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Ronald M. Noble, P.E., President

ENR TOP 500 DESIGN FIRMS

Attachment A

Project Description

by Noble Consultants, Inc.

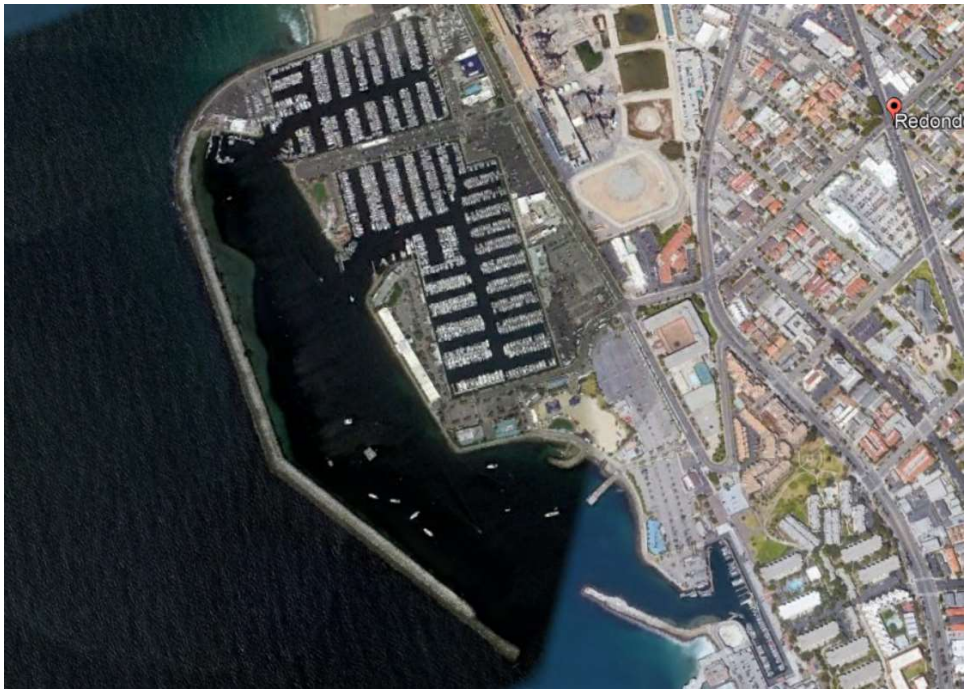
ATTACHMENT A

PROJECT DESCRIPTION

KING HARBOR MAINTENANCE DREDGING PROJECT

Prepared for:

City of Redondo Beach
Public Works Department, Engineering Services Division
415 Diamond Street, Door E
Redondo Beach, California 90277



July 10, 2020

Prepared by:

Noble Consultants, Inc.
2201 Dupont Drive, Ste 830, Irvine, CA 92612

PROJECT DESCRIPTION

KING HARBOR MAINTENANCE DREDGING PROJECT

1 INTRODUCTION

King Harbor occupies approximately 150 acres of land and water at the southern end of Santa Monica Bay in Redondo Beach. Located approximately 17 miles southwest of the business center of the City of Los Angeles, and about 7 miles south of the Los Angeles International Airport, King Harbor primarily services small vessels. The harbor extends approximately 3/4 of a mile along the coast and is roughly 0.4 miles wide at the widest point. King Harbor was established in the early 20th century as a commercial port. However, after the Port of Los Angeles became fully operational, King Harbor shifted its focus to recreational craft and fishing boats. Beneficial uses of King Harbor waters include industrial service supply, navigation, water contact recreation, non-contact water recreation, commercial and sport fishing, marine habitat, wildlife habitat, preservation of rare and endangered species, and potentially shellfish harvesting. The vicinity map is shown in Figure 1.

Figure 1. Vicinity Map

The safe navigation of vessels within King Harbor, Redondo Beach is currently restricted by accumulated sediment shoals, creating a need for the maintenance dredging proposed by this project. The purpose of the King Harbor Maintenance Dredging Project is to return the harbor to design navigational draft depth and to provide safe vessel access by removing shoals that have accumulated within King Harbor.

2 PROPOSED MAINTENANCE DREDGING

The City is responsible for maintenance of the in-harbor, that includes the three boat basins and the wave protection baffles at the entrances to Basins 1 and 2. As part of its Operations and Maintenance program, the USACE is responsible for maintenance of the breakwaters. The last maintenance dredging occurred in 2004-2005, and consisted of dredging only 7,000 cubic yards of material.

2.1 Dredging Sites and Quantities

The maintenance dredging of King Harbor is proposed for two areas, as shown in Figure 2. Dredging Area I is the shoal fronting the north portion of King Harbor North Breakwater. Dredging Area II is the shoal fronting the inner portion of South Breakwater at the entrance of Basin 3. These two dredging areas are referred to as "Outer Harbor Dredging Area" and "Basin 3 Dredging Area", respectively, in the Sampling and Analysis Plan Report (SAPR) that was prepared by Wood Environment & Infrastructure Solutions, Inc. (Wood).

The proposed maintenance dredging depth for Dredging Area I is -18 feet MLLW, and the approximate dredging area is 4.1 acres. The estimated dredging quantity is approximately 45,500 cubic yards (cy) to the design depth and 60,000 cy when including the 2-foot over dredge depth (OD) to -20 feet MLLW. The proposed dredging depth for Dredging Area II is -15 feet MLLW, and the dredging area is approximately 0.35 acre. The estimated dredging quantity is 800 cy to the design water depth and 2,000 cy when including the a 2-foot OD allowance In total, the estimate dredging quantity for the two dredging areas is 60,000 cy to the design depth and 62,000 cy when including a 2-foot OD allowance. The breakdown in dredging quantities are listed in Table 1. The typical dredging cross-sections are shown in Figure 3.

Table 1. Dredging Quantities

Dredging Area	Dredging Area (acres)	Design Dredging Depth (ft MLLW)	Estimated Dredging Quantities (cy)		
			To Design Depth	2-foot OD	Total
I	4.11	-18	45,500	14,500	60,000
II	0.35	-15	800	1,200	2,000
Total	4.46	-	46,300	15,700	62,000

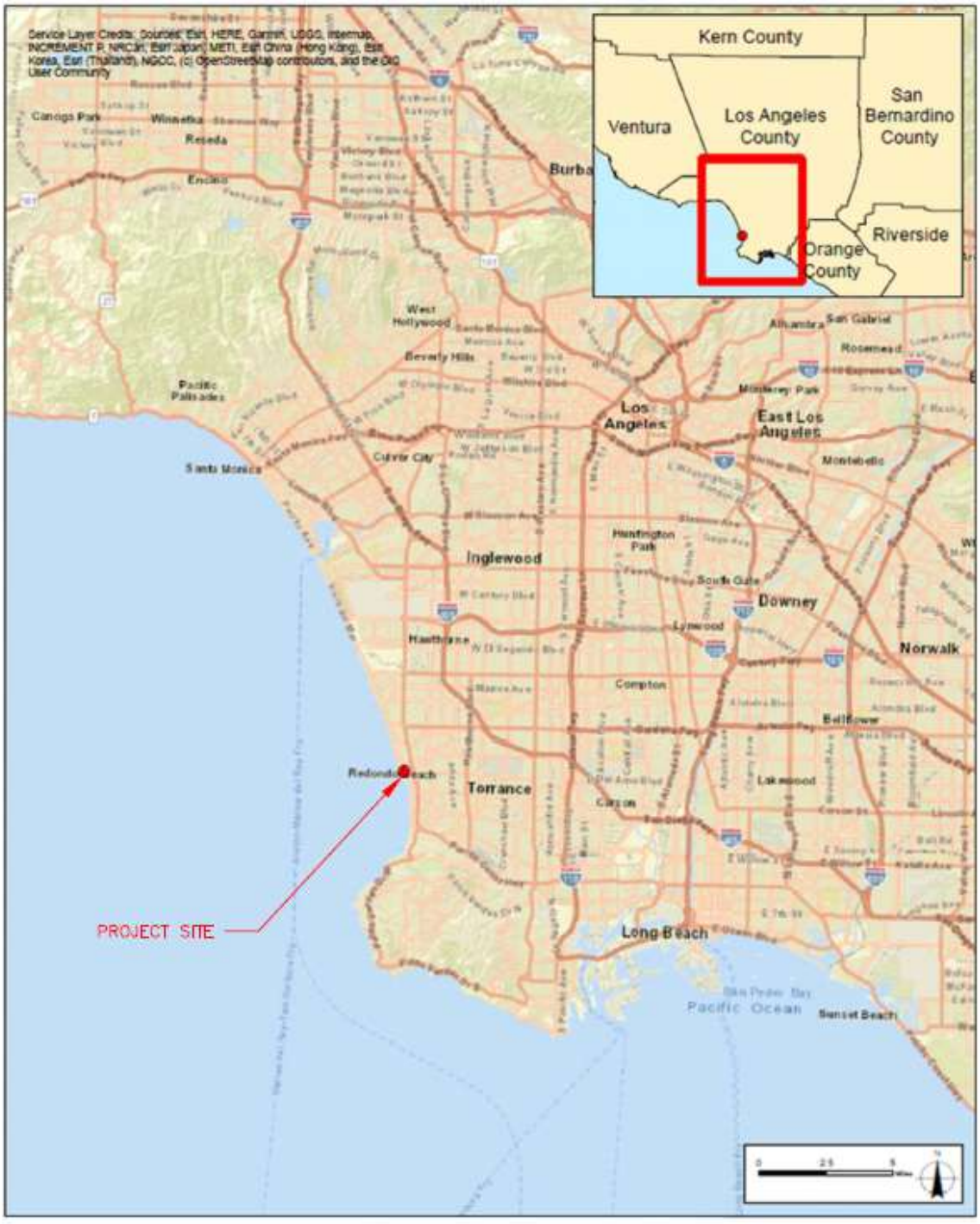


Figure 2. Plan View of Dredging Areas

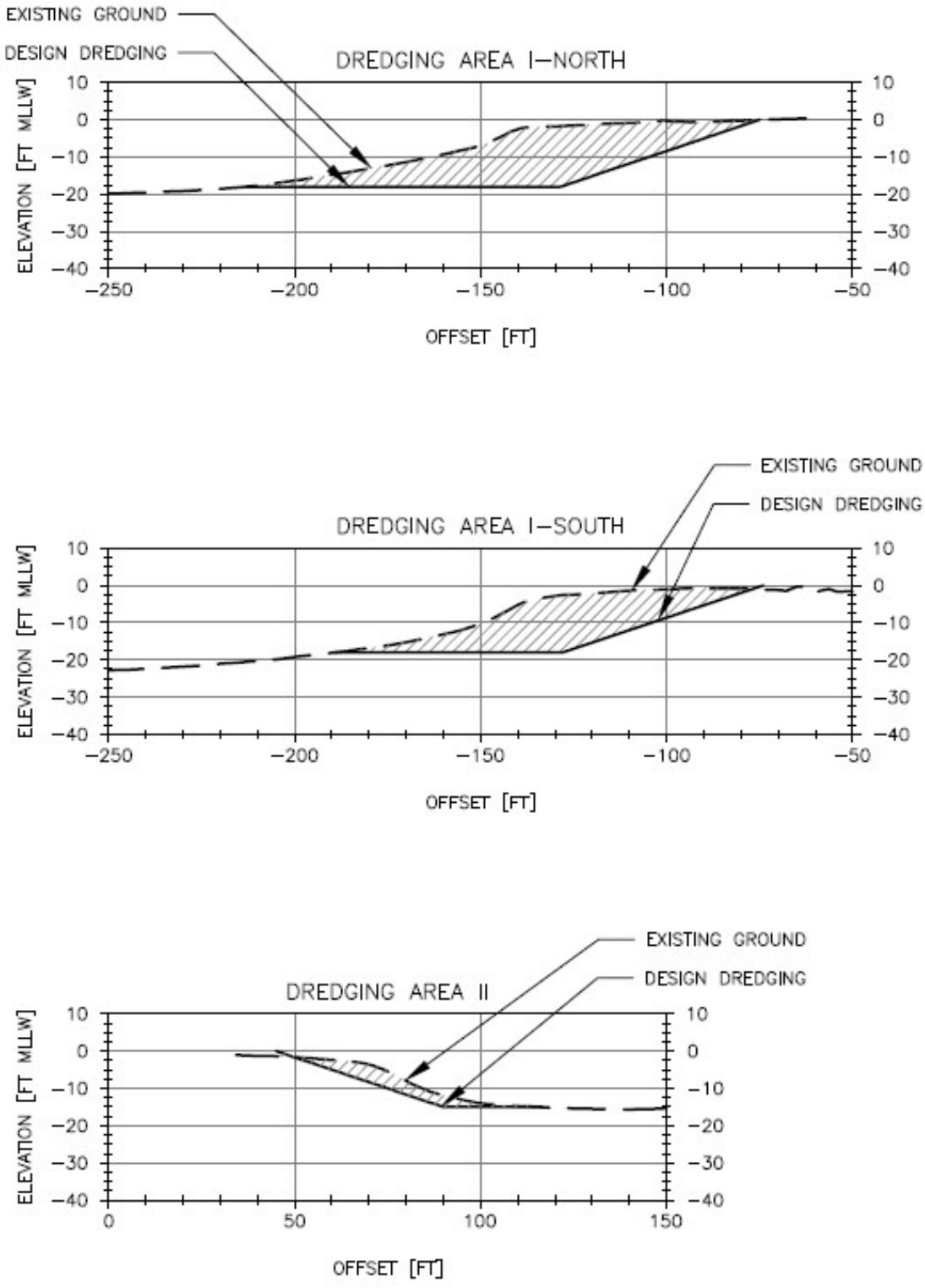


Figure 3. Typical Dredging Cross-Sections

2.2 Sediment Characterization Study

A detailed sediment characterization study has been conducted by Wood Environment & Infrastructure Solutions, Inc. for the proposed dredging areas and potential placement sites of the dredged material. They include Dredging Area I, Dredging Area II, the In-harbor placement site, and a temporary nearshore placement site. This nearshore placement site, located just 1,500 feet offshore of the nearby South Redondo Beach, has been approved as a borrow site for future beach nourishment activities by the Los Angeles County (County) and United States Army Corps of Engineers (USACE). The results are discussed in Attachment C: Sampling and Analysis Plan Report (SAPR), Sediment Characterization Study, which was prepared by Wood. Overall the Study findings concluded the following:

- Majority of samples collected in the dredging areas contain 80 percent or more sand.
- The dredged materials meet compatibility requirements for the temporary nearshore placement site (referred to as "outer harbor placement site" in SAPR) which was comprised of approximately 99 percent of sand.
- Based on the surficial samples collected in the In-harbor placement area, the portion of fines at this placement site is 47.5 percent fines, which is not compatible with the dredged material that contains approximately 4 to 10 percent of fines.
- Sediment chemistry for the temporary nearshore placement site do not have any elevated levels of chemicals. However, sediment chemistry for the In-harbor placement site does contain elevated levels of DDT's and PCB congeners, which is similar to the dredged materials from the south portion of Dredging Area I (composite areas OH-C and OH-D as defined in the SAPR).

2.3 Placement of Dredged Material

The placement sites that were considered for the dredged materials were: the In-harbor placement site, the temporary nearshore placement site, and direct beach placement.

In-Harbor Placement

The In-harbor placement site will act as a sediment sink in which the dredged material will fill in a depressed harbor entrance bottom area that currently has a deeper water depth. While the surficial samples collected in the In-harbor placement area are finer than the samples collected in the dredging areas, deeper sediments at this location are expected to be coarser and more like those collected within the dredged area. Although the dredged material may not physically be compatible with the surface sediments at the in-harbor placement site, the placement of the dredged material will prevent further scour and help maintain a more even depth in this area. In addition, sediment chemistry for the In-harbor placement site does contain elevated levels of DDT's and PCB congeners, which is similar to the dredged materials from the south portion of Dredging Area I. This indicates that the dredged materials at the south portion of Dredging Area I are more suitable for the In-harbor placement site. The location of this placement area is shown in Figure 4.

Figure 4. Plan View of Dredged Material Placement Areas

Direct Beach Placement versus Temporary Nearshore Placement

Since the completion of the Redondo Beach Widening project in 1968 and the construction of the Topaz Groin in 1969, Redondo Beach south of Topaz Groin has been stable ever since. However, the beach north of the Topaz Groin is erosive and needs periodic nourishments. Several beach nourishment projects have been implemented for the beach north of the Topaz Groin. Approximately 300,000 cy of sand dredged from the Marina del Rey was placed on this beach in the year 2000, and approximately 75,000 cy of sand, also dredged from Marina del Rey, was placed on the beach in 2012. A very small amount (approximately 7,000 cy) dredged material from King Harbor was also placed on this beach in 2004-2005. Based on the performance of these historical beach nourishment projects, it is concluded that Redondo Beach north of the Topaz Groin is in need of nourishment, however, it is best to replenish this beach with a large nourishment (>80,000 cy). A beach nourishment with 80,000 cy of sand would initially widen this beach by 40 to 50 feet. Placement of smaller quantities of sand on this beach will be quickly eroded and lost into the Redondo Canyon. The best practice is to stockpile the sand at the nearshore temporary placement site until funding and resources align for a major nourishment event.

During the 2004-2005 King Harbor dredging, the proposed and permitted dredging volume was approximately 56,500 cy and the dredged materials were proposed for placement on the Redondo Beach north of the Topaz Groin. However, the dredging was incomplete due to the presence of stone intermixed with the shoal material. The hydraulic dredge could not pump the sand/stone mixture to the beach placement area. Based on this lesson learned from the 2004-2005 dredging, it is not recommended to directly place the dredged material from King Harbor onto the beach due to the fact that the dredged material contain stones intermixed with the shoal material that are not suitable for beach nourishment without additional screening and treatment.

