SUPPLEMENTAL
ENVIRONMENTAL ASSESSMENT

FOR

CHANNEL ISLANDS HARBOR
BREAKWATER AND JETTY REPAIR PROJECT
Ventura County, California

PREPARED BY

U.S. ARMY CORPS OF ENGINEERS
SOUTH PACIFIC DIVISION
LOS ANGELES DISTRICT

February, 2021

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

PROPOSED PROJECT

Location and Project Description. The proposed project is located within the Channel Islands Harbor facility (Harbor), on and adjacent to a protective offshore breakwater (Channel Islands Harbor Detached Breakwater) located near the entrance to the Harbor. The Harbor is located in the city of Oxnard (Figure 1), Ventura County, California. The project area would encompass approximately 17 acres on and surrounding the offshore breakwater. An Environmental Assessment (EA) was prepared in June 2019 to address upcoming breakwater and jetty maintenance and repair work that is currently anticipated to commence in the Spring/Summer of 2021. Shoaling has occurred in the lee of the breakwater. Removal of this shoal is necessary to provide access to safely and efficiently conduct all of the needed repairs. In addition, proposed changes to the project description have been identified that would improve safety during future inspections and operation of the structure. These changes include installation of three sets of concrete steps on the surface of the breakwater and replacement of a navigational aid pad. The U.S. Army Corps of Engineers' Los Angeles District (Corps), as part of its Operations and Maintenance Program, is therefore proposing to perform the installation of three staircases, replacement of the navigational aid pad on the breakwater, and excavation of shoaled sediments in the lee of the structure. Approximately 25,000 cubic yards will be excavated to a depth of -15 feet MLLW with a 2 feet allowable over-depth and side-cast. The staircases will be approximately 3 feet by 13 feet and placed approximately between 0.0 to +13.0 feet MLLW.

Excavation of the shoal in the lee of the detached breakwater would be performed by a clamshell dredge, over a period of approximately 1 – 2 weeks. The excavated material will be side cast into Area B and C of the existing Channel Islands Harbor Operations and Maintenance dredge template (Figure 4).

1.1.3 Timing of Project. Construction of breakwater repairs including these additional elements (shoal removal, stair construction and replacement of the navigational aid) is expected to take place in the Spring and Summer of 2021. Construction is anticipated to last 3 months, but delays or schedule extensions may occur due to adverse weather conditions, mechanical failures or other unforeseen issues.

1.1.4 Staging Areas. Staging areas are the same as previously described in the June 2019 EA for the breakwater repair project. The areas are located at the Kiddie Beach parking lot, the Silver Strand Beach parking lot, and a portion of the beach adjacent to the parking lot (Figure 2). No additional staging areas are required for the proposed project modifications.

1.1.5 Construction Equipment. Repair of the detached breakwater and harbor jetties would be accomplished using equipment specified in the June 2019 EA. Shoal removal would require the use of a Crane-equipped Barge and support vessels. Construction of stairs and replacement of the navigation aid would likely require the use a concrete mixer, concrete forms and tools. A concrete truck may be utilized to deliver concrete for staircases and navigation aid pad. The capabilities and compliment of such equipment are as follows:

Crane-equipped Barge. Typically, a barge with an attached crane that uses a clamshell bucket would be used to excavate the shoaled material in the lee of the breakwater. The material would be deposited directly from the clamshell bucket into Area B and Area C of the Channel Islands Harbor O&M Dredge plan footprint. (see Figure 4). A scow with an attached grizzly may be used in tandem with the crane-equipped barge if the excavated material warrants filtering. If boulders or other material is excavated from the shoal that is unsuitable for deposit into the Area B and Area C, the clamshell bucket would deposit shoaled material on top of the grizzly with the scow bottom open below. The same crane-equipped barge or an additional crane-equipped barge could also facilitate movement of precast staircases and the replacement of the navigation concrete pad from the barge to the breakwater.

Support Vessels. Self-propelled boats that serve as tenders, tugs, and spotting craft. The main purpose of a support vessel is to assist the crane operator as well as to ferry equipment and crew back and forth from the shore, breakwaters, staging areas, and the crane and support barges. The compliment of these vessels is usually just one operator unless ferrying other crew.

1.2 ENVIRONMENTAL ASSESSMENT PROCESS

This Draft Supplemental Environmental Assessment (SEA) addresses potential impacts associated with implementing the proposed modifications or additions to the upcoming Channel Islands Harbor breakwater repair project. A previous Environmental Assessment was issued in June 2019 that addresses the impacts related to repair of the breakwater and jetties.

The Corps is the lead agency for this project. This EA complies with the National Environmental Policy Act (NEPA) of 1969, as amended, (42 U.S.C. 4321, *et seq.*), Council on Environmental Quality (CEQ) regulations implementing NEPA and Corps NEPA implementing regulations (33 C.F.R. Part 230) and guidance.

The EA process follows a series of prescribed steps. This Draft Supplemental EA will be distributed for a 15-day public review. The final step is preparing a Finding of No Significant Impact (FONSI), if it is determined the federal action will not have a significant effect on the human environment. This is a concise summary of the decision made by the Corps. If it is determined the federal action will have a significant effect on the human environment, an EIS must be prepared.

PURPOSE AND NEED

SECTION 2 – PROJECT PURPOSE AND NEED

Need: Shoaling that has occurred along the lee of the breakwater over the last few years is limiting the ability of construction equipment to approach close enough to the breakwater to safely and efficiently perform all of the needed repairs. In addition, it has been noted by the Corps' Coastal Engineers and inspectors that accessing the slippery surface of the breakwater to assess the structure for damages, can be dangerous. Additionally, the concrete pad supporting the navigation aid requires replacement due to weathering.

Purpose: The proposed shoal removal and sidecasting operation would provide access for repairs. The proposed addition of three staircases would improve safety during inspections. The replacement of the concrete pad ensures the functionality of the navigation aid and is essential to mariner safety.

SECTION 3 – PROJECT ALTERNATIVES

3.1 PROPOSED PROJECT CRITERIA REQUIREMENTS

Legislation authorizes maintenance and repair activities on existing harbor facilities to be conducted at Channel Islands Harbor to ensure continued safe navigability to and from the harbor.

3.2 ALTERNATIVES CONSIDERED

Congressional legislation directs that operations, maintenance, repair, replacement, and rehabilitation (OMRR&R) work associated with Channel Islands Harbor must occur specifically at Channel Islands Harbor, no other alternative sites for maintenance construction and repair of existing facilities are considered viable. Therefore, no other alternatives would be analyzed in detail other than the "No Action Alternative."

3.2.1 No Action Alternative

The No Action Alternative would not allow for excavation of the shoal necessary for full, safe and efficient breakwater repairs, or for installation and maintenance of the staircases and navigation aid pad. Not removing the shoal would limit the ability of the contractor to fully access and construct all needed repairs to the breakwater; however, breakwater repair would still occur to the extent possible as detailed in the June 2019 EA. Not replacing and performing maintenance for the navigation aid pad would result in a loss of harbor navigational safety and potential losses to life and property. Not installing staircases increases the risk for personnel to safely access the detached breakwater.

3.2.2 Alternatives Considered

Proposed Action. The proposed repair work, described more fully in Section 1.1, would consist of excavating the leeward side of the detached breakwater of accumulated material. This excavation in turn would allow access for the proposed staircase installations and replacement of the navigation aid pad.

SECTION 4 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section provides a discussion of the affected environment and assessment of potential impacts associated with the proposed project and no action alternative. Only those Affected

Environments relevant to this Supplemental Environmental Assessment are covered. These include Oceanography and Water Quality and Oceanography, Marine Resources,and Cultural Resources, Air Quality and Aesthetics. Additional Affected Environment elements and the fuller spectrum of Environmental Consequences related to breakwater and jetty repair are discussed and analyzed in the June 2019 Channel Islands Breakwater and Jetty Repair Project Environmental Assessment. Additional Environmental Consequences related to the shoal excavation are discussed and analyzed in the August 2018 Channel Islands-Port Hueneme Maintenance Dredging Environmental Assessment.

The proposed action has been preliminarily coordinated with the Environmental Protection Agency, California Coastal Commission, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Los Angeles Regional Water Quality Control Board. Analysis of the proposed action and the 2017-2018 Channel Islands Harbor Sediment Analysis Plan Report confirms the sandy material is suitable for side-cast placement. The proposed action has been presented at the Southern California Dredge Materials Management Team (SC-DMMT) meeting on December 9, 2020

4.1 Oceanography and Water Quality

4.1.1 Affected Environment. The tides in southern California are mixed, semi-diurnal tides with two unequal high tides and low tides roughly per day. Tidal variations are caused by the passage of two harmonic tidal waves; one with a period of 12.5 hours and one with a period of 25 hours. This causes a difference in height between successive high and low waters. The result is two high waters and two low waters each day, consisting of a higher high water and a lower high water, and a higher low water and a lower low water; respectively referred to as higher high water (HHW), lower high water (LHW), higher low water (HLW), and lower low water (LLW).

A greater than average range between HHW and LLW occurs when the moon, sun, and earth are aligned with each other to create a large gravitational effect. This spring tide corresponds to the phenomenon of a new or full moon. Neap tides, which occur during the first and third quarters of the moon, have a narrower range between HHW and LLW. In this situation, the moon, sun, and earth are perpendicular to each other, thereby reducing the gravitational effects on water levels. The mean tidal range for the project site is 5.4 feet. The extreme range is about 9.5 feet.

Water quality is typically characterized by salinity, pH, temperature, clarity, and dissolved oxygen (DO). Table 2 characterizes the overall water quality parameters for the project site:

Table 2
Water Quality Characteristics

Parameters	Project Site
Salinity (ppt)	32.9 to 34.4
Surface Temperature (F)	55 to 66
pH	7.4 to 7.6
Clarity (ft.)	13 to 15
D.O. (mg/l)	8.9

4.1.2 Environmental Consequences.

Significance Criteria. An impact to Oceanography and Water Quality will be considered significant if the proposed project would:

- Cause substantial changes in topography or physical processes acting on the system
- Cause water quality conditions that have potential deleterious effects on human, fish, or plant life;
- Cause substantial, long-lasting or dangerous levels of pollution or contamination.

Proposed Action.
Excavation of the shoal in the lee of the breakwater would not cause any lasting effects. Due to the relatively small footprint of the excavation work, any water quality effects including turbidity would be localized to the immediate work area, and generally short term. The plume resulting from sediment disturbance is not expected to travel beyond the immediate excavation and placement sites, and is not part of the littoral cell transport system. The excavation of the shoal would result in the removal of accumulated material on the leeward side of the breakwater, and a steeper elevation drop from the breakwater. The shoaled sediments have been characterized as >90% sand compatible with Area B and Area C of the sand trap, according to the 2017-18 Channel Islands Harbor Sediment Analysis Plan Report. The sediments sampled from adjacent locations to the breakwater revealed no physical or chemical contamination.

Installation of staircases could trigger small amounts of potential runoff from sediment and dust adhering to the stone and concrete which may become temporarily suspended in the water column and cause a slight increase in turbidity. Minimal grouting and rock drilling runoff may occur during the installation of staircases. The navigation aid pad will be installed well above the mean higher high waterline and is not expected to generate runoff or dust.

The proposed project will not substantively change topography or physical processes, cause deleterious water quality conditions or cause substantial levels of pollution or contamination; therefore, no significant impacts to oceanography or water quality.

No Action Alternative. No significant impacts would occur for Oceanography and Water Quality under the No Action Alternative.

4.2 Marine Resources

4.2.1 Affected Environment. An in-depth analysis of the Affected Environment covering Vegetation, Invertebrates, Fishes, Birds and Marine Mammals was included in the Channel Islands Harbor Breakwater and Jetty Repair June 2019 EA, including Threatened and Endangered Species as mandated by the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. § 1531 *et seq*.). The detached breakwater's leeward side where excavation is proposed is largely sandy bottom habit typical of the area. A bed of feather boa kelp *(Egregia menziesii)* dominates the entire perimeter of the detached breakwater from the waterline to approximately -12 feet MLLW per biological surveys conducted in September 2020. Other benthic organisms such as bivalves and crabs may be present on the substrate. While the proposed 17 acre excavation action is much smaller than the biennial dredging footprint, some affected environments are present within the proposed action of this Supplemental EA:

Invertebrates. The invertebrate population in the proposed project areas is expected to be similar to adjacent open coast, shallow water habitat. Common invertebrate faunal species consist of the sand crab (*Emerita anloga*), clams (i.e. *Tellina modesta*), and polychaetes (i.e. *Nephtys cliforniensis*). **Fishes.** Common fish species in the shallow offshore environments and in the harbors include thornback rays (*Platyrhinoides triseriata*), lizard fish (*Synodus lucioceps*), speckled sanddab (*Cithrichthys stigmaeus*), northern anchovy (*Engraulis mordax*), white croaker (*Genyonemus lineatus*), and walleye surfperch (*Hyperprosopon argenteum*). The breakwater and jetties support the following fishes: Garibaldi (*Hypsypops rubicundus*), sargo (*Anisotremus davidsonii*), opaleye (*Girella nigricans*), rock wrasse (*Halichoeres semicinctus*), senorita (*Oxyjulis californica*), half moon (*Medialuna californiensis*), and kelp bass (*Paralabrax clathratus*) use the interstitial spaces between rocks and rock cracks to breed, shelter, and forage for food. **Birds.** The breakwater and jetties provide loafing, foraging, and roosting areas for a variety of shorebirds and waterfowl. Brown pelicans (*Pelecanus occidentalis californicus*), gulls (*Larus* spp), double-crested cormorants (*Phalacrocorax auritus*), and elegant terns (*Thalasseus elegans*), use the breakwater and jetties for their respective life history requirements. Seabirds observed foraging in nearshore waters include western grebes (*Aechmophorus occidentalis*), scoters (*Melanita* spp), and loons (*Gavia* spp). **Marine Mammals.** California sea lions (*Zalophus caliornianus*) are commonly observed foraging in the entrance channel and harbor, as well as resting on the breakwater jetties and navigational buoys. Several other marine mammal species that use the area, and are observed offshore, include harbor seals (*Phoca vitulina*), and whales and porpoises including pilot whale, *Globicephala macrorhynchus*; harbor porpoise, *Phocena phocena*; common dolphin, *Delphinus delphis*; Pacific white-sided dolphin, *Lagenorhynchus obliquidens*; and the bottlenose dolphin, *Tursiops truncatus*. Marine mammals are protected by the Marine Mammal Protection Act (MMPA).

4.2.2 Environmental Consequences

Significance Criteria. An impact to Marine Resources will be considered significant if the proposed project would:

- Degrade habitat for, or reduce, the population size of a federally listed species;
- Cause a net loss in value of a sensitive biological habitat including a marine mammal haul out site or breeding area, seabird rookery
- Impede the movement or migration of fish;
- Cause a substantial loss in the population or habitat of any native fish, wildlife, or vegetation (a substantial loss is defined as any change in a population which is detectable over natural variability for a period of 5 years or longer).

Proposed Action. Excavation Impacts. Direct impacts (habitat loss/degradation or reduction in population size) to marine resources would be temporary and limited to the excavation template and placement sites. Temporary increases in turbidity and suspended solids may occur during excavation which could decrease the amount of DO near the dredge site, thus temporarily affecting fish and other marine life within the immediate area. Organisms may be exposed to suspended sediment concentrations 24 during excavation and up to 24 hours later for a distance generally 100 to 500 feet. Motile species are expected to relocate out of the area until excavation and sidecasting activities are finished. Some marine populations, particularly benthic organisms, would be destroyed by excavation, but are expected to recolonize the area once excavation has ceased. The *Egregia* surrounding the breakwater would rapidly regrow. **Staircase and Navigation Aid Pad Impacts.** Direct impacts to marine resources would be temporary and mainly to roosting bird species utilizing the breakwater. The presence of construction personnel is the main driver flushing birds from the breakwater. Birds would have other suitable roosting habitat available on other jetties and elevated perches and would be expected to return to the breakwater when work is complete. Marine mammals are not expected to be present due to the height, large diameter and angularity of the stones, and steepness of each structure's embankment walls. Marine invertebrates such as mussels and barnacles and marine algaes will displaced and/or crushed during installation of concrete structures, and will be limited to the work area of staircases and navigation aid pad above 0.0 feet MLLW.

The proposed project will not degrade habitat or reduce populations of any federally listed species, or cause any loss to sensitive biological habitat. The proposed project will not impede the movement of fish or cause any substantial losses in populations or habitats of native fishes, wildlife or vegetation. Thus, there are no significant impacts to marine resources.

Essential Fish Habitat (EFH). In accordance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act, an assessment of Essential Fish Habitat (EFH) has been conducted for the proposed breakwater and jetty repair work. The proposed project is located within an area designated as EFH for two Fishery Management Plans (FMPs): Coastal Pelagics Plan and Pacific Groundfish Management Plan. Many of the 90 species federally managed under these plans are known to occur in the area and could be affected by proposed project activities. Channel Islands Harbor and surrounding waters provide habitat for several of these species, including the northern anchovy (*Engraulis mordax*), Pacific sanddab (*Citharichthys sordidus*), and several species of rockfishes (*Sebastes* spp.) The harbor and adjacent habitats are not identified as important fish breeding or nursery areas. A bed of feather boa kelp *(Egregia menziesii)* dominates the entire perimeter of the detached breakwater from the waterline to approximately -12 feet MLLW per biological surveys conducted in September 2020. The survey, conducted by Merkel and Associates, found no eelgrass or surfgrass in the detached breakwater area. Absence of canopy kelp was also noted.

This section and Section 4.2.2 of this EA constitutes the Corps' EFH Assessment for the proposed federal action.

No Action Alternative. Impacts from proposed modifications (excavation, sidecasting, and placement of stairs and navigation aids) would not occur. Deterioration and failure of the existing harbor structures would be another consequence.

4.3 Cultural Resources

4.3.1 Affected Environment

The Channel Islands Breakwater was completed in 1959 as such, is considered a historic property. To meet Corps obligations under Section 110 of the National Historic Preservation Act (NHPA), the U.S. Army Corps of Engineers, Technical Center of Expertise for the Preservation of Historic Structures and Building evaluated the eligibility of the breakwater for listing in the

National Register of Historic Places (NRHP). In correspondence dating Oct 30, 2018, the California State Historic Preservation Officer (SHPO) agreed with the Corps' finding the breakwater is not eligible for the NRHP. The correspondence also identified several maintenance and repair actions to be performed on the structure. Since that time, additional actions have been proposed, including minor dredging on the leeward side of the breakwater to enable safe access for repair work, the addition of concrete steps to facilitate maintenance, and the removal and replacement of a concrete navigation aid base. The Corps reinitiated consultation with the SHPO to address potential effects of the new undertaking on a historic property and submitted a finding of no historic properties affected. In correspondence dated December 15, 2020 the SHPO agreed no historic properties would be affected by the additional actions.

4.3.2 Environmental Consequences

Significance Criteria. An impact to Cultural Resources will be considered significant if the proposed project would:

- Compromise the character defining features and qualities of a historic property eligible for listing in the National Register of Historic Places (NRHP);
- Adversely affect the setting, feeling, and association of a nearby or adjacent property eligible for listing in the NRHP;
- Introduce environmental or physiological changes that could damage the integrity of a NRHP eligible property;
- Harm culturally sensitive properties or properties of a religious nature

Proposed Action.

The project will install three sets of concrete stairs on top of the breakwater, replace a concrete navigation aid base, and dredge shoaled sediments from the leeward side of the structure. Because the breakwater was determined not eligible for listing in the NRHP, installation of steps and replacement of the navigation aid will not change the eligibility status of a historic property. The clamshell dredge will remove the upper 7' of leeward sediments accumulated next to the breakwater since construction in 1959. Excavation therefore will not impact original seafloor.

No Action Alternative.

Installation of concrete steps, replacement of the navigational aid base and access dredging would not occur. Because the breakwater is not eligible for listing in the NRHP, lack of action would pose no consequences to the property or to adjacent historic properties.

4.4 Air Quality

4.4.1 Affected Environment. The proposed action is located within the South Central Coast Air Basin, localized to the Oxnard, California area. Ambient air quality is considered good in the proposed action area of the detached breakwater. The project is located within the Ventura County portion of the South Central Coast Air Basin (SCCAB) under the jurisdiction of the

Ventura County Air Pollution Control District (VCAPCD). The Channel Islands-Port Hueneme Maintenance Dredging August 2018 EA details the air quality criterion and calculations.

4.4.2 Environmental Consequences. An impact to Air Quality will be considered significant if the proposed project would exceed the applicability rates specified in 40 CFR 93.153. Conformity criterion of the Clean Air Act (CAA) Section 176© are outlined in the Channel Islands-Port Hueneme Maintenance Dredging EA from August 2018, and attainment statuses of the South Central Coast Air Basin are summarized. **Excavation Impacts.** Emissions associated with the proposed excavation activities will come mainly from the excavation motor drive. A crew boat would be used to ferry crew out to the derrick barge and for miscellaneous transport of personnel and equipment on an as-needed basis. Air emissions calculations for the proposed action are provided in Appendix D of the Channel Islands-Port Hueneme Maintenance Dredging EA, and results are provided in Table 4. Given the very short time frame of the proposed excavation, emissions will be minimal. **Staircase and Navigation Aid Pad Impacts.** The equipment used for the navigation aid pad will likely consist of jackhammers to perform any concrete breaking, and use of the clamshell bucket on the barge to lift the concrete. A concrete mixer on the barge will likely be used in the staircase installation and navigation aid pad replacement.

No Action Alternative. Breakwater excavation and repair would not occur, nor staircase installation or navigation aid pad replacement. However, if further harbor structure deterioration occurs, frequent emergency operations to repair the breakwater and jetties may be undertaken to maintain navigable conditions. If emergency repair work were necessary, temporary increases in emissions from the construction equipment, ancillary vessels, and laborers' vehicles would be expected. This increase would be short term and less than significant.

4.5 Aesthetics

4.5.1 Affected Environment. The overall aesthetic character of the project area is composed of a mix of residential and water-oriented facilities. The beaches further add to the overall impression of a recreational-oriented visual setting. The area is well maintained. The natural resources in the area provide a visually attractive setting and relaxing atmosphere for residents and tourists.

4.5.2 Environmental Consequences

Significance Criteria. The project would significantly impact the aesthetics if a landscape is changed in a manner that permanently and significantly degrades an existing viewshed or alters the character of a viewshed by adding incompatible structures.

Proposed Action. The presence of construction equipment for breakwater and jetty repairs would result in mixed impacts depending on the opinion of the viewer. Many viewers will consider the presence of the construction equipment to be an adverse impact, interrupting viewpoints from local land points and from boats. Other viewers may consider the presence of construction equipment and construction activity to be beneficial impacts, providing an interesting feature to watch from a safe distance (construction activity of this type often attracts curious onlookers). Given that the crane-equipped barge and support vessels for the proposed repair activities would be present during the tourist season, but located in off-shore areas away from beaches, and construction activity would be a short-term impact, aesthetic impacts would be less than significant. The addition of three staircases would be less than significant for the aesthetic environments, as the distance from shore would render them barely visible. The replacement of the navigational aid would be an in-kind repair and no change to the aesthetics.

No action alternative. Not excavating the leeward shoal of the detached breakwater would not result in any perceivable aesthetic change. Non-replacement of the navigation aid pad would result in the deterioration of the existing navigation aid and possible failure. Not installing staircases would result in less safe access to the breakwater for personnel. There would be no significant impacts under the no action alternative.

4.6 Cumulative Impacts

Cumulative impacts are impacts on the environment that would result from the incremental effect of the proposed action when combined with other past, present, and reasonably foreseeable planned and proposed actions. Neither the currently proposed excavation or the addition of staircases would result in significant impacts, and the navigation aid pad is a replacement of an existing structure. The proposed breakwater and jetty repair, as well as ongoing biennial maintenance dredging are not expected to result in significant impacts. Because all of this work is being conducted within the same general footprint/disturbance area and within the same general timeframe, no additional cumulative impacts are anticipated.

SECTION 5 – ENVIRONMENTAL COMPLIANCE AND COMMITMENTS

5.1 COMPLIANCE

5.1.1 National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 et seq.,); Council on Environmental Quality Regulations for Implementing NEPA, 40 CFR Parts 1500 to 1508; Corps Regulations for Implementing NEPA, 33 CFR Part 230.

This Draft Supplemental EA has been prepared to address impacts associated with the proposed project. This Draft EA will be circulated for public review. If it is determined after public review that the project will not have a significant impact upon the quality of the human environment, then a Finding of No Significant Impact will be prepared and preparation of an environmental impact statement would not be required.

5.1.2 Clean Water Act.

The Clean Water Act (CWA) was passed to restore and maintain chemical, physical, and biological integrity of the Nation's waters. Specific sections of the CWA control the discharge of pollutants and wastes into aquatic and marine environments. The major section of the CWA that applies to the proposed project is Section 401, which requires certification that the permitted project complies with the State Water Quality Standards for actions within state waters, and Section 404(b)(1), which establishes guidelines for discharge of dredged or fill materials into an aquatic ecosystem. The Corps applied for a Section 401 Water Quality Certification (WQC) from the Los Angeles Regional Water Quality Control Board (LARWQCB) on November 25, 2020 for the proposed action including shoal excavation, installation of staircases and replacement of navigation aid pad. Upon receipt of the 401 WQC, the proposed project modifications will be in compliance with the Clean Water Act.

5.1.3 Endangered Species Act.

Under ESA Section 7(a)(2), each federal agency must ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of the species' designated critical habitat (16 U.S.C. § 1536(a)(2)). If an agency determines that its actions "may affect" a listed species or its critical habitat, the agency must conduct informal or formal consultation, as appropriate, with either the USFWS or the NMFS, depending on the species at issue (50 C.F.R. §§402.01, 402.14(a)–(b)). If, however, the action agency independently determines that the action would have "no effect" on listed species or critical habitat, the agency has no further obligations under the ESA.

The proposed action has no effect on any threatened or endangered species, and therefore no consultation is required with USFWS or NMFS. The proposed action complies with the Endangered Species Act.

5.1.4 Coastal Zone Management Act.

Section 307 of the CZMA states that federal activities within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs. The California Coastal Act is this state's approved coastal management program applicable to the federal action. The Corps initiated coordination on the proposed action on November 2, 2020 with California Coastal Commission, and received preliminary concurrence for an amended negative determination that includes the proposed action described in this Supplemental EA.

5.1.5 Clean Air Act.

The project is located within the Ventura County portion of the SCCAB under the jurisdiction of the VCAPCD. A conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the applicability rates specified in 40 CFR 93.153(b)(1). Ventura County is only in nonattainment (serious) for 8-hour ozone. The Los Angeles County portion of the SCAB is in extreme nonattainment for the federal 8-hour ozone, nonattainment for PM2.5, and in maintenance for PM10, Nox, and CO. As shown in Tables 4 and 5 of the 2019 EA, the total direct and indirect emissions associated with the federal action are not expected to equal or exceed the applicability rates specified at 40 CFR 93.153(b). A general conformity determination is not required. Therefore, the project is consistent with the SIP and meets the requirements of Section 176(c) of the CAA.

5.1.6 National Historic Preservation Act.

Section 106 of the NHPA requires Federal agencies to take into account the effects of undertakings they carry out, assist, fund, or permit on historic properties and to provide the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Federal agencies meet this requirement by completing the Section 106 process set forth in the implementing regulations, "Protection of Historic Properties," 36 C.F.R. Part 800. The goal of the Section 106 process is to identify and to consider historic properties that might be affected by an undertaking and to attempt to resolve any adverse effects through consultation. The Corps consulted with SHPO on the determination of the APE and identification efforts and on December 15, 2020 SHPO concurred with the Corps' determination that no historic properties would be affected by the proposed project. The project is in compliance with the Act.

5.1.7 Section 10 of the Rivers and Harbors Act.

Section 10 of the Rivers and Harbors Act approved March 3, 1899, (33 U.S.C. 403), prohibits the unauthorized obstruction or alteration of any navigable water of the United States. The construction of any structure in or over any navigable water of the United States, the excavating from or depositing of material in such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. Excavation and maintenance activities are not anticipated to have any effect on navigation into Channel Islands Harbor. The Harbor is a small boat harbor. Craft large enough to interfere with excavation and repair work would not be using the waterway. The shoal excavation, staircase installation and navigation aid pad replacement do not alter or obstruct any waters of the United States. The project is in compliance with the Rivers and Harbors Act.

5.1.8 Magnuson-Stevens Fishery Management and Conservation Act.

This Draft Supplemental EA is subject to an EFH Assessment as required by the Magnuson-Stevens Act. Although construction activities will occur within 17 acres of Essential Fish Habitat, the USACE has determined that the proposed project may adversely affect EFH, but would not result in a significant, adverse impact. Pursuant to 50 CFR 600.920(1), the Corps must reinitiate EFH consultation with NMFS if the proposed project is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendation. In compliance with the coordination and consultation requirements of the Act, the Draft Supplemental EA will be sent to the NMFS for review and comment. Upon receipt of their comments, or upon completion of the public review period if no comments are received, the project will be in full compliance with this Act.

5.1.9 Executive Order 12898, Environmental Justice in Minority and Low-Income Populations

E.O. 12898 focuses Federal attention on the environment and human health conditions of minority and low-income communities and calls on agencies to achieve environmental justice as part of its mission. The order requires the USEPA and all other Federal agencies (as well as state agencies receiving Federal funds) to develop strategies to address this issue as part of the NEPA process. The agencies are required to identify and address, as appropriate, any disproportionately high and adverse human health or environmental impacts of their programs, policies, and activities on minority and low-income populations. The order makes clear that its provisions apply fully to programs involving Native Americans. The CEQ has oversight responsibility for the Federal government's compliance with E.O. 12898 and NEPA. The CEQ, in consultation with the USEPA and other agencies, has developed guidance to assist Federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. According to the CEQ's Environmental Justice Guidance Under the National Environmental Policy Act, agencies should consider the composition of the affected area to determine whether minority populations or low-income populations are present in the area affected by the proposed action, and if so whether there may be disproportionately high and adverse human health or environmental impacts (CEQ 1997). The proposed project is in compliance. There would be no impacts resulting from the proposed project that would result in disproportionately high and adverse impacts to minority and low income communities.

