424-8802
California Office of Emergency Services (OES)	800-OILS-911 or 800-852-7550.

During the phone call, the following information will be given over the phone.

a. Name and telephone number of caller.
b. Where did you see the spill?
c. What do you think was spilled (oil, gas, diesel, etc.)?
d. Can you estimate the size of the spill?
e. The date & time you saw this spill? (PLEASE report on the same day).
f. Did you see any oiled or threatened wildlife?
g. Do you have any information or thoughts about who spilled the material?

h. What, if any, activity did you observe at the spill site?

After taking the necessary actions, the spill will be reported in writing to the Governor's Office of Emergency Services on their forms.

8.0 DIVER CHECKLIST

Prerequisites:

1. Copy of dive manual shall be at work site.
2. Site safety has reviewed work plan.
3. A written pre-job brief has been approved by the manager or designee.
4. All prerequisites required in the dive manual have been met.
5. Verify that a rescue plan is in place.
6. All procedures, drawings, and work documents are available.
7. All video and communication equipment is operable.
8. All diver qualifications are active.
9. Any known hazards have been identified.
10. Verify that all hazard barriers are in place.
11. Verify that waves and tidal conditions will not impact diving operations.
12. A diving supervisor shall be present at all times while the diver is in the water.

Diver Equipment Checkout:

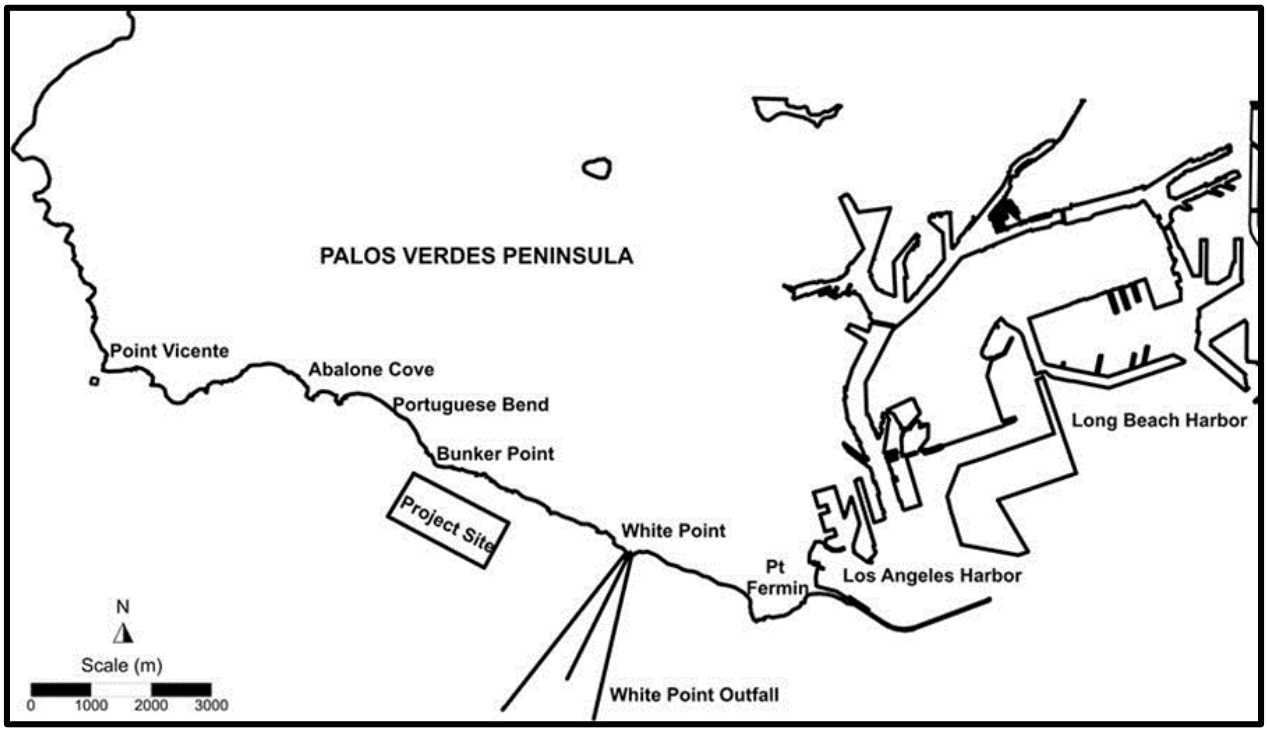
1. Ensure that there are two sources of breathing air available.
2. Ensure that air compressor fuel tank and oil levels are full prior to diving.
3. Ensure that breathing air compressors are not located in an area where the induction of harmful gases is possible.
4. Ensure that the Dive Supervisor inspects the diver's equipment per their daily equipment checklist.
5. Ensure that diver communication equipment checkout is performed.

Placing a Diver in the Water:

1. Notify the control room prior to commencing dive activities. Also:
    a. Verify method of communication to be used with the control room.
    b. Notify control room at conclusion of daily dive activities.
2. Verify that standby divers are in the immediate area and in a state of preparedness to enter the water within two minutes.
3. If SCUBA equipment is used, two divers shall be in the water.
4. Remove the diver from the water if any operational changes are encountered.

APPENDIX C

INITIAL STUDY AND ENVIRONMENTAL CHECKLIST FOR THE PALOS VERDES REEF RESTORATION PROJECT



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February 2017

MISSION STATEMENT

The California State Lands Commission provides the people of California with effective stewardship of the lands, waterways, and resources entrusted to its care through preservation, restoration, enhancement, responsible economic development, and the promotion of public access.

CEQA DOCUMENT WEBSITE
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Geographic Location:

Latitude: N 33.720917
Longitude: W 118.349167

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INTIAL STUDY AND ENVIRONMENTAL CHECKLIST

This appendix contains the Initial Study (IS) that was prepared for the proposed Palos Verdes Reef Restoration Project (Project) in accordance with the requirements of the California Environmental Quality Act (CEQA). The National Oceanic and Atmospheric Administration (NOAA), the Project proponent, is the federal lead agency for the Project under the National Environmental Policy Act, and the California State Lands Commission (CSLC), as the land owner, is the state lead agency under CEQA. A Draft Environmental Assessment and Finding of No Significant Impact (DEA and FONSI) has been prepared by NOAA, and the CSLC intends to use the EA and FONSI as the CEQA-equivalent of a Negative Declaration (State CEQA Guidelines, § 15221).

The following IS identifies site-specific conditions and impacts, evaluates their potential significance, and discusses ways to avoid or lessen impacts that are potentially significant. The evaluation of environmental impacts provided in this IS is based in part on the impact questions contained in Appendix G of the State CEQA Guidelines; these questions, which are included under each environmental category (e.g., Aesthetics, Agriculture/Forest Resources, Air Quality, Biological Resources, etc.), are "intended to encourage thoughtful assessment of impacts." Each question is followed by a check-marked box with column headings that are defined below.

- **Potentially Significant Impact**. This column is checked if there is substantial evidence that a Project-related environmental effect may be significant. If there are one or more "Potentially Significant Impacts," an Environmental Impact Report would be prepared.
- **Less than Significant with Mitigation**. This column is checked when the Project may result in a significant environmental impact, but the incorporation of identified Project revisions or mitigation measures (MMs) would reduce the identified effect(s) to a less-than-significant level.
- **Less-than-Significant Impact**. This column is checked when the Project would not result in any significant effects. The Project's impact is less than significant even without the incorporation of Project-specific MMs.
- **No Impact**. This column is checked when the Project would not result in any impact in the category or when the category does not apply.

None of the environmental factors below would be affected by this Project (all impacts are either "Less Than Significant" or there would be No Impact).

☐ Aesthetics	☐ Agriculture and Forest Resources	☐ Air Quality
☐ Biological Resources (Terrestrial and Marine)	☐ Cultural and Paleontological Resources	☐ Geology and Soils
☐ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials	☐ Hydrology and Water Quality
☐ Land Use and Planning	☐ Mineral Resources	☐ Noise
☐ Population and Housing	☐ Public Services	☐ Recreation
☐ Transportation/Traffic	☐ Tribal Cultural Resources	☐ Utilities and Service Systems

☐ Mandatory Findings of Significance
☐ Other Major Areas of Concern: Commercial and Recreational Fishing
☐ Other Major Areas of Concern: Environmental Justice

A detailed Project description can be found in Chapters 1 and 2 of the DEA. Detailed descriptions and analyses of impacts from Project activities and the basis for their significance determinations are provided for each environmental factor on the following pages, beginning with Section 1.0, Aesthetics. Attachment 1 identifies federal and state laws and regulations pertaining to the various environmental categories and relevant to the Project. Local plans, goals, and policies applicable to the Project are listed in the Regulatory Setting for each environmental factor analyzed in this IS.

AGENCY DETERMINATION

Based on the environmental impact analysis provided by this Initial Study:

☒ I find that the proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent.
A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

Signature

2/21/2017
Date

Kelly Keen, Environmental Scientist
California State Lands Commission

1.0 AESTHETICS

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

1.1 Environmental Setting

The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula in Los Angeles County. Inshore of the Project site is the City of Rancho Palos Verdes, which includes numerous recreational facilities that use the visual character of the area, as well as scenic roadways, viewing stations, and residential communities. Additionally, this area is near the Ports of Los Angeles and Long Beach.

1.1.1 Recreational Facilities

Open spaces for recreation within the Project vicinity include: (1) Abalone Cove Shoreline Park; (2) Ocean Trails Reserve; (3) Trump National Golf Club; (4) Royal Palms/White Point County Beach; (5) White Point Nature Reserve; (6) Point Fermin Park; and (7) Angels Gate Park.

1.1.2 Scenic Roadways

There are no State Scenic Highways in the City of Rancho Palos Verdes; however, Palos Verdes Drive East, which has a distant view of the Project site, is a locally-designated scenic roadway in the City (City of Rancho Palos Verdes 2013a), and travelers on this roadway are considered sensitive to activities in the Project area.

1.1.3 Viewing Stations

The City of Rancho Palos Verdes General Plan–Visual Resources Element (2013a) identifies two types of viewing stations, viewing points and viewing sites, where people can enjoy the City's visual resources. Viewing points are locations at private residences and roadway turnouts along vehicular corridors that allow for the viewing of visual resources. Roadway turnouts with viewing points of the Project area include: Terranea Resort; Abalone Cove; Hawthorne Boulevard; and Trump National Golf Club. Viewing sites are larger areas that provide significant vantage points. Viewing sites within view of the Project include: Upper Point Vicente; Terranea Estates public trails; Trump National Golf Club public trails; and Ocean Trails Reserve.

1.1.4 Residential Communities near the Project Site

One-third of the total land in Rancho Palos Verdes is vacant, with more than three-fourths of the immediate coastline vacant (City of Rancho Palos Verdes 2013a). The closest residential communities to the Project site are located approximately 0.4 mile northeast of the site in Rancho Palos Verdes and approximately 0.6 mile inshore of the site, across the street from Palos Verdes Drive South. Because the latter community is located on a hill, residents would likely be able to view the Project site.

1.1.5 Harbors near the Project Site

The Ports of Los Angeles and Long Beach are located approximately 8 nautical miles (nm) from the Project site. Together, these ports handle over 4,000 commercial vessel calls per year (Port of Los Angeles 2014; CBRE Research 2015) and include 19 marinas with a total of 7,665 boat slips. Most of the area in the immediate Project vicinity is navigated by small recreational craft, sport-fishing excursions, and seasonally by lobster boats. Additionally, approximately 3 nm offshore of the Palos Verdes Peninsula are the western and northern routes of the shipping lanes, in which large commercial vessels travel to and from the Ports of Los Angeles and Long Beach.

1.2 Regulatory Setting

Federal and state laws and regulations pertaining to aesthetics and relevant to the Project are identified in Attachment 1. At the local level, the City of Rancho Palos Verdes General Plan–Visual Resources Element (2013a) includes a goal and policies that may be relevant to the Project:

- Goal: It shall be the goal of the City to preserve these views and vistas for the public benefit and, where appropriate, the City should strive to enhance and restore these resources, the visual character of the City, and provide and maintain access for the benefit and enjoyment of the public.
- Policy 1: Develop controls to preserve existing significant visual aspects from future disruption or degradation.
- Policy 2: Enhance views and vistas where appropriate.
- Policy 3: Preserve and enhance existing positive visual elements, while restoring those that have been lost.

1.3 Impact Analysis

a) Have a substantial adverse effect on a scenic vista?

Less Than Significant Impact. The Project would create short-term, temporary visual impacts associated with construction of the rocky reef; however, after the submerged reef is constructed, no scenic vistas would be affected. Construction of the reef would take place over a 40- to 60-day period, with construction paced at 1 acre per day, to place quarry rock on 40 acres within the 69-

acre Project site. During Project construction, several water craft (including a tugboat, barges, and small boats) would be visible from the shoreline. Such small-scale construction activity is common along the California coastline, and the occasional and temporary offshore presence of tugboats, barges, and other vessels and equipment are familiar sights to coastal residents and visitors who use the beaches and coastal zone for recreation. As described in Chapter 8 of the DEA, a planned public outreach program is scheduled to occur prior to construction to explain the purpose of the Project, as well as the timing and limited duration of construction. Because the only visual impacts associated with the Project would be during construction, which would be short-term and temporary, the Project would have a less than significant impact on scenic vistas.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. The Project site is not within view of a State Scenic Highway; therefore, there would be no impacts to scenic resources within a State Scenic Highway.

c) Substantially degrade the existing visual character or quality of the site and its surroundings?

Less Than Significant Impact. See answers to ***a)*** and ***b)*** above.

d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less Than Significant Impact. Construction would take place during daylight hours when any light generated by Project activities would be diminished by natural light, and any glare produced would be no more severe than glare generated by activities already occurring daily in nearshore waters. The transportation of quarry rock to and from the quarries on Santa Catalina Island and the Project site may occur at night. As a result, nighttime lighting would be required, but would be limited to safety-required navigation lighting. Safety-related lighting is a typical sight along the California coastline and is designed to be as unobtrusive as possible; therefore, it is considered to be neither a substantial nor new source of light. Because the completed reef would be entirely submerged with no lights or structures, there would be no potential for light or glare. Since any light or glare effects during construction and transportation of the quarry rock would be short term and temporary, the Project would have a less than significant impact on day or nighttime views in the area.

1.4 Mitigation Summary

The Project would not result in significant impacts to aesthetics; therefore, no mitigation is required.

2.0 AGRICULTURE AND FOREST RESOURCES

Would the Project[1]:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Natural Resources Agency, to non- agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Pub. Resources Code, § 12220, subd. (g)), timberland (as defined by Pub. Resources Code, § 4526), or timberland zoned Timberland Production (as defined by Gov. Code, § 51104, subd. (g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

2.1 Environmental Setting

The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula in Los Angeles County. No agricultural or forest resources are present offshore.

2.2 Regulatory Setting

No federal, state, or local laws relevant to agriculture and forest resources are applicable.

2.3 Impact Analysis

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Natural Resources Agency, to non-agricultural use?

[1] In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the State's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Pub. Resources Code, § 12220, subd. (g)), timberland (as defined by Pub. Resources Code, § 4526), or timberland zoned Timberland Production (as defined by Gov. Code, § 51104, subd. (g))?

d) Result in the loss of forest land or conversion of forest land to non-forest use?

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

a) through e) No Impact. There are no farm lands or forest lands located in the vicinity of the Project site, which is located 0.3 mile offshore; therefore, there would be no impact.

2.4 Mitigation Summary

The Project would have no impacts to agriculture and forest resources; therefore, no mitigation is required.

3.0 AIR QUALITY

Would the Project[2]:	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

3.1 Environmental Setting

3.1.1 Topography, Climate, and Meteorology

The Project is located within the South Coast Air Basin (SCAB), as well as the Southern California Bight climatological sub-region, which is characterized by a subtropical climate, with Mediterranean-type dry summers and short, mild winters. A series of mountain ranges and coastal plains border the SCAB. The Transverse Ranges are a series of east-west trending mountain ranges and include the Santa Monica, San Gabriel, and San Bernardino mountain ranges, which together delineate the northern boundary of the SCAB. The southeastern portion of the SCAB is bounded by the north-northwest trending Peninsular Ranges, which include the Santa Ana and Cuyamaca mountains. Winds are predominantly onshore throughout the year, with northwesterly winds during the summer and southeasterly winds during the winter. While winds typically disperse and dilute air pollutants, the combination of natural barriers such as mountain ranges, onshore winds, and temperature inversions within the SCAB, concentrate noxious pollutants on the coastal side of these ranges, resulting in deleterious air quality. A contrary wind condition, referred to as a "Santa Ana" (short for "Santa Ana winds"), occurs when a high-pressure cell over the Great Basin results in the reversal of the prevailing onshore winds. Within the SCAB, Santa Ana winds transport pollutants offshore; however, these southwesterly winds can also redistribute air pollutants to other air basins, such as the San Diego Air Basin.

[2] Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.

3.1.2 Air Pollutants

Air quality is measured as the relative degradation of ambient air quality standards, which are set by state and federal agencies. An air quality standard defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health. The National Ambient Air Quality Standards represent the maximum acceptable concentrations that may not be exceeded more than once per year, with the exception of the annual standards, which may never be exceeded. The California Ambient Air Quality Standards represent the maximum acceptable pollutant concentrations that are not to be equaled or exceeded, as established by the California Air Resources Board (CARB).

Criteria air pollutants are defined as those for which a state or federal ambient air quality standard has been established to protect public health (see Table 5-5 in the DEA). These include nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), volatile organic compounds (VOCs)/reactive organic compounds (ROCs), and particulate matter less than or equal to 10 microns in diameter (PM_{10}). Nitrogen oxides and VOCs/ROCs interact in the presence of solar radiation to form secondary pollutants such as ozone.

Air pollutants are broken down into primary and secondary sources. Primary pollutants are derived directly from a point source into the atmosphere. Secondary pollutants are derived from primary pollutants and are produced through chemical reactions and phase transformations that occur in the atmosphere. Air pollutants are expressed in concentrations, either parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$), which are averaged over a given sampling period. For more information regarding primary and secondary pollutants, see Section 5.4, Air Quality, of the DEA.

While air quality has improved in recent years in the SCAB, this basin exceeds standards for one or more air pollutants. State law requires CARB to designate each area as attainment, nonattainment, or unclassified for each State standard. If the hourly ppm levels for individual criteria pollutants exceed State or Federal standards, the area is considered to be in nonattainment. Tables 2-2 and 2-3 of the DEA present the attainment status of criteria pollutants in the SCAB and the number of days and hourly ppm concentration thresholds in the SCAB, respectively.

3.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to air quality and the Project are identified in Attachment 1. At the local level, the South Coast Air Quality Management District (SCAQMD) has regulatory jurisdiction over stationary sources of air emissions within the SCAB, and ensures compliance with state and federal air pollution control requirements. Mobile sources, such as transportation vehicles and mobile construction equipment, are regulated by the air districts only where these sources are operated as stationary sources. Stationary sources of air emissions for the Project include idling tugboats and the equipment used during loading and offloading of the barges. Mobile sources of air emissions for the Project, which are not regulated by the SCAQMD, include the trucks used to haul the quarry rock and the tugboats underway to and from

the Project site. NOAA consulted with SCAQMD staff in evaluating potential Project emissions and relevant permitting processes and requirements, and the SCAQMD determined that no permits are required for the Project. Nevertheless, the DEA and this appendix include an evaluation of the emissions from both stationary and mobile sources, along with measures to reduce the emissions.

3.3 Impact Analysis

a) Conflict with or obstruct implementation of the applicable air quality plan?

No Impact. Emissions would be produced during the construction phase of the Project; however, no emissions would be generated when the rocky reef is complete. The construction of the rocky reef would include emissions from tugboats, barges, and other equipment (e.g., crane, off-loading bulldozer) used to transport the quarry rock and place it on the seafloor. NOAA calculated the expected construction-related emissions, evaluated the emissions in relation to the Federal Clean Air Act and the more stringent SCAQMD significance criteria, and consulted with SCAQMD staff on the results of the analyses. All construction-related emissions, discussed in ***b)*** below, were below the daily and quarterly emission significance thresholds established by the SCAQMD (see Section 6.2, Air Quality, in the DEA). For these reasons, the Project was determined to be consistent with applicable air quality plans and policies; therefore, there would be no impact.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Less Than Significant Impact. Emissions would be produced during the construction phase of the Project; however, no emissions would be generated when the rocky reef is complete. Table C-1 provides a description of the individual Project-related activities that were included in the air emission analysis. Emissions would also be associated with the excavation and transport of rock from the quarries on Santa Catalina Island, which have direct marine access to the transport barges at the marina on Catalina Island; however, because the quarry owner (Connolly-Pacific Company) is operating under current permits, air emissions associated with this phase of the Project are not included in the following air emissions evaluation.

As described in in Section 3.2, Regulatory Setting, above, the SCAQMD regulates air emissions from stationary sources within the SCAB. The SCAQMD has published emission thresholds as guidelines for determining whether a project would have a significant impact on air quality under CEQA. The thresholds are expressed in terms of daily and quarterly levels of emissions, and are provided for the construction and operations phases of the Project. The period for estimating quarterly emissions is 78 days long given a 6-day work week. The Project would only generate potentially significant emissions during construction; consequently, only construction-related emissions and significance thresholds are considered in this analysis. The daily and quarterly significance thresholds for construction-related emissions adopted by the SCAQMD are listed below in Table C-2.

Table C-1. Project-Related Activities in Air Emissions Analysis

Project-Related Activities	Description
Quarry Rock Transport by Tugboat	A total of 70,000 tons of quarry rock would be transported by tugboat from the Pebbly Beach and Empire Quarries on Santa Catalina Island to the Project site. This would require 18 trips towing loaded supply barges to the Project site and 18 trips returning to the quarries without towing barges, or towing empty barges, for a total of 36 trips. The distance from the quarries to the Project site is approximately 26 nm, and would take an estimated 6 hours each way. The tugboat would make only one trip per day; thus, 6 hours per day are used to calculate daily tugboat emissions for the transport tugboat.
Offloading of Quarry Rock	Emissions for the offloading of quarry rock for reef placement are split into two construction elements: (1) derrick barge emissions, and (2) front loader emissions. The emission figures for this construction component assume a range of 2 to 8 hours of equipment usage (depending on the equipment type) for daily emissions and 60 days of construction for quarterly emissions. Construction operations producing emissions on the derrick barge include the use of: (1) generators for the mooring winches (estimated 8 hours/day usage); (2) the derrick crane to move the front loader from the derrick barge to the supply barge (estimated 2 hours/day usage); and (3) the attending tug to position the supply barge to the derrick barge (estimated 2 hours/day usage).
Transport of Crew by Crew Boat	Crew members would be transported from the harbor to the Project site daily by a 300-horsepower diesel-powered crew boat. This vessel would, on average, make one roundtrip per day (15 miles), which would consume approximately 50 gallons of fuel.
Workers Commuting	An estimated 15 crew members would be needed for reef construction. Daily emissions are calculated for 15 crew members driving an average of 25 miles roundtrip. Quarterly emissions are calculated for 15 crew members driving an average of 25 miles roundtrip over a 60-day period.
Auxiliary Generators	Auxiliary generators onboard each tug boat may be used when the tug boat is not actively engaged in activities. Because two tug boats would be used for the Project, daily emissions for one auxiliary generator are estimated on a 24-hour-per-day usage. Quarterly emissions are based on a 60-day construction period.

Table C-2. SCAQMD Construction-Related Emission Thresholds for Criteria Pollutants

Pollutant	Maximum Daily Emissions (pounds/day)	Maximum Quarterly Emissions (pounds/quarter)
Nitrogen oxides (NO_x)	100	5,000
Reactive organic compounds/volatile organic compounds (ROC/VOC)	75	5,000
Particulate matter less than 10 micrometers (PM_{10})	150	13,500
Particulate matter less than 2.5 micrometers ($PM_{2.5}$)	55	-
Sulfur Oxides (SO_x)	150	13,500
Carbon monoxide (CO)	550	49,500
Lead (Pb)	3	-

Note: [1] SO_x are compounds of sulfur and oxygen molecules. Sulfur dioxide (SO_2) is the predominant form found in the lower atmosphere.

Estimated daily and quarterly emissions of criteria pollutants for the Project are presented in Table C-3. Construction is estimated to take up to 60 days, with 18 roundtrips (36 one-way trips total) by tugboat to transport all the reef material to the site. Quarterly emissions are estimated by multiplying daily emissions by 36 days for the quarry rock transport and by 60 days for the remainder of the construction components. Since the Project would be constructed within a single quarter, the quarterly emissions are the same as the total emissions.

Table C-3. Total Daily and Quarterly Emissions for Criteria Air Pollutants

Pollutant	Daily Emissions[1] (pounds/day)	Quarterly Emissions[2] (pounds/quarter)
Carbon monoxide (CO)	63.66	2,984.88
Reactive organic compounds/volatile organic compounds (ROC/VOC)	10.28	495.44
Nitrogen oxides (NO_x)	95.19	4,628.29
Sulfur Oxides (SO_x)	3.94	146.69
Particulate matter less than 10 micrometers (PM_{10})	3.11	152.89
Particulate matter less than 2.5 micrometers ($PM_{2.5}$)[3]	2.92	144.724

Source: Coastal Environments (2014a).

Notes:

[1] Daily emissions include barge loading, workers commuting, tugboat/barge shipping, and material off-loading at the Project site.

[2] Total of 60 days of reef construction, all in one quarter, with some proponents of construction occurring over 36 days. Quarterly numbers were computed by adding quarterly emissions estimates for individual components.

[3] $PM_{2.5}$ estimates were calculated by using updated CEIDARS table with $PM_{2.5}$ fractions.

As presented in Table C-3, the total daily and quarterly emissions for CO, ROC, SO_x, PM_{10}, and $PM_{2.5}$ are well below the thresholds of significance presented in Table C-2. Daily and quarterly emissions for NO_x, 95 pounds/day and 4,628 pounds/quarter, also do not exceed the thresholds for this pollutant. Thus, the Project would not violate air quality standards or contribute substantially to an existing or projected air quality violation, and the impact would be less than significant.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Less Than Significant Impact. See answers to ***a)*** and ***b)*** above. Further, the Project's incremental contribution of emissions would not be cumulatively considerable as it would not hinder progress towards attainment of state and federal ambient air quality standards. Project construction is temporary, and its offshore location would allow for adequate dispersion of pollutants and prevent accumulation of emissions. As a result, the Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the region is non-attainment under an applicable federal or state air quality standard. Therefore, this impact would be less than significant.

d) Expose sensitive receptors to substantial pollutant concentrations?

Less Than Significant Impact. See answers to ***a)*** and ***b)*** above. With regard to air pollutant impacts, sensitive receptors are defined as people that have an increased sensitivity to air pollution or environmental contaminants. Sensitive receptor locations include schools, parks and playgrounds, day care centers, nursing homes, hospitals, and residential dwelling units. Sensitive receptors are not anticipated to be exposed to substantial pollutant concentrations due to the temporary nature of construction activities, as well as the Project's offshore location, which would allow for adequate dispersion of pollutants and prevent accumulation of emissions. As a result, the Project is unlikely to expose sensitive receptors to substantial pollutant concentrations. Therefore, this impact would be less than significant.

e) Create objectionable odors affecting a substantial number of people?

Less Than Significant Impact. The exhaust of diesel-powered vessels and equipment may be considered an objectionable odor; however, due to the offshore location of the Project, these odors would be highly dispersed prior to reaching shore and, therefore, would not be considered a nuisance. In addition, there would be no solid waste or wastewater generated by the Project, either during construction or after it is complete, that would create objectionable odors. As a result, the Project is unlikely to create objectionable odors affecting a substantial number of people. Therefore, this impact would be less than significant.

3.4 Mitigation Summary

The Project would not result in significant impacts to air quality; therefore, no mitigation is required.

4.0 BIOLOGICAL RESOURCES

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☒	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?	☐	☐	☐	☒

4.1 Environmental Setting

The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula in Los Angeles County. The Project site is in the region called the Southern California Bight (SCB), which includes the coastal area of southern California from Point Conception to the United States/Mexico border and offshore to the Channel Islands.

The SCB contains many unique biological and physical characteristics. Biologically, this area is the transition zone between northern marine populations to more temperate marine species, with 87 percent of California fish species found in this region. Physically, water temperatures are generally warmer and more consistent than in areas north and south of the SCB and wind speeds in the area are much lower than on other parts of the California coast (Gelpi and Norris 2008). This is a region of highly productive and valuable biological environments, particularly in the nearshore region; however, many of the biological environments in this area have been negatively affected by sedimentation and turbidity from nonpoint source pollution, reef burial from landslides,

decimation of kelp beds from sea urchins, sediment contamination from sewage effluent from the nearby Joint Water Pollution Control Plant's White Point Outfall, and other impacts.

4.1.1 Soft-Bottom Habitat

Soft-bottom habitats are the largest type of community in the SCB, typifying the majority of sea bottom habitat types in water depths greater than 20 meter (m) (EPA 2003; Allen et al. 2011), and consist of sand or sand interspersed between boulders, rocks, and cobbles. The most common type of marine species found in this subtidal soft-bottom habitat are bottom-feeding (benthic) fish and infaunal and epifaunal invertebrates (EPA 2003; Allen et al. 2011). This habitat also contains plankton suspended in the water column as well as some algal species.

Because of their low productivity, subtidal soft-bottom communities are often considered to be less important than more productive rocky reef environments, which promote increased species richness and biological productivity. Subtidal soft-bottom environments provide habitat for sanddollars (*Dendraster* spp.), sand stars (*Astropecten* spp. and *Luidia* spp.), and sea pens (*Stylatula* spp.), as well as many species of polychaetes, crustaceans, gastropods, rays, and flat fishes. Subtidal soft-bottom environments are also economically important to nearshore fisheries, which trawl for white croaker (*Genyonemus lineatus*) and various flatfish.

4.1.2 Hard-Bottom Habitat

Hard-bottom substrate in the shallow (less than 30 m) depth range in the SCB generally consists of cobble (low-relief substrate), bench rock (high-relief substrate), or more commonly, a combination of the two (Dailey et al. 1994). Hard-bottom habitats are generally a limiting habitat type in the SCB, comprising approximately 25 percent of the nearshore environment in the Palos Verdes area (Pondella 2009). Within the boundaries of the Project site (15 to 20 m depth range), much of the reef has been impacted by sedimentation, mostly due to landslides (Pondella et al. 2012). A review of side-scan sonar data collected by EcoSystems Management Associates (2014) within the boundaries of the Project site identified approximately 9 acres of substantial hard substrate that could be considered biologically important habitat. The remaining area (approximately 60 acres) contains predominantly buried-reef habitat covered by a thin veneer of sand less than 1 m thick. A diver ground-truthing survey conducted at the Project site in April 2014 indicated the presence of gorgonians, algae, and sea urchins in the areas with hard substrate. Giant kelp (*Macrocystis pyrifera*) was largely absent (Coastal Environments 2014b).

Hard-bottom habitats provide substrate for the attachment of algae and sessile organisms and community structure for mobile organisms, such as macroinvertebrates and fish (Schiff et al. 2000). Within hard-bottom habitat, giant kelp is an important ecological and economic resource because of the array of benefits it provides. Kelp beds provide critical habitat for marine life and contribute substantially to the primary productivity of coastal waters (Foster and Schiel 1985). Economically, kelp forests support the production of many commercially important species and attract recreational divers and fishermen (Wilson et al. 1990; Foster and Schiel 1985). Kelp is also

harvested commercially for alginate production, which is an emulsifying and binding agent used in the pharmaceutical and food industries (Foster and Schiel 1985).

4.1.3 Biological Survey

A biological survey of the Project site was conducted between January and February 2015 to assess the invertebrate, algal, and fish species present at the Project site. In order to sample for fish densities and species diversity, divers counted fish and estimated total fish length for all fish encountered along 26 underwater transects (30 m by 2 m); macroinvertebrates were counted by targeting individual invertebrates along these transects (swath method).

<u>Invertebrate Community</u>

Common members of the invertebrate community associated with the kelp beds include three species of sea urchins that graze on kelp: (1) the purple urchin (*Strongylocentrotus purpuratus*), (2) the red urchin (*Strongylocentrotus franciscanus*), and (3) the white urchin (*Lytechinus anamesus*). Other species in the invertebrate community include various polychaetes, bivalves, sea stars, sea cucumbers, brittle stars, cnidarians (e.g., anemones and sea fans), and crustaceans. At the Project site, 33 species of macroinvertebrates were observed during the 2015 biological survey. Of these 33 species, the predominant macroinvertebrate, making up almost 60 percent of the total number of invertebrates, was the gorgonian, *Muricea californica*. Although *Muricea* spp. is native, it is often considered invasive on shallow reefs in southern California. This is because it can occur in high densities and exclude kelp, understory algae, and other sessile invertebrates. The next most abundant macroinvertebrate was the orange puffball sponge (*Tethya californiana*), representing 13 percent of the total number of invertebrates.

<u>Fish Community</u>

While hard substrate areas are the least abundant habitat type in the region, they are one of the most important for fish habitat. About 30 percent of the species and 40 percent of the families of approximately 76 percent of transects were devoid of biota. Approximately 24 percent of transects had hard substrate with biota; however, on these transects, gorgonians accounted for approximately 80 percent of the coverage. At the Project site, 27 percent of transects had 0 to 10 percent biotic coverage; 12 percent had 10 to 20 percent biotic coverage; 23 percent had 20 to 30 percent biotic coverage; and 38 percent had greater than 30 percent biotic coverage. Areas with high biotic coverage (greater than 20 percent) were generally found closer to the existing kelp bed at Bunker Reef, while areas of low biotic coverage (less than 20 percent) were generally found farther offshore, closer to the line of hard substrate.

4.1.4 Marine Mammals

The SCB contains one of the largest and most diverse assemblages of marine mammal populations in the world. The coast of California supports a rich assemblage of marine mammals, including 27

species from the order Cetacea, six species from the sub-order Pinnipedia, and one species from the order Carnivora (Dailey et al. 1974). Marine mammals in the SCB can largely be categorized as pinnipeds and cetaceans. The most common marine mammals in the SCB are California sea lions (*Zalophus californianus*), harbor seals (*Phoca vitulina richardsi*), bottlenose dolphins (*Tursiops truncatus truncatus*), and gray whales (*Eschrichtius robustus*).

4.1.4 Sea Turtles

Five species of sea turtle have been observed in southern California waters. These are the leatherback sea turtle (*Dermochelys coriacea*), green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), olive ridley sea turtle (*Lepodochelys olivacea*) and Pacific hawksbill sea turtle (*Eretmochelys imbricate*). There are no known nesting beaches for these species in the Project area, and sightings are extremely rare.

4.1.5 Marine Birds

More than 195 species of birds use coastal or offshore aquatic habitats in the SCB (Dailey et al. 1994). Pelagic birds are birds that are most often observed more than 1 kilometer (km) offshore and rarely use inland habitats. Shoreline bird species include those found within 1 km of the coast and use bays and harbors, and those found along beaches, rocky shores, or jetties. Some pelagic and shoreline birds that may occur in the Project area include the black storm petrel (*Oceanodroma melania*), double-crested cormorant (*Phalacrocorax auritus*), western snowy plover (*Charadrius alexandrinus nivosus*), California gull (*Larus californicus*), elegant tern (*Sterna elegans*), least tern (*Sterna antillarum browni*), and common loon (*Gavia immer*).

4.1.6 Federal- and State-Listed Species in the Project Area

Table C-4 lists the federally or state-designated endangered, threatened, or species of concern that may occur in the Project area.

Table C-4. Federal- and State-Listed Species that May Occur in the Project Area

	Common Name	Scientific Name	Status
Invertebrate	White abalone	*Haliotis sorenseni*	FE
Mammals	Sei whale	*Balaenoptera borealis*	FE
	Blue whale	*Balaenoptera musculus*	FE
	Fin whale	*Balaenoptera physalus*	FE
	Humpback whale	*Megaptera novaeangliae*	FE
	Right whale	*Eubalaena japonica*	FE
Reptiles	Green sea turtle	*Chelonia mydas*	FT
	Leatherback sea turtle	*Dermochelys coriacea*	FE
	Loggerhead sea turtle	*Caretta caretta*	FT
	Olive ridley sea turtle	*Lepidochelys olivacea*	FT
	Pacific hawksbill sea turtle	*Eretmochelys imbricata*	FE

	Common Name	Scientific Name	Status
Birds	Black storm petrel	*Oceanodroma melania*	CSC
	California gull	*Larus californicus*	CSC
	California least tern	*Sterna antillarum browni*	SE/FE
	Common loon	*Gavia immer*	CSC
	Double-crested cormorant	*Phalacrocorax auritus*	CSC
	Elegant tern	*Thalasseus elegans*	CSC/FSC
	Western snowy plover	*Charadrius lexandrines nivosus*	CSC/FT

Acronyms: CSC = California Species of Concern; FE = Federally Endangered; FSC = Federal Species of Concern; FT = Federally Threatened; SE = State Endangered.

4.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to biological resources and the Project are identified in Attachment 1. At the local level, the City of Rancho Palos Verdes General Plan–Natural Environment Element (NEE) (1975) and Coastal Specific Plan (SP) (1978), including a chapter on Subregion 7 (where the Project is located), include the following policies that may be related to the Project:

- NEE Policy 8: Encourage establishment of the rocky intertidal areas as a marine reserve and strict enforcement be applied to all regulations concerning marine resources.
- SP (Subregion 7) Policy 3: Lend support wherever possible to organizations wishing to initiate or continue marine restorative efforts.
- SP Policy 10: Protect, enhance and encourage restoration of marine resources of the City through marine resource management and cooperation with other public agencies and private organizations.
- SP Policy 13: Encourage and support programs, policies and actions of other agencies designed to maintain, manage, and restore the ocean water quality.
- SP Policy 20: Encourage restoration efforts dealing with enhancing the marine environment from a biological standpoint.

4.3 Impact Analysis

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Less Than Significant Impact. The Project would create 40 acres of rocky-reef habitat, in addition to the subsequent development of a 69-acre kelp forest, which would have beneficial effects on marine organisms, including native and resident migratory fish and wildlife species. The Project's construction plan was designed and scaled to have minimal adverse effects on sensitive species that may occur in the Project area. For example, the construction footprint of the Project

would be localized (i.e., below the barge where quarry rock is being off-loaded), and the pace of construction would be about 1 acre per day. Due to the small construction footprint, the anticipated response to construction activities by mobile marine wildlife would be temporary avoidance and use of adjacent areas for predation, foraging, and migration. Because there are extensive alternative areas of suitable habitat available adjacent to the Project site, construction activities are expected to not have a substantial adverse effect on mobile species listed as candidate, sensitive, or special status species. Therefore, impacts to mobile species would be less than significant.

Less mobile and stationary organisms have the potential to be crushed or buried by quarry rock, buried by locally suspended sediments, or crushed by derrick barge anchors. These types of organisms are associated with rocky substrate, which comprises about 9 acres of the 69-acre Project site. Hard substrate areas at the Project site are degraded and low in biological diversity; however, hard-bottom substrate is biologically important. As a result of these potential impacts, the Project was designed to include measures to protect hard-bottom habitat in the Project area.

Quarry rock placement would avoid hard-bottom habitat by targeting the remaining 60 acres of the Project site, which consists of degraded sandy-bottom habitat with low biological diversity. Placement of the quarry rock on sand may result of suspended sediments and turbidity; however, these impacts would likely be minor and localized. Sediment grain sizes in the Project vicinity are generally too large to remain suspended in the water column for very long. As result, the levels of suspended sediments and turbidity resulting from the construction associated with this Project would likely remain well below levels that would substantially affect water turbidity.

Hard-bottom substrate in the Project area is potential habitat for the federally endangered white abalone (*Haliotis sorenseni*), as well as the pink abalone (*Haliotis corrugata*) and pinto abalone (*Haliotis kamtschatkana*), which are National Marine Fisheries Service (NMFS) species of concern. Although past surveys of the Project site did not detect these species, to ensure these species are not present at the time of construction, a pre-construction survey would occur within 30 days of the start of construction. If white abalone were discovered, NOAA would contact the University of California at Davis, which holds a permit for collection of white abalone to enhance captive broodstock. The survey would assure the white abalone meets the collection requirement that no other white abalone occurs within a 10-m radius, and then the white abalone would be collected and transferred to Davis. If pink or pinto abalone were discovered, or white abalone that do not meet the collection requirement, NOAA would consult with the California Department of Fish and Wildlife and, upon receiving authorization, relocate the animals to suitable habitat on the western side of Palos Verdes Peninsula, outside of the Project area.

To further protect hard-bottom habitat, an anchoring plan (see Appendix A) was developed to avoid anchoring in areas of hard substrate and minimize anchor drag, especially during inclement weather. The anchoring plan consists of the following components:

- Avoidance of areas of hard substrate greater than 30 percent (as identified in the side-scan sonar and diver ground-truthing surveys);

- Avoidance of areas of biological significance (as identified in the biological survey);
- Implementing measures to reduce drag on bottom habitat and postponing operations during inclement weather.

For these reasons, the Project is not considered to have a substantial adverse effect on less mobile or stationary species listed as candidate, sensitive, or special status species. Therefore, impacts to these species and habitats would be less than significant.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No Impact. There is no riparian habitat present on the developed quarry sites or submerged Project site, and there are no identified sensitive natural communities that would be adversely affected by the Project. In fact, the Project would enhance the biological resources in the area, which has been degraded and has low biological diversity. For these reasons, there would be no adverse effect on riparian habitat or any sensitive natural community. Therefore, there would be no impact.

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No Impact. There are no federally protected wetlands present either at the quarry sites or at the submerged Project site. Therefore, there would be no impact.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less Than Significant Impact. The completed rocky reef would enhance the existing marine ecological conditions at and adjacent to the Project site. Project construction would be highly localized on a daily basis, with the pace of construction being 1 acre per day. Due to the small construction footprint, the anticipated response to construction activities by marine wildlife would be avoidance and the use of adjacent areas for predation, foraging, and migration. Additionally, there are no native wildlife nursery sites in the Project area. For these reasons, the Project would not substantially interfere with movement of migratory fish or wildlife species or impede the use of native wildlife nursery sites; therefore, the impact would be less than significant.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No Impact. The Project would occur in an area where biological resources have been diminished overtime as a result of the effects of past region-wide waste water disposal. About 60 acres of the 69-acre Project site consist of degraded sandy-bottom habitat with low biological diversity. The remaining 9 acres are comprised of hard-bottom habitat, which is also degraded and low in biological diversity. The completed rocky reef would enhance existing ecological conditions at and adjacent to the Project site. As discussed in ***a)*** through ***d)*** above, the Project could temporarily displace biological resources from the Project area over the 60-day construction period, and has the potential to affect bottom habitat and biological resources as a result of derrick barge anchoring and quarry rock placement. However, due to the small Project footprint and temporary nature of Project construction, as well as an anchoring plan and avoidance of hard-bottom habitat, the Project would not conflict with existing plans and ordinances that protect or preserve biological resources. Therefore, there would be no impact.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?

No Impact. As discussed in ***e)*** above, the Project would restore kelp and other marine biological resources in an area where such resources have been diminished over time by the effects of past region-wide wastewater disposal. The constructed rocky-reef habitat would not change the current use of the site, but would enhance its biological productivity. The restoration and enhancement of coastal marine biological resources is consistent with the California Coastal Act, the California Fish and Game Code, the California Resources Management Act, the California Ocean Plan, and the City of Rancho Palos Verdes Coastal Specific Plan. For these reasons, the Project would not conflict with any existing habitat conservation plans. Therefore, there would be no impact.

4.4 Mitigation Summary

The Project would not result in significant impacts to biological resources; therefore, no mitigation is required.

5.0 CULTURAL AND PALEONTOLOGICAL RESOURCES

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☐	☒

5.1 Environmental Setting

5.1.1 Archaeological Resources

Archaeological resources refer to any material remains of past human life or activities which are of archaeological interest (for information regarding tribal cultural resources, see Section 17.0 Tribal Cultural Resources). These include items such as pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, and human skeletal materials that are more than 100 years old.

During the Pleistocene epoch, which occurred from about 70,000 to 10,000 years ago, there were multiple sea level regressions and transgressions in which a symmetric rise and fall of sea level both inundated and exposed the continental shelf to aerial and marine erosive processes. This caused significant alterations in sea level, and by the end of the Pleistocene (about 10,000 years ago), the current continental shelf and shoreline extended almost 500 feet (125 m) offshore from where it is today (Masters and Flemming 1983). What are now inundated portions of the continental shelf were likely occupied during the late Pleistocene and early Holocene epochs; therefore, archaeological records are incomplete. There are two types of prehistoric remains that may occur within water depths associated with the Project site:

- In situ prehistoric remains that pre-date the Holocene marine transgression and are situated on relict, submerged landforms, either mantled with unconsolidated sediments or exposed on bedrock outcrops.
- Remains deposited following the Holocene marine transgression that are situated on the seafloor either on top of or within recent unconsolidated Holocene sediments. These remains consist of isolated prehistoric or historic artifacts.

Evidence of the first human occupation of southern California was seen between 15,000 and 10,000 years ago, in the Pleistocene epoch (Moratto 1984, cited in Port of Los Angeles 2008). A number of submerged archaeological sites have been located off the coast of southern California. Many of these sites contain a variety of prehistoric artifacts, including manos, mutates, choppers

and pestles (Weinman and Stickel 1978; Bickel 1978; URS Corporation 1986). Most of these known submerged archaeological sites and associated artifacts are located in relatively shallow water. Many of the shallow water sites may be a result of cliff erosion and are most likely associated with archaeological sites located on the cliffs above. Other submerged artifacts are the consequence of random loss and some may have been purposefully discarded in association with ceremonial rituals or other events.

A literature search of the known archeological sites in the Project area and within a 0.5-mile radius of the Project site was conducted through the South Central Coast Information Center (2015). The search included a review of all recorded archaeological and built-environment resources and cultural resource reports on file. In addition, the California Points of Historical Interest, California Historical Landmarks, California Register of Historical Resources, National Register of Historic Places, and California State Historic Properties Directory listings were researched. These studies determined that no archaeological resources exist at the Project site; however, there are several recorded sites onshore. As a result of erosion and landslides in the area, these resources have the potential to have been transported to the Project site.

5.1.2 Submerged Historic Resources

Submerged historic resources include sunken ships, boats, and other vessels such as: barges; cargo or fittings such as anchors lost from vessels; sunken navigational equipment such as buoys; sunken aircraft; and various sorts of industrial equipment related to activities such as offshore oil development (CSLC 2015).

Results from a side-scan sonar survey conducted at the Project site in January 2014 (EcoSystems Management Associates 2014) did not reveal any anthropogenic structures on the seafloor. Subsequent surveys—a diver-based ground-truthing survey performed in April 2014 and an additional biological survey in March 2015—did not reveal any historical resources that may have been missed during the side-scan sonar survey.

Historic shipwrecks and other submerged historic resources within the vicinity of the Project area are listed in the Shipwreck Database maintained by the CSLC (2015). While there are no shipwrecks at the Project site, there are some within the vicinity of the Project area, the closest of which is the ferry Melrose approximately 1.41 nm from the Project site.

5.1.3 Paleontological Resources

Paleontology is a form of geology that deals with the life of past geologic periods, as recorded in fossil remains. Marine fossils in the Los Angeles area are found in the Los Angeles Basin. This basin is one of more than 20 basins in California that were formed during the Tertiary Period, which extended from about 2 to 65 million years ago. The Los Angeles Basin extends from the Santa Monica mountains to the north, the foothills of the Santa Ana Mountains and the San Joaquin

Hills to the east, on the south by the ocean and the Palos Verdes Hills (or San Pedro Hills); and on the west by the ocean (Woodring 1938).

The two major classes of marine fossils that occur on the Palos Verdes Peninsula are Foraminifera and Mollusks. The fossils that occur on the Palos Verdes Peninsula and along the Los Angeles Basin are part of the Repetto formation, which was created in the Pliocene Epoch and occurred 5.33 to 2.58 million years before present. During the Pliocene Epoch, the sea extended beyond the present physiographic basin, extending across the Santa Monica Mountains, Palos Verdes Hills, and the San Joaquin Hills and covering part of the Santa Ana Mountains (Hargreaves 2013). Fossils in the Repetto formation are found in the major oil deposits in most of the major oil fields in the Los Angeles Basin. These fossils are assigned to three depth-range groups: (1) fossils of shallow water facies; (2) fossils of intermediate-depth facies, which range from shallow water into deep water; and (3) fossils of deep-water facies (Woodring 1938). Because the degree of research done in this area and their wide distribution through the Palos Verdes Peninsula, paleontological resources are not thought to be endangered (City of Rancho Palos Verdes 1975).

5.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to cultural and paleontological resources and the Project are identified in Attachment 1. At the local level, the City of Rancho Palos Verdes General Plan–Socio/Cultural Element (1975), includes a goal to preserve and protect its cultural resources, including all significant archaeological, paleontological and historical resources, and to promote programs to meet the social needs of its citizens. Policy 2 of this element, "Encourage the identification of archaeologically sensitive areas and sites," is also relevant.

5.3 Impact Analysis

a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?

a) and b) No Impact. No known historical or archaeological resources are within the Project area based on a records search and field surveys on the Project site and up to 0.5 mile from the Project boundary, in addition to subsequent field surveys, including side-scan sonar surveys and visual inspection by divers. Further, no human-made materials were detected during these field surveys. The 69-acre site is located in water depths where sediment movement is dynamic and the sediment cover is discontinuous and thin; as a result, this is not an environment in which historical materials are expected to remain in place or be buried. Therefore, there would be no substantial adverse change in the significance of historical resources. Therefore, there would be no impact.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No Impact. The Project would involve placing non-fossiliferous granite quarry rock on the seafloor in a location underlain by middle-to-late Miocene-age shale and mudstone known as the Altamira Shale. The Altamira Shale is fossiliferous, including numerous fish species associated with a Miocene-age subtropical shallow sea. However, the Altamira Shale is common in the Palos Verdes Peninsula and readily accessible to geologists and paleontologists in the hills to the northeast of the Project site. Additionally, no excavation would take place on the Project site; the quarry rock would be placed on top of the Altamira Shale. For these reasons, no paleontological resources would be directly or indirectly destroyed by the Project. Furthermore, there are no unique geological features associated with the Project site. The seafloor in this location is a rocky, low-relief area that is geologically similar to many other areas in the vicinity of the Palos Verdes Peninsula and elsewhere along the southern California coastline. Therefore, the Project would not destroy a unique paleontological resource or site or unique geologic feature. Therefore, there would be no impact.

d) Disturb any human remains, including those interred outside of formal cemeteries?

No Impact. The Project would be located in a submerged location 0.3 mile from the shoreline in a dynamic environment of strong ocean currents and thin layers of shifting sand. The location and nature of the environment is such that interred human remains do not occur. Furthermore, there would be no excavation on the Project site; the quarry rock would be placed on top of the sediment. As a result, no interred human remains would be disturbed by the Project. Therefore, there would be no impact.