Alternatively, there is an approved nearshore disposal site that can be utilized as a temporary placement site for the dredged material of King Harbor. This temporary placement site is located approximately 1,500 feet offshore of Redondo Beach, as shown in Figure 4. This site was used as the borrow site for the 1968-1969 Redondo Beach Widening project, with 1.4 million cy of sand being dredged from this area and placed onto the Redondo Beach Reach. This area has been identified, evaluated, and approved as a borrow site by both the County and the USACE for beach nourishment at Redondo Reach. Part of the 2012 Marina del Rey dredged material, in the amount of approximately 82,000 cy, was last placed in this site. Recent surveys show that this site still has a capacity for the placement of 116,000 cy of sediment.

By placing King Harbor dredged material within this USACE's nearshore placement site, it will temporally reserve this material until funding and resources align for a major nourishment event that would likely be more effective and cost efficient, with less interruption to the public, than placements of smaller quantities of material in several episodic events. It will also allow for sediment to be more effectively screened for stones and other material unsuitable for beach nourishment before placing this material back onto Redondo Beach. Furthermore, beach operations in this part of the Santa Monica Bay are within the jurisdiction of LA County, not the City of Redondo Beach, and so any beach nourishment event would be subject to the approval of LA County, and in coordination with their long-term maintenance objectives. In addition, dredged

sediments placed within this nearshore temporary disposal site are still within the littoral zone and will not be lost down the Redondo Beach Submarine Canyon.

Based on the above considerations, it is strongly recommended that the identified 33,000 cy of King Harbor dredged material's placement into the temporary nearshore placement site is the optimal alternative when compared to its direct placement onto the beach.

Proposed Dredged Material Placement

It is proposed to place up to approximately 29,000 cy of the material dredged from the south portion of Dredging Area I (composite areas OH-C and OH-D as defined in SAPR) within the In-harbor placement site, and approximately 33,000 cy of the dredged material (comprised the north portion of Dredging Area I and Dredging Area II) within the USACE's temporary nearshore placement site. These final placement locations for the dredged materials were presented to the SC-DMMT at their May 27, 2020 meeting with no objections. The plan view of the dredged material placement areas is shown in Figure 4. The typical placement cross-sections are shown in Figure 5.

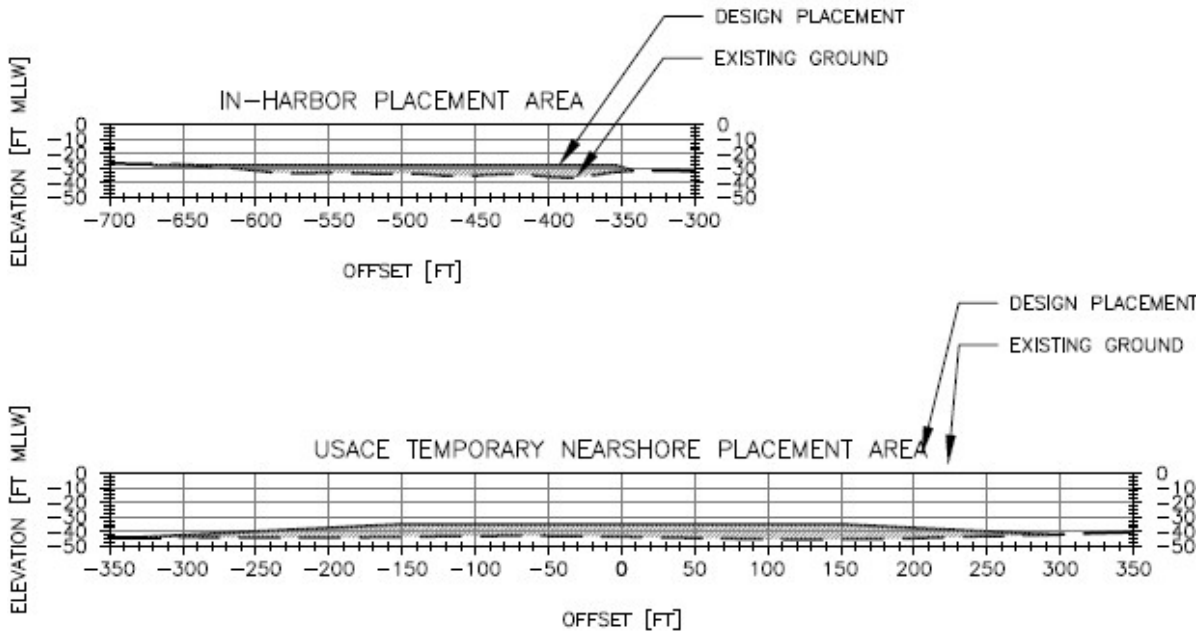


Figure 5. Typical Dredged Material Placement Cross-Sections

3 CONSTRUCTION EQUIPMENT AND SCHEDULE

This maintenance dredging project will be performed utilizing mechanical dredge equipment verses hydraulic dredge equipment due to the location and very limited area of the area being

dredged, and due to the potential for some larger size of dredged sediments. The expected dredge equipment will consist of the following:

- 1-barge of approximately 50 feet x 150 feet with a clam shell for dredging
- 1-2,000 to 3,000 cubic yard bottom dump scow of approximately 45 feet x 200 feet
- 1- 1,500 horsepower tug boat

The estimated construction schedule to complete the maintenance dredging is approximately 20 days if working 24 hours per 7-day week; 40 days if working 12 hours per 7-day week; or 60 days if working 8 hours per 5-day week. The dredging will be performed outside of the seabass spawning season between July and September.

The final project construction plans and specifications will include a debris management plan that includes screening for stone size material, screening and removal of trash or other debris, and best management practices to reduce ecological impacts.

All construction activities will meet the requirements of the project's specifications and any regulatory permit conditions, and will follow the Best Management Practice (BMP) guidelines set forth in the Caltrans (2013) "Caltrans Storm Water Quality Handbooks, Construction Site Best Management Practices Manual". Additional measures identified in Attachment D: Biological Resources Report prepared by Chambers Group, Inc., in order to protect biological resources, will also be followed.

4 DRAWINGS

The full set of drawing plans, including a vicinity map, plan views of the dredging and placement sites, and the typical dredging and placement cross-sections, is included in Attachment B.

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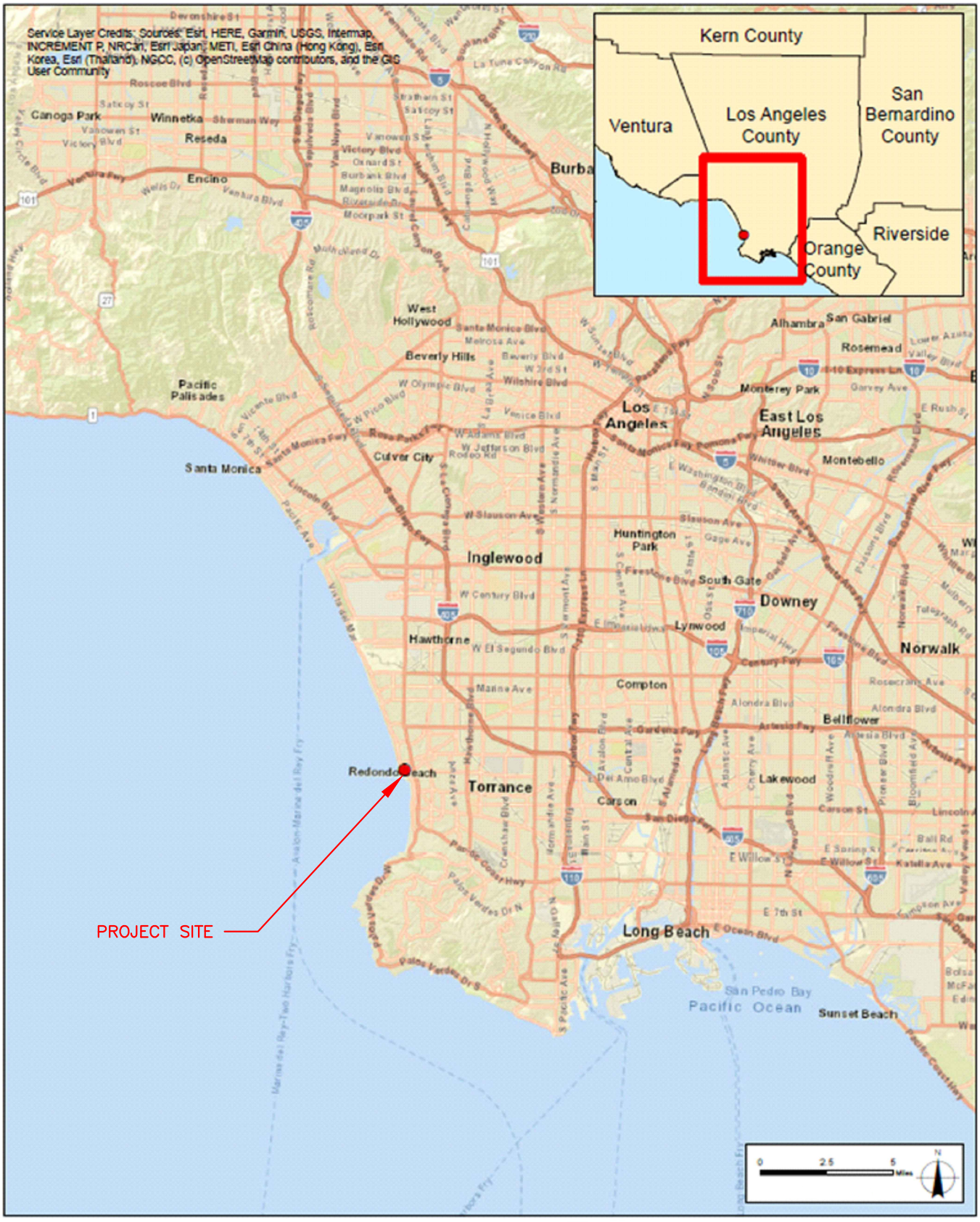
Attachment B

Drawings

by Noble Consultants, Inc.



VICINITY MAP

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SHEET 1 OF 5

08 JUL 2020

DREDGING PLAN

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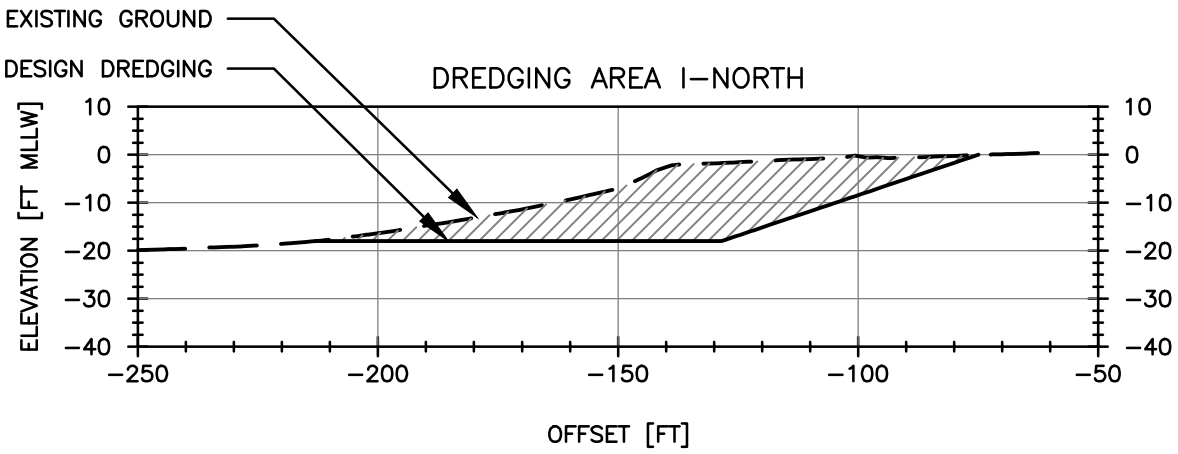
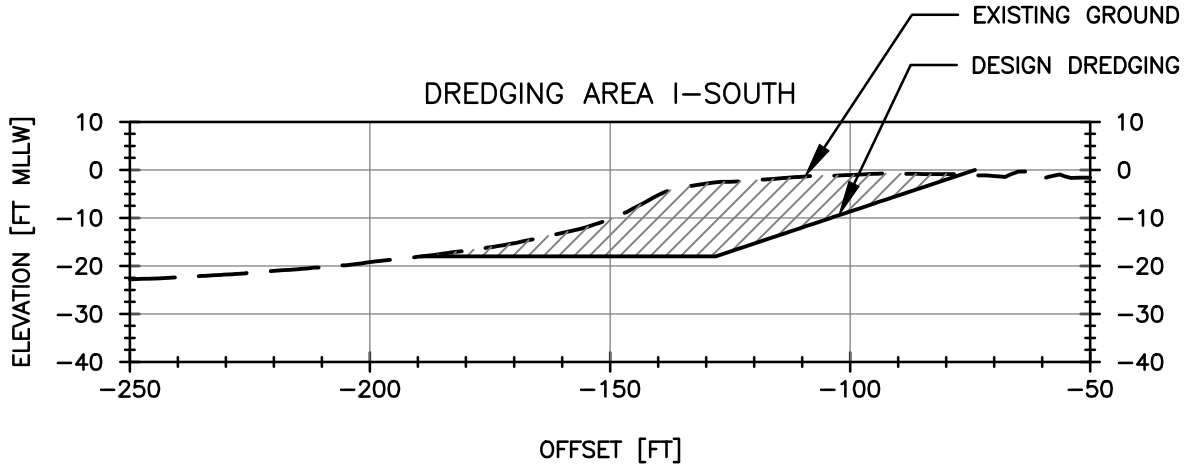
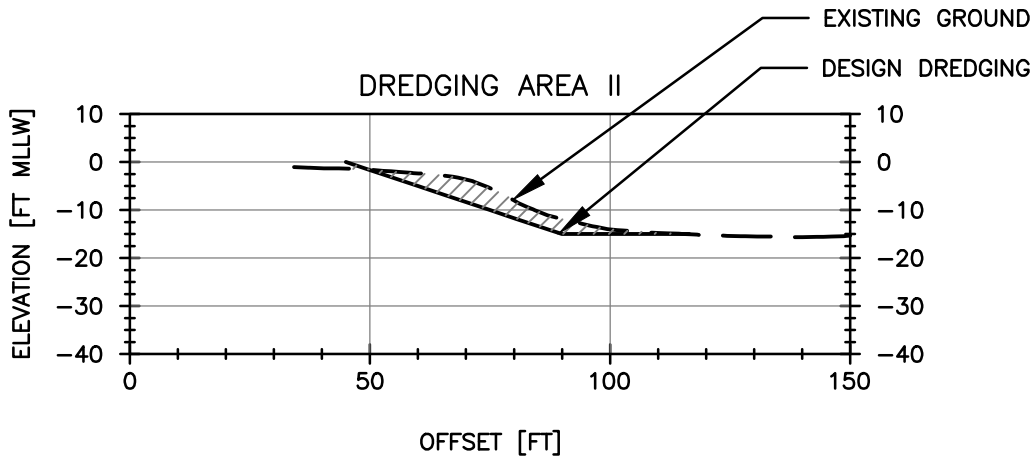
SHEET 2 OF 5

08 JUL 2020







TYPICAL DREDGING SECTIONS

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SHEET 3 OF 5

08 JUL 2020

PLACEMENT PLAN

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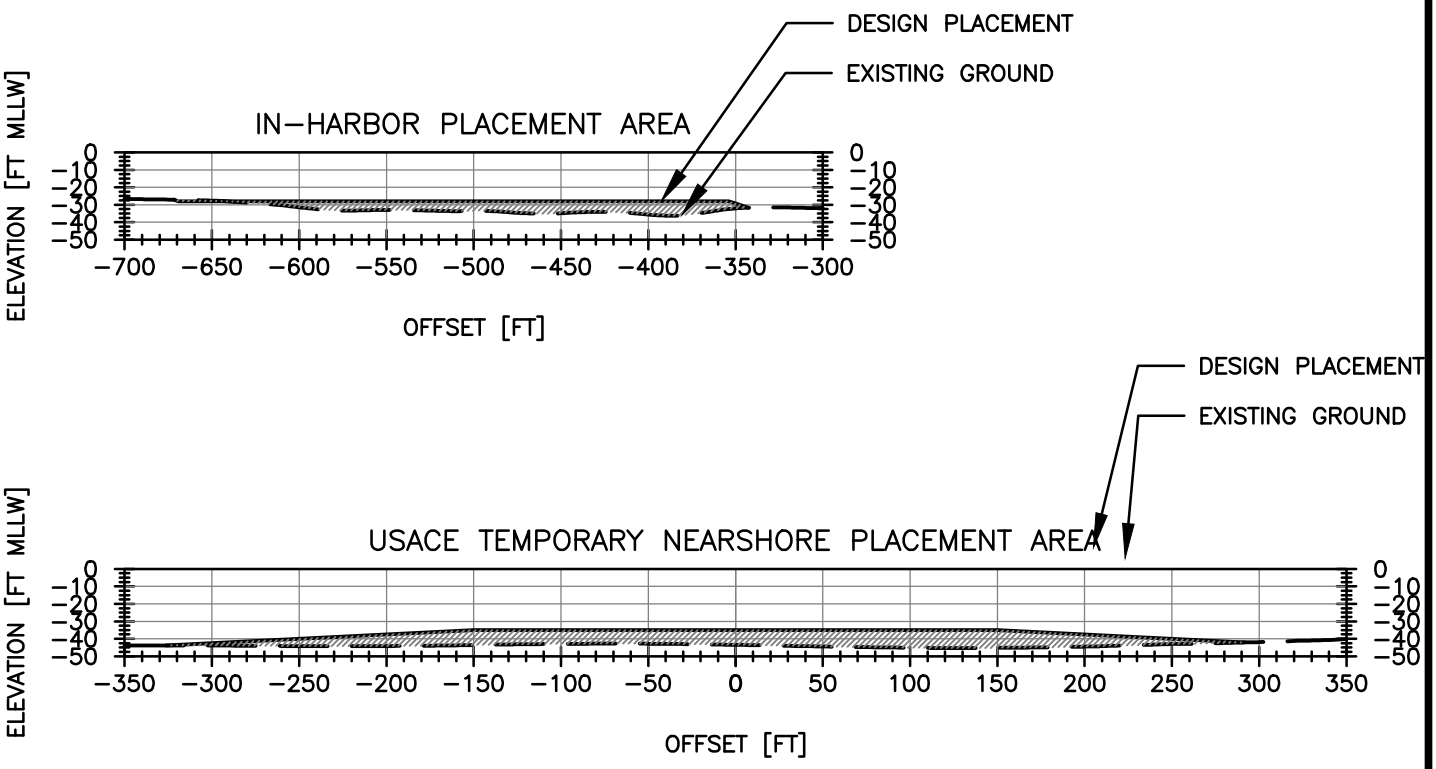
SHEET 4 OF 5

08 JUL 2020



TYPICAL PLACEMENT SECTIONS

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SHEET 5 OF 5

08 JUL 2020

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Ronald M. Noble, P.E., President

ENR TOP 500 DESIGN FIRMS

Attachment C

Final Sampling and Analysis Plan Report

Sediment Characterization Study

by Wood Environment & Infrastructure Solutions, Inc.