Executive Order 11988, Floodplain Management

Signed May 24, 1977, this order requires that government agencies, in carrying out their responsibilities, provide leadership and take action to restore and preserve the natural and beneficial values served by floodplains. Before proposing, conducting, supporting or allowing an action in the floodplain, each agency is to determine if planned activities will affect the floodplain and evaluate the potential effects of the intended action on its functions. In addition, agencies shall avoid locating development in a floodplain to avoid adverse effects in the floodplains. The eight-step process outlined in ER 1165-2-26, para. 8, General Procedures was followed.

The Corps is responsible for maintaining the Federally-authorized channel design at the Channel Islands Harbor, which is located within the floodplain. The purpose of the proposed project is to provide a plan that allows for the repair and maintenance of the existing breakwater and two jetties, promoting navigation safety. Maintenance of the Harbor's structural components requires project activities within the floodplain. The action does not negatively affect the natural and beneficial values of the floodplain. The proposed action does not induce floodplain development or increase risks to public safety. The proposed project is in compliance with this Executive Order.

ENVIRONMENTAL COMMITMENTS

The proposed project includes the following environmental commitments that would be included in contract specifications:

1. It is the Contractor's responsibility to obtain all applicable air permits and comply with federal, state, and local air and noise regulations.

2. In the event that previously unknown cultural resources are discovered during the project,

all ground disturbing activities shall immediately cease within 200 feet of the discovery until the Corps has met the requirement of 36 CFR 800.13 regarding post-review discoveries. The Corps shall evaluate the eligibility of such resources for listing on the National Register of Historic Places and propose actions to resolve any anticipated adverse effects. Work shall not resume in the area surrounding the potential historic property until the Corps re-authorizes project construction.

3. The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters.

4. The Contractor will be required to have in place a Spill Prevention and Cleanup Plan that includes measures to prevent spills and to cleanup any spills that could occur.

5. All construction and repair activities will remain within the boundaries specified in the plans. There will be no dumping of fill or material outside of the project area or within any adjacent aquatic community.

6. The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife.

7. The Contractor shall mark their vessels, and all associated equipment, in accordance with U.S. Coast Guard regulations. The contractor must contact the U.S. Coast Guard two weeks prior to the commencement of construction and repair activities. The following information shall be provided: the size and type of equipment to be used; names and radio call signs for all working vessels; telephone number for on-site contact with the project engineer; the schedule for completing the project; and any hazards to navigation.

8. The contractor shall move equipment upon request by the U.S. Coast Guard and Harbor patrol law enforcement and rescue vessels.

9. The following avoidance and minimization measures would be implemented to ameliorate potential impacts from construction and dredging activities in the proposed action area:
   - The limits of construction and dredging activities shall be clearly marked or maintained with GPS coordinates prevent heavy equipment from entering areas beyond the smallest footprint needed to complete the project.
   - Vehicles and all construction-related activities shall remain within the defined activity area and use only designated access points and staging areas.

- The work area shall be kept clean to avoid attracting predators. All food and trash shall be disposed of in closed containers and removed from the project site.
- No pets shall be allowed on the construction site.

SECTION 6 – REFERENCES

Barringer, Debra. 2017. Hollywood Beach Breeding Season Monitoring Report for the Western Snowy Plover and California Least Tern. Ventura Audubon Society.

2016. Hollywood Beach Breeding Season Monitoring Report for the Western Snowy Plover and California Least Tern. Ventura Audubon Society.

2015. Hollywood Beach Breeding Season Monitoring Report for the Western Snowy Plover and California Least Tern. Ventura Audubon Society.

Parsons Engineering Science, Inc. 1996. Letter report from Marlund Hale to James McNally, Great Lakes Dredge & Dock Company, regarding Noise Level Testing Weekend Day Results.

U.S. Fish & Wildlife Service (USFWS). 2012. Revised Designation of Critical Habitat for the Pacific Coast Population of the Western Snowy Plover, Final Rule. Federal Register. June.

SECTION 7 – ACRONYMS

ACHP....................................Advisory Council on Historic Preservation
APE.......................................Area of Potential Effects
ARB......................................Air Resources Board
ASBS.....................................Area of Special Biological Significance
CAA......................................Clean Air Act
CEQ.......................................Council on Environmental Quality
CO...Carbon monoxide
CWA.....................................Clean Water Act
DO...Dissolved oxygen
EA...Environmental Assessment
EFH.......................................Essential Fish Habitat
ESA.......................................Endangered Species Act
FEA.......................................Final Environmental Assessment
FMP.......................................Fishery Management Plan
FONSI...................................Finding of No Significant Impact
FWCA...................................Fish and Wildlife Coordination Act
LAD......................................Los Angeles District
MLLW..................................Mean Lower Low Water
NEPA....................................National Environmental Policy Act
NHPA....................................National Historic Preservation Act
NMFS....................................National Marine Fisheries Service

NO2..Nitrogen dioxide
PL...Public Law
SHPO ....State Historic Preservation Officer
SIP..State Implementation Plan
USACE ..................................U.S. Army Corps of Engineers
USFWS .................................U.S. Fish and Wildlife Service
VCAPCD ....Ventura County Air Pollution Control District

SECTION 8 – PREPARERS/REVIEWERS

8.1 Preparers

Kymberly Howo	Corps, Biologist, Regional Planning Section
Lauren McCroskey	Corps, Archeologist, Regional Planning Section

8.2 Reviewers

Tiffany Bostwick	Corps, Acting Chief, Environmental Resources Branch
Hayley Lovan	Corps, Chief, Ecosystem Restoration Branch

FIGURES

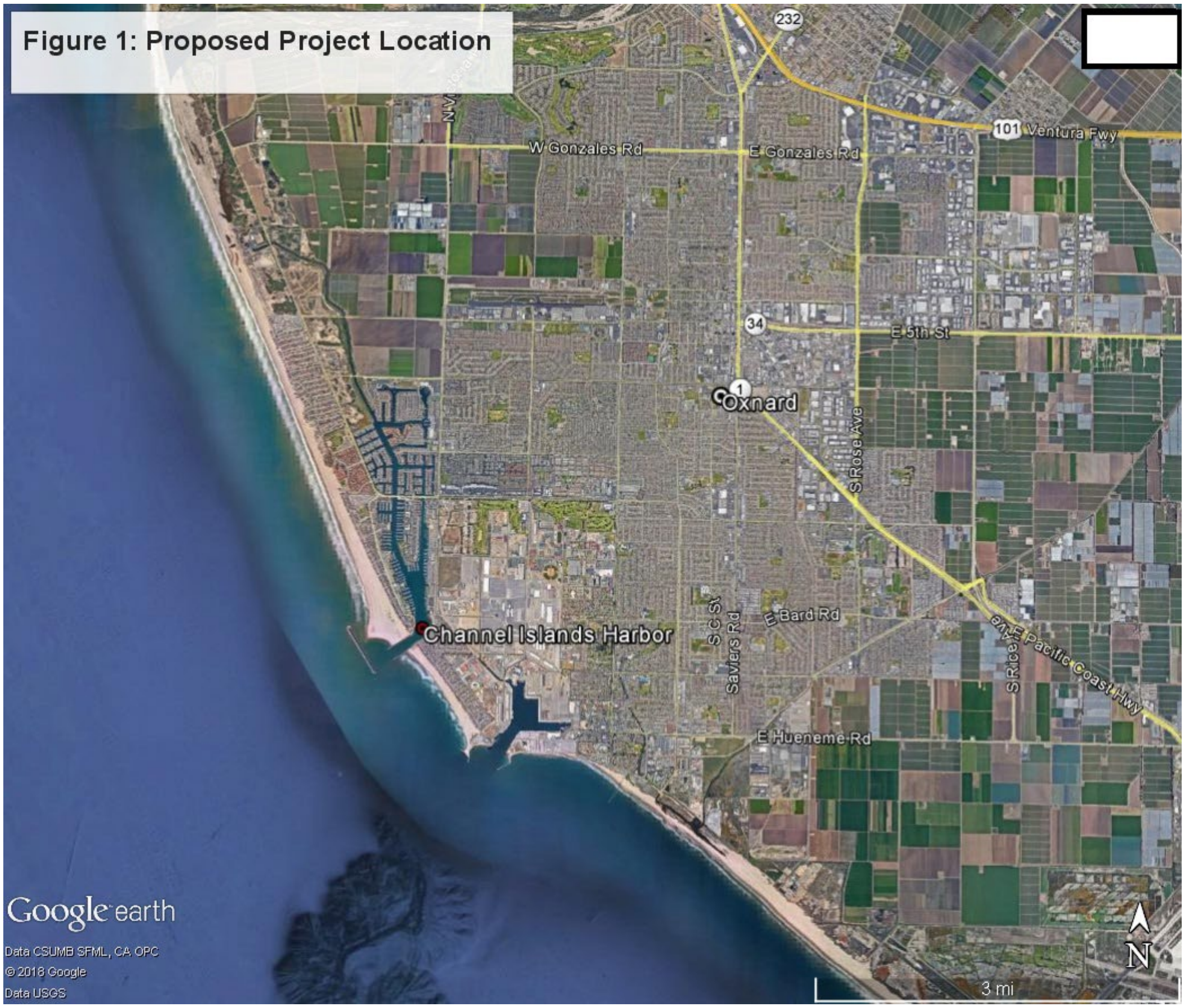


Figure 1

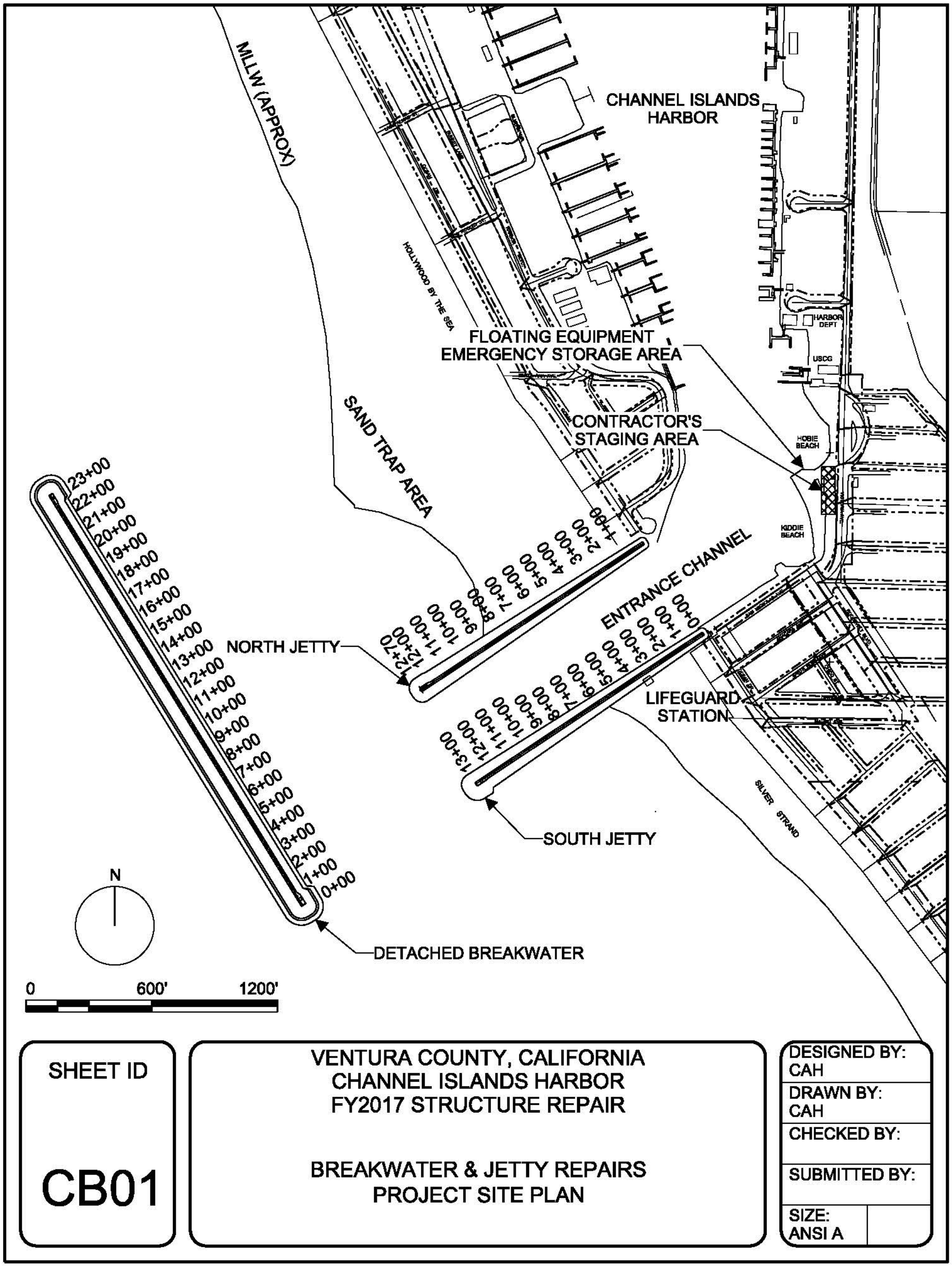
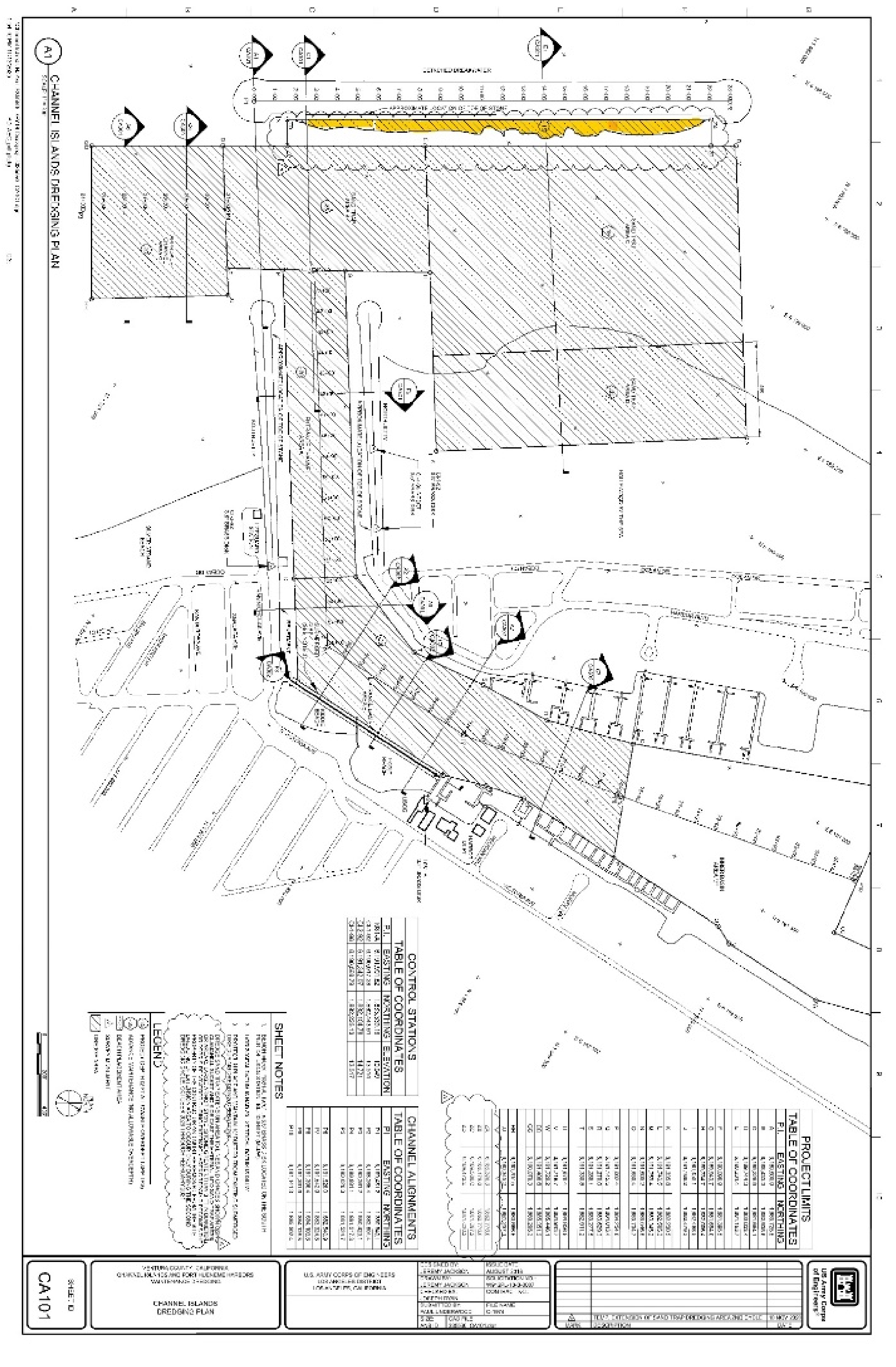

CHANNEL ISLANDS HARBOR
MLLW (APPROX)
HOLLYWOOD BY THE SEA
FLOATING EQUIPMENT EMERGENCY STORAGE AREA
HARBOR DEPT
USCG
CONTRACTOR'S STAGING AREA
HOBIE BEACH
KIDDIE BEACH
SAND TRAP AREA
ENTRANCE CHANNEL
NORTH JETTY
LIFEGUARD STATION
SOUTH JETTY
SILVER STRAND
DETACHED BREAKWATER
N
0
600'
1200'
SHEET ID
CB01
VENTURA COUNTY, CALIFORNIA
CHANNEL ISLANDS HARBOR
FY2017 STRUCTURE REPAIR
BREAKWATER & JETTY REPAIRS
PROJECT SITE PLAN
DESIGNED BY: CAH
DRAWN BY: CAH
CHECKED BY:
SUBMITTED BY:
SIZE: ANSI A

Figure 2


Channel Islands Harbor Breakwater/Jetty
Area of Potential Effect
Channel Islands Harbor Jetties
Kiddie Park
Staging Area
Channel Islands
Harbor Breakwater
Silver Strand
Staging Area
Project Locations
Miles
0 0.075 0.15 0.3
1:12,000
N
W
E
S
Copyright:© 2013 National Geographic Society, i-cubed, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 3



CHANNEL ISLANDS DREDGING PLAN
CONTROL STATIONS
TABLE OF COORDINATES
CHANNEL ALIGNMENTS
TABLE OF COORDINATES
PROJECT LIMITS
TABLE OF COORDINATES
SHEET NOTES
LEGEND
U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES, CALIFORNIA
CHANNEL ISLANDS
DREDGING PLAN
CA101

Figure 4

APPENDIX A- MAILING LIST

Dept. of Parks and Recreation
Division of Boating & Waterways
One Capitol Mall, Suite 500
Sacramento, CA 95814

Ken Alex, Director Chris Delith
U.S. Fish & Wildlife Service
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, CA 93003

Melissa Scianni
U.S. Environmental Protection Agency
600 Wilshire Boulevard Suite 940
Los Angeles, CA 90017

Allan Ota
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Jun Zhu
Regional Water Quality Control Board
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

Mr. Chris Yates
Assistant Regional Administrator
ATTN: Bryant Chesney
National Marine Fisheries Service
501 W. Ocean Blvd., Suite 4200
Long Beach, CA 92802

Commanding Officer
US Coast Guard
Sector LA-LB
1001 South Seaside Avenue, Bldg 20
San Pedro, CA 90731

Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

John Laird, Secretary
California Natural Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Michael J. Villegas,
Executive Officer
Ventura Air Pollution Control District
669 County Square Drive, 2nd Floor
Ventura, CA 93003

State Clearing House
1400 Tenth Street, Room 121
Sacramento, CA 95814

California State Lands Commission
100 Howe Avenue, Suite 100 South
Sacramento, CA 95852

Carrie Bowen
State of California Dept. of Transportation, District 7
100 South Main Street
Los Angeles, CA 90012

Julianne Polanco
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, CA 95816

John Ainsworth
Executive Director
ATTN: Larry Simon
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Chad Lousen
Naval Base Ventura County
311 Main Road, Bldg 632
Point Mugu, CA, 93042

Loni Adams
California Department of Fish & Wildlife
3883 Ruffin Road
San Diego, CA 92123

Rod Butler
City Manager
City of Port Hueneme
250 North Ventura Road
Port Hueneme CA 93041

Ashley Golden
Development Services Director
City of Oxnard
214 South C Street
Oxnard CA 93030

Akbar Alikhan
General Manager
Channel Islands Beach Community Services District
353 Santa Monica Drive
Oxnard CA 93035-4473

Channel Islands National Park
National Park Service
1901 Spinnaker Drive
Ventura, CA 93001

Karen Miner
California Department of Fish & Wildlife
3883 Ruffin Road
San Diego, CA 92123

Kimberly Prillhart
Planning Director
County of Ventura
800 South Victoria Ave
Ventura, CA 93009

Interim Director, Harbor Department
County of Ventura
3900 Pelican Way, L#5200
Oxnard, CA 93035

Merkel & Associates, Inc.
5434 Ruffin Road, San Diego, CA 92123
Tel: 858/560-5465 • Fax: 858/560-7779
e-mail: associates@merkelinc.com

September 21, 2020
M&A #20-075-01

U.S. Army Corps of Engineers
Attn: Ms. Natalie Martinez-Takeshita
915 Wilshire Blvd, Suite 930
Los Angeles, CA 90017-3401

Connolly-Pacific Co.
Attn: Caleb Shen
1925 Pier D St.
Long Beach, CA, 90802

Pre-construction Seagrass and Canopy Kelp Surveys Report
In Support of the Channel Islands Harbor Breakwater and Jetty Repairs Project

Dear Ms. Martinez-Takeshita and Mr. Shen:

PURPOSE AND INTRODUCTION

The Army Corps of Engineers is completing repairs of the north and south ocean inlet jetties and detached breakwater at Channel Islands Harbor, Ventura County, California under the Channel Islands Harbor Breakwater and Jetty Repairs Project (Project). The Corps has retained Connolly-Pacific Company (C-P) to complete the repairs under Contract No. W912PL-20-C-0011. Merkel & Associates Inc. (M&A) has been retained by C-P to complete environmental surveys in support of the planned work.

Under the Magnuson–Stevens Fishery Conservation and Management Act, the National Marine Fisheries Service (NMFS) is charged with providing for the development and implementation of Fishery Management Plans (FMPs) that include designation of Essential Fish Habitat (EFH). Under EFH, a special category of habitats have been identified as Habitat Areas of Particular Concern (HAPC). Seagrass communities and canopy kelp communities fall within this defined HAPC for the Pacific Coast Groundfish Fishery Management Plan (FMP). As a result, the Corps has requested surveys focusing on these resources as follows:

- **Eelgrass Survey**: A focused pre-construction eelgrass survey and mapping is to occur within the Area of Potential Effects (APE) within the Channel Islands Harbor and immediate vicinity as illustrated in Figure 1;

- **Canopy Kelp Survey**: A pre-construction canopy kelp survey, mapping, and characterization is to be completed within the APE as shown in Figure 1;

- **Surfgrass Survey**: A focused pre-construction surfgrass survey and mapping of the intertidal and subtidal areas of the detached breakwater, north and south jetties in the following areas: Detached Breakwater (leeward, seaward, radius of North and South heads: Station

N
W
E
S

Pre-construction Eelgrass, Canopy Kelp, and Surfgrass Survey Areas

Channel Islands Harbor Breakwater and Jetty Repairs
Ventura County, CA

Figure 1

0+00 to Station 23+00) North Jetty Head Section (channel, seaward, radius of head: Station 9+50 to Station 12+70) South Jetty Head and Trunk Section (channel, seaward, radius of head: Station 2+75 to Station 13+00). All surfgrass survey areas have been expanded to include buffers beyond the defined survey requirements. The surveyed areas are illustrated in Figure 1.

PROJECT LOCATION AND SURVEY AREA

Surveys were completed within the outer federal channel areas, channel jetties and detached breakwater of Channel Islands Harbor, Ventura County, California (Figure 1).

Eelgrass and kelp habitat surveys were conducted within a 180-acre survey area. This is smaller than the estimated 205 acres outlined in the RPF due to limiting the survey area to areas within water at the time of the survey. The primary reduction in footprint from the RFP is located on Hollywood Beach north of the North Jetty.

Surfgrass surveys were completed in more discrete areas located around the individual repair areas identified within the Project. The survey areas were located at the north jetty head, the south jetty head and trunk, and over the entirety of the detached breakwater (Figure 1).

SURVEY METHODOLOGY

M&A conducted the eelgrass and surfgrass surveys from September 8 - 11, 2020. Spatial extent data were collected using three different survey tools, interferometric sidescan sonar (ISS), remotely operated vehicle (ROV), and unmanned aerial vehicle (UAV).

INTERFEROMETRIC SIDESCAN SONAR (ISS)

The interferometric sidescan sonar provided an acoustic backscatter image of the seafloor within the project area concurrent with collecting high-density swath bathymetric data. Interpretation of the backscatter data allowed for an assessment of the distribution of eelgrass, mapping of rocky and sandy habitats, identification of debris and structures on the bottom, and identification of bottom disturbance and hydrodynamic energy patterns on the bayfloor. Sidescan backscatter data were acquired at a frequency of 468 kHz scanning out 31 meters on both the starboard and port channels for a 62-m wide swath. ISS surveys covered the entirety of the eelgrass survey area (Figure 1).

The rigid hull mounted ISS system integrates motion sensors to control for heave pitch and roll, a sound velocity sensor for speed of sound correction, and a dual antenna real time kinematic global positioning system (RTK GPS) and electronic compass to control for vessel position and yaw. This rigid integration of the ISS transducers within the positioning sensors provides significantly increased precision and accuracy over conventional sidescan sonar equipment. The hull mounted system also allows for maneuvering the vessel in tight environments while collecting good quality data and avoiding potential impact of the transducer with the bottom. This was beneficial for surveying well up onto the shoulders of the jetties.

The survey was conducted by running parallel transects that were spaced to allow for overlap between adjoining sidescan swaths. Survey swaths were navigated until the entirety of the survey area was captured in the survey report. All data were collected in latitude and longitude using the

North American Datum of 1983 (NAD 83), converted to the Universal Transverse Mercator system in meters (UTM), and plotted on a geo-rectified aerial image of the study area.

Remotely Operated Vehicle (ROV)

Following the sidescan survey, the survey team deployed an ROV. The ROV was operated from the surface using an operator-held control unit. An acoustic ultra-short baseline (USBL) positioning system allowed the position of the ROV to be tracked on a chart plotter. A color camera on board the ROV sent video images to the computer where the video was routed to large format computer monitors showing the video output and associated position on a live chart. This allowed the operators to annotate the chart while collecting video, aiding in mapping and ground-truthing.

For surfgrass surveys, the ROV was run within the surfgrass survey areas (Figure 1). Surveys were conducted by navigating the ROV in contour parallel paths along the rock starting at the jetty toe and working up the jetty face with the vessel tracking along with the ROV. Horizontal visibility during surveys was approximately 4-9 feet ahead of the ROV being visible during the transect runs. On the outside of the detached breakwater horizontal visibility was as high as 12 feet.

For eelgrass surveys, the ROV focused on ground-truthing eelgrass surveys. Data were collected by lowering the ROV to the seafloor in areas where eelgrass had previously occurred and navigating the ROV across the bottom. As no eelgrass was encountered, eelgrass density data were not collected.

Unmanned Aerial Vehicle (UAV)

The third piece of equipment applied in the survey effort was an UAV. The UAV was flown by a licensed drone pilot operating within authorized airspace requirements. The UAV was fitted with a 20-megapixel RGB true color camera. Photography was completed at multiple altitudes, including 200 feet and 100 feet above ground level (AGL). Surveys were conducted using pre-programmed flight plans with camera orientations and image sidelap and frontlap suitable to produce high-resolution orthomosaic imagery by processing the photographs using Structure from Motion (SfM) technology. The imagery was processed using Agisoft Photoscan software.

Data Analysis

Following completion of the surveys, data sources were geographically registered, and eelgrass and surfgrass were digitized as spatial themes from the multiple data sources in ESRI ArcGIS. ISS survey mosaics, and ROV video transects were used to investigate the potential for eelgrass. During this survey, coves that had historically supported eelgrass were intensively explored with the ROV. Kelp was mapped using ISS and UAV data. For surfgrass mapping, multiple data sources were available to support spatial mapping, with most of the surfgrass being detectible in a combination of UAV, ROV data, and sometimes in the ISS data streams. Dynamic range spectral stretch tools were used to assist in illuminating the spectral signature of surfgrass from the collected UAV imagery.

SURVEY RESULTS AND DISCUSSION

Eelgrass

No eelgrass (*Zostera marina* or *Zostera pacifica*) was found within the eelgrass survey area. These results follow those noted during April 2020 surveys for U.S. Coast Guard Station Channel Islands Harbor (Merkel & Associates 2020). However, the results in the 2020 surveys differ from a prior harborwide survey completed in 2005 which found scattered eelgrass in the harbor, including eelgrass within the coves occupied by Hobie Beach and Kiddie Beach (Figure 2).

The 2005 survey was a comprehensive survey that detected a minor 1.2 acres of eelgrass within the entirety of the harbor (Merkel & Associates 2008). The majority of this was located off Hobie Beach (Figure 2). Surveys completed in 2005 were conducted using sidescan sonar in association with extensive diving ground-truthing conducted in association with saturation surveys for *Caulerpa taxifolia*.

While no eelgrass or signs of eelgrass were detected during the present surveys, it is notable that in April 2020, a few blades of Pacific eelgrass (*Zostera pacifica*) were observed within algal wrack located on the bottom of the cove supporting Hobie Beach. This suggests the presence of Pacific eelgrass in the area, although no live eelgrass of any species was detected during either of the overlapping April or September 2020 surveys.

Surfgrass

No surfgrass (*Phyllospadix*) was located within the surveyed areas (Figure 1) and no surfgrass was noted anecdotally outside of the surveyed areas. The survey area ranged as deep as -33 feet up to middle intertidal elevations. The survey area generally supported typical intertidal zonation patterns with a mussel and barnacle zone. At the lower intertidal zones, rock supports a combination of turf, foliose, and coralline algae. Within the more protected portions of the survey zone are monotypic beds of feather boa kelp (*Egregia menziesii*).

The habitat suitability for surfgrass within the surveyed areas is not considered to be good due to the general steepness of the breakwater and the low scour levels on the jetties and breakwater as well as the low physical energy allowing macroalgae to dominate over surfgrass. Dense beds of feather boa kelp preclude suitability for eelgrass on the most protected areas of the survey locations.