5.4 Mitigation Summary

The Project would have no impacts to cultural and paleontological resources; therefore, no mitigation is required.

6.0 GEOLOGY AND SOILS

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

6.1 Environmental Setting

6.1.1 Geologic Setting

The Project site is located offshore of the Palos Verdes Peninsula on the San Pedro Shelf. The San Pedro Shelf is broad and shallow, generally extending seaward 4.8 to 19 km; however, offshore of the Project site the shelf is relatively narrow (about 2 km wide; Nardin and Henyey 1978). Seaward of the shelf break, the continental slope is narrow and steep, and terminates at the nearly flat 800 m deep floor of the San Pedro Basin (Lee et al. 2002).

The Palos Verdes Peninsula is primarily composed of seaward-dipping siliceous shales and volcanic rocks of the Altamira member of the Miocene Monterrey Formation (Lee et al. 2002). The Palos Verdes Peninsula is underlain by the Catalina Schist which is exposed in the middle of the anticlinal structure (Fisher et al. 2003). There is a large unconformity between the Cretaceous Catalina Schist (95 to 115 million years ago) and the overlying middle to late Miocene age (6 to 15 million years ago) deep-marine Monterey Formation (Woodring et al. 1946; Conrad and Ehlig 1987). The Monterey formation has been broken down into three main lithologic units: Altamira

Shale; Valmonte Diatomite; and Malaga Mudstone (Woodring et al. 1946). Of these three lithologic units, the Miocene Altamira Shale covers a majority of exposed bedrock over the Palos Verdes Peninsula (Conrad and Ehlig 1987). Within the Altamira Shale unit is a tuffaceous unit formed during volcanic eruptions that occurred 9 to 15 million years ago during a period of extension (Conrad and Ehlig 1987). The ash from these volcanoes combined with fine ocean sediments to form a bentonite clay layer which is the slide layer upon which most Palos Verdes landslides occur. It is this bentonite clay that acts as the "slip plane" for almost every major landslide that occurs on the Peninsula (Haneberg 1995).

Diver surveys conducted at the Project site in April 2014 showed that approximately 71 percent of the Project area contained less than 30 percent hard substrate coverage, 35 percent of the area contained coarse-grained sandy bottom, and 47 percent of the area had sediment depths (above bedrock) less than 0.5 m.

6.1.2 Seismic Hazards

The Project area straddles the tectonically active boundary between the onshore Los Angeles Basin and the offshore California Continental Borderland (Fisher et al. 2003). The Palos Verdes Fault Zone forms the western boundary of the Los Angeles Basin. The Palos Verdes Peninsula is a tectonic fault block, a compressional feature bounded between regional northwest trending, southwest dipping faults (Woodring et al. 1946; Yerkes et al. 1965). These compressional forces are causing the Palos Verdes Peninsula to be uplifted and squeezed into an anticlinal form, causing the once horizontally deposited sediments to be deformed into an arch, which has led to destructive landslides over at least the last 250,000 years.

The Project area lies at the intersection of the North American and Pacific Plates. The interaction between these two tectonic plates has produced numerous active faults in the region. Faults present on or near the Palos Verdes Peninsula include the Cabrillo fault, Palos Verdes fault, Thums-Huntington fault, and Newport-Inglewood fault. The Palos Verdes and Newport-Inglewood, and Whittier faults are the most significant nearby faults in terms of potential seismic hazards, capable of producing earthquakes of at least magnitude 7.0 on the Richter scale. The California Geological Survey establishes criteria for determining faults as active, potentially active, or inactive. Active faults are those that show evidence of surface displacement within the last 11,000 years. Potentially active faults are those that demonstrate displacement within the past 1.6 million years. Faults showing no evidence of displacement in the last 1.6 million years are considered inactive.

6.1.3 Landslides

Landslides have occurred throughout the Palos Verdes Peninsula, but none are more prominent than those of the Portuguese Bend Ancient Landslide Complex and surrounding areas. As mentioned above, the bentonite clay layer within the Altamira Shale serves as the slide plane for almost all of the landslides (LGC Valley, Inc. 2011). For those landslides that reach the coast, wave removal of the toe of the landslide further contributes to the occurrence of landslides by

providing space for more landslide material to move downhill and through undercutting of the sea cliffs. Positive feedback occurs within these landslide complexes due to decreased support on up-slope material, as well as increased water infiltration due to fractured landslide material that creates buoyancy forces and decreases the strength of underlying clays.

More than 180 landslides have occurred on the Palos Verdes Peninsula (Haydon 2007), with more than 130 homes being destroyed in the last 60 years. Historical landslides associated with the Portuguese Bend Landslide (PBL; 1956 to 1999[3]) and Abalone Cove Landslide (1974 to 1985[3]) indicate that mass movements have been occurring regularly throughout the Portuguese Bend Ancient Landslide Complex. Starting in the 1980s, land management practices and engineering solutions (e.g., dewatering efforts, installation of new septic systems, better landscaping practices, regrading, installation of surface drains, and shoreline protective measures) were implemented to slow the PBL. These efforts have substantially decreased the rate of landslide movement to about 10 percent of former rates (Kayen et al. 2002; Lee et al. 2002; EPA 2009; Calabro et al. 2010), and data in 2000 suggested that the landslide had decreased substantially from its 1998 movement (Kayen et al. 2002). Movement rates based on 1995 to 2000 data indicate an average rate of 1 m/year, compared to an average rate of 3.3 to 3.8 m/year from 1956 to 2002 (Calabro et al. 2010). Landslide erosion at the toe of the PBL is mainly initiated by storm events and is not always related to the rate of landslide movement (Kayen et al. 2002). Sediment from the toe of the landslide was redistributed by several large storms that occurred in 1982, 1983, and 1988 (Santschi et al. 2001).

Even with the structural improvements mentioned above, a large earthquake on any of the greater Los Angeles region faults would likely produce multiple landslides on the Palos Verdes Peninsula, and depending on the size of the earthquake, millions of cubic yards of sediment could be deposited in the nearshore zone south of the Palos Verdes Peninsula. In addition to earthquakes, large rain years, especially El Niño Southern Oscillation years, could trigger landslides. Once the soil has become fully saturated and heavy, and the land management practices/solutions have been stressed or overwhelmed, landslides are likely to occur. Predicting the size and location of these landslides is not currently possible.

6.1.4 Currents and Sediment Movement

The California Current System, the dominant system affecting the SCB, is composed of a complex array of north- and south-flowing currents and undercurrents. The California Current System branches shoreward within the SCB, and forms the Southern California Countercurrent. Similar to the California Undercurrent, the Southern California Countercurrent system runs in a northerly direction. While the California undercurrent in the inner SCB is perennially pole-ward, the surface current is highly variable. At times, especially the summer to early fall, an eddy-like circulation pattern, called the Southern California Eddy, forms around the offshore islands coinciding with

[3] The great majority of the movement of this landslide occurred in the years mentioned, but the slide has continued into the present.

the offshore equator-ward flowing California Current and the inshore pole-ward flowing counter current (Hickey 1992; Browne 1994).

The Palos Verdes Shelf sediments are derived from multiple sources, including: (1) landslides; (2) effluent from the White Point Outfall; (3) riverine discharge; and, to a smaller extent, (4) primary production. However, the two largest sediment sources near the Project area are landslides and effluent from the outfall (Santschi et al. 2001; Kayen et al. 2002; EPA 2009). Input from other sources, such as rivers, is restricted due to shelf circulation patterns, the Redondo Submarine Canyon to the northwest, and the exposed bedrock ridge that traces the submarine extension of the Cabrillo fault system, acting as an impediment to sediment bypass (Lee et al. 2002; EPA 2009). The base level of sedimentation, at around the 60-m isobath, is estimated to be 1.3 cm/year (Santschi et al. 2001). Sediments derived from the nearby Portuguese Bend Landslide move in an east to southeasterly direction between the 5 to 15 m isobaths (Kayen et al. 2002; Dong et al. 2009).

6.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to geology and soils and the Project are identified in Attachment 1. No local laws relevant to this issue area are applicable to the Project.

6.3 Impact Analysis

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

No Impact. The Project area does not fall within the Alquist-Priolo Special Study fault zone, an ordinance passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Project involves the placement of quarry rock on the seafloor 0.3 mile offshore and does not include the construction of any buildings or structures that would potentially be damaged or cause injury or death. Therefore, there would be no impact.

ii) Strong seismic ground shaking?

No Impact. The placement of quarry rock on the seafloor would not cause strong seismic shaking, nor would a seismic event cause substantial adverse effect including the risk of loss, injury, or death due to quarry rock placement; therefore, there would be no impact.

iii) Seismic-related ground failure, including liquefaction?

iv) Landslides?

iii) and iv) No Impact. The Project would occur in 15 to 21 m of water 0.3 mile offshore Rancho Palos Verdes. The continental shelf in this region has an average slope of less than 1°. For this reason, there is no risk of seismic related ground failure and landslides. Although there is the potential for liquefaction of the sediments underlying the reef that could lead to settling and subsidence of the reef, there are no potential substantial adverse effects, including the risk of loss, injury, or death due to the offshore location of the reef. Therefore, there would be no impact.

b) Result in substantial soil erosion or the loss of topsoil?

No Impact. The Project would use rock from existing developed quarries and would place the rock on the seafloor where topsoil does not exist. Soil, including topsoil, is the result of subaerial weathering processes and therefore does not form in submerged marine locations. Therefore, there would be no impact.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

No Impact. The Project site is located 0.3 mile offshore on a gently sloping seafloor where hard, stable Altamira Shale bedrock is only thinly covered by sand. Because the Project site is gently sloping and closely underlain by hard bedrock, there is no potential for landslide, lateral spreading, subsidence, liquefaction, or collapse. Therefore, there would be no impact.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

No Impact. Project construction would not involve the construction of foundations, require grading, excavation, drainage, or erosion control, and therefore is not impacted by the Uniform Building Code. Therefore, there would be no impact.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No Impact. Project construction would not involve the use of septic tanks or alternative wastewater disposal systems. As a result, the Project would have no impact on soils capable of supporting the use of septic tanks or alternative waste water disposal systems. Therefore, there would be no impact.

6.4 Mitigation Summary

The Project would not result in significant impacts to geology and soils; therefore, no mitigation is required.

7.0 GREENHOUSE GAS EMISSIONS

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

7.1 Environmental Setting

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). GHGs are emitted by natural processes as well as by human activities. Examples of GHGs that are produced by both natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs that are created and emitted primarily as the result of human activity include fluorinated gases (hydrofluorocarbons [HFCs] and perfluorocarbons [PFCs]) and sulfur hexafluoride (SF_6).

Each GHG has a varying global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. By convention, CO_2 is assigned a GWP of 1. By comparison, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. N_2O has a GWP of 310, which means that it has a global warming effect 310 times greater than CO_2 on an equal-mass basis. To account for their GWPs, GHG emissions are often reported as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emission of each GHG by its GWP, and adding the results together to produce a single, combined emission rate representing all GHGs (Port of Los Angeles 2008).

The accumulation of GHGs in the atmosphere regulates the Earth's temperature. Without natural GHGs, the earth's surface would be approximately 34° Centigrade (C) cooler (Hendrix et al. 2007). GHGs differ from criteria pollutants in that GHG emissions do not cause direct, adverse human health effects. Rather, the direct environmental effect of GHG emissions is an increase in global temperatures, which in turn has numerous indirect effects on the environment and humans (Port of Los Angeles 2008).

7.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to GHG emissions and the Project are identified in Attachment 1. At the local level, the SCAQMD has regulatory jurisdiction over stationary sources of air emissions within the SCAB. Mobile sources, such as transportation vehicles and mobile construction equipment are not regulated by the air districts, except where these are operated as stationary sources. Stationary sources of air emissions for the Project include idling tugboats and the equipment used during the loading and offloading of the barges. Mobile

sources of air emissions for the Project, which are not regulated by the SCAQMD, include the trucks used to haul the quarry rock and the tugboats underway to and from the Project site. The SCAQMD posts a significance threshold of 10,000 metric tons (MT)/year of CO_2e emissions for industrial projects, 3,000 MT/year for commercial projects, and 1,100 MT/year for mixed projects where the SCAQMD is the lead agency (SCAQMD 2008).

7.3 Impact Analysis

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less Than Significant Impact. While GHG emissions would be produced during construction of the reef, upon completion, no Project GHG emissions would occur. Table 6-2 of the DEA provides cumulative GHG (CO_2 and CH_4) emissions and computed CO_2e values associated with the Project. Total CH_4 and CO_2 emissions are 0.047 MT (103.3 pounds) and 347.8 MT (766,843.8 pounds), respectively. Thus, Project construction would not exceed the SCAQMD threshold of 10,000 MT/year for industrial projects, 3,000 MT/year for commercial projects or 1,100 MT/year for mixed projects, and GHG emissions would be considered less than significant.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

No Impact. As described in ***a)*** above, Project construction emissions would not exceed SCAQMD thresholds of significance and would not have a significant impact on the environment or substantially contribute to global GHG emissions. As a result, the Project would not conflict with applicable plans, policies, or regulations adopted for the purposes of reducing GHG emissions. Therefore, there would be no impact.

7.4 Mitigation Summary

The Project would not result in significant impacts to GHG emissions; therefore, no mitigation is required.

8.0 HAZARDS AND HAZARDOUS MATERIALS

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the Project result in a safety hazard for people residing or working in the Project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the Project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

8.1 Environmental Setting

Hazardous materials are generally referred to as substances with chemical compositions or other properties that make them capable of causing illness, death, or some other kind of harm to humans and/or other life forms when mismanaged or released into the environment (California Department of Toxic Substances Control 2016). For this Project, concerns about hazardous materials are related to the transport and disposal of potentially hazardous materials, which may include the following: (1) quarry rock used for reef construction and (2) oil and gas aboard marine vessels.

8.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to hazards and hazardous materials and the Project are identified in Attachment 1. At the local level, the following plans are applicable to the Project.

- Los Angeles County has a Local Government Marine Oil Spill Contingency Plan designed to document the procedures necessary to deal with an oil spill in marine waters and on the shores of Los Angeles County. This plan informs community responders, planners, and residents about the potential hazardous ramifications of marine oil spills, and directs coastal communities and special districts at risk for an oil spill to create emergency response plans compatible with the Los Angeles County Operational Area Emergency Response Plan.
- The Los Angeles/Long Beach North Area Committee has developed a site-specific oil spill response plan called the Area Contingency Plan. This plan provides guidance on oil spill response, including the organization of incident command, planning and response roles and responsibilities, response strategies, and logistics. The Plan is updated annually.
- The City of Rancho Palos Verdes General Plan (1975) sets goals and standards to manage the City's marine safety. Through the General Plan, the City seeks to provide, maintain, and enhance safe, clean, healthy beaches and other marine resources for the public's enjoyment; to provide adequate emergency medical and marine safety services; to maintain the coastline in a manner that prevents the degradation of the community's visual and environmental resources; and to continue coordinating with the Rancho Palos Verdes Fire Department and other appropriate public agencies to provide emergency responses to spills, illegal dumping, and other incidents involving hazardous materials or waste.

8.3 Impact Analysis

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

a) and b) Less Than Significant Impact. The Project would place approximately 70,000 standard tons of quarry rock at the Project site. The rock, which would come from the Pebbly Beach and Empire Quarries on Santa Catalina Island, could potentially be considered a hazardous substance. However, this potential impact would be reduced to less than significant by implementing California Department of Fish and Wildlife Material Specification Guidelines (Wilson et al. 1990), which state that:

- The materials shall be clean and free of any contaminants, especially those that could dissolve in seawater (e.g., asphalt, paint, oil, or oil stains).

- All rocks used for the Project must be accepted by state and federal agencies in the following respects:
    - Purity: The materials shall be free of contamination and foreign materials.
    - Specific gravity: Shall be greater than 2.2.
    - Durability: Rocks used must remain unchanged after 30 years of submersion in seawater.

Reef construction would also use marine vessels and equipment powered by diesel fuel and lubricated by oil and other mechanical fluids, which are considered hazardous substances. Accidental releases of hazardous substances from Project vessels, vehicles, or equipment would have potential adverse environmental impacts. All ocean-going vessels used for the Project would not transport such substances in quantities in excess of their operating requirements. Additionally, vessels would maintain emergency response and oil spill prevention plans in accordance with applicable regulations (see Appendix B). Equipment and supplies to respond to a spill would also be onboard. Further, construction crews would be licensed, trained in oil spill response, and have a regular maintenance program to prevent a spill from an equipment malfunction. With the implementation of the above measures, the potential for diesel fuel, oil, mechanical fluids and other hazardous materials to create a significant hazard to the public or environment through routine transport, use, or disposal is less than significant.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?

No Impact. The Project site is located 0.3 mile offshore, and is not within 0.25 mile of an existing or proposed school. The nearest school, Mira Catalina Elementary School, is 1.37 miles from the Project site. Therefore, there would be no impact.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact. The Hazardous Waste and Substances Sites (Cortese) List is a planning document used by the State, local agencies, and developers to comply with CEQA requirements in providing information about the location of hazardous materials release sites. Government Code section 65962.5 requires the California Environmental Protection Agency to develop an updated Cortese List at least annually. The Project site is not included on the list of over 500 California hazardous material sites compiled pursuant to Government Code section 65962.5; however, the Project site is not far from the Palos Verdes Shelf-White Point Outfall which is on the list and was an area adversely affected by wastewater discharge from White Point Outfall. Because the purpose of the Project is to restore biological resources adversely affected by this wastewater discharge, the proximity of the Project site to the impacted area was one of the site criteria for selecting the site. Therefore, given the information above, the Project would not create a significant hazard to the public or environment. Therefore, there would be no impact.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the Project result in a safety hazard for people residing or working in the Project area?

f) For a project within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the Project area?

e) and f) No Impact. No public or public-use airports or private airstrips are within 2 miles of the Project site. The nearest airport, Torrance Zamperini Field Airport, is approximately 5.2 miles from the Project site. Additionally, the construction of a fully submerged rocky reef would not include any equipment that would present a risk to air traffic. Therefore, there would be no impact.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No Impact. The Project would not interfere with the implementation of emergency response or evacuation plans in the area due to the Project's location (0.3 mile offshore), limited duration (60 days), and limited number of vessels operating on site. Therefore, there would be no impact.

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

No Impact. The location and nature of the Project 0.3 mile offshore are such that there is no potential for wildfires to occur. Therefore, there would be no impact.

8.4 Mitigation Summary

The Project would not result in significant impacts to hazards and hazardous materials; therefore, no mitigation is required.

9.0 HYDROLOGY AND WATER QUALITY

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off site?	☐	☐	☐	☒
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site?	☐	☐	☐	☒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Expose people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow?	☐	☐	☒	☐

9.1 Environmental Setting

The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula, Los Angeles County. Nearshore marine water quality is influenced by many factors, including local currents and freshwater inflow, natural hydrocarbon seeps, vessel traffic, port infrastructure and petroleum development activities, municipal and stormwater discharges through ocean outfalls, and other point and nonpoint sources. Many of these sources contribute to increased levels of nutrients, trace metals, and synthetic organic contaminants in offshore waters.

Approximately 2 km from the Project site is White Point Outfall. Since 1937, the Joint Water Pollution Control Plant, located in Carson, has sent treated wastewater to ocean outfalls at White Point. From approximately 1950 through 1971, dichlorodiphenyltrichloroethane (DDT) was discharged from this outfall. Polychlorinated biphenyls (PCBs) were also discharged from this outfall until 1976. In 1971, emissions of DDT and PCBs effluent were 21.1 MT and 5.2 MT, respectively (EPA 2013). The highest concentrations of DDT and PCBs in the sediments are located at the 60-m isobath, near the White Point Outfall (Lee et al. 2002). Contaminants are not found farther inshore than the 30-m isobath due to high wave energy and a larger grain size that is unable to retain the contamination (Lee et al. 2002; EPA 2003). An EPA (2013) study of surface sediments surrounding the White Point Outfall found an observed decrease in DDT concentrations, from 110 MT to 20 MT, over a 6-year period from 2003 to 2009, and a decline in PCB concentrations from 10 MT to 0.1 MT. These decreases are believed to have been caused by: (1) dechlorination, (2) sediment deposition and burial from terrestrial sources; and (3) sediment resuspension, coupled with desorption of chemicals of concern from sediment into seawater (Santschi et al. 2001; EPA 2013). These current DDT and PCB concentrations are below requirements for cleanup efforts or capping (EPA 2013).

9.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to hydrology and water quality and the Project are identified in Attachment 1. At the local level, the City of Rancho Palos Verdes Coastal Specific Plan (1978) includes the following policy that may be related to the Project:

- Policy 13: Encourage and support programs, policies and actions of other agencies designed to maintain, manage, and restore the ocean water quality.

9.3 Impact Analysis

a) Violate any water quality standards or waste discharge requirements?

Less Than Significant Impact. During construction, placement of quarry rock at the Project site would temporarily resuspend fine sands and silts on the seafloor causing a temporary local increase in turbidity. Some sediment may also be introduced to the water from material on the quarry rock. As a result, the placement of quarry rock at the Project site has the potential to impact the local water quality through the introduction of contaminants and through the resuspension of sediments.

Permits for the discharge of fill material would be obtained from the U.S. Army Corps of Engineers and the Los Angeles Regional Water Quality Control Board, pursuant to Clean Water Act Section 401. Such permits typically include the following criteria to reduce impacts to water quality:

- Education of Project personnel on pollution prevention measures, spill response procedures, and implementation and maintenance of best management practices (BMPs)

- Compliance with the Water Quality Orders and Statewide General Waste Discharge Requirements for the discharges of dredged or fill material
- Washing of reef material that contains mud, silt, or other pollutants from equipment prior to placement
- Prevention of hazardous substances entering waters through the proper implementation of BMPs
- Visual monitoring of turbidity plumes by a qualified observer during each day of construction. If visual monitoring indicates turbidity greater than ambient 0.5 mile from the discharge site at any time for two consecutive days then the Regional Board must be notified, mitigation measures must be enacted to reduce turbidity, and if turbidity persists, daily water clarity testing and reporting may be required.

Artificial reef construction must also conform to California Department of Fish and Wildlife Material Specification Guidelines and Notification Procedure for Augmentation of Artificial Reefs with Surplus Materials. These guidelines specify the following:

- The materials shall be clean and free of any contaminants, especially those that could dissolve in seawater (e.g., asphalt, paint, oil, or oil stains).
- All rocks used for the Project must be accepted by state and federal agencies in the following respects:
    - Purity: The materials shall be free of contamination and foreign materials.
    - Specific gravity: Shall be greater than 2.2.
    - Durability: Rocks used must remain unchanged after 30 years of submersion in seawater.

Given the above BMPs to reduce impacts to water quality, the Project would have a less than significant impact on water quality standards or waste discharge requirements.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

No Impact. The Project, which would be located 0.3 mile offshore, does not involve groundwater extraction, and no groundwater recharge facilities are in the vicinity of the Project site; therefore, there would be no impact.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off site?

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site?

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

c) through e) No Impact. The Project, which would be located 0.3 mile offshore, would not alter the existing drainage pattern of the site or area or create or contribute runoff that would exceed the capacity of stormwater drainage systems; therefore, there would be no impact.

f) Otherwise substantially degrade water quality?

Less Than Significant Impact. See answer to ***a)*** above.

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

i) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?

g) through i) No Impact. The Project, which would be located 0.3 mile offshore, does not involve housing, would not impede or redirect flood flows in a 100-year flood-hazard area, and would not be located be located in a submerged offshore location where flooding does not occur and where levees and dams do not exist; therefore, there would be no impact.

j) Expose people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow?

Less Than Significant Impact. The Project involves placing quarry rock on the seafloor 0.3 mile offshore to enhance marine ecological resources, and does not include the construction of housing and/or other kinds of structures that can be inhabited or used by people. The Project is located offshore, which could expose workers to a seiche or tsunami is one were to occur; however, due to the short Project construction duration, impacts of a seiche or tsunami are considered low. Additionally, there is no potential to expose people, including workers, or structures to mudflows since these terrestrial phenomena do not occur in a marine environment. Therefore, this impact would be less than significant.

9.4 Mitigation Summary

The Project would not result in significant impacts to hydrology and water quality; therefore, no mitigation is required.

10.0 LAND USE AND PLANNING

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

10.1 Environmental Setting

The Project would be located between Bunker Point and White Point on the Palos Verdes Peninsula, approximately 0.3 mile offshore, past the existing kelp beds and in water depths between 15 to 23 m. The land area directly inshore of the Project site is under the jurisdiction of the City of Rancho Palos Verdes. One-third of the total land is vacant, with more than three-fourths of the immediate coastline land vacant (City of Rancho Palos Verdes 2013b). Land use near the Project site is predominately single-use residential and open space. Directly inshore of the Project site is the Ocean Trails Reserve and a golf club. To the northwest of the Project site is a large open space, occupied by the Abalone Cove Preserve and the City of Rancho Palos Verdes' Abalone Cove Shoreline Park. The land to the southeast of the Project site is under the jurisdiction of the City of San Pedro. This area is predominantly residential and open space. Open space areas include the White Point Nature Preserve and the Point Fermin Park.

10.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to land use and planning and the Project are identified in Attachment 1. Various entities address this issue area at the local level, as discussed below.

The City of Rancho Palos Verdes General Plan (1975) focuses on land use and planning within City boundaries, not offshore at the Project site, but establishes standards for noise that might affect coastal residences and commercial structures during the Project's construction phase. The City's Visual Resources Element (2013a) generally encourages the maintenance of scenic vistas, but does not establish specific visual standards applicable to the proposed construction activities. The City's Coastal Specific Plan (1978) encourages the restoration of marine biological resources restoration in adjacent waters. These three components of the City of Rancho Palos Verdes General Plan are considered in the noise, visual, and biological components of this Initial Study.

The County of Los Angeles General Plan (1980) focuses on land use and planning in the County's unincorporated areas, including land along the coast and on offshore islands. It does not include ocean waters or incorporated parts of the County. The Project site is adjacent to the incorporated City of Rancho Palos Verdes, and therefore is not adjacent to a County Planning Area. The quarry site on Catalina Island lies in the County's Coastal Island Planning Area.

10.3 Impact Analysis

a) Physically divide an established community?

No Impact. The Project would involve short-term construction of a submerged rocky reef 0.3 mile offshore, and does not include any above-ground structures which would physically divide an established community; therefore, there would be no impact.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

b) and c) No Impact. The Project would restore kelp and other marine biological resources in an area where such resources have been diminished over time by a number of effects, including region-wide wastewater disposal. The rocky-reef habitat that would be created by the placement of quarry rock at the Project site would not change the current use of the site, but would enhance its biological productivity.

The submerged reef location would not be affected by sea-level rise and, as discussed in Section 15.0, Recreation, based on research performed by Elwany et al. (1998), the rocky-reef habitat and associated kelp forest should not influence the size, shape, and direction of waves near the Project site; therefore, sea-level rise analysis pursuant to state and local agency plans and practices is not applicable.

Abalone Cove State Marine Conservation Area (SMCA) and Point Vicente State Marine Reserve (SMR) are two adjoining marine protected areas (MPAs) located in the general vicinity of the Project site. Abalone Cove SMCA lies about 1.5 miles to the west-northwest, while Point Vicente SMR is located about 2.7 miles west-northwest of the Project site. These two MPAs cover a total of 19.87 square miles, and protect natural habitats and marine life by protecting or limiting removal of wildlife from within their boundaries. For example, Point Vicente SMR prohibits all take of living marine resources, and Abalone Cove SMCA prohibits take of all living marine resources except recreational and commercial take of specific species. The Project would not impact these MPAs, and no take is expected in connection with the Project.

The restoration and enhancement of coastal marine biological resources is consistent with the California Coastal Act, California Fish and Game Code, California Ocean Resources Management Act, Coastal Zone Management Act, California Ocean Plan, and City of Rancho Palos Verdes Coastal Specific Plan. There are no conflicts with the Marine Life Protection Act or general or specific plans or policies adopted by the City of Rancho Palos Verdes or the County of Los Angeles. For these reasons, the Project would not conflict with any applicable land use plan, policy, or regulation. Therefore, there would be no impact.

10.4 Mitigation Summary

The Project would have no impacts to land use and planning; therefore, no mitigation is required.

11.0 MINERAL RESOURCES

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?	☐	☐	☒	☐
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

11.1 Environmental Setting

The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula in Los Angeles County. Potential mineral resources that could be found in the Project vicinity include sand and gravel resources, as well as oil and natural gas deposits. To construct the rocky reef, 7,000 tons of quarry rock would be extracted from the Pebbly Beach and Empire Quarries (State Mine ID Nos. 91-19-0010 and 91-19-0011, respectively) located on Santa Catalina Island, approximately 26 nm from the Project site. Both quarries, which are operated by Pacific-Connolly Company, are identified on the Department of California Office of Mine Reclamation's "AB 3098 List" as meeting Surface Mining and Reclamation Act provisions set forth under Public Resources Code section 2717, subsection (b). The type of quarry rock material that would be used is riprap, with each rock weighing between 0.25 and 1 ton.

11.1.1 Quarry Rock

Quarry rock is quarried from relatively consolidated formations comprised of either sedimentary or igneous rock and can be used in a variety of ways. In its largest form, it can be used to create riprap (e.g., for slope stabilization, marine breakwaters) or dimension stone (e.g., for building and construction, flagstone, curbing, and monumental stone). Crushed quarry rock material is referred to as aggregate, which includes sand, gravel, and crushed stone, which are often used in construction. These aggregate materials also provide the bulk and strength to Portland Cement Concrete (PCC), asphaltic concrete, plaster, and stucco.

Aggregate is an important commodity in California because of its use in the building and paving industries. These industries consume large quantities of aggregate, and future demand for this commodity is expected to increase throughout California. Because of its importance, the California Department of Conservation tracks the availability and consumption of aggregate in aggregate study areas. Aggregate study areas follow either a Production-Consumption (P-C) region boundary (one or more aggregate production districts and the market area those districts serve) or a county boundary. Approximately 4 billion tons of permitted aggregate reserves lie within the 31 aggregate study areas. In 2012, the total production of construction aggregate (sand-and-gravel and crushed stone) was 121.3 million tons (Clinkenbeard and Smith 2014).

The availability of, and demand for, PCC-grade aggregate in Los Angeles County was last reviewed in 1994 in a report titled Update of Mineral Land Classification of Portland Cement Concrete Aggregate in Ventura, Los Angeles, and Orange Counties, California (Miller 1994). In this report, Los Angeles County was divided into five P-C regions, and the Catalina Island area was not included. This report also estimated that Los Angeles County contains approximately 11,179 million tons of PCC-grade resources and 750 million tons of PCC-grade aggregate reserves; however, projection data indicate that existing reserves may be depleted by 2016.

In an updated report for the San Gabriel Valley P-C region (one of the five P-C regions in Los Angeles County), Clinkenbeard (2012) indicated that the region had between 11 and 20 years of permitted aggregate reserves remaining. In the San Gabriel Valley P-C region alone, 800 million tons of aggregate are expected to be needed by the end of 2060. According to the updated report, the highest areas of demand in California were the South San Francisco Bay area, the Temescal Valley-Orange County area, and the Western San Diego County area, which are expected to require more than 1 billion tons of aggregate by the end of 2060.

11.1.2 Sand and Gravel

Sand and gravel are resources used primarily in construction and beach nourishment projects. Most sand and gravel come from land-based deposits, although there is an interest in using offshore sources (Mokhtari-Saghafi and Osborne 1980; California Geological Survey 2005). However, because of the narrow continental shelf in southern California, together with the many technical, economic, and legal restrictions on dredging in the United States, very few areas along the coastal shelf of southern California are accessible for the potential extraction of sand. One of the few accessible areas is the Santa Monica Shelf. This area is located offshore of the Los Angeles Basin, extending from the City of Santa Monica south to the City of Redondo Beach. Areas suitable for sand extraction are located at the 40-m contour. Within the Santa Monica Shelf, two areas have been identified as potential offshore sand sources: Area I, B-IV, and Area I, B-V. These two sites, which are located north of the Project site, contain 325 million cubic yards and between 18 and 66 million cubic yards of sand, respectively. The Project site itself is not currently intended for offshore sand extraction, nor is it close to any areas that are in need of sand replenishment, which mainly exist to the north along the beaches of Santa Monica (California Geological Survey 2005).

11.1.3 Phosphorite

Phosphorite is a type of sedimentary rock that contains large quantities of phosphate-bearing minerals used in fertilizers and other products. Phosphate deposits come from three main sources: (1) marine sedimentary phosphorite, (2) apatite-rich igneous rock, and (3) ancient and modern guano accumulations (Glenn et al. 1994). Marine phosphorites mainly occur as crusts, plates, nodules, muds, and sands, and are found in shallow waters of fewer than 1,000 m (Rowland and Cruickshank 1983). Nodular phosphorite is the most abundant type of rock in non-depositional environments in southern California, with approximately one-third of all the rock recovered in this area being phosphorite (Dietz et al. 1942). A survey of phosphate deposits in Santa Monica Bay

estimated that 50 million tons of nodules and 12.5 million tons of phosphate sands were present (Inderbitzen et al. 1970). Historically in the United States, marine phosphorites occurred in large enough quantities to be economically viable off the coast of southern California (Rowland and Cruickshank 1983); however, the most recent Mineral Commodity Summary prepared by the U.S. Geological Survey (Jasinski 2014) indicates that most (greater than 85 percent) of the existing phosphate rock in the United States was mined from Florida and North Carolina, with the remainder from Idaho and Utah. In 1980, the United States accounted for 40 percent of the world's production (Rowland and Cruickshank 1983); however, currently it accounts for only approximately 14 percent of world production (Jasinski 2014). Anticipated depletion of onshore resources, coupled with increasing onshore land-use conflicts, have made questionable the value of further marine phosphorite mining (Rowland and Cruickshank 1983).

11.1.4 Oil and Gas Deposits

Oil resources have been identified at 23 major oil-drilling locations or state-designated oil fields in Los Angeles, which in whole or in part underlie the City (Port of Los Angeles 2008); however, none of these areas underlie the Project site and there are no active pending leases.

11.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to mineral resources and the Project are identified in Attachment 1. No local laws relevant to this issue area are applicable to the Project.

11.3 Impact Analysis

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?

Less Than Significant Impact. The Project would involve placing quarry rock on 40 acres of sandy seafloor 0.3 mile offshore to enhance marine ecological resources. Sand, nodular phosphorite, oil, and gas are mineral resources that could possibly be affected by the Project; however, mineral mining and extraction does not occur at the site, and there are no known plans for future mining or extraction.

Construction of the rocky reef would involve the use of quarry rock, an important mineral resource that becomes an important aggregate commodity once it is ground finely. The Project would diminish, to some extent, the availability of quarry rock in the region, as the Project is proposing to use 70,000 standard tons of quarry-rock material. Because of the relatively small size of this Project, only 0.06 percent of the total production of construction aggregate in the State and 0.6 percent of the Los Angeles County PCC-grade resources would be used during construction. Currently, no State standards dictate the rate at which aggregate resources can be consumed. Additionally, there are few sites in California conducive to sand or gravel extraction, and the

Project site is not listed as a potential extraction site. Thus, this Project would not result in the loss of availability of quarry rock that would be of value to the region and the residents of California.

Sand is a known mineral resource that is mined in southern California for beach enhancement. While the Project would inhibit future sand extraction within the 69-acre site, sand at the site is sparse (which is necessary to keep the quarry rock from sinking and becoming buried) in comparison with many other areas along the southern California coastline that could be available for mining. For this reason, the Project site is not believed to contain sand in quantities that would be of substantive value to the region or to the residents of California.

There has also historically been interest in mining nodular phosphorite along the southern California coast to be used to produce fertilizer, but with no resulting commercial extraction. Because there are many other sites available and no commercial mining in the foreseeable future, the Project is considered to not have a significant effect in reducing the availability of phosphorite in California.

Offshore oil and gas extraction is also a potential use for the Project site. There are many constraints on developing nearshore sites for oil and gas extraction, but apart from these constraints, the placement of 40 acres of quarry rock on the 69-acre Project site would not preclude development of the site for oil and gas production.

For these reasons, the Project would not significantly affect mineral resource availability for the region or residents of California. Therefore, the impact would be less than significant.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. The Project site has not been delineated in any local plans as an important mineral resource recovery site; therefore, there would be no impact.

11.4 Mitigation Summary

The Project would not result in significant impacts to mineral resources; therefore, no mitigation is required.

12.0 NOISE

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Result in exposure of persons to or generation of excessive ground-borne vibration or ground- borne noise levels?	☐	☐	☒	☐
c) Result in a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?	☐	☐	☐	☒
d) Result in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the Project expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒

12.1 Environmental Setting

12.1.1 Measuring Noise

Noise is generally defined as an unwanted or objectionable sound. Noise can cause annoyance, interference with communication, sleep disturbance, or in severe cases, hearing impairment. Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighted scale adjusts the actual sound power levels in order to be consistent with human hearing response, since the human ear is not equally sensitive to sound at all frequencies. Table 5-7 of the DEA outlines common noise terms and their definitions.

The sound pressure level is measured on a logarithmic scale with the 0-dB level based on the lowest detectable sound pressure level that people can perceive. Based on the logarithmic scale, a doubling of sound intensity is equivalent to an increase in 3 dB, and a sound that is 10 dB less than the ambient sound level has no effect on the ambient noise. In terms of human response to noise, a sound 10 dBA higher than another is judged to be twice as loud. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud).

According to the U.S. Environmental Protection Agency, impairment of the human ear begins at about 70 dBA. Noise levels above 35 to 45 dB would disturb a sleeping person; noise levels

between 50 and 60 dB can make it difficult to carry on a quiet conversation; and noise levels above 85 dB can produce stress reactions (City of Rancho Palos Verdes 2013c). Table 5-8 of the DEA outlines the sound levels of common noise sources.

12.1.2 Existing Noise Levels

The City of Rancho Palos Verdes General Plan–Noise Element (2013c) describes existing noise levels and sources in the City. Ambient noise monitoring within the city has shown that ambient noise levels are generally between 42.4 and 75 dBA. Ambient noise levels in the city come from two major sources: transportation and community noises. Areas that are sensitive to noise, called sensitive-use areas, include residences, schools, churches, and medical facilities.

Transportation noises include automobiles, trucks, motorcycles, buses, trains, and planes. The most common sources of noise in the Project area are traffic-related, stemming from automobiles, trucks, and motorcycles. Traffic noises within the city range from moderate to high. Traffic noises are considered moderate if the 70-dBA current noise equivalent level (CNEL) contour is confined within the roadway right-of-way, but the 65 and 60 dBA CNEL contours extend beyond the right-of-way. Traffic noises are considered high if the 70, 65, and 60 dBA CNEL contours extend beyond the roadway right-of-way. Moderate traffic noises come from Highridge Road, Indian Peak Road, Miraleste Drive, Palos Verdes Drive (South, East, and West), Silver Spur Road, Crest Road, Crestridge Road, Western Avenue, and portions of Crenshaw Boulevard and Hawthorne Boulevard. High traffic noises originate from some parts of Hawthorne Boulevard and the majority of Crenshaw Boulevard.

The City of Rancho Palos Verdes is served by four regional and sub-regional transit providers; however, the contribution of bus transportation to traffic-related noise levels is low. No railroad lines lie within or abut the City, although rail traffic from the Port of Los Angeles may be audible on the City's east side. Therefore, the contribution of rail traffic to ambient noise levels is low. There are three airports near the City. These include Los Angeles International Airport, Torrance Zamperini Field, and Long Beach Daugherty Field. From these three airports, there are no designated take-off or approach paths over the City; thus, these noise impacts are also fairly low.

Community noise sources include both constant noises and single-event noises. Constant noises include noises generated from traffic; from activities around service stations, Golden Cove Center, Peninsula Center, and the commercial strip along Western Avenue; and from other non-residential uses in the community. Constant noises also include noises from construction, such as from the operation of bulldozers and heavy trucks and from the pounding of hammers. Single-event noises include noises that are infrequent, but that may be louder and more intrusive than constant noises. These may include noise sources such as a plane flying overhead, barking dogs, or a loud motorcycle.

In addition to transportation and community noises, the sound produced by the ocean surf contributes to the measured noise levels of the coastal zone. The sound of the ocean surf can vary

depending on the tides and weather conditions. At a point 50 feet from the surf line, gentle lapping waves could produce about 20 dBA, while large waves and surf would produce about 55 dBA. The nominal value under normal conditions is around 40 dBA.

12.1.3 Land Use Patterns near the Project Site

Land uses near the Project site within the City of Rancho Palos Verdes include RS-1 (residential single lot greater than 1 acre), RS-2 (residential single lot greater than 20,000 square feet), RS-5 (residential single lot greater than 8,000 feet^2), RPD (residential planned development), OH (open space–hazard), and OR (open space–recreational). The majority of the land just inshore of the Project site is designated RS-1, which includes a golf club. A small portion of RS-5 is present at the northeastern boundary of the golf club. A small strip of land designated as OH lies between the RS-1 and RPD areas and the Pacific Ocean. In this area is the Ocean Trails Reserve, which consists of a series of pedestrian and bike trails. A small area of OH mixed with OR lies in the northeastern area of the Ocean Trails Reserve. Inland of these areas is a mix of residential (RS-4 and RS-5), OH, and I (institutional) designations (City of Rancho Palos Verdes 2013b). Table C-5 outlines the distances from the nearshore boundary of the Project site to the various land-use designations.

Table C-5. Distances from Project Site to Various City Land Use Designations

Land Use Pattern in City of Rancho Palos Verdes	Distance from Project Site (feet)[1]
Open Space: Ocean Trails Reserve	1,246
Residential Single Lot: Trump National Golf Club	1,709
Residential Single Lot: North of Palos Verdes Drive	2,500
Open Space: Royal Palms/White Point County Park	4,950
Sensitive Use Area: School library, Mira Catalina Elementary School	7,257

Note:
[1] Distances were taken from the nearshore boundary of the project site in order to reflect the least amount of distance from the project site to onshore land uses.

12.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to noise and the Project are identified in Attachment 1. Various entities address this issue area at the local level, as discussed below.

The County of Los Angeles General Plan–Noise Element (2015) addresses various noises and sources throughout the County, specifically focusing on sources such as traffic, railroad, and aircraft. The guidelines used by the County are based on the community noise compatibility guidelines established by the State of California's Department of Health Services. Regulations that implement these guidelines are set forth in the Los Angeles County Code. Section 12.08.440 of the County of Los Angeles Noise Ordinance prohibits construction during weekday evening and

nighttime hours from 7:00 p.m. and 7:00 a.m., or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real-property line. The ordinance sets specific limits for construction noise affecting existing structures during daytime hours from 7:00 a.m. to 7:00 p.m., varying by the day and type of structure. On weekdays, the noise limit for: single-family residences is 75 dBA; multi-family residences is 80 dBA; and commercial structures is 85 dBA. On Sundays and legal holidays, the noise limit for: single-family residences is 60 dBA; multi-family residences is 64 dBA; and commercial structures is 70 dBA.

The City of Los Angeles General Plan–Noise Element (1999) establishes standards to ensure that sources of noise in the City do not create an unacceptable noise environment. Noises are categorized as A (normally acceptable), C (conditionally acceptable), N (normally unacceptable), and U (clearly unacceptable). Where a land use is denoted as "A" for the given CNEL noise environment, the highest noise level in that range should be considered the maximum desirable for conventional construction that does not incorporate any special acoustic treatment. The acceptability of noise environments classified as "C" or "N" depends on the anticipated amount of time that would normally be spent outside of the structure and the acoustic treatment to be incorporated into the structure's design. Generally, for single-family residential areas, normally acceptable noises include noises up to 50 dBA. For multi-family residential areas, up to 55 dBA is considered normally acceptable, and for playgrounds and parks, up to 65 dBA is considered normally acceptable.

For the City of Rancho Palos Verdes, as outlined in the City of Rancho Palos Verdes General Plan–Noise Element (2013c), there is, in general, a 65-dB limitation on mechanical equipment at the closest property line; however, the operation of mechanical equipment can exceed 65 dBA on commercial properties that abut a residential district between the hours of 7 a.m. and 7 p.m., Monday through Saturday. The City of Rancho Palos Verdes acknowledges that short-term noise impacts from construction would be higher than existing ambient noise levels, with typical maximum noise levels reaching up to 91 dBA at 50 feet during construction. In order to reduce construction noise levels, the City has measures to reduce potential construction noise impacts. These include:

- Equipping all construction equipment with properly maintained mufflers, consistent with manufacturers' standards.
- Placing all stationary equipment so that emitted noise is directed away from sensitive receptors nearest the project site
- Locating equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site.
- Constructing temporary sound barriers/walls to dampen the noise attenuation effect.

The City of Rancho Palos Verdes General Plan–Urban Environment Element (1975) identifies the following relevant noise policies:

- Policy 1: Mitigate impacts generated by steady-state noise intrusion (e.g., land strip buffers, landscaping, and site design).
- Policy 2: Develop an ordinance to control noise.
- Policy 3: Regulate land use so that there is a minimal degree of noise impact on adjacent land uses.
- Policy 7: Maintain current and up-to-date information on noise control measures, on both fixed point and vehicular noise sources.
- Policy 11: Encourage the state and federal governments to actively control and reduce vehicle noise emissions.

12.3 Impact Analysis

a) Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less Than Significant Impact. The completed rocky reef would be a passive, submerged feature that would not generate noise; however, noise would be generated during construction of the rocky reef as a result of construction-related vessels and equipment. Construction noise would be occur during the 40- to 60-day construction period and would generated during daylight hours only (Monday through Saturday). While the placement of quarry rock on the barge and seafloor would occur during the day, transportation of the quarry rock to the Project site may occur at night.

Table C-6 outlines the equipment that would be used for this Project, and shows the noise levels at various distances from the source. The rock quarry and docks at Santa Catalina Island are developed industrial facilities that are currently being operated under the regulatory oversight of the County of Los Angeles, including the County's noise control ordinances. In general, the median noise level in the vicinity of the quarry is expected to be about 45 dBA when equipment is not being operated. When equipment is being operated, the median noise levels would be expected to increase to levels of about 50 to 60 dBA.

Construction equipment and quarry rock transportation would produce noise ranging from 51 to 60 dBA as measured at the shoreline (1,600 feet away from the Project site; the closest residence/sensitive use area is 1,709 feet from the Project site [see Table C-5]). These levels would not be highly distinguishable from the ambient noise levels along the beaches and coastal roads, and would not exceed the acceptable noise range outlined in the City of Rancho Palos Verdes General Plan–Noise Element (2013c) for the affected coastal land use pattern. As a result, while Project construction would contribute to noise levels in the area, it would not generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. Therefore, the impact would be less than significant.

Table C-6. Estimated Noise Levels from Project Equipment

Operation	Equipment	Hours of Operation	Quantity	Sound Levels at Maximum Engine Power with Mufflers at Indicated Distances (dBA)				
				100 Feet	200 Feet	400 Feet	800 Feet	1600 Feet
Towing barge/ anchor positioning/ standby	Tugboats	8	2	84	78	72	66	60
Positioning system	Diesel engine	9	1	81	75	66	60	54
Power-up during operation hours	Generator	9	1	75	69	63	57	51
Scoop and drop rock from barge	Tracked loader	8	1	79	73	67	61	55
Hoist track loader onto rock barge	Derick cranes	1.5	1	82	76	70	64	58
Maneuver items on derrick barge platform	Bulldozer	1	1	82	76	69	63	57

b) Result in exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

Less Than Significant Impact. The Project involves placing quarry rock on the seafloor 0.3 mile offshore. The impact of the quarry rock on the seafloor would be dampened by the water column, and any vibration would be highly localized and not perceptible either on site or along the coastline. For this reason, the Project was determined to not expose persons to or generate excessive ground-borne vibration or noise. Therefore, the impact would be less than significant.

c) Result in a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?

No Impact. See answer to ***a)*** above. The completed rocky reef would be a passive, submerged feature that would not generate noise. While noise would be generated during the construction of the rocky reef, it would be minor and temporary. As a result, this Project would not result in a permanent increase in ambient noise levels in the Project vicinity. Therefore, there would be no impact.

d) Result in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project?

Less Than Significant Impact. See answer to ***a)*** above.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

f) For a project within the vicinity of a private airstrip, would the Project expose people residing or working in the Project area to excessive noise levels?

e) and f) No Impact. The Project, which is located 0.3 mile offshore, is not located within 2 miles or in the vicinity of a public airport or private airstrip; therefore, there would be no impact.

12.4 Mitigation Summary

The Project would not result in significant impacts to noise; therefore, no mitigation is required.

13.0 POPULATION AND HOUSING

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

13.1 Environmental Setting

The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula in Los Angeles County. Inshore of the Project site is the City of Rancho Palos Verdes. According to the 2010 census, the population in the City of Ranchos Palos Verdes was 41,943, which represented a 1.21 percent growth rate since 2000. In that census, there were 15,763 reported households. The population growth rate was, and still is, much lower than both the State's average growth rate of 9.99 percent and the national average growth rate of 9.71 percent (U.S. Census Bureau 2014).

13.2 Regulatory Setting

No federal, state, or local laws relevant to this issue area are applicable to the Project.

13.3 Impact Analysis

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. The Project involves the placement of quarry rock on the seafloor 0.3 mile offshore to enhance marine ecological resources. The Project would not create any infrastructure or other structures or facilities. For this reason, the Project does not have the potential to induce substantial population growth. Therefore, there would be no impact.

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

b) and c) No Impact. The Project involves the placement of quarry rock on the seafloor 0.3 mile offshore to enhance marine ecological resources. The Project would not displace existing housing or substantial numbers of people, nor would it necessitate the construction of replacement housing elsewhere. Therefore, there would be no impact.

13.4 Mitigation Summary

The Project would have no impacts to population and housing; therefore, no mitigation is required.

14.0 PUBLIC SERVICES

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☒
Police Protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

14.1 Environmental Setting

The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula in Los Angeles County. Inshore of the Project site is the City of Rancho Palos Verdes. Onshore and offshore service providers are listed below in Table C-7.

Table C-7. Summary of Public Service Providers

Service	Provider(s)
Fire Protection	City of Los Angeles Fire Department
Police Protection	City of Los Angeles Police Department
Parks	City of Los Angeles Department of Parks and Recreation
Other: Maritime Law Enforcement	Los Angeles County Sheriff's Harbor Patrol U.S. Coast Guard

Due to the offshore location of the Project, the following discussion focuses on the offshore emergency response services that would be needed in the event of a fire, collision, or accident onboard vessels or barges at the Project site. In the City of Rancho Palos Verdes and Los Angeles County, these services are provided by: (1) the U.S. Coast Guard, (2) Los Angeles County lifeguards, and (3) the Los Angeles County Sheriff's Department's Harbor Patrol. While these organizations all work together, each has a unique role.