FINAL
SAMPLING AND ANALYSIS PLAN REPORT
SEDIMENT CHARACTERIZATION STUDY
IN SUPPORT OF MAINTENANCE DREDGING IN
KING HARBOR WITH POTENTIAL OUTER OR IN-HARBOR PLACEMENT

CITY OF REDONDO BEACH

Submitted to:

City of Redondo Beach
Public Works Department, Engineering Services Division
415 Diamond Street, Door E
Redondo Beach, California 90277

Submitted by:

Wood Environment & Infrastructure Solutions, Inc.
3560 Hyland Avenue Suite 100
Costa Mesa, California 92626

9210 Sky Park Court, Suite 200
San Diego, California 92123

Submitted: March 25, 2020
Revised and Resubmitted for Meeting: May 27, 2020

Wood Project Number: IR18166910

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

This document serves as the Sampling and Analysis Plan Report (SAP Report) for the sediment characterization study (Study) for the proposed City of Redondo Beach (City) Maintenance Dredging Project at King Harbor with Potential Outer Harbor or In-Harbor Placement (Project).

This Final SAP Report was presented to the Southern California Dredged Material Management Team (SC-DMMT) on March 25, 2020. The SAP Report was revised on May 20, 2020 and re-submitted for SC-DMMT review. Updates to the SAP Report included updates to the following items in the SAP Report:

- Figure 1-1b to show the location of the Redondo Submarine Canyon and other coastline features;
- Updates to Section 1.2 - Site Description to include additional information for the outer harbor placement site;
- Updates to the beginning of Section 2.1 and the addition of Section 2.2 to include site history for the Outer Harbor Placement area/borrow site;
- Addition of Section 5.3 and Table 5-1 that include a summary of the March 25, 2020 SC-DMMT meeting and responses to comments.

1.1 Project Summary

The safe navigation of vessels with King Harbor is currently restricted by accumulated sediment shoals, creating a need for the maintenance dredging proposed by the Project. The total dredge area for the Project is 193,433 square feet. The Study objective was to determine the best placement option within King Harbor for dredged sediments. Figure 1-1a shows the regional location of the Project and Study.

The Study involved collection and analysis of sediment samples from shoals that have formed in the Outer Harbor and Basin 3 Entrance Channel (Figure 1-1b). Sediments collected from the proposed dredge areas were evaluated for potential placement at two proposed nearshore areas including: 1) the In-Harbor (IH) and 2) the Outer Harbor (OH). The OH placement site is a Los Angeles County (County) and United States Army Corps of Engineers (USACE) approved borrow site located offshore of the nearby South Redondo Beach (Figure 1-1b). The Project-specific Sampling and Analysis Plan (SAP) outlined the procedures for collection and analysis of sediment in both the dredging and placement areas (Wood, 2019). The proposed dredge depths for the Project are -18 feet mean lower low water (MLLW) for the Outer Harbor and -15 feet MLLW for Basin 3. The total proposed dredge volumes for the Project are approximately 46,300 cubic yards (cy) to the design depth and 62,000 cy including the 2-foot overdredge (OD) to -20 feet MLLW for the Outer Harbor and -17 feet MLLW for Basin 3.

Nearshore placement of dredged material is primarily regulated under Section 404 of the Clean Water Act (CWA). The United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE) each administer specific aspects of Section 404, which established a permit program and technical guidelines to regulate discharges of dredged or fill material. The evaluation of a Section 404 permit application involves determining whether the

proposed project complies with 40 Code of Federal Regulations (CFR) 230 (Guidelines for Specification of Disposal Sites for Dredge or Fill Material) and USACE permit regulations (33 CFR 320-330). The nearshore replenishment site for Project dredged materials will be chosen by the City in consultation with the Southern California Dredged Material Management Team (SC-DMMT). The placement location for the Project will be selected based on the results of this Study.

1.2 Site Description

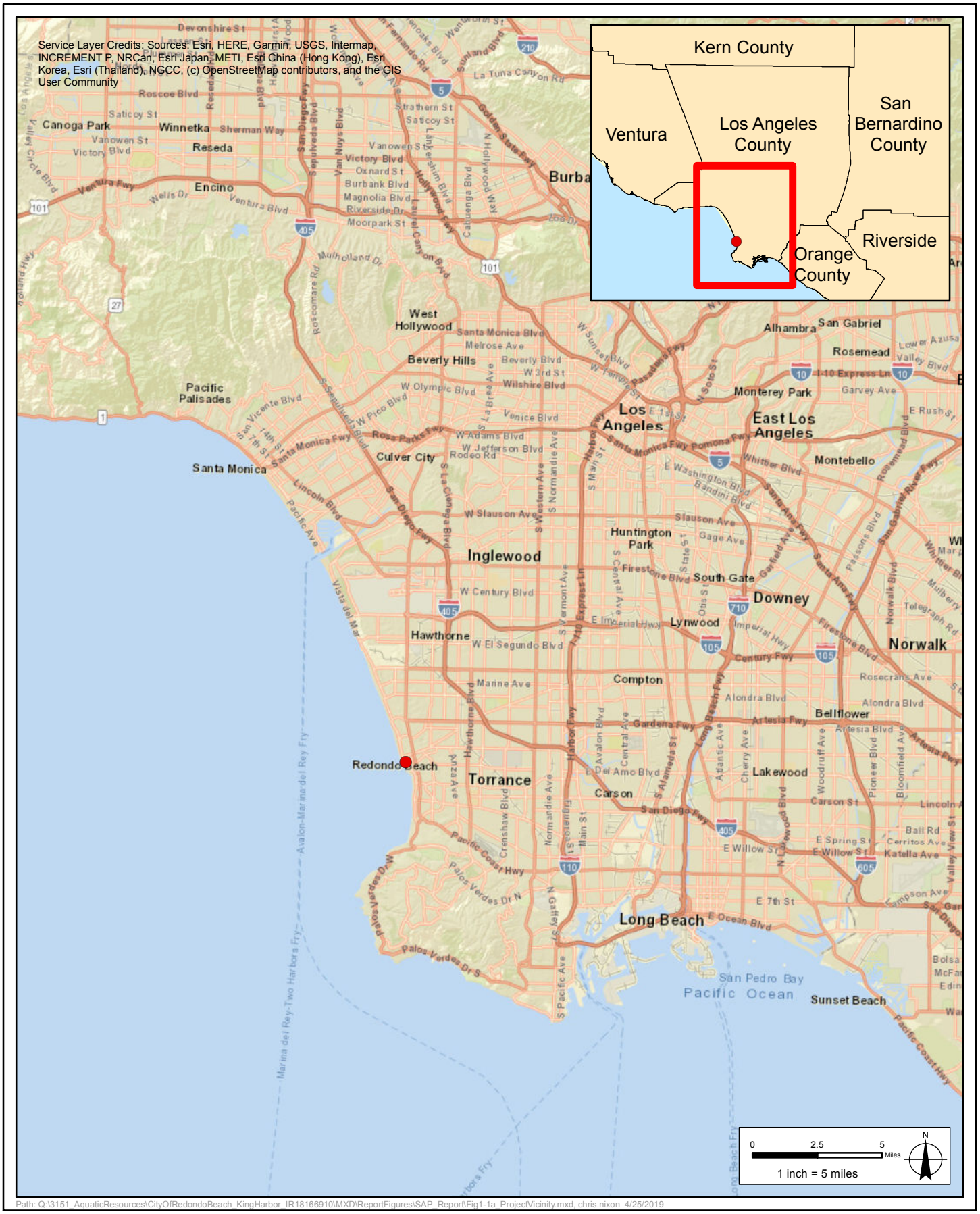
King Harbor occupies approximately 150 acres of land and water at the southern end of Santa Monica Bay in Redondo Beach. Located approximately 17 miles southwest of the business center of the City of Los Angeles and about 7 miles south of the Los Angeles International Airport, King Harbor primarily services small vessels. The harbor extends approximately 3/4 of a mile along the coast and is roughly 0.4 miles wide at the widest point.

King Harbor was established in the early 20th century as a commercial port. However, after the Port of Los Angeles became fully operational, King Harbor shifted its focus to recreational craft and fishing boats.

Beneficial uses of King Harbor in-harbor waters include industrial service supply, navigation, water contact recreation, non-contact water recreation, commercial and sport fishing, marine habitat, preservation of rare and endangered species, and potentially shellfish harvesting (Los Angeles Regional Water Quality Control Board [Regional Board], 2004). Beneficial uses for the outer harbor waters include navigation, water contact recreation, non-contact water recreation, commercial and sport fishing, marine habitat, wildlife habitat, and preservation of rare and endangered species (Regional Board, 2004). A recent biological resources report for this area is included as Appendix A to this SAPr.

The City is responsible for maintenance of the in-harbor that includes the three boat basins and the wave protection baffles at the entrances to Basins 1 and 2. As part of its Operations and Maintenance program, the USACE is responsible for maintenance of breakwaters.

The two placement locations considered for the Project consist of an In-Harbor depression that likely acts as a fine-grained sediment sink within King Harbor and an Outer Harbor placement site that has been historically used as a borrow site by the USACE. The Outer Harbor placement site is located to the south of the Topaz Groin and is part of the South Redondo Beach Reach, a moderate sized beach approximately 130 to 170 feet wide (Figure 1-1b). The Outer Harbor placement site is located approximately 0.75 miles from the head of the Redondo Submarine Canyon. The center of the Outer Harbor Placement/borrow site is approximately 0.3 miles from its center to the closest edge of the canyon offshore.



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wood.

Project Vicinity
King Harbor Maintenance Dredging Project
City of Redondo Beach

FIGURE
1-1a

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Bathymetric Contour

Dredge Area

Placement Area

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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wood.

King Harbor Dredge Areas and Placement Sites
Redondo Beach, California

N

1 inch = 1,000 feet

0 1,000 Feet

FIGURE

1-1b

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In order to assess a suitable placement option, the sediments within the proposed dredge footprint were characterized in accordance with the USEPA and USACE's Inland Testing Manual ([ITM], 1998). The Study included the characterization of materials using a Tier II evaluation outlined in the ITM (USACE/USEPA, 1998). If the sediments are determined to be uncontaminated, in accordance with USEPA and USACE's ITM, the sediments are appropriate for nearshore placement.

The Study SAP (Wood, 2019) was presented to the SC-DMMT as part of the July 24, 2019 agenda. The SAP was approved with minor comments from the SC-DMMT and updated for final submittal on August 9, 2019.

1.2.1 Document Purpose

Wood Environment & Infrastructure Solutions, Inc. (Wood)[1] was contracted by the City under a sub-consultant agreement to Noble Consultants-GEC, Inc. (Noble) to prepare this SAPr, which includes the following elements:

- Project description and personnel;
- Site Maps – Depictions of the Project collection locations;
- Vibracore and Grab Logs – Collection coordinates, target and actual penetration, sediment characteristics (e.g., strata, color, odor) and photographic documentation;
- Methods and Materials – All information pertaining to sample collection, handling, and analyses;
- Results – Results of all physical, chemical, and elutriate analyses compared to applicable sediment quality and water quality guidelines;
- Quality Assurance/Quality Control (QA/QC) Information – All raw data sheets, spike and recovery information, and internal QC audits;
- Conclusions; and
- References.

1.3 Roles and Responsibilities

Wood, under contract to Noble, was responsible for all Project elements and overall contract management. Key project personnel and their contact information are listed in Table 1-1. Certain services were provided by the following subcontractors:

- Six Scientific Service (SixSci)1 - Vibracore and grab sampling equipment and operation;
- Leviathan Environmental Services1 – Vessel operation and station positioning services;
- Eurofins Calscience Environmental Laboratories, Inc. (Eurofins Calscience)**2** – Sediment chemical and physical analyses.

[1] Amec Foster Wheeler's parent company is now owned by Wood plc.

[1]Leviathan Environmental Services and Six Scientific Services were used in place of Aquatic Blue and Pacifica due to scheduling conflicts.

[2] Eurofins Calscience is a laboratory certified by the National Environmental Laboratory Accreditation Program (NELAP), the California Department of Public Health, and the United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP) (certificate No. L12-86-121).

Table 1-1. Key Project Personnel

Organization	Name	Title	Office Phone	Cellular Phone
City of Redondo Beach	Geraldine Trivedi	Department of Public Works Engineering Division	(310) 318-0661 Ext. 2036	N/A
Noble	Ron Noble	Professional Engineer	(415) 885-0727	N/A
Wood	Kim Holland	Wood Project Manager	(949) 574-7504	(310) 748-9157
Wood	Barry Snyder	Wood QA/QC Manager	(858) 300-4320	(858) 354-8340
Wood	Kimbrie Gobbi	Wood Field Manager	(858) 300-4326	(443) 852-4637
Wood	Leanne Hirsch	Wood Field Technician	(858) 300-4353	(352) 443-9719
Wood	Tyler Huff	Wood Health and Safety Manager	(858) 300-4322	(858) 449-2334
Leviathan Environmental[1]	Steve LaMothe	Vessel Captain	N/A	(925) 381-5813
Six Scientific Services[1]	Chris Clark	Vibracore Contractor	(760) 908-5753	(760) 908-5753
Eurofins Calscience[2]	Carla Hollowell	Laboratory Director	(714) 895-5494	(714) 904-5235

Notes:
N/A = not applicable

2.0 SITE HISTORY AND HISTORICAL DATA REVIEW

Site history and historical data was reviewed for both King Harbor dredging projects and the proposed Outer Harbor placement site. There is no known history specific to Basin 3 or the In-Harbor placement site.

2.1 King Harbor Dredging History

No significant dredging has been performed at King Harbor since the completion of the breakwaters in the late 1930s except for a one-time minor dredging of 7,600 cy on the harbor side of the south breakwater in 2004-2005 (Noble et al., 2017). Table 2-1 outlines the volumes and placement locations for prior dredging events. Dredging has been completed both mechanically and hydraulically, and dredged material has previously been approved for beneficial reuse including beach nourishment and nearshore placement based on coarse mean grain sizes and low concentrations of contaminants of concern. In 2004-2005, dredged material was placed near residences approximately 150 yards south of the pier (Moffatt & Nichol and Kinnetic Laboratories, Inc., 2011).

Table 2-1. Dredging Site History

Dredging Year	Total Volume Dredged (cy)	Dredge Depth (feet MLLW)	Contaminants of Concern	Placement (ocean, upland, beach, etc.)
2004-2005	~7,000	-18 in Dredge Areas I and III; -10 in Dredge Areas IIA and IIB	See Table 2-2	Nearshore Beach Placement in Tidal Zone

Maintenance dredging depths vary across the harbor. In 2004, dredging was proposed and permitted to restore operational depths to -18 feet MLLW within Dredge Areas I and III and -10 feet MLLW in Dredge Areas IIA and IIB (Figure 2-1a). Dredged volume proposed for removal was approximately 56,500 cy in Dredge Areas I and III and was proposed for placement below the high tide line in a beach/surf zone deposition area approximately 1,000 feet south of the Redondo Beach Pier Complex to replenish the sandy beach (Figure 2-1b, Regional Board, 2004). In addition, a smaller amount of dredged material was proposed for hand-dredging using a very small hydraulic dredge by divers in Dredge Areas IIA and IIB (Figure 2-1a). Approximately 380 cy of dredged material from Dredge Area IIA was proposed for placement within an adjacent depression (G-1) approximately 250 feet away from the dredge site and 3,000 cy of dredged material from Dredge Area IIB was proposed for placement in a deep depression (G-2) located on the bottom of the main channel (Figure 2-1a).

Although proposed and permitted for dredging in 2004, only material from Dredge Area I (the Basin 3 entrance channel) and a small volume from Dredge Area II was completed (Figure 2-1a). Dredging from Dredge Area II was incomplete in 2004 due to of the presence of stone intermixed with the shoal material. The stone originated from the USACE breakwater road repair base material that was placed on the North Breakwater crest during their 1990's breakwater renovation project that raised crest elevation. The hydraulic dredge could not pump the sand/stone mix to

the beach placement area, so it was not removed. Material from both sites was placed within the beach nourishment site (Figure 2-1b).