*Low altitude photo of the detatched breakwater showing a dense monotypic bed of feather boa kelp (*Egregia menziesii)

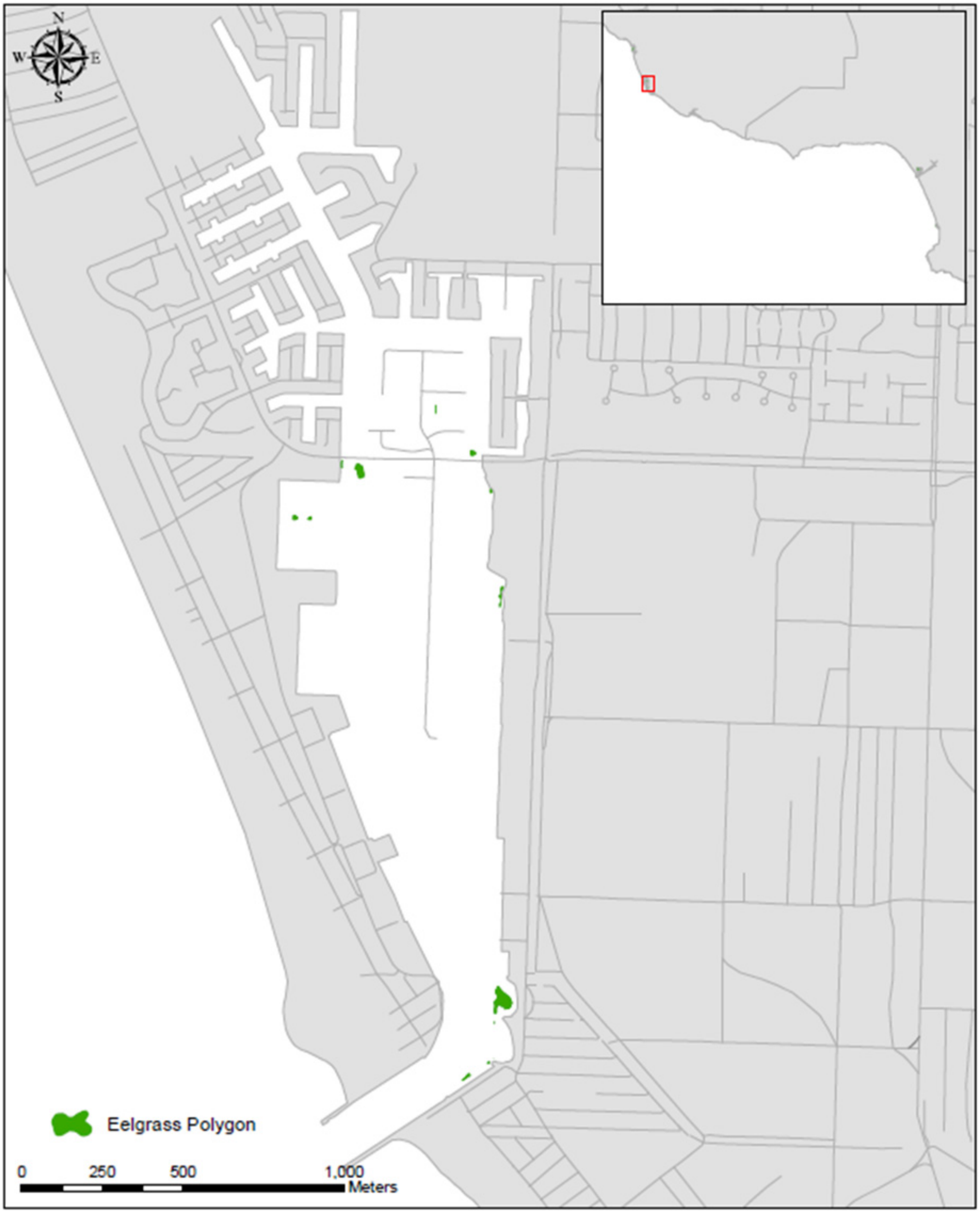


Figure 2. Maximum known extent of eelgrass in Channel Islands Harbor 2005

Canopy Kelp

Dense bands of feather boa kelp occurs throughout the more protected leeward margins of all of both jetties and the detached breakwater (Figure 3). The area of this kelp totals 3.0 acres (11,984 m^2).

Feather boa kelp is a brown algae with a broad representation within intertidal and subtidal rocky habitats. The species is often found within low intertidal and shallow subtidal areas where it forms dense beds. Feather boa under these conditions sweeps surrounding areas of other algae and invertebrates and tends to expand into the available space generated. Conversely, *Egregia* also occurs as an understory alga within more complex canopy kelp communities that are often dominated by giant kelp (*Macrocystis pyrifera*) or bull kelp (*Nereocystis luetkeana*).

Canopy kelp is defined by NMFS as *"The canopy kelp HAPC includes those waters, substrate, and other biogenic habitat associated with canopy-forming kelp species (e.g.,* Macrocystis *spp. and* Nereocystis *spp.)."* Under the present circumstances, it is not believed that the monitypic, intertidal and extreme shallow (less than -10 feet MLLW) beds of *Egregia* constitute canopy kelp HAPC as defined. As such, no canopy kelp HAPC has been found within the surveyed area. This is not to suggest that the presence of *Egregia* is counter to a determination of the presence of canopy kelp HAPC. Feather boa is a recognized constituent element of canopy kelp HAPC, but is not considered to be canopy kelp HAPC when present in the shallow waters and monotypic beds found within the study area. Rather it is a common subcanopy element within more diverse and structured canopy kelp habitats.

While the feather boa kelp beds found on the breakwater and jetties is not considered canopy kelp HAPC, impacts to this habitat should be minimized to the extent practicable. However, it is not essential to avoid impacts. This habitat is expected to be resilient to minor disturbances and is anticipated to recover within one to three years following disturbance when more substantially damaged and residual beds remain adjacent to the disturbed areas.

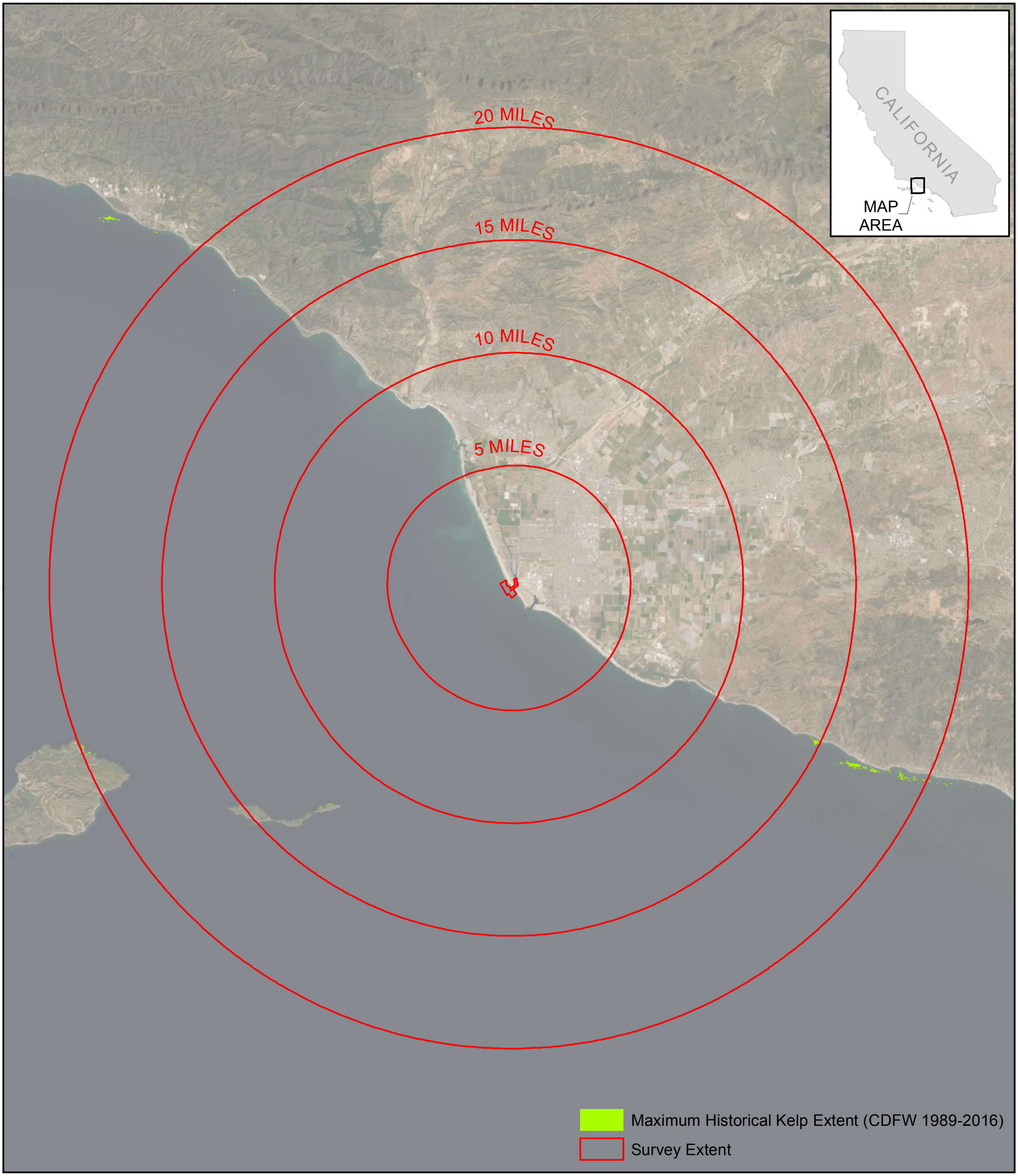
In the absence of detection of canopy kelp HAPC, a more expansive investigation was undertaken to determine the distribution of kelp habitat in the vicinity of the Project area. This was done by completing a search of the regional kelp mapping data prepared by the CDFW to determine the distribution of any offshore kelp beds located within the vicinity of Channel Islands Harbor. Data were acquired for this effort through queries of ftp://ftp.dfg.ca.gov/R7_MR/BIOLOGICAL/Kelp/, the Department's data server. Regional kelp data layers within the Department's system have been updated through 2016 surveys with new surveys not yet available. Kelp communities in the vicinity of the harbor are very limited. As such the survey area was extended outward beyond 20 miles from the mouth of the harbor (Figure 4). This kelp canopy is mapped by CDFW and its contractors using aerial overflight surveys that are subsequently digitally interpreted to plot kelp canopy. The beds identified are typically dominated by *Macrocystis pyrifera*. The lack of proximate natural rock habitat in proximity to the mouth of Channel Islands Harbor explains the lack of kelp in proximity.

Pre-construction Canopy Kelp - September 2020

Channel Islands Harbor Breakwater and Jetty Repairs

Ventura County, CA

Figure 3



Project Vicinity Map with Regional Kelp Distribution

Channel Islands Harbor Breakwater and Jetties Repair Project

Figure 4

The results of the surveys for seagrasses and canopy kelp revealed an absence of either eelgrass or surfgrass and an absence of canopy kelp HAPC, although *Egregia* dominated kelp beds were present.

It has been a pleasure working with you on this project. If you have any questions regarding the results of this investigation, please contact me.

Sincerely,

Keith W. Merkel
Principal Consultant

REFERENCES

National Oceanic and Atmospheric Administration (NOAA). 2014. California Eelgrass Mitigation Policy and Implementing Guidelines.

Merkel & Associates. 2008. Southern California Caulerpa Surveillance Program - Final Status Report: Appendix A. Eelgrass Maps. Prepared for Southern California Caulerpa Action Team.

Merkel & Associates. 2020. U.S. Coast Guard Station Channel Islands Harbor - Baseline Eelgrass Survey. May 27, 2020.

SAMPLING AND ANALYSIS PLAN REPORT

2017-2018 CHANNEL ISLANDS HARBOR GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION PROJECT

USACE Contract No. W912PL-17-D-0003, Task Order No. 006

Prepared for:

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
LOS ANGELES, CALIFORNIA

Prepared by:

AECOM Technical Services
999 TOWN AND COUNTRY ROAD
ORANGE, CA 92868

KINNETIC LABORATORIES INC.
10377 LOS ALAMITOS BLVD
LOS ALAMITOS, CA 90720

May 24, 2018

DISTRIBUTION LIST

Mr. Mark Cooke **USACE Project Manager** **PPMD Navigation & Coastal Projects Branch** **Fields, James A SPL** **Mark.D.Cooke@usace.army.mil**	**Mr. Michael Smith** **AECOM Project Manager** **AECOM Technical Services** **Michael.g.smith@aecom.com**
Mr. Jeffrey Devine, Technical Manager **U. S. Army Corps of Engineers,** **Los Angeles District** **Jeffrey.D.Devine@usace.army.mil**	**Mr. Ken Kronschnabl** **KLI Project Manager** **Kinnetic Laboratories, Inc.** **kkronsch@kinneticlabs.com**
Mr. Larry Smith **USACE Environmental Coordinator** **Los Angeles District** **lawrence.j.smith@usace.army.mil**	**Mr. David Schug** **Senior Principal Geologist** **AECOM Technical Services** **david.schug@aecom.com**
Mr. Jun Zhu **Los Angeles Regional Water Quality Control Board** **jun.zhu@waterboards.ca.go**	**Mr. Spencer Johnson** **Field Operations Manager** **Kinnetic Laboratories, Inc.** **sjohnson@kinneticlabs.com**
Ms. Melisa Scianni **United States Environmental Protection Agency-Region 9** **scianni.melissa@epa.gov**	**Ms. Amy Howk** **KLI QA/QC Management** **Kinnetic Laboratories, Inc.** **ahowk@kinneticlabs.net**
Mr. Allan Ota **United States Environmental Protection Agency-Region 9** **ota.allan@epa.gov**	**Mr. Jon Toal** **Health and Safety Management** **Kinnetic Laboratories, Inc.** **jtoal@kinneticlabs.com**
Ms. Carol Roberts **U.S. Fish and Wildlife Service** **carol_a_roberts@fws.gov**	**Ms. Kathy Burney** **Project Manager** **Eurofins Calscience** **CarlaHollowell@eurofinsUS.com**
Mr. Larry Simon **Federal Consistency Coordinator** **Energy, Ocean Resources and Federal** **California Coastal Commission** **lsimon@coastal.ca.gov**	

SAMPLING AND ANALYSIS PLAN REPORT
2017-2018 Channel Islands Harbor Geotechnical and Environmental Investigation Project
AECOM Project No. 60564349

USACE Contract No. W912PL-17-D-0003, Task Order No. 006

May 2018

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ASTM	American Society for Testing and Materials	**MSD**	Matrix Spike Duplicate
BLK	Method or Procedural Blank	**MSD**	Minimum Significant Difference
BMP	Best Management Practice	**ND**	Not Detected
BS	Blank Spike	**NOAA**	National Oceanic and Atmospheric Administration
BSD	Blank Spike Duplicate	**OEHA**	Office of Environmental Hazard Assessment
Cal/EPA	California Environmental Protection Agency	**OTM**	Ocean Testing Manual
CD	Compact Disc	**PAH**	Polyaromatic Hydrocarbon
CDFG	California Department of Fish and Game	**PCB**	Polychlorinated Biphenyl
CESPD	Corps of Engineers South Pacific Division	**PDS**	Post Digestion Spike
CHHSL	California Human Health screening Level	**PDSD**	Post Digestion Spike Duplicate
COC	Chain of Custody	**PPB**	Parts Per Billion
CSLC	California State Lands Commission	**PPM**	Parts Per Million
CV	Coefficient of Variation	**PRG**	Preliminary Remediation Goals
cy	Cubic Yards	**PVC**	Polyvinyl Chloride
CRM	Certified Reference Material	**QA**	Quality Assurance
DDD	Dichlorodiphenyldichloroethane	**QC**	Quality Control
DDE	Dichlorodiphenyldichloroethylene	**QUAL**	Qualifier
DDT	Dichlorodiphenyltrichloroethane	**RBC**	Risk-Based Concentration
DGPS	Differential Global Positioning Satellite	**RL**	Reporting Limit
DTSC	Department of Toxic Substances Control	**RPD**	Relative Percent Difference
DUP	Laboratory Replicates	**RSLs**	Regional Screening Levels for Cleanup of Superfund Sites
EDD	Electronic data deliverable	**SAP**	Sampling and Analysis Plan
ERL	NOAA Effects Range Low	**SC-DMMT**	Southern California Dredge Material Management Team
ERM	NOAA Effects Range Medium	**SOPs**	Standard Operating Procedures
GPS	Global Positioning Satellite	**SRM**	Standard Reference Material
HHMSSL	Human Health Medium – Specific Screening Levels	**STLC**	Title 22 Soluble Threshold Limit Concentration
HDPE	High-density Polyethylene	**SURR**	Surrogate Analysis
ITM	Inland Testing Manual	**SWQCB**	State Water Resources Control Board
LCL	Lower Control Limit	**TOC**	Total Organic Carbon
LCS	Laboratory Control Spike	**TRPH**	Total Recoverable Hydrocarbons
LDPE	Low-density Polyethylene	**TTLC**	Title 22 Total Threshold Limit Concentration
LPC	Limiting Permissible Concentration	**UCL**	Upper Control Limit
LSD	Least Significant Difference	**USACE**	U.S. Army Corps of Engineers
MLLW	Mean Lower Low Water	**USEPA**	U.S. Environmental Protection Agency
MS	Matrix Spike	**USCS**	Unified Soil Classification System

SAMPLING AND ANALYSIS PLAN REPORT
2017-2018 Channel Islands Harbor Geotechnical and Environmental Investigation Project
AECOM Project No. 60564349

USACE Contract No. W912PL-17-D-0003, Task Order No. 006

May 2018

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) conducts maintenance dredging of the Channel Islands Harbor (Figure 1) sand traps and channels once every two years. The project serves the following two purposes:

- Remove accumulated sand from the sand traps to nourish Hueneme Beach and Silver Strand Beach down coast.
- Maintain the federal navigation channels of Channel Islands Harbor.

Sediments to be dredged require a physical and environmental evaluation every five years in accordance to a testing plan agreed upon by USACE and the Southern California Dredge Material Management Team (SC-DMMT). The last two testing episodes conducted in 2012 and 2006 indicated that the Channel Islands Harbor Sediments were predominantly sand and contained no substantially elevated sediment concentrations. The Inland Testing Manual (ITM) (USACE and USEPA, 1998) provides an allowance for predominantly sandy soils with low organic carbon content to be exempt from Tier II (chemical) and Tier III (biological) testing since sandy sediments are not known to be carriers of elevated contaminants. As such, a Tier I exclusion from additional environmental testing is being sought for the Channel Island sediments based on previous analytical and physical data and the fact that there are no known spills or anthropogenic events that have occurred that could potentially affect the quality of the sediment in the Harbor. For a Tier I exclusion to take effect, it must be shown that the Channel Island sediments are still predominantly sand.

The purpose of this project was to sample and test sediments from shoaled areas within the Channel Islands Harbor federal channels and sand traps, and from the beach nourishment sites at Hueneme Beach and Silver Strand Beach to evaluate beach nourishment reuse and to confirm that sediments are low in fine particles and that Tier II and III testing are not necessary. This work was performed under AECOM's USACE Contract No. W912PL-17-D-0003 and is authorized by the 1958 Rivers and Harbors Act (H. DOC. 356, 90TH CONG. 2nd SESS).

1.1 Project Summary

The Channel Islands detached breakwater was constructed in the early 1960s prior to the development of Channel Islands Harbor. The intent of the detached breakwater was to create an area in the lee of the breakwater that would shoal, and then the shoaled sands were to be "backpassed" to Hueneme Beach once every two years. Approximately 1.2 million cubic yards of sand shoals behind the detached breakwater (in the sand traps) on an annual basis.

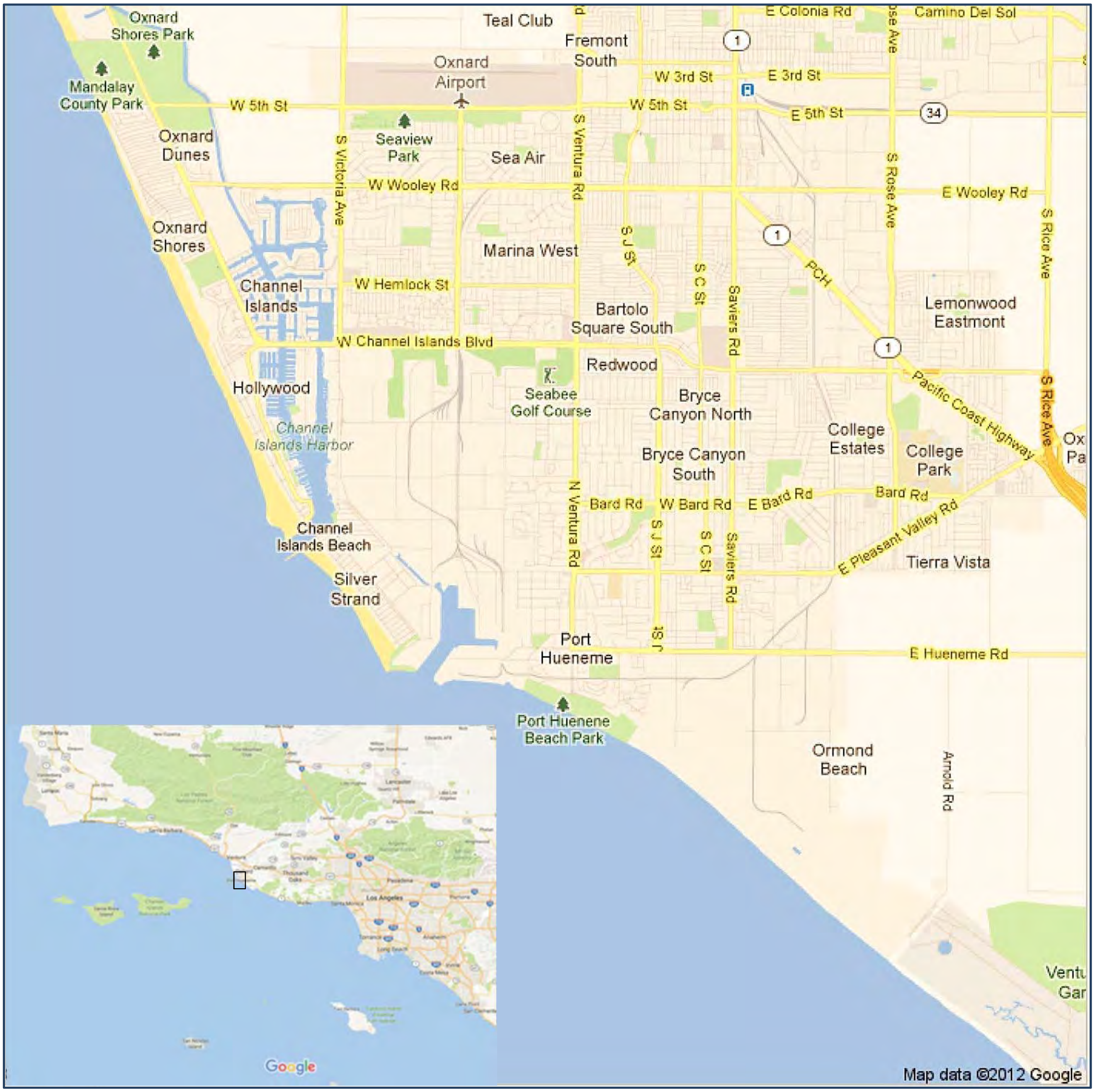


Figure 1. Location of Channel Islands Harbor and Silver Strand Beach.

Channel Islands Harbor was constructed a few years after the detached breakwater construction, and the Entrance Channel and Interior Channel were deemed as federal channels. Proper maintenance dredging would remove 2.4 million cubic yards for each 2-year dredge cycle event. However, due to funding constraints, the dredge quantity for any given year is typically below the required amount. Since 1992, the average dredge quantity per every 2-year dredge cycle has been 1,600,000 cubic yards.

The sand traps and Channel Islands Harbor federal navigation channels were divided into seven dredge units according to location and design depths. Figure 2 shows an overview of the entire dredge area and Figures 3 and 4 are close-ups showing the 2017 bathymetric data with sampling locations. The Entrance Channel (Area A), Inner Channel (Area E), and South Approach Channel (Area G) have an authorized depth of -20 ft Mean Lower Low Water (MLLW) while the Sand Traps (Areas B, C and D) have an authorized depth of -35 ft MLLW. The inner-most channel, Area F, which has an authorized depth of -10 ft MLLW, is not being evaluated as part of this project. Based on the September 2017 bathymetric survey, there are about 2,300,000 cubic yards (cy) of sediments, with a two foot overdepth allowance, that would be available for dredging in order to completely restore the sand traps and federal navigation channels back to their design depths. The quantity of shoaled material is not necessarily indicative of what will be dredged from year to year. The last dredge cycle (December 2016 to February 2017) removed 1,623,000 cy of material. Project elevations, sampling elevations, and September 2017 dredge volumes for each dredge unit in Channel Islands Harbor are provided in Table 1.

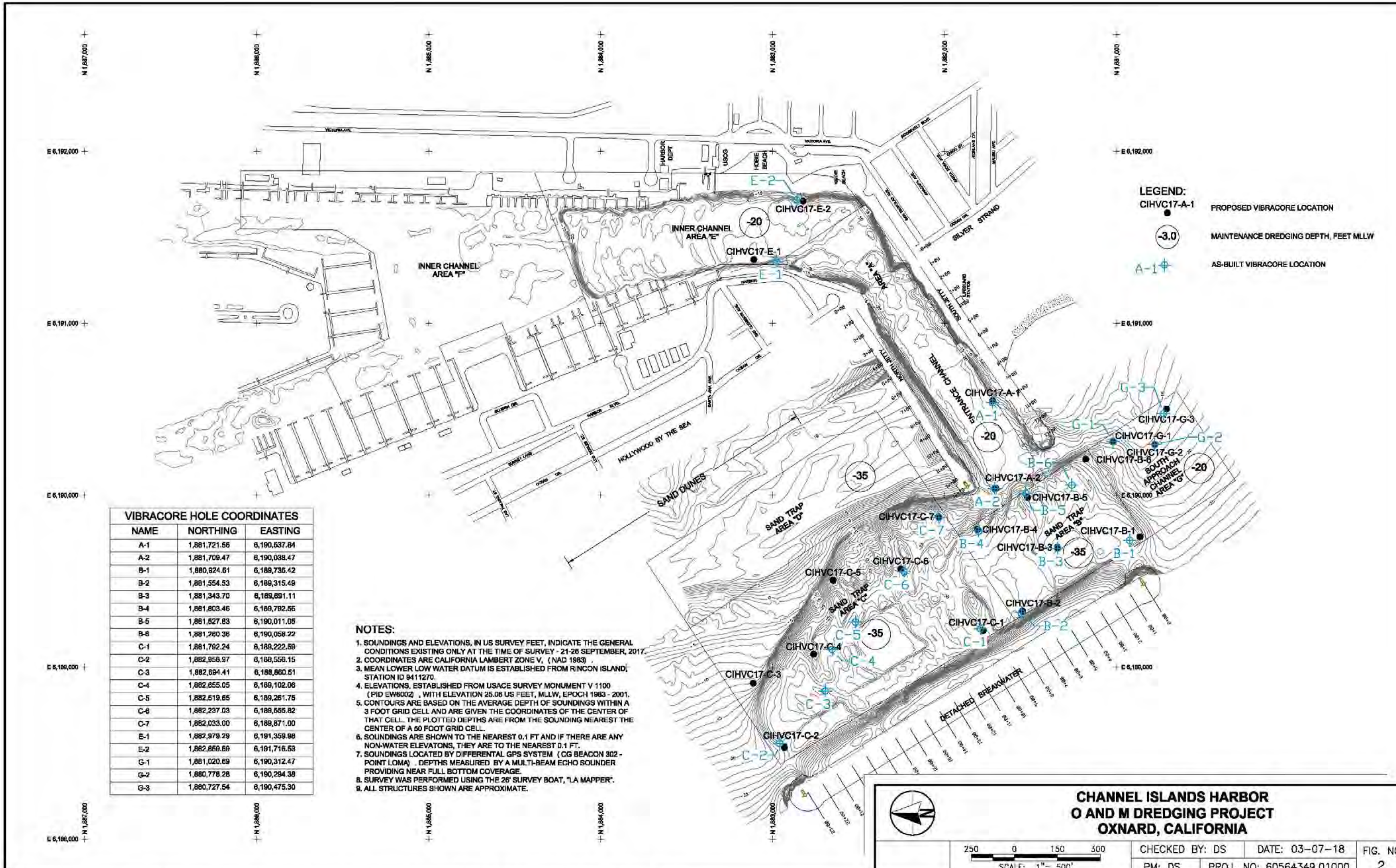
The project intent is to place the vast majority of dredge material form each dredge cycle over the next six years on Hueneme Beach, and approximately 150,000 to 200,000 cubic yards onto Silver Strand Beach each cycle. These beaches are indicated on Figure 1.

Channel Islands Harbor is dredged with a hydraulic cutterhead dredge and the dredged sediments are delivered by pipeline to the receiving beaches. This same method is expected for future dredging episodes.