- The U.S. Coast Guard is the federal government's primary maritime law enforcement agency and is responsible for ensuring overall safety and security in the marine environment. The U.S. Coast Guard responds to boat emergencies that occur more than 3 nm offshore, and will assist within 3 nm if requested by other agencies. The closest U.S. Coast Guard stations to the Project site are at the Ports of Los Angeles and Long Beach.
- Lifeguards at state beaches and at beaches in the cities of Los Angeles and Rancho Palos Verdes respond to distress calls primarily from people swimming or surfing near shore, as well as from some boaters. Additionally, there are highly trained Ocean Lifeguard Specialists with Los Angeles County Fire Department's Underwater Rescue and Recovery

Unit Dive Team, who respond to missing swimmers and divers, sinking (or sunken) vessels, and aircraft in the water. Non-emergency boating problems, such as engine problems or equipment failure, are handled through a private service in the area.

- The Los Angeles County Sheriff's Harbor Patrol Port Police responds to all emergencies within 3 nm of the Los Angeles County shoreline, and is the first point of contact for vessel emergencies. The Harbor Patrol regularly patrols the offshore area and has a fire boat on duty 24 hours a day. If a physical injury occurs, the Patrol calls paramedics to assist either onshore or at the site of the accident. The Harbor Patrol also calls the City of Los Angeles, City of Rancho Palos Verdes, and state beach lifeguards for help as necessary. The Harbor Patrol also has a scuba dive team that serves as an underwater unit, which polices the area within and around the Port of Los Angeles. On occasion, the dive team would assist the U.S. Coast Guard with investigating spills, accidents, and suspicious incidents.

14.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to public services and the Project are identified in Attachment 1. No local laws relevant to this issue area are applicable to the Project.

14.3 Impact Analysis

a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services?

- ***Fire protection?***
- ***Police Protection?***
- ***Schools?***
- ***Parks?***
- ***Other public facilities?***

No Impact. The Project involves the placement of quarry rock on the seafloor 0.3 mile offshore to enhance marine ecological resources. Project construction is short-term and would not require any additional services outside of those mentioned above and currently available. Furthermore, the nature of the completed rocky reef is such that it would not require or affect governmental services, such as fire protection, or public facilities, such as schools. Therefore, there would be no impact.

14.4 Mitigation Summary

The Project would have no impacts to public services; therefore, no mitigation is required.

15.0 RECREATION

Would/does the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
c) Would the Project substantially interfere with recreational surfing activities or have a substantially adverse effect on surfers?	☐	☐	☒	☐
d) Would the Project substantially interfere with recreational diving activities or have a substantially adverse effect on divers?	☐	☐	☒	☐

15.1 Environmental Setting

The Project is located offshore of the Palos Verdes Peninsula, which is a unique natural resource that attracts many recreational users because of its natural beauty, temperate climate, beaches, wildlife, and location near a large metropolitan complex. However, landslides are prevalent, and many of the coastal areas are categorized as "hazardous open space," which is deemed undevelopable. Many of these areas have been made into parks that the public can use for a variety of recreational activities.

Inshore of the Project area is the City of Rancho Palos Verdes, which includes multiple locations that the public can use for recreation, including: (1) Abalone Cove Shoreline Park, (2) Ocean Trails Reserve, (3) Trump National Golf Club, (4) Royal Palms/White Point County Beach, (5) White Point Nature Reserve, (6) Point Fermin Park, and (7) Angels Gate Park. These open-space areas contain trails and roads, and some allow access to the beaches through trails that lead down the coastal bluffs. Abalone Cove Reserve, Ocean Trails Reserve, White Point Nature Reserve, and Point Fermin Park feature parking areas and hiking trails that enable recreational users to access the beach. These access points are used for surfing, diving, and fishing, tidepooling, hiking the bluffs, wildlife viewing, and other recreational purposes.

15.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to recreation and the Project are identified in Attachment 1. Various entities address this issue area at the local level, as discussed below. No local laws relevant to this issue area are applicable to the Project.

15.3 Impact Analysis

This section addresses potential impacts on recreational facilities. It should be noted that the two checklist questions do not address potential effects on recreational fishing or other recreational activities, such as the potential for the Project to diminish the quality of visual resources that support onshore recreational activities, including beach activity. Potential impacts on onshore recreational activities are discussed in Section 1.0, Aesthetics; potential conflicts with recreational boat traffic are discussed in Section 16.0, Transportation/Traffic; and potential impacts on recreational fishing are discussed in Section 20.1, Commercial and Recreational Fishing.

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact. During Project-related construction, workers may use nearby park and recreation facilities in the short term; however, due to the limited number of workers and the short-term nature of the Project, the Project would not increase the use of existing parks or recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated. Additionally, the enhanced ecological conditions resulting from the Project could lead to improved recreating in the area, including recreational angling and diving; however, it is not anticipated that this would increase the use of existing nearby parks or recreational facilities such that substantial physical deterioration would occur or be accelerated. Therefore, there would be no impact.

b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

No Impact. See answer to ***a)*** above. Furthermore, the Project does not include the construction or expansion of recreational facilities. Therefore, there would be no impact.

c) Would the Project substantially interfere with recreation surfing activities or have a substantial adverse effect on surfers?

Less Than Significant Impact. For many beachgoers, the Palos Verdes Peninsula is known as the crown jewel of Los Angeles when it comes to surfing. There are many surfing breaks in the Palos Verdes Peninsula area, and near the Project site, due to rock points and the Redondo Submarine Canyon, which funnels swells towards Palos Verdes. During Project construction, marine vessels and construction equipment would be located approximately 0.3 mile offshore in water depths of 15 to 21 m. The surfing breaks near the Project site are much closer to shore, in water depths not exceeding 5 m. Therefore, Project construction would not impact surfers or surfing activities.

The restoration of 69 acres of rocky-reef substrate offshore of surfing breaks on the Palos Verdes Peninsula has the potential to influence the size, shape, and direction of these breaks, which could create a significant effect on nearby surfing conditions. However, Elwany et al. (1998) concluded that reefs and the associated kelp forests would not change the measurable attenuation of height or

energy of long-period swell waves, nor would they affect the propagation or direction of swell waves. They also concluded that the construction of a reef would not substantially affect the distribution and transport of sediment in the littoral zone, nor the width of the beach. They determined that kelp forests dampen the effects of high-frequency sea waves, which are generated by local onshore winds and result in surface chop or roughness. These rough, choppy conditions are generally not favorable for surfing. Since the presence of a kelp forest would reduce these conditions, resulting in a smooth, glassy sea surface, it would actually have a beneficial effect on surfing. Based on the research performed by Elwany et al. (1998), the rocky-reef habitat and associated kelp forest should not influence the size, shape, and direction of waves near the Project site. Therefore, the restored reef would have a less than significant impact on surfing.

d) Would the Project substantially interfere with recreational diving activities or have a substantial adverse effect on divers?

Less Than Significant Impact. Construction of the reef would occur over a 40- to 60-day period, with construction paced at 1 acre per day, to place quarry rock on 40 acres within the 69-acre Project site. The Project site is located in an area known for diving, and as a result of Project construction, divers would be temporarily excluded from a daily 1-acre site within the Project area; the rest of the Project area and the extensive adjacent coastal waters would remain available during this period. Additionally, there are many other diving sites along the Palos Verdes Peninsula that divers can use during reef construction. To notify divers of Project activities and the lease/buffer zone around the Project site, a Local Notice to Mariners would be submitted to the U.S. Coast Guard Waterways Branch. The notice would also include information about the purpose of the Project, construction activities and timeframes, and any potential safety hazards to the public. Currently, the Project site contains substantial areas of buried reef, which are not conducive to recreational diving. Once completed, the Project would provide additional diving sites along the Palos Verdes Peninsula. The addition of limiting hard substrate should provide suitable habitat for the growth of giant kelp (*Macrocystis pyrifera*), as well as additional habitat for fish species, leading to a more productive, biologically diverse reef that would be more attractive to recreational divers. Given the information above, this impact would be less than significant.

15.4 Mitigation Summary

The Project would not result in significant impacts to recreation; therefore, no mitigation is required.

16.0 TRANSPORTATION/TRAFFIC

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

16.1 Environmental Setting

The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula in Los Angeles County. Inshore of the Project site is the City of Rancho Palos Verdes, and approximately 1.3 miles northeast of the Project site is the City of San Pedro. For this Project, regional transportation networks would include both ground and waterborne transportation. Ground transportation would include the commuting of construction workers to the Cabrillo Marina via roadways at or near the City of San Pedro, where they would board a crew boat that would take them to the offshore Project site. Waterborne transportation would involve vessels commuting to the Project site from the Catalina Island quarry, the Cabrillo Marina, and the Ports of Los Angeles and Long Beach.

16.1.1 Ground Transportation

Ground transportation would be limited to the roadways in and around San Pedro, which would be used by construction workers traveling to the Cabrillo Marina. Ground transportation would be limited to approximately 15 vehicles carrying reef construction workers to the Cabrillo Marina in

San Pedro for pickup by crew boat. Because the reef materials would be transported entirely by waterborne craft, there would be no truck hauling of such materials on public roadways.

Potential Roadways Used by Project and Workers

Potential roadways that could be used by reef construction workers include: (1) Interstate 710 (Long Beach Freeway); (2) Interstate 110 (Harbor Freeway); (3) Seaside Freeway; (4) South Harbor Boulevard; (5) Pacific Avenue; (6) West 22nd Street; and (7) Via Cabrillo Marina Street. Smaller roadways within the City of San Pedro that may be used by commuting construction workers would include South Harbor Boulevard, Pacific Avenue, West 22nd Street, and Via Cabrillo Marina Street.

Existing Traffic Volumes

Year 2013 data from the California Department of Transportation (Caltrans) show that the annual, average daily traffic volume for the Seaside Freeway is 51,000 vehicles per day (vpd); for Interstate 710 north of the Seaside Freeway junction, it is 59,000 vpd; and for Interstate 110 at the Seaside Freeway junction, it is 68,000 vpd (Caltrans 2013).

16.1.2 Waterborne Transportation

Waterborne transportation for the Project would include: (1) the transport of quarry rock via tugboat-pulled barges from Santa Catalina Island to the Project site; (2) transport of crew members by crew boat from the Cabrillo Marina to the Project site; and (3) transport of the marine construction fleet to the Project site from either the Port of Los Angeles or the Port of Long Beach.

- Waterborne Transport of Quarry Rock: Quarry rock used in the construction of the reef would be obtained from the Pebbly Beach and Empire Quarries on Santa Catalina Island (see Section 11.0, Mineral Resources). Using quarry rock from these sources would require a minimal amount of trucking, of up to 0.25 mile from the quarries to the loading dock. These trucks operate on property roads owned by the quarries and are part of the existing permitted operations. The quarry rock would then be loaded onto two supply barges and would be pulled by tugboat 26 nm to the Project site for a total of 18 round trips.
- Waterborne Transport of Construction Workers: An estimated 15 construction workers would be transported daily from the Cabrillo Marina to the Project site and back by crew boat, for a round trip distance of approximately 14 nm. The crew boat would be docked at the public docks at the Cabrillo Marina or at a permanent berth at the Port of Los Angeles or Port of Long Beach.
- Waterborne Transport of Construction Equipment: The marine construction fleet for reef construction would include: (1) a derrick barge (construction barge), (2) two tugboats, and (3) four supply barges. The marine construction fleet would come from either the Port of Los Angeles or the Port of Long Beach, traveling approximately 10 nm from either port to

the Project site. Once anchored offshore, the marine construction fleet would remain offshore for the duration of the construction period unless inclement weather caused it to return to port.

Additionally, Project-related barges and tugboats may be anchored temporarily at the Port of Los Angeles or the Port of Long Beach during inclement weather, as well as to store excess rock material and transport it back to the Project site once the weather is favorable for reef construction.

Existing Waterborne Transportation Networks

The waterborne transportation network for this Project includes the area from Santa Catalina Island to San Pedro Bay, which encompasses approximately 130 square miles. Because of the proximity of this region to the Ports of Los Angeles and Long Beach, the major shipping lanes contain substantial commercial traffic. In addition, recreational vessels are docked at the 19 marinas within these ports, which hold a total of 7,665 boat slips. There are also many yacht clubs in the area to facilitate recreational boating. Additionally, the proximity of these marinas to Santa Catalina Island makes them popular docking spaces for recreational vessels.

16.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to transportation/traffic and the Project are identified in Attachment 1. No local laws relevant to this issue area are applicable to the Project.

16.3 Impact Analysis

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

Less Than Significant Impact. Ground transportation would include the commuting of construction workers to the Cabrillo Marina via roadways at or near the City of San Pedro, where they would board a crew boat that would take them to the Project site. Commuters traveling to the Cabrillo Marina would use roads designated as: Freeways, Class II Major Highways, Secondary Highways, and Local Streets. Only one local street is estimated to be used by commuting workers, which includes Via Cabrillo Marina Street. Considering that the construction of the reef would only require an estimated 15 employees, and thus, a maximum of 15 additional cars on these roadways, this should not cause a significant increase in traffic in relation to the existing traffic volume, nor should it cause a substantial increase in vehicular movement. Therefore, this is considered a less than significant impact to intersections, streets, highways, and freeways.

The City of San Pedro Community Plan (City of Los Angeles Department of City Planning 2012), defines priority streets within the City. Priority street designations include: pedestrian, bicycle, public transit, motorized vehicles, and goods movement streets. The only street designation with a bicyclist or pedestrian designation is Pacific Avenue, which is designated as a pedestrian street. Because Pacific Avenue is a Secondary Highway, it is designed to have sidewalks with a minimum of 10 feet (City of Los Angeles Department of City Planning 2012). Since this road has infrastructure in place for pedestrians, the addition of a maximum of 15 extra vehicles per day on this road is considered a less than significant impact to pedestrians or bicyclist paths.

Construction workers traveling to the Cabrillo Marina who live in San Pedro could also use the Port of Los Angeles Waterfront Red Car Line, which provides clean electric powered rail transport along the San Pedro Waterfront and which travels down Harbor Boulevard. However, the number of new users would be minimal and impacts to mass transit are considered less than significant.

Waterborne transportation routes that would be used for Project construction include: (1) routes between Santa Catalina Island and the Project site; (2) routes from the Cabrillo Marina to the Project site; and (3) routes from the Port of Long Beach or Port of Los Angeles to the Project site. For the route between Santa Catalina Island and the Project site, one tugboat would tow two 2,000-ton capacity barges at a time from Catalina Island to the Project site through 18 roundtrips. This is expected to occur over a 24-hour period during the entire construction time frame. For the routes from the Cabrillo Marina to the Project site, one boat would travel daily to transport crew to and from the Project site to the Cabrillo Marina. For the routes from the Port of Long Beach or Los Angeles to the Project site, a derrick barge and attending tugboat would be moved from the ports to the Project site at the initiation of construction and completion of construction. Waterborne travel associated with construction would be located out of established shipping lanes in the area and would therefore not interfere with existing waterborne traffic. As a result, this impact would be less than significant.

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

No Impact. Pursuant to the Los Angeles County Congestion Management Program (CMP), administered by the Los Angeles County Metropolitan Transportation Authority, a traffic impact analysis is required at the following:

- CMP arterial monitoring intersections, including freeways on- or off-ramps, where the Project would add 50 or more trips per day during either the a.m. or p.m. weekday peak hours (8:00 a.m. to 5:00 p.m.).
- CMP freeway monitoring locations where the Project would add 150 or more trips per day during either the a.m. or p.m. weekday peak hours.

Construction activities would involve approximately 15 workers per day for a period of approximately 60 days. Therefore, this is under the criteria for CMP freeway or intersection monitoring. Therefore, there would be no impact.

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

No Impact. The Project involves the construction of a fully submerged rocky reef, and the construction of the reef would not include any equipment that would present a risk to air traffic. The very nature and location of the Project precludes the potential for air traffic-related safety issues. Furthermore, no air travel is associated with the Project. Therefore, there would be no impact.

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact. The Project involves the construction of a fully submerged rocky reef 0.3 mile offshore, and does not involve roadways or roadway design that would increase hazards due to a design feature or incompatible uses; therefore, there would be no impact.

e) Result in inadequate emergency access?

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

e) and f) No Impact. See answer to ***d)*** above.

16.4 Mitigation Summary

The Project would have no impacts to transportation/traffic; therefore, no mitigation is required.

17.0 TRIBAL CULTURAL RESOURCES

Would the Project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
a) Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☐	☒
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☒

17.1 Environmental Setting

17.1.1 Background

Evidence of the first human occupation of southern California was seen between 15,000 and 10,000 years ago, in the Pleistocene epoch (Moratto 1984, cited in Port of Los Angeles 1984). A number of submerged archaeological sites have been located off the coast of southern California. Many of these sites contain a variety of prehistoric artifacts, including manos, mutates, choppers and pestles (Weinman and Stickel 1978; Bickel 1978; URS Corporation 1986). Most of these known submerged archaeological sites and associated artifacts are located in relatively shallow water. Many of the shallow water sites may be a result of cliff erosion and are most likely associated with archaeological sites located on the cliffs above. Other submerged artifacts are the consequence of random loss and some may have been purposefully discarded in association with ceremonial rituals or other events.

17.1.2 Gabrielino/Tongva

When Spanish explorers and missionaries first visited the southern coastal areas of California, the indigenous inhabitants of the Los Angeles area (the Tongva) were given the Spanish name Gabrielino. Before the arrival of the Spanish explorers, the Palos Verdes area was home to the Tongva people, also known as the Gabrielinos. Before colonization of the Spanish in the 1700s, the population of the Tongva people was estimated at 200,000. By the late 1800s, only 6,000 remained (Bureau of Ocean Energy Management 2013; Welch 2006). Ethnographic information

indicates that the Gabrielino occupied the area between the Palos Verdes Peninsula and the Los Angeles River as evidenced by the number of recorded village sites in each of these areas.

McCawley (1996, cited in Port of Los Angeles 2008) provides Gabrielino place names for the peninsula, including Chaawvenga, Xuuxonga, Toveemonga, Aataveanga, Kiinkenga, Toveemonga, and Haraasnga. McCawley also provides information for the village sites of Swaanga and Ahwa Anga as located along the Los Angeles River closest to its junction with the Pacific Ocean. These villages were occupied as late as the 1700s and early 1800s as evidenced by notations in the baptismal registers of Mission San Gabriel (McCawley 1996, cited in Port of Los Angeles 2008). Swaanga was documented as one of the larger, more substantial village sites (McCawley 1996 citing Reid 1852, cited in Port of Los Angeles 2008). However, there is some discrepancy as to the actual location of the village. McCawley (1996, cited in Port of Los Angeles 2008) cites Reid's (1852) notation that Swaanga was located at "Suang-na" suggesting that this was still a recognizable place by 1852.

A local San Pedro historian provides a specific location for Suang-na as the side of the hill above what is now Anaheim Street between the Harbor Freeway and Gaffey Street (Silka 1993, cited in Port of Los Angeles 2008). Silka adds that the village was located near a crossing of major Native American trails, which today is located at the intersection of Gaffey and Anaheim Streets, Vermont Avenue and Palos Verdes Drive North, commonly called Five Points. McCawley (1996, cited in Port of Los Angeles 2008) cites Reid (1852), stating that Chaawvenga is located on "Palos Verdes." McCawley also cites Jose Zalvidea, stating that the name Tsauvinga applies to San Pedro and that the village of Xuuxonga was located on the shore below San Pedro (Harrington 1986, cited in Port of Los Angeles 2008). As documented, none of the recorded village sites is located within the proposed Project area. However, given their proximity to the proposed Project area, it was likely used by inhabitants of some or all of these villages.

The open waters along this coast, where the proposed Project is located, have long been used for trade, transportation, fishing, and hunting. Prehistorically, offshore fishing by the Gabrielino/Tongva tribe was accomplished from boats using line and hook, nets, basket traps, spears, and poisons. Much of the fishing, shellfish harvesting, and fowling occurred along the ocean shoreline. Sea mammals were taken with harpoons, spears, and clubs (Hudson and Blackburn 1982, cited in Port of Los Angeles 2008).

17.1.3 Submerged Tribal Cultural Resources

A literature search of the known cultural sites in the Project area and within a 0.5-mile radius of the Project site was conducted through the South Central Coast Information Center (South Central Coast Information Center 2015). The search included a review of all recorded archaeological and built-environment resources as well as a review of cultural resource reports on file. In addition, California Points of Historical Interest, California Historical Landmarks, California Register of Historical Resources, National Register of Historic Places, and California State Historic Properties Directory listings were researched.

Results from a side-scan sonar survey conducted at the Project site in January 2014 (EcoSystems Management Associates 2014) did not reveal any anthropogenic structures on the seafloor. Subsequent surveys—a diver-based ground-truthing survey performed in April 2014 and an additional biological survey in March 2015—did not reveal any historical resources that may have been missed during the side-scan sonar survey.

These studies and surveys suggest that cultural resources do not exist at the Project site; however, there are several recorded sites onshore. Therefore, as a result of erosion and landslides in the area, these resources have the potential to have been transported to the Project site.

17.2 Regulatory Setting

Federal and state laws and regulations pertaining to and relevant to tribal cultural resources and the Project are identified in Attachment 1. At the local level, the City of Rancho Palos Verdes General Plan–Socio/Cultural Element (1975), includes a goal to preserve and protect its cultural resources, including all significant archaeological, paleontological and historical resources, and to promote programs to meet the social needs of its citizens. Policy 2, "encourage the identification of archaeologically sensitive areas and sites," may also be relevant to the Project:

17.3 Impact Analysis

a) Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

(i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)? or

(ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

No Impact. The Project site is located 0.3 mile offshore, between Bunker Point and White Point on the Palos Verdes Peninsula. The Project involves the placement of quarry rock on the seafloor to restore and enhance biological resources, and does not include excavation or the construction of any buildings or structures. There are no resources at the Project site that are listed or eligible for listing in the National Register of Historical Places or in a local register of historical resources. Additionally, there are no archaeological materials located on the site, nor are there historical materials such as those related to shipwrecks.

Assembly Bill (AB) 52 made changes to CEQA regarding tribal cultural resources and consultation with California Native American Tribes who have previously requested to be notified of projects in the geographic area traditionally and culturally affiliated with that tribe. Tribal cultural resources include sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a Tribe that is eligible under the California Register of Historic Resources or local register of historical resources. A tribal cultural resource can also be a resource that a lead agency determines, in its discretion and considering the significance of the resource to a Tribe, to be significant pursuant to criteria set forth in Public Resources Code section 5024.1. Under AB 52, lead agencies must avoid damaging effects to tribal cultural resources, when feasible, regardless of whether consultation occurred or is required.

To date, CSLC staff has not received written requests for notification from tribes whose geographic area of cultural affiliation overlaps with that of the Project; however, the Native American Heritage Commission (NAHC) provided a contact list of five Tribes that the CSLC should contact to gather information regarding the potential for tribal cultural resources within the Project area. CSLC staff notified these Tribes on October 18, 2016, to proactively engage with those tribes to ensure they have the opportunity to provide meaningful input on the Project's potential effects. On October 30, 2016, the Gabrieleño Band of Missions Indians notified the CSLC via email regarding the ancestral and traditional territories of the Kizh (Kitc) Gabrieleño villages in the area. The Tribe also requested that an experienced and certified Native American monitor be on site during any and all ground disturbances. During subsequent communications with the Tribe's Chairman, CSLC staff explained that the quarry rock used to construct the rocky reef would be placed on top of the sediment and that no excavation would occur at the Project site. CSLC staff was also made aware of Toveemur Rock, a culturally significant and sacred site located offshore Point Vicente on the Palos Verdes Peninsula. Because Toveemur Rock is located more than 3 miles from the western boundary of the Project site lease area, the Project would not impact this sacred site. If the CSLC is notified of additional tribal cultural resources in the Project area, staff will consult with those tribes to ensure that impacts to tribal cultural resources remain less than significant. Furthermore, the NAHC searched its Sacred Lands File for Native American cultural sites and found no occurrences in the Project area (NAHC letter to the CSLC dated September 12, 2016).

In addition to a literature and records search (as described in Section 5.0, Cultural and Paleontological Resources), both side-scan sonar surveys and visual inspection by divers failed to detect the presence of human-made materials within the Project area. The 69-acre site is located in water depths where the sediment movement is dynamic and the sediment cover is thin (less than 3 feet). The site is also subject to strong currents that scour, move, and redeposit sand seasonally and as a result, it does not contain the older, more stable sedimentary deposits that have the potential to contain tribal cultural resources. As a result, there would be no substantial adverse change in the significance of tribal cultural resources. Therefore, there would be no impact.

17.4 Mitigation Summary

The Project would have no impacts to tribal cultural resources; therefore, no mitigation is required.

18.0 UTILITIES AND SERVICE SYSTEMS

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the Project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

18.1 Environmental Setting

The Project is a short-term construction project involving the placement of quarry rock on the seafloor 0.3 mile offshore. The Project would not result in the construction of new utility or service systems, nor create a new demand for permanent utilities or service systems.

18.2 Regulatory Setting

No federal, state, or local laws relevant to this issue area are applicable to the Project.

18.3 Impact Analysis

a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

a) through c) No Impact. The Project involves the construction of a fully submerged rocky reef 0.3 mile offshore and would not generate wastewater. As a result, the Project would not exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board nor would it result in the construction or expansion of water or wastewater treatment facilities. The nature and location of the Project also preclude the need for new stormwater drainage facilities or the expansion of such existing facilities Therefore, there would be no impact.

d) Have sufficient water supplies available to serve the Project from existing entitlements and resources, or are new or expanded entitlements needed?

No Impact. The Project involves the construction of a fully submerged rocky reef 0.3 mile offshore. As a result, the nature and location of the Project preclude the need for a sufficient water supply from existing entitlements or resources. Therefore, there would be no impact.

e) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?

No Impact. See answer to ***a)*** above.

f) Be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs?

g) Comply with federal, state, and local statutes and regulations related to solid waste?

f) and g) No Impact. The Project involves the construction of a fully submerged rocky reef 0.3 mile offshore, and there would be no solid waste produced as a result of the Project. The nature and location of the Project preclude the need for solid waste disposal, and there would be no effects related to local landfill capacity limits. Therefore, there would be no impact.

18.4 Mitigation Summary

The Project would have no impacts to utilities and service systems; therefore, no mitigation is required.

19.0 MANDATORY FINDINGS OF SIGNIFICANCE

The lead agency shall find that a project may have a significant effect on the environment and thereby require an EIR to be prepared for the project where there is substantial evidence, in light of the whole record, that any of the following conditions may occur.

Where prior to commencement of the environmental analysis a project proponent agrees to MMs or project modifications that would avoid any significant effect on the environment or would mitigate the significant environmental effect, a lead agency need not prepare an Environmental Impact Report solely because without mitigation the environmental effects would have been significant (per State CEQA Guidelines, § 15065).

Does the Project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐
b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of past, present and probable future projects)?	☐	☐	☒	☐
c) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Less Than Significant Impact. The Project would involve minor construction-related impacts, but is designed to substantially improve the quality of the marine environment by increasing habitat, biological diversity, and populations of fish and wildlife species. Further, there are no historic or pre-historic resources in the Project area. Therefore, impacts would be less than significant.

b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of past, present and probable future projects)?

Less Than Significant Impact. The Project involves the construction of a fully submerged rocky reef 0.3 mile offshore to enhance marine biological resources. The Project was determined to have less than significant impacts on the following resource categories: aesthetics, air quality, biological resources, hazards and hazardous materials, hydrology and water quality, noise, and transportation and traffic.

- Aesthetics/Noise: Potential cumulative effects on visual aesthetics and noise are specific to location and timing since only the immediate project vicinity would be affected and only during the 40- to 60-day construction period.
- Air Quality: SCAQMD sets the individual project emissions permitting requirement thresholds to avoid significant emissions-related cumulative impacts. For this Project, cumulative construction-related air emissions are alleviated in considering that emissions would be miniscule with respect to the larger air basin and minor enough that there are no SCAQMD emissions-related permit requirements.
- Biological Resources: Potential concern over cumulative biological impacts is alleviated by the nature and purpose of the Project in that the minor impacts on benthic organisms during construction would be more than offset by the resulting substantial increases in biological population numbers and diversity.
- Hazards and Hazardous Materials/Hydrology and Water Quality: Cumulative impacts as a result of quarry rock and the use of potentially hazardous materials such as diesel fuel and other mechanical fluids would be alleviated through the implementation of material specification guidelines, emergency response plans, and oil spill prevention plans in accordance with local policies and plans.
- Transportation/Traffic: Potential concern over cumulative transportation and traffic impacts is alleviated by the offshore nature of the Project which would occur over a 40- to 60-day construction period. The Project would only require an estimated 15 employees and would not significantly traffic in relation to the existing traffic volume. Additionally, all waterborne routes that would be used by Project-related vessels would be located out of established shipping lanes in the area and would not interfere with existing waterborne traffic.

For any impacts to act cumulatively on any past, present, or reasonably foreseeable projects, these projects would have to have individual impacts in the same resources areas, some at the same time, or occur within an overlapping area as the Project. No such projects were identified during the site selection process or during consultation with federal, state, or local agencies. Therefore, this impact would be less than significant.

c) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Less Than Significant Impact. The Project involves the construction of a fully submerged rocky reef 0.3 mile offshore to enhance marine biological resources. During construction of the rocky reef, shoreline residents or visitors would be affected by temporary air emissions, aesthetic, and noise impacts associated with the placement of the quarry rock on the seafloor. Because construction is temporary (no more than 60 days) and the completed Project would be fully submerged, these impacts were determined to be minor and not to cause substantial direct or indirect adverse effects on human beings. Therefore, the impact would be less than significant.

20.0 OTHER MAJOR AREAS OF CONCERN

20.1 Commercial and Recreational Fishing

Coastal waters support both coastal and recreational fishing activities in the Project vicinity, and offshore construction activities associated with the Project have the potential to affect both commercial and recreational fisheries. Although this environmental issue is not included in the CEQA Appendix G Checklist, the CSLC is including it here due to the Project's location.

20.1.1 Environmental Setting

Commercial Fishing

The California Department of Fish and Wildlife keeps data on the quantity and value of various species caught by commercial fishers. These data are collected at designated "blocks" along the coast. Fishing blocks have a block ID, which is used to tie that spatial location with associated records, including commercial fishing, sport fishing, historical sport fishing, and recreational fishing. The blocks adjacent to and encompassing the Project site are No. 719 and No. 720. The lease area is entirely within Block No. 719. Together, Blocks 719 and 720 encompass the entire Palos Verdes Peninsula, a small portion of Santa Monica Bay, and northern San Pedro Bay. Block 719 covers a smaller marine area, mostly over the shelf, while Block 720 is above a deep canyon and channel waters.

The major commercial species caught in the Project vicinity are lobster, crab, sea urchin, and demersal fish, such as halibut. Lobster traps are set during a limited season that runs from the first Wednesday in October through the first Wednesday after March 15th of each year. Spider crabs and sea urchins may be fished all year; however, there is a size limit on what may be taken.

Recreational Fishing

Recreational fishing, particularly hook-and-line fishing, is popular in the vicinity of the Project site. Recreational boaters and commercial passenger fishing vessels originate primarily from King Harbor and Marina del Rey, which are located approximately 12 and 20 miles, respectively, northwest of the Project site. A smaller number of fishing vessels originate from the Ports of Long Beach and Los Angeles, approximately 4 miles south of the Project site. The most heavily fished area is from Malaga to Rocky Point, along the northwestern section of the Palos Verdes Peninsula. This is due to the high number of boats departing from King Harbor and the abundant reef and kelp habitat in the area. Rocky Point is the largest reef, and it has the most persistent kelp in the region, making it a very popular fishing destination (Pondella 2009). Other popular nearshore areas for fishing from vessels include Rocky Point, Point Fermin Reef, Long Point, and Point Vicente Cliffs (Davey's Locker 2014).

20.1.2 Impact Analysis

No federal or state significance criteria for impacts to commercial and recreational fisheries have been established and Appendix G of the State CEQA Guidelines does not list fisheries as a specific resource area. Given the prevalence and importance of recreational and commercial fishing in California, previous CSLC environmental analyses have evaluated the potential loss of available area, reduction of habitat, and/or substantial decrease in the number of organisms of commercial or recreational value as the basis for analyzing impacts. The criteria are generally based on what level of loss of access to fishing areas or seasons would be expected to substantially interfere with or adversely affect commercial or recreational fishers' livelihoods. For this assessment, a significant impact to commercial or recreational fisheries would occur if the following is expected.

a) Would the Project exclude fishermen from some or all of the proposed Project area and thereby significantly impact commercial or recreational fishing?

Less Than Significant Impact. Although Project construction would occur over a 40-to 60-day period, the daily Project footprint (1 acre) would be small and localized. Even though fishing would be excluded from this 1-acre construction site, the rest of the Project area and the extensive adjacent coastal fishing waters would remain available during this period. Additionally, Project construction would be complete prior to the start of the lobster season, which begins on October 1st. Once the rocky reef is complete, the entire Project area would be available for fishing. Therefore, this impact would be less than significant.

b) Would the Project alter the seafloor in such a manner so as to significantly reduce the availability of the Project area to commercial or recreational fisheries?

No Impact. The Project involves the placement of quarry rock on sandy seafloor areas to enhance marine biological resources, including species of interest to fishermen. Both commercial and recreational fishermen seek out the type of habitat that the Project would create because hard substrate is known to support relatively abundant and diverse marine life. Therefore, there would be no impact.

c) Would the Project result in loss or damage to commercial fishing gear?

No Impact. The Project involves the placement of quarry rock on the seafloor to create the type of rocky-reef habitat sought out by both commercial and recreational fishermen. There are no artificial structures or other potential obstructions proposed for the Project site that might increase the normal risk of loss or damage to commercial fishing equipment. Therefore, there would be no impact.

d) Would the Project substantially reduce Essential Fish Habitat required by one or more of the species managed by the Pacific Fisheries Management Council's fisheries management plans?

Less Than Significant Impact. The Project area contains Essential Fish Habitat (EFH) for a variety of fish species that are managed under coastal pelagic species, groundfish, and highly migratory species management plans, as well as two Habitat Areas of Particular Concern, rocky reef, and canopy kelp. The Project has the potential to affect bottom habitat and biological resources as a result of derrick barge anchoring at the Project site; however, an anchoring plan (see Appendix A) was developed to avoid anchoring in areas of hard substrate and minimize anchor drag, especially during inclement weather. While Project construction may have minor impacts on the existing degraded habitat, the completed rocky reef would yield a significant net expansion and improvement in the quality of fish habitat in the Project area. Ongoing consultation with NMFS combined with the anchoring plan would minimize potential impacts to EFH. Therefore, impacts would be less than significant.

20.2 CSLC Environmental Justice Policy

Environmental justice is defined by California law as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies" (Senate Bill 115 [Stats. 1999, ch. 690]). This definition is consistent with the Public Trust Doctrine principle that the management of trust lands is for the benefit of all of the people. The CSLC adopted an environmental justice policy in October 2002 to ensure that environmental justice is an essential consideration in the agency's processes, decisions, and programs. Through its policy, CSLC reaffirms its commitment to an informed and open process in which all people are treated equitably and with dignity, and in which its decisions are tempered by environmental justice considerations. As part of its environmental justice policy, the CSLC pledges to continue and enhance its processes, decisions, and programs with environmental justice as an essential consideration by:

- Identifying relevant populations that might be adversely affected by CSLC programs or by projects submitted by outside parties for its consideration.
- Seeking out community groups and leaders to encourage communication and collaboration with the CSLC and its staff.
- Distributing public information as broadly as possible and in multiple languages, as needed, to encourage participation in the CSLC's public processes.
- Incorporating consultations with affected community groups and leaders while preparing environmental analyses of projects submitted to the CSLC for its consideration.
- Ensuring that public documents and notices relating to human health or environmental issues are concise, understandable, and readily accessible to the public, in multiple languages, as needed.
- Holding public meetings, public hearings, and public workshops at times and in locations that encourage meaningful public involvement by members of the affected communities.

- Educating present and future generations in all walks of life about public access to lands and resources managed by the CSLC.
- Ensuring that a range of reasonable alternatives is identified when siting facilities that may adversely affect relevant populations and identifying, for the CSLC's consideration, those that would minimize or eliminate environmental impacts affecting such populations.
- Working in conjunction with federal, state, regional, and local agencies to ensure consideration of disproportionate impacts on relevant populations, by instant or cumulative environmental pollution or degradation.
- Fostering research and data collection to better define cumulative sources of pollution, exposures, risks, and impacts.
- Providing appropriate training on environmental justice issues to staff and the CSLC so that recognition and consideration of such issues are incorporated into its daily activities.
- Reporting periodically to the CSLC on how environmental justice is a part of the programs, processes, and activities conducted by the CSLC and by proposing modifications as necessary.

20.2.1 Methodology

The CSLC does not specify a methodology for conducting programmatic-level analysis of environmental justice issues. This analysis focuses primarily on whether the Project's impacts may affect areas of high minority populations and/or low-income communities disproportionately and thus would create an adverse environmental justice effect. For the purpose of the environmental analysis, the Project's inconsistency with the CSLC's environmental justice policy would occur if the Project would:

- Have the potential to disproportionately affect minority and/or low-income populations adversely; or
- Result in a substantial, disproportionate decrease in employment and economic base of minority and/or low-income populations residing in immediately adjacent communities.

20.2.2 Project Analysis

The Project's limited impact on the human environment is established in various sections of this appendix. The Project involves the construction of a fully submerged rocky reef 0.3 mile offshore, and is adjacent to open space, including beaches, a golf club, and unbuildable property subject to flooding. The closest residences are located on or adjacent to the golf club. Project construction activities would be limited to a 60-day period, and the only potential impacts to local residents, including aesthetics, air quality, and noise, would be less than significant. Less than significant: Given the small number of employees involved and the short construction period, the Project would have only a minor positive effect on employment, income, and economic activity.

Therefore, the Project would not adversely affect any populations, including minority or low-income populations.

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Appendix C, Attachment 1

Abridged List of Major Federal and State Laws, Regulations, and Policies Potentially Applicable to the Project

Attachment A to this Initial Study and Environmental Checklist identifies the major **Federal and State** laws, regulations and policies (local/regional are presented in each issue area chapter) that are potentially applicable to the Project, organized by issue area in the order provided in the State California Environmental Quality Act Guidelines Appendix G (http://resources.ca.gov/ceqa/guidelines/Appendix_G.html).

Frequently Used Abbreviations	
§	section
ºC	degrees Celsius
ºF	degrees Fahrenheit
AB	Assembly Bill
BCDC	San Francisco Bay Conservation and Development Commission
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSFM	California State Fire Marshal
CSLC	California State Lands Commission
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DOT	U.S. Department of Transportation
EO	Executive Order
FERC	Federal Energy Regulatory Commission
FR	Federal Register
nm	nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
OSPR	Office of Spill Prevention and Response (CDFW)
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SWRCB	State Water Resources Control Board
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

MULTIPLE ENVIRONMENTAL ISSUES

Multiple Environmental Issues (Federal)	
Coastal Zone Management Act (CZMA) (42 USC sec. 4321 et seq.)	The CZMA recognizes a national interest in coastal zone resources and in the importance of balancing competing uses of those resources, giving full consideration to aesthetic, cultural and historic, ecological, recreational, and other values as well as the needs for compatible economic development. Pursuant to the CZMA, coastal states develop and implement comprehensive coastal management programs (CMPs) that describe uses subject to the CMP, authorities and enforceable policies, and coastal zone boundaries, among other elements. The CZMA also gives state coastal management agencies regulatory control ("federal consistency" review authority) over federal activities and federally licensed, permitted or assisted activities, if the activity affects coastal resources; such activities include military projects at coastal locations and outer continental shelf oil and gas leasing, exploration and development. The CCC and BCDC coordinate California's federally approved CMPs and federal consistency reviews within their respective jurisdictions.

Multiple Environmental Issues (State)	
CEQA (Pub. Resources Code, § 21000 et seq.)	CEQA requires state and local agencies to identify significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a "project" that must receive some discretionary approval (i.e., the agency has authority to deny the requested permit or approval) which may cause either a direct physical change, or a reasonably foreseeable indirect change, in the environment.
CSLC and the Public Trust Doctrine	The CSLC has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways, as well as certain residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions (Pub. Resources Code, §§ 6301, 6306). All tidelands and submerged lands, granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the Common Law Public Trust. As general background, the State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable lakes and waterways upon its admission to the United States in 1850. The State holds these lands for the benefit of all people of the State for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. On tidal waterways, the State's sovereign fee ownership extends landward to the mean high tide line, except for areas of fill or artificial accretion. The CSLC's jurisdiction also includes a 3-nm-wide section of tidal and submerged land adjacent to the coast and offshore islands, including bays, estuaries, and lagoons; the waters and underlying beds of more than 120 rivers, lakes, streams, and sloughs; and 1.3 million acres of "school lands" granted to the State by the Federal government to support public education. The CSLC also has leasing jurisdiction, subject to certain conditions, over mineral extraction from State property owned and managed by other State agencies (Pub. Resources Code, § 68910, subd. (b)), and is responsible for implementing a variety of State regulations for activities affecting these State Trust Lands, including implementation of CEQA.
California Coastal Act (Pub. Resources Code, § 30000 et seq.) CCC Federal Consistency Program	Pursuant to the Coastal Act, the CCC, in partnership with coastal cities and counties, plans and regulates the use of land and water in the coastal zone. The Coastal Act includes specific policies (see Chapter 3) that address issues such as shoreline public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, oil and gas development, transportation, development design, power plants, ports, and public works. Development activities in the coastal zone generally require a coastal permit from either the CCC or the local government: (1) the CCC retains jurisdiction over the immediate shoreline areas below the mean high tide line and offshore areas to the 3 nm State water limit; and (2) following certification of county- and municipality-developed Local Coastal Programs, the CCC has delegated permit authority to many local governments for the portions of their jurisdictions within the coastal zone. The CCC also implements the CZMA as it applies to federal activities (e.g., development projects, permits, and licenses) in the coastal zone by

Multiple Environmental Issues (State)	
	reviewing specified federal actions for consistency with the enforceable policies of Chapter 3 of the Coastal Act.

AESTHETICS / VISUAL RESOURCES

Aesthetics/Visual Resources (State)	
California Scenic Highway Program (Sts. & Hy. Code, § 260 et seq.)	The purpose of California's Scenic Highway Program, which was created by the Legislature in 1963 and is managed by Caltrans, is to preserve and protect scenic highway corridors from change which would diminish the aesthetic value of lands adjacent to highways. State highways identified as scenic, or eligible for designation, are listed in Streets and Highways Code section 260 et seq.
Coastal Act Chapter 3 policies	*See Multiple Environmental Issues*. The Coastal Act is concerned with protecting the public viewshed, including views from public areas, such as roads, beaches, coastal trails, and access ways. Section 30251 states: Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural landforms, to be visually compatible with the character of the surrounding area, and, where feasible, to restore and enhance visual quality in visually degraded areas.

AGRICULTURE AND FORESTRY RESOURCES

Agriculture and Forestry Resources (Federal)
Agriculture and Forestry Resources (State)
There are no major federal or state laws, regulations, and policies potentially applicable to this Project.

AIR QUALITY

Air Quality (Federal)	
Federal Clean Air Act (FCAA) (42 USC sec. 7401 et seq.)	The FCAA requires the USEPA to identify National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. National standards are established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter (PM_{10} and $PM_{2.5}$), and lead. The FCAA mandates that states submit and implement a State Implementation Plan (SIP) for local areas not meeting those standards; plans must include pollution control measures that demonstrate how the standards would be met. Pursuant to the 1990 FCAA amendments, the USEPA also regulates hazardous air pollutants (HAPs), which are pollutants that result in harmful health effects, but are not specifically addressed through the establishment of NAAQS. HAPs require the use of the maximum or best available control technology to limit emissions. USEPA classifies air basins (or portions thereof) as in "attainment" or "nonattainment" for each criteria air pollutant by comparing monitoring data with State and Federal standards to determine if the NAAQS are achieved. Areas are classified for a pollutant as follows: • "Attainment" – the pollutant concentration is lower than the standard. • "Nonattainment" – the pollutant concentration exceeds the standard. • "Unclassified" – there are not enough data available for comparisons. In 2007, the U.S. Supreme Court ruled that carbon dioxide (CO_2) is an air pollutant as defined under the FCAA, and that the USEPA has authority to regulate greenhouse gas emissions.

Air Quality (State)	
California Clean Air Act of 1988 (CCAA)	The CCAA requires all air districts in the State to endeavor to achieve and maintain State ambient air quality standards for ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and particulate matter. CARB sets air quality standards for the State at levels to protect public health and welfare with an adequate margin of safety. The California Ambient Air Quality Standards (CAAQS) are generally stricter than national standards for the same pollutants; California also has standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. The CAAQS describe adverse conditions (i.e., pollution levels must be below these standards before a basin can attain the standard). Air quality is considered in "attainment" if pollutant levels are continuously below or equal to the standards and violate the standards no more than once each year. The 1992 CCAA Amendments divide ozone nonattainment areas into four categories of pollutant levels (moderate, serious, severe, and extreme) to which progressively more stringent requirements apply. CARB also regulates toxic air contaminants (pollutants that result in harmful health effects, but are not specifically addressed by air quality standards) through the use of air toxic control measures.
Air Toxics Hot Spots Information and Assessment Act (Health & Saf. Code, § 44300 et seq.)	The Air Toxics Hot Spots Information and Assessment Act provides for the regulation of over 200 toxic air contaminants, including diesel particulate matter. Under the act, local air districts may request that a facility account for its toxic air contaminant emissions. Local air districts then prioritize facilities on the basis of emissions, and high priority designated facilities are required to submit a health risk assessment and communicate the results to the affected public.
Coastal Act Chapter 3 policies	*See Multiple Environmental Issues*. Section 30253, subdivision (c) requires that new development shall be consistent with requirements imposed by an air pollution control district or CARB as to each particular development.
Other	• Health and Safety Code sections 25531-25543 set forth changes in four areas: (1) provides guidelines to identify a more realistic health risk; (2) requires high-risk facilities to submit an air toxic emission reduction plan; (3) holds air pollution control districts accountable for ensuring that plans achieve objectives; and (4) requires high-risk facilities to achieve their planned emission reductions. • Under California's Diesel Fuel Regulations, diesel fuel used in motor vehicles and harbor craft is limited to 15 parts per million (ppm) sulfur. • CARB's Heavy Duty Diesel Truck Idling Rule prohibits heavy-duty diesel trucks from idling for longer than 5 minutes at a time (idling for longer than 5 minutes while queuing is allowed if the queue is located more than 100 feet of a home or school). • The Statewide Portable Equipment Registration Program (PERP) establishes a uniform program to regulate portable engines/engine-driven equipment units. Once registered in the PERP, engines and equipment units may operate throughout California without the need to obtain individual permits from local air districts.

BIOLOGICAL RESOURCES

Biological Resources (Federal)	
Federal Endangered Species Act (FESA) (7 USC sec. 136, 16 USC sec. 1531 et seq.)	The FESA, which is administered in California by the USFWS and NMFS, provides protection to species listed as threatened or endangered, or proposed for listing as threatened or endangered. When applicants propose projects with a Federal nexus that "may affect" a federally listed or proposed species, the Federal agency must (1) consult with the USFWS or NMFS, as appropriate, under Section 7, and (2) ensure that any actions authorized, funded, or carried out by the agency are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of areas determined to be critical habitat. Section 9 prohibits the "take" of any member of a listed species. • **Take**. "To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

Biological Resources (Federal)	
	• **Harass**. "An intentional or negligent act or omission that creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering." • **Harm**. "Significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering."
Fish and Wildlife Coordination Act of 1958	This Act requires that whenever a body of water is proposed to be controlled or modified, the lead agency must consult the state and federal agencies responsible for fish and wildlife management (e.g., USFWS, CDFW, and NOAA). The Act allows for recommendations addressing adverse impacts associated with a proposed project, and for mitigating or compensating for impacts on fish and wildlife.
Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC sec. 1801 et seq.)	The MSA governs marine fisheries management in Federal waters. The MSA was first enacted in 1976 and amended in 1996. Amendments to the 1996 MSA require the identification of Essential Fish Habitat (EFH) for federally managed species and the implementation of measures to conserve and enhance this habitat. Any project requiring Federal authorization, such as a USACE permit, is required to complete and submit an EFH Assessment with the application and either show that no significant impacts to the essential habitat of managed species are expected or identify mitigations to reduce those impacts. Under the MSA, Congress defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 USC sec. 1802(10)). The EFH provisions of the MSA offer resource managers a means to heighten consideration of fish habitat in resource management. Pursuant to section 305(b)(2), federal agencies shall consult with the NMFS regarding any action they authorize, fund, or undertake that might adversely affect EFH.
Marine Mammal Protection Act (MMPA) (16 USC sec. 1361 et seq.)	The MMPA is designed to protect and conserve marine mammals and their habitats. It prohibits takes of all marine mammals in the United States (including territorial seas) with few exceptions. The NMFS may issue a take permit under section 104 if the activities are consistent with the purposes of the MMPA and applicable regulations at 50 CFR, Part 216. The NMFS must also find that the manner of taking is "humane" as defined in the MMPA. If lethal taking of a marine mammal is requested, the applicant must demonstrate that using a non-lethal method is not feasible.
Migratory Bird Treaty Act (MBTA) (16 USC sec. 703-712)	The MBTA was enacted to ensure the protection of shared migratory bird resources. It prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase, or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11). The USFWS issues permits for takes of migratory birds for activities such as scientific research, education, and depredation control, but does not issue permits for incidental take of migratory birds.
National Invasive Species Act (NISA) (33 CFR, Part 151, Subpart D)	NISA (originally passed in 1990 as the Nonindigenous Aquatic Nuisance Prevention and Control Act [16 USC sec. 4701-4751] and reauthorized, renamed and expanded in 1996) is the U.S.'s chief protection against new aquatic invaders. The Act recognizes the global movement of aquatic species, particularly those that arrive in ballast water, authorized important research, and linked results of the research to decisions to the necessity of further ballast water regulation. Under its provisions, the USCG requires ballast water management (i.e., ballast water exchange) for vessels entering U.S. waters from outside the 200 nm U.S. Exclusive Economic Zone. The original Act was established to: (1) prevent unintentional introduction and dispersal of nonindigenous species into Waters of the United States through ballast water management and other requirements; (2) coordinate and disseminate information on federally conducted, funded, or authorized research, on the prevention and control of the zebra mussel and other aquatic nuisance species; (3) develop and carry out control methods to prevent, monitor, and control unintentional introductions of nonindigenous species from pathways other than ballast water exchange; (4) understand and minimize economic and ecological impacts of established nonindigenous aquatic nuisance species; and (5) establish a program of research and technology development and assistance to states in the management and removal of zebra mussels.