Sediment Testing Results (2004)

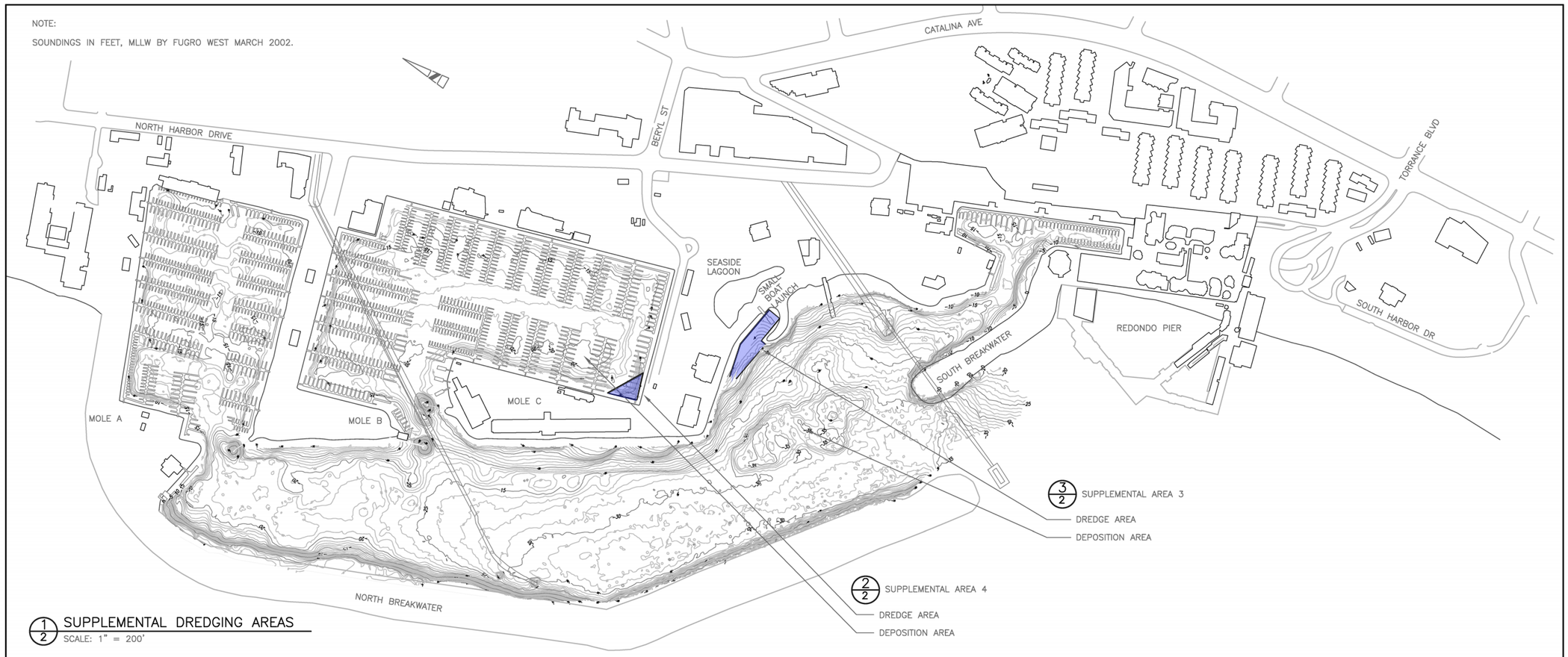
Table 2-2 summarizes analytical testing results for the 2004 dredged material characterization study. Sediment collected from the dredged materials removed in 2004 were analyzed and evaluated to a depth of approximately -20 feet MLLW in Areas I and III and approximately -12 feet in Area II (the design depth plus a 2-foot OD allowance; Regional Board, 2004). Three composite samples representing Areas I, II, and III, respectively, were analyzed for trace metal and organic concentrations, and grain size characteristics.

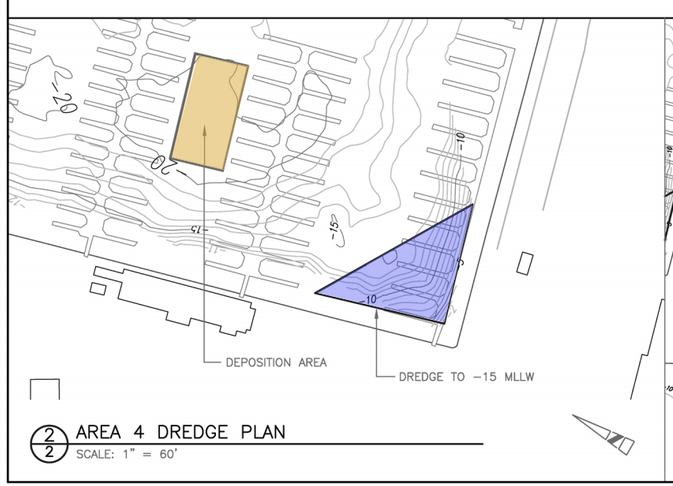
Table 2-2. 2004 Sediment Characteristics – King Harbor

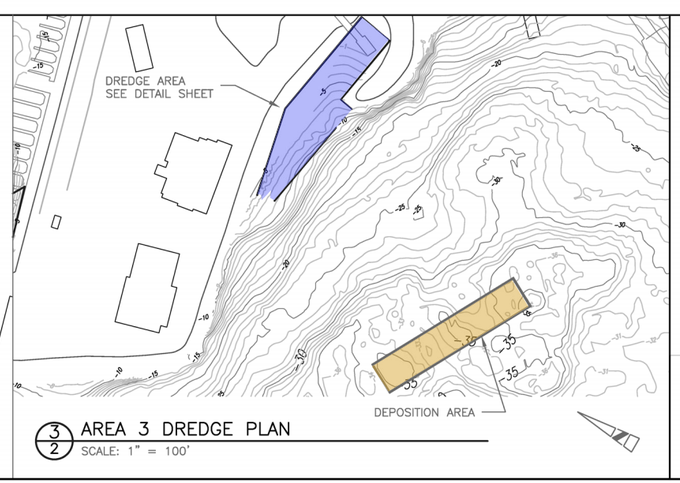
Parameter	Area I	Area II	Area III	ERL Threshold	ERM Threshold	Samples Exceeding Thresholds
Sand	89.8%	97.8%	87.4%	N/A	N/A	N/A
Silt/Clay	9.2%	2%	10.6%	N/A	N/A	N/A
Silver	<0.5 ppm	<0.5 ppm	<0.5 ppm	1 ppm	3.7 ppm	0% > ERL 0% > ERM
Arsenic	0.80 ppm	<0.5 ppm	1.24 ppm	8.2 ppm	70 ppm	0% > ERL 0% > ERM
Cadmium	<0.5 ppm	<0.5 ppm	<0.5 ppm	1.2 ppm	9.6 ppm	0% > ERL 0% > ERM
Chromium	13.4 ppm	4.27 ppm	8.04 ppm	81 ppm	370 ppm	0% > ERL 0% > ERM
Copper	11.4 ppm	6.43 ppm	6.19 ppm	34 ppm	270 ppm	0% > ERL 0% > ERM
Mercury	0.29 ppm	0.30 ppm	0.11 ppm	0.15 ppm	0.71 ppm	67% > ERL 0% > ERM
Nickel	6.76 ppm	1.77 ppm	3.99 ppm	21 ppm	51.6 ppm	0% > ERL 0% > ERM
Lead	14.2 ppm	4.48 ppm	5.26 ppm	47 ppm	218 ppm	0% > ERL 0% > ERM
Selenium	< 0.5 ppm	<0.5 ppm	0.27 ppm	Not Available	Not Available	N/A
Zinc	47.0 ppm	26.6 ppm	30.1 ppm	150 ppm	410 ppm	0% > ERL 0% > ERM
Total DDT	<1 ppb	<1 ppb	<1 ppb	1.58 ppb	46.1 ppb	0% > ERL 0% > ERM
Total PCB	<2 ppb	<2 ppb	<2 ppb	22.7 ppb	180 ppb	0% > ERL 0% > ERM
Total PAH	<330 ppb	< 330 ppb	< 330 ppb	4,022 ppb	44,792 ppb	0% > ERL 0% > ERM

Notes: Table from Regional Board, 2004. % = percent; ppm = parts per million; ppb = parts per billion; > = greater than; < = less than; ERL = Effects Range-Low; ERM = Effects Range-Median; DDT = dichlorodiphenyltrichloroethane; N/A = not applicable; PCB = polychlorinated biphenyl congener; PAH = polycyclic aromatic hydrocarbon

SOURCE: Noble Consultants Inc., July 2004







STAGING AND STORAGE NOTES:

1. RETURN ALL CONTRACTOR WORK AREAS AND ACCESS TO ORIGINAL CONDITION UPON DEMOBILIZATION.

Prepared by:
NOBLE CONSULTANTS, INC.
2201 DUPONT DRIVE, SUITE 620
IRVINE, CA 92715
(949) 752-1530
(949) 752-8381 (FAX)

REVISIONS	
DATE	DESCRIPTION

CITY OF REDONDO BEACH
CALIFORNIA
DEPARTMENT OF ENGINEERING & BUILDING SERVICES

KING HARBOR MAINTENANCE DREDGING PROJECT

AREAS 3 and 4 DREDGE PLAN

SUPPLEMENTAL WORK

DRAWN JTM	CHECKED RMN	SCALE AS SHOWN
APPROVED BY CITY ENGINEER – R.C.E.		DATE 27 JUL 04
PROJECT NO. 7556	SHEET NO. 1 OF 1 SHEETS	DRAWING NO.

Q:\3151_AquaticResources\CityOfRedondoBeach_KingHarbor_IR18166910\Graphics\SAP chris.nixon 04/25/2019

wood.

King Harbor Historical Dredging & Placement Sites (2004)
King Harbor, Redondo Beach

FIGURE
2-1a

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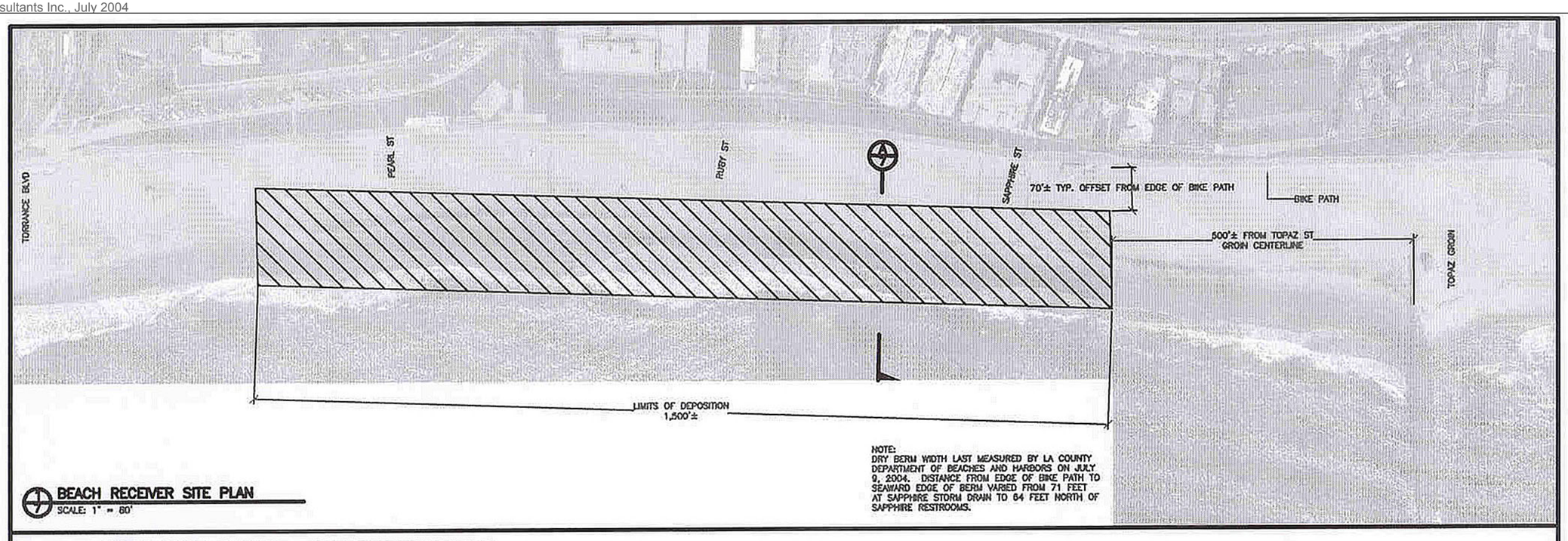
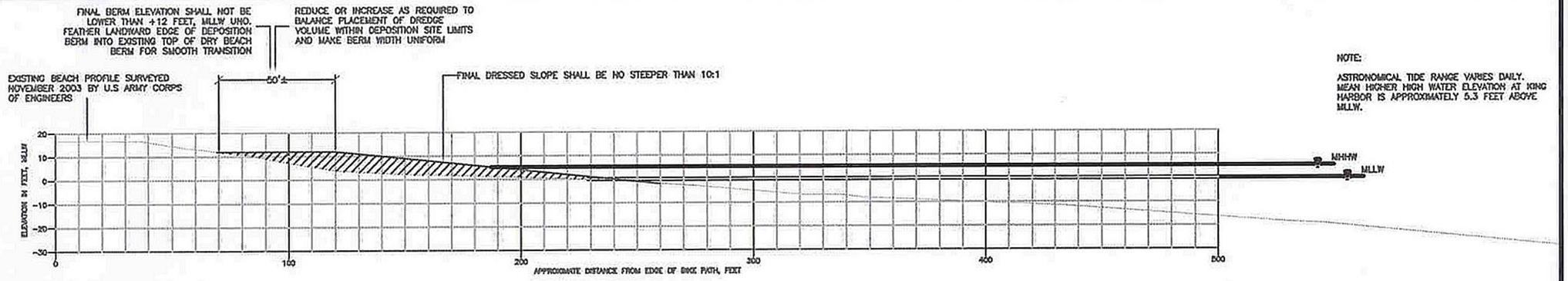
SOURCE: Noble Consultants Inc., July 2004



BEACH RECEIVER SITE PLAN
SCALE: 1" = 60'



TYPICAL NOURISHMENT SECTION
SCALE: 1" = 20'

BEACH DEPOSITION WORK NOTES:

1. DEPOSIT ALL DREDGE MATERIAL WITHIN SPECIFIED LIMITS IN CONFORMANCE WITH SECTION 1300 OF THE SPECIAL PROVISIONS.
2. CONTRACTOR SHALL NOTIFY ENGINEER TWO WEEKS PRIOR TO PERFORMING ANY WORK ON THE BEACH SO THAT ALL LOS ANGELES COUNTY AUTHORITIES MAY BE DULY NOTIFIED AS STIPULATED BY BEACHES AND HARBORS PERMIT 03-312.
3. CONTRACTOR SHALL ENSURE THAT BIKE PATH IS NOT OBSTRUCTED AT ANY TIME FOR COUNTY AND EMERGENCY VEHICLES.
4. CONTRACTOR'S WORK AND ACTIVITIES SHALL NOT DISRUPT THE LIFEGUARD TELEPHONE AND THE 911 SYSTEM.
5. PROTECT ALL EXISTING STRUCTURES ON THE BEACH IN PLACE.

REVISIONS	
DATE	DESCRIPTION

Prepared by:
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IRVINE, CA 92715
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CITY OF REDONDO BEACH
CALIFORNIA
DEPARTMENT OF ENGINEERING & BUILDING SERVICES

KING HARBOR

DREDGE MATERIAL DEPOSITION SITE DETAIL

MAINTENANCE DREDGING PROJECT

DRAWN JTM	CHECKED RWN	SCALE AS SHOWN
APPROVED BY _____ CITY ENGINEER - R.C.E.		DATE 27 JUL 04
PROJECT NO. 7556	SHEET NO. 7 OF 7 SHEETS	DRAWING NO.

Q:\3151_AquaticResources\CityOfRedondoBeach_KingHarbor_IR18166910\Graphics\SAP chris.nixon 04/25/2019

wood.

King Harbor Nearshore Beach Replinishment Site (2004)
King Harbor, Redondo Beach

FIGURE
2-1b

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The grain size of the sediments indicated they were compatible for beach nourishment, with a range of 87.4 percent to 97.8 percent sand. In addition, analytical results indicated the majority of metals and organic concentrations were below Effects Range-Low (ERL) guidelines developed by the National Oceanic and Atmospheric Administration (NOAA; [Buchman, 2008]). Mercury concentrations in Areas I and II did exceed the ERL but did not exceed the Effects Range-Median (ERM).

2.2 Outer Harbor Placement Site

Extensive offshore sand reserves exist along the Southern California Coast, including offshore of South Redondo Beach where the Outer Harbor Placement site is located (Noble et al., 2017). This area has been identified, evaluated, and approved as a borrow site by both the County and the USACE for beach nourishment at the Redondo Canyon Reach and the South Redondo Beach Reach (Figure 1-1b). The offshore (Outer Harbor) placement site is a stable placement location for sediments that was created during the last significant South Redondo Beach restoration project conducted in 1968 and 1969. At this time, 1.4 million cy of sand was dredged from the borrow site and placed on the South Redondo Beach Reach, widening the beach to approximately 250 feet (Noble, 2016a; Noble et al. 2017). This project is considered as one of the largest and most successful replenishment projects in Southern California to date. The current beach width ranges between 130 and 170 feet seasonally and is still considered to provide adequate shoreline protection for nearby infrastructure (Noble, 2016a).

Long-term studies of South Redondo Beach have verified the success of this project, as beach widths have remained relatively stable since placement occurred. Littoral current movements show that sediments placed on the beaches north of the Topaz Grain within the Redondo Canyon Reach are quickly eroded into the canyon; however, sediment placed on the South Redondo Beach Reach between Malaga Cove and the Topaz Groin are more stable (Figure 1-1b, Noble, 2016a). Sediment placement within the Redondo Canyon Reach north of the Topaz Groin was last performed in 2012 by Dutra Dredging Company. County and USACE studies of this area indicate that a beach width of approximately 60-70 feet is considered stable although the beach itself is classified as erosive as it has been observed that any additional sediment quickly sloughs into the Redondo Submarine Canyon. In 2012, approximately 76,000 cy of sediment were placed directly on the beach north of the Topaz Groin. No additional beach nourishment is proposed for this area at this time.

Since the 1968-1969 dredging event, there has been capacity at the Outer Harbor/borrow site for additional sediment placement. Sand was last placed at the borrow site from Marina del Rey in 2012. At this time, approximately 82,000 cy of sediment were placed at the borrow site (Redondo Disposal Summary Log – Marina del Rey dredging, 2012). Recent surveys show that the borrow site still has capacity for approximately 116,000 cy of sediment.