Table 1. September 2017 Dredge Area Volume Estimates for the Channel Islands Federal Channels

Dredge/ Composite Area	Project Elevation (ft, MLLW)	Project Elevation + Overdepth (ft, MLLW)	Sampling Elevation* (ft, MLLW)	Estimated Dredge Quantities with Overdepth (CY)
A	-20	-22	-22	24,230
B	-35	-37	-37	66,890
C	-35	-37	-37	771,710
D	-35	-37	NA	1,368,060
E	-20	-22	-22	65,850
F	-10	-12	NA	0
G	-20	-22	-22	40,000
TOTAL SEPTEMBER 2017 DREDGE QUANTITIES				**2,336,740**

* Sampling depth includes two feet for overdepth allowance for all areas
NA = Not Applicable



VIBRACORE HOLE COORDINATES		
NAME	NORTHING	EASTING
A-1	1,881,721.56	6,190,537.84
A-2	1,881,709.47	6,190,038.47
B-1	1,880,924.61	6,189,736.42
B-2	1,881,554.53	6,189,315.49
B-3	1,881,343.70	6,189,691.11
B-4	1,881,803.46	6,189,792.56
B-5	1,881,527.83	6,190,011.05
B-6	1,881,260.36	6,190,058.22
C-1	1,881,792.24	6,189,222.59
C-2	1,882,958.97	6,188,556.15
C-3	1,882,694.41	6,188,860.51
C-4	1,882,655.05	6,189,102.06
C-5	1,882,519.65	6,189,261.75
C-6	1,882,237.03	6,189,555.82
C-7	1,882,033.00	6,189,871.00
E-1	1,882,979.29	6,191,359.98
E-2	1,882,859.69	6,191,716.53
G-1	1,881,020.69	6,190,312.47
G-2	1,880,778.28	6,190,294.38
G-3	1,880,727.54	6,190,475.30

U:\Projects\US Army\60564349_T06_Channel Islands\900-Work\910-CAD\25-Sketches\60564349-C-FIG-SITE.dwg Apr 03, 2018 - 8:19am

Figure 2. Overview of Channel Islands Harbor 2018 Dredge Area and SAP and Actual Sampling Locations.

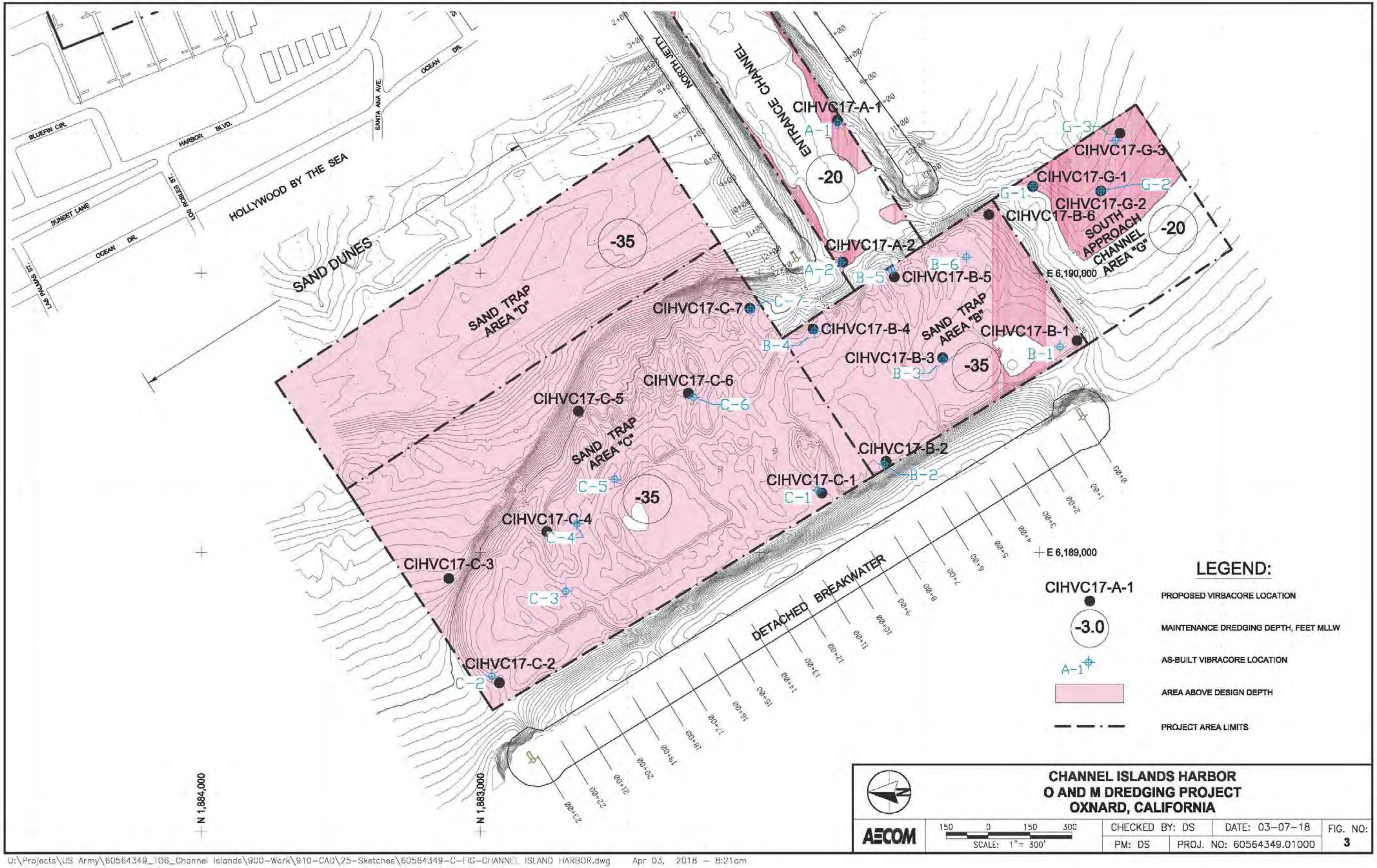


Figure 3. Close-up of Channel Islands Harbor 2018 Bathymetry and SAP and Actual Sampling Locations for Areas A, B, C and G

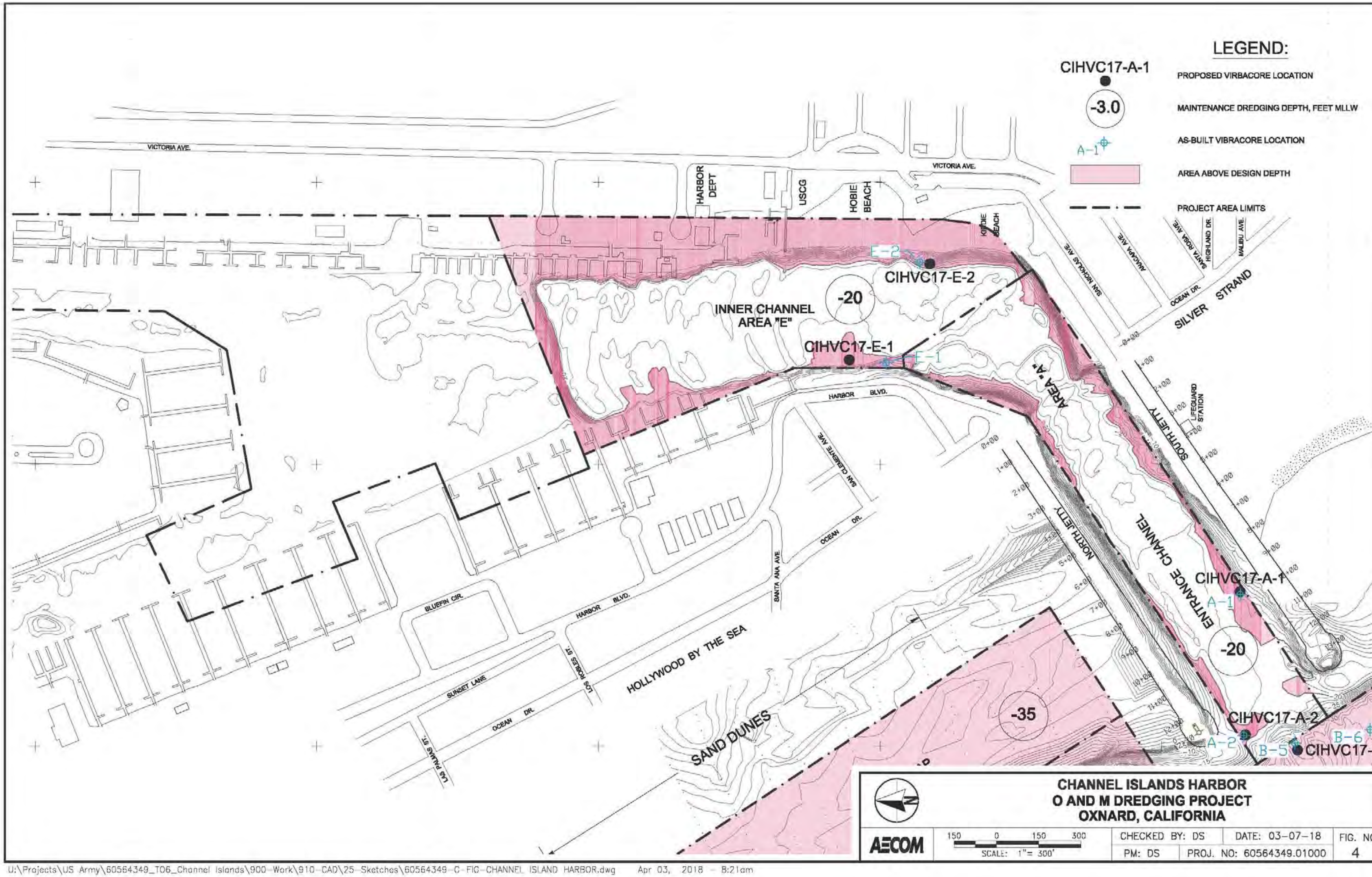


Figure 4. Close-up of Channel Islands Harbor 2018 Bathymetry and SAP and Actual Sampling Locations for Areas A and E.

1.2 Site Location

Channel Islands Harbor is located in Ventura County, California (Figure 1). Geographic coordinates (NAD 83) for the north side of the Entrance to the Harbor are 34° 09' 24" N and 119° 13' 50" W. Majority of the dredged sand is placed at Hueneme Beach, located 1.6 miles south of the Channel Islands Harbor entrance, and just to the south of the Port Hueneme entrance, at approximately 34° 09' 07" and 119° 13' 10" W. A lesser quantity of material is placed at Silver Strand Beach is between Channel Islands Harbor and Port Hueneme between the following geographic coordinates: 34° 9' 25" N, 119°13' 33" W; 34° 8' 45" N, 119°12' 59" W

1.3 Roles and Responsibilities

Project responsibilities and key contacts for this sediment characterization program are listed in Tables 2 and 3. Kinnetic Laboratories Inc. (KLI) provided sampling services. AECOM was responsible for core logging and geotechnical testing.

The principal users of the data produced by this project are the following Southern California Dredge Material Management Team (SC-DMMT) regulatory agencies:

1. Los Angeles District, U.S. Army Corps of Engineers (USACE);
2. Los Angeles Regional Water Quality Control Board (LARWQCB)—Region 4;
3. U.S. Environmental Protection Agency (USEPA) - Region IX; and
4. California Coastal Commission.

Other users of the data may include the following agencies:

1. California Department of Fish and Wildlife (CDFW);
2. U.S. Fish and Wildlife Service (USFWS);
3. U.S. National Marine Fisheries Service (USNMFS); and
4. California State Lands Commission (CSLC).

Table 2. Project Team and Responsibilities.

Responsibility	Name	Affiliation
Project Planning and Coordination	Mark Cooke Jeffrey Devine Larry Smith David Schug Ken Kronschnabl	USACE USACE USACE AECOM Kinnetic Laboratories
SAP Preparation	Ken Kronschnabl David Schug	Kinnetic Laboratories AECOM
Field Sample Collection and Transport	Spencer Johnson Dale Parent	Kinnetic Laboratories Kinnetic Laboratories
Geotechnical Investigation	David Schug Sabah Fanaiyan Jeffrey Devine	AECOM AECOM USACE
Health and Safety Officer and Site Safety Plan	Derek Rector[1] Jon Toal	AECOM Kinnetic Laboratories
Laboratory Chemical Analyses and Laboratory Coordination	Carla Hollowell Amy Howk	Eurofins Kinnetic Laboratories
QA/QC Management Analytical Laboratory QA/QC	Danielle Gonsman Amy Howk Carla Hollowell Amy Dahl	Kinnetic Laboratories Kinnetic Laboratories Eurofins AECOM
Technical Review	Pat Kinney Larry Smith Joe Ryan	Kinnetic Laboratories USACE USACE
Final Report	Ken Kronschnabl David Schug Michael Smith	Kinnetic Laboratories AECOM AECOM
Agency Coordination	Jeffrey Devine Larry Smith	USACE USCAE

[1] Other AECOM staff may be SSHO's depending on availability.

Table 3. Key Project Contacts.

Mark Cooke USACE Project Manager PPMD Navigation and Coastal Projects Branch U. S. Army Corps of Engineers, Los Angeles District 915 Wilshire Blvd. Los Angeles, Ca. 90017 Tel. (213) 452-3704 Mark.D.Cooke@usace.army.mil	Jeffrey Devine USACE Project Technical Manager Geology and Investigations Section U. S. Army Corps of Engineers, Los Angeles District 915 Wilshire Blvd. Los Angeles, Ca. 90017 Tel. (213) 452-3579 Jeffrey.D.Devine@usace.army.mil
David Schug, CEG, CHG Senior Principal Geologist, GeoEngineering AECOM 401 West A Street, Suite 1200 San Diego, CA 92101 Tel. (619) 610-7600 david.schug@aecom.com	Ken Kronschnabl Project Manager - Sampling/Testing Kinnetic Laboratories, Inc. (KLI) 307 Washington St. Santa Cruz, CA 95060 Tel. (831) 457-3950 kkronsch@kinneticlabs.net
Spencer Johnson Field Operations Mgr. Kinnetic Laboratories, Inc. (KLI) 307 Washington St. Santa Cruz, CA 95060 Tel. (831) 457-3950 sjohnson@kinneticlabs.net	Michele Castro Business Development Manager Eurofins Calscience, Inc. 7440 Lincoln Way Garden Grove, CA 92841-1427 Tel.: (949) 870-8766 MicheleCastro@eurofinsUS.com
Amy Howk KLI QA/QC Management Kinnetic Laboratories, Inc. 307 Washington St. Santa Cruz, CA 95060 Tel. (831) 457-3950 ahowk@kinneticlabs.net	Michael Smith, PE, GE, Principal Geotechnical Engineer AECOM 999 Town and Country Road Orange, CA 92868 D 1-714-567-2791 C 1-714-697-5239 michael.g.smith@aecom.com
Larry Smith USACE Environmental Coordinator U.S. Army Corps of Engineers, Los Angeles District 915 Wilshire Blvd. Los Angeles, CA 90017 Tel (213) 452-3846 lawrence.j.smith@usace.army.mil	

2.0 SITE HISTORY AND HISTORICAL DATA REVIEW

This section provides a brief history of Channel Islands Harbor, potential sources of contamination, dredging history, and most recent testing and sampling results.

2.1 Harbor Construction, Site Setting and Potential Sources of Contamination

Channel Islands Harbor is located 68 miles north of the City of Los Angeles in the City of Oxnard, just north of Naval Base Ventura County in Port Hueneme. The Harbor is owned and operated by the County of Ventura.

2.2 Site Description

The US Army Corps of Engineers formed the Harbor in 1960 by removing sand dune and wetland sediment and depositing the material on beaches near Port Hueneme. The Harbor is divided into three areas (West, East, and Peninsula) and contains 166 acres of water with multiple marinas and approximately 2,150 boat slips. Marina facilities, restaurants, hotels, sport fishing facilities, chandleries and shops are scattered throughout the Harbor. Marina facilities include launch ramps, a fuel dock, sewage pump out facilities and public restrooms. Figure 5 shows a map of Harbor facilities.

According to the County of Ventura GIS mapping system, there are no major storm water outfalls that enter the Harbor. There are, however, numerous minor outfalls from localized runoff.

2.3 Previous Channel Islands Harbor Dredging and Testing Episodes

The US Army Corps of Engineers performs maintenance dredging at Channel Islands Harbor every one or two years. Most of the material dredged throughout the years has been pumped to Hueneme Beach. In addition, 150,000 to 200,000 cy is typically pumped directly on Silver Strand Beach during most dredging episodes.

2.3.1 2012 Testing Episode

Channel Islands Harbor sediments were last sampled in April 2012 and tested for beach nourishment. Twenty-six (26) sediment core samples were collected from five (5) designated composite areas and submitted to laboratories for chemical and geotechnical testing. Beach transect grab samples were collected from two (2) perpendicular transects at Silver Strand Beach and three (3) perpendicular transects at Hueneme Beach. Data generated in this investigation are summarized in a report by Diaz Yourman, GeoPentech and Kinnetic Laboratories JV (2012) and were used to complete chemical and grain size compatibility analyses. Summary tables from this report are also provided in Appendix A.

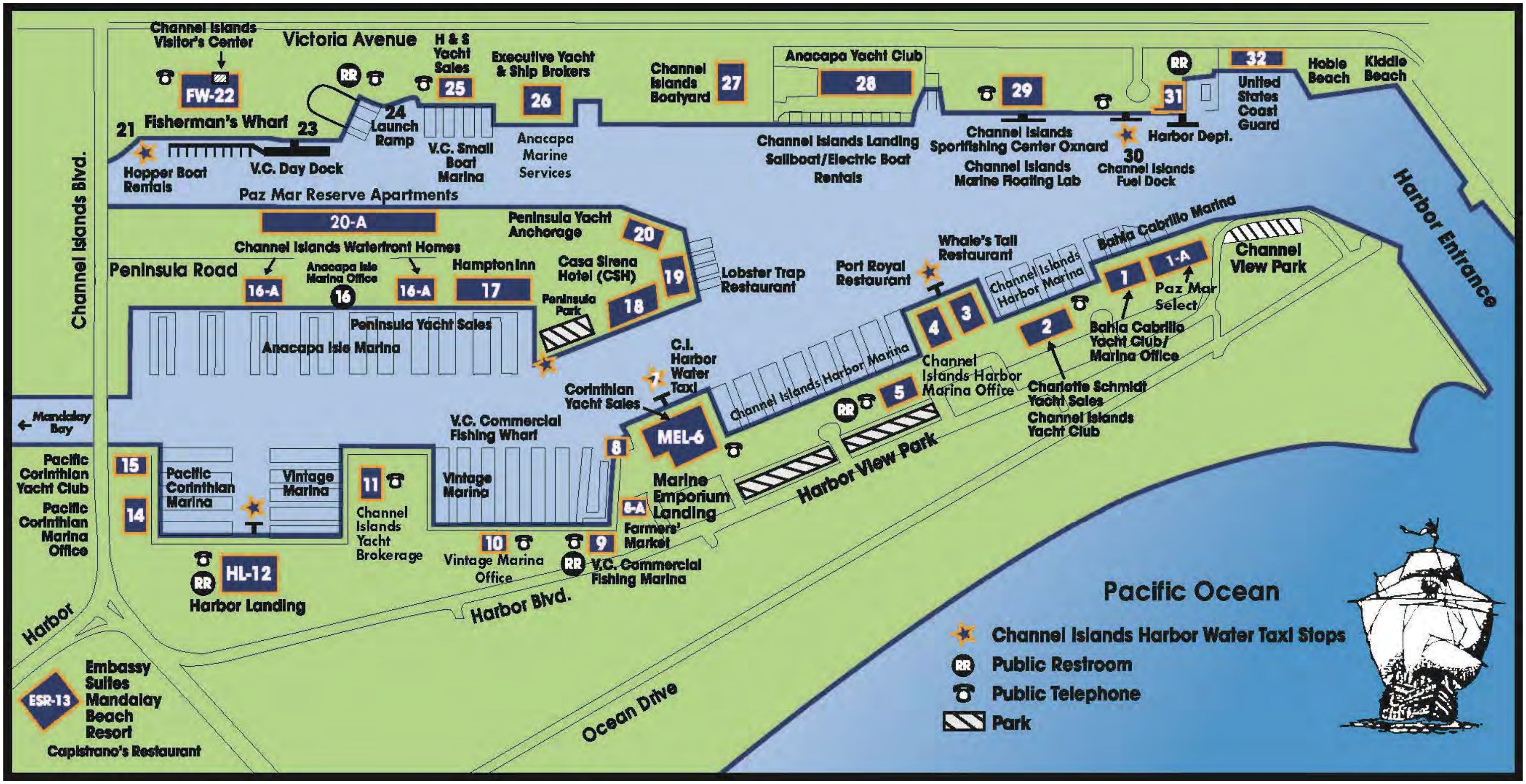


Figure 5. Map Showing Channel Islands Harbor Facilities. (http://www.mappery.com/Channel-Islands-Harbor-California-Map)

USACE, Los Angeles District conducted the beach physical compatibility analysis using the 2012 grain size data. Their report (USACE, 2012), which is attached to the main report, concluded that sediments from all five composite areas tested were physically compatible with Silver Strand and Hueneme beaches based on both the weighted average individual and composite sediment grain size curves for each area.

The results of the chemical analysis of composite sediment samples from 2012 found overall contaminant concentrations were below detection or small compared to effects based screening values. Only DDT was detected above a NOAA Effects Range Low (ERL) screening value (Long et. al., 1995) in three of the five areas (Area A, Area C and Area E), with Area E (Inner Channel) having the highest value. The total DDT concentration in Area E was 9.9 µg/kg, which was about six times higher than the ERL value of 1.58 µg/kg and about five times lower than the NOAA Effects Range Median (ERM) value of 46.1 µg/kg.

Except for arsenic, all contaminants detected in the Channel Islands Harbor sediments from 2012 were well below updated Regional Screening Levels for Chemical Contaminants at Superfund Sites (RSLs) (USEPA Region 9, updated 2017) and the most recent California Human Health Screening Levels (CHHSLs) for residential soils (Cal/EPA, 2005, updated 2010) developed for human protection. As part of the 2012 study, the California Coastal Commission requested that an arsenic background concentration be determined for beaches near Channel Islands Harbor. This study, which was incorporated into the report, determined an upper bound beach background concentration of 2.14 mg/kg. The 2012 sediment arsenic concentrations were similar to or only slightly higher than the calculated background concentration.

The 2012 report concluded that excursions above screening levels appeared to be minor and the data indicated that there was little chance of adverse biological or human health effects from the placement of Channel Islands Harbor Sediments at Silver Strand and Port Hueneme Beaches.

2.3.2 2006 Testing Episode

Previous analytical testing data are also available for a prior study conducted in 2006. This study involved the collection of six composite samples in October 2006 (Diaz-Yourman and Associates and Kinnetic Laboratories, 2007). Data generated from this study are provided in Appendix B. For the most part, only low levels of contaminants were evident in the predominantly sandy Channel Islands Harbor sediments. Silver, butyltins, phenols, PCB aroclors, oil and grease and total recoverable hydrocarbons were not detected above reporting limits in any samples. All other metal concentrations were below NOAA ERL values. Low levels (at or below the reporting limit) of numerous PCB congeners were detected in all but two composite samples. DDT compounds in two samples and total PAH compounds in a single sample are the only detected organic contaminants exceeding ERL values. In all cases, contaminant concentrations were below NOAA ERM values. Only arsenic exceeded human health objectives.

3.0 METHODS

This section describes the dredging design, study design and field and testing methods for this testing program.

3.1 Dredge Design

Bathymetric data from September 2017 in relationship to target sampling locations are shown on Figures 2 through 4. These figures also define the limits of dredging, as well as design depths for each area identified for future dredging.

3.2 Sampling and Testing Design

The sampling and testing design detailed in the SAP for this project and summarized below covered data collection tasks for Channel Islands Harbor sediment collection and testing and Silver Strand Beach sampling and testing. Evaluation guidelines are also discussed below.

The main approach for the Channel Islands Harbor sediments was to sample the sediments to dredge depths plus allowable overdepth, log the physical characteristics of each boring, and submit a sample of each major stratigraphic layer for geotechnical testing. This data was used to determine if the Channel Islands Harbor sediments were physically suitable for placement on Silver Strand and Hueneme Beaches. Sampling and testing followed guidance in the Inland Testing Manual (ITM) (USEPA/USACE, 1998) and from USACE, Los Angeles District guidelines (CESPL, undated). Acceptability guidelines published in these documents was used to evaluate the suitability of Channel Islands Harbor maintenance-dredged sediments for beach nourishment.

In addition to collecting samples for physical testing, samples were collected and archived from each boring (mudline to overdepth elevation) for possible chemical testing, and composited sediments from each channel area were archived for possible chemical and biological testing. An archived area composite sample may be chemically tested if the physical testing determines that a large proportion of that composite sample contains fined grained material. Individual boring archives and/or a bioassay archive may be tested if a particular composite sample has elevated contaminant concentrations.

3.2.1 Channel Islands Harbor Sample Identification, Composite Areas, Sediment Collection and Testing

Vibracore sampling, as described in Section 3.3.2 (Vibracore Sampling Methods), was carried out to collect subsurface sediment data at two (2) locations within Area A, six (6) locations in Areas B, seven (7) locations in Area C, two (2) locations in Area E, and three (3) locations in Area G. This equates to 20 separate vibracore sampling locations. The prefix for all vibracore locations was “CIHVC-18-#-##.” Sampling occurred February 26 – 28, 2018. Final as well as the SAP sampling locations are shown on Figures 2 through 4. Due to extreme shoaling, limited access and safety concerns, no samples were taken from the Area D Sand Trap. During the last sampling effort in 2012 for Area D, heavy shoaling in this area limited access by traditional boat mounted vibracore methods. As such, this necessitated conducting coring instead by use of specialized truck mounted sampling unit. Due to these difficulties, the samples were collected short of the dredge depth. However, physical and bulk sediment chemistry test results for this area showed that the sediment was approximately 98% sand with no contamination. Sediment samples were collected to the project dredge depth from the Area C sand trap adjacent to Area D. Since this area is adjacent to Area D, it is assumed that the sediment in both areas is the same and that samples collected in 2018 from Area C will reasonably represent the sediment present in Area D.

Geographic coordinates, time of sampling, seafloor elevations, target elevations and sampling intervals for the finals sample locations are listed in Table 4. Note that a few sample locations changed slightly from the proposed locations to target more shoaled areas. California Lambert coordinates are shown on Figure 2.

A total of five (5) area composite samples were created from the five (5) dredge units being sampled and were archived for possible chemical (Tier II) and biological (Tier III) testing. One composite sample was created from each channel area. Continuous samples from the mudline to project depths plus two feet for overdepth testing were collected from all core locations. These primary core intervals were homogenized and then combined with all primary core intervals in a composite area to the form composite samples. Sediments below overdepth elevations were not included in any sediment composite sample.

Individual core archive samples for possible Tier II testing from each core were collected and represent the mudline to the area overdepth elevation or to the depth of refusal. Core subsamples for geotechnical testing included any geo-physically different layers of material in each core and were analyzed for grain size distribution as described later in Section 3.2.3.

3.2.2 Beach Transect and Nearshore Reference Samples

A series of surface grabs were collected along two (2) transects perpendicular to the shore at the Silver Strand Beach identified on Figure 6. The beach transect sampling consisted of collecting surface grab samples at eight elevations (+12, +6, 0, -6, -12, -18, -24 and -30 feet MLLW) along each transect. Individual geotechnical grain size testing was performed on all grab samples collected from the beach and nearshore sites. Table 5 lists the final locations of the beach transect samples.

Since beach transect and nearshore grain size data were collected at Hueneme Beach as part of the 2016 Port Hueneme Harbor dredge material investigation (Diaz Yourman, GeoPentech and Kinnetic Laboratories JV, 2017), no additional sampling was conducted. A summary of these data are provided in Appendix C. The 2016 Hueneme Beach physical data was used as part of USACE's beach compatibility analysis. Figure 6 shows the locations of the 2016 Hueneme Beach sampling transects and nearshore area sample locations.

Table 4. Actual Sampling Location Coordinates, Date and Time of Sampling, Core Depths, Mudline Elevations, and Sampling Elevations for the 2017 Channel Islands Harbor Sampling and Testing Program.

Fed. Chan./ Area	Core Designation	Date Sampled	Time Sampled	California Lambert Zone 5 (NAD 83)		Geographic Coordinates (NAD 83)		Mudline Elevation (ft., MLLW)	Design Depth + Overdepth (ft., MLLW)	Core Recovery (ft.)	Core Interval Sampled (ft., MLLW)
				Northing (feet)	Easting (feet)	Latitude North	Longitude West				
Area A Entrance Channel	CIHVC-18-A-01	02/27/18	08:15	1881721	6190537	34° 09.410'	119° 13.606'	-18.7	-22	6.8	3.3
	CIHVC-18-A-02	02/27/18	08:50	1881709	6190038	34° 09.407'	119° 13.705'	-17.4	-22	6.3	4.6
Area B Sand Trap	CIHVC-18-B-01	02/27/18	10:30	1880924	6189736	34° 09.277'	119° 13.763'	-33.7	-37	6.3	3.3
	CIHVC-18-B-02	02/27/18	11:30	1881554	6189315	34° 09.380'	119° 13.848'	-32.7	-37	6.5	4.3
	CIHVC-18-B-03	02/27/18	09:45	1881343	6189691	34° 09.346'	119° 13.773'	-32.8	-37	6.5	4.2
	CIHVC-18-B-04	02/27/18	15:30	1881803	6189792	34° 09.422'	119° 13.754'	-26.0	-37	12.9	11.0
	CIHVC-18-B-05	02/27/18	13:30	1881527	6190011	34° 09.377'	119° 13.710'	-29.7	-37	10.2	7.3
	CIHVC-18-B-06	02/27/18	12:45	1881260	6190058	34° 09.333'	119° 13.700'	-28.7	-37	10.7	8.3
Area C Sand Trap	CIHVC-18-C-01	02/28/18	12:27	1881792	6189222	34° 09.419'	119° 13.867'	-29.5	-37	8.9	7.5
	CIHVC-18-C-02	02/28/18	12:00	1882958	6188556	34° 09.610'	119° 14.002'	-30.2	-37	8.7	6.8
	CIHVC-18-C-03	02/28/18	11:05	1882694	6188860	34° 09.567'	119° 13.941'	-30.2	-37	8.6	6.8
	CIHVC-18-C-04	02/27/18	17:05	1882655	6189102	34° 09.561'	119° 13.893'	-24.8	-37	13.3	12.2
	CIHVC-18-C-05	02/28/18	09:04	1882519	6189261	34° 09.539'	119° 13.861'	-21.2	-37	18.0	15.8
	CIHVC-18-C-06	02/27/18	16:20	1882237	6189555	34° 09.493'	119° 13.802'	-23.0	-37	14.0	14.0
	CIHVC-18-C-07	02/28/18	07:55	1882032	6189870	34° 09.460'	119° 13.739'	-16.8	-37	15.0	15.0
Area E Inner Channel	CIHVC-18-E-01	02/28/18	17:25	1882979	6191359	34° 09.619'	119° 13.446'	-19.8	-22	5.5	2.2
	CIHVC-18-E-02	02/27/18	07:45	1882859	6191716	34° 09.600'	119° 13.375'	-17.3	-22	6.5	4.7
Area G South Approach Channel	CIHVC-18-G-01	03/01/18	09:30	1881020	6190312	34° 09.294'	119° 13.649'	-16.1	-22	8.9	5.9
	CIHVC-18-G-02	03/01/18	09:05	1880778	6190294	34° 09.254'	119° 13.652'	-17.3	-22	7.5	4.7
	CIHVC-18-G-03	03/01/18	08:35	1880727	6190475	34° 09.246'	119° 13.616'	-16.2	-22	6.0	5.8

Figure 6. Location of Silver Strand Beach Sampling Transects and the 2016 Hueneme Beach Sampling Transects and Nearshore Sampling Locations.