Biological Resources (Federal)	
Federal Executive Orders (EO)	• EO 11990 requires federal agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. Each agency, to the extent permitted by law, must (1) avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds there is no practical alternative to such construction or the proposed action includes all practical measures to minimize harm to wetlands that may result from such use; (2) take into account economic, environmental and other pertinent factors in making this finding; and (3) provide opportunity for early public review of any plans or proposals for new construction in wetlands. • EO 13112 requires federal agencies to use authorities to prevent introduction of invasive species, respond to and control invasions in a cost-effective and environmentally sound manner, and provide for restoration of native species and habitat conditions in invaded ecosystems. The EO establishes the Invasive Species Council, which is responsible for the preparation and issuance of the National Invasive Species Management Plan, which details and recommends performance-oriented goals and objectives and measures of success for federal agencies. • EO 13158 requires federal agencies to (1) identify actions that affect natural or cultural resources that are within an MPA; and (2) in taking such actions, to avoid harm to the natural and cultural resources that are protected by a MPA. • EO 13186 sets forth responsibilities of federal agencies to protect migratory birds.
Other	• CWA and Rivers and Harbors Act. (See Hydrology and Water Quality.) • CZMA. (See Multiple Environmental Issues.) • The Bald and Golden Eagle Protection Act makes it illegal to import, export, take, sell, purchase or barter any bald eagle or golden eagle or parts thereof. • The Estuary Protection Act (16 USC sec. 1221-1226) authorizes the Secretary of the Interior to enter into cost-sharing agreements with states and subdivisions for permanent management of estuarine areas in their possession. Federal agencies must assess the impacts of commercial and industrial developments on estuaries.

Biological Resources (State)	
California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.)	The CESA provides for the protection of rare, threatened, and endangered plants and animals, as recognized by the CDFW, and prohibits the taking of such species without its authorization. Furthermore, the CESA provides protection for those species that are designated as candidates for threatened or endangered listings. Under the CESA, the CDFW has the responsibility for maintaining a list of threatened species and endangered species (Fish & G. Code, § 2070). The CDFW also maintains a list of candidate species, which are species that the CDFW has formally noticed as under review for addition to the threatened or endangered species lists. The CDFW also maintains lists of Species of Special Concern that serve as watch lists. Pursuant to CESA requirements, an agency reviewing a proposed project within its jurisdiction must determine whether any State-listed endangered or threatened species may be present in the project site and determine whether the proposed project will have a potentially significant impact on such species. The CDFW encourages informal consultation on any proposed project that may affect a candidate species. The CESA also requires a permit to take a State-listed species through incidental or otherwise lawful activities (§ 2081, subd. (b)).
Coastal Act Chapter 3 policies	*See Multiple Environmental Issues*. • Section 30230. "Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes." • Section 30231. "The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible,

Biological Resources (State)	
	restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams." • Section 30232. "Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur." • Section 30240 states: (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas. (b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.
Marine Invasive Species Act (MISA) (Assembly Bill [AB] 433; Stats. 2003, ch. 491)	Originally passed in 2003 and amended several times, the purpose of MISA is to move towards eliminating the discharge of nonindigenous species into waters of the state or waters that may impact waters of the state, based on the best available technology economically achievable. MISA requires mid-ocean exchange or retention of all ballast water and associated sediments for all vessels 300 gross registered tons or more, U.S. and foreign, carrying ballast water into the waters of the state after operating outside the waters of the State. For all vessels 300 gross register tons or more arriving at a California port or place carrying ballast water from another port or place within the Pacific Coast Region, the Act mandates near-coast exchange or retention of all ballast water. MISA also requires completion and submission of Ballast Water Reporting Form 24 hours in advance of each port of call in California, annual submittal of the Hull Husbandry Reporting Form, the keeping of a ballast management plan and logs, and the application of "Good Housekeeping" Practices designed to minimize the transfer and introduction of invasive species. Compliance with MISA is the responsibility of the vessel owners/operators and not the responsibility of marine terminals.
Marine Life Protection Act (MLPA) (Fish & G. Code, §§ 2850–2863)	Passed in 1999, the MLPA required the CDFW to redesign its system of Marine Protected Areas (MPAs) to increase its coherence and effectiveness at protecting the state's marine life, habitats, and ecosystems. For the purposes of MPA planning, a public-private partnership commonly referred to as the MLPA Initiative was established, and the State was split into five distinct regions (four coastal and the San Francisco Bay) each of which had its own MPA planning process. All four coastal regions have completed these individual planning processes. As a result the coastal portion of California's MPA network is now in effect statewide. Options for a planning process in San Francisco Bay have been developed for consideration at a future date.
Other relevant California Fish and Game Code sections	• Sections 900-903 (California Species Preservation Act) provide for the protection and enhancement of amphibians, birds, fish, mammals, and reptiles. • Section 1900 et seq. (California Native Plant Protection Act) is intended to preserve, protect, and enhance endangered or rare native plants in California. This Act includes provisions that prohibit the taking of listed rare or endangered plants from the wild and a salvage requirement for landowners. The Act directs the CDFW to establish criteria for determining what native plants are rare or endangered. Under section 1901, a species is endangered when its prospects for survival and reproduction are in immediate jeopardy from one or more causes. A species is rare when, although not threatened with immediate extinction, it is in such small numbers throughout its range that it may become endangered. • Sections 3503 & 3503.5 prohibit the taking and possession of native birds' nests and eggs from all forms of needless take and provide that it is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nests or eggs of any such bird except as otherwise provided by this Code or any regulation adopted pursuant thereto.

Biological Resources (State)	
	• Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), & 5515 (fish) designate certain species as "fully protected;" such species, or parts thereof, may not be taken or possessed at any time without permission by the CDFW. • Section 3513 does not include statutory or regulatory mechanism for obtaining an incidental take permit for the loss of non-game, migratory birds.
Other	• Lempert-Keene-Seastrand Oil Spill Prevention and Response Act. *(See Hazards and Hazardous Materials.)* • California Aquatic Invasive Species Management Plan, produced by the CDFW, provides a framework for agency coordination and identifies actions to minimize the harmful effects of aquatic invasive species.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Cultural Resources (Federal)	
Archaeological and Historic Preservation Act (AHPA)	The AHPA provides for the preservation of historical and archaeological data that might be irreparably lost or destroyed as a result of (1) flooding, the building of access roads, the erection of workmen's communities, the relocation of railroads and highways, and other alterations of terrain caused by the construction of a dam by an agency of the U.S. or by any private person or corporation holding a license issued by any such agency; or (2) any alteration of the terrain caused as a result of a federal construction project or federally licensed project, activity, or program. This Act requires federal agencies to notify the Secretary of the Interior when they find that any federally permitted activity or program may cause irreparable loss or destruction of significant scientific, prehistoric, historical, or archaeological data. The AHPA built upon national policy, set out in the Historic Sites Act of 1935, "...to provide for the preservation of historic American sites, buildings, objects, and antiquities of national significance...."
Archaeological Resources Protection Act (ARPA)	The ARPA states that archaeological resources on public or Indian lands are an accessible and irreplaceable part of the nation's heritage and: • Establishes protection for archaeological resources to prevent loss and destruction due to uncontrolled excavations and pillaging; • Encourages increased cooperation and exchange of information between government authorities, the professional archaeological community, and private individuals having collections of archaeological resources prior to the enactment of this Act; • Establishes permit procedures to permit excavation or removal of archaeological resources (and associated activities) located on public or Indian land; and • Defines excavation, removal, damage, or other alteration or defacing of archaeological resources as a "prohibited act" and provides for criminal and monetary rewards to be paid to individuals furnishing information leading to the finding of a civil violation or conviction of a criminal violator. ARPA's enforcement provision provides for criminal and civil penalties against violators of the Act. The ARPA's permitting component allows for recovery of certain artifacts consistent with NPS Federal Archeology Program standards and requirements.
Federal Executive Orders (EO)	• EO 13007, Indian Sacred Sites, requires federal agencies with administrative or legal responsibility to manage Federal lands to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sites (to the extent practicable permitted by law and not clearly inconsistent with essential agency functions) • EO 13158 requires federal agencies to (1) identify actions that affect natural or cultural resources that are within an MPA; and (2) in taking such actions, to avoid harm to the natural and cultural resources that are protected by a MPA.
National Historic Preservation Act	Archaeological resources are protected through the NHPA and its implementing regulation (Protection of Historic Properties; 36 CFR 800), the AHPA, and the ARPA. This Act presents a general policy of supporting and encouraging the preservation of prehistoric and historic

Cultural Resources (Federal)	
(NHPA) (16 USC sec. 470 et seq.) (applies only to Federal undertakings)	resources for present and future generations by directing federal agencies to assume responsibility for considering the historic resources in their activities. The State implements the NHPA through its statewide comprehensive cultural resource surveys and preservation programs coordinated by the California Office of Historic Preservation (OHP) in the State Department of Parks and Recreation, which also advises federal agencies regarding potential effects on historic properties. The OHP also maintains the California Historic Resources Inventory. The State Historic Preservation Officer (SHPO) is an appointed official who implements historic preservation programs within the State's jurisdictions, including commenting on Federal undertakings. Under the NHPA, historic properties include "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places" (16 U.S.C. 470w [5]).
National Park Service Abandoned Shipwreck Act of 1987 (43 USC sec. 2101–2106).	Under this Act, states have the responsibility for management of living and nonliving resources in State waters and submerged lands, including certain abandoned shipwrecks that have been deserted and to which the owner has relinquished ownership rights with no retention. The NPS has issued guidelines that are intended to: maximize the enhancement of cultural resources; foster a partnership among sport divers, fishermen, archeologists, sailors, and other interests to manage shipwreck resources of the states and the U.S.; facilitate access and utilization by recreational interests; and recognize the interests of individuals and groups engaged in shipwreck discovery and salvage. Specific provisions of the Act's guidelines include procedures for locating and identifying shipwrecks, methods for determining which shipwrecks are historic, and preservation and long-term management of historic shipwrecks.
Omnibus Public Land Management Act of 2009 - Public Law 111-11 (123 Stat. 991)	Public Law 111-011 at Title VI, subtitle D lays out statutory requirements for Paleontological Resources Preservation (PRP). PRP provides definitions but requires the definition of some terms, and uses other terms and concepts that need further definition or details to clarify intent or enforcement. PRP identifies management requirements, collection requirements, curation requirements, need for both criminal and civil penalties, rewards and forfeiture, and the need for confidentiality of some significant resource locations.

Cultural Resources (State)	
California Register of Historical Resources (CRHR)	The CRHR is "an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (Pub. Resources Code, § 5024.1, subd. (a)). The criteria for eligibility for the CRHR are modeled after National Register of Historic Places (NRHP) criteria (Pub. Resources Code, § 5024.1(b)) but focus on resources of statewide significance. Certain resources are determined by the statute to be automatically included in the CRHR, including California properties formally determined to be eligible for, or listed in, the NRHP. To be eligible for the CRHR, a prehistoric or historical period property must be significant at the local, State, and/or Federal level under one or more of the following criteria (see State CEQA Guidelines, § 15064.5, subd. (a)(3)): • Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage. • Is associated with the lives of persons important in California's past. • Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values. • Has yielded, or may be likely to yield, information important in prehistory or history. A resource eligible for the CRHR must meet one of the criteria of significance described above, and retain enough of its historic character or appearance (integrity) to be recognizable as an historical resource and to convey the reason for its significance. It is possible that an historic resource may not retain sufficient integrity to meet the criteria for listing in the NRHP, but it may still be eligible for listing in the CRHR. Properties listed, or formally designated as eligible for listing, on the National Register are automatically listed on the CRHR, as are certain State Landmarks and Points of Interest. A lead agency is not precluded from determining that the

Cultural Resources (State)	
	resource may be an historical resource as defined in Public Resources Code sections 5020.1, subdivision (j), or 5024.1 (State CEQA Guidelines, § 15064.5, subd. (a)(4)).
CEQA (Pub. Resources Code, § 21000 et seq.)	As CEQA lead agency, the CSLC is responsible for complying with all CEQA and State CEQA Guidelines provisions relating to "historical resources." A historical resource includes: (1) a resource listed in, or eligible for listing in, the California Register of Historic Resources (CRHR); (2) a resource included in a local register of historical or identified as significant in an historical resource surveys; and (3) any resource that a lead agency determines to be historically significant for the purposes of CEQA, when supported by substantial evidence in light of the whole record.
Coastal Act Chapter 3 policies	*See Multiple Environmental Issues*. Section 30244 states: Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.
Other	• Health and Safety Code section 7050.5 states that if human remains are exposed during construction, no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code section 5097.998. The Coroner has 24 hours to notify the Native American Heritage Commission (NAHC) if the remains are determined to be of Native American descent. The NAHC will contact most likely descendants, who may recommend how to proceed. • Public Resources Code section 5097.5 prohibits excavation or removal of any "vertebrate paleontological site or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands." Penal Code section 623 spells out regulations for the protection of caves, including their natural, cultural, and paleontological contents. It specifies that no "material" (including all or any part of any paleontological item) will be removed from any natural geologically formed cavity or cave. • Public Resources Code section 5097.98 states protocol for notifying the most likely descendent from the deceased if human remains are determined to be Native American in origin. It also provides mandated measures for appropriate treatment and disposition of exhumed remains. • Executive Order B-10-11 establishes as state policy that all agencies and departments shall encourage communication and consultation with California Indian Tribes and allow tribal governments to provide meaningful input into proposed decisions and policies that may affect tribal communities.

GEOLOGY AND SOILS

Geology and Soils (State)	
Alquist-Priolo Earthquake Fault Zoning Act (Pub. Resources Code, §§ 2621-2630)	This Act requires that "sufficiently active" and "well-defined" earthquake fault zones be delineated by the State Geologist and prohibits locating structures for human occupancy on active and potentially active surface faults. (Note that since only those potentially active faults that have a relatively high potential for ground rupture are identified as fault zones, not all potentially active faults are zoned under the Alquist-Priolo Earthquake Fault Zone, as designated by the State of California.)
Seismic Hazards Mapping Act & Mapping Regs (Pub. Resources Code, § 2690; Cal. Code Regs., tit. 14, div. 2, ch. 8, art. 10).	These regulations were promulgated for the purpose of promoting public safety by protecting against the effects of strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes. The Act requires that site-specific geotechnical investigations be conducted identifying the hazard and formulating mitigation measures prior to permitting most developments designed for human occupancy. Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California* (California Division of Mines and Geology [CDMG] 1997), constitutes the guidelines for evaluating seismic hazards other than surface fault-rupture, and for recommending mitigation measures as required by Public Resources Code section 2695, subdivision (a). The Act does not apply offshore as the California Geological Survey has not zoned offshore California under the Act.

Geology and Soils (State)	
Coastal Act Chapter 3 policies	*See Multiple Environmental Issues*. With respect to geological resources, Section 30253 requires, in part, that: New development shall: (a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard; and (b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. Section 30243 also states in part that the long-term productivity of soils and timberlands shall be protected.

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

Greenhouse Gas Emissions and Climate Change (Federal & International)	
Federal Clean Air Act (FCAA) (42 USC sec. 7401 et seq.)	In 2007, the U.S. Supreme Court ruled that carbon dioxide (CO_2) is an air pollutant as defined under the FCAA, and that the USEPA has authority to regulate GHG emissions.
Mandatory Greenhouse Gas Reporting (74 FR 56260)	On September 22, 2009, the USEPA issued the Mandatory Reporting of Greenhouse Gases Rule, which requires reporting of GHG data and other relevant information from large sources and suppliers in the U.S. The purpose of the Rule is to collect accurate and timely GHG data to inform future policy decisions. The Rule is referred to as 40 CFR Part 98 (Part 98). Implementation of Part 98 is referred to as the GHG Reporting Program (GHGRP). The gases covered by the GHGRP are CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers.
Kyoto Protocol	On March 21, 1994, the Kyoto Protocol was signed. The Kyoto Protocol was a treaty made under the United Nations Framework Convention on Climate Change, and was the first international agreement to regulate GHG emissions. If the commitments outlined in the Kyoto Protocol are met, global GHG emissions would be reduced by 5 percent from 1990 levels during the commitment period of 2008 to 2012. Although the U.S. is a signatory to the Kyoto Protocol, Congress has not ratified it, therefore the U.S. is not bound by the Protocol's commitments.
Paris Climate Agreement	In December 2015, the Paris Climate Agreement (Agreement) was endorsed and adopted by 195 countries. The overarching goal was to reduce pollution levels so that the rise in global temperatures is limited to no more than 2 ^{o}C (3.6 ^{o}F). The Agreement also contains language urging that the increase be limited even further to 1.5 ^{o}C (2.7 ^{o}F), if possible. The Agreement includes voluntary commitments from 186 of the 195 signatories, including the U.S., to cut or limit the growth of their GHG emissions. The signatories agreed to convene every 5 years to take stock, revisit their pledges, and steadily increase them to achieve the 2 ^{o}C goal. The new agreement also requires regular and transparent reporting of every country's carbon reductions.

Greenhouse Gas Emissions and Climate Change (State)	
California Global Warming Solutions Act of 2006 (AB 32, Stats. 2006, ch. 488)	Under AB 32, CARB is responsible for monitoring and reducing GHG emissions in the State and for establishing a statewide GHG emissions cap for 2020 that is based on 1990 emissions levels. CARB (2009) has adopted the AB 32 Climate Change Scoping Plan (Scoping Plan), which contains the main strategies for California to implement to reduce CO2 equivalent (CO2e) emissions by 169 million metric tons (MMT) from the State's projected 2020 emissions level of 596 MMT CO2e under a business-as-usual scenario. The Scoping Plan breaks down the amount of GHG emissions reductions CARB recommends for each emissions sector of the State's GHG inventory, but does not directly discuss GHG emissions generated by construction activities.
AB 197 (Stats. 2016, ch. 250)	AB 197 creates the Joint Legislative Committee on Climate Change Policies; requires CARB to prioritize direct emission reductions and consider social costs when adopting regulations to reduce GHG emissions beyond the 2020 statewide limit; requires CARB to prepare reports on sources of GHGs and other pollutants, update the reports at least annually, and make the reports

Greenhouse Gas Emissions and Climate Change (State)	
	available on its Internet website; establishes six-year terms for voting members of CARB; and adds two legislators as non-voting members of CARB.
AB 1493 (Stats. 2002, ch. 200)	In 2002, with the passage of AB 1493, California launched an innovative and proactive approach to dealing with GHG emissions and climate change at the state level. AB 1493 requires CARB to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards were designed to apply to automobile and light trucks beginning with the model year 2009. Although litigation challenged these regulations and the USEPA initially denied California's related request for a waiver, the waiver request was granted (USEPA 2010c).
SB 32 (Stats. 2016, ch. 249)	AB 32 required CARB to approve a statewide GHG emissions limit equivalent to the statewide GHG emissions level in 1990 to be achieved by 2020. This bill requires CARB to ensure that statewide GHG emissions are reduced to 40 percent below the 1990 level by 2030.
SB 97 (Stats. 2007, ch. 185)	Pursuant to SB 97, the State Office of Planning and Research prepared and the Natural Resources Agency adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. Effective as of March 2010, the revisions to the CEQA Environmental Checklist Form (Appendix G) and the Energy Conservation Appendix (Appendix F) provide a framework to address global climate change impacts in the CEQA process; State CEQA Guidelines section 15064.4 was also added to provide an approach to assessing impacts from GHGs.
SB 350 (Stats. 2015, ch. 547)	The 2015 Clean Energy and Pollution Reduction Act was signed into law on October 10, 2015, and requires that the amount of electricity generated and sold to retail customers from renewable energy resources be increased to 50 percent by December 31, 2030, and that a doubling of statewide energy efficiency savings in electricity and natural gas by retail customers be achieved by January 1, 2030.
SB 375 (Stats. 2008, ch. 728)	SB 375 (effective January 1, 2009) requires CARB to develop regional reduction targets for GHG emissions, and prompted the creation of regional land use and transportation plans to reduce emissions from passenger vehicle use throughout the State. The targets apply to the regions covered by California's 18 metropolitan planning organizations (MPOs). The 18 MPOs must develop regional land use and transportation plans and demonstrate an ability to attain the proposed reduction targets by 2020 and 2035.
State Executive Orders (EOs)	• EO B-30-15 (Governor Brown, April 2015) established a new interim statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target to reduce GHG emissions to 80 percent below 1990 levels by 2050. State agencies with jurisdiction over sources of GHG emissions to implement measures were also directed pursuant to statutory authority, to achieve GHG emissions reductions to meet the 2030 and 2050 targets. • EO S-01-07 (Governor Schwarzenegger, January 2007) set a low carbon fuel standard for California, and directed the carbon intensity of California's transportations fuels to be reduced by at least 10 percent by 2020. • EO S-3-05 (Governor Schwarzenegger, June 2005) directed the state to reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 level by 2050.

HAZARDS AND HAZARDOUS MATERIALS

Hazards and Hazardous Materials (Federal)	
California Toxics Rule (40 CFR 131)	In 2000, the USEPA promulgated numeric water quality criteria for priority toxic pollutants and other water quality standards provisions to be applied to waters in California to protect human health and the environment. Under CWA section 303(c)(2)(B), the USEPA requires states to adopt numeric water quality criteria for priority toxic pollutants for which the USEPA has issued criteria guidance, and the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses. These Federal criteria are legally applicable in California for inland surface waters, enclosed bays, and estuaries.

Hazards and Hazardous Materials (Federal)	
Hazardous Liquid Pipeline Safety Act of 1979	This Act includes requirements for hazardous liquid pipelines, which fall under the jurisdiction of the DOT, including accident reporting, design, and construction requirements, and minimum requirements for hydrostatic testing, compliance dates, test pressures, and duration; and records.
National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300)	Authorized under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA: 42 USC sec. 9605), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA: Pub. L. 99-499); and by CWA section 311(d), as amended by the OPA (Pub. L. 101-380), the NCP outlines requirements for responding to oil spills and hazardous substance releases. It specifies compliance, but does not require preparation of a written plan, and provides a comprehensive system for reporting, spill containment, and cleanup. Per 40 CFR 300.175 and 40 CFR 300.120, the USCG has responsibility for oversight of regional response for oil spills in "coastal zones."
Oil Pollution Act (OPA) of 1990 (33 USC sec. 2712)	The OPA requires owners and operators of facilities that could cause substantial harm to the environment to prepare and submit, and maintain up-to-date, plans for responding to worst-case discharges of oil and hazardous substances and for facilities and vessels to demonstrate that they have sufficient response equipment under contract to respond to and clean up a worst-case spill. The passage of the OPA motivated California to pass a more stringent spill response and recovery regulation and the creation of the OSPR to review and regulate oil spill plans and contracts. The OPA includes provisions to expand prevention and preparedness activities, improve response capabilities, provide funding for natural resource damage assessments, ensure that shippers and oil companies pay the costs of spills that do occur, and establish an expanded research and development program. Pursuant to a Memorandum of Understanding established to divide areas of responsibility, the USCG is responsible for tank vessels and marine terminals, the USEPA for tank farms, and the Research and Special Programs Administration for pipelines; each of these agencies has developed regulations for its area of responsibility. In addition, the Secretary of Interior is responsible for spill prevention, oil-spill contingency plans, oil-spill containment and clean-up equipment, financial responsibility certification, and civil penalties for offshore facilities and associated pipelines in all federal and State waters.
Resource Conservation and Recovery Act (RCRA) (42 USC sec. 6901 et seq.)	The RCRA authorizes the USEPA to control hazardous waste from "cradle-to-grave" (generation, transportation, treatment, storage, and disposal). RCRA's Federal Hazardous and Solid Waste Amendments from 1984 include waste minimization and phasing out land disposal of hazardous waste as well as corrective action for releases. The Department of Toxic Substances Control is the lead State agency for corrective action associated with RCRA facility investigations and remediation.
Toxic Substan-ces Control Act (TSCA) (15 USC sec. 2601–2692)	The TSCA authorizes the USEPA to require reporting, record-keeping, testing requirements, and restrictions related to chemical substances and/or mixtures. It also addresses production, importation, use, and disposal of specific chemicals, such as polychlorinated biphenyls (PCBs), asbestos-containing materials, lead-based paint, and petroleum.
Other Relevant Laws, Regulations, and Recognized National Codes and Standards	• CWA. (See Hydrology and Water Quality.) • Hazardous Materials Transportation Act. *(See Transportation/Traffic.)* • 33 CFR, Navigation and Navigable Waters, regulates aids to navigation, vessel operations, anchorages, bridges, security of vessels, waterfront facilities, marine pollution financial responsibility and compensation, prevention and control of releases of materials (including oil spills) from vessels, ports and waterways safety, boating safety, and deep-water ports. The USEPA is responsible for the National Contingency Plan and for developing regulations for SPCC plans and regulates disposal of recovered oil. • 40 CFR Parts 109, 110, 112, 113, and 114. The Spill Prevention Countermeasures and Control (SPCC) plans covered in these regulatory programs apply to oil storage and transportation facilities and terminals, tank farms, bulk plants, oil refineries, and production facilities, and bulk oil consumers (e.g., apartment houses, office buildings, schools, hospitals, government facilities). These regulations include minimum criteria for developing oil-removal contingency plans, prohibit discharge of oil such that applicable water quality standards would be violated, and address oil spill prevention and preparation of SPCC plans. They also establish financial liability limits and provide civil penalties for violations of the oil spill regulations.

Hazards and Hazardous Materials (Federal)	

	• 46 CFR parts 1 through 599 and Inspection and Regulation of Vessels (46 USC Subtitle II Part B) provide that all vessels operating offshore, including those under foreign registration, are subject to requirements applicable to vessel construction, condition, and operation. All vessels (including motorboats) operating in commercial service (e.g., passengers for hire, transport of cargoes, hazardous materials, and bulk solids) on specified routes (inland, near coastal, and oceans) are subject to requirements applicable to vessel construction, condition, and operation. These regulations also allow for inspections to verify that vessels comply with applicable international conventions and U.S. laws and regulations.
	• Act of 1980 to Prevent Pollution from Ships requires ships in U.S. waters, and U.S. ships wherever located, to comply with International Convention for the Prevention of Pollution from Ships (MARPOL).
	• Convention on the International Regulations for Preventing Collisions at Sea establish "rules of the road" such as rights-of-way, safe speed, actions to avoid collision, and procedures to observe in narrow channels and restricted visibility.
	• Fire and Explosion Prevention and Control, National Fire Protection Agency (NFPA) Standards.
	• Safety and Corrosion Prevention Requirements — ASME, National Association of Corrosion Engineers (NACE), ANSI
	  o ASME & ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings;
	  o ASME & ANSI B16.9, Factory-Made Wrought Steel Butt Welding Fittings;
	  o ASME & ANSI B31.1a, Power Piping;
	  o ASME & ANSI B31.4a, addenda to ASME B31.4a-1989 Edition, Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia, and Alcohols;
	  o NACE Standard RP0190-95, Item No. 53071. Standard Recommended Practice External Protective Coatings for Joints, Fittings, and Valves on Metallic Underground or Submerged Pipelines and Piping Systems; and
	  o NACE Standard RP0169-96, Item No. 53002. Standard Recommended Practice Control of External Corrosion on Underground or Submerged Metallic Piping Systems.

Hazards and Hazardous Materials (State)	
Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (OSPRA; Gov. Code, § 8670.1 et seq., Pub. Resources Code, § 8750 et seq., and Rev. & Tax. Code, § 46001 et seq.)	The OSPRA and its implementing regulations seek to protect State waters from oil pollution and to plan for the effective and immediate response, removal, abatement, and cleanup in the event of an oil spill. The Act requires applicable operators to prepare and implement marine oil spill contingency plans and to demonstrate financial responsibility, and requires immediate cleanup of spills, following the approved contingency plans, and fully mitigating impacts on wildlife. The Act assigns primary authority to OSPR within the CDFW to direct prevention, removal, abatement, response, containment, and cleanup efforts with regard to all aspects of any oil spill in the marine waters of the State; the CSLC is also provided with authority for oil spill prevention from and inspection of marine facilities and assists OSPR with spill investigations and response. Notification is required to the Governor's State Office of Emergency Services, which in turn notifies the response agencies, of all oil spills in the marine environment, regardless of size. The Act also created the Oil Spill Prevention and Administration Fund and the Oil Spill Response Trust Fund. Pipeline operators pay fees into the first of these funds for pipelines transporting oil into the State across, under, or through marine waters.
Elder California Pipeline Safety Act of 1981 (Gov. Code, §§ 51010-51018) & California Code of Regulations,	The California Pipeline Safety Act gives regulatory jurisdiction to the California State Fire Marshal (CSFM) for the safety of all intrastate hazardous liquid pipelines and all interstate pipelines used for the transportation of hazardous or highly volatile liquid substances. The law establishes the governing rules for interstate pipelines to be the Federal Hazardous Liquid Pipeline Safety Act and Federal pipeline safety regulations. Government Code sections 51010 through 51018 provide specific safety requirements that are more stringent than the Federal rules, including periodic hydrostatic testing of pipelines, pipeline leak detection, and a requirement that all leaks be reported. Recent amendments require that pipelines include leak prevention and cathodic protection, with acceptability to be determined by the CSFM. All new

Hazards and Hazardous Materials (State)	
title 19, Public Safety	pipelines must be designed to accommodate the passage of instrumented inspection devices (i.e., smart pigs). Under California Code of Regulations, title 19, Public Safety, the CSFM develops regulations relating to fire and life safety. These regulations have been prepared and adopted to establish minimum standards for the prevention of fire and for protection of life and property against fire, explosion, and panic. The CSFM also adopts and administers the regulations and standards considered necessary under the California Health and Safety Code to protect life and property.
Oil Pipeline Environmental Responsibility Act (Assembly Bill [AB] 1868)	This Act requires every pipeline corporation qualifying as a public utility and transporting crude oil in a public utility oil pipeline system to be held strictly liable for any damages incurred by "any injured party which arise out of, or caused by, the discharge or leaking of crude oil or any fraction thereof...." The law applies only to public utility pipelines for which construction would be completed after January 1, 1996, or that part of an existing utility pipeline that is being relocated after the above date and is more than 3 miles in length.
Clean Coast Act of 2005 (SB 771)	This Act, which went into effect January 1, 2006, includes requirements to reduce pollution of California waters from large vessels, such as by: prohibiting discharges of hazardous wastes, other wastes, or oily bilge water into California waters or a marine sanctuary; prohibiting discharges of grey water and sewage into California waters from vessels with sufficient holding-tank capacity or vessels capable of discharging grey water and/or sewage to available shore-side reception facilities; and requiring reports of prohibited discharges to the State Water Resources Control Board (SWRCB).
Coastal Act Chapter 3 policies	*See Multiple Environmental Issues*. Section 30232 of the Coastal Act addresses hazardous materials spills and states that "Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur."
Other	• California Code of Regulations, title 22, division 4.5 regulates hazardous wastes and materials by the implementation of a Unified Program to ensure consistency throughout the state in administration requirements, permits, inspections, and enforcement through a Certified Unified Program Agency (CUPA). • Fire Code regulations (Cal. Code Regs, tit 24, part 9) state hazardous materials should be used and storage in compliance with the state fire codes. • Harbors and Navigation Code specifies a State policy to "promote safety for persons and property in and connected with the use and equipment of vessels," and includes laws concerning marine navigation that are implemented by local city and county governments. This Code also regulates discharges from vessels within territorial waters of the State of California to prevent adverse impacts on the marine environment. This Code regulates oil discharges and imposes civil penalties and liability for cleanup costs when oil is intentionally or negligently discharged to the State waters. • Hazardous Material Release Response Plans and Inventory Law (Health & Saf. Code, ch. 6.95) is designed to reduce the occurrence and severity of hazardous materials releases. This State law requires businesses to develop a Release Response Plan for hazardous materials emergencies if they handle more than 500 pounds, 55 gallons, or 200 cubic feet of hazardous materials. In addition, the business must prepare a Hazardous Materials Inventory of all hazardous materials stored or handled at the facility over the above thresholds, and all hazardous materials must be stored in a safe manner. • Hazardous Waste Control Act (Cal. Code Regs., tit. 26) defines requirements for proper management of hazardous materials. • Hazardous Waste Control Law (Health & Saf. Code, Ch. 6.5 & Cal. Code Regs., tit. 22 and 26) establishes criteria for defining hazardous waste and its safe handling, storage, treatment, and disposal. The law is designed to provide cradle-to-grave management of hazardous wastes and reduce the occurrence and severity of hazardous materials releases. • Health and Safety Code titles 22 and 26: regulate the management of hazardous materials • Porter-Cologne Water Quality Control Act. *(See Hydrology and Water Quality.)*

Hazards and Hazardous Materials (State)	
	• Seismic Hazards Mapping Act and Seismic Hazards Mapping Regulations. *(See Geology and Soils.)*

HYDROLOGY AND WATER QUALITY

Hydrology and Water Quality (Federal)	
Federal Clean Water Act (33 USC sec. 1251 et seq.)	The CWA is comprehensive legislation (it generally includes reference to the Federal Water Pollution Control Act of 1972, its supplementation by the CWA of 1977, and amendments in 1981, 1987, and 1993) that seeks to protect the nation's water from pollution by setting water quality standards for surface water and by limiting the discharge of effluents into waters of the U.S. These water quality standards are promulgated by the USEPA and enforced in California by the SWRCB and nine RWQCBs. CWA sections include: • Section 401 (33 USC sec. 1341) specifies that any applicant for a federal permit or license to conduct any activity which may result in any discharge into the navigable waters of the United States to obtain a certification or waiver thereof from the state in which the discharge originates that such a discharge will comply with established state effluent limitations and water quality standards. USACE projects are required to obtain this certification. • Section 402 (33 USC sec. 1342) establishes conditions and permitting for discharges of pollutants under the National Pollution Discharge Elimination System) (NPDES). Under the NPDES Program, states establish standards specific to water bodies and designate the types of pollutants to be regulated, including total suspended solids and oil; all point sources that discharge directly into waterways are required to obtain a permit regulating their discharge. NPDES permits fall under the jurisdiction of the SWRCB or RWQCBs when the discharge occurs within California's territorial limit (out to 3 nm). • Section 404 (33 USC sec. 1344) authorizes the USACE to issue permits for the discharge of dredged or fill material into waters of the United States, including wetlands, streams, rivers, lakes, coastal waters or other water bodies or aquatic areas that qualify as waters of the United States.
Rivers and Harbors Act (33 USC sec. 401)	This Act governs specified activities in "navigable waters" (waters subject to the ebb and flow of the tide or that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce). Specifically, it limits the construction of structures and the discharge of fill into navigable waters of the U.S. Under Section 10, the following activities require approval from the USACE or authorization from the Secretary of War: • building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, or navigable river; • excavation or fill in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or enclosure within the limits of any breakwater, or of any channel of any navigable waters of the U.S.
Other	• Oil Pollution Act (OPA). (See Hazards and Hazardous Materials.) • The Marine Plastic Pollution Research and Control Act prohibits the discharge of plastic, garbage, and floating wood scraps within 3 nm of land. Beyond 3 nm, garbage must be ground to less than one inch, but discharge of plastic and floating wood scraps is still restricted. This Act requires manned offshore platforms, drilling rigs, and support vessels operating under a Federal oil and gas lease to develop waste management plans. • Navigation and Navigable Waters (33 CFR) regulations include requirements pertaining to prevention and control of releases of materials from vessels (e.g., oil spills), traffic control, and restricted areas, and general ports and waterways safety.

Hydrology and Water Quality (State)	
Porter-Cologne Water Quality Control Act	Porter-Cologne is the principal law governing water quality in California. The Act established the SWRCB and nine RWQCBs, which have primary responsibility for protecting State water quality and the beneficial uses of State waters. Porter-Cologne also implements many

Hydrology and Water Quality (State)	
(Wat. Code, § 13000 et seq.) (Porter-Cologne)	provisions of the federal CWA, such as the NPDES permitting program. Pursuant to CWA section 401, applicants for a federal license or permit for activities that may result in any discharge to waters of the United States must seek a Water Quality Certification from the State in which the discharge originates; such Certification is based on a finding that the discharge will meet water quality standards and other appropriate requirements of State law. In California, RWQCBs issue or deny certification for discharges within their jurisdiction. The SWRCB has this responsibility where projects or activities affect waters in more than one RWQCB's jurisdiction. If the SWRCB or a RWQCB imposes a condition on its Certification, those conditions must be included in the federal permit or license. Plans that contain enforceable standards for the various waters they address include the following: • Basin Plan. Porter-Cologne (see § 13240) requires each RWQCB to formulate and adopt a Basin Plan for all areas within the region. Each RWQCB must establish water quality objectives to ensure the reasonable protection of beneficial uses, and an implementation program for achieving water quality objectives within the basin plan. In California, the beneficial uses and water quality objectives are the State's water quality standards. • The California Ocean Plan (see § 13170.2) establishes water quality objectives for California's ocean waters and provides the basis for regulating wastes discharged into ocean and coastal waters. The plan applies to point and non-point sources. In addition, the Ocean Plan identifies applicable beneficial uses of marine waters and sets narrative and numerical water quality objectives to protect beneficial uses. The SWRCB first adopted this plan in 1972, and it reviews the plan at least every 3 years to ensure that current standards are adequate and are not allowing degradation to indigenous marine species or posing a threat to human health. • Other water quality control plans include: Water Quality Control Plan for Enclosed Bays and Estuaries of California; Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan); and San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan. RWQCBs also oversee on-site treatment of "California Designated, Non-Hazardous Waste" and enforces water quality thresholds and standards set forth in the Basin Plan. Applicants may be required to obtain a General Construction Activities Storm Water Permit under the NPDES program, and develop and implement a Storm Water Pollution Prevention Plan (SWPPP) that includes best management practices (BMPs) to control erosion, siltation, turbidity, and other contaminants associated with construction activities. The SWPPP would include BMPs to control or prevent the release of non-storm water discharges, such as crude oil, in storm water runoff.
Coastal Act Chapter 3 policies	*See Multiple Environmental Issues*. Section 30231 states that the biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.
Fish and Game Code sections 1601 to 1603	Under these sections, CDFW must be notified prior to any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. The term "stream" can include perennial, intermittent, and ephemeral streams; rivers; creeks; dry washes; sloughs; and watercourses with subsurface flows.
Harbors and Navigation Code sections 650-674	This code specifies a State policy to "promote safety for persons and property in and connected with the use and equipment of vessels," and includes laws concerning marine navigation that are implemented by local city and county governments. This Code also regulates discharges from vessels within territorial waters of the State of California to prevent adverse impacts on the marine environment. This code regulates oil discharges and imposes civil penalties and

Hydrology and Water Quality (State)	
	liability for cleanup costs when oil is intentionally or negligently discharged to the waters of the State of California.
Other sections	• Clean Coast Act of 2005. (See Hazards and Hazardous Materials) • Water Code section 8710 requires that a reclamation board permit be obtained prior to the start of any work, including excavation and construction activities, if projects are located within floodways or levee sections. Structures for human habitation are not permitted within designated floodways. • Water Code section 13142.5 provides marine water quality policies stating that wastewater discharges shall be treated to protect present and future beneficial uses, and, where feasible, to restore past beneficial uses of the receiving waters. The highest priority is given to improving or eliminating discharges that adversely affect wetlands, estuaries, and other biologically sensitive sites; areas important for water contact sports; areas that produce shellfish for human consumption; and ocean areas subject to massive waste discharge.

LAND USE AND PLANNING

See also Multiple Environmental Issues for laws, regulations, and policies related to land use and planning.

Land Use and Planning (Federal)
There are no major federal laws, regulations, and policies potentially applicable to this Project.

Land Use and Planning (State)	
Coastal Act Chapter 3 policies	*See Multiple Environmental Issues*. • Section 30220. Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses. • Section 30221. Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area. • Section 30222. The use of private lands suitable for visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation shall have priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry. • Section 30223. Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible. • Section 30224. Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.
Submerged Lands Act	The State of California owns tide and submerged lands waterward of the ordinary high watermark. State law gives primary responsibility for determination of the precise boundary between these public tidelands and private lands, and administrative responsibility over state tidelands, to the CSLC. Access and use of state shoreline areas can be obtained through purchase or lease agreements.

MINERAL RESOURCES

Mineral Resources (Federal)	
CFR, Titles 10, 18, and 30	• 10 CFR addresses energy consumption and the Department of Energy. • 18 CFR addresses the Federal Energy Regulatory Commission (FERC). • 30 CFR establishes the Bureau of Ocean Energy Management (BOEM, formerly the MMS), which manages energy resources in the Federal OCS.

Mineral Resources (State)	
Surface Mining and Reclamation Act (SMARA) (Pub. Resources Code, §§ 2710-2796).	The California Department of Conservation is the primary agency with regard to mineral resource protection. The Department, which is charged with conserving earth resources (Pub. Resources Code, §§ 600-690), has five program divisions: California Geological Survey (CGS); Division of Oil, Gas, and Geothermal Resources; Division of Land Resource Protection; State Mining and Geology Board (SMGB); and Office of Mine Reclamation. SMGB develops policy direction regarding the development and conservation of mineral resources and reclamation of mined lands. In accordance with SMARA, CGS classifies the regional significance of mineral resources and assists in designating lands containing significant aggregate resources. Four Mineral Resource Zones (MRZs) are designated to indicate the significance of mineral deposits. • MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence. • MRZ-2: Areas where adequate information indicates significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence. • MRZ-3: Areas containing mineral deposits the significance of which cannot be evaluated from available data. • MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.
Other	• Public Resources Code section 6801 (Oil and Gas and Mineral Leases) • Warren-Alquist Act, adopted in 1974 to encourage conservation of non-renewable energy resources.

NOISE

Noise (Federal)	
Noise Control Act (42 USC sec. 4910)	This Act required the USEPA to establish noise emission criteria, as well as noise testing methods (40 CFR Chapter 1, Subpart Q). These criteria generally apply to interstate rail carriers and to some types of construction and transportation equipment. The USEPA published a guideline (USEPA 1974) containing recommendations for acceptable noise level limits affecting residential land use of 55 dBA L_{dn} for outdoors and 45 dBA L_{dn} for indoors.
NTIS 550\9-74-004, 1974	In response to a Federal mandate, the USEPA provided guidance in NTIS 550\9-74-004, 1974 ("Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety"), commonly referenced as the "Levels Document" that establishes an L_{dn} of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses including residences and recreation areas. The USEPA recommendations contain a factor of safety and do not consider technical or economic feasibility (i.e., the document identifies safe levels of environmental noise exposure without consideration for achieving these levels or other potentially relevant considerations), and therefore should not be construed as standards or regulations.

Noise (State)	
Land Use Compatibility Guidelines from the now defunct California Office of Noise Control	State regulations for limiting population exposure to physically and/or psychologically significant noise levels include established guidelines and ordinances for roadway and aviation noise under Caltrans and the now defunct California Office of Noise Control. Office of Noise Control land use compatibility guidelines provided the following: • For residences, an exterior noise level of 60 to 65 dBA Community Noise Equivalent Level (CNEL) is considered "normally acceptable;" a noise level of greater than 75 dBA CNEL is considered "clearly unacceptable." • A noise level of 70 dBA CNEL is considered "conditionally acceptable" (i.e., the upper limit of "normally acceptable" for sensitive uses [schools, libraries, hospitals, nursing homes, churches, parks, offices, commercial/professional businesses]).
Other	• California Administrative Code, title 2, establishes CNEL 45 dBA as the maximum allowable indoor noise level resulting from exterior noise sources for multi-family residences. • California Administrative Code, title 4, which applies to airports operating under permit from the Caltrans Division of Aeronautics, defines a noise-impacted zone as any residential or other noise-sensitive use with CNEL 65 and above.

POPULATION AND HOUSING

Population and Housing (Federal)
Population and Housing (State)
There are no major federal or state laws, regulations, and policies potentially applicable to this Project.

PUBLIC SERVICES

Public Services (Federal)	
CFR Title 29	• Under 29 CFR 1910.38, when required by an Occupational Safety and Health Administration (OSHA) standard, an employer must have an Emergency Action Plan that must be in writing, kept in the workplace, and available to employees for review. An employer with 10 or fewer employees may communicate the plan orally to employees. Minimum elements of an emergency action plan include the following procedures: Reporting a fire or other emergency; emergency evacuation, including type of evacuation and exit route assignments; employees who remain to operate critical plant operations before they evacuate; account for all employees after evacuation; and employees performing rescue or medical duties • Under 29 CFR 1910.39, an employer must have a Fire Prevention Plan (FPP). A FPP must be in writing, be kept in the workplace, and be made available to employees for review; an employer with 10 or fewer employees may communicate the plan orally to employees. • Under 29 CFR 1910.155, Subpart L, Fire Protection, employers are required to place and keep in proper working order fire safety equipment within facilities.

Public Services (State)	
California Code of Regulations, title 19 (Public Safety)	Under this section, the CSFM develops regulations relating to fire and life safety. These regulations have been prepared and adopted to establish minimum standards for the prevention of fire and for protection of life and property against fire, explosion, and panic. The CSFM also adopts and administers regulations and standards necessary under the California Health and Safety Code to protect life and property.

RECREATION

Recreation (Federal)
There are no major federal laws, regulations, and policies potentially applicable to this Project.

Recreation (State)	
Coastal Act Chapter 3 policies	See Multiple Environmental Issues. • Section 30210: In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse. • Section 30220: Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

TRANSPORTATION / TRAFFIC

Transportation / Traffic (Federal)	
Ports and Waterways Safety Act	This Act provides the authority for the USCG to increase vessel safety and protect the marine environment in ports, harbors, waterfront areas, and navigable waters, including by authorizing the Vessel Traffic Service, controlling vessel movement, and establishing requirements for vessel operation.

Transportation / Traffic (State)	
California Vehicle Code	Chapter 2, article 3 defines the powers and duties of the California Highway Patrol, which enforces vehicle operation and highway use in the State.
Caltrans	Caltrans is responsible for the design, construction, maintenance, and operation of the California State Highway System and the portion of the Interstate Highway System within State boundaries. Chapter 2, article 3 of the Vehicle Code defines the powers and duties of the California Highway Patrol, which has enforcement responsibilities for the vehicle operation and highway use in the State.

TRIBAL CULTURAL RESOURCES

Tribal Cultural Resources (Federal)
See Cultural and Paleontological Resources.

Tribal Cultural Resources (State)	
See Cultural and Paleontological Resources.	
AB 52 (Gatto, Stats. 2014, Ch. 532)	AB 52 (effective July 1, 2015) adds sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3 to CEQA, relating to consultation with California Native American tribes, consideration of tribal cultural resources, and confidentiality. The definition of tribal cultural resources considers tribal cultural values in addition to scientific and archaeological values when determining impacts and mitigation. AB 52 provides procedural and substantive requirements for lead agency consultation with California Native American tribes and consideration of effects on tribal cultural resources, as well as examples of mitigation measures to avoid or minimize impacts to tribal cultural resources. AB 52 establishes that if a project may cause a substantial adverse change in the significance of a tribal cultural resource, that project may have a significant effect on the environment. Lead agencies must avoid damaging effects to tribal cultural resources, when feasible, and shall keep information submitted by tribes confidential.

UTILITIES AND SERVICE SYSTEMS

Utilities and Service Systems (Federal)	
CFR Title 29	*See Public Services*.

Utilities and Service Systems (State)
There are no major state laws, regulations, and policies potentially applicable to this Project.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Socioeconomics and Environmental Justice (Federal)	
Executive Order (EO) 12898	In 1994, President Clinton issued an "Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (EO 12898). This EO was designed to focus attention on environmental and human health conditions in areas of high minority populations and low-income communities, and promote non-discrimination in programs and projects substantially affecting human health and the environment (White House 1994). The EO requires Federal agencies (as well as State agencies receiving Federal funds) to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

Socioeconomics and Environmental Justice (State)	
CSLC	In 2002, the CSLC adopted an Environmental Justice Policy to ensure consideration of environmental justice as part of the CSLC's processes, decisions, and programs (Calendar Item 63, April 9, 2002). The policy stresses equitable treatment of all members of the public and commits to consider environmental justice in its processes, decision-making, and regulatory affairs. CSLC staff implements the Policy, in part, through identification of and communication with relevant populations that could be adversely and disproportionately affected by CSLC projects or programs, and by ensuring that a range of reasonable alternatives is identified that would minimize or eliminate environmental issues affecting such populations.

APPENDIX D

RESPONSES TO PUBLIC COMMENTS

PALOS VERDES REEF RESTORATION PROJECT

PREPARED BY THE VANTUNA RESEARCH GROUP AT OCCIDENTAL COLLEGE
IN COORDINATION WITH THE
MONTROSE SETTLEMENTS RESTORATION PROGRAM

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Prepared by the Vantuna Research Group at Occidental College

APPENDIX D1

RESPONSES TO PUBLIC COMMENTS:
PUBLIC COMMENT PERIOD, FEBRUARY 21 TO MARCH 22, 2017

**PREPARED BY THE VANTUNA RESEARCH GROUP AT OCCIDENTAL COLLEGE
IN COORDINATION WITH THE
MONTROSE SETTLEMENTS RESTORATION PROGRAM**

Public Comment Summary and Responses

Prepared by the Vantuna Research Group at Occidental College in coordination with MSRP

Table 1. Summarized information regarding those who contacted either the National Oceanic and Atmospheric Administration (NOAA)/Montrose Settlements Restoration Program (MSRP) or California State Lands Commission (CSLC), including the "Contact No." referenced in Table 2.

Contact No.	Contact Date	Name of Contact	Title	Represented Group
1	2/16/17	Jim MacLellan	Resident	Rancho Palos Verdes
2	3/3/17	Lili Amini	General Manager	Trump National Golf Course
3	3/6/17	Jim Randall	Resident	Rancho Palos Verdes
4	3/6/17	Marc Schwarting	Resident	Rancho Palos Verdes
5	3/7/17	Gary Randall	Resident	Rancho Palos Verdes
6	3/9/17	Robert Marnani	Resident	San Pedro
7	3/10/17	Marianne Hunter William Hunter	Residents	Rancho Palos Verdes
8	3/12/17	Matt Garland	Resident	San Pedro
9	3/16/17	Naoko Munakata	Supervising Engineer	County Sanitation Districts of Los Angeles County (LACSD)
10	3/17/17	Jeff Dorsett	Resident	Rancho Palos Verdes
11	3/17/17	Michelle Ernst	Resident	San Pedro
12	3/17/17	Ray Volman	Resident	San Pedro
13	3/18/17	Gene Dewey	Resident	Rancho Palos Verdes
14	3/18/17	Gary Randall	Resident	Rancho Palos Verdes
15	3/18/17	Tom Kirk	unknown	unknown
16	3/18/17	Kevin Poffenbarger	unknown	unknown
17	3/18/17	Greg Sinclair	unknown	unknown
18	3/19/17	Francisco Bernues	Resident	Rancho Palos Verdes
19	3/19/17	Ken Estrella	unknown	unknown
20	3/19/17	Bill Korakis	Resident	Harbor City
21	3/19/17	Bryce Lowe-White	Resident	San Pedro
22	3/19/17	John Stillo	Resident	Rancho Palos Verdes
23	3/20/17	Bruce V. Rorty	Resident	San Pedro
24	3/20/17	Clayton Kuhlman	Resident (former)	Rancho Palos Verdes
25	3/20/17	Chris Del Moro	Resident	Rancho Palos Verdes
26	3/20/17	<anonymity requested>	Resident	Rancho Palos Verdes
27	3/20/17	Lili Amini	General Manager	Trump National Golf Course
28	3/20/17	Laureen C. Vivian	Resident	San Pedro
29	3/21/17	Jeff Jappe	Resident	Rancho Palos Verdes
30	3/21/17	Jon Jenkins	unknown	unknown
31	3/21/17	John R. Jensen	Resident	Rancho Palos Verdes
32	3/21/17	Sarah Sikich Rita Kampalath Dana Roeber Murray	Vice President Science & Policy Director Marine Scientist & Coastal Policy Manager	Heal the Bay
33	3/21/17	Marty Foster	Resident	Rancho Palos Verdes
34	3/21/17	Kathy Snell	Resident	Rancho Palos Verdes
35	3/21/17	Greg Stanton	unknown	unknown
36	3/21/17	Oliver Hazard	Resident	Rancho Palos Verdes
37	3/22/17	Susan Brooks	Councilwoman	Rancho Palos Verdes City Council
38	3/22/17	Kate Huckelbridge	Senior Environmental Scientist	California Coastal Commission
39	3/22/17	Edmundo Hummel	Resident	Rancho Palos Verdes
40	3/22/17	Ken Dyda	Resident	Rancho Palos Verdes
41	3/22/17	Bill Foster	Resident	Rancho Palos Verdes
42	3/22/17	Dianna Watson	LD-IGR Branch Chief	California Department of Transportation
43	3/22/17	Jessica Vlaco	Resident	Rancho Palos Verdes
44	3/23/17	Charles Hipkins	unknown	unknown
45	3/24/17	Fred Zscheile	Resident	Rancho Palos Verdes
46	4/4/17	Brian Campbell	Mayor	City of Rancho Palos Verdes

Table 2. Summary of comments, responses, and references (where appropriate).