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3.0 METHODS

Sampling and analysis procedures for this Study were designed to satisfy the testing requirements outlined in the Green Book (USACE/USEPA, 1991) and ITM (USEPA/USACE, 1998). This section describes the locations and techniques used to collect test sediments at 15 vibracore sampling locations and 10 grab sampling locations to prepare 7 composite samples at King Harbor.

3.1 Dredge Design

The maintenance dredging depth proposed for King Harbor is -18 feet MLLW for the Outer Harbor and -15 feet MLLW for Basin 3. In total, approximately 46,300 cy to the design depth and 62,000 cy to the 2-foot OD depths of -20 feet MLLW and -17 feet MLLW is proposed for removal from King Harbor (Table 3-1).

Table 3-1. Proposed Dredging Locations and Placement Sites Areas and Volumes

Dredging Site/Composite Area	Approximate Area (acres)	Design Depth (feet MLLW)	Estimated Dredge Volume to Design Depth (cy)	Estimated 2-ft OD Volume (cy)[1]	Estimated Total Volume (cy)[1,2]
Outer Harbor	4.11	-18	45,500	14,500	60,000
Basin 3	0.35	-15	800	1,200	2,000
Total	4.46	-	46,300	15,700	62,000
Placement Location	**Estimated Placement Site Capacity (Volume, cy)[1]**				
In-Harbor	29,000				
Outer-Harbor	116,000				

Notes:
[1] Volumes are conservative estimates and should be used for planning purposes only.

3.2 Sampling Design

Sediment collection followed the guidance provided in *Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual* (USEPA, 2001) and is detailed in the approved SAP (Wood, 2019). Sample collection was documented using vibracore logs, grab sample logs, and photography. Complete vibracore and grab sample logs are in Appendix B and sample photographs are in Appendix C.

3.2.1 Sample Collection Locations and Depths

To adequately characterize the proposed dredge footprints, 15 vibracore samples and 10 grab samples were collected. Those samples were then subsampled and combined to form 7 composites for analytical chemistry and geotechnical parameters. Each core was also sub-sectioned into layers for grain size analyses, as required by the USEPA guidance documents. The layers include: 0-2 feet (upper [U]), 2 feet to project design depth (middle [M]), and project design depth to the potential OD depth (lower [L]).

Vibracore and grab samples were collected at King Harbor between October 14 and October 17, 2019 (Table 3-2a and Table 3-2b). Coring locations were positioned as close to the proposed sites as possible, only relocating to avoid rip-rap, rocks, or dangerous sampling conditions

(Table 3-2c). The actual sample collection locations in the King Harbor footprints are plotted on Figures 3-1a, 3-1b, 3-2a, and 3-2b.

Navigation to the proposed sample collection locations was performed primarily using a Differential Global Positioning System (DGPS) with real-time monitoring of the most recent shape files aboard the vessel *M/V Leviathan.* This device has a global positioning accuracy of approximately plus or minus 3 meters (m). The position of the *M/V Leviathan* was adjusted on a fine scale until the coordinates in Table 3-2a were reached. The vessel was secured over the collection location using the bow anchor and at least one stern line. Once a location was secured and confirmed, the actual location coordinates and water depth (measured with a weighted fiberglass tape) were recorded in the Study field log (Table 3-2a and 3-2b). The water depth was corrected to MLLW using NOAA tide tables and compared with the bathymetric data provided by the Navy to verify proper sampling locations.

3.2.2 Vibracore Collection

All collection locations were sampled as described in the SAP (Wood, 2019). Six Scientific Service technicians deployed a vibracore to collect sediment samples. The vibracore used a 4-inch-diameter aluminum tube connected to a stainless-steel cutter. The aluminum-encased vibrating unit used 240-volt, 3-phase, 26-ampere electricity to drive two counter-rotating concentric vibrators. The vibracore and tube were lowered by a hydraulic winch and vibrated until penetration to either Project depth or maximum allowable depth (refusal) was achieved. Core penetration depth was determined using a tape measure attached to the vibracore head. After the vibracore was turned off, the sediment core was returned to the boat's deck for processing. Once onboard, core samples were carefully extruded into clean, polyethylene-lined trays, photographed, and inspected for unique strata, color, odors, and other notable characteristics. This information was recorded on field data sheets prior to subsampling for chemical and physical analyses. Grab Field Data Logs are in Appendix B and grab photograph logs are in Appendix C.

3.2.3 Van Veen Grab Sample Collection

Surface sediments were collected using a stainless-steel, 0.1-square-meter (m^2) Van Veen grab sampler (grab sampler). Prior to deployment, the grab sampler was cocked with the trigger held in place by tension supplied from the weight of the grab sampler. The grab sampler was lowered approximately 2 meters per second (m/sec) until it was approximately 5 meters above the bottom, at 5 meters descent was slowed to 1 m/sec to minimize the effects of bow wave disturbance of the surface sediment. As bottom contact was made (indicated by slack in the wire), tension on the wire was loosened, releasing the trigger. The tension on the wire was then slowly increased, causing the lever arms to close the grab, and the grab sampler was reeled into the boat. Once the grab sampler was back on board, the top doors were opened for inspection. Overlying water was decanted or siphoned off to evaluate sample acceptability.

Once the grab sampler had been retrieved and the grab samples were considered acceptable, they were photographed and characterized by general descriptions of their color, odor, composition, etc. This information was recorded on field data sheets prior to subsampling for

chemical and physical analyses. Grab Field Data Logs are in Appendix B and grab photograph logs are in Appendix C.

A specially designed stainless-steel scoop was used to collect sediments from a depth of 0 to 5 centimeters (cm) inside the sampler, taking care not to collect sediment in contact with the inside surfaces. The surface sediment retained from each grab was then placed in a pre-cleaned stainless-steel bowl and thoroughly homogenized with a stainless-steel spoon, then distributed into pre-labeled sample containers.

3.2.3.1 Vibracore Sample Nomenclature

Vibracore sediment sample names used the following identification scheme consisting of 5 alphanumeric characters:

LL-C#-D

Where:

- The first characters “LL” identify the sample’s location – either OH for “Outer Harbor,” or B3 for “Basin 3.”
- The next character (C) indicates that the sample is a core sample.
- The character “#” indicates the collection location of the sample (1 through 12 for OH and 1 through 3 for B3).
- The next character (D) indicates the relative depth interval of the sample:
    - U (Upper) – 0 to 2 feet below the sediment-water interface (SWI)
    - M (Middle) – 2 feet below the SWI to the proposed design depth for each area
    - L (Lower) – the OD depth or sediment collected from the proposed design depth for each area to 2-feet below that depth.

  For example, following the identification scheme, OH-C1-M indicates the sample collected at the Outer Harbor, core sample 1, from the middle of the core (from 2 feet below the SWI to the proposed design depth for that area).

3.2.3.2 Grab Sample Nomenclature

Grab sediment sample names used the following identification scheme consisting of 4 alphanumeric characters:

LL-G#

Where:

- The first characters “LL” identify the samples location – OH for “Outer Harbor” or IH for “In-Harbor.”
- The next character (G) identifies that the sample is a grab sample.
- The character “#” identifies the collection location of the sample (1 through 5 for OH and IH).

For example, following the identification scheme, IH-G5 indicates the sample collected In-Harbor at grab location number 5.

3.2.4 Composite Areas

Sample collection and analysis was divided into the following areas that were composited and analyzed for the following sample frequencies:

- Proposed Dredge Areas (Figure 3-1a and b, Table 3-2a)
    - Outer Harbor (OH; 46,000 cy to design depth)[3] – Twelve (12) sampling locations with four (4) composite chemistry & geotechnical samples and thirty-three (33) grain size samples.
    - Basin 3 (B3; 750 cy to design depth)[3] - Three (3) sampling locations with one (1) composite chemistry and geotechnical sample and nine (9) grain size samples.
- Placement sites (Figures 3-2a and b, Table 3-2b)
    - In-Harbor Placement (IH): Five (5) grab samples collected within each area and tested individually for geotechnical parameters and composited for analytical chemistry.
    - Outer Harbor Placement (OH): Five (5) grabs tested individually for geotechnical parameters and composited for analytical chemistry.

Each vibracore composite was comprised of sediment from three cores that were grouped based on their location in the Project footprint. Each core was subsampled into similarly sized aliquots and homogenized for analysis. The vibracore composites were comprised of the following samples:

- OH-A-Composite – Cores OH-C1, OH-C2, and OH-C3
- OH-B-Composite – Cores OH-C4, OH-C5, and OH-C6
- OH-C-Composite – Cores OH-C7, OH-C8, and OH-C9
- OH-D-Composite – Cores OH-C10, OH-C11, and OH-C12, and
- B3-Composite – Cores B3-C1, B3-C2, and B3-C3.

[3] Value does not include overdredge volume.

Grab composites were similarly created by combining representative aliquots of each individual grab sample to make a composite.

- OH-G-Composite - Grabs OH-G1 through OH-G5
- IH-G-Composite Grabs IH-G1 through IH-G5

3.2.5 Deviations from SAP

There were several deviations from the Survey SAP for this study. Deviations included:

- The proposed subcontractor was not used due to a scheduling conflict. Instead of Aquatic Blue Environmental (Aquatic Blue), SixSci and Leviathan Environmental were used to operate the marine sampling vessel, collect samples and operate vibracore and grab sampling equipment.
- Adjustments to sampling locations to safely maneuver around visible and submerged obstructions were made by the Field Manager. A new location was picked within the sampling footprint using caution and discretion (Table 3-2c).
- Total petroleum hydrocarbons (TPH) was not measured and analyzed due to review of historical data that revealed TPH was not sampled historically.
- Total Recoverable Petroleum Hydrocarbons (TRPH) was measured as USEPA HEM:SGT Oil and Grease SGT 1664 instead of 418.1M due to phase out of freon;
- Of the 36 samples proposed for grain size analysis, 33 were tested. This was because 3 samples (OH-C5-L, OH-C6-L, and OH-C7-L) did not meet the OD depth at the proposed sampling locations.
- Testing for Atterberg limits (the moisture content of the sediment) was not performed. According to the lab, the samples were determined to be non-plastic and therefore unsuitable to test for Atterberg limits. “Non-plastic” refers to the plastic limit of the Atterberg limit and is defined as the amount of water moisture present in the soil. The plastic state of the soil is reached when a thread of soil with 3.2 millimeters (mm) diameter begins to crumble.

3.2.6 Equipment Decontamination

Once the core sleeve was extracted from the vibracore tube/barrel, any remnant sediment on the equipment was removed with site water and scrubbed with a clean brush and Alconox-water solution. The core barrel or Van Veen grab sampler was then re-rinsed with site water prior to moving to the next sampling location. Additionally, all sediment sampling tools, including stainless-steel mixing vessels and scoops, core extraction trays, and other reusable items that came in contact with the sample were similarly decontaminated prior to reuse.

3.2.7 Sediment Archiving

The Wood Field Manager retained archived subsamples from each of the vibracore upper and lower samples, the vibracore composite samples, and each of the Van Veen grab samples used for analytical chemistry testing. Archived samples will be retained at the Wood San Diego office in a locked freezer at −20 ºC for at least one year after their collection (until October 17, 2020).

3.3 Sample Collection Documentation, Handling, and Delivery

Sample documentation followed the procedures in the SAP (Wood 2019). The integrity of each sample from the time of collection to the time of data reporting was maintained throughout the Study by recording accurate core logs, filling out chain-of-custody forms at the time of sample collection, and photographically documenting each core and collection attempt. All samples were maintained at 4ºC throughout transport as noted on the sample check-in sheet provided by the analytical laboratory.

Sediment samples for both cores and grabs were couriered to the Eurofins Calscience analytical laboratory. Individual core samples for each composite area were composited in the field by Wood scientists, and subsamples from each composite were sent to Eurofins Calscience via courier in labeled 16-ounce glass jars, quart size plastic bags, and one-gallon plastic bags.

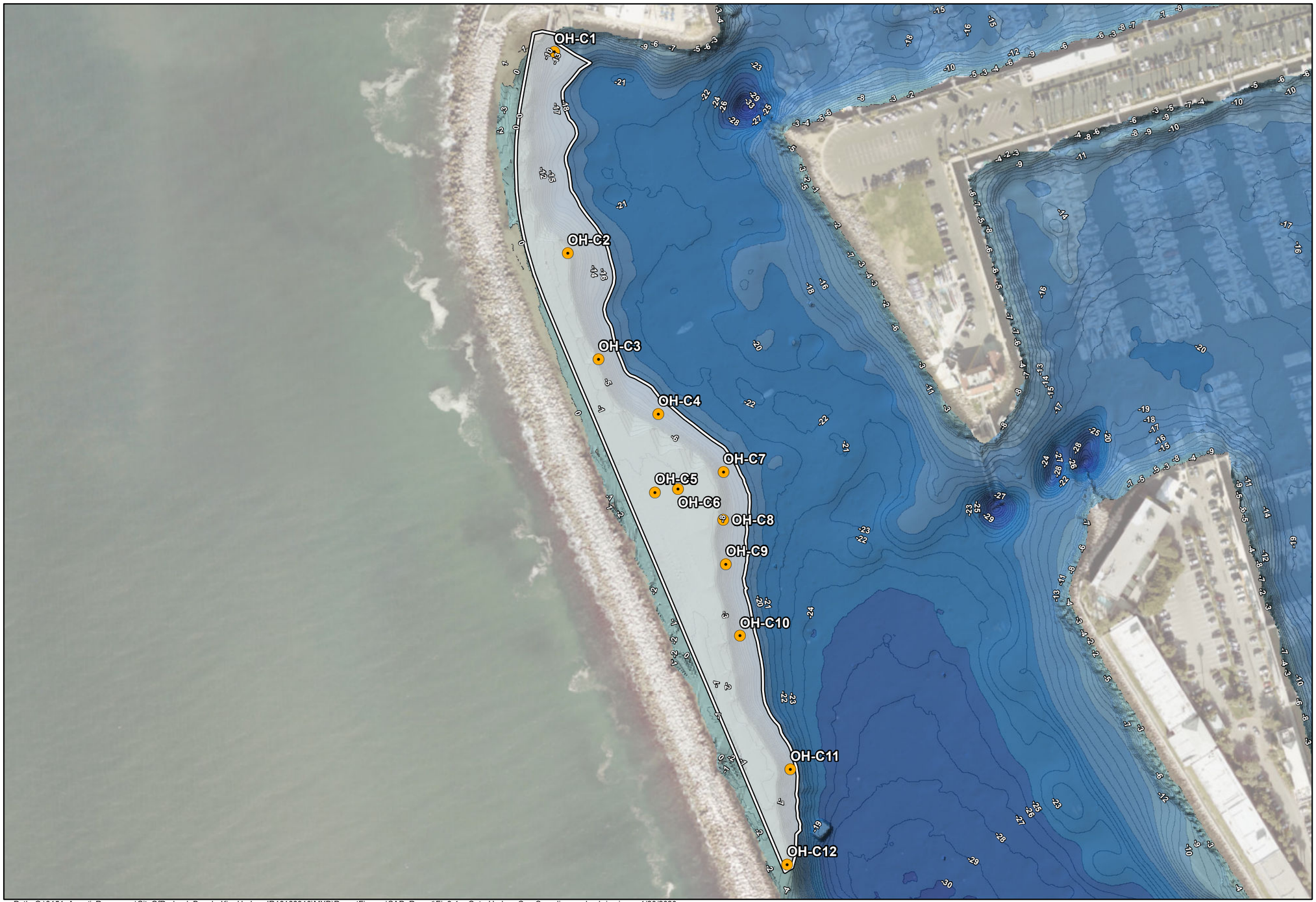
3.4 Physical and Chemical Analysis

The chemical and physical testing methods used for the Project are of sufficient sensitivity to meet the objectives of the testing protocols and ensure that any adverse impacts to the water column or the benthic environment are identified.

Sample testing results collected during the sediment investigation were compared to appropriate sediment quality guidelines such as Effects Range-Low (ERL) and Effects Range-Median (ERM, [Buchman 2008]). Eurofins Calscience conducted all physical and chemical analyses on sediment samples according to regulatory-approved methods for the constituents listed in Table 3-3.

3.4.1 Physical Analyses

Grain-size analysis was performed on each of the 12 individual vibracore upper, middle, and lower samples; with the exception of OH-C5-L, OH-C6-L, and OH-C7-L; and the 10 grab samples. The grain-size analyses were performed using method ASTM D4464(M) and ASTM D4318. Percent gravel, sand, silt, and clay were reported to 0.1 percent, along with the corresponding millimeter and phi sizes, and a cumulative grain-size distribution diagram.



Outer Harbor Dredge Area

Actual Sampling Locations

Vibracore

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: Q:\3151_AquaticResources\CityOfRedondoBeach_KingHarbor_IR18166910\MXD\ReportFigures\SAP_Report\Fig3-1a_OuterHarbor_CoreSampling.mxd, chris.nixon, 1/20/2020

wood.