Table 5. Date, Times and Sampling Coordinates for Samples Collected from the Silver Strand Beach Transects.

Area	Site Designations	Date	Time	Approx. Sampling Elevations (feet, MLLW)	Geographic Coordinates (NAD 83)	
					Latitude North	Longitude West
Silver Stand Beach Transect A	SSB18-A-1	2/28/18	14:36	+12	34° 09.238′	119° 13.288′
	SSB18-A-2	2/28/18	14:33	+6	34° 09.234′	119° 13.294′
	SSB18-A-3	2/28/18	14:27	0	34° 09.229′	119° 13.301′
	SSB18-A-4	2/28/18	14:24	-6	34° 09.217′	119° 13.315′
	SSB18-A-5	3/1/18	07:50	-12	34° 09.172′	119° 13.413′
	SSB18-A-6	3/1/18	09:58	-18	34° 09.157′	119° 13.433′
	SSB18-A-7	3/1/18	10:05	-24	34° 09.095′	119° 13.524′
	SSB18-A-8	3/1/18	10:12	-30	34° 09.039′	119° 13.613′
Silver Stand Beach Transect B	SSB18-B-1	2/28/18	14:57	+12*	34° 09.070′	119° 13.147′
	SSB18-B-2	2/28/18	14:53	+6	34° 09.067′	119° 13.155′
	SSB18-B-3	2/28/18	14:51	0	34° 09.065′	119° 13.161′
	SSB18-B-4	2/28/18	14:46	-6	34° 09.053′	119° 13.188′
	SSB18-B-5	3/1/18	08:02	-12	34° 09.003′	119° 13.249′
	SSB18-B-6	3/1/18	10:20	-18	34° 08.979′	119° 13.284′
	SSB18-B-7	3/1/18	10:28	-24	34° 08.940′	119° 13.345′
	SSB18-B-8	3/1/18	10:33	-30	34° 08.882′	119° 13.439′

* The +12 location in Transect B was sampled at an elevation of +15.5' from the top of the berm.

3.2.3 Geotechnical Samples and Testing

A sufficient quantity of sediment was collected from each location within the Channel Islands Harbor federal channels so that a representative amount of sediment was included in each geotechnical sample. At least one primary grain size sample was formed and analyzed from each core between the mudline and the overdepth elevations. Additional grain size samples representing layers of physically different material greater than six (6) inches were also collected. The field geologist coordinated with the Project Technical Manager on the selection of samples and any samples to be archived. Grain size analyses were also run on each sampling location along the two (2) Silver Strand Beach transects. All mechanical grain size tests were run according to ASTM D 422 (1963) and was conducted by an AECOM laboratory.

In addition to the mechanical grain size samples, five (5) hydrometer tests were run according to ASTM D 422 and five (5) Atterberg Limits tests were run according to ASTM D 4318 (2005). The hydrometer and Atterberg tests were run on representative samples of relatively fine grained material collected from the sediment cores.

All geotechnical data gathered was used to do physical beach compatibility analyses between the dredged sediments and the receiving beach. This task was accomplished by USACE, Los Angeles District and is included as Appendix G to this report.

3.3 Field Sampling Protocols

Vibracore sampling, grab sampling, decontamination, sample processing and documentation procedures are discussed in this section.

3.3.1 Positioning and Depth Measurements

Positioning at sampling locations was accomplished using a differential GPS (DGPS) navigation system referenced to a local geodetic benchmark with positioning accuracies of 3 to 10 feet. The locations were recorded in both Geographic coordinates (NAD 83) and later converted to State Plane Coordinates (CA Zone V, NAD 83). Water depths were measured with a graduated lead line and corrected to mean lower low water (MLLW). Tidal stage was determined using NOAA predicted tide tables checked against a local tide gage or real-time tidal stage data. These tide data were used to calculate the seafloor elevation (mudline) for each site.

All sampling sites were located within federal channel limits and as close as possible to target locations. If the target location was not reached (due to shoaling, obstructions, etc.), a location as close as practical that is within the area and project limits and that is shoaled above the project elevation was sampled. Locations B-01, B-06, C-03 and C-05 were moved to another spot in the general area because the shoaling was so much that we were unable to safely get the boat over the proposed location with the swells that were coming in. E-01 was moved slightly to target a more shoaled area.

3.3.2 Vibracore Sampling Methods

All sediment samples were collected using an electric vibracore that was able to penetrate and obtain samples to the project sample elevations. Cores were advanced to the target sampling elevations or beyond (project elevations plus two feet for overdepth allowance plus additional depth for geotechnical pusposes only). Core refusal was not encountered for any location though the core recovery fell short for one of the deeper Sand Trap cores at location C-07. At the conclusion of a successful vibracore, the core liner was removed and split open for inspection and sampling. Extrusion of the core was not allowed. Processing took place onboard the sampling vessel.

Vibracore sampling was conducted from the 35-foot vessel ***DW Hood***. This vessel, with a Uniflite hull, is outfitted with a 14-foot tall A-frame and a winch that is suitable for the coring equipment. This vessel is fully equipped with all necessary navigation, safety, and lifesaving devices per Coast Guard requirements and is capable of three-point anchoring.

Kinnetic Laboratories' vibracore consists of a 4-inch diameter aluminum coring tube, a stainless steel cutting tip, and a stainless-steel core catcher. Inserted into the core tubes were food-grade clean polyethylene liners. The vibrating unit has two counter-rotating motors encased in a waterproof aluminum housing. A three-phase, 240-volt generator powers the motors. The vibracore head and tube were lowered overboard with an A-frame and winch. The unit was then vibrated until it reaches target sampling elevation.

When penetration of the vibracore was complete, power was shut off to the vibra-head and the vibracore was brought aboard the vessel. A check valve located on top of the core tube, that reduced or prevented sediment loss during pull-out, was removed. The length of sediment recovered was confirmed by measuring down the interior of the core tube to the top of the sediment. The core cutting tip and catcher were then removed and the core liners were sealed on both ends until processed.

A stand was used to support the vibracore in waters unprotected from wave action. The vibracore and stand were lowered overboard from the sampling vessel as one unit. Use of a stand allowed the sampling vessel to move off of the sampling location while the coring apparatus penetrated the sediment. Thus one-point anchoring or no anchoring was utilized. A stand also prevented the coring apparatus from being pulled up from waves during penetration, thus alleviating multiple penetrations of the same material.

3.3.3 Vibracore Decontamination

All sample contact surfaces were stainless steel, polyethylene or Teflon® coated. Compositing tools were stainless steel or Teflon® coated stainless steel. Except for the core liners, all contact surfaces of the sampling devices and the coring tubes were cleaned between each sampling location. The cleaning protocol consisted of a site water rinse, a Micro-90® soap wash, and then finished with deionized water rinses. The polyethylene core liners were new and of food grade quality. All rinseate was collected in containers and disposed of properly.

3.3.4 Core Processing

Whole cores were placed in a PVC core rack that was cleaned between cores. All cores were processed on board the ***DW Hood*** with clean plastic sheeting covering the deck. After placement in the core rack, core liners were split lengthwise to expose the recovered sediment. Once exposed, sediment that came in contact with the core liner was removed by scraping with a pre-cleaned stainless steel spoon. Each core was photographed, measured, and lithologically logged in accordance with the Unified Soil Classification System (USCS) as outlined in ASTM Standards D-2488 (2006) and D-2487 (2006). Additional sediment characteristics including likely sediment origin and other observations was also recorded. A geologist from AECOM did the lithologic logging along with collection of sample splits for geotechnical testing.

Photographs were taken of each core (each photograph covers a maximum two-foot interval), prior to sample processing and of sampling equipment and procedures. These pictures are provided in Appendix D with captions describing the subject and date.

Following logging, vertical composite subsamples were then formed from each core and samples for grain size analyses were formed. The primary vertical composite subsamples were from the mudline to two feet below the project depth for the area. Primary vertical composite subsamples were archived for chemical testing and used to form area composite samples to be archived for possible chemical and biological testing.

Vertical composite subsamples were formed by combining and homogenizing a representative sample from each sampling interval and from each core stratum, as described in Section 3.2.1, in a pre-cleaned stainless steel or Teflon®-coated tray. A 0.5-liter portion of each primary vertical composite subsample and core stratum was placed in a pre-cleaned and certified glass jar with a Teflon®-lined lid for archived material (Ziploc bags for geotechnical samples). The representative portion of each primary vertical composite subsample within each sampling interval identified for composite sample formation were placed in a large pre-cleaned mixing bowl for area compositing with other cores from the same sampling interval in the same composite area. The composited sediment was placed in 1-liter pre-cleaned and certified glass jars with a Teflon®-lined lids and archived for chemistry. Another representative portion of each core from a composite area were placed in a food-grade clean 5-gallon LPDE bucket liner as archive material for potential Tier III testing. All samples for grain size analyses were transferred to pre-labeled sample containers (sealed plastic bags) and stored appropriately, until they were transferred to AECOM for analysis.

All chemistry archive samples were placed on ice initially and then frozen as soon as possible. A small amount of headspace as allowed for archived chemistry samples to prevent container breakage during freezing. Archived samples for Tier III testing are being kept refrigerated and maintained at 2 to 4° C. The sample containers, jars and bags, were sealed to prevent any moisture loss and possible contamination.

3.3.5 Beach Transect and Nearshore Area Grab Samples

The top six inches of sand or sediment was collected at all beach transect sampling locations. The four highest locations along each beach transect were sampled on land using a hand held scoop. All other offshore stations were sampled from the ***DW Hood*** using Smith-McIntyre Grab. The grab sampler was deployed at each offshore location, and upon retrieval, the grab was visually inspected to ensure the sample was acceptable according to SOPs. Contents of each grab were placed in pre-labeled sample containers (sealed plastic bags) and stored appropriately for transfer to AECOM for grain size analyses.

3.3.6 Detailed Sediment Log

A detailed sediment log was prepared for each vibracore sampling location. These logs include the project name, hole or transect number or designation, date, time, location, water depth, estimated tide, mudline elevation, type and size of sampling device used, depth of penetration, length of recovery, name of person(s) taking samples, depths below mudline of samples, and a description and condition of the sediment. Description of the sediment were made in accordance with ASTM D 2488 (2006), and include grain size, color, maximum particle size, estimation of density (sand) or consistency (silts and clays), odor (if present), and description of amount and types of organics and trash present. Completed sediment logs are provided in Appendix E.

3.3.7 Documentation and Sample Custody

All samples had their containers physically marked as to sample location, date, time and analyses. All samples were handled under Chain of Custody (COC) protocols beginning at the time of collection. Redundant sampling data was also recorded on field data log sheets. Copies of these logs are included in this report as Appendix D.

Samples were considered to be "in custody" if they were (1) in the custodian's possession or view, (2) in a secured place (locked) with restricted access, or (3) in a secure container. Standard COC procedures were followed for all samples collected, transferred, and analyzed as part of this project. COC forms were used to identify the samples, custodians, and dates of transfer. Each person who had custody of the samples signed the COC forms and ensured samples are stored properly and not left unattended unless properly secured. The completed COC forms were placed in a sealable plastic bags that were taped to the lid of coolers containing the samples.

Standard information on Chain of Custody forms includes:

- Sample Identification
- Sample Collection Date and Time
- Sample Matrices (e.g., marine sediment)
- Analyses to be Performed
- Container Types
- Preservation Method
- Sampler Identification
- Dates of Transfer
- Names of Persons with Custody

A daily field activity log was maintained listing the beginning and ending time for every and all phases of operation, the names and responsibilities of all field personnel present, description and length of any delays, and weather and sea conditions.

As described in Sections 3.3.6, detailed sediment logs were prepared from each sampling location, including beach transect locations.

4.0 RESULTS AND DISCUSSION

Physical testing results of the Channel Islands Harbor sediments are summarized in Tables 6 and grain size analysis of Silver Strand Beach are presented in Table 7 below. Results from the 2016 grain size analysis of Port Hueneme Beach can be found in Appendix C. Subsections that follow describe the physical testing results, as summarized in Tables 6 and 7 in terms of objectives for beach nourishment and ODMDS placement.

4.1 Sediment Observations

Sediment characteristics were generally similar among the cores. According to sediment logs (Appendix F), sediments were described as poorly graded sand (SP) or poorly graded sand with silt (SP-SM) down to the project overdepth elevations. Minor thin layers of silt with shells (less than about 0.5 feet thick) were logged in the cores. B-2 encountered a 1-foot thick silty sand (SM) layer at the top of the core. B-3 also encountered a 1-foot thick silty sand (SM) layer at the top of the core as well as a 1-foot thick silty sand (SM) interbed at the project overdepth elevation. One core (18-E-1) encountered silt (ML) to the project overdepth elevation.

The beach transect samples consisted of poorly graded sand (SP). Several samples were described as poorly graded sand with silt (SP-SM).

4.2 Sediment Physical Results

Grain size analyses were performed on multiple layers from each of the 20 cores collected. Data for each core and each individual layer are provided in Table 6. Sieve analysis data for Silver Strand Beach is provided in Table 7. Individual grain size distribution curves for each individual grain size sample are provided in Appendix F along with plasticity index plots and hydrometer data for a select number of samples.   Results from the 2016 prior testing of Port Hueneme Beach can be found in Appendix C of this report.

The weighted average composite grain size gradation was calculated for all five dredge areas based on the grain size test results from the vibracore borehole samples (Table 6). The weighted average sand content is 97.8% for Area A, 93.3 % for Area B, 92.9 % for Area C, 70.6 % for Area E and 98.4 % for Area G. In comparison, the average sand content for Silver Strand Beach was 97.8 % (Table 7) and the previous testing of Port Hueneme Beach in 2016 was 92.8%.

Results of the physical compatibility analysis are provided in Appendix G as a separate report prepared by the Los Angeles District USACE. This report concluded that the grain size distribution for Areas A, B, C and G are compatible for placement at Silver Stand Beach, Port Hueneme Beach as well as the four nearshore sites (Alpha, Bravo, Charlie and Delta) located south of Port Hueneme Harbor. Sediments from Area E do not fit within the compatibility envelope of Silver Stand Beach or three of the nearshore disposal areas (Bravo, Charlie and Delta). However, they are compatible with both the Port Hueneme Beach sediments and the Alpha nearshore location.

4.3 Sediment Chemistry Results

Composited sediments from each channel area were archived for both chemical and biological testing. Physical testing of these sediments confirmed primarily sandy sediments with little to no fine grain material. As such, chemical and biological analyses were not performed.

As previously mentioned, grain size analysis was not conducted on Port Hueneme Beach or the nearshore locations Alpha, Bravo, Charlie and Delta. These sediments were collected for Port Hueneme Deep Navigation Project. Those results can be found in Appendix C of this report. Sampling for Port Hueneme Beach occurred in November of 2016 and showed an average sand content of 92.8%, the nearshore Delta location was sampled in March of 2017 and had an average sand content of 95%. Additional confirmation testing of the Delta nearshore location occurred again in June of 2017 along with testing of the Alpha, Bravo and Charlie locations with the average sand content ranging from 89% to 95%.

Table 6. Channel Islands Harbor Sieve Analysis Data

Core Designation	Sampling Depth (ft, MLLW)	Gravel			Coarse Sand		Medium Sand				Fine Sand					Silt		Atterberg Limits		Classification
		Sieve No./Sieve Size/% Passing																		
		1/2" 12.5mm	3/8" 9.5mm	4 4.750mm	7 2.800mm	10 2.000mm	14 1.400mm	18 1.000mm	25 0.710mm	35 0.500mm	45 0.355mm	60 0.250mm	80 0.180mm	120 0.125mm	170 0.090mm	200 0.075mm	230 0.063mm	LL	PI	
Area A																				
CIHVC-18-A-01	-22	100.0	100.0	99.7	99.0	98.3	97.4	96.1	94.4	91.6	83.2	58.7	32.2	9.0	3.0	2.1	1.9			POORLY GRADED SAND (SP)
CIHVC-18-A-01	-22	100.0	100.0	93.9	92.8	92.0	90.9	89.6	87.8	84.9	78.4	59.3	35.7	11.0	3.5	2.2	1.9			POORLY GRADED SAND (SP)
CIHVC-18-A-02	-22	100.0	100.0	100.0	100.0	99.9	99.7	99.2	97.3	92.0	81.1	60.7	37.7	11.2	3.5	2.3	2.0			POORLY GRADED SAND (SP)
Area A Weighted Avg.		100	100	98.2	97.8	97.4	96.8	96.0	94.2	89.9	80.6	60.0	36.4	10.9	3.4	2.2	2.0			
Area B																				
CIHVC-18-B-01	-37	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.8	99.6	98.9	94.2	71.3	22.5	6.7	4.0	3.2			POORLY GRADED SAND (SP)
CIHVC-18-B-02	-37	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.7	99.5	99.2	98.3	95.3	64.3	41.9	33.6	29.7			SILTY SAND (SM)
CIHVC-18-B-02	-37	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.8	99.4	97.4	81.6	26.4	7.7	4.3	3.3			POORLY GRADED SAND (SP)
CIHVC-18-B-03	-37	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.8	99.5	97.8	88.1	47.2	27.3	22.0	19.6			SILTY SAND (SM)
CIHVC-18-B-03	-37	100.0	100.0	100.0	99.9	99.8	99.7	99.6	99.5	99.1	98.0	91.3	67.4	19.3	5.4	3.4	2.9			POORLY GRADED SAND (SP)
CIHVC-18-B-03	-37	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.8	99.7	99.3	97.1	77.6	55.6	47.2	42.9			SILTY SAND (SM)
CIHVC-18-B-04	-37	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.7	94.6	64.8	19.3	8.0	6.0	5.3			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-B-04	-37	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.5	92.2	62.2	16.4	6.1	4.5	4.0			POORLY GRADED SAND (SP)
CIHVC-18-B-05	-37	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.8	99.6	98.5	87.3	43.6	12.4	4.0	2.5	2.1			POORLY GRADED SAND (SP)
CIHVC-18-B-06	-37	100.0	100.0	99.9	99.6	99.4	98.9	98.2	96.9	94.7	90.4	76.3	54.5	14.6	6.9	5.1	4.6			POORLY GRADED SAND WITH SILT (SP-SM)
Area B Weighted Avg.		100	100	100	99.9	99.9	99.7	99.6	99.2	98.6	97.2	89.3	62.6	20.9	9.1	6.7	5.9			
Area C																				
CIHVC-18-C-01	-37	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.9	95.8	87.1	66.5	42.4	17.9	12.1	11.4	11.3			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-01	-37	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.9	99.6	99.3	96.8	81.8	27.3	13.1	9.1	7.4			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-01	-37	100.0	100.0	100.0	100.0	99.9	99.8	99.7	99.4	98.9	97.7	89.0	43.6	10.6	3.8	2.7	2.4			POORLY GRADED SAND (SP)
CIHVC-18-C-02	-37	100.0	100.0	100.0	99.9	99.9	99.8	99.7	99.5	99.2	98.5	95.6	81.0	30.3	14.1	9.1	6.9			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-03	-37	100.0	100.0	100.0	100.0	99.9	99.8	99.7	99.5	99.3	98.9	96.7	76.3	26.2	15.0	11.1	9.4			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-03	-37	100.0	100.0	100.0	100.0	99.9	99.9	99.7	99.4	98.8	97.4	91.6	66.9	24.5	14.5	11.3	9.7			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-04	-37	100.0	100.0	100.0	100.0	99.9	99.9	99.9	99.8	99.6	99.2	95.1	56.1	18.5	10.1	7.6	6.7			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-04	-37	100.0	100.0	99.9	99.9	99.7	99.5	99.4	99.1	98.9	98.1	91.6	57.0	16.6	8.0	5.2	4.2			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-05	-37	100.0	100.0	100.0	99.9	99.9	99.8	99.8	99.6	99.0	98.4	92.2	44.3	9.9	3.3	2.4	2.0			POORLY GRADED SAND (SP)
CIHVC-18-C-05	-37	100.0	100.0	99.6	99.5	99.4	99.3	99.2	99.0	98.6	97.5	90.6	47.2	11.5	4.4	3.1	2.8			POORLY GRADED SAND (SP)
CIHVC-18-C-05	-37	100.0	100.0	100.0	100.0	99.9	99.8	99.7	98.4	96.1	90.2	66.1	39.1	16.9	10.3	8.7	7.8			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-06	-37	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.8	99.4	94.4	56.4	17.8	9.7	7.7	6.8			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-06	-37	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.4	93.8	68.5	16.8	7.1	4.8	4.1			POORLY GRADED SAND (SP)
CIHVC-18-C-07	-37	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.8	99.5	97.9	79.5	43.4	14.6	8.0	6.4	5.7			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-C-07	-37	100.0	100.0	99.9	99.7	99.6	99.4	99.2	98.8	98.3	97.4	94.0	84.2	59.1	45.0	39.3	36.2			SILTY SAND (SM)
CIHVC-18-C-07	-37	100.0	100.0	99.9	99.9	99.9	99.9	99.8	99.7	99.3	97.9	84.5	44.5	11.3	3.8	2.4	2.0			POORLY GRADED SAND (SP)
Area C Weighted Avg.		100	100	100	99.9	99.9	99.8	99.8	99.5	99.0	97.7	88.6	56.9	18.5	9.5	7.1	6.1			
Area E																				
CIHVC-18-E-01	-22	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.6	98.8	97.5	93.5	84.4	79.2	76.1	29	2	SILT WITH SAND (ML)
CIHVC-18-E-01	-22	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.8	99.5	98.1	95.6	90.3	81.0	76.6	74.2	34	8	SILT WITH SAND (ML)
CIHVC-18-E-02	-22	100.0	100.0	100.0	99.7	99.5	99.2	97.8	91.2	72.3	41.1	14.4	7.7	6.4	5.7	5.4	5.3			POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC-18-E-02	-22	100.0	100.0	99.0	98.2	97.8	96.9	94.9	87.4	69.7	43.0	18.2	10.3	8.4	7.5	7.1	7.0			POORLY GRADED SAND WITH SILT (SP-SM)
Area E Weighted Avg.		100	100	99.5	99.0	98.7	98.2	96.9	92.0	79.7	60.8	43.2	37.4	34.7	31.2	29.4	28.5			
Area G																				
CIHVC-18-G-01	-22	100.0	100.0	99.9	99.9	99.8	99.7	99.4	99.0	97.9	94.6	81.1	50.1	10.1	1.7	1.0	0.9			POORLY GRADED SAND (SP)
CIHVC-18-G-01	-22	100.0	98.7	98.0	97.7	97.5	97.2	96.7	95.4	93.4	91.0	85.0	64.6	17.2	4.9	2.7	2.2			POORLY GRADED SAND (SP)
CIHVC-18-G-02	-22	100.0	100.0	99.9	99.7	99.7	99.4	99.2	98.8	98.3	96.5	85.5	52.8	10.7	2.2	1.1	1.0			POORLY GRADED SAND (SP)
CIHVC-18-G-02	-22	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.8	99.4	94.3	69.0	13.6	3.0	1.5	1.3			POORLY GRADED SAND (SP)
CIHVC-18-G-03	-22	100.0	100.0	100.0	99.9	99.9	99.8	99.7	99.5	99.1	97.7	87.4	50.3	9.5	2.5	1.4	1.2			POORLY GRADED SAND (SP)
CIHVC-18-G-03	-22	100.0	100.0	100.0	100.0	99.9	99.8	99.7	99.4	98.8	96.8	83.3	52.0	12.3	3.1	1.9	1.4			POORLY GRADED SAND (SP)
Area G Weighted Avg.		100	99.8	99.6	99.5	99.4	99.3	99.1	98.6	97.8	95.9	86.0	56.5	12.3	2.9	1.6	1.3			

Table 7. Silver Strand Beach Transect Sieve Analysis Data.

Location	Elevation (feet)	Fine Gravel			Coarse Sand		Medium Sand				Fine Sand					Silt/Clay		Classification
		Sieve No./Sieve Size/% Passing																
		1/2"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	
		12.5mm	9.5mm	4.750mm	2.800mm	2.000mm	1.400mm	1.000mm	0.710mm	0.500mm	0.355mm	0.250mm	0.180mm	0.125mm	0.090mm	0.075mm	0.063mm	
SSB18-A-1	+12	100.0	100.0	100.0	100.0	99.9	99.5	97.9	88.5	61.6	23.8	3.0	0.7	0.3	0.2	0.1	0.1	POORLY GRADED SAND (SP)
SSB18-A-2	+6	100.0	100.0	99.9	99.6	98.8	96.1	88.1	70.5	47.9	24.5	4.2	0.6	0.2	0.2	0.2	0.2	POORLY GRADED SAND (SP)
SSB18-A-3	0	100.0	99.8	99.0	98.3	97.9	97.5	97.2	96.6	94.7	83.0	24.3	6.5	1.3	0.9	0.9	0.9	POORLY GRADED SAND (SP)
SSB18-A-4	-6	100.0	100.0	99.9	99.4	98.9	98.0	96.4	92.9	85.9	70.2	35.7	12.1	2.2	0.9	0.9	0.8	POORLY GRADED SAND (SP)
SSB18-A-5	-12	100.0	100.0	100.0	99.8	99.8	99.7	99.5	99.3	99.1	98.1	91.0	62.7	11.4	2.1	1.2	1.0	POORLY GRADED SAND (SP)
SSB18-A-6	-18	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.7	99.2	95.4	60.6	11.2	2.5	1.3	1.1	POORLY GRADED SAND (SP)
SSB18-A-7	-24	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.6	96.1	22.0	5.5	2.4	1.8	POORLY GRADED SAND (SP)
SSB18-A-8	-30	100.0	100.0	99.5	99.4	99.4	99.4	99.3	99.3	99.2	99.1	98.4	95.0	39.7	13.5	6.5	4.4	POORLY GRADED SAND WITH SILT (SP-SM)
SSB18-B-1	+12	100.0	98.6	96.7	92.2	87.7	81.2	72.5	61.1	47.4	34.3	18.2	7.8	2.3	1.3	1.1	1.0	POORLY GRADED SAND (SP)
SSB18-B-2	+6	100.0	100.0	100.0	99.9	99.6	98.7	96.1	87.1	58.0	18.9	1.2	0.1	0.1	0.1	0.1	0.1	POORLY GRADED SAND (SP)
SSB18-B-3	0	100.0	100.0	99.6	98.1	95.3	88.9	78.9	65.0	46.5	24.2	4.4	0.9	0.6	0.5	0.5	0.5	POORLY GRADED SAND (SP)
SSB18-B-4	-6	100.0	100.0	99.9	99.5	99.1	98.5	97.4	95.1	89.5	72.5	30.1	10.4	2.2	1.4	1.3	1.3	POORLY GRADED SAND (SP)
SSB18-B-5	-12	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.7	98.5	93.3	75.6	55.3	15.5	4.0	1.8	1.1	POORLY GRADED SAND (SP)
SSB18-B-6	-18	100.0	100.0	99.9	99.9	99.9	99.9	99.8	99.8	99.7	99.6	98.9	94.5	25.8	6.7	2.4	1.7	POORLY GRADED SAND (SP)
SSB18-B-7	-24	100.0	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.8	99.3	96.5	39.4	12.6	5.9	4.0	POORLY GRADED SAND WITH SILT (SP-SM)
SSB18-B-8	-30	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.9	99.9	99.8	98.5	47.8	16.6	9.1	5.6	POORLY GRADED SAND WITH SILT (SP-SM)
A & B Weighted Avg.		100.0	99.9	99.7	99.1	98.5	97.3	95.2	90.9	83.0	71.3	54.9	43.6	13.9	4.3	2.2	1.6	

4.4 Conclusions and Recommendations

Sediment grain size results along with the chemical results from the 2012 Channel Islands sampling were compatible for beach nourishment. Grain size results were similar to the grain size results in the current testing program, it is therefore expected that the chemical concentrations will be similar and as such should be suitable for beach nourishment or nearshore placement.

The beach physical compatibility analysis, as described in Appendix G of this report, concluded that the Channel Islands Harbor sediments are compatible for beach nourishment reuse or nearshore placement. Compatibility was based on the weighted average grain size distribution as a composite of all vibracores in a composite area combined as well as the weighted average distributions for each individual core. Based on this, all sediments from Areas A, B, C and G were determined to be compatible with Silver Strand Beach and Port Hueneme Beach as well as all nearshore locations. Area E showed finer grained material especially within vibracore E-01. Based on the composite weighted average calculations for locations E-01 and E-02 collected in this area, all of the sediment in Area E was determined to be suitable for placement at Hueneme Beach or offshore within the Alpha nearshore area (Figure 6).

5.0 QUALITY CONTROL REQUIREMENTS

Formal QA/QC procedures were followed for this project. The objectives of the QA/QC Program were to fully document the field and laboratory data collected, to maintain data integrity from the time of field collection through storage and archiving, and to produce the highest quality data possible. Quality assurance involves all of the planned and systematic actions necessary to provide confidence that work performed by the project team conforms to contract requirements, laboratory methodologies, state and federal regulation requirements, and corporate Standard Operating Procedures (SOPs). The program is designed to allow the data to be assessed by the following parameters: Precision, Accuracy, Comparability, Representativeness, and Completeness. These parameters are controlled by adhering to documented methods and procedures (SOPs), and by the analysis of quality control (QC) samples on a routine basis.

Field quality control procedures were followed and included adherence to SOPs, field documentation, formal sample documentation and tracking, use of certified clean laboratory containers, protocol cleaning, and sample preservation.

Composited sediments from each channel area were archived for both chemical and biological testing. Testing was not performed. Formal analytical quality control procedures will be followed, if required.

6.0 REFERENCES CITED

ASTM D 2487-06. Classification of Soils for Engineering Purposes (USCS), American Society for Testing and Materials, W. Conshohocken, PA, latest edition.