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
Communication and Outreach to Stakeholders				
1	Lack of communication/outreach to stakeholders regarding project	2, 3, 5, 7, 10, 12, 25, 26, 27, 34, 43	Notification of public review of the Environmental Assessment/ Negative Declaration (EA/ND) and the public meeting was sent out on February 21, 2017, by email, directly to 87 members of local, county, state, and federal government, representatives of native tribes, councils, and nations, academic and independent research institutions, and other non-government organizations throughout the region. The notification of the EA/ND and public meeting also followed the noticing requirements pursuant to State California Environmental Quality Act (CEQA) Guidelines section 15072, including publishing in the Los Angeles Times on February 25, 2017. Additionally, outreach regarding this specific project has been ongoing since the release of the MSRP Final Phase 2 Restoration Plan EA in 2012. The public meeting for the plan was announced October 24, 2011, and was held at the Point Vicente Interpretative Center on November 9, 2011.	
2	Public meeting had no presentation and no formal Q&A session	3, 5, 10, 26, 30	The meeting was intended to provide an informal opportunity for stakeholders to ask clarifying questions directly to MSRP staff regarding the EA. In response to public comments, an additional meeting was held on October 11, 2017, at the Pont Vicente Interpretive Center to describe the project in more detail and allow for questions and discussion regarding the reef design and other aspects of this project.	
3	Concern regarding length of public comment period	5, 7	Public comment periods are not a requirement for EAs under the National Environmental Policy Act (NEPA); however, because this was a joint document that includes the ND subject to CEQA, the document was circulated for public review for at least 30 days pursuant to State CEQA Guidelines section 15073.	
4	Concern regarding lack of media coverage	7	We informed the media of the 30-day public comment period and March 2017 informal public meeting, including publishing in the Los Angeles Times on February 25, 2017, and the October 2017 public meeting. The notification of the EA/ND and public meeting followed the noticing requirements pursuant to the California Environmental Quality Act (CEQA) Guidelines section 15072.	
5	Concern regarding rapidly approaching start date	5, 7	The proposed project start date has been moved back one-year from summer/fall 2017 to summer/fall 2018.	
6	Who is in favor/opposed to the project?	7	A list of individuals and representatives who submitted public comments can be found in this document. Of the comments received, 7 commenters were in favor of the project and 38 commenters opposed the project or were critical of at least one aspect of the project design or implementation plan.	

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
7	Environmental Assessment is biased in favor of the restoration reef/reef location	10	The EA was prepared by NOAA and included information from reports and studies written by independent consulting groups. These groups have been studying biological, chemical, geological, and economic aspects of the study region for nearly 40 years, with almost a decade of study on the project area for the purposes of enhancing lost fishing opportunities. Many potential restoration areas were evaluated to achieve the goals of the Phase 2 restoration plan. The proposed project design was determined to be the preferred alternative.	[9; pg 37 – 39]

Support

8	Generally supportive of project	1, 9, 19, 20, 42, 44	General support of the project is acknowledged.	
9	Interest in combining restoration effort with Marine Sanctuary	1	The creation of a marine sanctuary is outside the scope of work presented in the MSRP Phase 2 Final Restoration Plan and the limits of available funding.	[1; Sections 1.1, 2.1]

Project Funding

10	What is the cost of the project?	3	$6.5 million	
11	Who commissioned and paid for the studies?	7	The studies and restoration project have been/will be funded by NOAA MSRP, and not by Trump National Golf Course or Donald Trump himself. Additionally, research has been continuous for the last decade and funding for restoration work was secured nearly two decades prior to the existence of the Trump Administration.	
12	Does the project budget for possible adverse effects of construction efforts (e.g. hazardous spills)?	3	The issuance of a permit is contingent upon demonstrating the ability to assume liability for risks associated with the project. There have been concerns regarding the quarry rock used for reef construction and potential spills associated with oil and gas aboard marine vessels. The Project will adhere to California Department of Fish and Wildlife's (CDFW's) Material Specification Guidelines and employ Best Management Practices at every step of the construction process to prevent adverse effects. There are no additional hazardous chemicals or substances used in this project. Furthermore, all ocean-going vessels used for the Project would not transport such substances in quantities in excess of their operating requirements. Additionally, vessels would maintain emergency response and oil spill prevention plans in accordance with applicable regulations. Equipment and supplies to respond to a spill would also be onboard. Further, construction crews would be licensed, trained in oil spill response, and have a regular maintenance program to prevent a spill from an equipment malfunction.	
13	Would this project be under consideration if there were no Monsanto (sic) funds available?	45	This project would not be under consideration without the funds available through MSRP.	
14	There are better uses for MSRP funds	3, 11, 12, 15, 29, 32	Approximately 75% of the settlement funds have been used to address contaminated sediment, to reimburse past damage assessment costs, and to implement Phase I projects and studies. Under the terms of the settlement, the remainder (approximately $15 million) is to be used for additional natural resource restoration work including fishing and fish habitat restoration, Bald Eagle and Peregrine Falcon restoration, and seabird restoration. This Project addresses fish habitat restoration as part of the Phase II restoration activities.	[1; pg 1-6]

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
14a	….. specifically for disaster response	21, 36	Disaster response is not included as an objective in the settlement with Montrose Chemical Corporations.	
14b	….. specifically for DDT/PCB removal	45	Settlement funds specifically directed toward cleanup efforts are managed by the U.S. Environmental Protection Agency (EPA). According to the EPA's record of decision, the selected remedy for contaminated sediment is to place an isolation cap of clean sediment over contaminated sediments near the outfalls where the concentrations are highest.	[4; pg 2]
15	MSRP funds are not appropriate to use for this project since reef burial is not a function of Montrose pollutants	14, 18, 28, 31, 39	While Montrose Chemical Corporation's effluent is not responsible for the burial of these reefs, one stated purpose of the funds is to restore fishing losses to the region. This restoration project is one method for restoring loss habitat and creating a healthier ecosystem. One aspect of a healthier ecosystem is improved fishing opportunities; however, these reefs are not designed solely to benefit commercially or recreationally fished species.	

Restoration Reef Design

16	Project name and purpose are misleading as the project does not restore existing rocky reef	14	As stated in the EA, landslides deposited substantial terrestrial sediment into the project area, burying historic rocky reefs. This project seeks to restore that rocky reef habitat by constructing the restoration reef on top of those currently buried rocky areas.	[2; pg 4]
17	Requests reef design details and a detailed map of the restoration reef and project area	5, 34, 38	Reef design information and maps can be found in Reference #9.	Maps: [9; pgs 10, 13, 16, 21, 29, 30, 40, 41, 43] Design details: [9; pgs 27-37]
17a	….. and alternative designs	38	Alternative reef designs can be found in Reference #9.	[9; pgs 37-39]
18	What percentage of rocky reef in the Palos Verdes region will the restoration reef comprise?	14	There are approximately 3,182 acres of rocky reef at Palos Verdes Peninsula currently, including the buried/degraded reef areas. The restoration reef is designed to provide approximately 40 acres of buried/degraded rocky reef within the 69-acre site. Therefore, the restoration reef will comprise ~1.25% of rocky reef habitat at Palos Verdes Peninsula.	[2; pg 7], [10; pg 4]
19	Kelp surveys more recent than 2009 should be used to determine restoration reef location	34	The kelp cover data used during restoration reef design was an additive composite of all kelp cover from the 2008 and 2011 to 2014 seasons.	[9; pgs 10-13]
20	Is offshore transport of sediment a goal, and will it be successful?	14	Offshore transport of sediment is not a goal of this restoration reef.	
21	The Environmental Assessment states that the objective of the restoration reef is to create hard, rocky substrate upon which kelp will become established, while the MSRP Final Phase 2 Report states that kelp forest production is NOT a goal	14, 18, 28, 31, 39	Correct. The overall objective for building the restoration reef is to create the most productive habitat. While kelp growth will likely occur on the restoration reef, and production is partially a function of kelp growth, it is not the primary goal for building the reef.	[9; pg 31]
22	Lack of small-scale testing to determine effects	30	While no specific pilot study was conducted, many other reefs in the area have been monitored extensively. The effects of such a reef can't be "scaled-down" in a natural setting, as the size and extent of the reef complex is important for providing connectivity to existing natural reefs and to provide sufficient habitat to support self-sustaining populations of fish.	[9; pg 31]

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
23	Is this project considered to be experimental?	18, 28, 31, 39	This project is not considered to be experimental; however, experimental design was incorporated when designing the restoration reef. The restored reef is expected to provide statistically and biologically sound data on the effects of the project on the environment to potentially inform future restoration projects.	[9; pgs 27, 35]
24	Only one engineer named in the proposal	30	Section 10.1 provides the list of preparers of the EA; however, the personnel involved in the design of this project were comprised of a collaborative group of engineers, resource managers, and scientists.	[2; pgs 54-55]

Suggested Alternatives

25	Let nature run its course/do not interfere with nature	3, 12, 21, 45	The landslides resulting from human-caused environmental degradation has occurred to such an extent in this area that restoration of fish habitat in the form of artificial reefs would provide an ecosystem benefit. Due to the existing layer of sediment on top of former rocky reef habitat and the ongoing nature of the Portuguese Bend Landslide, the only way to restore rocky reef fish habitat in this area is to create a high-relief reef that will be resilient against the effects of sedimentation. Without the addition of high-relief rocky reefs, sediment would continue to cover and scour the relatively flat rocks that currently exist in the area, preventing natural recovery. By introducing rock that will remain exposed well above the sediment bed, natural processes of reef succession will result in colonization by a diverse and productive assemblage of marine organisms. The placement of the reef modules was designed so that sediment can move between the reef modules within a block through sand channels that are 10 to 20 m wide. This will help to prevent the buildup of sediment within reef blocks as sand is moved by wave action and longshore currents.	[2; pg 4], [9; pg 35]
26	Restoration reef should begin closer to Portuguese Point and overlap to redirect current and wave action away from the coastline in order to transport silt offshore and keep nearshore waters calm and clear while re-establishing tidepools	40	While creating a series of artificial barriers closer to the source of terrestrial input may promote offshore transport of silt and sediment while discouraging coastal erosion, this plan would: a) cause extensive damage to recreational (particularly surfing) opportunities along the shoreline; b) require reef heights that would pose a hazard to navigation; c) not be feasible within the proposed budget; and, d) not be within the scope of what MSRP Phase 2 Final Restoration Plan.	
27	Why not plant more kelp beds?	34	Kelp outplanting was considered but it was decided that direct outplanting would be unnecessary on the Palos Verdes Peninsula due to the high availability of natural kelp recruits in the region.	[1; pg A-21]
28	Sea otters should be relocated to the restoration reef to control sea urchin populations	40	This suggestion, while rooted in sound ecological theory, is not appropriate or necessary. Relocating sea otters is against two separate federal laws (Marine Mammal Protection Act and Endangered Species Act), and past efforts to do so by the U.S. Fish and Wildlife Service were deemed failures and were abandoned unofficially in 2003 and officially in 2012.	[1; pg A-14 to 15]

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
Existing Artificial Reef Comparisons				
29	Has an artificial reef been constructed near an ongoing landslide in the past?	18, 28, 31, 39	We are not aware of another artificial reef that has been implemented in the area of an active landslide; however, this reef was designed to be resilient against the ongoing sedimentation caused by the Portuguese Bend Landslide by maximizing the amount of vertical relief of the reef itself. Natural high-relief reef patches in the area have persisted and remain very productive because the rocks are well above the sediment. The project specifically incorporates sedimentation into the design. High-relief reefs are immediately upcoast and downcoast of the restoration area and are not being buried.	
30	No long-term studies of similar reefs	30	Artificial reefs are widely studied worldwide and have been shown to be highly productive fish habitat. Locally, there are numerous artificial reefs in similar water depths in Santa Monica Bay and on the San Pedro Shelf, and those with high relief components have been found to have high fish biomass. The components of this reef were designed to mimic the physical structure of a nearby natural reef with very high fish biomass. The researchers in this project have been continually studying artificial reefs in the region since 1974, the longest continual surveys of artificial reefs.	[5], [9; pgs 22-24]
31	Wheeler North Reef does not meet 5 of 14 critical issues	3	The Wheeler North Reef (WNR) at San Clemente has a different design and a different set of core objectives than this restoration reef. WNR was designed primarily to grow giant kelp and to maximize the acreage of new kelp habitat. This reef is specifically designed to provide productive fish and invertebrate habitat, and consists of a set of discrete high-relief modules.	[9; pgs 22-37]
32	No discussion/comparison to Belmont Pier Reef Restoration Project	32	The MSRP Trustee Council had previously investigated an artificial reef project located adjacent to the Belmont Pier. The purpose of this project was to change the species composition of the fish available to anglers from soft-bottom species that typically carry higher contaminant loads to rocky reef species that often carry lower contamination loads. As such, the purpose of the Belmont Pier project was not habitat restoration, but rather to create a more traditional fishing reef. The project was determined to be infeasible due to constraints associated with the lack of a local partner that would assume the long-term ownership of the reef and associated liability. In addition, at the time the Trustees evaluated the project, the City of Long Beach was in the process of evaluating the pier location. One option that was being considered was moving the pier to a new location, which would reduce or eliminate the intended value of the project to pier anglers. Neither of these issues are limiting factors for the current reef project. The intended goal of the current project is to restore fish habitat (independent of angling) and the Southern California Marine Science Institute (SCMI) will be the long-term lease holder for the project.	

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
Likelihood and Measurement of Success				
33	No evidence provided that the restoration reef would improve fish habitats	11, 30, 32	There is substantial evidence that artificial reefs, when correctly designed, can improve fish habitat. There is also a large amount of data suggesting that rocky reefs that are not covered in sediment are far more productive than rocky reefs that are covered in sediment. Additionally, this restoration reef design was modeled specifically after highly productive natural reefs immediately adjacent to the site. Conservatively ~6 tons (5,419 kg) of fish will be produced by this design.	[5], [9; pgs 22-26, 34]
34	No information given about likelihood of success or what metrics would define success/failure	14, 18, 28, 31, 32, 39	As this restoration reef is not being proposed as a mitigation for a specific set of lost services (unlike the WNR), there is no need to define specific goals for the project that would deem it a success or failure. However, post-construction monitoring will be conducted with side-scan sonar surveys to confirm the location of rock material, and diver surveys to assess the biological community and progress of habitat on the reef (see EA section 6.1.5). It is expected that at the very least more fish will utilize the restored habitat than currently do (which is nearly zero). Optimally, fish production and biomass values will be comparable or exceed other non-sediment-impacted reefs at Palos Verdes Peninsula.	[2; pg 41], [9; pgs 36-37, 41-45]
35	The restoration reef will be buried by continuous landslides and wave action	3, 11, 12, 14, 18, 25, 28, 31, 32, 36, 37, 39, 46	This reef was designed to be resilient against the ongoing sedimentation caused by the Portuguese Bend Landslide by maximizing the amount of vertical relief of the reef itself. Natural high-relief reef patches in the area have persisted and remain very productive because the rocks are well above the sediment. The project specifically incorporates sedimentation into the design.	[1; pg A-11], [9; pgs 25, 31, 33, 37]
35a	….. Will sink in to new fissures created by construction	34	The bedrock underlying the thin layer of sediment is solid rock, based on sub-bottom/echosounder profiles and corroborated by diver surveys. Neither the quarry rock nor the construction equipment has the capability to break through or create fissures in the bedrock layer.	[9; pgs 20-21, 40-41], [11], [12]
Restoration Reef Construction				
36	Conflicting timelines for construction given	5, 7	The proposed project start date has been moved to summer/fall 2018.	
37	No testing of quarry rocks to determine chemical reaction with ocean, decomposition rates, or chance of movement	30	The quarry rocks used to construct the reefs will be compliant with the guidelines set forth by the CDFW, which state that: (1) materials shall be clean and free of any contaminants, especially those that could dissolve in seawater, (2) materials shall be free of foreign materials, (3) specific gravity must be greater than 2.2, and (4) rocks must be durable enough to remain unchanged after 30 years of submersion in seawater. This is standard for reefing and breakwater projects in California.	
38	Reports states that no permanent structures will be constructed. Is the reef not permanent?	3, 14	This statement refers to the visual and construction equipment aspect of the project, not the reef itself.	[2; pg 44]
39	Air pollution concerns	7, 27, 34	According to an analysis of the project using assumptions based on worst-case conditions, none of the construction-related emissions will be above the daily or quarterly emission thresholds for CEQA analysis established by the South Coast Air Quality Management District.	[6]

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
40	Noise level concerns	7, 27, 34	Noise levels resulting from construction at sensitive noise receptors would range from 38 to 58 decibels (A-weighted; dBA), which are below the maximum acceptable noise levels outlined in the regulatory framework of the Rancho Palos Verdes General Plan, the City of Los Angeles General Plan, and the Los Angeles County General Plan. The project will raise ambient noise levels between 0 and 1.5 dBA, well below the threshold for creating a physical or psychological effect from construction noise. Furthermore, all construction-related activities will be conducted between the hours of 7 a.m. and 7 p.m. to remain compliant with the regulatory framework.	[7]

Effects on Local Businesses and Vessel Traffic

41	What are the effects on vessels and vessel traffic?	7	The impacts on large vessel traffic will be negligible. The reef site is 0.3 mile from the shoreline in depths less than 66 feet. The shipping lane is located several miles offshore in much deeper water. For smaller commercial and recreational fishing and diving vessels, the reefs are situated deep enough to be of no concern for small boaters as the shallowest reef component will be 40 feet below the surface at mean lower low water. Once completed, the restoration reef will be surveyed and charted in conjunction with NOAA's Office of Coast Survey.	[13]
42	Potential damage to business at Trump National Golf Course	7, 27, 34	As provided in Section 9.4 (page 53) of the EA, no permanent structures will be visible following the end of the construction period. Also see responses to Comments 38-40.	

Surfing, Waves, Geological, and Coastline Impacts

43	Requests a map of faults, fissures, and slides both onshore and underwater	34	See Reference 12.	[12; pgs 1-14]
44	Unknown impacts of restoration reef on landslide areas and coastline	3, 4, 13, 18, 21, 22, 23, 28, 31, 33, 34, 35, 39, 41, 43	There is no reason to expect that the placement of an artificial reef 0.3 miles offshore will affect the rate of erosion of the toe of the landslide. The rate of the landslide itself is controlled by terrestrial processes and will not be affected by the restoration reef.	[3]
44a	….. How will damage to homes and roads be mitigated?	34	Please see response to Comment 44.	
45	Previous ideas about placing a breakwall at Portuguese Bend were abandoned; reasoning should be explored	3	Assuming the Comment is referring to the 2000 proposal to build a sediment containment dike offshore of Portuguese Bend Landslide, the project was not recommended for authorization for numerous reasons, the most prominent being concerns about the ability of the proposed structure to contain sediments from the landslide. That project was deemed unfeasible. That project was also outside of the proposed study and restoration area and was intended to stop flow of sediment downcoast and help stabilize the toe of the landslide. This restoration project does not seek to do either of those things.	[14]

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
46	Restoration reef may damage surfing conditions	3, 6, 10, 11, 12, 14, 17, 21, 23, 25, 26, 29, 38, 43	The nearest surf breaks to the project site are The Shack, K & G Point, Bee Aye Point, and Japan Cove. The Shack is most ridable with west swell that will not pass over the restoration reefs. K & G, Bee Aye, and Japan Cove surf breaks are all best with swells from the south or south-southeast (SSE). These swells will not pass over the restoration reef prior to reaching Japan Cove. South and SSE swells will pass over the restoration reef before reaching K & G and Bee Aye; however, the water depth between the top of the restoration reef and the water's surface is at least 40 feet. Typical surfable waves on our coast will not break until a bottom depth of < 20 feet is reached. Wave conditions along the Rancho Palos Verdes coastline are controlled by shallow natural reefs that lie inshore of the project site in water depths of approximately 13 to 20 feet. Additionally, since the reef modules are comprised of narrow sets of individual rock piles rather than a single large obstacle set parallel to shore, most of the wave energy will pass well over the top of the reef and through the channels between reef modules. The naturally existing reef that these restoration reef modules are modeled after lies directly in the path of the Japan Cove surf break and clearly does not cause any harm to surfing conditions.	Figure 1, [15; pgs 6-7], [Cleary and Stern, 1963. "Surfing Guide to Southern California"], [18; pg 1 – 3]
46a	….. provide map of surf breaks in relation to proposed restoration reef	38	See References 15 and 18.	[15; pg 7], [18; pg 1]
47	No models of changes to tidal flow	30	Tidal flow will not be influenced by the restoration reef.	
48	Study relating increased kelp on surf and shore conditions is from San Clemente and is not applicable to Palos Verdes	3, 14, 26, 38	We believe that this study is indeed appropriate. The reef referenced in the study had no measurable influence on long period swells, yet it was placed in shallower water than the proposed Palos Verdes Reef. The physics of wave shoaling and breaking are consistent between the two locations, and there is no reason to believe that this deeper reef will have any additional effect on long period waves.	[17; pg 4.3-4 – 4.3-5]
49	Should include a surfing wave enhancement element in the design	16	A surfing wave enhancement is outside the scope of work presented in the MSRP Phase 2 Final Restoration Plan and the limits of available funding.	[1; Sections 1.1, 2.1]

Ecological Concerns: Kelp Beds and Rocky Reefs

50	Stated purpose of the restoration reef is to restore kelp beds, but kelp beds are healthy at present	7	Although one of the parameters for siting the restoration reef included suitable depths for kelp forest establishment, and the restoration reef would likely provide substrate for kelp, it is not designed to restore kelp. There is a different project that includes kelp restoration, which is also a part of MSRP, but kelp restoration is not a key purpose of the restoration reef project.	[9; pg 31]
51	Are the kelp beds in bad shape?	7	No. Since the 1970s, kelp beds along Palos Verdes Peninsula have been increasing in size and persistence as a product of improved wastewater treatment and other MSRP restoration efforts.	
52	Why is there no kelp in the circular area towards the east, nearshore?	34	This area is mostly a sand/mud bottom that is not suitable for kelp growth; it is directly below a natural gully where runoff from the peninsula flows from north of Palos Verdes Drive South (beginning just south of Seaclaire Drive) into the ocean where it is deposited onto the ocean floor.	

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
53	No need for more rocky reef or kelp	12	Significant amounts of reef and kelp habitats have been lost on the Palos Verdes Peninsula since the mid-20th century due to pollution and several landslides including the Portuguese Bend Landslide beginning in 1956.	[1; pg 5.14]
54	East Area would benefit more from increased kelp because there is less kelp there than in the West Area.	26	It's true that the East Area currently has less kelp than the West Area. However, the West Area was selected because the fine-grained sediments are thinner within the depths most suitable for reef construction. The relative absence of fine-grain sediments means the quarry rock would be less likely to sink or be covered by sediments, which would hinder kelp from becoming established.	[2; pg 7]
55	Why would hard-bottom associated fauna inhabit the new reef when they don't inhabit current/adjacent hard-bottom habitat?	3	The current/adjacent habitat is heavily degraded by sedimentation and scouring, whereas restoration reef habitat would provide more protected substrate for flora and fauna that are susceptible to these effects.	[9; 13-19]
56	Not enough increase in kelp bed/rocky reef acreage for project cost	3, 14	Based upon the analyses of multiple reef designs, this is the most cost-effective reef design in terms of overall reef production.	
57	Kelp forests will not grow on restoration reef due to presence of sea urchins at the site.	11	While kelp growth will likely occur on the restoration reef, it is not the purpose of building the reef. Regarding sea urchin grazing preventing growth of kelp, the urchins on adjacent/current reefs are in low enough densities not to create barrens due to overgrazing. Additionally, the depths of the restoration reefs are generally below the preferred depth for the urchins (purple sea urchins, *Strongylocentrotus purpuratus*) that are mostly responsible for creating urchin barrens in southern California.	[9; pg 31], [16]

Ecological Concerns: Physical Damage from Construction

58	Kelp/rocky reef will be damaged as a result of the construction process	22, 25, 26	Reef construction has the potential to damage existing benthic communities, but the reef site consists primarily of degraded sandy-bottom and degraded/buried hard substrate bottom habitat. Construction will implement a proactive anchoring plan to minimize impacts by avoiding hard substrate and anchor drag.	[2; pg 36-37]
58a	….. How will damage to adjacent/existing reefs from restoration reef construction be mitigated?	14, 18, 28, 31, 39	See response to Comment 58.	
59	Soft bottom marine life and habitat will be destroyed as a result of the construction process	3	The soft-bottom marine life that are most likely to be affected by construction of the restoration reef are common throughout the Southern California Bight, though not dense enough to be harmed in great numbers during construction. Additionally, soft-bottom habitat is far more common and of far less ecological value than hard-bottom habitat.	[2; pg 37]
60	Are endangered species impacted?	7	No endangered species are impacted.	[2; pgs 13, 19, 22, 16]

Ecological Concerns: DDTs/PCBs and Human Health

61	Diversion of sediments for Portuguese Bend Landslide would prevent further burial of DDTs/PCBs	24	Offshore transport of sediment is not a goal of this restoration reef, nor is it expected to be a major function of this project. However, the movement of sediment from Portuguese Bend offshore to bury dichlorodiphenyltrichloroethane/polychlorinated biphenyl (DDTs/PCBs) will not be affected by this project.	

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
62	Construction will disturb sediment and release DDT/PCBs	10, 14, 17, 18, 21, 23, 25, 28, 29, 31, 32, 34, 39, 43, 46	Resuspension of contaminated sediment was a major consideration when evaluating alternatives for this project. The current understanding is that any additional contamination from re-suspended sediment would be extremely minor for two important reasons. First, the reef will be constructed on a shallow layer of sand that is covering a historic low-relief reef. Thus, there is very little sediment that could be disturbed. Second, and perhaps more important, is that the actual concentrations of DDT compounds and PCBs in the project area are very low when compared with the sediments farther offshore and closer to the White's Point outfall, and comparable to other nearshore areas in southern California. The amount of DDT in the sediment is at the ambient levels consistent with the rest of the nearshore habitats in the Southern California Bight, and reef construction will not expose any buried pollutants that are not currently available to the ecosystem.	[1; pg A-12], [8]
62a	….. How will recontamination issues be addressed?	32	See response to Comment 62.	
63	DDT/PCB concentrations have not decreased in fishes in spite of decreases in sediments; should not be encouraging fishing in areas with DDT/PCB contaminated fishes	32	DDT concentrations in the muscle tissue of white croaker (*Genyonemus lineatus*) have been monitored since the 1980s. The total DDT found in white croaker muscle tissue has shown a sharp decline since the year 2000. Furthermore, total DDT in the muscle tissue was found to be significantly lower in the 2000s compared to the 1990s, and continues to decline in the 2010s. However, white croaker are a soft-sediment associated species and would not be a target species for people fishing on the restoration reef. Rocky-reef associated species such as kelp bass (*Paralabrax clathratus*) and black perch (*Embiotica jacksoni*) are less limited by fish consumption advisories than white croaker. Furthermore, while the goal of this project is not to enhance fishing opportunities, there is no legal recourse to prevent fishing on the restored reef or the natural reefs in the area. The Institutional Controls portion of the MSRP Phase 2 seeks to provide the public with the necessary information about contaminants in order for them to make healthy choices for themselves and their families.	[1; pg A-10], [8]
63a	….. Shore-based hook and line anglers are disproportionately represented by minorities, therefore exposing more minorities to DDT/PCB contaminated fishes; this is contrary to the CSLC's policy on Environmental Justice	32	The proposed restoration reef is approximately 600 m offshore, beyond kelp beds. The restoration reef is not an area accessible to shore-based anglers; therefore, there would be no risk to shore-based anglers.	[1; pg A-10], [8], [9; pgs 10, 13, 16, 21, 29, 30, 40, 41, 43]
64	How will injuries to divers by moving rocks from the restoration reefs be prevented?	34	Storms, swell, and surge will undoubtedly jostle the piles to some degree soon after construction. Rocks will settle into a stable position far prior to harvestable species settling in/around the restoration reefs. This construct will be no different that breakwaters, jetties, and other artificial reefs in that while divers can and do eventually explore and harvest from them, they must do so at their own risk. We know of no reported injuries to divers associated with such structures.	

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
Ecological Concerns: Marine Mammals				
65	Is it feasible that whales could come inshore as far as the proposed restoration reef?	38	While whales, particularly gray whales (*Eschrichtius robustus*), could feasibly come inshore as far as the proposed restoration reef, the reef was designed to mimic highly productive natural reefs nearby. Gray whales generally do not forage during their migration, but they have been observed skimming kelp beds for food and utilizing kelp forest for escape cover. These areas are believed to be particularly important to cow-calf pairs in the northern migration during late winter and spring. Accordingly, the presence of a kelp-covered reef could have a beneficial effect upon gray whales. During the time frame of construction (May-September), there are three species of migratory whales that may be found in the project area. These include: (1) blue whales, (2) fin whales, and (3) humpback whales. However, these whales are generally found farther from shore than where project construction will occur and are adept at avoidance. The project is being planned to avoid the gray whale migration period.	
65a	….. if so, marine wildlife monitoring during construction of the restoration reef should be incorporated into the project	38	During the construction phase of the project, a trained and qualified marine mammal observer will be placed at the construction site for the purpose of monitoring marine mammals and other sensitive marine species as set forth in the guidelines of the National Oceanic and Atmospheric Administration's West Coast Region. If sensitive marine wildlife is observed within the safety zone radius specified in the permit, survey operations will cease until the animal(s) is gone.	[2; pg 41]
66	Restoration reef will not increase marine mammal life	33	This is not a goal of the restoration reef.	
Unidentified Concerns				
67	Unidentified safety concerns	27	Safety is of utmost importance. All applicable laws, regulations, and guidelines will be strictly adhered to with regard to safety of workers, the marine environment, and the public.	
68	Not enough attention given to "unavoidable environmental effects"	3	The section of the EA (Chapter 7) describes the effects that will undoubtedly occur as a result of the construction process. It is not intended to describe any potential negative effects the reef itself may have on the environment; this information is available in Chapter 6.	[2; pgs 36-48, pg 49]
69	Project risks outweigh the benefits	4, 8, 10, 15, 22	Large construction projects such as this do carry risks to the environment and to people. However, many measures have been taken to minimize risks to the seafloor during construction, eliminating any increase in public exposure to toxic pollutants, sedimentation, impacts to recreation, air quality, noise, and many more. The benefits include an increase in productive habitat for fish and other marine species in a highly impacted section of the southern California coast.	[2]
Local, County, State, and Federal Agency Requests and Recommendations				
70	Request placing restoration reef >100 m of Sanitation Districts' light energy monitoring station	9	We will attempt to adjust the restoration project to accommodate this request in the final design. We do not anticipate that the final design will affect light levels and will work with LACSD to accommodate their monitoring program.	

Comment No.	Summarized Question, Comment, or Concern	Contact Nos.	Response to Comment or Concern	References [#, pgs]
71	Request advance notice and communication during construction period to avoid potential conflicts between NPDES permit-required sampling efforts	9	Notice will be given to Los Angeles County Sanitation District and all other affected parties as far in advance as possible.	
72	Include California Coastal Act as an applicable law in Section 4 and revise the language in Section 4.5 to reflect the change	38	The California Coastal Act is discussed in Section 5.5.4.1 of the EA.	[2; pg 29]

Table 3. References and associated "References No." given in Table 2.

Reference No.	Reference
1	Montrose Settlements Restoration Program. 2012. Final Phase 2 Restoration Plan and Environmental Assessment/Initial Study. Report of the Montrose Settlements Restoration Program, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, National Park Service, California Department of Fish and Game, California Department of Parks and Recreation, and California State Lands Commission.
2	Montrose Settlements Restoration Program. 2017. Environmental Assessment Palos Verdes Reef Restoration Project.
3	Kayen, R.E., H.J. Lee, J.R. Hein. 2002. Influence of the Portuguese Bend landslide on the character of the effluent-affected sediment deposit, Palos Verdes margin, southern California. Continental Shelf Research, 22: 911-922
4	US EPA, Region IX. 2009. Interim Record of Decision, Palos Verdes Shelf Operable Unit 5 of Montrose Chemical Corporation Superfund Site. Los Angeles County, California.
5	Smith, J.A., M.B. Lowry, C. Champion, I.M. Suthers. 2016. A designed artificial reef is among the most productive marine fish habitats: new metrics to address 'production versus attraction'. Marine Biology 163: 188
6	Coastal Environments, Inc. 2014. Palos Verdes Reef Restoration Project: Air Quality. Prepared for Vantuna Research Group.
7	Coastal Environments, Inc. 2015. Palos Verdes Reef Restoration Project: Noise. Prepared for Vantuna Research Group.
8	Vantuna Research Group. 2017. DDT Concentrations at the Bunker Point Reef Restoration Project Study Area.
9	Vantuna Research Group. 2016. Bunker Point Reef Restoration Project: Criteria, Design, and Monitoring. Prepared for NOAA/MSRP.
10	Claisse J.T., D.J. Pondella II, J.P. Williams, J. Sadd. 2012. Using GIS mapping of the extent of nearshore rocky reefs to estimate the abundance and reproductive output of important fishery species. PLoS ONE 7(1): e30290
11	Coastal Environments, Inc. 2015. Palos Verdes Reef Restoration Project: Habitat Characterization of the Palos Verdes Restoration Reef Site. Prepared for Vantuna Research Group.
12	Coastal Environments, Inc. 2015. Palos Verdes Reef Restoration Project: Geology. Prepared for Vantuna Research Group.

13	Coastal Environments, Inc. 2015. Palos Verdes Reef Restoration Project: Transportation. Prepared for Vantuna Research Group.
14	US Army Corps of Engineers, Los Angeles District. 2000. Draft Feasibility Report, Rancho Palos Verdes, Los Angeles County, CA. Volume I, Main Report. Environmental Impact Statement/Environmental Impact Report.
15	Coastal Environments, Inc. 2015. Palos Verdes Reef Restoration Project: Recreation. Prepared for Vantuna Research Group.
16	Claisse, J.T., J.P. Williams, T. Ford, D.J. Pondella II, B. Meux, and L. Protopapadakis. 2013. Kelp forest habitat restoration has the potential to increase sea urchin gonad biomass. Ecosphere 4(3):38
17	Resource Insights, 1999. Final Program Environmental Impact Report for the Construction and Management of an Artificial Reef in the Pacific Ocean Near San Clemente, California. Prepared for California State Lands Commission.
18	Vantuna Research Group. 2017. Surfing Opportunities and the Bunker Point Reef Restoration Project.

APPENDIX D2

WHITE PAPER: DDT CONCENTRATIONS AT THE BUNKER POINT RESTORATION REEF PROJECT STUDY AREA

PREPARED BY THE VANTUNA RESEARCH GROUP AT OCCIDENTAL COLLEGE IN COORDINATION WITH THE MONTROSE SETTLEMENTS RESTORATION PROGRAM

DDT Concentrations at the Bunker Point Reef Restoration Project Study Area

Summary

- The main Palos Verdes Shelf contamination site lies offshore of the proposed reef restoration site and the most recent surveys have shown a significant decline of DDTs on the entire Palos Verdes Shelf.
- Placement of restoration reef materials at the proposed Bunker Point site will not unbury latent DDTs on the Palos Verdes Shelf.
- DDTs in the project site are 5-50x lower than the offshore contaminated site.
- DDTs in White Croaker tissue has declined significantly over the last decade.
- DDTs in project site are comparable to those found throughout the Southern California Bight in shallow (< 30 m) soft bottom offshore habitats.

From the 1940s to the 1970s, industries in the Los Angeles County area discharged DDT into the ocean waters off the Southern California coast. Most of the DDT that was released was produced by the Montrose Chemical Corporation (MCC), a manufacturing plant located in Torrance, California. Waste from MCC was pumped into the Los Angeles County Sanitation District's (LACSD) sewer collection system, where treatment methods at the time were unable to capture DDT prior to their discharge via ocean outfall pipes. The LACSD's outfall pipes emptied into the Pacific Ocean off Whites Point on the Palos Verdes Shelf. Additional DDT-contaminated waste was dumped by Montrose off barges into the ocean in the San Pedro Basin near Catalina Island (Coastal Environments 2016).

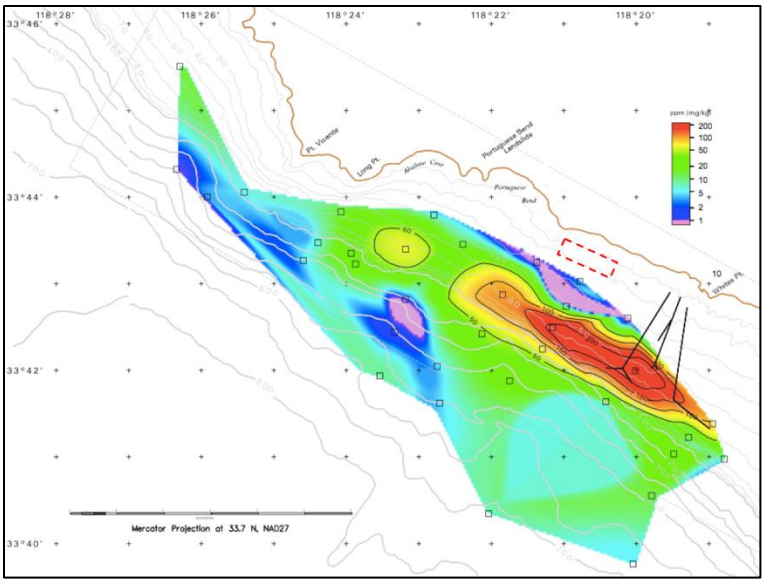

Figure 1. *Peak Total DDT at the Palos Verdes Shelf Superfund Site, including the study area (red dashed outline). Figure reproduced and adapted from Lee (1994).*

Environmental Protection Agency (EPA) funded studies in 2009 demonstrated that concentrations of contaminants of concerns (COCs) have significantly decreased from a peak level of contamination in 1992 (**Figure 1**, **Figure 2**), and it is likely that concentrations of DDTs (DDT, DDE and DDD) on the Palos Verdes Shelf will continue to decrease in the future (ITSI Gilbane Company & CDM Smith 2014). To further examine the potential contamination of sediment in the proposed restoration site, eight sediment samples were collected from the project area in 2016 by the Vantuna

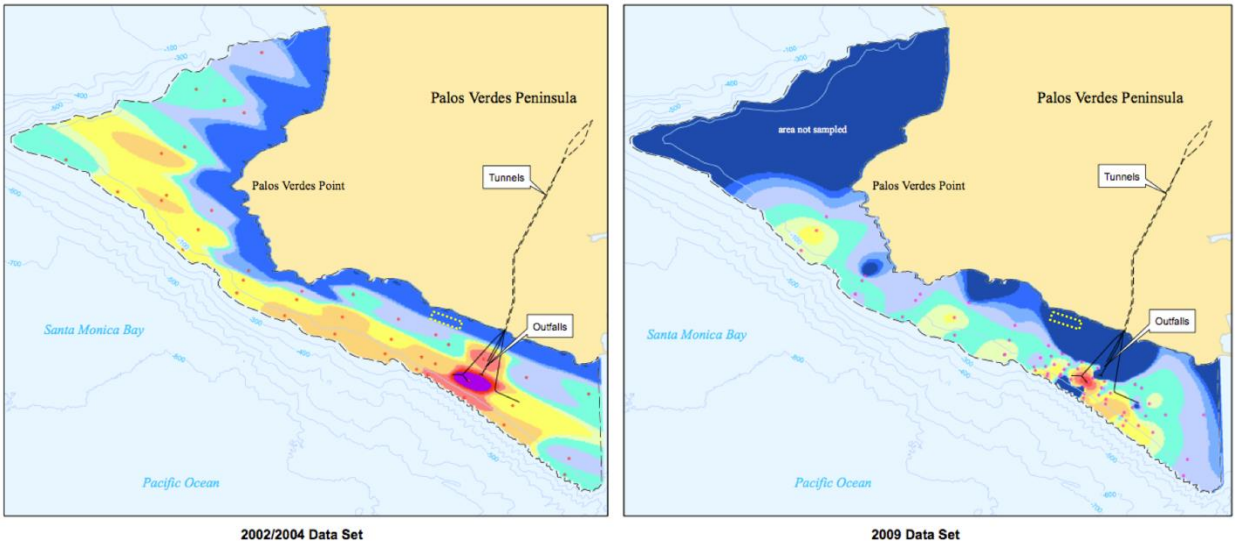

Figure 2. *Comparison of DDT distribution in 2002/2004 and 2009 with respect to the study area (yellow dashed outlines). Warmer colors indicate higher concentrations of DDTs. Figure reproduced and adapted from ITSI Gilbane Company & CDM Smith (2014).*

Research Group, tested for DDT and its isomers (DDE and DDD), and compared to historic levels of these contaminants from nearby survey stations (**Figure 3**, **Table 1**). In 2016, DDT was only observed at Station 1, with a concentration of 10.5 µg/kg DW (equivalent to ppb). Samples from all stations contained DDE with concentrations varying from 5.78 to 30.54 µg/kg DW, indicating that DDT was present it had deteriorated to DDE, and the area is recovering from the presence of DDT. This finding is consistent with the view that there have been no additional inputs of DDT at the project site. Of note, DDT and DDE concentrations are 5 to 50 times lower (respectively) than in previous surveys at nearby locations (**Figure 3**, **Table 1**). DDD was not detected in any sample (Coastal Environments 2016).

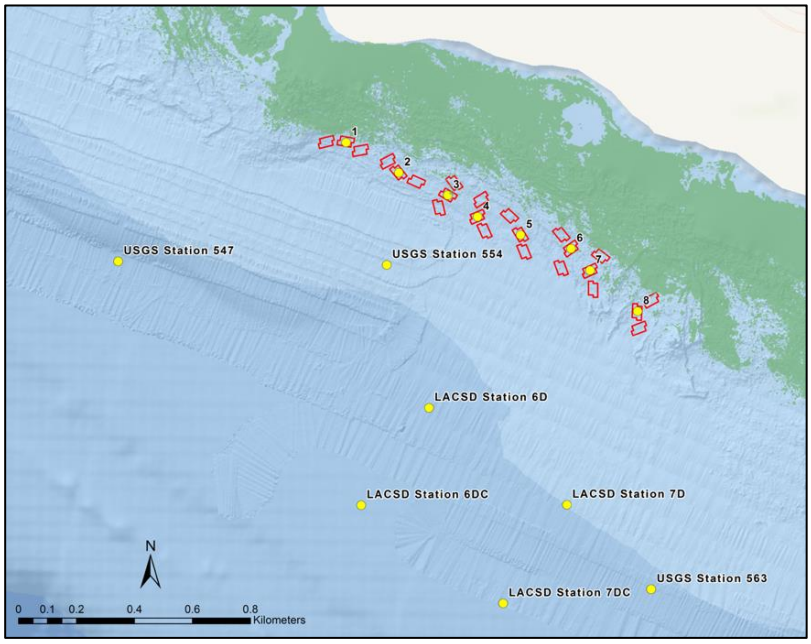

Figure 3. *Map of study area with 2016 sediment chemistry stations (1-8) and stations surveyed by LACSD and USGS from 1992 to 2009.*

Table 1. *DDD, DDE, DDT, and Total DDTs concentrations in µg/kg DW ± 95% confidence intervals (when available) from sampling stations nearest to the study area from 1992 to 2009, from Bight Regional Monitoring stations at depths of < 30m ("Inner Shelf"), plus stations (1-8) inside the study area in 2016. Total DDTs includes all isomers of DDD, DDE, and DDT. "–" indicates analyte was not tested for at that station during that year. Data from Schiff and Gossett (1998), Noblet et al. (2002), Schiff et al. (2006), Schiff et al. (2011), CH2M Hill (2007), Coastal Environments (2016), ITSI Gilbane Company & CDM Smith (2014), and LACSD (2016).*

		DDD (µg/kg)		DDE (µg/kg)		DDT (µg/kg)		Total DDTs (µg/kg)										
Depth	**Station**	**2009**	**2016**	**2009**	**2016**	**2009**	**2016**	**1992**	**1998**	**2002**	**2003**	**2004**	**2008**	**2009**	**2013**	**2014**	**2015**	**2016**
15-20 m	1	—	ND	—	6.36	—	10.5	—	—	—	—	—	—	—	—	—	—	16.86
	2	—	ND	—	7.8	—	ND	—	—	—	—	—	—	—	—	—	—	7.8
	3	—	ND	—	13.2	—	ND	—	—	—	—	—	—	—	—	—	—	13.2
	4	—	ND	—	9.24	—	ND	—	—	—	—	—	—	—	—	—	—	9.24
	5	—	ND	—	30.54	—	ND	—	—	—	—	—	—	—	—	—	—	30.54
	6	—	ND	—	8.25	—	ND	—	—	—	—	—	—	—	—	—	—	8.25
	7	—	ND	—	11.8	—	ND	—	—	—	—	—	—	—	—	—	—	11.8
	8	—	ND	—	22.5	—	ND	—	—	—	—	—	—	—	—	—	—	22.5
Bight Inner Shelf (< 30m)		—	—	—	—	—	—	—	33.5 ±33.3	—	2.3 ±0.4	—	20 ±22	—	12 ±15	—	—	—
30 m	USGS Station 547	—	—	—	—	—	—	655	—	—	—	—	—	—	—	—	—	—
	USGS Station 554	—	—	—	—	—	—	980	—	—	—	—	—	—	—	—	—	—
	USGS Station 563	—	—	—	—	—	—	457	—	—	—	—	—	—	—	—	—	—
	LACSD Station 6D	—	—	—	—	—	—	800	—	570	—	400	—	—	—	220	210	—
	LACSD Station 7D	—	—	—	—	—	—	560	—	630	—	450	—	—	—	320	250	—
40 m	LACSD Station 6DC	38.2	—	361.1	—	65.3	—	—	—	—	—	—	—	464.5	—	—	—	—
	LACSD Station 7DC	28.8	—	217.4	—	54.8	—	—	—	—	—	—	—	301.0	—	—	—	—
	Outfall Station 09	115.5	—	360.6	—	13.4	—	—	—	—	—	—	—	489.3	—	—	—	—

Effects level benchmarks from the NOAA Office of Response and Restoration (Buchman 2008) for all DDT and DDT isomers are presented in **Table 2**. These values generally range from more conservative to less conservative: threshold effects level (TEL), effects range-low (ERL), probable effects level (PEL), effects range median (ERM), and apparent effects threshold (AET). Higher thresholds (e.g., PEL, ERM, AET) identify pollutant concentrations above which effects can be expected and may be approaching toxic levels (Buchman 2008, Hou et al. 2009). DDT concentration at Station 1 was above all benchmarks except for AET, suggesting DDT at that location may have effects on various benthic infauna and epifauna. DDE benchmarks are more complex and variable, however all samples tested below the PEL, all but one (Station 5) tested below the ERM, yet only three stations (1, 2, 6) tested below the AET. These results suggest the potential for effects on benthic infauna and epifauna, but with lower certainty and probability.

Table 2. *NOAA effects level benchmarks for DDD, DDE, DDT, and Total DDTs (in µg/kg DW). Total DDTs includes all isomers of DDD, DDE, and DDT. From Buchman (2008).*

Benchmarks	**DDD**	**DDE**	**DDT**	**Total DDTs**
TEL: Threshold Effects Levels	1.22	2.07	1.19	3.89
ERL: Effects Range-Low	2	2.2	1	1.58
PEL: Probably Effects Level	7.81	374	4.77	51.7
ERM: Effects Range-Median	20	27	7	46.1
AET: Apparent Effects Threshold	16	9	12	11

DDT has degraded slowly in the environment and have bioaccumulated in animals that are in higher trophic levels. The Monitoring and Reporting Program (MRP) for the Joint Water Pollution Control Plant (JWPCP) National Pollution Discharge Elimination System (NPDES) permit requires the Los Angeles County Sanitation Districts (LACSD) participate in a bioaccumulation trends survey. This survey is conducted annually and builds upon sampling performed by NOAA (Mearns et al. 1991) and MBC Applied Environmental Sciences (MBC 1994) in the 1980s and 1990s.