Actual Sampling Locations
Outer Harbor Core Sampling Locations
Redondo Beach, California

N

1 inch = 175 feet

0 175 Feet

FIGURE
3-1a

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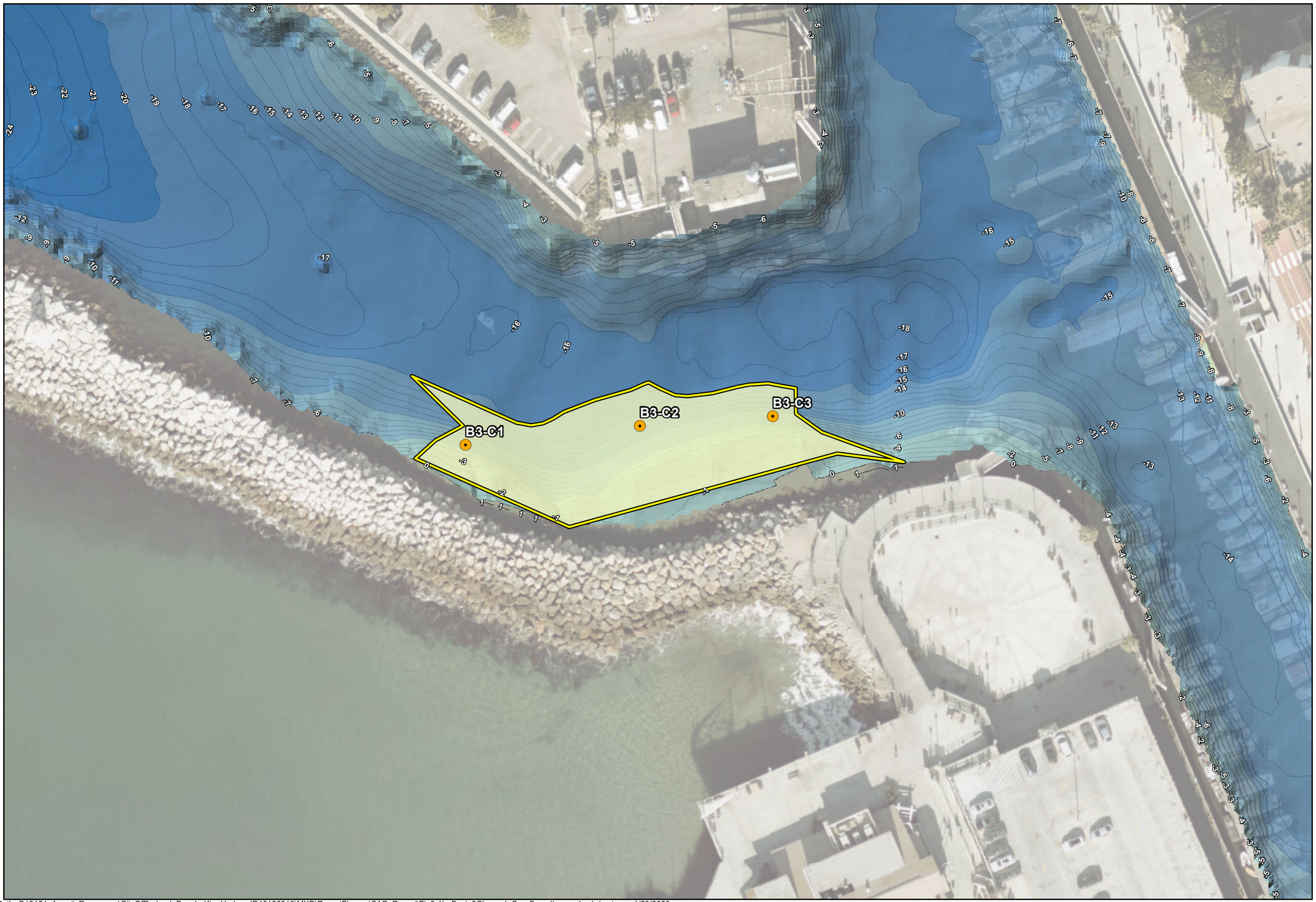

Basin 3 Dredge Area

Actual Sampling Locations

Vibracore

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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wood.

Actual Sampling Locations - Basin 3 Channel
Basin 3 Core Sampling Locations
Redondo Beach, California

N

1 inch = 60 feet

0 60 Feet

FIGURE
3-1b

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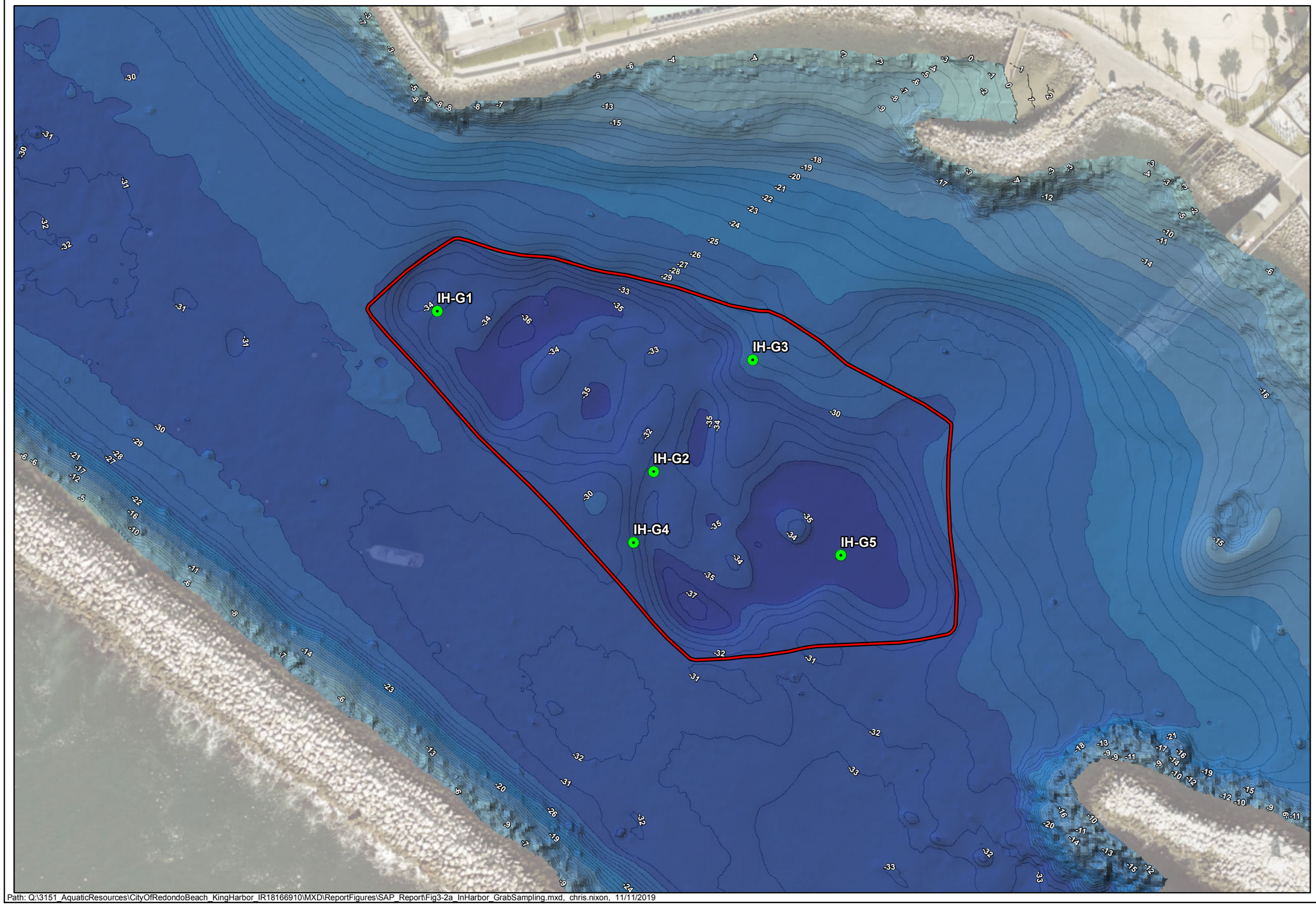

In-Harbor Placement Limit

Actual Sampling Locations

Grabs

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Path: Q:\3151_AquaticResources\CityOfRedondoBeach_KingHarbor_IR18166910\MXD\ReportFigures\SAP_Report\Fig3-2a_InHarbor_GrabSampling.mxd, chris.nixon, 11/11/2019

wood.

Actual Nearshore Placement Site
In-Harbor Placement Grab Sampling Locations
Redondo Beach, California

N

1 inch = 100 feet

0 100 Feet

FIGURE 3-2a

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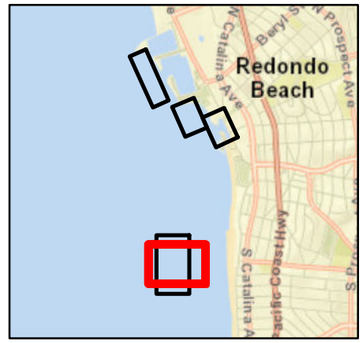

Outer Harbor Placement Limit

Actual Sampling Locations

Grabs

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Path: Q:\3151_AquaticResources\CityOfRedondoBeach_KingHarbor_IR18166910\MXD\ReportFigures\SAP_Report\Fig3-2b_OuterHarborPlacement_GrabSampling.mxd, chris.nixon, 11/11/2019

wood.

Actual Outer Harbor Placement Site
Outer Harbor Grab Sampling Locations
Redondo Beach, California

N

1 inch = 150 feet

0 150 Feet

FIGURE

3-2b

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Table 3-2a. Vibracore Field Log Summary Table

Sample ID	Latitude (dd°mm.mmm)	Longitude (ddd°mm.mmmm)	Date	Time	Project Depth	Mudline Elevation (ft MLLW)	Target Penetration (feet)	Actual Penetration (feet)	Recovered Core Length (feet)	Additional Notes
OH-C1	33°50.930	-118°24.077	10/14/2019	10:25	-20 to OD	-10.8	9.2	4.1	4.1	Sampling location obstructed by vessel, moved 10' east. Sample still in footprint. Felt hard at 1'. Eventually slid to 4.2' refusal. Hard refusal. Small gravelly plug. Strong odor on extraction. Lined core barrel for attempt 1, sample collected for core composite from 0 to 4'.
OH-C2	33°50.871	-118°24.072	10/14/2019	12:00	-20 to OD	-5.8	14.2	8.4	8.1	Shifting sampling location 10' east due to visible submerged riprap (still in project footprint). No plug. Shell hash from 2.0' to 4.0'. Refusal at 8.1'.
OH-C3	33°50.840	-118°24.061	10/14/2019	13:00	-20 to OD	-10.4	9.6	9.6	9.6	Sand plug. No refusal.
OH-C4	33°50.824	-118°24.040	10/16/2019	10:40	-20 to OD	-13.6	6.4	6.3	6.3	Sample location moved about 10'. Small sandy plug with piece of surf grass.
OH-C5	33°50.801	-118°24.041	10/15/2019	09:00	-20 to OD	-1.6	18.4	6.5	6.5	Moved sample about 15' east due to submerged riprap and inadequate water depth to collect sample, refusal at 6.5'. Sandy plug with shell hash.
OH-C6	33°50.802	-118°24.033	10/15/2019	10:45	-20 to OD	-1.6	18.4	5.0	5.0	Moved sample about 15' east due to submerged riprap and inadequate water depth to collect. Sand plug. Refusal at 5'.
OH-C7	33°50.807	-118°24.017	10/15/2019	12:15	-20 to OD	-11.4	8.6	4.6	3.5	Moved sample 15' east due to submerged riprap, refusal at 4.6' and inadequate water depth to collect.
OH-C8	33°50.793	-118°24.017	10/16/2019	11:45	-20 to OD	-9.7	10.3	6.0	6.0	Site too shallow to sample safely, moving vessel about 10' west. Note: Current velocity/surge prohibit sampling with a drill rig. Sediment felt soft and spongy at 5'. Terrestrial organic debris in core (material of detritus; sticks, leaves). Composited with attempt #2 and 3.
OH-C9	33°50.780	-118°24.016	10/16/2019	13:45	-20 to OD	-11.4	8.6	3.0	3.0	Refusal at 3', attempted collection for about 5 minutes before abandoning for next attempt, barrel bouncing on top of terrestrial organic debris material of sticks and leaves, composite attempt #2 and 3.
OH-C10	33°50.759	-118°24.011	10/14/2019	16:50	-20 to OD	-12.5	7.5	7.5	7.5	Recovered 7.1, lost about 0.5' water washout.
OH-C11	33°50.720	-118°23.993	10/14/2019	15:50	-20 to OD	-11.8	8.2	8.2	8.2	Sand plug.
OH-C12	33°50.692	-118°23.994	10/14/2019	15:10	-20 to OD	-13.2	6.8	6.8	6.8	Sand plug.
B3-C1	33°50.490	-118°23.567	10/17/2019	09:00	-17 to OD	-8.6	8.4	4.4	4.4	Refusal, moved location about 5' out because proximity to riprap too precarious to 3 point anchor. Refusal felt like sand hammer effect penetration to 3' relatively smooth. Changing vibracore head for next attempt.
B3-C2	33°50.492	-118°23.546	10/17/2019	12:40	-17 to OD	-12.1	4.9	5.0	4.6	Sample collected at proposed location. Small sand plug. 1:1 recovery. Over penetrated.
B3-C3	33°50.493	-118°23.530	10/17/2019	13:20	-17 to OD	-8.3	8.7	8.7	7.7	Sample moved away from riprap/needed to avoid shoal buoy with anchor. Small plug. Core may be slightly compacted, but more likely 0.5' lost at surface during extraction (in water).

Table 3-2b. Grab Sample Field Log Summary Table

Sample ID	Latitude (dd.mmmmm)	Longitude (ddd.mmmmm)	Date	Time	Water Depth (feet)	Tide (feet)	Mean Lower Low Water (feet)	Grab fail code	Penetration (cm)	Composition	Odor	Color	Shell hash (N/L/M/H)	Infauna (Y/N)	Sed Chem (Y/N)	Grain size (Y/N)	Sed Tox (Y/N)	Debris (Y/N)	Additional Notes	Station Comments
OH-G1	33°49.772	-118°23.871	10/16/2019	0830	49.6	4.4	-45.2	S1	3.5	Sand	None	2.5Y 3/2 (v. dark grayish brown)	N	N	Y	Y	N	N	Surf grass at surface. Very homogenous	Sizeable swell
OH-G2	33°49.768	-118°23.730	10/16/2019	0850	45.8	4.6	-41.2	S1	3	Sand	None	2.5Y 3/2 (v. dark grayish brown)	M	N	Y	Y	N	N		
OH-G3	33°49.707	-118°23.795	10/16/2019	0905	48.7	4.8	-43.9	S1	3	Sand	None	2.5Y 4/2 (Dark grayish brown)	N	N	Y	Y	N	N	Worm burrows at surface. Very homogenous	
OH-G4	33°49.632	-118°23.861	10/16/2019	0920	51.5	4.9	-46.6	S1	3	Sand	None	2.5Y 3/2 (v. dark grayish brown)	M	N	Y	Y	N	N	Homogenous; some shell hash at surface	
OH-G5	33°49.647	-118°23.723	10/16/2019	0930	39.2	5	-34.2	S1	6	Sand	None	2.5Y 5/3 (light olive brown)	M	N	Y	Y	N	N	Homogenous; lighter color than other locations; Very clean. Biota on surface (sea biscuit? Urchin?)	
IH-G1	33°50.594	-118°23.789	10/15/2019	1500	35.9	1.23	-34.7	S1	12	Silty sand	None	2.5Y 3/1 (v. dark gray)	N	N	Y	Y	N	N	Intact surface, arthropod swimming in water	
IH-G2	33°50.567	-118°23.745	10/15/2019	1520	33.5	1.22	-32.3	S1	8	Silt	None	2.5Y 3/2 (v. dark grayish brown)	L	N	Y	Y	N	N	Creatures swimming in the water	
IH-G3	33°50.586	-118°23.725	10/15/2019	1540	30.8	0.99	-29.8	S1	7.5	Sandy silt	None	2.5Y 3/2 (v. dark grayish brown)	N	N	Y	Y	N	N	Door jammed on half of grab; worm	
IH-G4	33°50.555	-118°23.749	10/15/2019	1630	35.5	0.55	-35.0	S1	8	Sandy silt	None	2.5Y 3/2 (v. dark grayish brown)	N	N	Y	Y	N	N	Red algae on surface	
IH-G5	33°50.553	-118°23.707	10/15/2019	1730	36.7	0.51	-36.2	S1	7	Sandy silt	None	2.5Y 3/2 (v. dark grayish brown)	N	N	Y	Y	N	N	Live mussels on surface; 1cm thick layer	

Table 3-2c. Sample Location Adjustments

Sample ID	Reason for relocating
OH-C1	Proposed sampling location obstructed by vessel, moved 10' east.
OH-C2	Shifted sampling location 10' east due to visible submerged riprap.
OH-C4	Sample location relocated approximately 10'.
OH-C5	Sample relocated approximately 15' east due to submerged riprap and inadequate water depth to collect sample.
OH-C6	Sample relocated about 15' east due to submerged riprap and inadequate water depth to collect.
OH-C7	Sample relocated 15' east due to submerged riprap.
OH-C8	Site too shallow to sample safely, moved sampling location approximately 10' west.
B3-C1	Sample location moved approximately 5' out because proximity to riprap too precarious to 3 point anchor.
B3-C3	Sample relocated to avoid shoal buoy with anchor.

3.4.2 Chemical Analyses

Eurofins Calscience analyzed all sediment samples according to USEPA and USACE approved methods for the constituents listed in Table 3-3. The analyte list for the investigation included metals, polycyclic aromatic hydrocarbons (PAHs), phenols, and polychlorinated biphenyl congeners (PCBs). These chemicals were chosen because they are chemicals that are common wood treatment chemicals (i.e. sometimes used on pilings).