ASTM D 2488-06. Standard Practice for Description and Identification of Soils (Visual Manual Procedure), American Society for Testing and Materials, W. Conshohocken, PA, latest edition.

ASTM D 422-63. Particle-Size Analysis of Soils, American Society for Testing and Materials, W. Conshohocken, PA, latest edition.

ASTM D 4318-05. Liquid Limit, Plastic Limit, and Plasticity Index of Soils, American Society for Testing and Materials, W. Conshohocken, PA, latest edition.

California Environmental Protection Agency (Cal/EPA). 2010. Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties. September 2010.

CESPD, 2000. Quality Management Plan, CESPD R 1110-1-8, U.S. Army Corps of Engineers, South Pacific Division, 26 May 2000.

CESPL, undated. Requirements for Sampling, Testing and Data Analysis of Dredge Material, U.S. Corps of Engineers, Los Angeles District.

Diaz Yourman and Kinnetic laboratories, 2007. Sediment Sampling and Chemical Testing, Channel Islands Harbor, Port Hueneme Harbor and Oceanside Harbor. Prepared for USACE, Los Angeles District. Task Order No. 0002, USACE Contract No. W912PL-06-D-004. February 5, 2007.

Diaz Yourman, GeoPentech, Kinnetic Laboratories, JV. 2012. Final Report. Sampling and Analysis Results for the 2012 Channel Islands Harbor Geotechnical and Environmental Investigation Project. Prepared for USACE, Los Angeles District. Task Order No. 0003, USACE Contract No. W912PL-11-D-0015. August 2012.

Diaz Yourman, GeoPentech, Kinnetic Laboratories, JV. 2017. Final Report. Sampling and Analysis Results for the 2016 Port Hueneme Harbor Deep Navigation Geotechnical and Environmental Investigation Project. Prepared for USACE, Los Angeles District. Task Order No. 014, USACE Contract No. W912PL-11-D-0015. April 2017.

Long, E.R., D.D. MacDonald, S.I. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological Effects Within the ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environmental Management, Vol. 19:81-97.

USEPA/USACE 1998. Evaluation of Dredged Material Proposed For Discharge In Waters Of The U.S. – Testing Manual [Inland Testing Manual (Gold Book)]. EPA-823-B-98-004.

USEPA Region 9. Updated 2017. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. http://www.epa.gov/region9/superfund/prg/. Updated November 2015.

Appendix A

Sampling, Physical and Analytical Data
Channel Islands Harbor 2012 Environmental and Geotechnical Investigation Project
(Diaz Yourman, GeoPentech and Kinnetic Laboratories, JV, 2012)

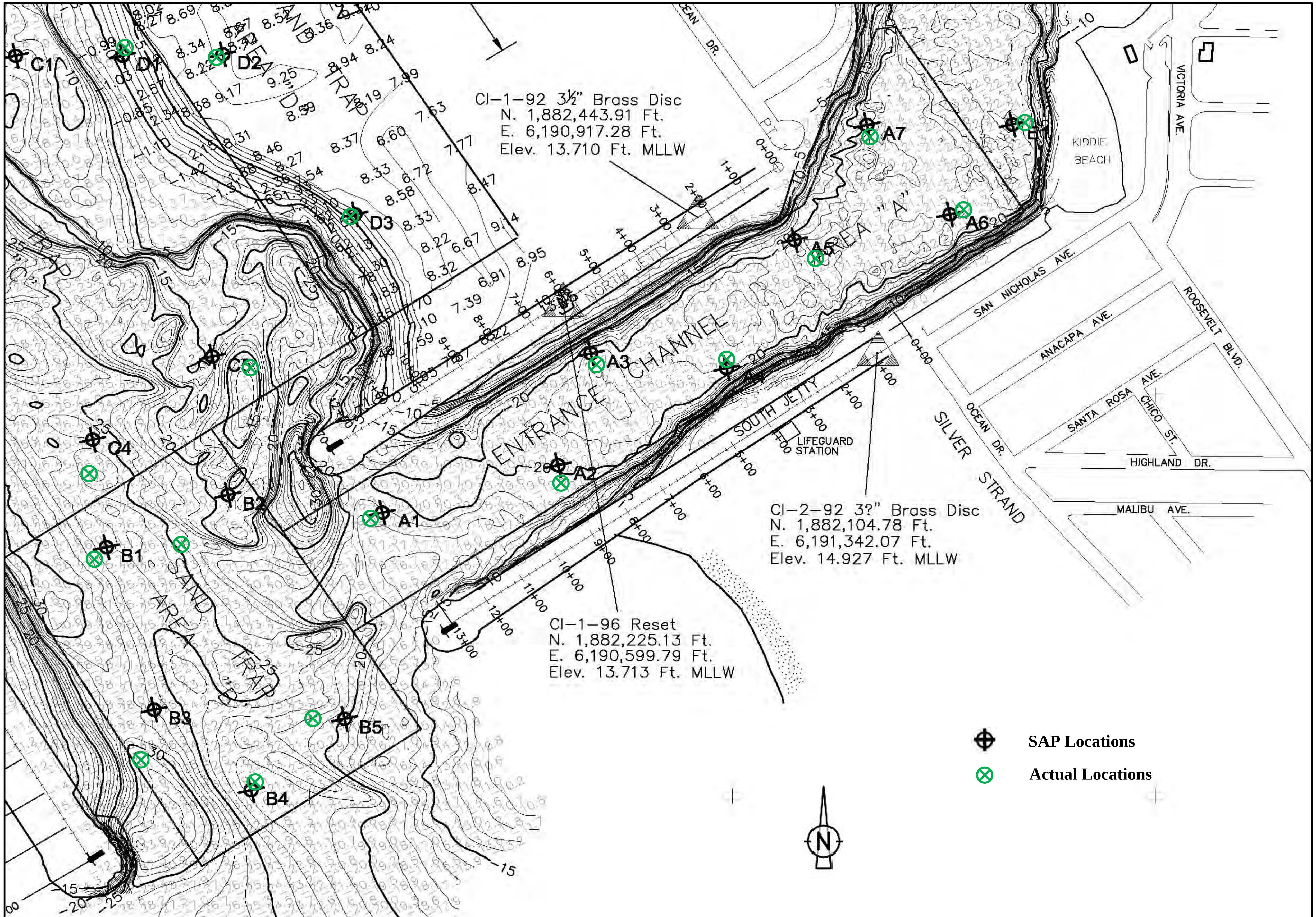


Figure 4. Channel Islands Harbor Areas A and B with Actual and Proposed 2012 Sampling Locations, and September 2011 Bathymetric Data.

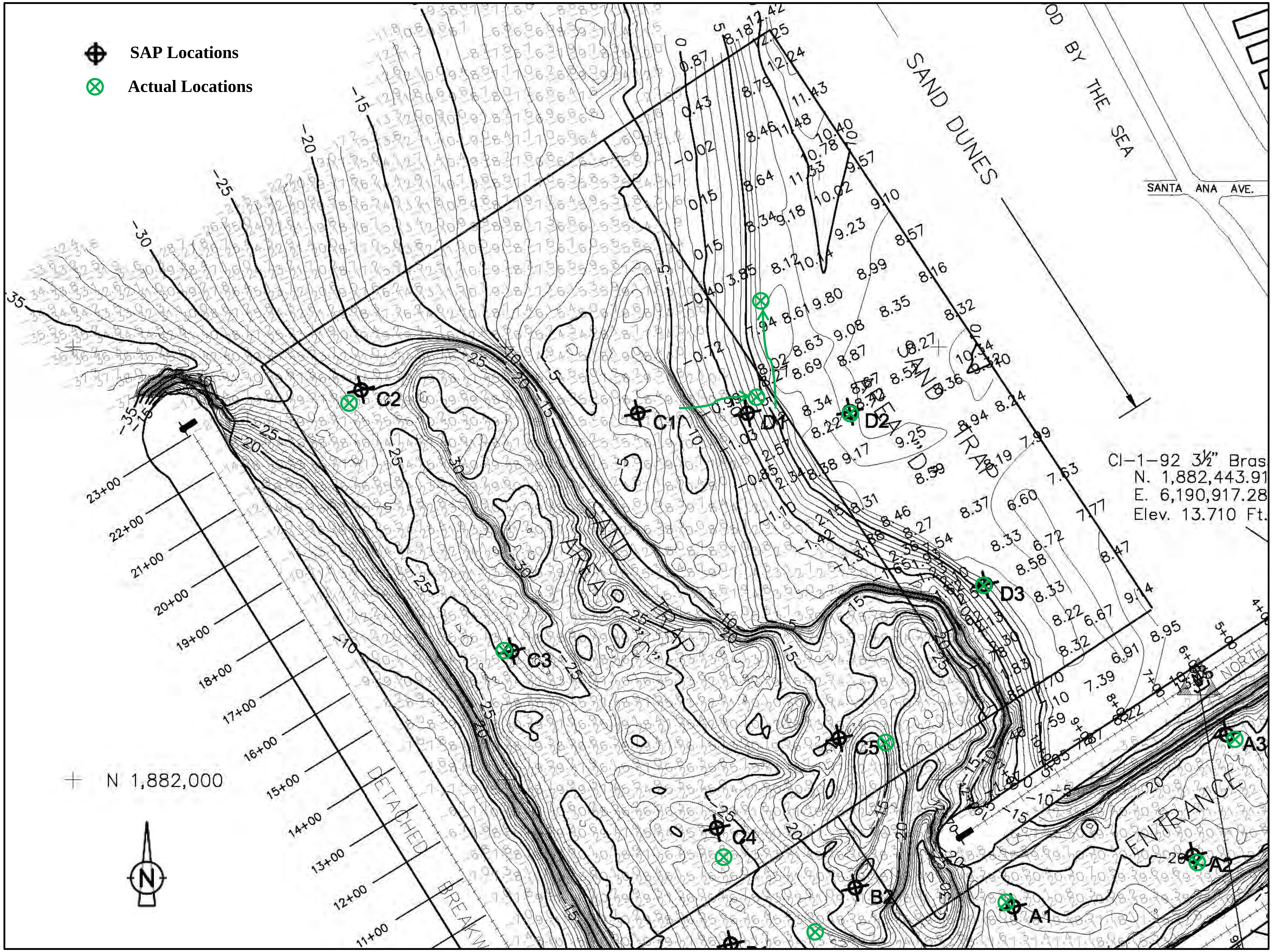


Figure 5. Channel Islands Harbor Areas C and D with and Actual and Proposed 2012 Sampling Locations, and September 2011 Bathymetric Data.

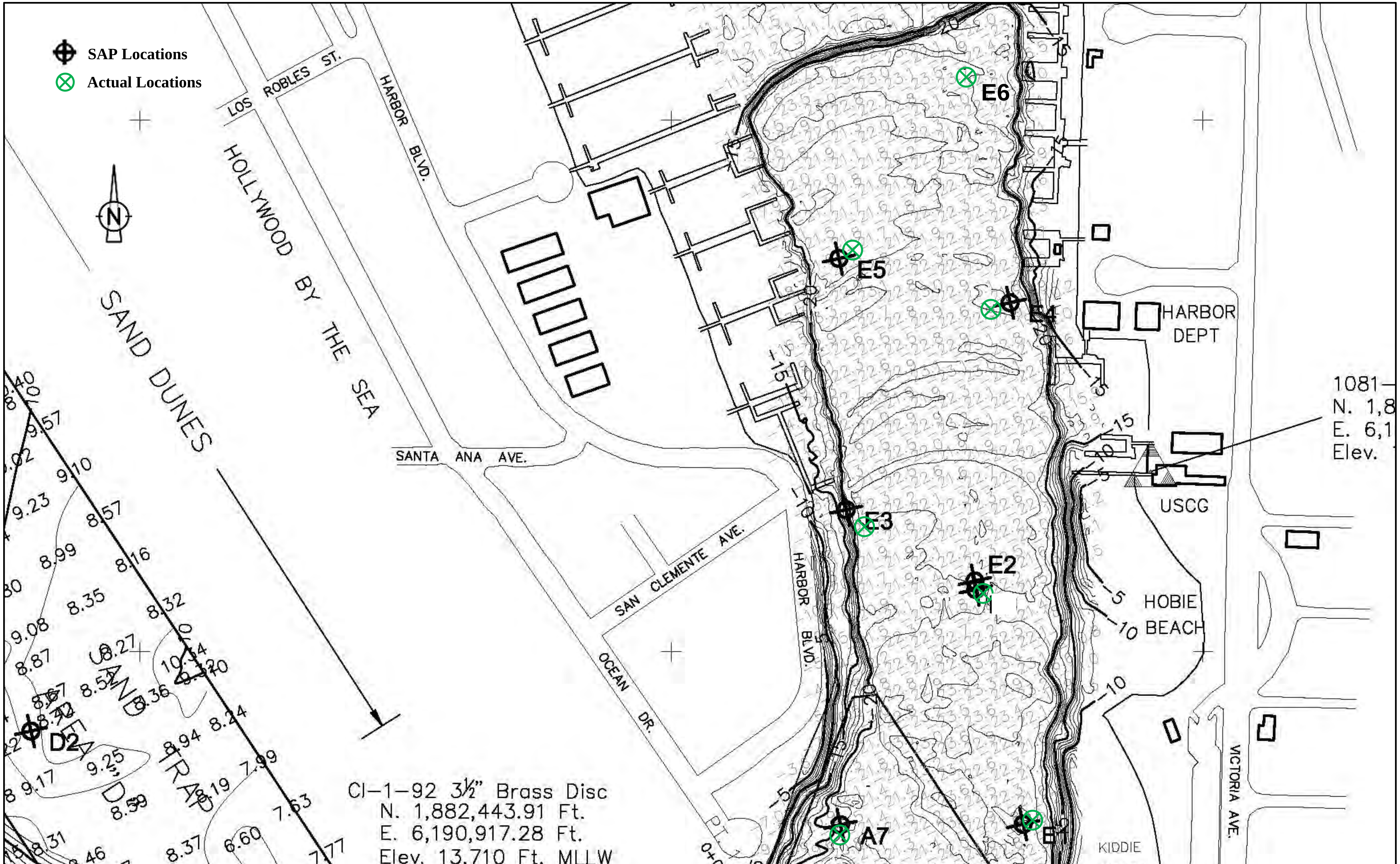


Figure 6. Channel Islands Harbor Area E with Actual and Proposed 2012 Sampling Locations, and September 2011 Bathymetric Data.

Table 3. Core Sampling Locations and Depths, Existing Mudline Elevations, and Project and Sampling Elevations, Channel Islands Harbor.

Composite Area	Core Designation	Sampling Date	Sampling Time	Latitude North	Longitude West	Mudline (ft, MLLW)	Project Elevation (ft, MLLW)	Core Length Recovery (feet)	Target Sampling Elevation (ft, MLLW)	Core Length Sampled** (ft)
Entrance Channel										
A	CIHVC12-A-1	4/11/12	1745	34° 09’ 24.1”	119° 13’ 40.3”	-16.0	-20	12.6	-22	6.0
A	CIHVC12-A-2	4/11/12	0932	34° 09’ 25.3”	119° 13’ 35.6”	-18.1	-20	12.3	-22	3.9
A	CIHVC12-A-3	4/11/12	1021	34° 09’ 28.2”	119° 13’ 34.5”	-19.6	-20	11.8	-22	2.4
A	CIHVC12-A-4	4/11/12	1104	34° 09’ 28.5”	119° 13’ 31.0”	-20.5	-20	10.5	-22	1.5
A	CIHVC12-A-5	4/11/12	1140	34° 09’ 30.9”	119° 13’ 28.7”	-20.5	-20	10.3	-22	1.5
A	CIHVC12-A-6	4/11/12	1227	34° 09’ 32.2”	119° 13’ 24.6”	-20.9	-20	11.2	-22	1.1
A	CIHVC12-A-7	4/11/12	1340	34° 09’ 34.0”	119° 13’ 27.3”	-20.5	-20	11.5	-22	1.5
Sand Trap										
B	CIHVC12-B-1	4/10/12	0914	34° 09’ 23.5”	119° 13’ 48.5”	-23.3	-35	18.8	-37	11.7
B	CIHVC12-B-2	4/12/12	1535	34° 09’ 23.8”	119° 13’ 46.5”	-18.4	-35	23.5	-37	18.6
B	CIHVC12-B-3	4/10/12	1750	34° 09’ 18.7”	119° 13’ 47.3”	-28.4	-35	17.4	-37	8.6
B	CIHVC12-B-4	4/10/12	1843	34° 09’ 17.0”	119° 13’ 44.5”	-25.1	-35	18.6	-37	11.9
B	CIHVC12-B-5	4/10/12	1922	34° 09’ 20.1”	119° 13’ 42.8”	-17.1	-35	23.2	-37	19.9
Sand Trap										
C	CIHVC12-C-1*	4/17/12	1448	34° 09’ 36.0”	119° 13’ 47.5”	+2.5	-35	39.5	-37	39.5
C	CIHVC12-C-2	4/10/12	1225	34° 09’ 35.6”	119° 13’ 59.1”	-28.0	-35	13.9	-37	9.0
C	CIHVC12-C-3	4/10/12	1353	34° 09’ 30.2”	119° 13’ 54.8”	-24	-35	19.5	-37	13.0
C	CIHVC12-C-4	4/10/12	1646	34° 09’ 25.1”	119° 13’ 48.5”	-24.7	-35	16.8	-37	12.3
C	CIHVC12-C-5	4/10/12	1514	34° 09’ 28.1”	119° 13’ 43.7”	-19.4	-35	20.0	-37	17.6
Sand Trap										
D	CIHVC12-D-1*	4/18/12	1100	34° 09’ 40.5”	119° 13’ 47.2”	+4.25	-35	48.25	-37	41.25
D	CIHVC12-D-2*	4/17/12	1245	34° 09’ 35.7”	119° 13’ 45.4”	+8.0	-35	45.0	-37	45.0
D	CIHVC12-D-3*	4/18/12	1450	34° 09’ 31.8”	119° 13’ 41.6”	+1.25	-35	38.0	-37	38.0

Table 3. Core Sampling Locations and Depths, Existing Mudline Elevations, and Project and Sampling Elevations, Channel Islands Harbor.

Composite Area	Core Designation	Sampling Date	Sampling Time	Latitude North	Longitude West	Mudline (ft, MLLW)	Project Elevation (ft, MLLW)	Core Length Recovery (feet)	Target Sampling Elevation (ft, MLLW)	Core Length Sampled** (ft)
Inner Channel										
E	CIHVC12-E-1	4/11/12	1430	34° 09' 34.3"	119° 13' 22.9"	-21.5	-20	12.3	-22	0.5
E	CIHVC12-E-2	4/11/12	1516	34° 09' 38.4"	119° 13' 24.0"	-21.8	-20	13.0	-22	0.2
E	CIHVC12-E-3	4/11/12	1610	34° 09' 39.5"	119° 13' 26.8"	-21.4	-20	12.8	-22	0.6
E	CIHVC12-E-4	4/12/12	1830	34° 09' 43.8"	119° 13' 24.0"	-22.9	-20	7.0	-22	NS
E	CIHVC12-E-5	4/12/12	1740	34° 09' 44.8"	119° 13' 27.2"	-22.1	-20	9.0	-22	NS
E	CIHVC12-E-6	4/12/12	1710	34° 09' 48.1"	119° 13' 24.7"	-23.6	-20	6.9	-22	NS

* Denotes samples taken with the rotosonic drill.

** Only covers the length of core down to the project overdredge depth sampled for chemistry.

NS = Geotechnical samples only.

Table 4. Dates, Times and Locations for Each Sample Collected from Silver Strand Beach and Hueneme Beach.

Area	Site Designations	Date	Time	Sampling Elevations (feet, MLLW)	Latitude North	Longitude West
Silver Strand Beach Transect A (Ventura Ave)	A+12	4/12/2012	10:14:35AM	+12	34 09 04.2	119 13 09.0
	A+6	4/12/2012	10:11:47AM	+6	34 09 03.8	119 13 09.8
	A0	4/12/2012	10:12:25AM	0	34 09 03.3	119 13 10.6
	A-6	4/12/2012	10:17:20AM	-6	34 09 02.0	119 13 12.6
	A-12	4/12/2012	11:29:26AM	-12	34 09 00.4	119 13 15.7
	A-18	4/12/2012	11:39:20AM	-18	34 08 59.3	119 13 17.0
	A-24	4/12/2012	11:46:09AM	-24	34 08 56.6	119 13 21.0
	A-30	4/12/2012	12:01:39PM	-30	34 08 54.2	119 13 25.1
Silver Strand Beach Transect B (Hueneme Ave)	B+12	4/12/2012	10:29:28AM	+12	34 09 14.6	119 13 18.0
	B+6	4/12/2012	10:27:08AM	+6	34 09 14.2	119 13 18.6
	B0	4/12/2012	10:25:31AM	0	34 09 13.4	119 13 19.7
	B-6	4/12/2012	10:30:11AM	-6	34 09 12.4	119 13 21.3
	B-12	4/12/2012	12:18:28PM	-12	34 09 11.3	119 13 23.7
	B-18	4/12/2012	12:24:49PM	-18	34 09 08.2	119 13 26.7
	B-24	4/12/2012	12:40:22PM	-24	34 09 06.1	119 13 30.3
	B-30	4/12/2012	12:51:58PM	-30	34 09 02.5	119 13 35.0
Hueneme Beach Transect A	A+12	4/12/2012	8:06:36AM	+12	34 08 33.2	119 11 46.2
	A+6	4/12/2012	8:01:43AM	+6	34 08 32.2	119 11 47.0
	A0	4/12/2012	7:57:38AM	0	34 08 31.0	119 11 48.1
	A-6	4/12/2012	8:10:24AM	-6	34 08 29.7	119 11 49.3
	A-12	4/25/2012	2:00:03PM	-12	34 08 25.9	119 11 48.5
	A-18	4/12/2012	9:06:01AM	-18	34 08 26.1	119 11 53.1
	A-24	4/12/2012	11:09:32AM	-24	34 08 22.5	119 11 55.4
	A-30	4/12/2012	9:29:17AM	-30	34 08 18.5	119 11 59.4
Hueneme Beach Transect B	B+12	4/12/2012	8:27:01AM	+12	34 08 40.0	119 12 00.7
	B+6	4/12/2012	8:20:07AM	+6	34 08 39.1	119 12 01.2
	B0	4/12/2012	8:18:25AM	0	34 08 38.0	119 12 02.1
	B-6	4/12/2012	8:28:48AM	-6	34 08 36.3	119 12 02.8
	B-12	4/25/2012	2:34:35PM	-12	34 08 34.6	119 12 05.8
	B-18	4/12/2012	10:55:34AM	-18	34 08 31.0	119 12 05.5
	B-24	4/12/2012	10:00:37AM	-24	34 08 25.8	119 12 08.8
	B-30	4/12/2012	9:44:16AM	-30	34 08 20.2	119 12 10.8
Hueneme Beach Transect C	C+12	NA	NA	NA	NA	NA
	C+6	NA	NA	NA	NA	NA
	C0	NA	NA	NA	NA	NA
	C-6	4/12/2012	9:32:18AM	-6	34 08 40.0	119 12 10.7
	C-12	4/25/2012	2:54:08PM	-12	34 08 38.3	119 12 22.5
	C-18	4/12/2012	10:13:01AM	-18	34 08 32.4	119 12 22.6
	C-24	4/12/2012	10:23:56AM	-24	34 08 27.5	119 12 22.3
	C-30	4/12/2012	10:40:07AM	-30	34 08 23.1	119 12 21.5

Table 9. 2012 Channel Islands Harbor Physical Data Above Overdredge Depth for Each Individual Core.

Location	Sample Number	Mudline	Elevation (ft, MLLW)		Gravel			Coarse Sand		Medium Sand				Fine Sand						Silt	Classification
					Sieve No./Seive Size/% Passing																
						3/8	4	7	10	14	18	25	35	45	60	80	120	170	200	230	
			Top	Bottom	19 mm	9.5 mm	4.75 mm	2.8 mm	2 mm	1.4 mm	1.0 mm	0.71 mm	0.50 mm	0.355 mm	0.250 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	
Area A - Entrance Channel																					
CIHVC12-A-1	2	-16	-16	-22.0	100	100	100	100	100	100	100	99	98	97	93	79	28	4	1	0	POORLY GRADED SAND (SP)
CIHVC12-A-2	2	-18.1	-18.1	-22.0	100	100	100	100	100	99	99	98	97	96	92	79	32	8	5	3	POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC12-A-3	2	-19.6	-19.6	-22.0	100	100	100	100	100	100	99	98	97	96	94	87	52	22	15	12	SILTY SAND (SM)
CIHVC12-A-4	2	-20.6	-20.6	-22.0	100	100	100	100	100	100	99	99	98	97	92	78	44	19	13	10	SILTY SAND (SM)
CIHVC12-A-5	2	-20.5	-20.5	-22.0	100	100	100	100	100	100	99	99	97	91	72	52	32	16	11	8	POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC12-A-6	1	-20.9	-20.9	-22.0	100	100	100	100	100	99	99	98	94	83	65	48	29	20	16	14	SILTY SAND (SM)
CIHVC12-A-7	1	-20.5	-20.5	-22.0	100	100	100	100	100	99	99	98	94	83	58	35	23	15	12	10	POORLY GRADED SAND WITH SILT (SP-SM)
Area B - Sand Trap																					
CIHVC12-B-1	2	-23.3	-23.3	-35.0	100	100	100	100	100	99	99	99	98	98	95	85	41	16	11	9	POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC12-B-1	3	-23.3	-35	-37.0	100	100	100	100	100	100	99	99	98	98	96	91	64	37	28	22	SILTY SAND (SM)
CIHVC12-B-2	2	-18.4	-18.4	-37.0	100	100	100	100	100	100	99	99	98	96	91	71	22	4	2	1	POORLY GRADED SAND (SP)
CIHVC12-B-3	2	-28.4	-28.4	-37.0	100	100	100	100	100	99	99	98	97	96	92	80	38	14	9	3	POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC12-B-4	2	-25.1	-25.1	-37.0	100	100	100	100	100	100	99	99	98	95	84	61	15	2	0	0	POORLY GRADED SAND (SP)
CIHVC12-B-5	2	-17.1	-17.1	-37.0	100	100	100	99	98	98	97	95	93	88	75	52	12	1	0	0	POORLY GRADED SAND (SP)
Area C - Sand Trap																					
CIHVC12-C-1	2	2.5	2.5	-37.0	100	100	100	98	97	95	93	90	85	79	61	36	9	3	2	1	POORLY GRADED SAND (SP)
CIHVC12-C-2	2	-28	-28	-37.0	100	100	100	99	98	98	97	96	94	93	91	83	44	19	12	9	POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC12-C-3	2	-24	-24.0	-37.0	100	100	100	100	100	99	99	99	99	98	95	81	34	11	6	4	POORLY GRADED SAND WITH SILT (SP-SM)
CIHVC12-C-4	2	-24.7	-24.7	-37.0	100	100	100	100	100	100	100	99	99	98	94	82	29	6	3	2	POORLY GRADED SAND (SP)
CIHVC12-C-5	1	-19.4	-19.4	-20.7	No Test - all organic material																
CIHVC12-C-5	2	-19.4	-20.7	-37.0	100	100	100	99	99	99	99	98	98	97	91	71	27	8	4	3	POORLY GRADED SAND (SP)
Area D - Sand Trap																					
CIHVC12-D-1	2	4.2	4.2	-37.0	100	100	99	96	94	92	89	84	74	59	36	17	6	3	2	2	POORLY GRADED SAND (SP)
CIHVC12-D-2	2	8.0	8.0	-37.0	100	100	100	100	100	100	99	98	93	83	56	27	7	3	2	2	POORLY GRADED SAND (SP)
CIHVC12-D-3	1	1.2	1.2	-0.8	100	100	100	100	100	100	100	99	98	93	59	19	2	1	0	0	POORLY GRADED SAND (SP)
CIHVC12-D-3	2	1.2	1.2	-37.3	100	100	100	100	100	100	99	98	96	93	82	59	20	7	5	4	POORLY GRADED SAND WITH SILT (SP-SM)
Area E - Inner Channel																					
CIHVC12-E-1	1	-21.5	-21.5	-22.0	100	100	100	100	100	99	98	96	93	87	79	69	50	33	26	21	SILTY SAND (SM)
CIHVC12-E-2	1	-21.8	-21.8	-22.0	100	100	100	100	100	99	98	97	95	93	87	81	67	48	38	32	SILTY SAND (SM)
CIHVC12-E-3	1	-21.4	-21.4	-22.0	100	100	100	100	100	99	99	98	96	87	65	40	21	13	10	8	POORLY GRADED SAND WITH SILT (SP-SM)

Table 10. Surface Physical Data for Silver Strand Beach and Hueneme Beach Collected in 2012.