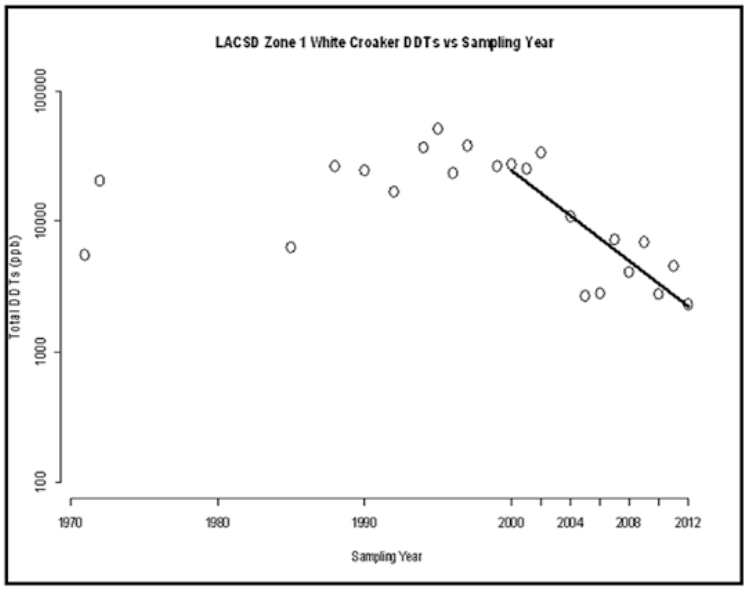

Figure 4. *Concentration of Total DDTs (ppb) in White Croaker (*Genyonemus lineatus*) muscle tissue from the study area, 1971-2012. Figure reproduced from Coastal Environments (2016); data from Mearns et al. (1991), MBC (1994), and LACSD (2016).*

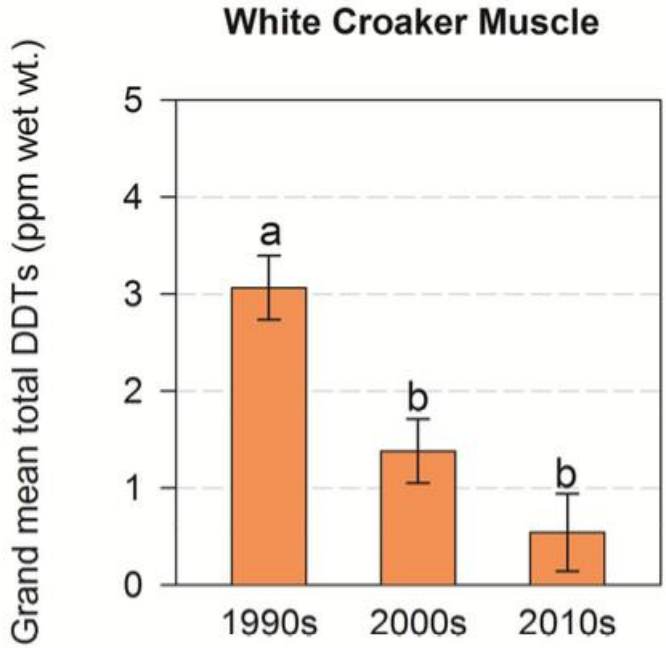

Figure 5. *Mean total of DDTs found in White Croaker (*Genyonemus lineatus*) muscle tissue at Palos Verdes Peninsula by decade. Letters indicate significant differences in concentration of DDTs. Figure reproduced from LACSD (2016).*

White Croaker (*Genyonemus lineatus*) are not only an important recreational and commercial fisheries species in the Southern California Bight, but they are also considered a sentinel species for tissue contamination. This soft-bottom associated species becomes highly contaminated as they feed on benthic organisms from contaminated sediment. However, temporal trends at LACSD Zone 1 (the area near the outfalls and encompassing the study site) show a sharp decline in Total DDT found in White Croaker muscle tissue since the turn of the century (**Figure 4**). Furthermore, Total DDT in White Croaker muscle tissue was found to be significantly lower in the 2000s compared to the 1990s, and continues to decline in the 2010s (**Figure 5**; LACSD 2016).

Regional sampling of nearshore (< 30m) areas throughout the Southern California Bight (**Figure 6**) has historically shown far lower levels of Total DDTs than in deeper areas of the shelf (Schiff and Gossett 1998, Noblet et al. 2002, Schiff et al. 2006, Schiff et al. 2011; Table 1). The 2016 samples are consistent with the 2008 (20 ±22 ug/kg) and 2013 (12 ±15 ug/kg) for the shallow water (<30 m) soft bottom habitats within the bight. The proposed subtidal rocky-reef habitats lie between 10m and 20m isobaths, far inshore of the historically highly contaminated sediments which lay beyond the 30m isobath (**Figures 1-3**, **Table 1**).

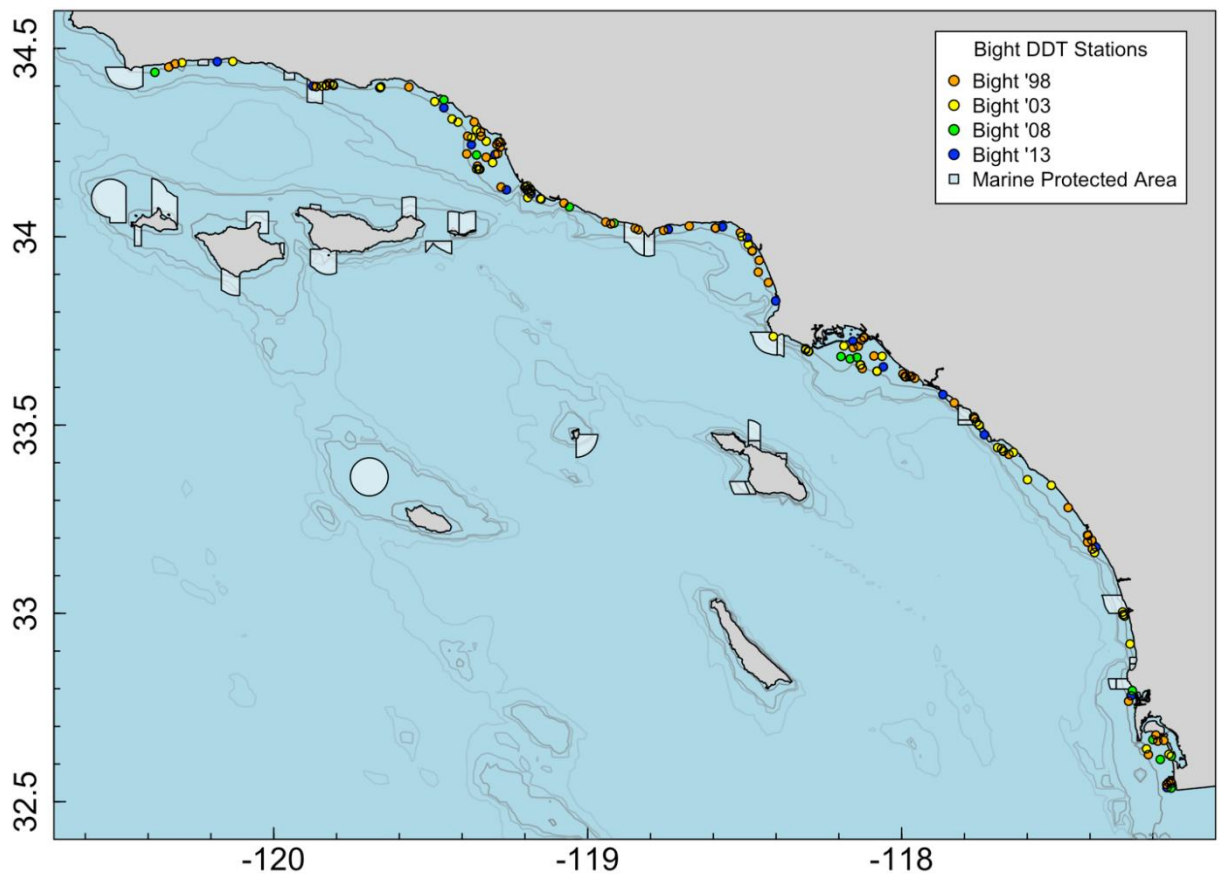

Figure 6. *Map of the Southern California Bight with locations of Bightwide Regional Survey (from 1998-2013) stations where DDT compounds were sampled for and quantified.*

Additionally, construction of a rocky reef is designed to alter the fish communities in the study area. The highly-contaminated soft-bottom associated fishes typically do not inhabit rocky-reef habitats (Allen 1999), therefore a primary benefit of placing rocky reefs even in contaminated soft-bottom habitats would be to displace soft-bottom associated species with midwater and rocky-reef associated species that do not typically feed on benthic organisms from contaminated sediment (MSRP 2005). Not only will this increase production of fishes whose tissues typically have lower concentrations of DDT (Dixon and Schroeter 1998), but organisms that prey on fishes in the study area will also be exposed to reduced levels of DDT, including recreational anglers (MSRP 2005).

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APPENDIX D3

WHITE PAPER: SURFING OPPORTUNITIES AND THE BUNKER POINT REEF RESTORATION PROJECT

PREPARED BY THE VANTUNA RESEARCH GROUP AT OCCIDENTAL COLLEGE IN COORDINATION WITH THE MONTROSE SETTLEMENTS RESTORATION PROGRAM

Surfing Opportunities and the Bunker Point Reef Restoration Project

Summary

- High vertical relief is a critical requirement for restoring sediment-impacted rocky-reef habitat while avoiding further sedimentation impacts.
- Wave conditions along the Rancho Palos Verdes coastline are controlled by shallow, high relief natural reefs inshore of the project site.
- The restoration reef will not affect wave conditions at adjacent surf spots, even during 100-year-wave events.
- The restoration reef will not affect sediment transport and deposition patterns that could affect wave conditions.

The proposed restoration reef modules are modeled after a nearby, natural, high-relief reef (KOU Rock; **Figure 1**) that does not suffer the ill-effects of sedimentation that the low-relief reefs in the adjacent 69-acre restoration area do. High vertical relief is a critical requirement for restoring sediment-impacted rocky-reef habitat while avoiding further sedimentation impacts. Local residents have expressed concern that added rocky reef structure represents a potential barrier to wave action at local surf breaks inshore of the restoration area and will negatively affect surfing conditions. These concerns have been addressed by previous studies at other locations in the Southern California Bight (SCB) and are further addressed specific to the southern Palos Verdes Peninsula shoreline herein.

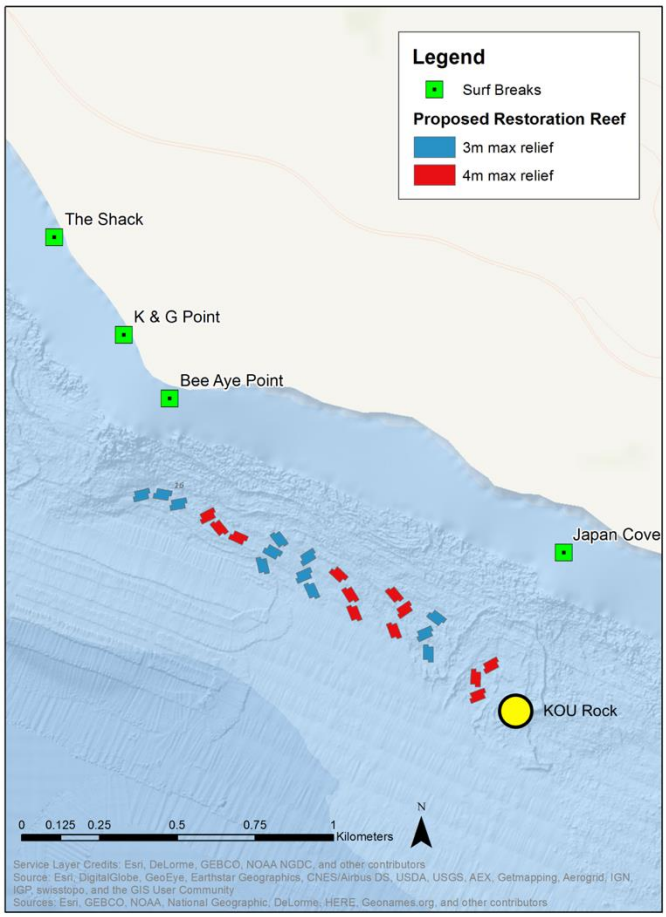

Figure 1. *Location and position of KOU Rock, the proposed restoration reef modules, and surf breaks along the Palos Verdes Peninsula.*

As a result of shadowing from the southern Channel Islands, Palos Verdes Peninsula has a relatively mild wave climate compared to other areas in the SCB. Most of the wind waves that reach the SCB originate in the north Pacific Ocean near the Gulf of Alaska and are diffracted by Point Conception, causing the swell to arrive at a more northwesterly angle. Northwest swell energy is both diffracted and attenuated due to the Channel Islands' creation of a wave shadow zone on the leeward side of the islands. Both south and west swells can strike the SCB shoreline more directly than the more

common northwest swell (Coastal Environments, 2015). The nearest surf breaks to the restoration site are The Shack, K & G Point, Bee Aye Point, and Japan Cove (**Figure 1**). The Shack is most ridable with west swell that will not pass over the restoration reefs. K & G, Bee Aye, and Japan Cove surf breaks are all best with swells from the south or south-southeast (Cleary and Stern, 1963). These swells will not pass over the restoration reef prior to reaching Japan Cove. They will, however, pass over the restoration reef before reaching K & G and Bee Aye.

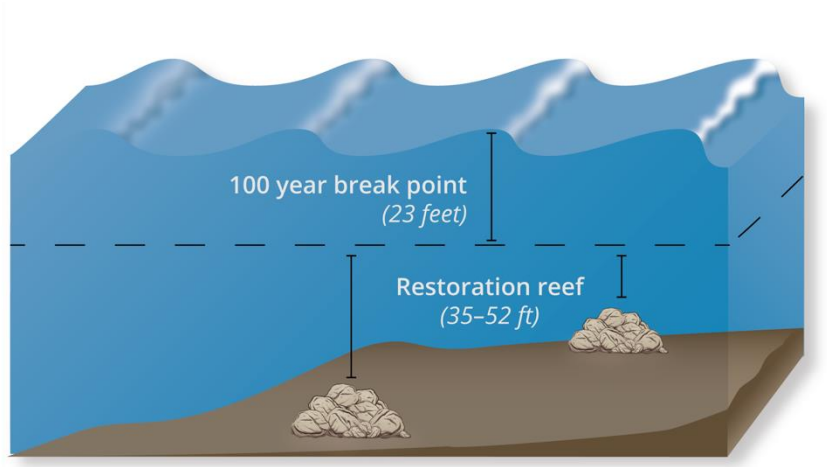

Figure 2. *A representation of the proposed restoration reef showing depth at maximum reef height and the depth at which a 100-year-wave would break.*

To determine whether the restoration reef will affect surfing conditions at these two sites, two interactions between swell and existing or proposed reef were considered. First, the water depth between mean sea level (MSL) and the top of the reef is between 10.6 and 15.8 m (35 and 52 ft; **Figure 2**). The corresponding ratio of wave height to water depth has the critical value of 0.78 (USACOE, 1984). This means that when the wave height reaches a value 0.78 times the water depth, the wave will break. Therefore, in order for the waves to break over any portion of the restoration reef, wave heights would need to exceed 8.5 m (28 ft; **Table 1**).

Mean wave heights at the restoration site are only about 1 m (3.3 ft) and exceed 1.5 m (5 ft) less than 20% of the time (CH2M Hill, 2007). Wave activity peaks in the winter (December–March) where maximum significant wave heights reach 3-4 m (9-13.2 ft) with 14- to 17-second periods during large storms (Wiberg et al., 2002). Large waves that are generated on or near the shelf have a wave height of about 2 m (6.6 ft), a period of 10 seconds, and arrive between five and ten times a year. Open-ocean waves, with a height of 2 m (6.6 ft) and 14- to 17-second periods, arrive about once a year. Waves propagating eastward from the open ocean arrive with a period of about 16- to 17-seconds and an approximate height of 3-5 m (9-16.5 ft) about once in 3 years (Seymour et al., 1984). Maximum wave heights of 5-8 m (16.5-26.4 ft) with 16- to 18-second periods are expected every five to ten years (Kolpack, 1987). These heights were recently met by swell from Hurricane Marie in August 2014 which generated maximum wave heights of 4.5-7.6 m (15 to 25 ft – estimates vary by source) from the south and closed coastal access points at Palos Verdes to the public. This event met or exceeded the predicted 100-year-wave height for the region (5.5 m/18 ft), a height that was last reached by Hurricane Linda in 1997 and would cause waves to break at a depth of 7 m (23 ft). Wave conditions along the Rancho Palos Verdes coastline are controlled by shallower natural reefs having high relief that lie inshore of the project site in water depths of about 3.9-6.1 m (13-20 ft). None of these actual or theoretical events would have caused waves to break over the restoration reef.

Table 1. *Maximum height, period, break point depth, and frequency of wave types at Palos Verdes Peninsula including wave data from the two most recent 100-year-wave events (Hurricanes Linda and Marie). Also shown for comparison are minimum depth of the proposed restoration reef and wave height necessary to break on the proposed restoration reef.*

	Wave Type	Maximum Height (m)	Maximum Height (ft)	Period (s)	Break Point (m)	Break Point (ft)	Frequency
Annual	Average	1	3.3	–	1.3	4.2	–
	Above Average	1.5	5	–	1.9	6.4	18% of days
High Surf Event	Strong Winter Storm	4	13.2	14-17	5.1	16.9	–
	Large Shelf Origin	2	6.6	10	2.6	8.5	5-10x per year
	Large Open Ocean	2	6.6	14-17	2.6	8.5	once per year
	Large Open Ocean	5	16.5	16-17	6.4	21.2	once per 3 years
	Large Open Ocean	8	26.4	16-18	10.3	33.8	once per 5-10 years
	100-Year-Wave	5.5	18	–	7.1	23.1	once per 100 years
Hurricanes	Hurricane Linda	5.5	18	–	7.1	23.1	September 1997
	Hurricane Marie	7.6	25	–	9.7	32.1	August 2014
		Wave Height to Break on Restoration Reef			**Restoration Reef Minimum Depth**		
		8.5	28		10.6	35	

The second consideration is whether the quarry rock might change regional sediment transport and deposition patterns that, in turn, might affect coastline geometry and therefore wave conditions. This concern is addressed by the concept of "closure depth" (Inman et al., 1993) which defines the water depth beyond which the ocean bottom does not change appreciably with time. The closure depth in the restoration area, where the ocean floor is at a depth of 15.2-20 m (50-66 ft), is about 9-13.6 m (30-45 ft). The restoration site is therefore located offshore of the coastal zone where regional sediment transport and deposition patterns would be affected. Consequently, the proposed restoration reef will not have an effect on nearshore sedimentation patterns or wave conditions at the adjacent surf spots.

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APPENDIX D4

BUNKER POINT REEF RESTORATION PROJECT: CRITERIA, DESIGN, AND MONITORING

PREPARED BY THE VANTUNA RESEARCH GROUP AT OCCIDENTAL COLLEGE

BUNKER POINT REEF RESTORATION PROJECT: CRITERIA, DESIGN, AND MONITORING

Vantuna Research Group

Occidental College

October 2016

EXECUTIVE SUMMARY

In this report we detail the biological, physical, engineering, and theoretical constraints for developing a subtidal rocky-reef restoration project on the Palos Verdes Peninsula. We begin with detailing the restoration need. There are well documented declines in available reef and giant kelp habitat, commercial and recreational fishing opportunities and rocky reef ecosystem health. We present the theoretical constraints and justification for restoring rocky reefs in an area of approximately 70 acres of loss habitat.

The purpose of the Palos Verdes Reef Restoration Project is to restore rocky-reef habitats and associated marine species on the Palos Verdes Shelf that were impacted by contamination in the sediments from the discharge of DDT and PCB from the Joint Water Pollution Control Plant's Whites Point Outfall (JWPCP), as well as to restore reefs that have been impacted by sedimentation and scour. This restoration project will fulfill the objective of the Montrose Settlements Restoration Program (MSRP) to restore fish and the habitats upon which they depend within the Southern California Bight (SCB). This reef will provide essential fish habitat and substrate for kelp, other marine algae, and marine invertebrates to become attached to, creating a productive rocky-reef ecosystem in an area with limited hard substrate (Claisse et al., 2012).

The amount of giant kelp and rocky reef habitat on the Palos Verdes Peninsula has declined appreciably over the last 100+ years. Originally kelp canopy loss was attributed to pollution from the Whites Point outfall; however, this deleterious problem has been ameliorated. Currently, we describe a variety of other drivers for the continued loss of this habitat (i.e., urchin barrens, sedimentation and turbidity). From Abalone Cove to Point Fermin sedimentation and associated processes are responsible for the loss of reef and kelp habitat. Landslides were the primary drivers of this process, and this latent sedimentation continues to bury reefs, reduce visibility and scour exposed habitat. This report details the documentation of these processes along this valuable stretch of coastline and, more importantly, delineates the steps necessary to restore productive habitat under these stressors.

Developing a subtidal rocky-reef restoration project of this type is a unique endeavor. Currently reefing projects in southern California have been used to construct fishing reefs (Lewis and McKee 1989), mitigate for lost kelp bed habitat (Reed et al. 2006a; Reed et al. 2006b), provide underwater scuba opportunities (e.g., Yukon), create fishery habitat in estuaries (Pondella et al. 2006) and shoreline protection from breakwaters and jetties (Stephens et al. 1994; Froeschke et al. 2005). Restoring lost habitat, *in situ*, which is currently being employed in oyster habitat and coral reefs (Rinkevich 2005; Beck et al. 2011), has not been attempted in a temperate kelp community.

In order to accomplish this objective, we generated a conceptual model of highly productive reef system based upon natural reef performance along this stretch of coastline. The next challenge is to utilize limited resources and engineering criteria to develop a restoration reef plan that maximizes the biological benefits. These benefits include insights drawn from reefs at Palos Verdes and throughout the Southern California Bight and include species richness, diversity and biomass. Our research indicates that multiple factors including reef size, spacing, relief, rock size, heterogeneity, depth, sediment depth, location relative to kelp bed perimeter and flux all influence reef performance. We developed a secondary production model that specifically analyzes the production of fish biomass to evaluate reef performance. In this project, these factors were juxtaposed with the economic, physical and engineering constraints to develop the restoration plan.

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Table 5. Historical monitoring (with S indicating years sampled) and proposed monitoring (with X indicating sites to be sampled). Sites include (Kelp Restoration) those involved in the kelp restoration project which may contain urchin barrens, be active kelp restoration sites, or sites where the kelp has been restored, (MPA) those within the MPAs that were implemented in 2012, (Within Reef) those located among the proposed restoration reef Blocks, (Adjacent Reef) those located just north or south of the proposed restoration reef, or (Reference) sites that do not currently involve any of the previously mentioned activities or designations. The monitoring plan includes sampling all sites in 2016 prior to reef construction, then once before and once after reef construction in 2017, then annually for at least 5 years after construction. CRANE protocols require >50% coverage of rocky reef, the restoration area has not supported kelp or significant percentages of rocky substrate precluding it from previous CRANE surveys.....45

INTRODUCTION TO RESTORATION PROJECT STUDY AREA

For a variety of reasons, the nearshore environment of the Palos Verdes Peninsula (Figure 1) has been intensively studied for decades. In particular, the nearshore reefs of this headland have garnered attention due to a variety of anthropogenic activities (e.g., commercial and recreational fishing, establishment of marine protected areas, giant kelp beds lost to pollution, landslides)(Stull 1987; Pondella 2009; Foster and Schiel 2010). Historically the greatest deleterious impact to the reefs at Palos Verdes was the loss of its kelp beds due to pollution from the Joint Water Pollution Control Plant's (JWPCP) Whites Point outfall. By 1960 due to untreated sewage, the only kelp left on the peninsula was at Abalone Cove and in Portuguese Bend (North 1964). To exacerbate the situation, road construction on Palos Verdes Drive triggered the Portuguese Bend Landslide in 1956. From 1956 to 1999, approximately 5.7 to 9.4 million metric tons of sediment slid onto the inner shelf (Kayen 2002). By 1999, the landslide was dewatered, slowed appreciably and now only releases sediment due to wave action. Nonetheless the biological damage has been extreme, highlighted by the loss of the Portuguese Bend Kelp Bed leaving only the Abalone Cove Kelp Bed by 1974. Due to the infrastructure improvements of the Whites Point Outfall, between 1937 and 1967 the three deep outfalls were built and currently the two deepest outfalls, which reside ~1.5 miles offshore in 200' of water are used. In 1984, partial secondary treatment of the flow (60:40 mix of secondary:primary) started and continued until late 2002 when the discharge of 100% secondary effluent began. In the early 1970s, Wheeler North kelp restoration efforts at the Palos Verdes Peninsula for giant kelp were successful and giant kelp remains present to this time.

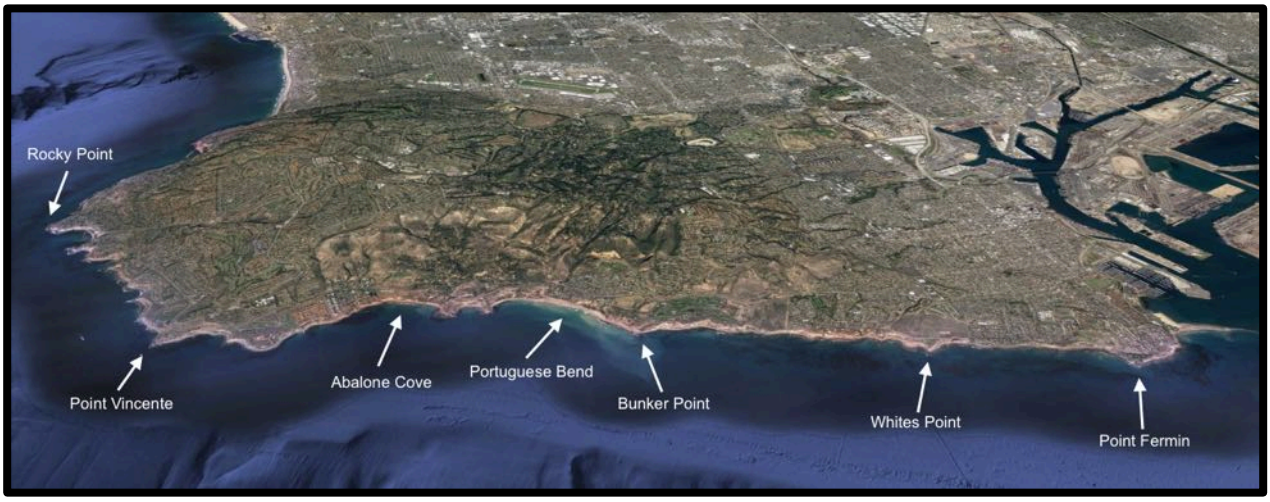

Figure 1. Satellite image of the Palos Verdes Peninsula (image adapted from NASA/JPL taken on 2/2/2016).

While these restoration and enhancement efforts ameliorated the historical consequences of the Whites Point Outfall throughout the peninsula, sedimentation and associated turbidity continue to have chronic impacts. First there is continued turbidity, sediment transport and scour associated with the sediment deposited in Portuguese Bend from the landslide (Figure 2). Turbidity currently is caused by wave action and is much reduced compared to Figure 2, which is an example of the turbidity plume prior to stabilization of the landslide. Further exacerbating this influx of sediment was the 16-acre landslide on June 2, 1999 from the 18th hole of the Trump National Golf Club, which sits above Bunker Point. Reef burial near Bunker Point was not observed during the extensive surveys of this region in the 1990s (Stephens 1996), but has been observed in more recent surveys (Pondella et al. 2012a; Pondella et al. 2015b). Proximity to the Trump National Golf Course landslide suggests that the reef has likely been buried since 1999. A third point source of turbidity and sedimentation comes from the large storm drains that empty into this nearshore environment. With these various chronic stressors there is continued deleterious impacts to the nearshore rocky environment, especially from Portuguese Bend (buried reef) to Point Fermin (Stephens 1996; Pondella et al. 2012b).

Figure 2. Turbidity plume from the Portuguese Bend landslide (left: circa 1980s; right: April 2016).

MAPPING THE RESTORATION STUDY AREA

We examined three potential restoration area alternatives in Portuguese Bend, the West Area (Bunker Point) and the East Area (Whites Point to Point Fermin) (Figure 3). Portuguese Bend was eliminated early in the evaluation process because the sediment depth was too deep and quarry rock would sink and be buried. The restoration study area was defined as the area from just east of Bunker Point to just west of the JWPCP Outfall at Whites Point (Figure 7). The western border was defined by the high relief reef at Bunker Point and the eastern border was delineated so as not to include the Whites Point Outfall.

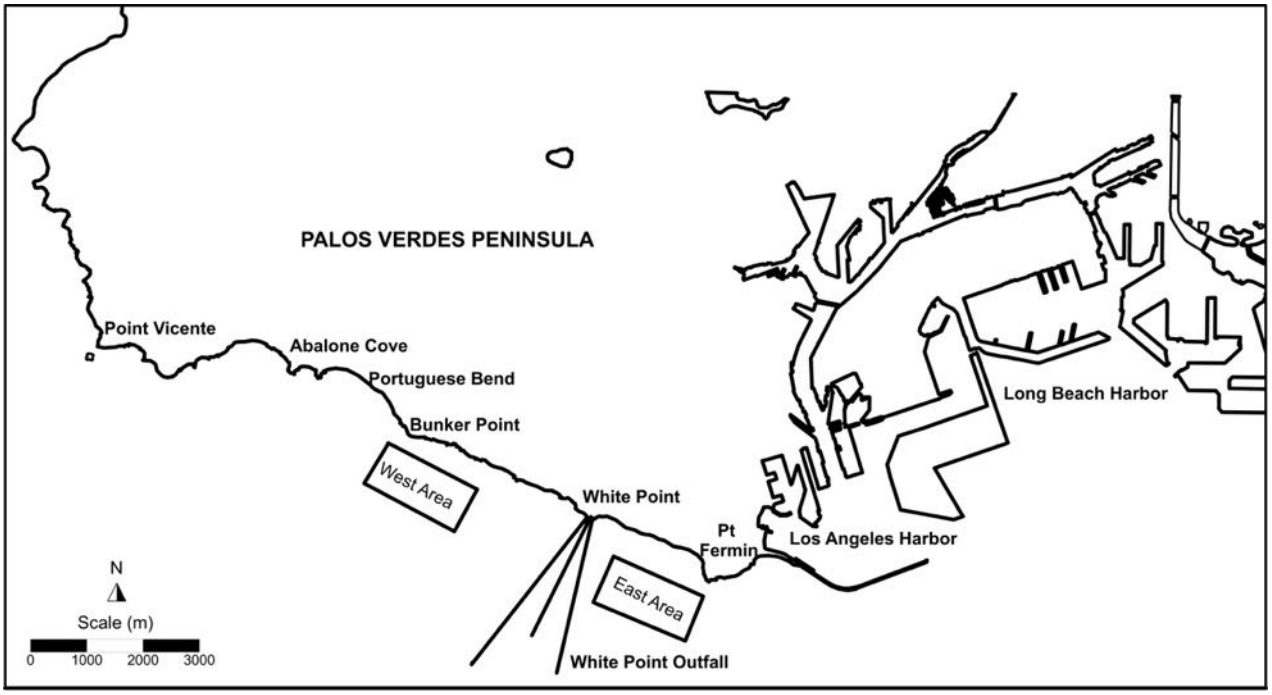

Figure 3. Location of the two proposed sites (West area and East area) for the Palos Verdes Reef Restoration Project, showing major landmarks in the area

The southern border is approximately the 30 m isobath and the northern border is the shoreline. This area consisted of approximately 2.9 km^2 (2,899,280 m^2) of nearshore environment. The geographic extent and character of marine hard bottom/reef was mapped by combining several different spatial datasets into a preliminary habitat data layer (Claisse et al. 2012). This layer was then verified and corrected using underwater field observations and analyses of aerial and satellite photography. All mapping and spatial analysis was done using ArcGIS software. Spatial data layers were created and maintained in the shapefile format, using the UTM Zone 11 North, WGS84 projection to minimize distortion in both area and length measurements. Kelp canopy was a highly precise polygon spatial layer created by using a 2-meter rectangular grid to classify georeferenced aerial photography (Kelner 2005). Kelp canopy varies significantly over seasons and years and has decreased well below historical levels (Figure 4,6). In this layer several years

(2008 and 2011-2014) of data was used additively. This project area is outside the kelp canopy but inside the area where historic kelp was found (Figures 5,7). Reefs are buried and /or suffer from scour at this depth prohibiting historical kelp growth (Pondella et al. 2012b). Triple beam and side scan sonar data were obtained from the Sea Floor Mapping Lab at California State University, Monterey Bay.

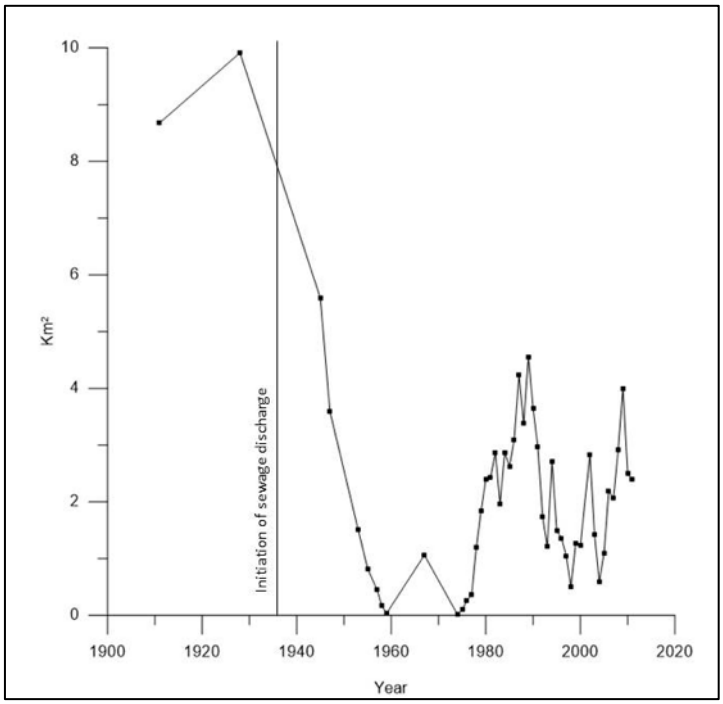

Figure 4. Kelp canopy coverage (km2) from 1911 – 2011 on the Palos Verdes Peninsula (data from MBC, 2012).

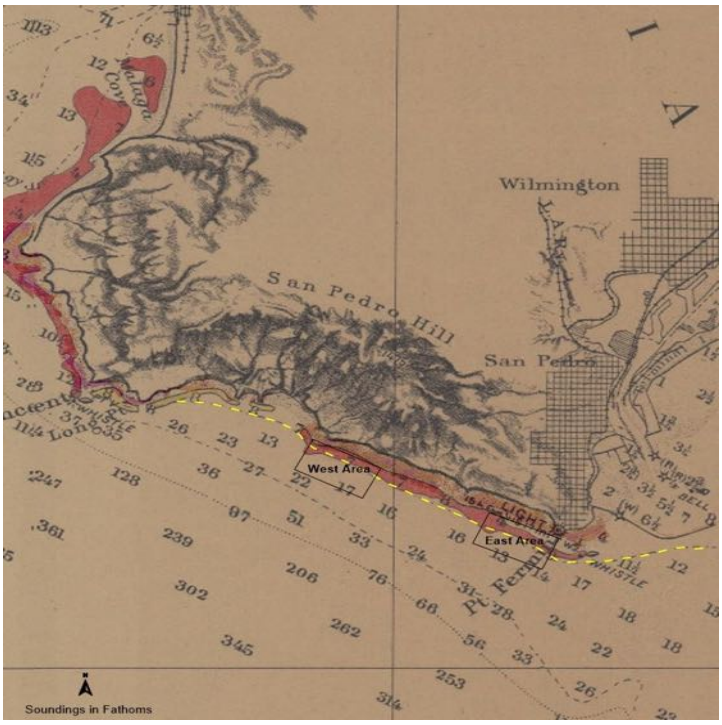

Figure 5. Locations of kelp beds along Palos Verdes in 1911 based on the Crandall survey (red shading). The orange shading shows a composite of kelp canopy data from the CDFW from 1988, 1999, 2002, 2004, 2005, 2006, 2008, and 2009. Purple shading shows kelp canopy data from the CDFW from 2013. From this map, it can be seen that the kelp canopy in 1911 was located up to the 10 fathom (18 m) line (yellow dashed line). Current kelp canopy coverage extends to 15 m depths.

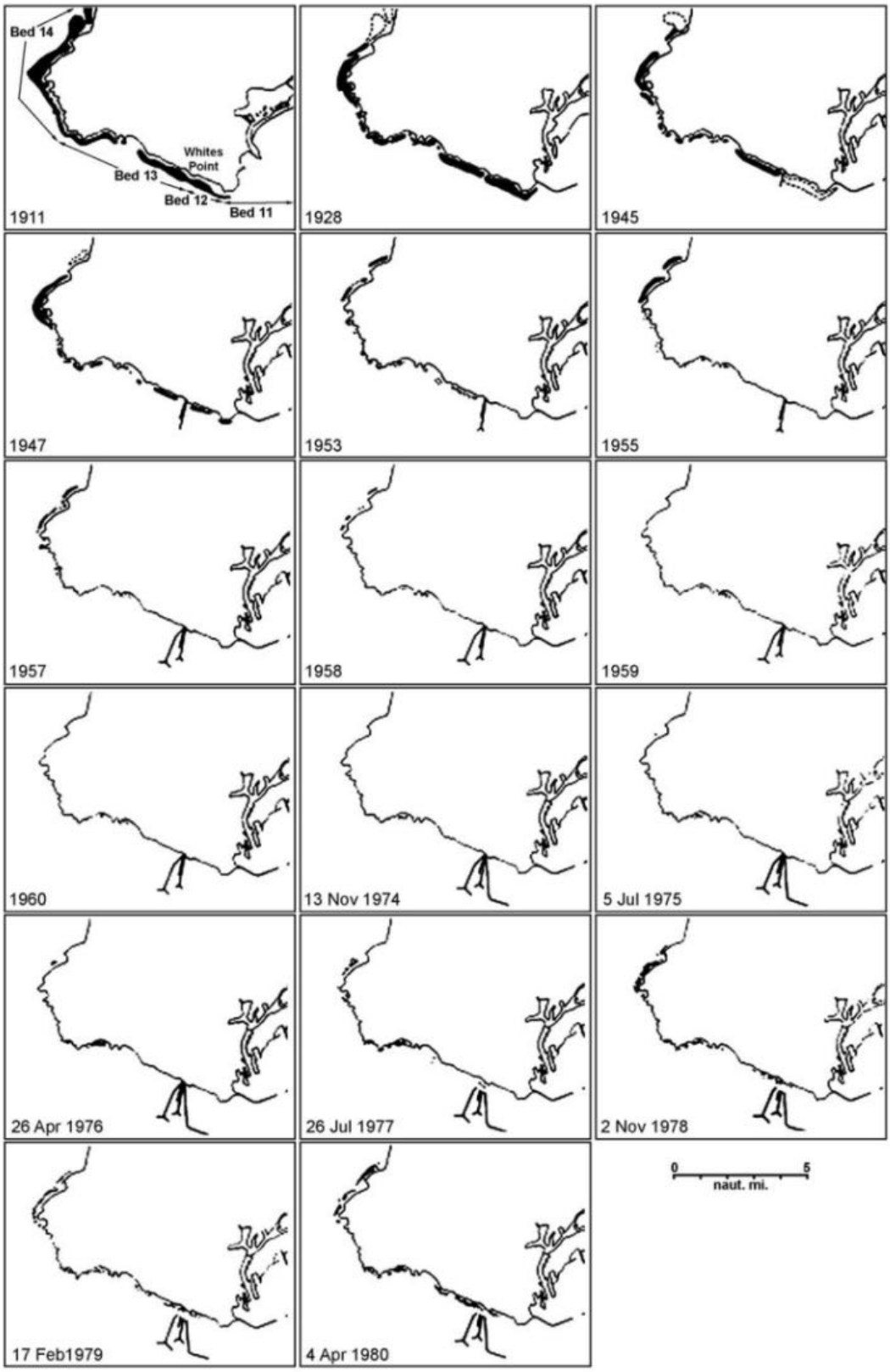

Figure 6. Kelp coverage on the Palos Verdes Peninsula in selected years between 1911 and 1980 (figure from MBC, 2012).

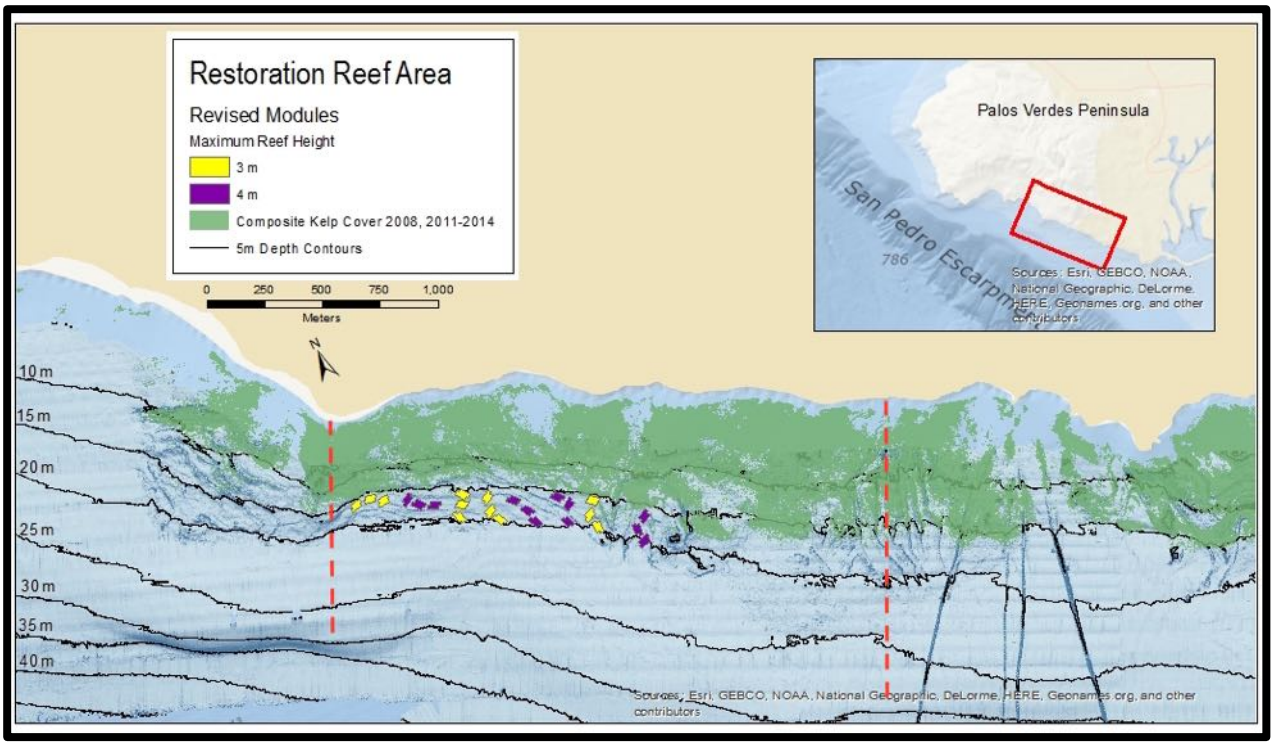

Figure 7. Bunker Point restoration site study area with kelp canopy, side scan imagery, and isobaths in 5-m increments. Western and eastern boundaries for the study area are shown as dashed red lines. This map also includes the proposed locations for the restoration reef blocks. Blocks have a maximum reef height of either 3 m (yellow) or 4 m (purple). The characteristics and placement of each block are described in more detail later in the report.

COMPREHENSIVE MONITORING OF REEFS AROUND PALOS VERDES PENINSULA

We examined the potential efficacy of fishery production enhancement reefs in this region by conducting an intensive biological and physical sampling program throughout the subtidal areas of Palos Verdes Peninsula. As part of multiple kelp forest monitoring programs we have conducted 578 surveys at 38 sites from 2004-2015 in this region (Figure 8, Table 1) using the CRANE protocol. This is a standardized comprehensive community monitoring survey method that quantifies fishes, invertebrates, algae and habitat characteristics within multiple depth zones at each site (for more details on the protocol see Claisse et al. 2012; Pondella et al. 2015a; Pondella et al. 2015b; Zahn et al. 2016). This protocol is focused primarily on sampling rocky reef habitats, and therefore areas that are primarily soft bottom, including the proposed locations for the restoration reef blocks, were sampled with additional supplementary methods (see Sediment Depth Surveys below). In order to determine the effects of the sedimentation and turbidity on rocky reef habitats around the Palos Verdes Peninsula, we conducted a habitat

characterization utilizing metrics generated from uniform point contact (UPC) data from the comprehensive kelp forest monitoring dataset. The physical substrate and relief of reefs varied throughout the peninsula. Most of the variation in substrate was associated with the fraction of sand versus bedrock, and most of the variation in physical relief was associated with the proportion of flat (0 – 0.1 m) reef versus moderate (1-2 m) and high relief (> 2m) reef. The restoration study area was characterized by flat to low relief reef with larger portions of sand, cobble, and boulders versus other areas of the peninsula where bedrock reefs are the dominant feature.

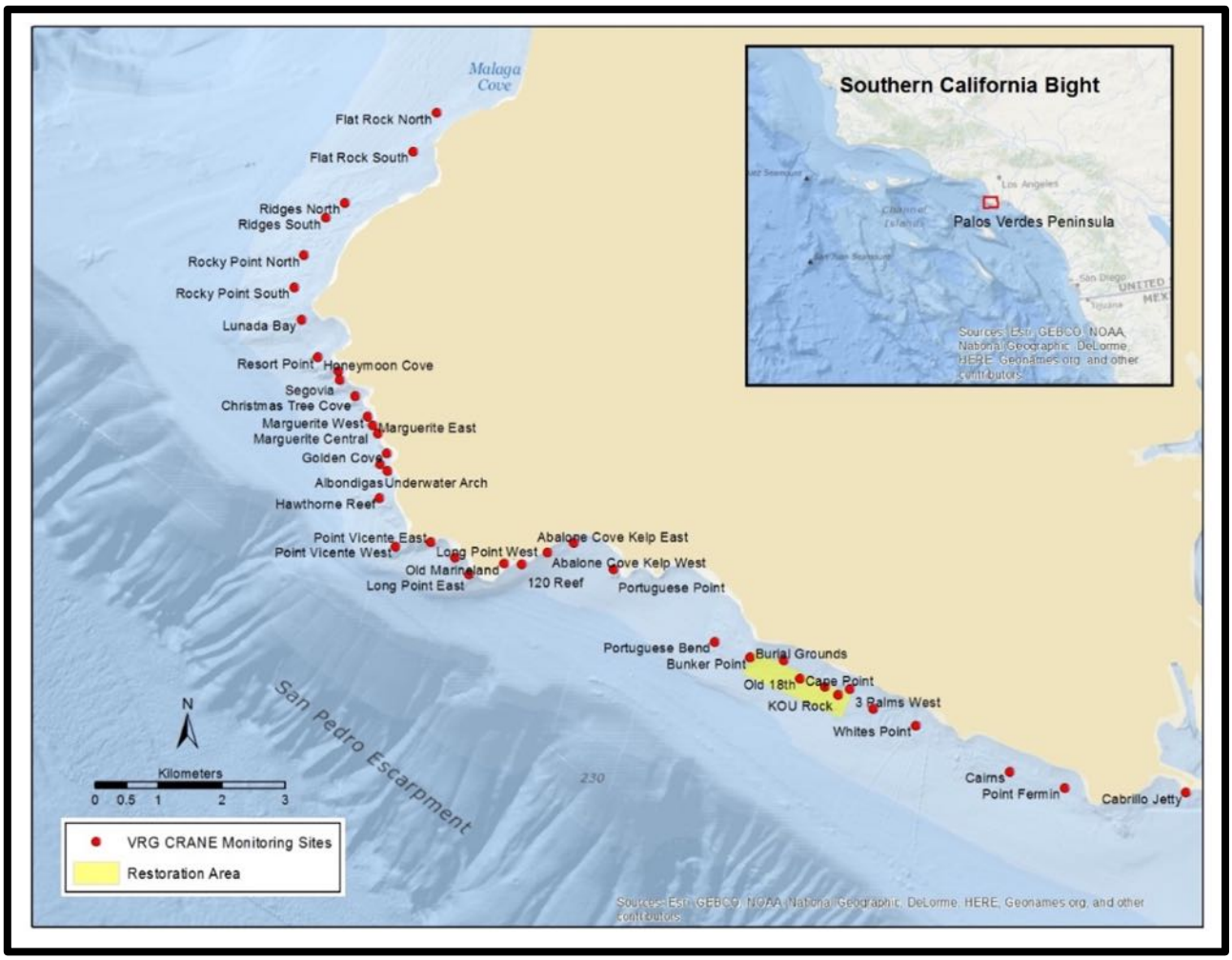

Figure 8. CRANE monitoring sites around the Palos Verdes peninsula with the restoration area (yellow).

Table 1. Sites surveyed using CRANE protocols by year, listed from northwest to southeast (Figure 8). The sites surveyed within the restoration area are indicated in gray. CRANE protocols require >50% coverage of rocky reef, the restoration area has not supported kelp or significant percentages of rocky substrate precluding it from previous CRANE surveys.

Site	2004	2007	2008	2009	2010	2011	2012	2013	2014	2015
Flat Rock North		X	X							X
Flat Rock South		X								X
Ridges North	X	X		X	X	X	X	X	X	X
Ridges South	X	X	X				X	X	X	X
Rocky Point North	X	X	X	X		X	X	X	X	X
Rocky Point South		X			X	X	X	X	X	X
Lunada Bay						X	X	X		X
Resort Point			X				X	X	X	X
Honeymoon Cove						X	X	X	X	X
Segovia							X	X		X
Christmas Tree Cove					X	X	X	X	X	X
Marguerite West						X	X	X	X	X
Marguerite Central						X	X	X	X	X
Marguerite East						X	X	X	X	X
Golden Cove						X	X	X	X	X
Underwater Arch					X		X	X		X
Albondigas						X	X	X	X	X
Hawthorne Reef		X		X	X	X	X	X	X	X
Point Vicente West	X	X	X	X	X	X	X	X	X	X
Point Vicente East		X								
Long Point West		X					X	X		X
Long Point East		X		X	X	X	X	X	X	X
Old Marineland						X	X	X		X
120 Reef					X	X	X	X		X
Abalone Cove Kelp West					X	X	X	X	X	X
Abalone Cove Kelp East					X		X			
Portuguese Point					X		X	X		X
Portuguese Bend								X		X
Bunker Point		X				X	X	X	X	X
Burial Grounds										X
Old 18th								X		X
Cape Point										X
KOU Rock				X		X	X	X	X	X
3 Palms West		X						X	X	X
3 Palms East		X	X	X					X	X
Whites Point		X	X		X	X	X	X	X	X
Cairns						X	X	X	X	X
Point Fermin		X	X		X	X	X	X	X	X

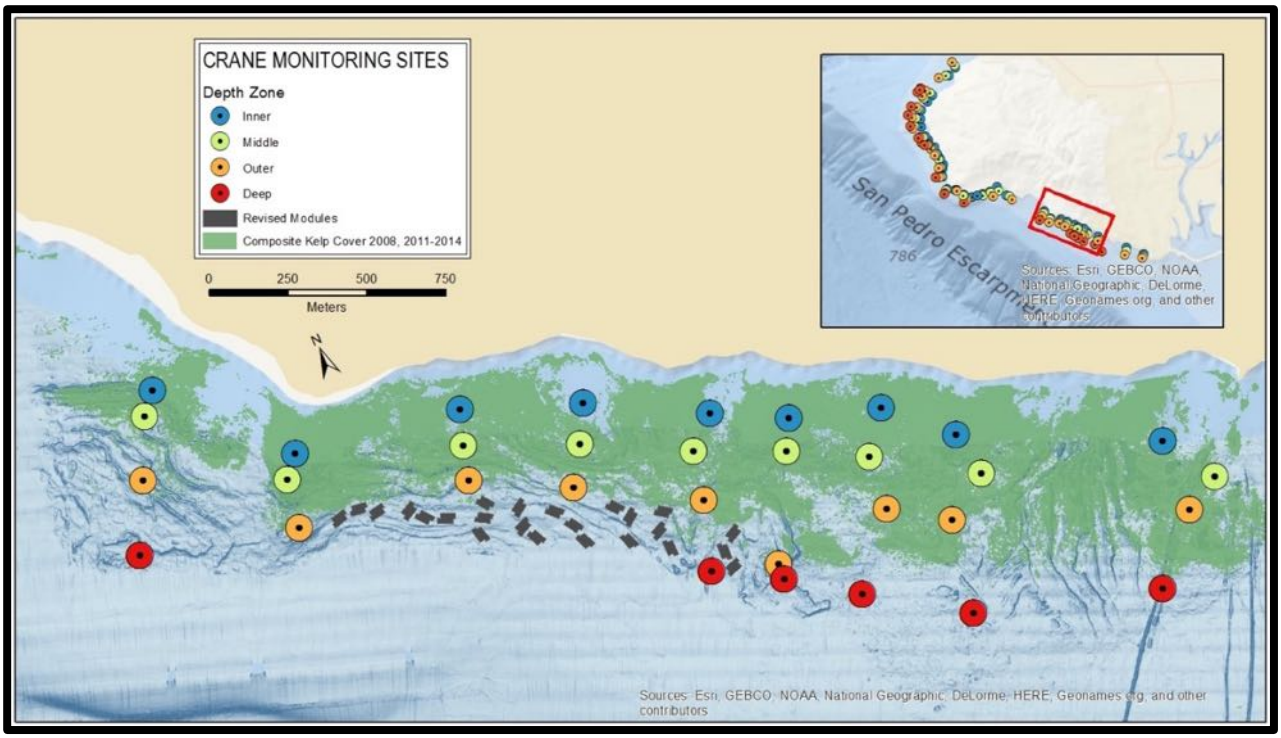

Figure 9. Mapped reef habitat, composite kelp cover, and subtidal survey locations by depth zone with currently proposed restoration reef blocks (gray). Multiple depth zones (Inner, Middle, Outer, Deep) are surveyed at each CRANE monitoring site.