Table 3-3. Analyses Methods of Sediment Samples

Analyte[i]	Analysis Method	Sediment Target Reporting Limit[a, b]
Grain Size	ASTM D4464 (M)	0.1 %
Sieve and Hydrometer	ASTM D422	0.1 %
Atterberg Limits	ASTM D4318	N/A
Total Solids	SM 2540 B	0.1 %
pH	USEPA 9045C	0.010 pH Units
Total Organic Carbon	USEPA 9060A	0.1 %
Total Ammonia	SM 4500-NH3 B/C (M) [c]	0.2 mg/kg
Total Sulfides	USEPA 376.2M [c]	0.5 mg/kg
Soluble Sulfides	USEPA 376.2M [c]	0.5 mg/kg
Oil & Grease	USEPA 418.1	10 mg/kg
Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Zinc)	USEPA 6020 [d]	0.1 mg/kg
Mercury	USEPA 7471A [d]	0.02 mg/kg
Total Recoverable Petroleum Hydrocarbons (TRPH)	USEPA HEM SGT: O&G[d]	10 mg/kg
Polycyclic Aromatic Hydrocarbons (PAHs) [e]	USEPA 8270C SIM [d]	10 µg/kg
Volatile Solids	USEPA 160.4	0.10 %
Organochlorine Pesticides [f]	USEPA 8081A [d]	1.0–20 µg/kg [j]
Polychlorinated Biphenyl (PCB) Congeners [g]	USEPA 8270C SIM [d]	0.2-0.4 µg/kg
Phenols	USEPA 8270C SIM [d]	10–500 µg/kg
Pyrethroids	GC/MS [i]	0.5–1.0 µg/kg
Phthalates	USEPA 8270C SIM [d]	50 µg/kg
Organotins	Krone, et al.[h]	3.0 µg/kg

Notes:

[a] Sediment minimum detection limits are on a dry-weight basis.

[b] Reporting limits are provided by Eurofins Calscience Environmental Laboratories, Inc.

[c] *Standard Methods for the Examination of Water and Wastewater*, 19th Edition, American Public Health Association et al., 1995.

[d] USEPA, 1986–2007 SW-846. Test Methods for Evaluating Solid Waste, *Physical/Chemical Methods*, 3rd Edition.

[e] Includes 1-methylnapthalene, 1-methylphenanthrene, 1,6,7-trimethylnapthalene, 2-methylnapthalene, 2,6-dimethylnapthalene, acenapthene, acenapthylene, anthracene, naphthalene, phenanthrene, fluorene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluroanthene, benzo(g,h,i)perylene, benzo(k)fluroanthene, dibenz(a,h)anthracene, chrysene, fluoranthene, indeno(1,2,3-c,d)pyrene, isophorone, pyrene, dibenzothiophene, benzo(e)pyrene, perthane, perylene, pyrene, and biphenyl

[f] Includes aldrin, α- benzene hexachloride (BHC), β-BHC (lindane), Δ=BHC, ¥-BHC, α-chlordane, ¥--chlordane, chlordane, dieldrin, cis-nonachlor, trans-nonachlor, DCPA (Dacthal), endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, heptachlor, heptachlor epoxide, methoxychlor, Mirex, toxaphene, oxychlordane, perthane, 2,4- and 4,4-dichlorodiphenyldichloroethane (DDD), 2,4- and 4,4-dichlorodiphenyldichloroethylene (DDE), and 2,4- and 4,4-dichlorodiphenyltrichloroethane (DDT)

[g] Polychlorinated biphenyls (PCBs) (sum of 42 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 132/153, 138/158, 149, 151, 156, 157, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206)

[h] Krone, C.A., D.W. Brown, D.G. Burrows, R.G. Bogar, S.L. Chan, and U. Varanasi, 1989. A Method for Analysis of Butyltin Species and Measurement of Butyltins in Sediment and English Sole Liver from Puget Sound. *Marine Environmental Research* 27: 1–18.

[i] Includes: allethrin (bioallethrin), bifenthrin, cyfluthrin-beta (baythroid), cypermethrin, deltamethrin/tralomethrin, phenothrin, fenpropathrin (danitol), fenvalerate (sanmarton)/esfenvalerate, fluvalinate, permethrin (cis/trans [C13]), phenothrin (sumithrin), resmethrin/bioresmethrin, tetramethrin, and lambda-cyhalothrin

[j] Except toxaphene, which is 1,000 micrograms per kilogram (parts per billion)

% = percent; µg/kg = micrograms per kilogram (parts per billion); ASTM = ASTM International; C6-C44 = carbon chain; GC = gas chromatography; (M) = modified; mg/kg = milligrams per kilogram; MS = mass spectrometry; N/A = not applicable; SIM = selective ion monitoring; SM = Standard Method; USEPA = United States Environmental Protection Agency

4.0 RESULTS

Sediments from the Project footprint were evaluated for suitability for nearshore placement, regulated under Section 404 of the Clean Water Act (CWA), or nearshore replenishment chosen by the City in consultation with the SC-DMMT. The placement location for the Project will be selected based on the results of this Study.

Analytical testing results for this study were evaluated to determine the potential of chemical contaminants in the sediment to cause adverse effects during dredging or placement. Sediment grain size results are summarized in Table 4-1a. Sediment chemistry results reported in dry weight are summarized in Table 4-1b. Full analytical laboratory reports for grain size and chemical analyses are included in the Eurofins Calscience reports in Appendix D.

4.1 Physical Analysis

Grain size analysis was performed on individual cores and composite samples. Mean grain size and the percent of sediment in each grain size classification (i.e. clay, silt, sand, and gravel) for all samples are detailed in Table 4-1a.

4.1.1 Dredging Areas

The individual cores were sampled from the upper, middle, and lower sections. All dredging area individual core samples were classified as sand, primarily either medium or fine-grained sand, and contained 80 percent or more (≥) sand, except for two samples, OH-C11 (47.8 percent) and B3-C1-M (75.3 percent). However, each of the individual core strata samples collected from sample OH-C11 (top, middle, and bottom), and the top, bottom, and the full core sample for location B3-C1 also contained ≥80 percent sand. Out of the five core composite samples, OH-A-Composite and B3-Composite were classified as medium sand and the remaining three composites; OH-B-Composite, OH-C-Composite, and OH-D-Composite were classified as fine sand. All composite samples contained ≥80 percent sand and are appropriate for nearshore placement.

4.1.2 Placement Areas

The individual grab samples were similar in composition to the core samples, with all samples classified as sand. Of the 10 samples, only OH-G1 was classified as fine-grained sand. Samples OH-G2 and OH-G5 were classified as coarse sand, OH-G3 and OH-G4 were classified as medium grained sand, and the remaining five grab samples were classified as very fine sand. The OH-G-Composite was also classified as coarse sand. Notably, individual grab samples collected at the IH placement sites were all classified as very fine sand and contained <80 percent sand (47.5 to 66.7 percent sand). The IH-G-Composite was also classified as very fine sand.

4.2 Sediment Chemistry Results

Sediment chemistry analysis was conducted on seven composite samples: five core samples and two grab samples (Table 3-3). Analytical chemistry data for all samples are provided in Table 4-1b.

4.2.1 Dredging Areas

Overall, the results of the analytical chemistry analyses indicated very low levels of analytes detected in all Project test sediments. The only exceptions were slight exceedances of ERL guideline values for 4,4'-DDE and total DDTs in all composite samples; slight exceedances of ERL guideline values of total PCB congeners for samples OH-C-Composite and OH-D-Composite; exceedances of the ERL guideline value for chlordane in the OH-A-Composite and OH-B-Composite; and slight exceedances of the ERL guideline value for dieldrin in the OH-D-Composite and the B3-Composite. In addition, there were also elevated concentrations of chlordane above the ERM guideline value in OH-C-Composite and B3-Composite samples. The only analyte that exceeded Human Regional Screening Levels (RSLs) for soils was arsenic; however, samples exceeded this level at both the dredging and placement locations, and the concentration of arsenic at all dredge areas was less than the IH placement site (Table 4-1b).

For metals, none of the samples contained concentrations of concern, with all results below the ERL and ERM guideline values. In addition, the majority of results for cadmium, mercury, selenium, and silver were detected at concentrations between the method detection limit (MDL) and reporting limit (RL) and are estimated values.

Total detectable PAHs ranged from 242 micrograms per kilogram (µg/kg) to 1463 µg/kg. Phenols were mostly non-detect, except for 3/4-methylphenol in the OH-C-Composite which was detected at a concentration of 30 µg/kg. Several phthalates were also detected in the Project sediments; however, they were also detected in the associated method blank or at J-flagged (estimated) concentrations including bis(2-ethylhexyl) phthalate, benzyl butyl phthalate, and di-n-butyl phthalate. In addition, although not detected in the method blank, results for diethyl and dimethyl phthalate were detected at concentrations between the MDL and RL and are estimated values. Diethyl phthalate was detected in four out of the five samples, with results ranging from 3.1 to 8.5 µg/kg and dimethyl phthalate was detected at estimated concentrations in three out of the five samples, with results of 3.6 µg/kg in B3-Composite, 5.7 µg/kg in the OH-D-Composite, and 66 µg/kg in the OH-C-Composite sample. Di-n-octyl phthalate was also detected at an estimated value in the OH-C-Composite (9.9 µg/kg) and the OH-D-Composite (3.3 µg/kg).

Total pyrethroids results were non-detect for the OH-A-Composite and B3-Composite; while the OH-B-Composite, OH-C-Composite and the OH-D-Composite had detectable results that were below 3.5 µg/kg. The only organotin detected was dibutyltin, with concentrations of 4.7 µg/kg in the OH-B-Composite and 4.3 µg/kg in the B3-Composite.

Total PCB Congeners were slightly elevated above ERL guideline values in two out of five samples. The OH-C-Composite and OH-D-Composite contained a total PCB congener

concentration of 67 µg/kg and 56 µg/kg, respectively. The average concentration for PCB congeners in all 5 composite samples is 34.8 µg/kg, which is slightly above the ERL of 22.7 µg/kg.

Oil and grease concentrations were variable throughout the dredging areas. Concentrations of oil and grease ranged between 326 milligrams per kilogram (mg/kg) in the OH-B-Composite and 906 mg/kg in the OH-C-Composite. Total recoverable petroleum hydrocarbons (TRPH) was measured as HEM-SGT: Oil and Grease for the Study. Results for TRPH ranged from 120 mg/kg in the OH-A-Composite to 467 mg/kg in the OH-C-Composite.

Mean ERM Quotient

Mean ERM quotients (mERMq) were determined for each composite area (Table 4-1b). The mERMq was calculated by dividing individual chemical analytes by their respective ERM value to determine the ERM quotient (ERMq) for each. If the result for an analyte was less than the MDL, ½ of the MDL was used to determine the ERMq. The mERMq were calculated by summing the ERMq values for each analyte and then dividing them by the total number of ERMq in the summation. Analytes that ERMq were calculated for included the metals arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc; the pesticides 4,4'-DDD/DDE/DDT, total DDTs, dieldrin, and chlordane; and the organics total PAHs and total PCB congeners. The mERMq ranged from 0.13 to 0.33 for the five composite areas with an average of 0.21. This is a simple approach to addressing chemical contamination in situations where there are multiple compounds present, and is intended for use in conjunction with the standard chemical-specific method. For other studies where mERMq have been considered, a guideline ERMq above 0.5 has been used to indicate a mixture of pollutants and elevated chemistry levels (Phillips et al. 1998). For this Study, only 4'4-DDE in the OH-D-Composite and B3-Composite and chlordane in the OH-B, C, D, and B3-Composite samples had ERMq that were above this level. None of the mERMq exceeded 0.5 for any composite area and only one analyte (chlordane) exceeded an ERM guideline). Furthermore, no more than four individual analytes were detected above an ERL guideline value in any one sample.

4.2.2 Placement Areas

Overall, the results of the analytical chemistry analyses for the placement area samples indicated very low levels of analytes detected in the sediments.

For metals, none of the samples contained concentrations of concern, with all results below the ERL and ERM guideline values. Similar to dredge area composite samples, when detected, the results for cadmium, mercury, selenium, and silver were detected at concentrations between the MDL and RL and are estimated values. The only exception was mercury detected in sample IH-Composite (concentration 0.149 µg/kg).

Total detectable PAHs ranged from non-detect in the OH-G-Composite to 686 µg/kg in the IH-G-Composite. All phenols were non-detect for both samples. Once again similar to dredge area composite samples, several phthalates were detected in the placement area composite samples; however, they were also detected in the associated method blank or as estimated values.

Total pyrethroids results were non-detect for the OH-G-Composite and 2.35 µg/kg for the IH-G-Composite. All organotins were non-detect in both samples.

Total PCB congeners were slightly elevated above the ERL guideline value in the IH-G-Composite, with a result of 31 µg/kg, however they were non-detect in the OH-G-Composite.

Oil and grease concentrations were also variable in the placement areas. Concentrations of oil and grease were 113 mg/kg in the OH-G-Composite and 302 mg/kg in the IH-G-Composite. Results for TRPH were 50.3 mg/kg in the OH-G-Composite and 125 mg/kg in the IH-G-Composite.

4.3 Quality Assurance/Quality Control

The following QA/QC information was provided by the analytical laboratory and reviewed by Wood.

- **GC/MS Semi VOA**: Method 8270C SIM CON: The continuing calibration verification (CCV) associated with batch 570-30133 recovered out of control limit for PCB-170, PCB-194, PCB-201 and PCB-206. The sample associated with this CCV only needed PCB-49, therefore, the data have been reported. The following sample is impacted: OH-D-Composite (570-10671-4).
- **Method 8270D TQ**: Surrogate recovery for the following sample was outside control limits: OH-A-Composite (570-10671-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed. No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.
- **Method D4464**: Shell/vegetative debris in samples may affect results.
- **Lab Admin:** Pursuant to a client request via email (on October 24, 2019), analysis for TPH-DRO was cancelled.
- **Subcontract Work:** Methods Atterberg - 3 pt / dry method std, Sieve + Hydrometer: These methods were subcontracted to Core Laboratories-Bakersfield. The subcontract laboratory certifications are different from that of the facility issuing the final report. The subcontract lab determined that all associated samples were non-plastic and not suitable for Atterberg testing. For that reason, results for Atterberg Limits will not be included in this report.
- **Method EPA 160.4 Total Volatile Solids**: This method was subcontracted to Weck Laboratories, Inc. The subcontract laboratory certification is different from that of the facility issuing the final report.
- For the remaining analysis, no additional quality issues were noted, other than those described in the definitions/glossary page. All are flagged with the appropriate qualifiers and are released without further action.

Table 4-1a. King Harbor Grain Size Analysis Results

Location	Total Gravel (%)	Very Coarse Sand (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Very Fine Sand (%)	Total Sand (%)	Silt (%)	Clay (%)	Total Silt & Clay (%)	Mean Grain Size (mm)	Plumb (1981) Grain Size Classification
Core Samples												
OH-C1-U	ND (<0.01)	ND (<0.01)	5.03	48.87	38.53	3.69	96.12	3.22	0.65	3.88	0.273	Medium Sand
OH-C1-M	ND (<0.01)	7.54	8.22	37.78	37.63	4.49	95.66	3.67	0.67	4.34	0.384	Medium Sand
OH-C1-L	ND (<0.01)	2.86	4.68	35.47	50.81	3.66	97.48	1.93	0.59	2.52	0.282	Medium Sand
OH-C1	ND (<0.01)	2.19	9.62	39.22	40.38	4.09	95.50	3.73	0.77	4.5	0.304	Medium Sand
OH-C2-U	ND (<0.01)	0.03	7.82	51.17	38.18	1.49	98.69	0.87	0.43	1.3	0.299	Medium Sand
OH-C2-M	ND (<0.01)	ND (<0.01)	3.24	54.9	38.84	1.57	98.55	1.07	0.39	1.45	0.282	Medium Sand
OH-C2-L[1]	ND (<0.01)	ND (<0.01)	2.01	47.76	45.72	2.54	98.03	1.58	0.39	1.97	0.262	Medium Sand
OH-C2	ND (<0.01)	ND (<0.01)	2.66	54.94	41.14	1.25	99.99	ND (<0.01)	ND (<0.01)	ND (<0.01)	0.281	Medium Sand
OH-C3-U	ND (<0.01)	ND (<0.01)	5.03	58.61	35.33	1.03	100.00	ND (<0.01)	ND (<0.01)	ND (<0.01)	0.300	Medium Sand
OH-C3-M	ND (<0.01)	0.01	4.24	43.54	44.38	4.83	97.00	2.45	0.55	3.01	0.261	Medium Sand
OH-C3-L	ND (<0.01)	ND (<0.01)	3.72	30.70	54.54	6.24	95.20	4.1	0.71	4.81	0.232	Fine Sand
OH-C3	ND (<0.01)	0.03	3.61	34.28	50.74	6.6	95.26	3.98	0.76	4.74	0.239	Fine Sand
OH-C4-U	ND (<0.01)	0.06	3.90	30.90	55.55	7.32	97.73	1.81	0.46	2.27	0.238	Fine Sand
OH-C4-M	ND (<0.01)	0.09	5.65	31.9	49.78	8.23	95.65	3.74	0.63	4.36	0.246	Fine Sand
OH-C4-L	ND (<0.01)	ND (<0.01)	6.03	20.91	48.73	12.89	88.56	10.14	1.3	11.44	0.214	Fine Sand
OH-C4	ND (<0.01)	ND (<0.01)	3.64	22.97	50.91	13.33	90.85	8.10	1.04	9.14	0.207	Fine Sand
OH-C5-U	ND (<0.01)	0.50	3.93	35.15	52.2	6.26	98.04	1.43	0.55	1.97	0.251	Medium Sand
OH-C5-M	ND (<0.01)	0.02	3.5	22.46	57.87	10.87	94.72	4.29	0.99	5.28	0.214	Fine Sand
OH-C5-L	**NO SAMPLE**											
OH-C5	ND (<0.01)	0.09	4.19	23.42	57.75	10.49	95.94	3.27	0.79	4.06	0.223	Fine Sand
OH-C6-U	ND (<0.01)	ND (<0.01)	2.58	30.34	55.47	9.62	98.01	1.44	0.54	1.98	0.227	Fine Sand
OH-C6-M	ND (<0.01)	ND (<0.01)	3.32	20.61	54.12	15.18	93.23	5.87	0.89	6.76	0.203	Fine Sand
OH-C6-L	**NO SAMPLE**											
OH-C6	ND (<0.01)	0.09	4.91	26.01	49.27	11.99	92.27	6.77	0.97	7.74	0.225	Fine Sand
OH-C7-U	ND (<0.01)	ND (<0.01)	4.68	41.89	41.53	4.98	93.08	6.13	0.79	6.91	0.254	Medium Sand
OH-C7-M	ND (<0.01)	ND (<0.01)	0.46	39.81	54.29	4.01	98.57	0.01	0.43	1.44	0.240	Fine Sand
OH-C7-L	**NO SAMPLE**											
OH-C7	ND (<0.01)	0.05	9.51	38.1	41.27	5.16	94.09	5.17	0.73	5.91	0.280	Medium Sand
OH-C8-U	ND (<0.01)	ND (<0.01)	1.44	18.79	62.35	12.91	95.49	3.65	0.86	4.51	0.199	Fine Sand
OH-C8-M	ND (<0.01)	ND (<0.01)	1.19	45.32	44.78	4.49	95.78	3.54	0.68	4.22	0.250	Medium Sand
OH-C8-L[1]	ND (<0.01)	0.11	6.35	31.11	46.57	8.83	92.97	6.19	0.83	7.02	0.247	Fine Sand