Location	Mudline	Gravel			Coarse Sand		Medium Sand				Fine Sand						Silt	Classification
		Sieve No./Seive Size/% Passing																
			3/8	4	7	10	14	18	25	35	45	60	80	120	170	200	230	
		19 mm	9.5 mm	4.75 mm	2.8 mm	2 mm	1.4 mm	1.0 mm	0.71 mm	0.50 mm	0.355 mm	0.250 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	
Hueneme Beach - Transect A																		
HBGS12-A-1	12	100	100	99	99	98	98	97	97	96	93	73	37	7	2	1	0	POORLY GRADED SAND (SP)
HBGS12-A-2	6	100	100	100	100	100	100	100	99	97	85	55	23	2	0	0	0	POORLY GRADED SAND (SP)
HBGS12-A-3	0	100	100	99	96	92	85	75	64	53	46	34	18	3	1	1	1	POORLY GRADED SAND (SP)
HBGS12-A-4	-6	100	100	97	93	87	77	65	55	45	35	22	10	2	1	1	1	POORLY GRADED SAND (SP)
HBGS12-A-5	-12	100	100	99	98	98	98	97	96	95	94	87	66	20	4	1	0	POORLY GRADED SAND (SP)
HBGS12-A-6	-18	100	100	100	99	99	99	99	99	98	98	97	96	86	43	13	7	SILTY SAND (SM)
HBGS12-A-7	-24	100	100	100	100	100	100	99	99	98	98	96	94	86	55	32	19	SILTY SAND (SM)
HBGS12-A-8	-30	100	100	100	100	100	100	99	99	98	96	83	70	56	28	12	7	POORLY GRADED SAND WITH SILT (SP-SM)
Hueneme Beach - Transect B																		
HBGS12-B-1	15	100	100	98	96	93	89	83	77	68	59	42	25	8	3	2	2	POORLY GRADED SAND (SP)
HBGS12-B-2	6	100	100	100	100	100	100	100	99	95	79	46	14	1	0	0	0	POORLY GRADED SAND (SP)
HBGS12-B-3	0	100	100	99	97	96	93	89	82	71	61	45	25	5	1	1	1	POORLY GRADED SAND (SP)
HBGS12-B-4	-6	100	100	100	100	100	99	98	97	95	91	80	59	21	6	1	0	POORLY GRADED SAND (SP)
HBGS12-B-5	-12	100	100	100	100	100	100	99	97	89	68	31	12	5	2	1	1	POORLY GRADED SAND (SP)
HBGS12-B-6	-18	100	100	100	99	99	99	98	97	97	95	93	89	76	55	34	21	SILTY SAND (SM)
HBGS12-B-7	-24	100	100	100	100	100	100	99	99	99	97	94	91	79	55	41	25	SILTY SAND (SM)
HBGS12-B-8	-30	100	100	100	100	100	100	100	99	97	81	52	49	40	13	5	3	POORLY GRADED SAND WITH SILT (SP-SM)
Hueneme Beach - Transect C																		
HBGS12-C-4a**	-6	100	100	100	100	100	99	99	99	97	95	86	64	25	7	2	1	POORLY GRADED SAND (SP)
HBGS12-C-5	-12	100	100	100	100	100	100	99	98	97	96	93	87	62	38	23	9	SILTY SAND (SM)
HBGS12-C-6	-18	100	100	100	100	100	100	99	99	98	98	97	95	85	65	44	26	SILTY SAND (SM)
HBGS12-C-7	-24	100	100	100	100	100	100	99	99	99	98	97	94	67	28	17	9	SILTY SAND (SM)
HBGS12-C-8	-30	100	100	100	100	100	100	100	99	99	98	96	93	56	11	3	1	POORLY GRADED SAND (SP)
Silver Strand Beach - Transect A																		
SSBGS12-A-1	6	100	100	100	100	100	100	99	94	73	43	12	2	0	0	0	0	POORLY GRADED SAND (SP)
SSBGS12-A-2	12	100	100	100	100	100	100	99	94	71	30	4	1	0	0	0	0	POORLY GRADED SAND (SP)
SSBGS12-A-3	0	100	100	100	99	98	96	90	79	41	18	5	2	0	0	0	0	POORLY GRADED SAND (SP)
SSBGS12-A-4	-6	100	100	100	100	100	99	98	96	87	64	23	7	1	0	0	0	POORLY GRADED SAND (SP)
SSBGS12-A-5	-12	100	100	100	100	100	100	99	98	96	89	65	40	9	1	0	0	POORLY GRADED SAND (SP)
SSBGS12-A-6	-18	100	100	100	100	100	100	100	99	99	97	92	77	19	2	1	0	POORLY GRADED SAND (SP)
SSBGS12-A-7	-24	100	100	99	99	99	99	98	98	97	96	94	88	42	11	3	1	POORLY GRADED SAND (SP)
SSBGS12-A-8	-30	100	100	100	100	100	100	99	99	98	97	96	93	56	15	5	2	POORLY GRADED SAND WITH SILT (SP-SM)
Silver Strand Beach - Transect B																		
SSBGS12-B-1	12	100	100	100	100	100	100	100	98	85	50	10	1	0	0	0	0	POORLY GRADED SAND (SP)
SSBGS12-B-2	6	100	100	100	98	93	83	68	54	44	34	19	6	1	0	0	0	POORLY GRADED SAND (SP)
SSBGS12-B-3	0	100	100	100	100	100	99	98	96	88	67	31	10	1	0	0	0	POORLY GRADED SAND (SP)
SSBGS12-B-4	-6	100	100	100	100	100	99	98	96	88	73	45	24	4	0	0	0	POORLY GRADED SAND (SP)
SSBGS12-B-5	-12	100	100	100	100	99	99	97	95	92	86	66	40	8	1	0	0	POORLY GRADED SAND (SP)

Table 10. Surface Physical Data for Silver Strand Beach and Hueneme Beach Collected in 2012.

Location	Mudline	Gravel			Coarse Sand		Medium Sand				Fine Sand						Silt	Classification
		Sieve No./Seive Size/% Passing																
			3/8	4	7	10	14	18	25	35	45	60	80	120	170	200	230	
		19 mm	9.5 mm	4.75 mm	2.8 mm	2 mm	1.4 mm	1.0 mm	0.71 mm	0.50 mm	0.355 mm	0.250 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	
SSBGS12-B-6	-18	100	100	100	100	100	100	99	98	97	96	92	81	29	4	1	1	POORLY GRADED SAND (SP)
SSBGS12-B-7	-24	100	100	100	100	99	99	98	98	97	96	95	90	42	7	2	1	POORLY GRADED SAND (SP)
SSBGS12-B-8	-30	100	100	100	100	100	100	99	98	97	97	96	91	45	13	7	5	POORLY GRADED SAND WITH SILT (SP-SM)

**Site was moved for safety.

Table 11. 2012 Channel Islands Harbor Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Channel Islands Harbor Composite Samples					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		CIHVC12-A Area A	CIHVC12-B Area B	CIHVC12-C Area C	CIHVC12-D Area D	CIHVC12-E Area E	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
SEDIMENT CONVENTIONALS												
Percent Solids	%	73.3	79.1	81	86.4	64.3						
Total Volatile Solids	%	1.3	0.63	1.2	0.35	0.91						
pH	pH Units	7.76	7.99	8.18	9.72	7.99						
Total Organic Carbon	%	0.4	0.25	0.46	0.1	0.9						
Oil and Grease	mg/kg dry	97	77	94	36	140						
TRPH	mg/kg dry	58	47	73	26	55						
Total Ammonia	mg/kg dry	1.9	1.9	0.43	2.3	2.2						
Water Soluble Sulfides	mg/L	0.1U	0.1U	0.1U	0.1U	0.1U						
Total Sulfides	mg/kg dry	140	0.63	9.9	0.12U	560						
METALS												
Arsenic	mg/kg dry	3.3	3.49	4.18	2.45	4.67	8.2	70	0.39	1.6	0.07	0.24
Cadmium	mg/kg dry	0.314	0.297	0.209	0.127	0.544	1.2	9.6	70	800	1.7	7.5
Chromium	mg/kg dry	13	13	7.95	5.75	22.9	81	370			100,000	1,000,000
Copper	mg/kg dry	8.56	7.1	5.34	3.1	21.8	34	270	3,100	41,000	3,000	38,000
Lead	mg/kg dry	3.88	3.67	2.92	2.15	7.44	46.7	218	400	800	150	3,500
Mercury	mg/kg dry	0.0273U	0.0253U	0.00893J	0.0174J	0.0101J	0.15	0.71	10	43	18	180
Nickel	mg/kg dry	12.3	11.3	8.79	5.31	19.1	20.9	51.6	1,500	20,000	1,600	16,000
Selenium	mg/kg dry	0.323	0.281	0.123U	0.116U	0.544			390	5,100	380	4,800
Silver	mg/kg dry	0.0376J	0.0387J	0.0248J	0.0125J	0.0864J	1	3.7	390	5,100	380	4,800
Zinc	mg/kg dry	33.4	31.9	23.4	15.4	65.5	150	410	23,000	310,000	23,000	100,000
BUTYLTINS												
Dibutyltin	µg/kg dry	4.1U	3.8U	3.7U	3.5U	4.7U			18,000	180,000		
Monobutyltin	µg/kg dry	4.1U	3.8U	3.7U	3.5U	4.7U						
Tetrabutyltin	µg/kg dry	4.1U	3.8U	3.7U	3.5U	4.7U						
Tributyltin	µg/kg dry	4.1U	3.8U	3.7U	3.5U	4.7U			18,000	180,000		
POLYAROMATIC HYDROCARBONS												
1-Methylnaphthalene	µg/kg dry	2.9J	13U	2.4J	12U	5.4J			22,000	99,000		
1-Methylphenanthrene	µg/kg dry	14U	13U	12U	12U	16U						
2,3,5-Trimethylnaphthalene	µg/kg dry	14U	13U	12U	12U	16U						
2,6-Dimethylnaphthalene	µg/kg dry	11J	3.2J	4.4J	12U	38						
2-Methylnaphthalene	µg/kg dry	3.3J	2.6J	2.8J	12U	5.5J	70	670	310,000	4,100,000		
Acenaphthene	µg/kg dry	14U	13U	12U	12U	3.5J	16	500	3,400,000	33,000,000		
Acenaphthylene	µg/kg dry	14U	13U	12U	12U	3.5J	44	640				
Anthracene	µg/kg dry	14U	13U	3.8J	12U	16U	85.3	1100	17,000,000	170,000,000		
Benzo (a) Anthracene	µg/kg dry	3.1J	13U	15	12U	7.5J	261	1600	150	2100		
Benzo (a) Pyrene	µg/kg dry	4.2J	13U	17	12U	7.9J	430	1600	15	210	38	130
Benzo (b) Fluoranthene	µg/kg dry	14U	13U	12	12U	9.7J			150	2100		
Benzo (e) Pyrene	µg/kg dry	5J	2.7J	12J	12U	10J						

Table 11. 2012 Channel Islands Harbor Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Channel Islands Harbor Composite Samples					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		CIHVC12-A Area A	CIHVC12-B Area B	CIHVC12-C Area C	CIHVC12-D Area D	CIHVC12-E Area E	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Benzo (g,h,i) Perylene	µg/kg dry	4.2J	13U	9.2J	12U	7.8J						
Benzo (k) Fluoranthene	µg/kg dry	14U	13U	13	12U	7J			1500	21,000		
Biphenyl	µg/kg dry	2.2J	13U	1.7J	12U	4.3J						
Chrysene	µg/kg dry	7.2J	3.1J	19	2.5J	13J	384	2800	15,000	210,000		
Dibenz (a,h) Anthracene	µg/kg dry	14U	13U	12U	12U	16U	63.4	260	15	210		
Dibenzothiophene	µg/kg dry	14U	13U	12U	12U	16U						
Fluoranthene	µg/kg dry	6.4J	3.4J	30	2.6J	12J	600	5100	2,300,000	22,000,000		
Fluorene	µg/kg dry	14U	13U	12U	12U	3.5J	19	540	2,300,000	22,000,000		
Indeno (1,2,3-c,d) Pyrene	µg/kg dry	14U	13U	6.5J	12U	4.6J			150	2100		
Naphthalene	µg/kg dry	3.5J	3J	3.9J	12U	14J	160	2100	3600	18,000		
Perylene	µg/kg dry	19	12J	19	5.5J	34						
Phenanthrene	µg/kg dry	8J	5.6J	18	3.3J	16	240	1500				
Pyrene	µg/kg dry	7.4J	3.8J	30	12U	16J	665	2600	1,700,000	17,000,000		
Total Low Weight PAHs	µg/kg dry	30.9	14.4	37	3.3J	93.7	552	3160				
Total High Weight PAHs	µg/kg dry	56.5	25	182.7	10.6J	129.5	1700	9600				
Total PAHs	µg/kg dry	87.4	39.4	220	13.9	223	4022	44792				
PHTHALATES												
Benzyl butyl phthalate	µg/kg dry	19	22	9.2J	20	29			260,000	910,000		
bis-(2-Ethylhexyl)phthalate	µg/kg dry	33	22	16	17	66			35,000	120,000		
Diethyl phthalate	µg/kg dry	11J	7.7J	4.6J	5.9J	7.3J			49,000,000	490,000,000		
Dimethyl phthalate	µg/kg dry	97	85	120	130	110						
Di-n-butyl phthalate	µg/kg dry	8.9J	9.7J	5.5J	10J	5.9J			6,100,000	62,000,000		
Di-n-octyl phthalate	µg/kg dry	14U	13U	12U	12U	4.6J						
PHENOLS												
2,3,4,6-Tetrachlorophenol	µg/kg dry	14U	13U	12U	12U	16U						
2,4,5-Trichlorophenol	µg/kg dry	14U	13U	12U	12U	16U						
2,4,6-Trichlorophenol	µg/kg dry	0.93J	0.98J	12U	0.8J	16U			44,000	160,000		
2,4-Dichlorophenol	µg/kg dry	14U	13U	12U	12U	16U			180,000	1,800,000		
2,4-Dimethylphenol	µg/kg dry	14U	13U	12U	12U	16U			1,200,000	12,000,000		
2,4-Dinitrophenol	µg/kg dry	81U	76U	74U	69U	93U			120,000	1,200,000		
2,6-Dichlorophenol	µg/kg dry	14U	13U	12U	12U	16U						
2-Chlorophenol	µg/kg dry	14U	13U	12U	12U	16U			390,000	5,100,000		
2-Methylphenol	µg/kg dry	1.7J	1.5J	12U	1.6J	2J						
2-Nitrophenol	µg/kg dry	2.9J	2.5J	12U	2.4J	1.4J						
3/4-Methylphenol	µg/kg dry	15	4.1J	12U	3.2J	18						
4,6-Dinitro-2-Methylphenol	µg/kg dry	81U	76U	74U	69U	93U						
4-Chloro-3-Methylphenol	µg/kg dry	1.5J	1.3J	12U	2.8J	1.9J						
4-Nitrophenol	µg/kg dry	36J	28J	74U	18J	33J						
Benzoic Acid	µg/kg dry	51J	33J	36J	120U	72J						

Table 11. 2012 Channel Islands Harbor Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Channel Islands Harbor Composite Samples					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		CIHVC12-A Area A	CIHVC12-B Area B	CIHVC12-C Area C	CIHVC12-D Area D	CIHVC12-E Area E	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
Pentachlorophenol	µg/kg dry	14U	13U	12U	12U	16U			890	2,700	4,400	13,000
Phenol	µg/kg dry	52	44	38	50	62			18,000,000	180,000,000		
CHLORINATED PESTICIDES												
2,4'-DDD	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
2,4'-DDE	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
2,4'-DDT	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
4,4'-DDD	µg/kg dry	0.88J	0.74J	1.6	0.37J	**3**	2	20	2,000	7,200	2,300	9,000
4,4'-DDE	µg/kg dry	**2.3**	1.4	**2.3**	0.66J	**6.9**	2.2	27	1,400	5,100	1,600	6,300
4,4'-DDT	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U	1	7	1,700	7,000	1,600	6,300
Total DDT	µg/kg dry	**3.18**	**2.14**	**3.9**	1.03J	**9.9**	1.58	46.1				
Aldrin	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U			29	100	33	130
BHC-alpha	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
BHC-beta	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
BHC-delta	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
BHC-gamma	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
Chlordane-alpha	µg/kg dry	1.4U	1.3U	1.2U	1.2U	0.72J						
Chlordane-gamma	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
Chlordane (Technical)	µg/kg dry	14U	13U	12U	12U	16U			1,600	6,500	430	1,700
Cis-nonachlor	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
DCPA (Dacthal)	µg/kg dry	14U	13U	12U	12U	16U	0.02	8	610,000	6,200,000		
Dieldrin	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U			30	110	35	130
Endosulfan Sulfate	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
Endosulfan I	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U			370,000	3,700,000		
Endosulfan II	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
Endrin	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U			180,000	1,800,000	21,000	230,000
Endrin Aldehyde	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
Endrin Ketone	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
Heptachlor	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U			110	380	130	520
Heptachlor Epoxide	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U			53	190		
Methoxychlor	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U			310,000	3,100,000	340,000	3,800,000
Mirex	µg/kg dry	6.8U	6.3U	6.2U	5.8U	7.8U			27	96	31	120
Oxychlordane	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
Perthane	µg/kg dry	14U	13U	12U	12U	16U						
Toxaphene	µg/kg dry	27U	25U	25U	23U	31U			440	1600	460	1,800
Trans-nonachlor	µg/kg dry	1.4U	1.3U	1.2U	1.2U	0.57J						
4,4'-Dichlorobenzophenone	µg/kg dry	34U	32U	31U	29U	39U						
Total Chlordane	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.29J						

Table 11. 2012 Channel Islands Harbor Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Channel Islands Harbor Composite Samples					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		CIHVC12-A Area A	CIHVC12-B Area B	CIHVC12-C Area C	CIHVC12-D Area D	CIHVC12-E Area E	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
PCB Aroclors												
Aroclor 1016	µg/kg dry	14U	13U	12U	12U	16U						
Aroclor 1221	µg/kg dry	14U	13U	12U	12U	16U						
Aroclor 1232	µg/kg dry	14U	13U	12U	12U	16U						
Aroclor 1242	µg/kg dry	14U	13U	12U	12U	16U						
Aroclor 1248	µg/kg dry	14U	13U	12U	12U	16U						
Aroclor 1254	µg/kg dry	14U	13U	12U	12U	16U						
Aroclor 1260	µg/kg dry	14U	13U	12U	12U	16U						
Aroclor 1262	µg/kg dry	14U	13U	12U	12U	16U						
Total Aroclors	µg/kg dry	14U	13U	12U	12U	16U						
PCB CONGENERS												
PCB003	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB008	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB018	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB028	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB031	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB033	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB037	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.26J						
PCB044	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB049	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB052	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB056	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB066	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB070	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB074	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB077	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			34	110		
PCB081	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			11	38		
PCB087	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB095	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB097	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB099	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.36J						
PCB101	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB105	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			110	380		
PCB110	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.39J						
PCB114	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.35J			110	380		
PCB118	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			110	380		
PCB119	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB123	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			110	380		
PCB126	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			0.034	0.11		

Table 11. 2012 Channel Islands Harbor Bulk Sediment Chemistry Results.

Valid Analyte Name	Units	Channel Islands Harbor Composite Samples					NOAA Screening		Human RSLs[2]		Human CHHSLs[3]	
		CIHVC12-A Area A	CIHVC12-B Area B	CIHVC12-C Area C	CIHVC12-D Area D	CIHVC12-E Area E	Salt ERL[1]	Salt ERM[1]	Residential	Industrial	Residential	Commercial Industrial
PCB128	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB132	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB138	µg/kg dry	1.4U	1.3U	1.2U	1.2U	1.6U						
PCB141	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB149	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB151	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB153	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB156	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			110	380		
PCB157	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			110	380		
PCB167	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			110	380		
PCB168	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB169	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			0.11	0.38		
PCB170	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			30	99		
PCB174	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB177	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB180	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			300	990		
PCB183	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB184	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB187	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB189	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U			110	380		
PCB194	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB195	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB200	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB201	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB203	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB206	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
PCB209	µg/kg dry	0.68U	0.63U	0.62U	0.58U	0.78U						
Total PCB Congeners	µg/kg dry	0.68U	0.63U	0.62U	0.58U	1.3	22.7	180			89	300
ERM Quotient		0.015	0.013	0.015	0.007	0.034						

1. Effects Range Low (ERL) and Effects Range Median (ERM) sediment quality objectives from Long *et al.* (1995).
2. Regional Screening Levels for Chemical Contaminants at Superfund Sites" (USEPA Region 9, 2010).
3. California Human Health Screening Levels for Soil (Cal/EPA, 2005).

Bolded values exceed ERL values.
Bolded and underlined values exceed ERM values.
Green shaded values exceed one or more of the corresponding human health values.
U = Not detected at the corresponding reporting limit.
J = Estimated between the Reporting Limit and the Method Detection Limit.

Appendix B

Sampling, Physical and Analytical Data
Channel Islands Harbor 2006 Dredge Material Investigation
(Diaz Yourman and Kinnetic Laboratories, 2007)

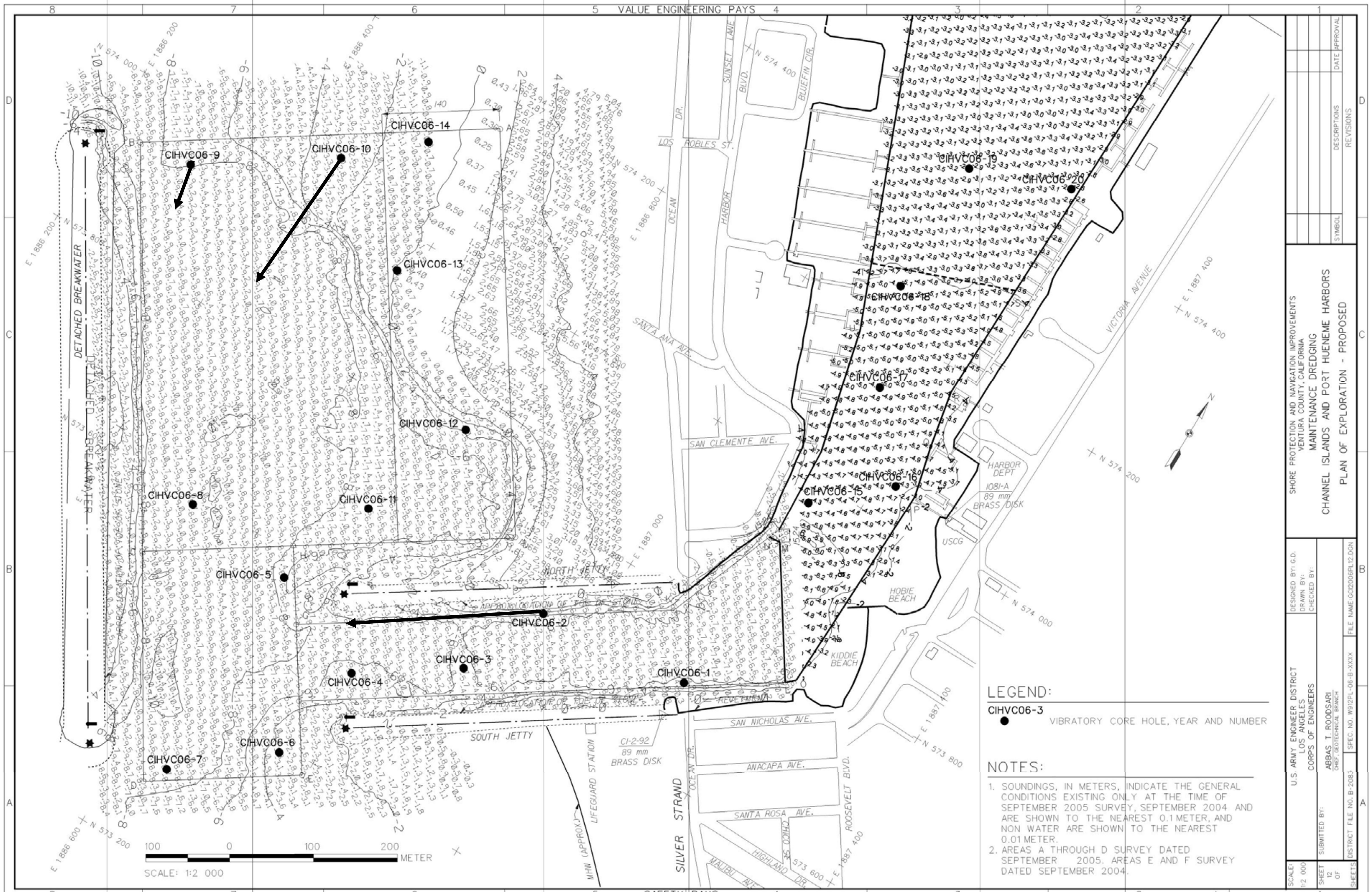


Figure A-1. Sampling Locations and Bathymetry Outside and Lower Channel Islands Harbor. Arrows denote instances where core locations were relocated from target locations.

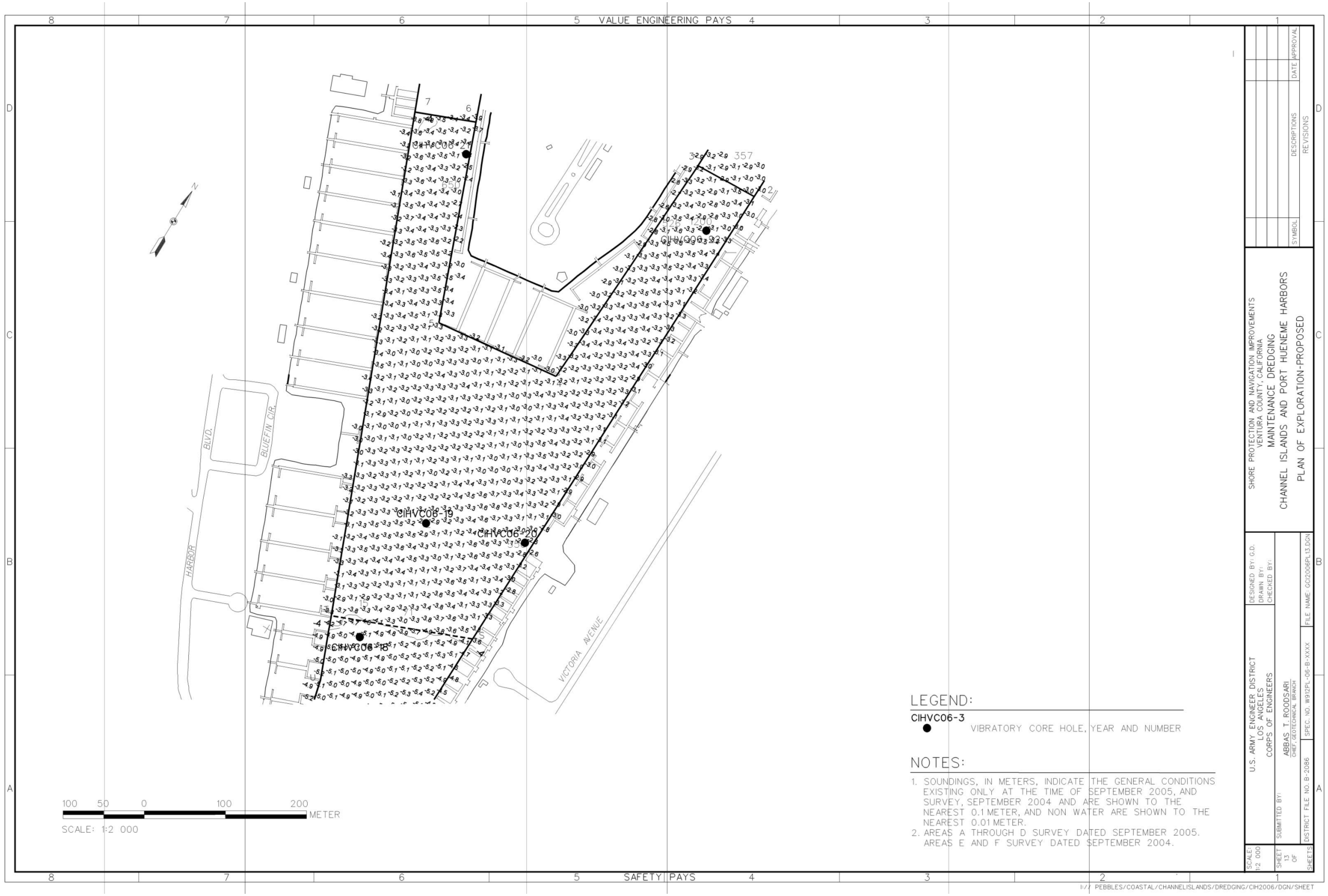


Figure A-2. Vibracore Sampling Locations and Bathymetry for Upper Channel Islands Harbor.

Table A-1. Channel Islands Vibracore Locations and Intervals Sampled

Area	Composite IDs	Core ID	Sampling Date	Sampling Time	Latitude	Longitude	Seafloor Level (m MLLW)	Target Sampling Depth (m bgs)	Core Length (m)	Core Intervals Sampled (m)
A	CI-A-U and CI-A-L	CIHVC06-01	5-Oct-06	1050	34 09 29.8	119 13 27.1	-5.24	-8.10	2.38	-5.24 to -6.10 -6.10 to -7.62
		CIHVC06-02	5-Oct-06	0836	34 09 25.1	119 13 42.4	-5.78	-8.10	2.32	-5.78 to -6.10 -6.10 to -8.10
		CIHVC06-03	5-Oct-06	0940	34 09 26.0	119 13 36.2	-5.40	-8.10	2.83	-5.40 to -6.10 -6.10 to -8.10
		CIHVC06-04	5-Oct-06	0740	34 09 23.6	119 13 40.2	-5.46	-8.10	2.64	-5.46 to -6.10 -6.10 to -8.10
B	CI-B-U and CI-B-L	CIHVC06-05	4-Oct-06	1024	34 09 24.8	119 13 44.7	-4.70	-12.70	5.24	-4.70 to -9.94 No Bottom
		CIHVC06-06	4-Oct-06	0908	34 09 19.5	119 13 40.8	-6.70	-12.70	5.70	-6.70 to -10.70 -10.70 to -12.4
		CIHVC06-07	4-Oct-06	0815	34 09 17.1	119 13 45.9	-9.10	-12.70	4.40	-9.10 to -10.70 -10.70 to -12.70
C	CI-C-U and CI-C-L	CIHVC06-08	4-Oct-06	1630	34 09 24.9	119 13 49.9	-8.73	-12.70	4.60	-8.73 to -10.70 -10.70 to -12.70
		CIHVC06-09	4-Oct-06	1350	34 09 34.5	119 13 58.5	-9.61	-12.70	4.70	-9.61 to -10.71 -10.71 to -12.71
		CIHVC06-10	4-Oct-06	1530	34 09 32.7	119 13 53.0	-6.90	-12.70	4.41	-6.90 to -10.70 -10.70 to -11.30
		CIHVC06-11	4-Oct-06	1250	34 09 29.1	119 13 43.6	-3.97	-12.70	4.37	-3.97 to -8.34 No Bottom
D	CI-D-U	CIHVC06-12	5-Oct-06	1710	34 09 32.9	119 13 41.5	+1.32	-12.70	3.80	+1.32 to -2.48 No Bottom
		CIHVC06-13	6-Oct-06	1600	34 09 37.7	119 13 48.2	+1.50	-12.70	3.50	+1.50 to -2.50 No Bottom
		CIHVC06-14	6-Oct-06	1640	34 09 29.8	119 13 27.1	+0.30	-12.70	4.00	+0.30 to -3.70 No Bottom

Table A-1. Channel Islands Vibracore Locations and Intervals Sampled

Area	Composite IDs	Core ID	Sampling Date	Sampling Time	Latitude	Longitude	Seafloor Level (m MLLW)	Target Sampling Depth (m bgs)	Core Length (m)	Core Intervals Sampled (m)
E	CI-E-U	CIHVC06-15	3-Oct-06	0950	34 09 38.3	119 13 26.3	-4.40	-7.10	2.70	-4.40 to -7.10
		CIHVC06-16	3-Oct-06	1310	34 09 38.1	119 13 22.8	-5.10	-7.10	2.10	-5.10 to -7.10
		CIHVC06-17	3-Oct-06	1400	34 09 43.8	119 13 26.2	-5.10	-7.10	2.50	-5.10 to -7.10
		CIHVC06-18	3-Oct-06	1500	34 09 47.4	119 13 27.9	-5.20	-7.10	2.30	-5.20 to -7.10
F	CI-F-L	CIHVC06-19	3-Oct-06	1552	34 09 52.9	119 13 28.1	-3.40	-4.00	0.75	-3.40 to -4.00
		CIHVC06-20	3-Oct-06	1628	34 09 54.2	119 13 23.6	-3.10	-4.00	1.00	-3.10 to -4.00
		CIHVC06-21	3-Oct-06	1715	34 10 06.2	119 13 36.2	-3.34	-4.00	0.97	-3.34 to -4.00
		CIHVC06-22	3-Oct-06	1755	34 10 08.6	119 13 24.2	-2.92	-4.00	1.61	-2.92 to -4.00

Table A-2. Bulk Sediment Chemistry Summary for Composite Samples Collected in Channel Islands Harbor, October 2006.