The most striking aspect of the benthos was the evidence of sedimentation effects in the study area as well as surrounding reefs. Sedimentation effects are evident upcoast and downcoast based upon the direction of the longshore current and suspension by swells. We observe these effects from Abalone Cove (ending at Long Point) through Whites Point (Figure 9). Bare rock cover on rocky reefs can be an indicator of scouring by either abiotic sources (e.g., sand, shell hash, wave action) and is typical of areas that are under stresses of high flow and/or high sedimentation (Figure 10). The proportion of abiotic cover (including bare rock, bare sand, shell hash, sediment, and detritus) on rocky reefs was far higher in sedimentation affected areas, such as those near storm drains, landscaping runoff zones, and landslide areas and is what we found in the study area (Figure 11). Biological indicators of sedimentation effects include the benthic cover proportion of sediment resistant tubeworms, including *Phragmatopoma californica*, *Salmacina tribranchiata*, and *Diopatra ornata* (Figure 12). These three metrics provide insight into the extent of ecosystem damages caused by various forms of sedimentation along Palos Verdes Peninsula.

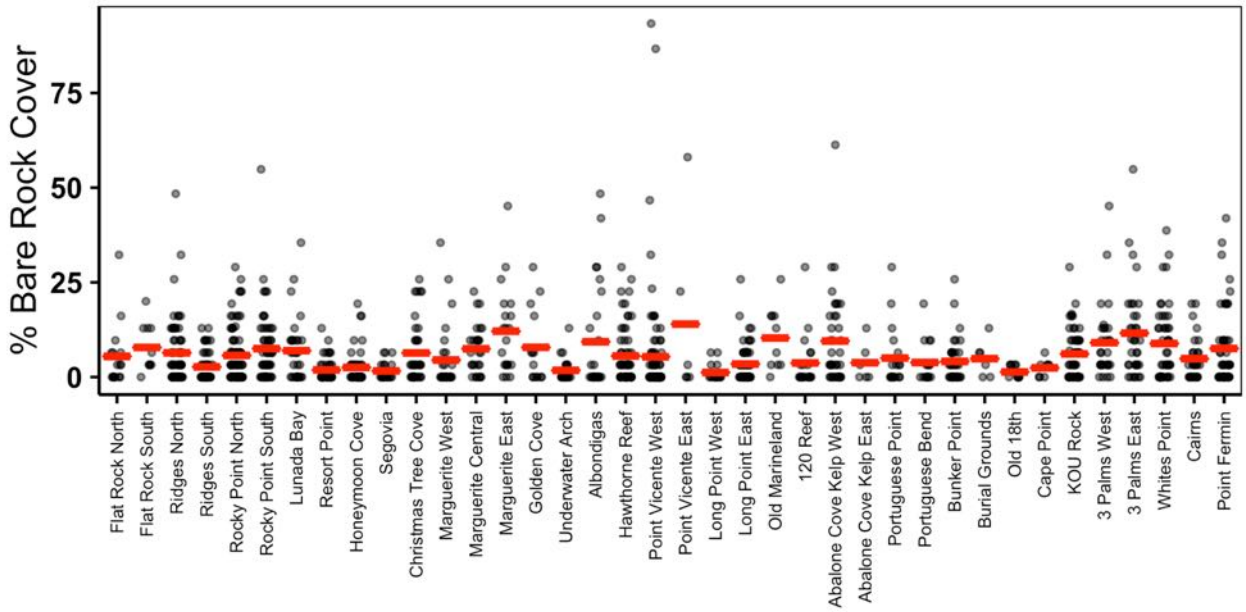

Figure 10. Percentage of bare rock cover on rocky reefs at each site along Palos Verdes Peninsula. Dots represent values for every transect, red crossbars represent mean values.

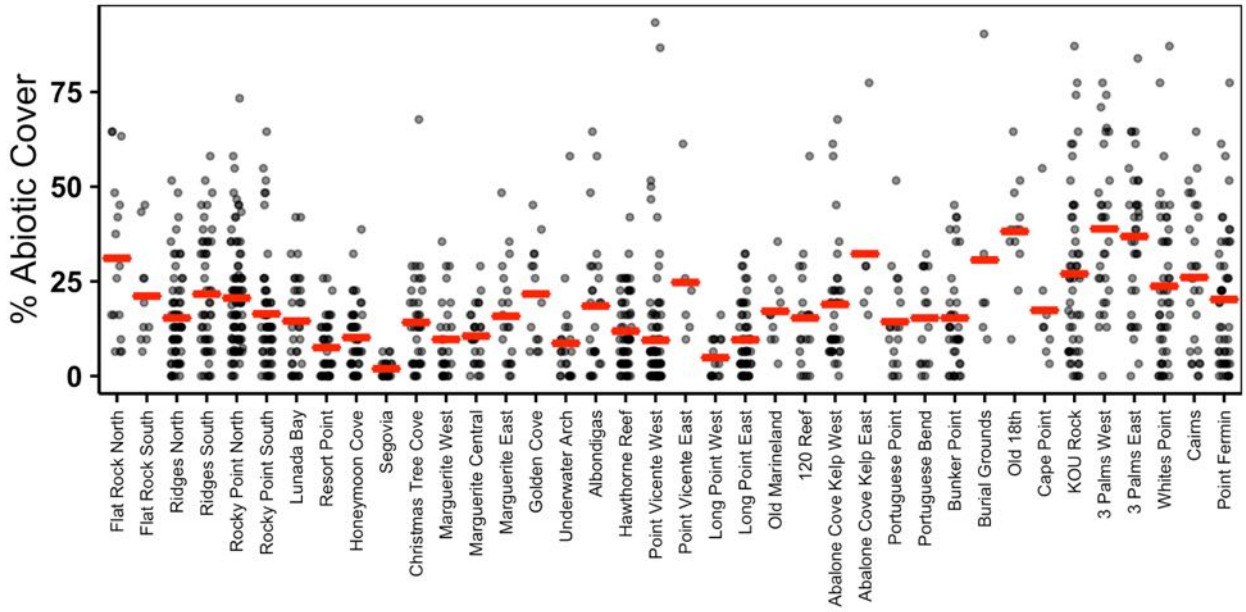

Figure 11. Percentage of abiotic cover (including bare rock, bare sand, shell hash, sediment, and detritus) on rocky reefs at each site along Palos Verdes Peninsula. Dots represent values for every transect, red crossbars represent mean values.

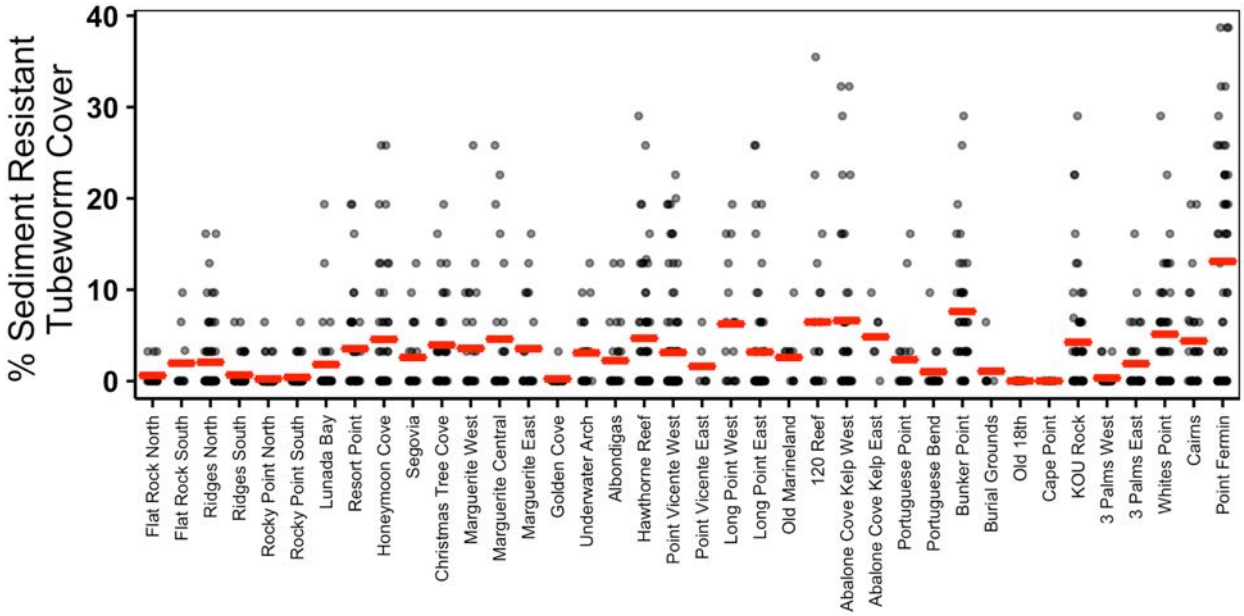

Figure 12. Percent sediment-resistant tubeworm cover on rocky reefs at each site along Palos Verdes Peninsula. Dots represent values for every transect, red crossbars represent mean values.

A second part of the CRANE subtidal survey protocols (swath) was used to determine macroalgal and macroinvertebrate densities in conjunction with the UPC surveys at each reef. Macroalgal densities provided insight into the community structure of each reef and the presence or absence of appropriate habitat for fishes and invertebrates that depend on macroalgae for food and/or shelter. While macroalgae along the Palos Verdes Peninsula consisted of several species, including giant kelp *Macrocystis pyrifera*, *Pterygophora californica*, *Laminaria farlowii*, and other understory kelps, giant kelp was the lone canopy creating species. Reefs with dense giant kelp forests require relatively clear, nutrient rich water, and are considered to be among the most productive areas in southern California. Giant kelp forests were found inside the restoration study area, but were far thinner and more ephemeral than in areas with less turbidity and sedimentation issues (Figures 13 & 14). *Pterygophora californica* creates understory canopies on flatter, low-relief reefs, and can withstand more turbidity than giant kelp. This macroalgae was found in high densities in the sediment-affected reefs in the study site, creating an understory in addition to the sparse giant kelp canopy (Figure 15). However, many of these individual kelps were completely denuded of blades and their stalks were parasitized by epiphytic macroalgae including giant kelp and *Laminaria farlowii*. It was hypothesized that these atypical epiphytes used the hearty stalks as substrate for their holdfasts largely as a product of availability versus natural substrate due to sedimentation effects.

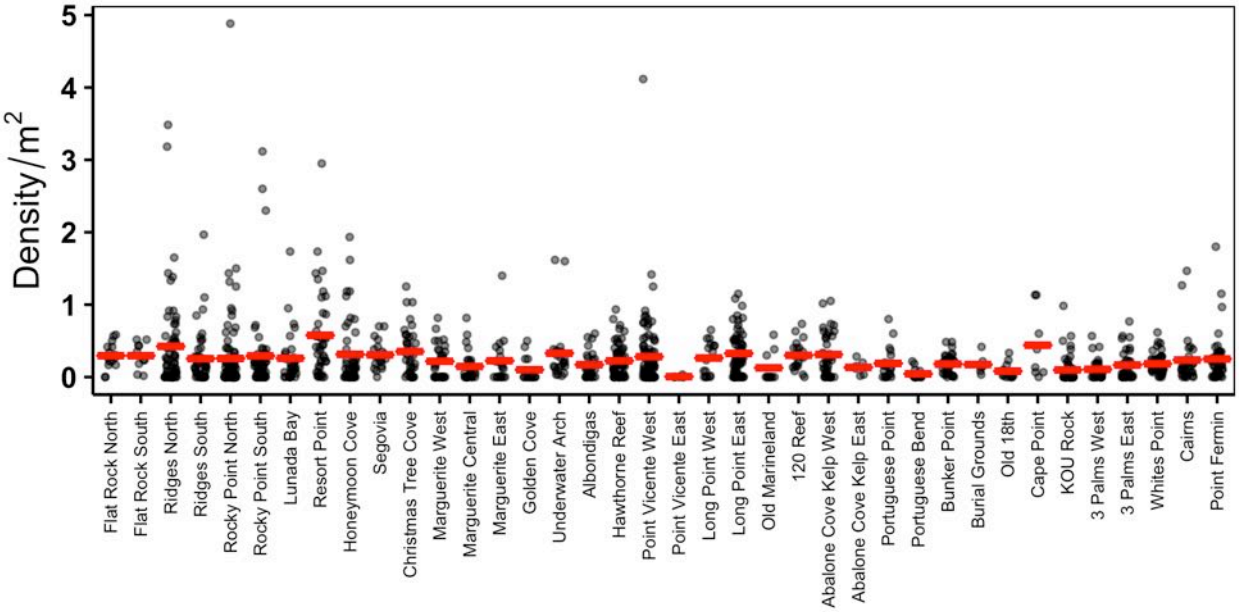

Figure 13. Giant kelp (*Macrocystis pyrifera*) density on rocky reefs at each site along Palos Verdes Peninsula. Dots represent values for every transect, red crossbars represent mean values.

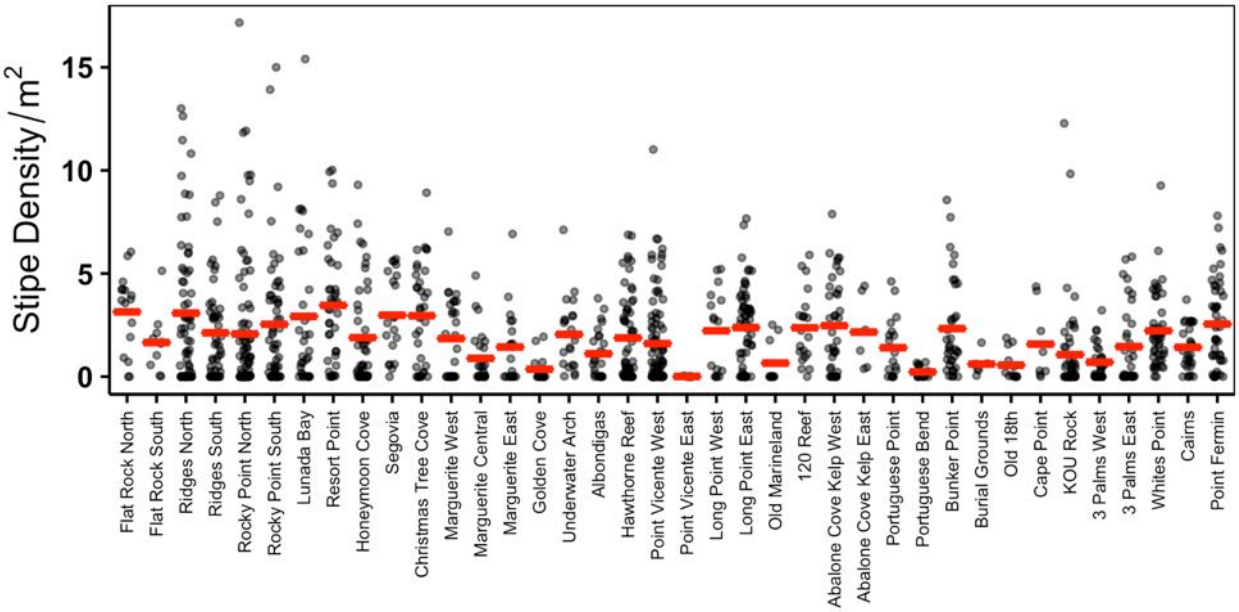

Figure 14. Giant kelp (*Macrocystis pyrifera*) stipe density (stipes per m^2) on rocky reefs at each site along Palos Verdes Peninsula. Dots represent values for every transect, red crossbars represent mean values.

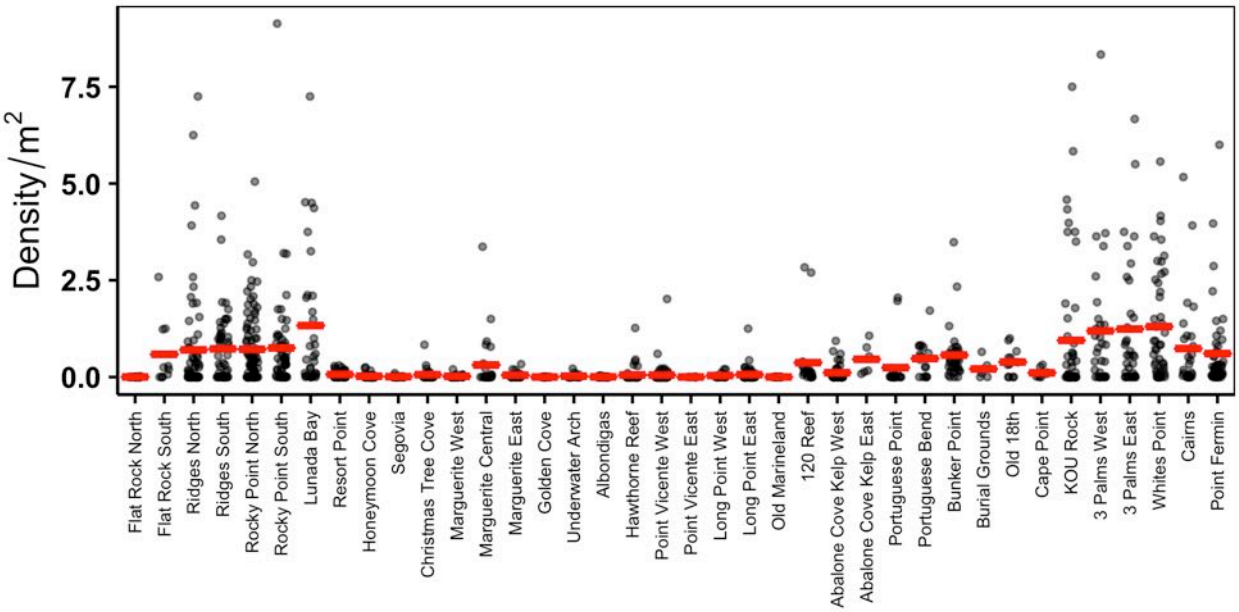

Figure 15. *Pterygophora californica* density on rocky reefs at each site along Palos Verdes Peninsula. Dots represent values for every transect, red crossbars represent mean values.

SEDIMENT DEPTH SURVEYS

We conducted supplementary scuba surveys at 9 locations to determine the sediment depth over rocky reef throughout this area (Figure 16) in an effort to better characterize soft bottom habitat areas in the study area and determine proposed locations for the restoration reef blocks. These surveys were conducted perpendicular to the coastline starting at the 20 m isobath, and divers would measure the sediment depth at 10 m intervals until completely uncovered and unbroken reef habitat was found. Sites that were found to be primarily exposed rocky reef were excluded from successive surveys. The initial sediment characterization was conducted in Spring 2009 and a second survey was conducted in Spring 2010. A third survey was conducted in Spring 2011 to fill in spatial gaps and further concentrate surveys on possible restoration sites. Between each of the first three study periods we had long winters of cold El Niño storms associated with heavy rains. This set up a natural experiment of the effects of heavy swell and rain on the study site, and helped determine fidelity of buried reefs (Pondella et al. 2012). A final survey was conducted in 2013 at sites that were considered prime options for restoration as a product of the previous surveys, all of which were across large, well-defined areas of buried rocky reef. While sediment depth and the amount of rocky reef covered by sand remained buried over time, no previously identified buried reefs were cleared of sand during this period (Table 2). Consistent

with the visual observations of the *Pterygophora* beds, these findings indicated that reef habitat continued to be buried at proposed locations for the restoration reef blocks.

Table 2. Sediment depth survey results summarized as mean sediment depth and percentage of exposed and buried reef by line (Figure 16) and survey year.

	2009	2010	2011	2013		2009		2010		2011		2013	
Line #	Mean Sediment Depth (cm)					% Exposed	% Buried	% Exposed	% Buried	% Exposed	% Buried	% Exposed	% Buried
1	19.2	–	–	–		71	29	–	–	–	–	–	–
2	8.7	4.5	21.4	3.3		60	40	15	85	11	89	30	70
13	–	–	10.7	8.7		–	–	–	–	15	85	20	80
3	3.2	10.7	4.0	10.8		0	100	0	100	10	90	18	82
4	2.6	6.0	–	–		22	78	42	58	–	–	–	–
5	–	21.3	–	–		–	–	0	100	–	–	–	–
6	3.0	–	–	–		38	62	–	–	–	–	–	–
7	3.0	5.5	10.3	7.4		0	100	8	92	27	73	20	80
8	1.9	4.6	5.4	4.6		40	60	0	100	26	74	41	59

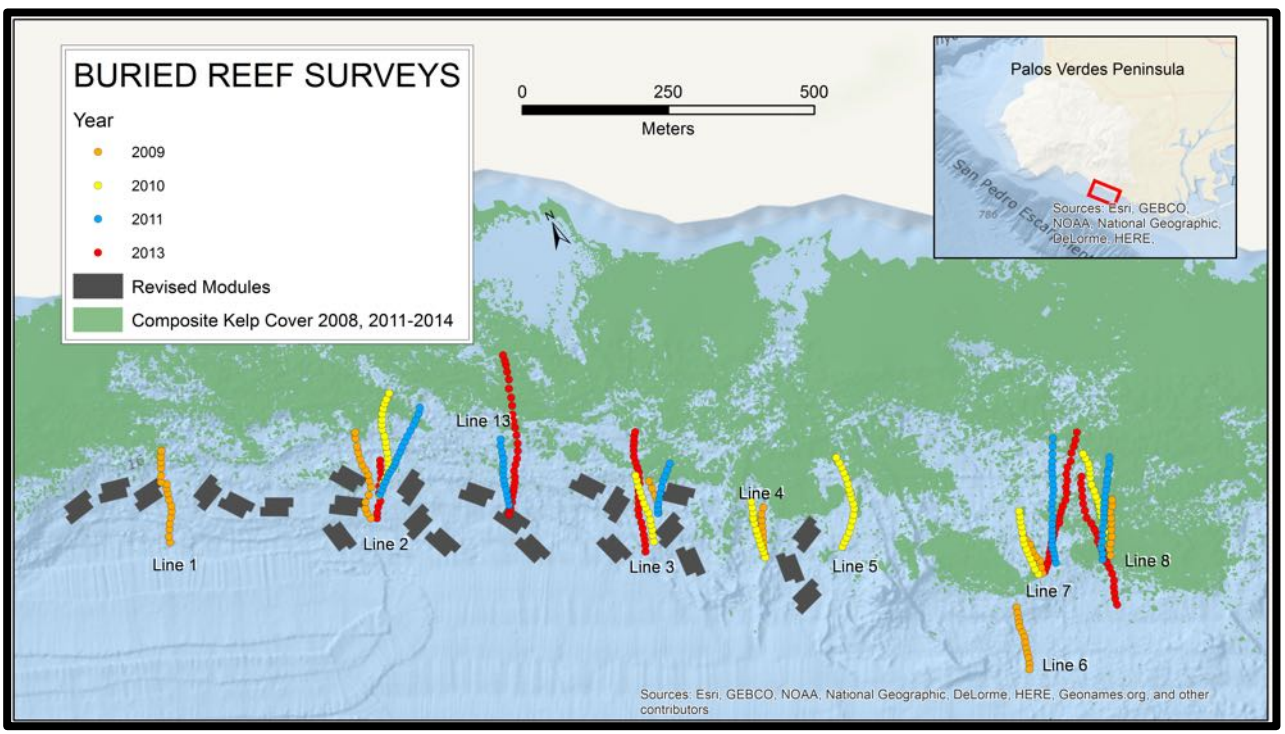

Figure 16. Mapped reef habitat, composite kelp cover, and yearly sediment survey locations with currently proposed restoration reef blocks.

PROXY REEF SURVEYS

In order to further our understanding of how reef shape, size, structure, and relief affect the fish, invertebrate, and macroalgal communities, 25 isolated reefs along and adjacent to Palos Verdes Peninsula at depths of 16-24 m were surveyed using CRANE protocols (Figure 17). These reefs included six natural reefs, 10 manmade reefs built with quarry rock, three shipwrecks, three sites with scattered debris, two sites with quarry rock resting on discharge pipes, and one site with engineered shelters. In addition to typical survey techniques, total reef height was also measured by recording depth at the bottom and top of the reef. During these surveys and all other subtidal surveys using CRANE protocols, fish densities were calculated by identifying, counting, and estimating the sizes of all conspicuous fishes throughout the water column. Fish length estimates were converted to biomass using standard species-specific length-weight conversions from the literature (e.g., Claisse et al. 2012; Williams et al. 2013) or FishBase (FishBase 2012).

Total fish biomass was generally found to be higher on the manmade quarry rock reefs than on the natural reefs, and there was positive relationship between fish biomass and total reef height for each habitat type (Figure 18). Quarry rock reefs performed better at lower heights when compared to natural reefs, most likely due to the increased rugosity and interstitial space afforded by the piled quarry rock, as opposed to the generally solid bedrock formations of a natural reef. These results are consistent with another study comparing manmade (primarily quarry rock) reefs with natural reefs in southern California (Granneman 2011; Granneman and Steele 2014). They found that manmade reefs had higher rugosity than natural reefs and that fish tissue production was positively correlated with the abundance of large boulders. On average, mean biomass for quarry rock artificial reefs we studied was 63 g/m^2 when reef height was less than 1.5 m, while mean biomass for isolated natural and manmade quarry rock reefs greater than 1.5 m in height was 189 g/m^2 (Figure 19).

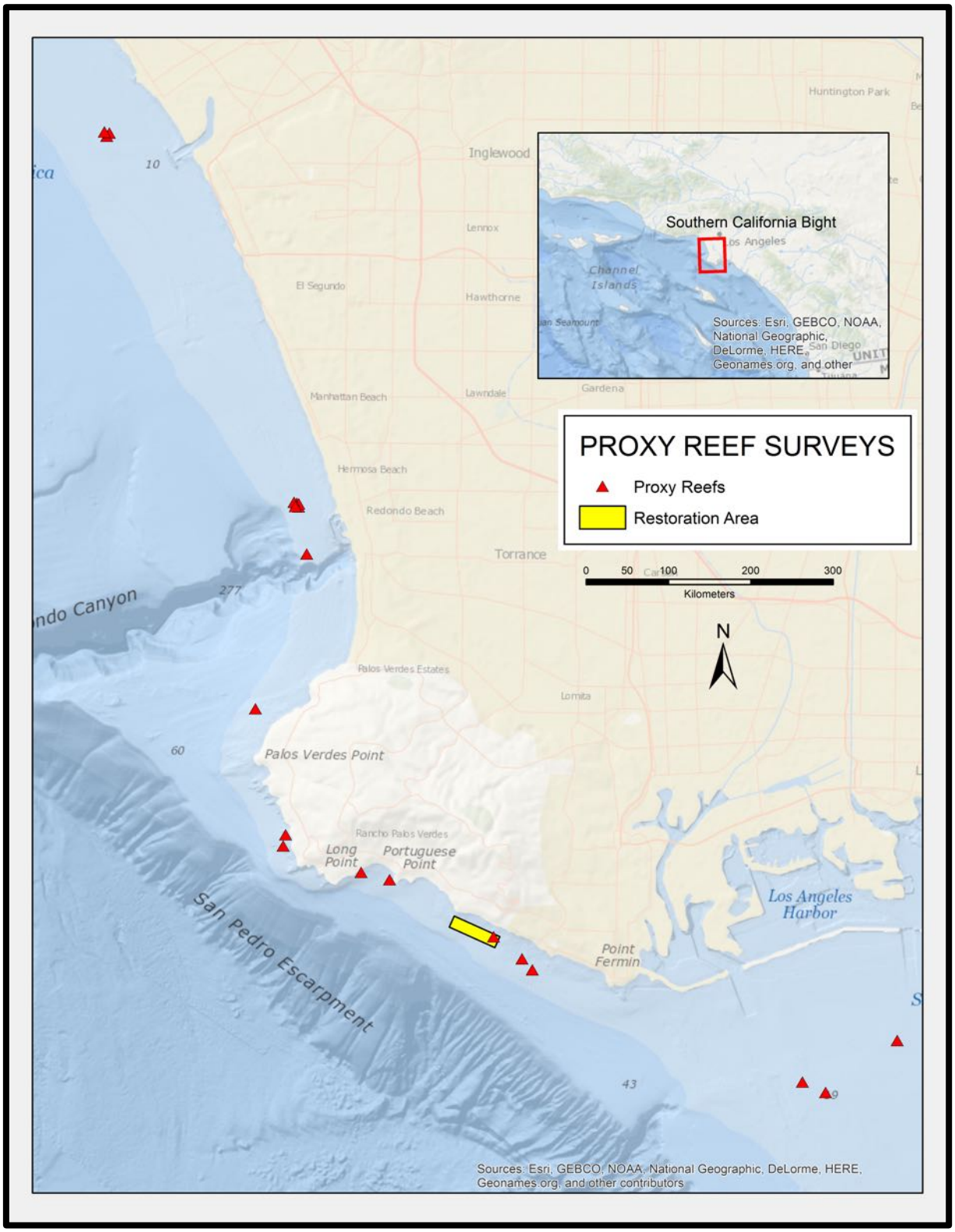

Figure 17. Location of artificial and high-relief natural reefs at Palos Verdes Peninsula and in Santa Monica and San Pedro Bays that were studied using CRANE surveys.

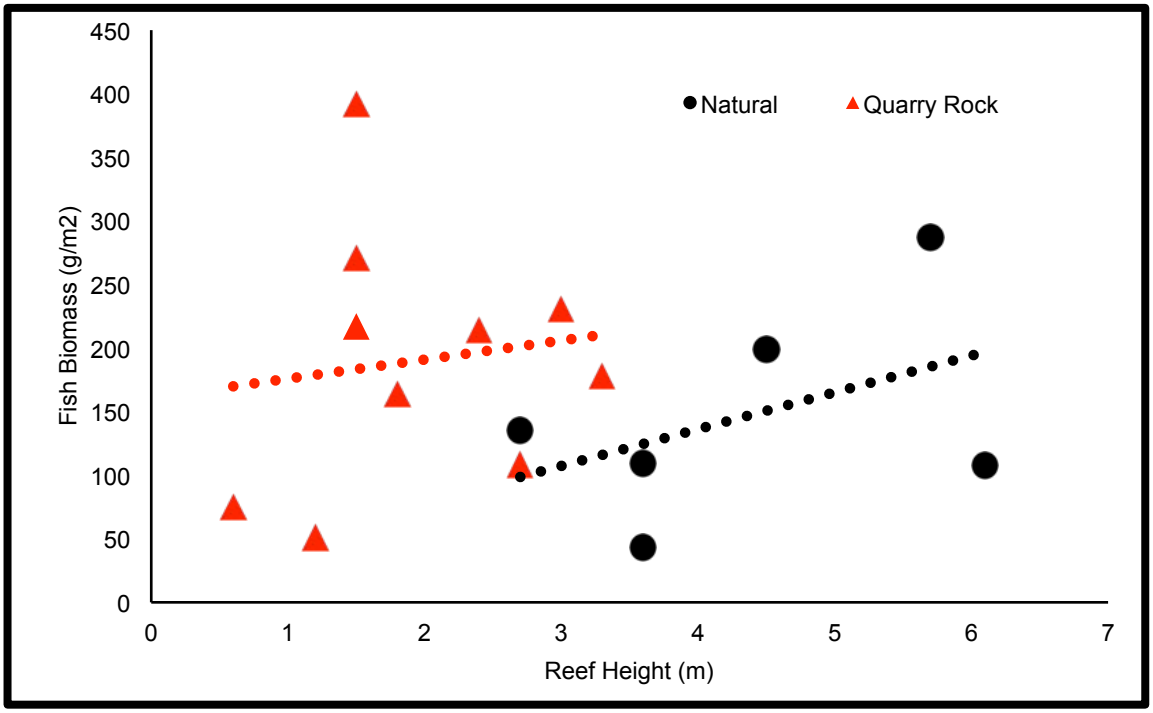

Figure 18. Reef height by total fish biomass (excluding young-of-the-year and pelagic species) at both natural isolated reefs and artificial reefs at Palos Verdes Peninsula and Santa Monica and San Pedro Bays.

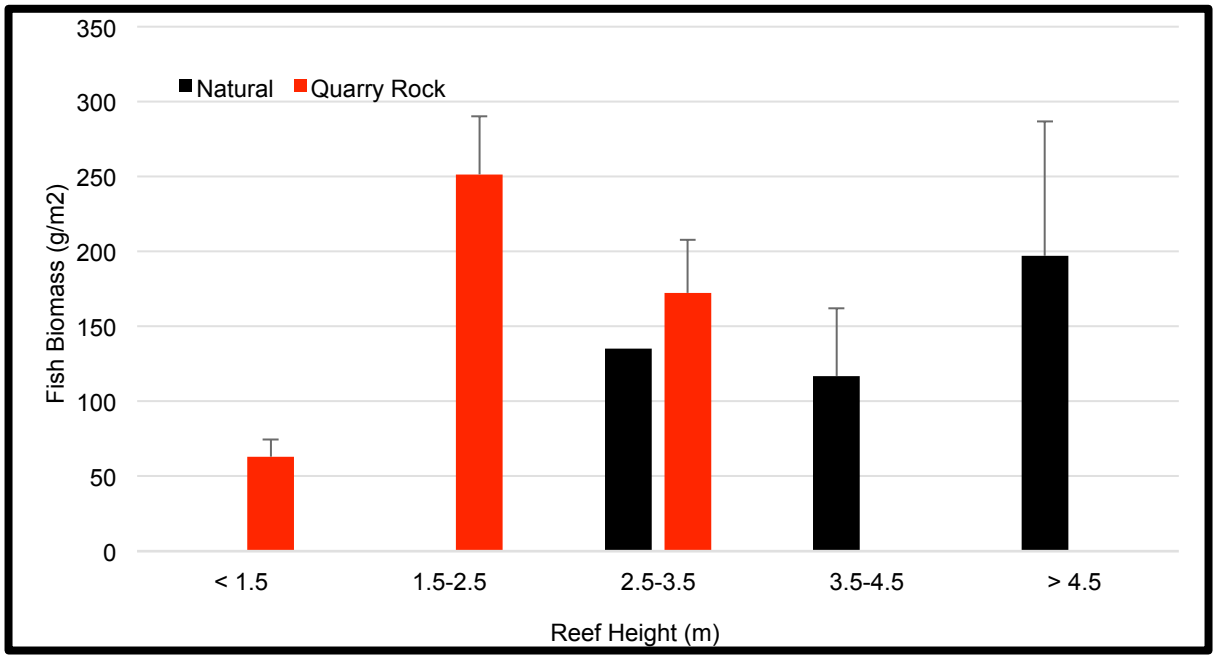

Figure 19. Mean reef height by total fish biomass (excluding young-of-the-year and pelagic species) at both natural isolated reefs and artificial reefs at Palos Verdes Peninsula and Santa Monica and San Pedro Bays.

HIGHLY PRODUCTIVE PALOS VERDES REEFS

Illustrating the complexity of this system, in spite of the sedimentation and turbidity problems from Bunker Point to Whites Point, the biomass and production potential for commercial and recreational fish species of the reefs was remarkably high where rocky reefs are present above the sediment. The biomass of kelp bass *Paralabrax clathratus* was higher at nearly every reef from Portuguese Bend to Cairns compared to the rest of the peninsula (Figure 20). California Sheephead, *Semicossyphus pulcher*, showed similar patterns, specifically from Portuguese Bend to KOU Rock, and at sites within MPAs (Long Point East and Point Vicente West; Figure 21). The reason for this increased biomass of fishery species in the area may reflect differential fishing pressure around the peninsula and/or elevated production along this stretch of coastline. Most salient to the design of the restoration reef is the total fish biomass at each site and depth zone (Figure 22). A typical reef along Palos Verdes Peninsula has the highest amount of fish biomass in the middle (~10 m) and outer (~15 m) depth zones. Notable among all depth zones and sites is the outer depth zone at the site named KOU Rock, which consistently has the highest fish biomass among anywhere on the peninsula averaging over 300 g/m^2. This semi-isolated pinnacle reef is inside the restoration project study area and subject to the same turbidity and sedimentation pressures as other reefs in the area, but its high (~5 m) total relief prevents accumulation of and burial under sediment. This reef was and continues to be the model for proposed restoration reefs at the study site. Details of the reef design are provided in subsequent sections.

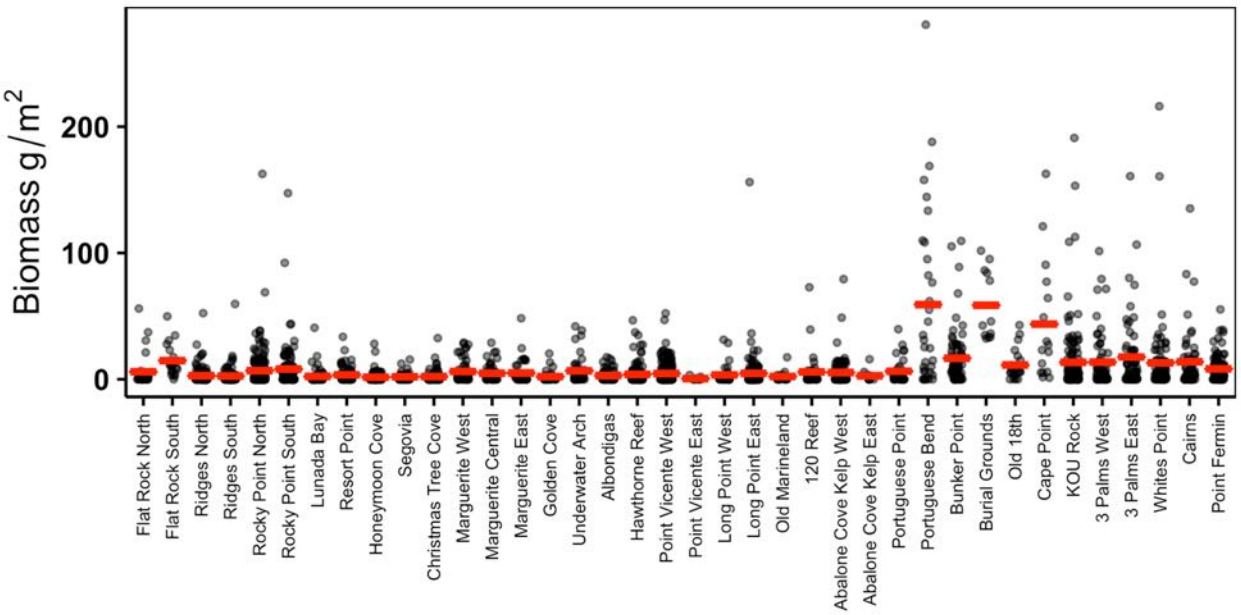

Figure 20. Biomass density of Kelp Bass (*Paralabrax clathratus*) at each site along Palos Verdes Peninsula. Dots represent values for every transect, red crossbars represent mean values.

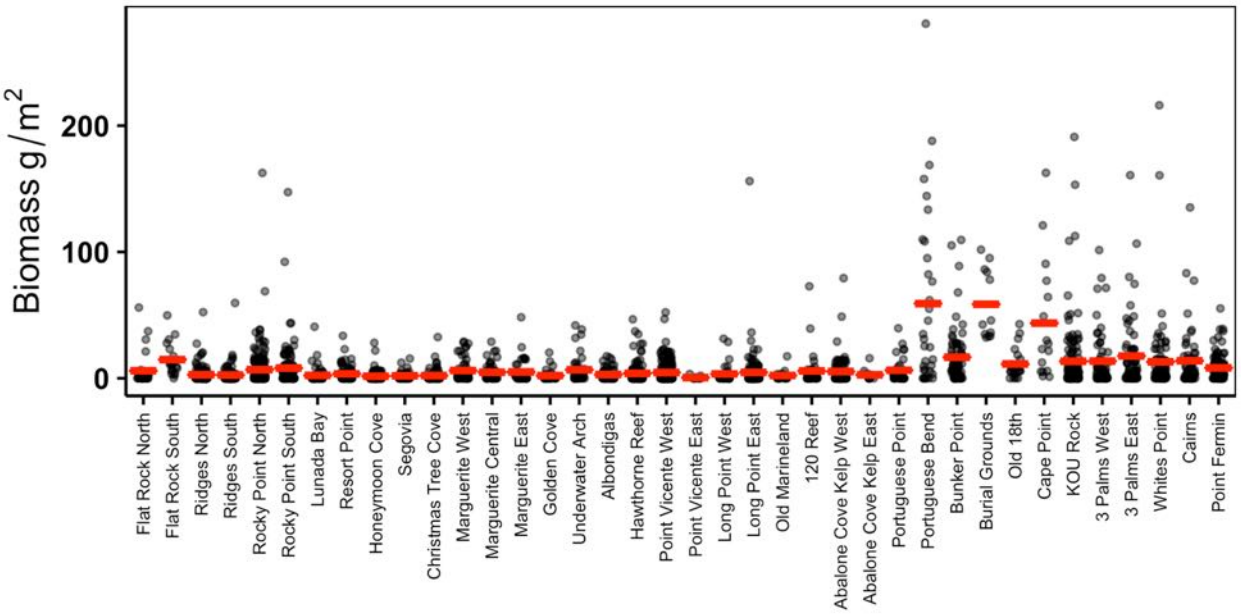

Figure 21. Biomass density of California Sheephead (*Semicossyphus pulcher*) at each site along Palos Verdes Peninsula. Dots represent values for every transect, red crossbars represent mean values.

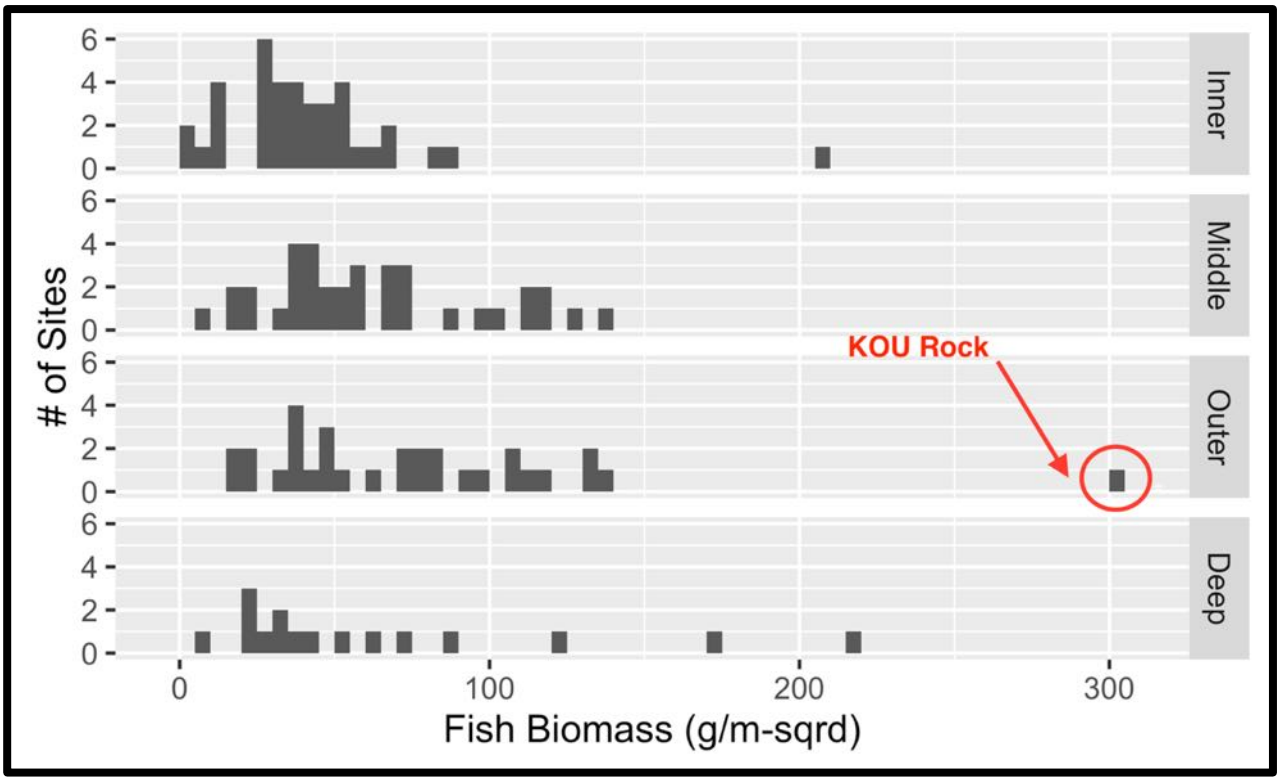

Figure 22. Distribution of total fish biomass at sites within specific depth zones. Note young-of-the-year and pelagic species are excluded from biomass estimates; The outer depth zone at the site named KOU Rock is where the large semi-isolated pinnacle reef is located in the restoration project study area. This high relief reef in the outer depth zone (surveyed six times from 2009-2015) is highlighted here as it served as the general model for the restoration reef design.

RESTORATION REEF DESIGN

The restoration reef is designed as set of eight "blocks" (Figures 23-25). Each block contains three modules (A, B, C). Each module consists of a 3 x 2 set of six "piles". The three piles on each side of the module are offset by 1/2 of the pile width (8 m). Each pile is a 16 m x 16 m square pyramid of quarry rock with an overall height of 1 m, 2 m, 3 m, or 4 m (Figure 23). The blocks will be in two designs, either with a 3 m overall pile height or a 4 m overall pile height. There is a 10 to 20 m wide sand channel between modules and at least 50 m of space between blocks. These distances were chosen due to the previously described 'halo' effect around reef of ~30 m (Johnson et al. 1994). Reef modules that are separated by < 30 m are more likely to operate as a single reef for many species, while blocks separated by > 30 m operate more independently (Pondella et al. 2006). In our design criteria reef blocks are spaced at least 50 m apart. By separating the blocks and modules by the appropriate distances we can restore a greater amount of reef perimeter sand-rock ecotone habitat and we can increase the independence of replicate reef blocks. The overall approach is to try to balance scientific study design considerations with maximizing the potential for an effective restoration effort across the range of important species, and kelp forest biodiversity. Major motivations included incorporating heterogeneity throughout the restoration reef design both within (e.g., varying pile heights within blocks) and amongst (e.g., varying block orientation across blocks) the reef blocks. Specific design elements and block placement considerations are discussed in more detail below.

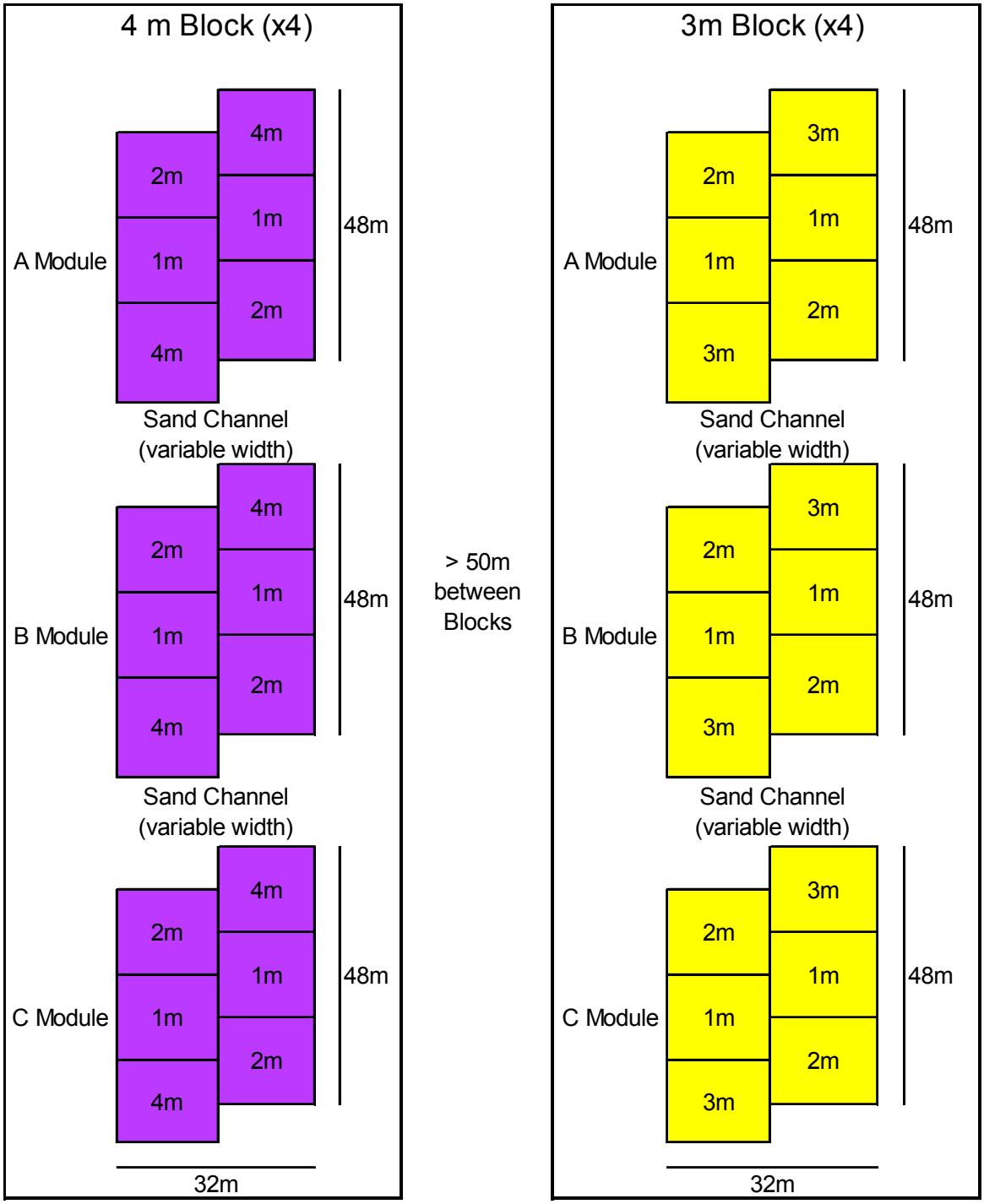

Figure 23. Design of 3m blocks and 4m blocks. Each block contains three modules (A, B, C). Each module consists of a 3 x 2 set of piles, offset by ½ pile length. Each pile is a 16 m x 16 m square pyramid of quarry rock with the overall height listed. There is a 10 to 20 m wide sand channel between modules and at least 50 m of space between blocks (construction design, control and precision details are contained in Appendix I).

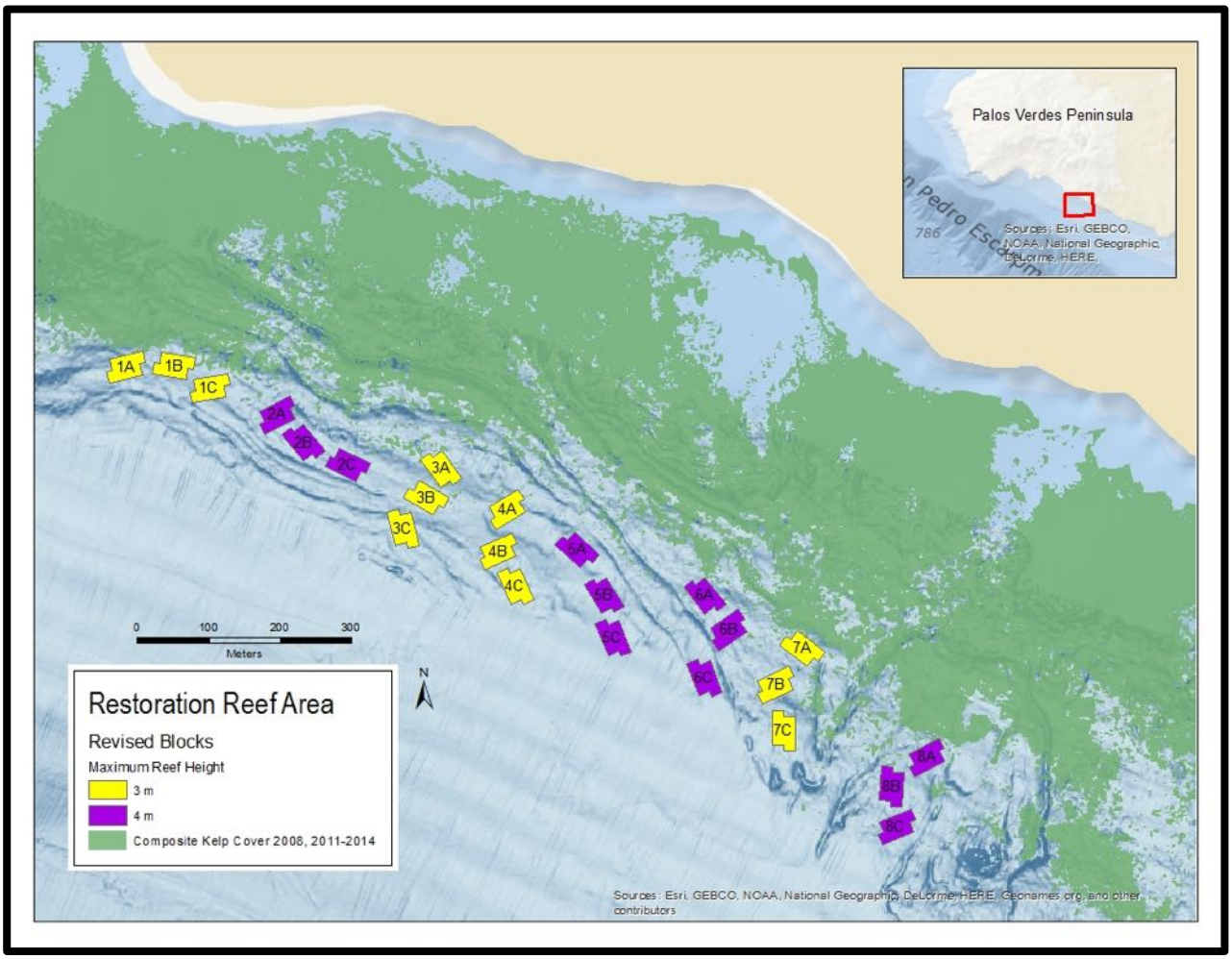

Figure 24. Proposed locations for the restoration reef blocks (1-8) at the Bunker Point restoration site study area with kelp canopy, side scan imagery. Each block consists of 3 modules (A-C). Blocks have a maximum reef height of either 3 m (yellow) or 4 m (purple).

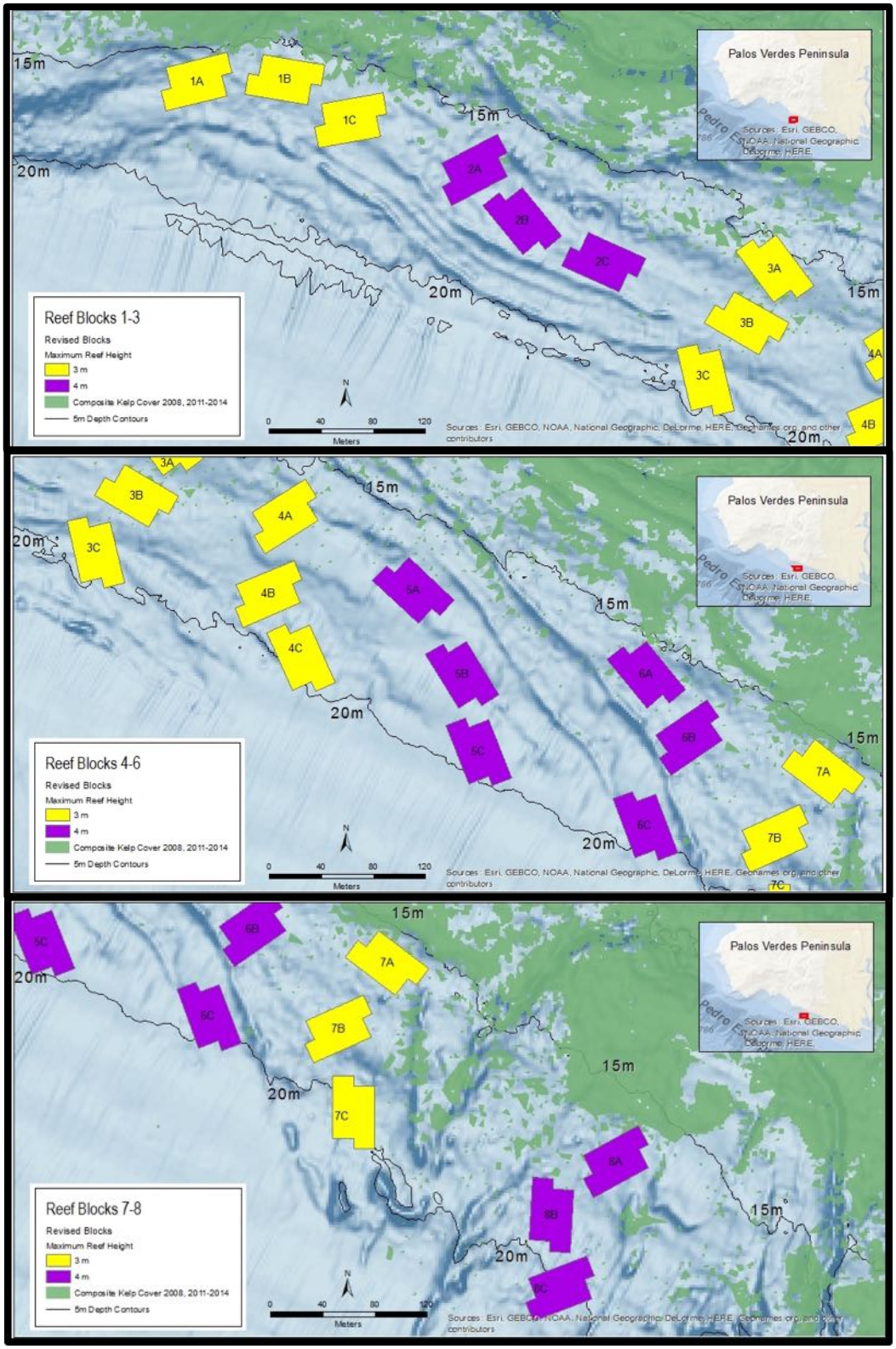

Figure 25. Close-up maps of the proposed locations for the restoration reef blocks (1-8) at the Bunker Point restoration site study area with kelp canopy, side scan imagery. Each block consists of 3 modules (A-C). Blocks have a maximum reef height of either 3 m (yellow) or 4m (purple).

PRIMARY BLOCK DESIGN CRITERIA

Based upon the contractor's estimate, there is 70,000 tons of rock available for this project. Thus, the overall objective is to utilize this limited resource to create the most productive habitat restoring the natural reef environment. The first criteria to consider is quarry rock size and the corresponding weight and void space. The quarry can filter rock sizes within a tight range (more expensive) to variation around a mean size (less expensive) diameters. Considering that this project's goal is to mimic natural reefs, using heterogeneously sized rocks was optimal as natural reefs are not composed of single sized rocks. Designating an average size (weight) within the constraints of the quarry results in the following percent size by weight profiles for rock (Figure 26). A previous study compared elements of fish production on natural and artificial rocky reefs in southern California (Granneman 2011; Granneman and Steele 2014). They found that tissue production was positively correlated with the abundance of large boulders, and they defined large boulders as those being at least 75 cm across. Production was lower on reefs with smaller boulders, most of these being natural reefs and the Wheeler North artificial reef. They explain that the Wheeler North artificial reef was designed with relatively low relief and low rugosity not to maximize fish production, but to mimic natural reefs in the southern Orange County region and to grow kelp. A higher proportion of larger boulders should also increase the likelihood of larger interstitial spaces between rocks in piles creating a variety (i.e., increase heterogeneity) of "hole" sizes for fishes and invertebrates that shelter within (Friedlander and Parrish 1998). Small rocks generally settle tightly, have small void spaces and are not considered as productive as larger rocks proportionally larger void spaces. The estimated average void space increases from 1 ft. to 1.5 ft. as rock size transitions from 0.25 ton to 0.50 tons, and then from 1.5 ft. to 2.0 ft. as rock size increase from 0.5-0.75 ton to 1 ton. Interstitial void space was also considered in the sizing criteria (Table 3). Additionally, having larger stones will minimize the chances of rocks at the edges of blocks from being covered in sediment while creating more complex eco-tone habitats at the sand/rock interface. The other trade-off to consider is that if you model rocks as sphere, as you increase the diameter, you get significantly heavier rocks without correspondingly significantly larger sizes (Figure 27). Note a 2-ton and 3-ton rock are not substantially larger than a 1-ton rock, but 2-3 times the cost, respectively, keeping in mind that weight is the cost estimate used for the quarry. Based upon these criteria, we chose 1.0-ton rock, which has the larger void spaces, is not overly heavy (costly) for our budget, and maximizes the known biological production.

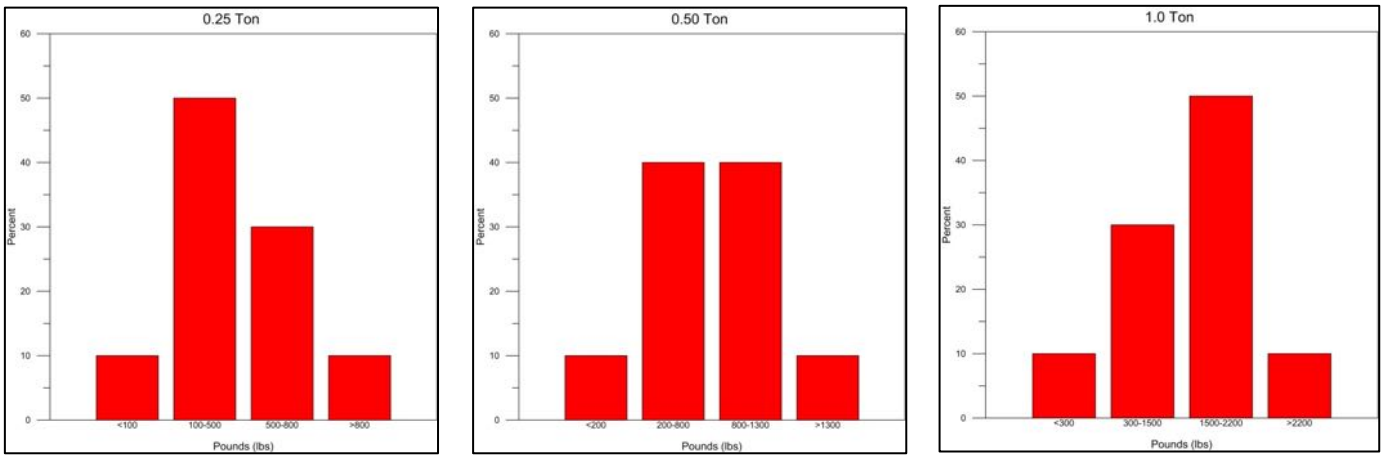

Figure 26. Percent size of quarry rock by weight based upon 0.25, 0.50 and 1.0 ton criteria.

Table 3. Quarry rock weight, dimensions and estimated average void size.

Rock Weight (lbs)	Rock Dimension (ft)	Estimated Average Void Size (ft)
200	1.5 x 1.0 x 1.0	1
300	1.5 x 1.3 x 1.0	
400	1.6 x 1.6 x 1.0	
500	2.0 x 1.5 x 1.0	
1000	3.0 x 2.5 x 2.0	1.5
1500	3.5 x 3.0 x 2.0	
2000	4.0 x 3.0 x 2.5	2
2500	4.0 x 3.5 x 2.5	
3000	4.5 x 3.5 x 2.5	
3500	5.0 x 4.0 x 2.5	

Figure 27. 3-ton, 2-ton and 1-ton quarry rocks arranged left to right.

In addition to optimizing rock sizes, the design of the blocks and modules maximize biological production based upon a variety of physical and biological criteria. First, maximizing the amount of exposed surface area and reef perimeter increase the production versus cost constraints. Engineering constraints dictate that reefs are constructed in a linear fashion as the 6-point barge anchoring systems are used to construct the habitat. Our goal is to design reef that maximize high relief components, surface area, perimeter, flux, and are consistent with the size of reefs along the Palos Verdes Peninsula. High relief reefs have a cost tradeoff, as they are more expensive (more weight per unit area) than low relief reefs. And, a critical consideration is how much rock is buried (and generally unavailable biologically) to create the high relief components. Modules within blocks are designed in 16 m^2 piles where variation in relief is staggered increasing the amount of surface area of the reef. These piles are also staggered maximizing the perimeter of the reef and surrounding ecotone.

The following additional design criteria were incorporated into our module and block designs:

- Stagger high relief piles within blocks. Vary pile heights across adjacent piles within blocks (Figure 23).
    - This should increase diversification of water flow by limiting overlap of high relief piles, reducing the occurrence of one high relief pile being in the "shadow" of another high relief pile. Heterogeneity in pile height may facilitate the creation of a mosaic of small-scale flow features, effectively facilitating microhabitat creation/diversification across the module/block/reef.
    - Maximize external surface area by limiting rock overlap of adjacent high relief piles.
    - Maximize heterogeneity in reef characteristics (e.g., relief, interstitial space, overall angle of outer reef surface) to increase biodiversity by increasing the heterogeneity of available micro-habitats within each block.
- Place high relief piles at the ends of each block to buffer any potential sedimentation of the 1 m relief piles in the middle of each block.
- Size blocks similar to current reefs along Palos Verdes. The pinnacle reef at KOU Rock is ~45m wide, the finger reef at Long Point East is ~120m wide, the finger reef at Point Vicente West is ~225m wide (Figure 8).
- Increase the amount of outer reef edge (the relationship between perimeter and area) by not making blocks too large. The highest biomass areas of the reefs we studied tended to be on the outer edges (zones) (Figure 22).

BLOCK PLACEMENT

The following design criteria were used to guide the positioning of restoration reef blocks (and the modules within them) across the Bunker Point restoration site study area:

- Blocks do not overlap with persistent kelp canopy. Persistent kelp canopy is an indication of stable rocky reef below that has not been covered by sediment (Figure 25).
- Blocks are placed at 15-20 m seafloor depth (Figure 25). The highest biomass areas of the reefs we studied tended to be in this depth zone (Figure 22). Placing blocks in these somewhat deeper depths would also limit wave action, scouring and seasonal excavation/deposition of sediments.
- Vary the orientation of each block and each module (Figure 24). This would again increase heterogeneity in reef characteristics, with respect to their relative orientation to the shoreline and to prevailing currents and wave action. This should increase the likelihood of high relief blocks causing creating a mosaic of small-scale flow features,

effectively facilitating microhabitat creation/diversification across the module/block/reef.

- Mimic natural features (reef width and orientation to natural features).
- Blocks placed in a maximum of 1m sediment to limit long-term burial/sinking.
- 10-20 m sand channels between modules within a block (Figures 23-25). Permits space for sediments moving with longshore current and wave action to move around/through modules. Modules are still close enough to provide connectivity (fishes can move over sand between them).
- Maintain connectivity with existing natural reefs. The was done by positioning the ends of at least one module within a block less than 30 m from existing nearshore natural exposed reef (kelp line) or existing (non-buried) rocky reefs so the blocks are not "isolated islands" in the sand (Figure 24-25).
- Maximize distance between blocks (>50 m) to increase independence of each block (Figure 24). Mimics natural reef ridges, these are typically oriented perpendicular to shore with large sandy areas between them.

SECONDARY BLOCK DESIGN CRITERIA

A secondary focus of our reef design was to create a reef design that would permit replicated elements that could be studied to inform future restoration programs (Figures 23-25). This was balanced however, with the primary goal of maximizing the potential for an effective restoration effort. A main question we are interested in examining is the effects of reef relief. Blocks will be in two forms, either with a 3 m overall pile height or a 4 m (Figure 23) overall pile height, with 3 replicate modules per block, and 4 replicate blocks of each height. This will permit a comparison of the two reef heights impact on fish biomass and production. Additionally, with the high level of heterogeneity, but many repeated elements (for example 1m, 2m, 3m and 4m piles, or blocks oriented at various angles relative to shore, or blocks in various seafloor depths), various other studies will also be possible. These could include fine scale habitat utilization patterns, effects of Block orientation relative to current), providing an opportunity to inform future restoration programs in the State.

Figure 28. Example of a 4 m high reef pile, an approximate representation of a module within a block.

RESTORATION REEF DESIGN EVALUATION

We produced simple estimates of the biomass of fishes expected on low (1 m) and higher (2 - 4 m) relief piles within the restoration reef Blocks, then summed these to produce an overall estimate of fish biomass for the restoration reef (Table 4). Fish biomass estimates are based on previously observed biomass densities from Proxy Reef study (Figures 18 & 19).

Table 4. Area and fish biomass estimates for current restoration reef design.

Block Type (Max Relief)	Blocks	Modules Per Block	Pile Relief (m)	Piles per Module	Pile Area 16m x 16m (m2)	Total Area (m2)	Total Area (Acres)	**Fish Biomass Density (g/m2)	Total Biomass (g)	Total Biomass (kg)
		3	4m	2	256	6144	1.5	189	1161216	1161
		3	2m	2	256	6144	1.5	189	1161216	1161
4m	4	3	1m	2	256	6144	1.5	63	387072	387
		3	3m	2	256	6144	1.5	189	1161216	1161
		3	2m	2	256	6144	1.5	189	1161216	1161
3m	4	3	1m	2	256	6144	1.5	63	387072	387
Totals						**36864**	**9.1**		**5419008**	**5419**

**63 g/m^2 is mean biomass for proxy reefs (all quarry rock) < 1.5 m relief and 189 g/m^2 is mean biomass for natural and quarry rock reefs > 1.5 m relief (Figures 18 & 19).

EVALUATION OF ALTERNATIVES

Four design alternatives were considered during initial stages of reef development (Figures 29-32). These used the same 70,000 tons of rock available for this project, but the rocks were placed in other configurations. Alternatives 1 and 2 (Figures 29 & 30) contained large areas of low relief "reef" (<1 or <0.5 m height), essentially individual rocks scattered over the landscape. This type of low relief design was used extensively throughout the Wheeler North artificial reef. However, it was not designed to maximize fish production, but to mimic the low relief natural reefs in the southern Orange County region. In the case of Palos Verdes where sedimentation and reef burial is a major concern, these low relief designs were deemed unlikely to meet the desired restoration objectives as they would likely be heavily impacted by sedimentation scour and burial. Alternatives 3 and 4 (Figures 31 & 32) contained only high relief elements. Early in the design process these alternatives served to motivate discussion of additional design elements (e.g., heterogeneity, spacing, orientation and depth of reef Blocks) that were ultimately included in the final proposed design.

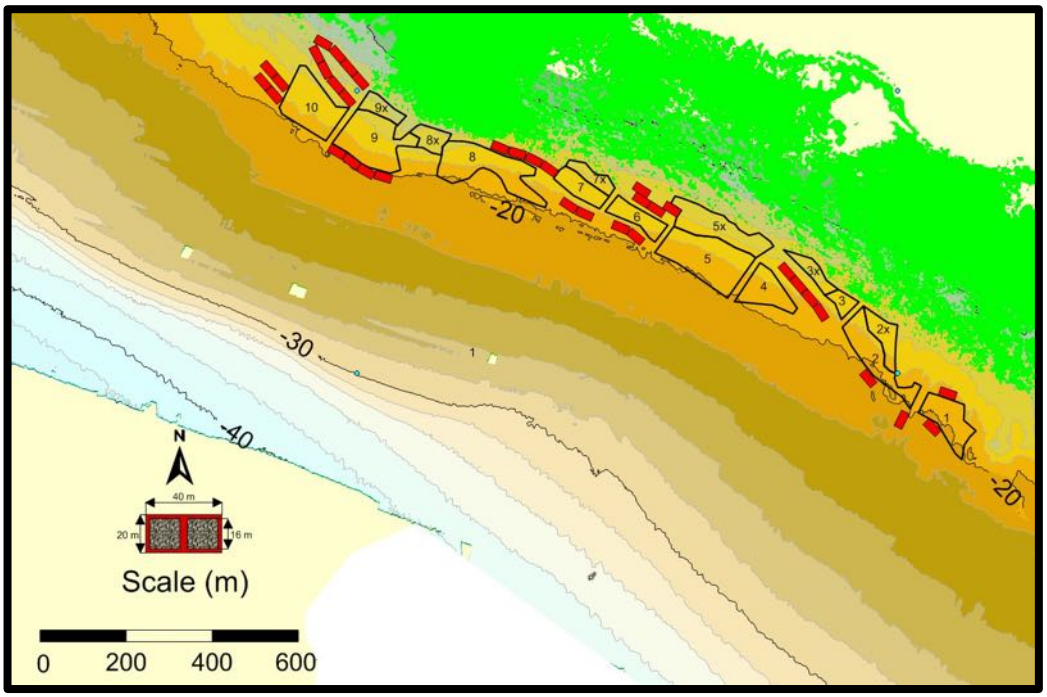

Figure 29. Alternative 1: A reef with high relief components (red polygons) and low relief components (black outlined polygons).

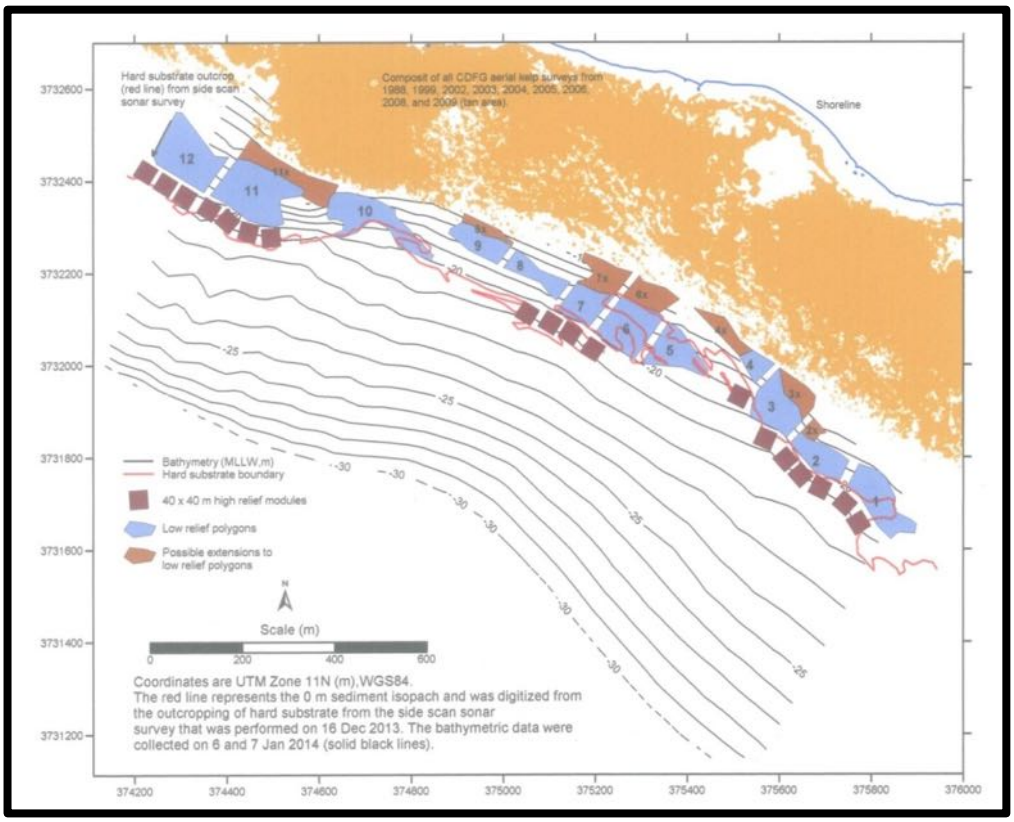

Figure 30. Alternative 2: In this alternative, a reef with high relief components (dark brown square polygons) and low relief components (blue and light brown polygons).

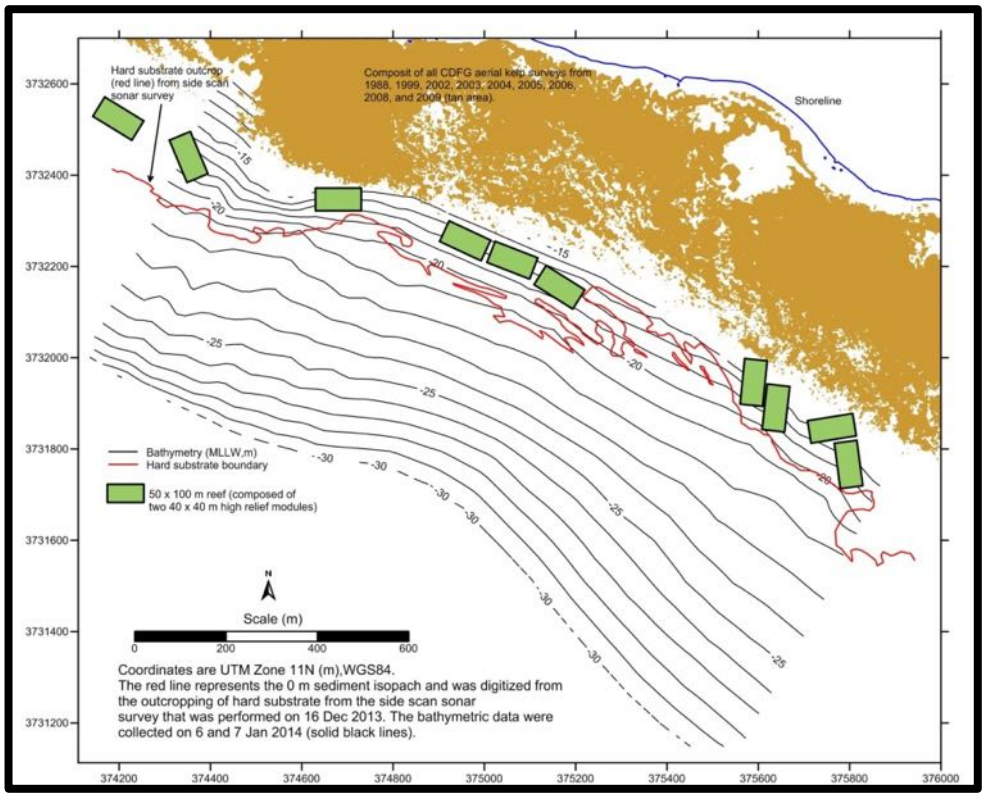

Figure 31. Alternative 3: In this alternative, a reef with high relief components (green polygons) located in shallower water.

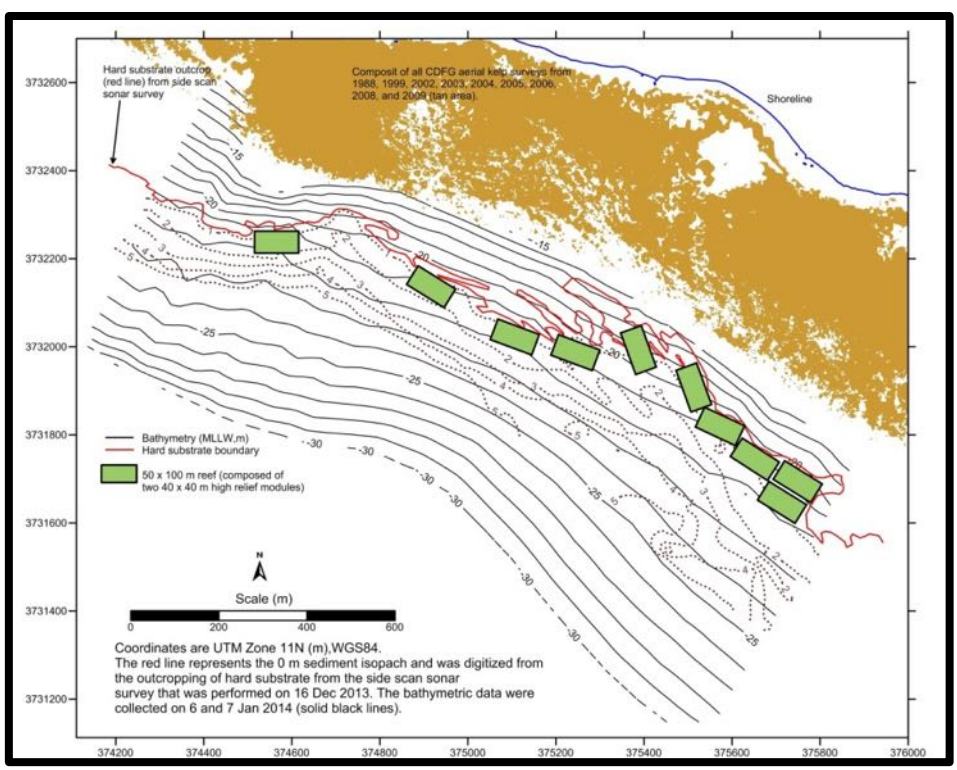

Figure 32. Alternative 4: In this alternative, a reef with high relief components (green polygons) located in deeper water.

GROUND TRUTHING SURVEYS

After the 2013 surveys were completed, it was determined that concentrating semi-contiguous restoration reefs on the west side of KOU Rock, a highly productive and anomalous pinnacle reef in the eastern half of the study area, would be more effective and less confounding to monitoring efforts. The depth of sediment cover on the buried reef between 15 and 20 m was significantly lower than what we found to the east. In addition, there was less slope to the reef increasing the amount of potential restoration habitat between 15-20 m. We determined that this was the optimal placement for the restoration reefs based upon feedback from the resource agencies. Subsequently, all further efforts at surveying the habitat were concentrated on the western side of the survey area. In 2014, eight surveys of the buried reef areas were performed to confirm the interpretation of the geophysical survey results (Figure 33). Divers descended at specific coordinates and swam perpendicular to shore for approximately 200 m. Every 10 m, sediment samples were taken and data was recorded on sediment type, sediment depth (up to 1.8 m), macroalgae, and macroinvertebrates. These data along with video documentation taken during this survey confirmed that the region contained primarily sand and sand-covered reef with scattered small areas of low-relief hard substrate dominated by gorgonians.

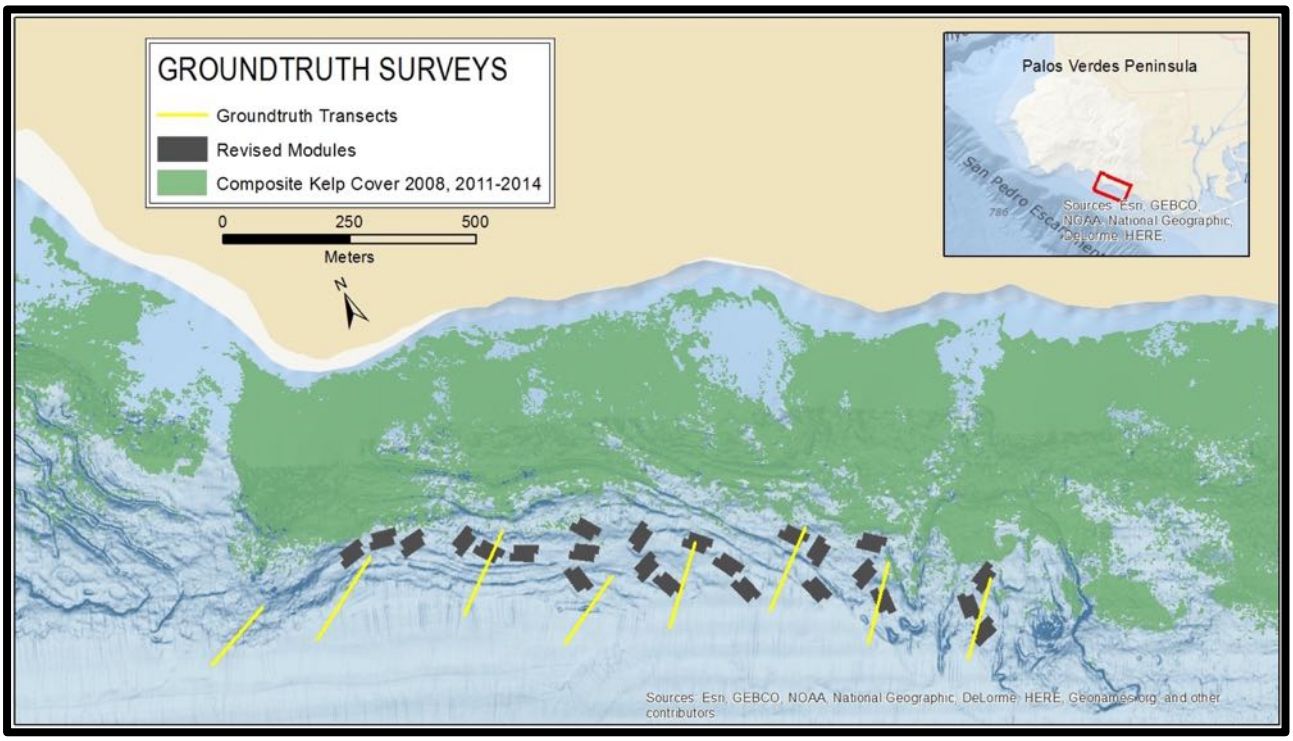

Figure 33. Mapped reef habitat, composite kelp cover, and ground truth transect locations with currently proposed restoration reef Blocks.

SITE INSPECTION SURVEYS

A final site inspection survey of the study area was conducted in 2015 using a simplified version of CRANE protocol (Figure 34). The 26 paired (end-to-end) transects provided information on the substrate composition as well as biological observations. The transect locations were chosen based on: (1) sites that represented areas that are commonly present throughout the proposed area of reef placement, (2) sites that cross ecotones (observed in backscatter data), and (3) sites in likely areas of reef restoration. In summary, 75% of the area was covered by sand (29% had hard substrate within 10 cm of the seafloor), while only a quarter of the substrate was rocky reef. These surveys provided further evidence of burial at specific locations and helped guide Block placement so that existing exposed rocky reef habitat will not be covered during restoration reef construction.

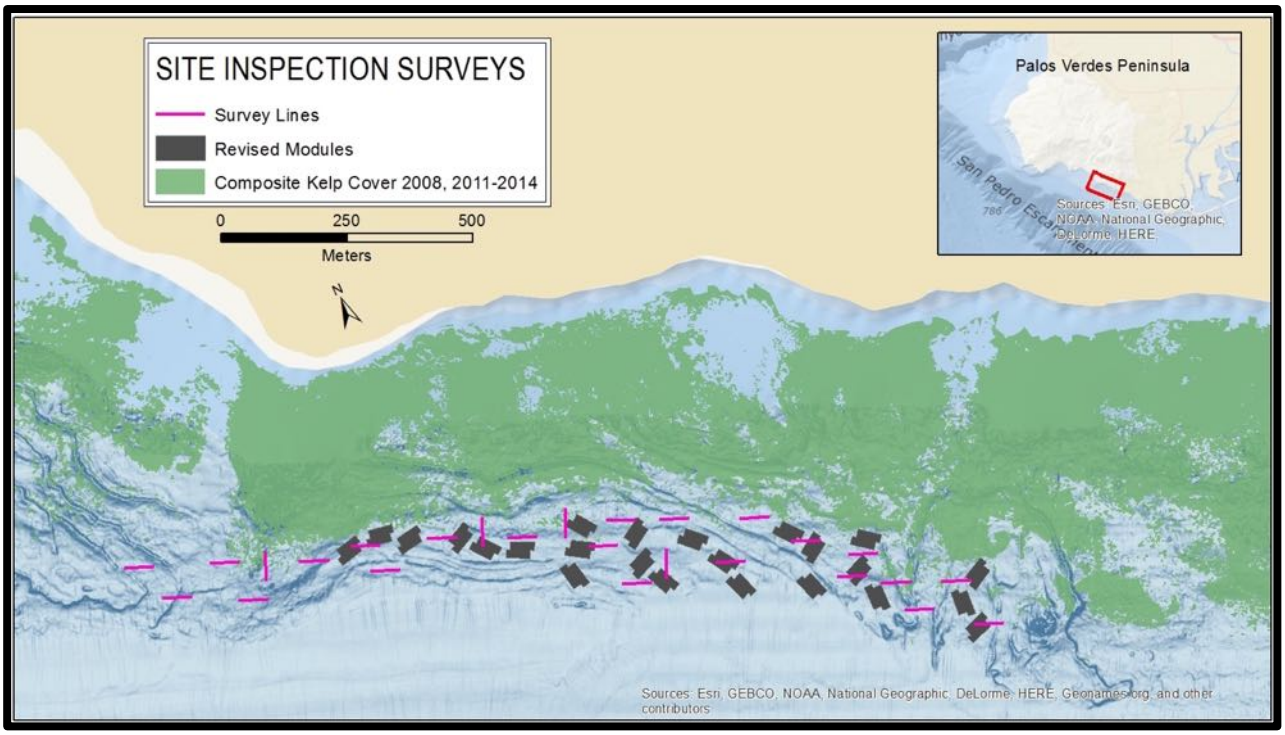

Figure 34. Mapped reef habitat, composite kelp cover, and site inspection survey locations with currently proposed restoration reef Blocks.

MONITORING PLAN

An important step in evaluating the effects of restoration actions along the Palos Verdes Peninsula is to develop an appropriate temporal and spatial sampling design for future monitoring. Short and long-term monitoring of the restoration reef Blocks and sites across the Palos Verdes Peninsula will be critical for evaluating the success of this restoration project and for evaluating the effect of various restoration reef design elements on the associated biological community. Over the first months to years after construction of the restoration reef, we will have the opportunity to measure the level of "attraction" of adult fishes relocating from nearby reefs to the new reef habitat (Figure 35). Over the medium to long-term (3-10 years) monitoring will provide the opportunity to estimate the increase in biomass of important species associated with the restoration reef Blocks, and for whole larger reef complex made up of the restoration reef and the adjacent natural reefs. A Before-After-Control-Impact Paired Series (BACIPS) sampling design (Osenberg et al. 2002) is likely the most appropriate, particularly with respect to also assessing potential changes in biomass due to fish movements (relocation from nearby reefs). This model will help to account for year-to-year environmental variability when assessing changes in biomass. The restoration reef as a whole would likely best be considered an unreplicated "treatment" in this context. While there will be multiple sites sampled within each treatment (i.e., restoration reef, adjacent natural reefs, reference natural reefs), these mostly adjacent sites will not be independent (Table 5; Figures 35). A key to a BACIPS design is having multiple "before" sampling events across sites. Reef construction is currently planned for the fall of 2017. The proposed monitoring design would include three complete rounds of sampling before reef construction (2015, 2016, and 2017 (pre); Table 5). The first round of "After" sampling would begin shortly after the completion of reef construction at the end of 2017 and would be completed in early (likely February) 2018. Subsequently, "after" sampling would be conducted annually for at least 5 years (Table 5). It will likely take at least this length of time for overall changes in biomass due to additional production to be begin to be observed (multiple years of recruitment followed by a few years for those fishes and invertebrates to mature). The restoration reef Modules will be sampled in a similar effort as is used to sample each Depth Zone at a natural reef site (Figure 35). At each module (A, B, C) within each reef block (1-8) we will perform four fish transects (bottom/midwater/canopy portions per transect), two benthic UPC transects, and two benthic swath transects. The quantification of habitat characteristics performed in the CRANE protocol will also permit us to incorporate appropriate methods in the analyses to account for differences in habitat characteristics among sites and treatments (e.g., Miller and Russ 2014).

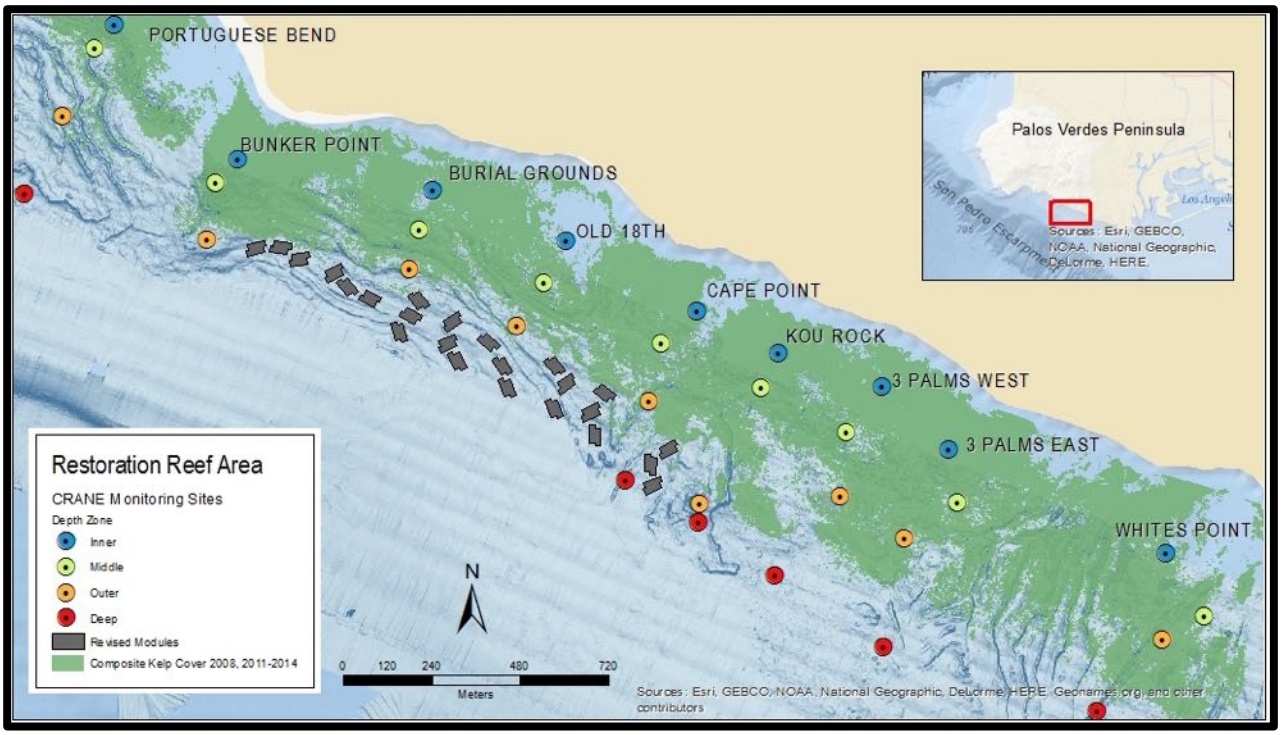

Figure 35. Restoration reef Blocks and CRANE monitoring Sites (individual depth zones indicated) at the Bunker Point restoration site study area with kelp canopy and side scan imagery.

Another part of this assessment is being able determine what proportion of biomass changes are due to fish movements to the restoration reef from the surrounding natural reefs compared with the increase in biomass from additional secondary production of fishes and invertebrates. The proposed sampling design will provide an opportunity to assess the degree to which increases in biomass on the new restoration reef are correlated with decreases in fish biomass on the adjacent natural reefs (Table 5, Figure 35) (Osenberg et al. 2002; Osenberg et al. 2006), suggesting some proportion of the fishes on the restoration reef relocated from nearby reefs. An increase in fish biomass on the restoration reefs and stable or increasing biomass on the adjacent reefs would suggest increased secondary production on entire reef complex. The monitoring data will also permit application of other novel analyses aimed at assessing the levels of 'local production' and 'biomass flux' within the restoration reef system (e.g., Smith et al. 2016). Performing additional studies would provide additional context from which to interpret the monitoring data and provide insight into the mechanisms behind changes in fish biomass in the system. These could include direct assessment of fish movements (e.g., traditional tagging, acoustic telemetry), which would be particularly informative if fishes on adjacent reefs could be tagged prior to reef construction. Other factors influencing fish production, such as increases in growth rates associated with higher relief habitat (e.g., Granneman 2011; Granneman and Steele 2014), could be assessed directly (e.g., through otolith studies for fishes).

Finally, the proposed reef and monitoring designs, with multiple replicated elements, will also provide an opportunity for subsequent studies to examine the effects of restoration reef design features. A primary assessment would be the effect of block relief, 3m versus 4m maximum pile heights, on the associated species biomass and habitat use patterns. Other features that can be assessed may include module orientation or position relative to the coast or dominant current pattern and Block depth. Understanding how these factors impact fish and invertebrate habitat utilization patterns will provide an opportunity to inform future restoration programs in the State.

Table 5. Historical monitoring (with S indicating years sampled) and proposed monitoring (with X indicating sites to be sampled). Sites include (Kelp Restoration) those involved in the kelp restoration project which may contain urchin barrens, be active kelp restoration sites, or sites where the kelp has been restored, (MPA) those within the MPAs that were implemented in 2012, (Within Reef) those located among the proposed restoration reef Blocks, (Adjacent Reef) those located just north or south of the proposed restoration reef, or (Reference) sites that do not currently involve any of the previously mentioned activities or designations. The monitoring plan includes sampling all sites in 2016 prior to reef construction, then once before and once after reef construction in 2017, then annually for at least 5 years after construction. CRANE protocols require >50% coverage of rocky reef, the restoration area has not supported kelp or significant percentages of rocky substrate precluding it from previous CRANE surveys.

		Historical Monitoring										Proposed Monitoring			
Site	**Designation**	**2004**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017 (Pre)**	**2017 (Post)**	**2018 - 2022**
Flat Rock North	Reference		S	S							S	X	X		X
Flat Rock South	Reference		S								S	X	X		X
Ridges North	Reference	S	S		S	S	S	S	S	S	S	X	X		X
Ridges South	Reference	S	S	S				S	S	S	S	X	X		X
Rocky Point North	Reference	S	S	S	S		S	S	S	S	S	X	X		X
Rocky Point South	Reference		S			S	S	S	S	S	S	X	X		X
Lunada Bay	Reference						S	S	S		S	X	X	X	X
Resort Point	Kelp Restoration			S				S	S	S	S	X	X		X
Honeymoon Cove	Kelp Restoration						S	S	S	S	S	X	X		X
Segovia	Kelp Restoration							S	S		S	X	X		X
Christmas Tree Cove	Kelp Restoration					S	S	S	S	S	S	X	X	X	X
Marguerite West	Kelp Restoration						S	S	S	S	S	X	X		X
Marguerite Central	Kelp Restoration						S	S	S	S	S	X	X		X
Marguerite East	Kelp Restoration						S	S	S	S	S	X	X		X
Golden Cove	Kelp Restoration						S	S	S	S	S	X	X		X
Underwater Arch	Kelp Restoration					S		S	S		S	X	X		X
Albondigas	Kelp Restoration						S	S	S	S	S	X	X	X	X
Hawthorne Reef	Kelp Restoration		S		S	S	S	S	S	S	S	X	X	X	X
Point Vicente West	MPA	S	S	S	S	S	S	S	S	S	S	X	X		X
Point Vicente East	MPA		S												
Long Point West	MPA		S					S	S		S	X	X		X
Long Point East	MPA		S		S	S	S	S	S	S	S	X	X	X	X
Old Marineland	MPA						S	S	S		S	X	X		X
120 Reef	MPA					S	S	S	S		S	X	X		X
Abalone Cove Kelp West	MPA					S	S	S	S	S	S	X	X		X
Abalone Cove Kelp East	MPA					S		S							
Portuguese Point	MPA					S		S	S		S	X	X		X
Portuguese Bend	Adjacent Reef								S		S	X	X	X	X
Bunker Point	Adjacent Reef		S				S	S	S	S	S	X	X	X	X
Burial Grounds	Within Reef										S	X	X	X	X
Old 18th	Within Reef								S		S	X	X	X	X
Cape Point	Within Reef										S	X	X	X	X
KOU Rock	Adjacent Reef				S		S	S	S	S	S	X	X	X	X
3 Palms West	Adjacent Reef		S						S	S	S	X	X	X	X
3 Palms East	Adjacent Reef		S	S	S					S	S	X	X	X	X
Whites Point	Reference		S	S		S	S	S	S	S	S	X	X	X	X
Cairns	Reference						S	S	S	S	S	X	X	X	X
Point Fermin	Reference		S	S		S	S	S	S	S	S	X	X	X	X

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