Analytical Parameter	CI-A-U	CI-A-L	CI-B-U	CI-B-L	CI-C-U	CI-C-L	CI-D-U	CI-E-U	CI-E-U Dup	CI-F-L	Screening Values		
											ERL	ERM	TTLC
SEDIMENT CONVENTIONALS													
pH	8.0J	7.7J	8.2J	8.3J	8.1J	7.9J	8.4J	8.1J	8.2J	7.7J			
Percent Solids (% by wt., wet)	72.5	72.7	77.9	79.9	71.4	72.3	83.9	69.3	68	75			
Total Volatile Solids (% by wt., dry)	0.9	0.8	0.8	1.2	1.1	0.5	1.9	1.6	2.1	2.1			
Total Ammonia (as N) (mg/kg, dry)	3.55	4.02	0.64	0.65	1.89	2.06	0.05U	1.35	2.06	0.05U			
Oil and Grease (%, dry)	0.01J	0.01J	0.02U	0.02U	0.02U	0.01J	0.02U	0.02U	0.01J	0.02U			
TRPH (%, dry)	0.01J	0.01J	0.02U	0.02U	0.02U	0.01J	0.02U	0.02U	0.02U	0.01J			
Total Sulfides (mg/kg, dry)	4.13J-	47.2J-	0.6J-	0.3J-	2.8J-	18.1J-	0.76J-	68.9J-	74.8J-	82.1J-			
Water Soluble Sulfides (mg/kg, dry)	0.04	0.08J	0.08J	0.06J	0.03J	0.08J	0.04J	0.89	0.12	0.15			
Total Organic Carbon (% by wt., dry)	0.2	0.32	0.13	0.16	0.37	0.34	0.1	0.54	0.5	0.37			
METALS (mg/kg, dry wt)													
Arsenic	2.32	2.44	2.41	2.43	2.87	3.24	1.91	4.19	4.53	3.56	8.2	70	500
Cadmium	0.188	0.172	0.274	0.148	0.246	0.248	0.117	0.532	0.514	0.348	1.2	9.6	100
Chromium	7.26	7.79	7.08	7.7	10.4	9.59	5.56	18.3	19.4	17.6	81	370	2500
Copper	4.21	4.66	3.39	3.29	5.26	5.43	2.34	17	18.6	17.8	34	270	2500
Lead	2.27	2.3	2.2	2.25	2.88	2.95	1.58	7.56	8.14	12.8	46.7	218	1000
Mercury	0.011J	0.013J	0.01J	0.01J	0.015J	0.017J	0.014J	0.045	0.044	0.057	0.15	0.71	20
Nickel	7.31	7.42	7.16	7.37	9.58	9.32	5.47	17	18.2	15.8	20.9	51.6	2000
Selenium	0.245	0.395	0.185	0.17	0.44	0.421	0.05U	0.812	0.725	0.549			100
Silver	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U	1.0	3.7	500
Zinc	19.4	19.4	18.1	21.5	25.1	25.1	13	53.5	58.1	58.4	150	410	5000
ORGANOTINS (ug/kg, dry wt)													
Dibutyltin	3UJ	3UJ	3UJ	3UJ	3UJ	3UJ	3UJ	3UJ	3UJ	3UJ			
Tributyltin	3U	3U	3U	3U	3U	3U	3U	3U	3U	3U			
Tetrabutyltin	3U	3U	3U	3U	3U	3U	3U	3U	3U	3U			
CHLORINATED PESTICIDES (ug/kg, dry wt)													
2,4'-DDT	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
2,4'-DDE	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
2,4'-DDD	5U	5U	5U	5U	5U	5U	5U	6.9	4.9J	5U			
4,4'-DDT	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	1.0	7	1000
4,4'-DDE	5U	5U	5U	5U	5U	5U	5U	**10.7**	**9.8**	**5.1**	2.2	27	1000
4,4'-DDD	5U	5U	5U	5U	5U	5U	5U	**8.6**	**8.6**	**3.1J**	2.0	20	1000
Total DDT	0	0	0	0	0	0	0	**26.2**	**23.3**	**8.2**	1.58	46.1	1000

Table A-2. Bulk Sediment Chemistry Summary for Composite Samples Collected in Channel Islands Harbor, October 2006.

Analytical Parameter	CI-A-U	CI-A-L	CI-B-U	CI-B-L	CI-C-U	CI-C-L	CI-D-U	CI-E-U	CI-E-U Dup	CI-F-L	Screening Values ERL	ERM	TTLC
Aldrin	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			1400
Dieldrin	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	0.02	8	8000
Endrin	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			200
Endrin ketone	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Endrin aldehyde	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Endosulfan II	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Endosulfan I	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Endosulfan sulfate	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
alpha-BHC	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
beta-BHC	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
delta-BHC	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
gamma-BHC (Lindane)	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Methoxychlor	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Mirex	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Toxaphene	50U	50U	50U	50U	50U	50U	50U	50U	50U	50U			
Heptachlor epoxide	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Heptachlor	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
alpha-Chlordane	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
gamma-Chlordane	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Oxychlordane	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
cis-Nonachlor	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
trans-Nonachlor	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U			
Total Chlordane	0	0	0	0	0	0	0	0	0	0	0.5	6	
PCBs (ug/kg, dry weight)													
Aroclor 1016	20U	20U	20U	20U	20U	20U	20U	20U	20U	20U			500000
Aroclor 1221	20U	20U	20U	20U	20U	20U	20U	20U	20U	20U			500000
Aroclor 1232	20U	20U	20U	20U	20U	20U	20U	20U	20U	20U			500000
Aroclor 1242	20U	20U	20U	20U	20U	20U	20U	20U	20U	20U			500000
Aroclor 1248	20U	20U	20U	20U	20U	20U	20U	20U	20U	20U			500000
Aroclor 1254	20U	20U	20U	20U	20U	20U	20U	20U	20U	20U			500000
Aroclor 1260	20U	20U	20U	20U	20U	20U	20U	20U	20U	20U			500000
Total Aroclor PCBs	0	0	0	0	0	0	0	0	0	0	22.7	180	500000

Table A-2. Bulk Sediment Chemistry Summary for Composite Samples Collected in Channel Islands Harbor, October 2006.

Analytical Parameter	CI-A-U	CI-A-L	CI-B-U	CI-B-L	CI-C-U	CI-C-L	CI-D-U	CI-E-U	CI-E-U Dup	CI-F-L	Screening Values ERL	ERM	TTLC
PCB008	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB018	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB028	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB031	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB033	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB037	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB044	5.0U	5.0U	1.6J	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB049	5.0U	5.0U	1.5J	1.1J	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB052	5.0U	5.0U	1.2J	1.5J	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB066	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB070	5.0U	1.3J	1.3J	1.7J	5U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB074	5.0U	5.0U	1.1J	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB077	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB081	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB087	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB095	1.2J	1.4J	2.5J	3J	2.3J	5.0U	5.0U	5.0U	5.0U	1.8J			
PCB097	5.0U	5.0U	5.0U	2J	3.2J	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB099	5.0U	1.4J	2.4J	2.7J	1.8J	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB101	5.0U	2.1J	4.1J	4.9J	3.8J	5.0U	5.0U	1.2J	5.0U	1.3J			
PCB105	5.0U	5.0U	2J	1.9J	5U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB110	1.4J	2.9J	3.9J	4.4J	3.2J	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB114	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB118	5.0U	3.1J	4J	4.7J	2.9J	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB119	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB123	5.0U	5.0U	5.0U	5.0U	2.7J	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB126	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB128+167	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB138	1.4J	2.7J	4.3J	5.1	7.8	5.0U	5.0U	5.0U	5.0U	3.0J			
PCB141	5.0U	5.0U	5.0U	1.6J	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB149	5.0U	5.0U	2.1J	3J	3.4J	5.0U	5.0U	1.1J	5.0U	4.6J			
PCB151	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	1.5J			
PCB153	1.3J	2J	3J	4.4J	5.2	5.0U	5.0U	5.0U	1.5J	5.1			
PCB156	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB157	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			

Table A-2. Bulk Sediment Chemistry Summary for Composite Samples Collected in Channel Islands Harbor, October 2006.

Analytical Parameter	CI-A-U	CI-A-L	CI-B-U	CI-B-L	CI-C-U	CI-C-L	CI-D-U	CI-E-U	CI-E-U Dup	CI-F-L	Screening Values ERL	ERM	TTLC
PCB158	5.0U	5.0U	1.6J	5.0U	1.8J	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB168+132	5.0U	5.0U	1.3J	1.5J	2.1J	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB169	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB170	5.0U	5.0U	1.9J	1.1J	3.3J	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB177	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	1.7J			
PCB180	5.0U	5.0U	1.5J	1.9J	3.7J	5.0U	5.0U	5.0U	5.0U	4J			
PCB183	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	1.3J			
PCB187	5.0U	5.0U	5.0U	5.0U	1.8J	5.0U	5.0U	5.0U	5.0U	2.1J			
PCB189	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB194	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB195	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB200	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB201	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB206	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
PCB209	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U			
Total PCB Congeners	5.3J	16.9J	41.3J	46.5J	49J	0	0	2.3J	1.5J	26.4J			
SEMI_VOLAITILE COMPOUNDS (ug/kg, dry wt.)													
2,4,6-Trichlorophenol	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U			
2,4-Dichlorophenol	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U			
2,4-Dimethylphenol	200U	200U	200U	200U	200U	200U	200U	200U	200U	200U			
2,4-Dinitrophenol	200U	200U	200U	200U	200U	200U	200U	200U	200U	200U			
2-Chlorophenol	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U			
2-Methyl-4,6-dinitrophenol	200U	200U	200U	200U	200U	200U	200U	200U	200U	200U			
2-Nitrophenol	200U	200U	200U	200U	200U	200U	200U	200U	200U	200U			
3+4-Methylphenol	134J	200U	200U	200U	200U	200U	200U	200U	200U	200U			
4-Chloro-3-methylphenol	200U	200U	200U	200U	200U	200U	200U	200U	200U	200U			
4-Nitrophenol	200U	200U	200U	200U	200U	200U	200U	200U	200U	200U			
Pentachlorophenol	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U			
Total Phenolic Compounds	137J	0	0	0	0	0	0	0	0	0			
bis-(2-Ethylhexyl)phthalate	53.6J+	57.6J+	40U	69.3J+	78J+	31.4U	41U	78.5J+	152.8J+	110.9J+			
Di-n-octyl phthalate	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U			
Diethyl phthalate	7.4J	7.6J	6J	15.7U	8.2J	5.2J	6.1J	10U	12.2U	10			
Di-n-butyl phthalate	860J+	928J+	717J+	120J+	924J+	245J+	756J+	291J+	1600J+	836J+			
Benzyl butyl phthalate	10U	10U	7.2J	7.7J	10.6	629	8.7J	10U	32.6	10U			

Table A-2. Bulk Sediment Chemistry Summary for Composite Samples Collected in Channel Islands Harbor, October 2006.

Analytical Parameter	CI-A-U	CI-A-L	CI-B-U	CI-B-L	CI-C-U	CI-C-L	CI-D-U	CI-E-U	CI-E-U Dup	CI-F-L	Screening Values ERL	Screening Values ERM	Screening Values TTLC
Dimethyl phthalate	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U			
Phenanthrene	10.8	3.4J	3.6J	4.8J	10.1	517	2.8J	10.3	8.5	4.7J	240	1500	
Naphthalene	1.9J	1.4J	2.3J	1.2J	2.2J	55.5	5U	3.8J	2.9J	1.9J	160	2100	
Fluorene	1.2J	5U	5U	5U	1.3J	108	5U	1.3J	1.1J	5U	19	540	
Dibenzothiophene	5U	5U	5U	5U	1.9J	34.2	5U	1.7J	1.4J	5U			
Biphenyl	1.9J	1.2J	1.3J	1.1J	2.6J	13.6	5U	2.8J	2.4J	1.1J			
Anthracene	2J	5U	5U	5U	5U	49.4	5U	2.5J	2.4J	2.1J	85.3	1100	
Acenaphthylene	5U	5U	5U	5U	5U	1.1J	5U	5U	5U	5U	44	640	
Acenaphthene	1.1J	5U	5U	5U	5U	49.2	5U	1.1J	5U	5U	16	500	
2-Methylnaphthalene	6.3	5.5	6.9	3.6J	7.2	44.1	4.3J	8.1	7.4	6.5	70	670	
2,6-Dimethylnaphthalene	3.2J	2.2J	2.7J	1.8J	3.2J	16.8	1.9J	4.2J	3.6J	2.9J			
2,3,5-Trimethylnaphthalene	1.6J	5U	5U	5U	2.4J	4.6J	5U	2.3J	5U	5U			
1-Methylphenanthrene	3.3J	1.5J	1.4J	2.2J	20.7	30.2	1.3J	4.2J	2.4J	5U			
1-Methylnaphthalene	2.7J	2.3J	2.7J	1.8J	3.6J	24	1.7J	4.9J	4J	2.5J			
Pyrene	19.8	3.2J	3.3J	6.6	9.5	402	2J	18.6	14.2	12.6	665	2600	
Perylene	18.9	15.4	11.4	21.6	43.7	89.9	12	40.1	29.7	14.4			
Indeno(1,2,3-cd)pyrene	5U	5U	5U	5U	5U	367	5U	15.6	14.8	5U			
Fluoranthene	20.9	3J	3.2J	6	7.9	592	1.6J	13.6	9.5	6.4	600	5100	
Dibenzo(a,h)anthracene	5U	5U	5U	5U	5U	56.2	5U	5U	5U	5U	63.4	260	
Chrysene	12.2	2.5J	2.4J	3.9J	20.1	223	2J	12.2	12.5	4.7J	384	2800	
Benzo(k)fluoranthene	11.4	5U	5U	1.6J	12.1	321	5U	16.2	14.3	11.6			
Benzo(g,h,i)perylene	6.7	5U	5U	5U	8.9	185	5U	12.8	11.2	8.4			
Benzo(e)pyrene	8.5	2.3J	2.8J	4J	15.1	206	1.6J	16.1	14.6	10			
Benzo(b)fluoranthene	10.1	2.3J	5U	5.6	26.8	360	5U	19.5	19.4	18.9			
Benzo(a)pyrene	10.1	5U	5U	1.7J	9.7	357	5U	17.7	12.6	13.5	430	1600	
Benzo(a)anthracene	12.2	5U	5U	4.3J	9.6	269	5U	8.8	10.4	6.6	261	1600	
Total PAHs	167	46.2	44	71.8	219	**4380**	31.2	238	199	129	4022	44792	

Bold values equal or exceed ERL.
Bold and underlined values equal or exceed ERL and ERM.
U= Not measured above reported sample reporting limit.
J= The result is an estimated quantity.
J+= The result is an estimated quantity but result may be biased high.

Appendix C

Summary of 2016 Hueneme Beach Physical Data

Table C-1. Surface Physical Data for Hueneme Beach Transect Samples Collected in November 2016.

Beach ID	Mudline Elevation (feet MLLW)	Fine Gravel*					Coarse Sand		Medium Sand				Fine Sand						Silt	Atterberg Limits		Soil Classification
		Sieve No./Sieve Size/% Passing																				
		1.5"	1"	3/4"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230			
		38.1 mm	25.4 mm	19 mm	9.5 mm	4.75 mm	2.38 mm	2 mm	1.41 mm	1.0 mm	0.71 mm	0.50 mm	0.35 mm	0.25 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	LL	PL	
Beach – Transect A																						
PHBTS16-A-04	-6	100	100	100	100	100	100	99	99	98	96	93	86	72	44	8	2	2	2			POORLY GRADED SAND (SP)
PHBTS16-A-05	-12	100	100	100	100	100	100	100	100	100	99	98	96	91	75	37	13	10	7			POORLY GRADED SAND WITH SILT (SP-SM)
PHBTS16-A-06	-18	100	100	100	100	100	100	100	99	99	99	99	98	97	94	57	25	16	10			SILTY SAND (SM)
PHBTS16-A-07	-24	100	100	100	100	100	100	100	100	100	100	99	99	98	94	33	12	9	7			POORLY GRADED SAND WITH SILT (SP-SM)
PHBTS16-A-08	-30	100	100	100	99	99	99	99	99	99	99	99	98	97	91	23	9	7	6			POORLY GRADED SAND WITH SILT (SP-SM)
Beach – Transect B																						
PHBTS16-B-01	12	100	100	100	100	100	100	100	99	97	91	82	71	52	23	4	1	1	1			POORLY GRADED SAND (SP)
PHBTS16-B-02	6	100	100	100	100	100	100	100	100	100	98	96	89	57	17	3	2	1	1			POORLY GRADED SAND (SP)
PHBTS16-B-03	0	100	100	100	100	97	97	97	96	95	93	88	78	56	27	6	3	2	2			POORLY GRADED SAND (SP)
PHBTS16-B-04	-6	100	100	100	100	98	95	90	84	76	64	53	42	31	15	4	2	1	1			POORLY GRADED SAND (SP)
PHBTS16-B-05	-12	100	100	100	99	98	98	97	97	97	97	97	96	93	76	31	7	5	4			POORLY GRADED SAND (SP)
PHBTS16-B-06	-18	100	100	100	100	100	99	99	99	99	99	98	97	96	94	60	29	23	20			SILTY SAND (SM)
PHBTS16-B-07	-24	100	100	100	99	99	99	99	99	99	99	99	98	95	91	64	27	19	14			SILTY SAND (SM)
PHBTS16-B-08	-30	100	100	100	100	100	100	100	100	100	100	99	98	88	81	27	9	8	7			POORLY GRADED SAND WITH SILT (SP-SM)
Beach – Transect C																						
PHBTS16-C-01	12	100	100	100	100	99	97	96	94	92	89	85	72	46	20	7	4	3	3			POORLY GRADED SAND (SP)
PHBTS16-C-02	6	100	100	100	100	100	100	100	100	100	97	87	61	35	12	3	2	2	2			POORLY GRADED SAND (SP)
PHBTS16-C-03	0	100	100	100	100	100	100	100	100	99	98	94	85	67	37	11	3	3	2			POORLY GRADED SAND (SP)
PHBTS16-C-04	-6	100	100	100	100	99	98	95	89	82	70	57	44	32	20	8	3	2	2			POORLY GRADED SAND (SP)
PHBTS16-C-05	-12	100	100	100	100	100	100	99	99	99	99	99	98	97	85	24	5	4	3			POORLY GRADED SAND (SP)
PHBTS16-C-06	-18	100	100	100	99	99	99	99	99	99	99	99	98	98	97	52	10	7	5			POORLY GRADED SAND WITH SILT (SP-SM)
PHBTS16-C-07	-24	100	100	100	100	100	100	100	100	100	100	100	99	97	93	62	18	13	11			SILTY SAND (SM)
Beach Compatibility Comparison																						
PHBTS – Fine Limit	-18	100	100	100	100	100	99	99	99	99	99	98	97	96	94	60	29	23	20			SILTY SAND (SM)
Average		100	100	100	100	100	99	99	98	97	95	91	86	76	60	27	10	7	6			
PHBTS – Coarse Limit	-6	100	100	100	100	98	95	90	84	76	64	53	42	31	15	4	2	1	1			POORLY GRADED SAND (SP)

*All material passed through sieve sizes greater than 38.1 mm.

Table C-1. Hueneme Beach Surface Sieve Analysis Data for the Nearshore Placement Area Collected in March 2017.

Nearshore Sample ID	Water Depth (feet)	Fine Gravel*					Coarse Sand		Medium Sand				Fine Sand						Silt	Soil Classification
		Sieve No./Sieve Size/% Passing																		
		1.5"	1"	3/4"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	
		38.1 mm	25.4 mm	19 mm	9.5 mm	4.75 mm	2.38 mm	2 mm	1.41 mm	1.0 mm	0.71 mm	0.50 mm	0.35 mm	0.25 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	
NSPHB16-01	-21.9	100	100	100	100	100	100	100	100	100	100	100	100	99	90	24	7	5	3	POORLY GRADED SAND (SP)
NSPHB16-02	-19.1	100	100	100	100	100	100	100	100	99	99	99	99	97	84	33	11	8	6	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB16-03	-26.4	100	100	100	100	100	100	100	100	100	100	100	99	98	88	34	10	7	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB16-04	-28.1	100	100	100	100	100	100	100	100	100	100	100	100	99	94	31	9	6	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB16-05	-18.2	100	100	100	100	100	100	100	100	100	100	100	100	100	82	27	8	6	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB16-06	-25	100	100	100	100	100	100	100	100	100	100	100	100	99	90	27	8	5	3	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB16-07	-25.8	100	100	100	100	100	100	100	100	100	100	100	100	100	97	43	12	7	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB16-08	-17.4	100	100	100	100	100	100	100	100	100	100	100	100	98	78	23	8	6	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB16-09	-19.7	100	100	100	100	100	100	100	100	100	100	100	100	98	74	24	8	6	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB16-10	-23.6	100	100	100	100	100	100	100	100	100	100	100	100	98	73	21	6	4	2	POORLY GRADED SAND (SP)
NSPHB16-11	-22.2	100	100	100	100	99	98	98	98	98	97	94	88	78	47	13	4	2	2	POORLY GRADED SAND (SP)
Average	-22.5	100	100	100	100	100	100	100	100	100	100	99	99	97	82	27	8	5	4	

*All material passed through sieve sizes greater than 38.1 mm.

** Weighted average calculated by factoring in the length of each core interval contributing to the composite sample.

Table C-2. Hueneme Beach Sieve Analysis Data for the Nearshore Placement Areas Collected in June 2017.

Nearshore Sample ID	Water Depth (feet)	Fine Gravel*					Coarse Sand		Medium Sand				Fine Sand						Silt	Soil Classification
		Sieve No./Sieve Size/% Passing																		
		1.5"	1"	3/4"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	
		38.1 mm	25.4 mm	19 mm	9.5 mm	4.75 mm	2.38 mm	2 mm	1.41 mm	1.0 mm	0.71 mm	0.50 mm	0.35 mm	0.25 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	
Alpha Nearshore																				
NSPHB17-AA-01	27	100	100	100	100	100	100	100	100	100	100	100	100	95	87	76	28	16	7	SILTY SAND (SM)
NSPHB17-AA-02	24	100	100	100	100	100	100	100	100	100	100	100	99	97	92	74	20	10	6	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AA-03	19	100	100	100	100	100	99	99	99	99	99	99	99	97	92	77	30	19	9	SILTY SAND (SM)
NSPHB17-AA-04	21	100	100	100	100	100	99	99	98	98	98	98	97	94	88	60	17	11	6	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AA-05	26	100	100	100	100	100	100	100	99	99	99	99	99	93	85	67	19	11	7	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AA-06	24	100	100	100	100	99	99	99	99	99	99	99	98	96	90	66	15	9	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AA-07	22	100	100	100	100	100	100	100	100	100	100	99	99	96	91	64	18	10	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AA-08	25	100	100	100	100	100	100	99	99	99	99	99	98	93	88	64	17	10	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AA-09	29	100	100	100	98	98	98	98	98	98	98	98	95	84	77	59	18	9	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AA-10	23	100	100	100	100	100	100	100	100	100	100	100	99	97	91	66	18	9	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AA-11	23	100	100	100	99	99	99	99	99	99	99	99	98	95	82	49	12	7	3	POORLY GRADED SAND WITH SILT (SP-SM)
Bravo Nearshore																				
NSPHB17-AB-01	26	100	100	100	100	100	100	100	100	100	100	100	99	99	95	57	13	8	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-02	30	100	100	100	100	100	100	100	100	100	100	100	99	99	96	64	16	9	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-03	31	100	100	100	100	100	100	100	100	100	100	100	98	96	84	62	18	10	6	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-04	27	100	100	100	100	99	99	99	99	99	99	98	98	98	96	68	15	9	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-05	26	100	100	100	100	100	100	100	100	99	99	99	99	98	95	81	25	11	6	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-06	30	100	100	100	100	100	100	100	100	99	99	99	99	99	96	82	26	13	7	SILTY SAND (SM)
NSPHB17-AB-07	25	100	100	100	100	100	99	99	99	99	99	99	99	98	96	64	13	8	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-08	28	100	100	100	100	100	100	100	99	99	99	99	99	98	95	75	16	8	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-09	28	100	100	100	100	100	100	100	100	100	100	99	99	97	92	77	23	12	6	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-10	24	100	100	100	100	100	100	100	99	99	99	99	99	98	95	70	16	9	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AB-11	27	100	100	100	100	100	100	100	100	100	100	99	99	97	93	76	22	10	6	POORLY GRADED SAND WITH SILT (SP-SM)
Charlie Nearshore																				
NSPHB17-AC-01	25	100	100	100	99	96	96	95	95	94	94	93	92	92	88	70	20	12		POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-02	30	100	100	100	100	100	100	100	99	99	99	99	99	98	96	76	18	10	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-03	33	100	100	100	100	100	100	99	99	99	99	99	98	98	95	76	29	18	9	SILTY SAND (SM)
NSPHB17-AC-04	26	100	100	100	100	100	100	100	99	99	99	99	99	98	95	74	20	11	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-05	30	100	100	100	100	100	100	100	100	99	99	99	99	98	96	76	23	11	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-06	31	100	100	100	100	99	99	99	99	99	99	99	99	97	89	58	17	10	6	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-07	27	100	100	100	100	99	99	99	99	99	98	98	97	96	89	62	16	9	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-08	28	100	100	100	99	99	99	99	99	99	99	99	98	96	88	59	15	8	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-09	32	100	100	100	100	100	100	100	99	99	99	99	99	97	90	67	18	9	5	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-10	23	100	100	100	97	97	96	96	96	96	96	96	95	93	84	40	10	5	3	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AC-11	29	100	100	100	100	100	100	100	100	100	99	99	92	69	52	30	7	4	2	POORLY GRADED SAND (SP)

Table C-2. Hueneme Beach Sieve Analysis Data for the Nearshore Placement Areas Collected in June 2017 (Continued).

Nearshore Sample ID	Water Depth (feet)	Fine Gravel*					Coarse Sand		Medium Sand				Fine Sand						Silt	Soil Classification
		Sieve No./Sieve Size/% Passing																		
		1.5"	1"	3/4"	3/8"	4	7	10	14	18	25	35	45	60	80	120	170	200	230	
		38.1 mm	25.4 mm	19 mm	9.5 mm	4.75 mm	2.38 mm	2 mm	1.41 mm	1.0 mm	0.71 mm	0.50 mm	0.35 mm	0.25 mm	0.18 mm	0.125 mm	0.09 mm	0.075 mm	0.063 mm	
Delta Nearshore																				
NSPHB17-AD-01	26	100	100	100	100	100	100	100	100	100	99	99	95	86	79	51	14	8	5	POORLY GRADED SAND WITH SILT(SP-SM)
NSPHB17-AD-02	22	100	100	100	100	99	99	99	99	99	98	98	95	90	76	34	7	4	3	POORLY GRADED SAND (SP)
NSPHB17-AD-03	19	100	100	100	99	99	99	98	98	98	98	98	97	93	69	19	5	3	2	POORLY GRADED SAND (SP)
NSPHB17-AD-04	22	100	100	100	100	100	100	100	100	100	100	100	100	99	92	49	13	7	4	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AD-05	27	100	100	100	100	100	99	99	99	98	98	96	93	89	84	40	9	5	3	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AD-06	27	100	100	100	100	100	100	100	99	99	99	99	98	97	94	69	14	7	3	POORLY GRADED SAND WITH SILT (SP-SM)
NSPHB17-AD-07	19	100	100	100	100	100	100	100	100	100	99	99	99	96	70	27	5	3	2	POORLY GRADED SAND (SP)
NSPHB17-AD-08	24	100	100	100	100	100	100	100	100	100	99	99	98	96	90	50	10	5	2	POORLY GRADED SAND (SP)
NSPHB17-AD-09	26	100	100	100	100	100	100	100	100	100	99	99	99	97	92	50	9	4	2	POORLY GRADED SAND (SP)
NSPHB17-AD-10	26	100	100	100	100	100	100	100	100	100	100	99	99	98	92	34	8	4	3	POORLY GRADED SAND (SP)
NSPHB17-AD-11	17	100	100	100	100	100	100	100	100	100	100	99	99	94	74	20	5	3	2	POORLY GRADED SAND (SP)
Averages																				
Alpha	22	100	100	100	100	99	99	99	99	99	99	99	98	94	87	66	19	11	6	
Bravo	25	100	100	100	100	100	100	100	100	99	99	99	99	98	94	71	18	10	5	
Charlie	25	100	100	100	100	99	99	99	99	98	98	98	97	94	87	62	17	10	5	
Delta	22	100	100	100	100	100	100	99	99	99	99	99	97	94	83	40	9	5	3	

*All material passed through sieve sizes greater than 38.1 mm.

** Weighted average calculated by factoring in the length of each core interval contributing to the composite sample.