Table 4-1a. King Harbor Grain Size Analysis Results (Continued)

Core Samples												
Location	**Total Gravel (%)**	**Very Coarse Sand (%)**	**Coarse Sand (%)**	**Medium Sand (%)**	**Fine Sand (%)**	**Very Fine Sand (%)**	**Total Sand (%)**	**Silt (%)**	**Clay (%)**	**Total Silt & Clay (%)**	**Mean Grain Size (mm)**	**Plumb (1981) Grain Size Classification**
OH-C8	ND (<0.01)	0.090	5.28	28.82	50.91	11.01	96.11	3.24	0.65	3.89	0.237	Fine Sand
OH-C9-U	ND (<0.01)	ND (<0.01)	4.59	27.45	49.60	11.31	92.95	6.13	0.92	7.05	0.224	Fine Sand
OH-C9-M	ND (<0.01)	2.8	5.13	42.59	43.91	3.62	98.05	1.53	0.42	1.94	0.299	Medium Sand
OH-C9-L	ND (<0.01)	ND (<0.01)	3.96	22.04	49.88	14.61	90.49	8.43	1.09	9.52	0.205	Fine Sand
OH-C9	ND (<0.01)	0.04	6.18	30.30	48.85	9.30	94.67	4.60	0.74	5.34	0.245	Fine Sand
OH-C10-U	ND (<0.01)	10.97	6.22	32.74	43.16	5.18	98.27	1.34	0.4	1.73	0.415	Medium Sand
OH-C10-M	ND (<0.01)	ND (<0.01)	2.24	20.46	49.89	18.79	91.38	7.63	1.00	8.62	0.192	Fine Sand
OH-C10-L	ND (<0.01)	ND (<0.01)	2.26	18.64	44.34	20.48	85.72	13.01	1.27	14.28	0.178	Fine Sand
OH-C10	ND (<0.01)	0.07	12.28	23.39	44.85	11.88	92.47	6.51	1.02	7.53	0.269	Medium Sand
OH-C11-U	ND (<0.01)	0.01	4.55	25.35	54.25	11.53	95.69	3.53	0.79	4.31	0.225	Fine Sand
OH-C11-M	ND (<0.01)	ND (<0.01)	1.07	24.76	57.89	10.82	94.54	4.75	0.71	5.47	0.205	Fine Sand
OH-C11-L	ND (<0.01)	ND (<0.01)	0.31	16.86	48.13	19.57	84.87	13.46	1.68	15.13	0.168	Fine Sand
OH-C11	ND (<0.01)	ND (<0.01)	ND (<0.01)	1.66	24.53	21.56	47.75	47.36	4.89	52.26	0.080	Very Fine Sand
OH-C12-U	ND (<0.01)	0.01	12.91	22.54	35.2	17.73	88.39	10.63	0.99	11.61	0.247	Fine Sand
OH-C12-M	ND (<0.01)	ND (<0.01)	5.5	13.63	44.31	24.1	87.54	11.09	1.36	12.46	0.185	Fine Sand
OH-C12-L	ND (<0.01)	ND (<0.01)	2.98	15.45	47.39	22.3	88.12	10.47	1.41	11.88	0.179	Fine Sand
OH-C12	ND (<0.01)	ND (<0.01)	2.31	18.57	48.12	20.82	89.82	9.02	1.17	10.19	0.184	Fine Sand
Basin 3												
B3-C1-U	ND (<0.01)	6.55	10.56	41.49	34.94	3.46	97.00	2.88	0.13	3.00	0.402	Medium Sand
B3-C1-M	ND (<0.01)	ND (<0.01)	4.17	20.88	35.23	15.02	75.30	22.43	2.27	24.7	0.181	Fine Sand
B3-C1-L	ND (<0.01)	0.49	22.54	25.22	34.54	11.60	94.39	4.02	1.60	5.62	0.327	Medium Sand
B3-C1	ND (<0.01)	0.11	11.25	38.68	36.76	5.78	92.58	6.27	1.15	7.42	0.284	Medium Sand
B3-C2-U	ND (<0.01)	0.04	5.62	34.54	44.50	6.69	91.39	7.49	1.12	8.60	0.244	Fine Sand
B3-C2-M	ND (<0.01)	12.36	16.57	35.81	29.09	2.92	96.75	2.69	0.56	3.25	0.477	Medium Sand
B3-C2-L	ND (<0.01)	ND (<0.01)	19.36	33.65	24.91	5.45	83.37	13.98	2.65	16.62	0.303	Medium Sand
B3-C2	ND (<0.01)	0.260	25.29	33.76	27.95	4.66	91.92	7.09	0.99	8.09	0.355	Medium Sand
B3-C3-U	ND (<0.01)	13.22	5.75	47.23	28.77	2.39	97.36	2.66	ND (<0.01)	2.66	0.493	Medium Sand
B3-C3-M	ND (<0.01)	ND (<0.01)	10.71	46.03	31.68	3.92	92.34	6.69	0.97	7.66	0.297	Medium Sand
B3-C3-L	ND (<0.01)	ND (<0.01)	3.40	35.16	50.17	6.41	95.14	4.03	0.83	4.86	0.241	Fine Sand
B3-C3	ND (<0.01)	ND (<0.01)	7.1	47.83	37.67	3.06	95.66	3.65	0.69	4.34	0.283	Medium Sand

Table 4-1a. King Harbor Grain Size Analysis Results (Continued)

Location	Total Gravel (%)	Very Coarse Sand (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Very Fine Sand (%)	Total Sand (%)	Silt (%)	Clay (%)	Total Silt & Clay (%)	Mean Grain Size (mm)	Plumb (1981) Grain Size Classification
Grab Samples												
OH-G1	ND (<0.01)	ND (<0.01)	ND (<0.01)	21.66	67.69	9.51	98.86	1.14	ND (<0.01)	1.14	0.208	Fine Sand
OH-G2	ND (<0.01)	5.00	64.70	23.55	5.74	0.57	99.56	0.43	0.01	0.43	0.615	Coarse Sand
OH-G3	ND (<0.01)	ND (<0.01)	2.05	41.92	52.88	3.14	99.99	ND (<0.01)	ND (<0.01)	ND (<0.01)	0.254	Medium Sand
OH-G4	ND (<0.01)	0.56	16.13	17.14	46.37	15.32	95.52	3.72	0.76	4.48	0.276	Medium Sand
OH-G5	ND (<0.01)	24.06	55.52	16.49	2.82	0.59	99.48	0.42	0.12	0.54	0.786	Coarse Sand
IH-G1	ND (<0.01)	ND (<0.01)	ND (<0.01)	3.56	21.14	25.50	50.20	45.94	3.86	49.80	0.084	Very Fine Sand
IH-G2	ND (<0.01)	ND (<0.01)	ND (<0.01)	2.3	25.43	25.15	52.88	43.36	3.76	47.12	0.087	Very Fine Sand
IH-G3	ND (<0.01)	ND (<0.01)	ND (<0.01)	6.86	37.58	22.21	66.65	30.39	2.96	33.34	0.116	Very Fine Sand
IH-G4	ND (<0.01)	ND (<0.01)	ND (<0.01)	3.59	19.45	24.42	47.46	48.12	4.42	52.54	0.080	Very Fine Sand
IH-G5	ND (<0.01)	ND (<0.01)	ND (<0.01)	7.35	25.00	27.69	60.04	36.87	3.09	39.96	0.103	Very Fine Sand
Composite Area Samples												
OH-A-Composite	ND (<0.01)	ND (<0.01)	5.43	43.58	42.23	4.42	95.66	3.59	0.76	4.34	0.266	Medium Sand
OH-B-Composite	ND (<0.01)	ND (<0.01)	0.79	24.51	57.85	10.92	94.07	4.96	0.97	5.93	0.204	Fine Sand
OH-C-Composite	ND (<0.01)	0.01	4.57	33.35	47.80	9.06	94.79	4.47	0.73	5.20	0.239	Fine Sand
OH-D-Composite	ND (<0.01)	ND (<0.01)	4.47	21.98	46.42	17.03	89.90	8.91	1.20	10.11	0.204	Fine Sand
B3-Composite	ND (<0.01)	ND (<0.01)	12.58	41.82	33.76	4.78	92.94	5.84	1.21	7.06	0.293	Medium Sand
OH-G-Composite	ND (<0.01)	10.43	38.13	22.66	23.36	4.31	98.89	0.83	0.28	1.11	0.531	Coarse Sand
IH-G-Composite	ND (<0.01)	ND (<0.01)	ND (<0.01)	4.25	24.31	23.90	52.46	43.20	4.34	47.54	0.089	Very Fine Sand

Notes: ND = Non-Detect

1. Sample results for OH-C2-L and OH-C8-L do not represent the layer between the design depth and the over dredge depth (i.e. last two feet of sediment). Sample OH-C2-L represents the depth from 6.0 to 8.1' feet and sample OH-C8-L represents the depth from approximately 4.0 to 6.6 feet below the sediment water interface.

Table 4-1b. King Harbor Analytical Chemistry Results

			Sediment Quality Guidelines				Dredging Areas										Placement Areas			
Analytical Method	Compound Name	Units	ERL (dry wt.)	ERM (dry wt.)	Human RSLs Residential	Human RSLs Industrial	OH-A-Composite		OH-B-Composite		OH-C-Composite		OH-D-Composite		B3-Composite		OH-G-Composite		IH-Composite	
SM 2540 B (M)	Total Solids	%	·	·			71.6		67.4		69.6		66.7		73.9		79.3		63.6	
EPA 9060A	Total Organic Carbon	%	·	·			0.467		0.989		2.39		1.83		0.837		0.245		1.85	
SM 4500-NH_3 B/C (M)	Ammonia (as N)	mg/kg	·	·			3.13		6.65		8.84		3.36		5.68		3.18		2.64	
EPA 376.2M	Total Sulfide	mg/kg	·	·			11.4		311		783		757		88.3		2.28		147	
EPA 376.2M	Dissolved Sulfide	mg/kg	·	·			ND (<0.100)		ND (<0.0999)		ND (<0.100)		ND (<0.100)		ND (<0.100)		ND (<0.100)		ND (<0.0999)	
EPA 1664A (M)	HEM: Oil and Grease	mg/kg	·	·			356		326		906		744		640		113		302	
EPA 9045C	pH	S.U.					8.6		8.0		7.9		8.1		8.4		7.9		7.9	
Metals																				
EPA 6020	Arsenic	mg/kg	**8.2**	**70**	***0.68***	***3.0***	***2.29***		***2.72***		***3.18***		***2.46***		***1.87***		***2.72***		***4.61***	
EPA 6020	Cadmium	mg/kg	**1.2**	**9.6**	***71***	***980***	ND (<1.43)		0.183	J	ND (<1.43)		0.242	J	0.163	J	ND (<1.27)		0.472	J
EPA 6020	Chromium	mg/kg	**81**	**370**			12.7		15.8		13.2		20.7		12.9		6.97		32.3	
EPA 6020	Copper	mg/kg	**34**	**270**	***3100***	***47000***	11.5		7.63		7.11		11.5		9.0		1.94		30.6	
EPA 6020	Lead	mg/kg	**46.7**	**218**	***400***	***800***	12.1		21.9		18.1		21.5		8.99		3.46		31.2	
EPA 7471A	Mercury	mg/kg	**0.15**	**0.71**	***11***	***46***	0.0372	J	0.0713	J	0.0517	J	0.0674	J	0.0505	J	0.0306	J	0.149	
EPA 6020	Nickel	mg/kg	**20.9**	**51.6**	***1500***[1]	***22000***[1]	7.14		9.0		6.99		11.3		7.2		4.51		16.7	
EPA 6020	Selenium	mg/kg	·	·	***390***	***5,800***	ND (<1.43)		ND (<1.48)		0.824	J	0.73	J	ND (<1.32)		ND (<1.27)		0.622	J
EPA 6020	Silver	mg/kg	**1.0**	**3.7**	***390***	***5,800***	ND (<1.43)		0.853	J	0.288	J	0.253	J	ND (<1.32)		ND (<1.27)		0.358	J
EPA 6020	Zinc	mg/kg	**150**	**410**	***23,000***	***350,000***	34.1		42.2		54.6		60.6		33.6		13.7		81.5	
EPA 1664A (M)	HEM - SGT: Oil and Grease	mg/kg	·	·			120		143		467		305		242		50.3		125	
Polycyclic Aromatic Hydrocarbons (PAHs)																				
EPA 8270C SIM	1,6,7-Trimethylnaphthalene	µg/kg	·	·			ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	1-Methylnaphthalene	µg/kg	·	·	***18,000***	***73,000***	ND (<14)		ND (<15)		4.5	J	ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	1-Methylphenanthrene	µg/kg	·	·			ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	2,6-Dimethylnaphthalene	µg/kg	·	·			ND (<14)		8.9	J	28		30		5.8	J	ND (<13)		45	
EPA 8270C SIM	2-Methylnaphthalene	µg/kg	**70**	**670**	***240,000***	***3,000,000***	ND (<14)		5.0	J	5.8	J	6.8	J	ND (<13)		ND (<13)		5.6	J
EPA 8270C SIM	Acenaphthene	µg/kg	**16**	**500**	***3,600,000***	***45,000,000***	ND (<14)		ND (<15)		14		5.4	J	4.6	J	ND (<13)		ND (<16)	
EPA 8270C SIM	Acenaphthylene	µg/kg	**44**	**640**			ND (<14)		ND (<15)		6.0	J	8.5	J	4.9	J	ND (<13)		4.9	J
EPA 8270C SIM	Anthracene	µg/kg	**85.3**	**1100**	***18,000,000***	***230,000,000***	2.9	J	4.5	J	32		26		18		ND (<13)		15	J
EPA 8270C SIM	Benzo (a) Anthracene	µg/kg	**261**	**1600**	***1,100***	***21,000***	20		18		100		93		33		ND (<13)		47	
EPA 8270C SIM	Benzo (a) Pyrene	µg/kg	**430**	**1600**	***110***	***2,100***	22		17		97		98		36		ND (<13)		50	
EPA 8270C SIM	Benzo (b) Fluoranthene	µg/kg	·	·	***1,100***	***21,000***	19		16		89		88		52		ND (<13)		52	
EPA 8270C SIM	Benzo (e) Pyrene	µg/kg	·	·			19		16		73		76		28		ND (<13)		44	
EPA 8270C SIM	Benzo (g,h,i) Perylene	µg/kg	·	·			14		13	J	47		50		12	J	ND (<13)		31	
EPA 8270C SIM	Benzo (k) Fluoranthene	µg/kg	·	·	***11,000***	***210,000***	18		12	J	92		85		41		ND (<13)		51	
EPA 8270C SIM	Biphenyl	µg/kg	·	·			ND (<14)		ND (<15)		14		8.9	J	ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	Chrysene	µg/kg	**384**	**2800**	***110,000***	***2,100,000***	27		22		160		160		43		ND (<13)		70	
EPA 8270C SIM	Dibenz (a,h) Anthracene	µg/kg	**63.4**	**260**	***110***	***2,100***	ND (<14)		ND (<15)		ND (<14)		9.5	J	ND (<13)		ND (<13)		5.4	J
EPA 8270C SIM	Dibenzothiophene	µg/kg	·	·			ND (<14)		ND (<15)		7.6	J	5.9	J	2.9	J	ND (<13)		ND (<16)	
EPA 8270C SIM	Fluoranthene	µg/kg	**600**	**5100**	***2,400,000***	***30,000,000***	31		33		170		250		87		ND (<13)		78	
EPA 8270C SIM	Fluorene	µg/kg	**19**	**540**	***2,400,000***	***30,000,000***	ND (<14)		3.6	J	12	J	6.5	J	4.2	J	ND (<13)		3.6	J
EPA 8270C SIM	Indeno (1,2,3-c,d) Pyrene	µg/kg	·	·	***1,100***	***21,000***	13	J	11	J	42		48		12	J	ND (<13)		28	

Table 4-1b. King Harbor Analytical Chemistry Results (Continued)

			Sediment Quality Guidelines				Dredging Areas												Placement Areas			
Analytical Method	Compound Name	Units	ERL (dry wt.)	ERM (dry wt.)	Human RSLs Residential	Human RSLs Industrial	OH-A-Composite		OH-B-Composite		OH-C-Composite		OH-D-Composite		B3-Composite		OH-G-Composite		IH-Composite	
EPA 8270C SIM	Isophorone	µg/kg	·	·			ND (<690)		ND (<740)		3.1	J B	ND (<740)		ND (<670)		ND (<630)		ND (<780)	
EPA 8270C SIM	Naphthalene	µg/kg	**160**	**2100**	***3,800***	***17,000***	ND (<14)		4.7	J	13	J	11	J	4.7	J	ND (<13)		6.2	J
EPA 8270C SIM	Perthane	µg/kg	·	·			ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	Perylene	µg/kg	·	·			ND (<14)		13	J	46		ND (<15)		ND (<13)		ND (<13)		24	
EPA 8270C SIM	Phenanthrene	µg/kg	**240**	**1500**			12	J	15		82		66		33		ND (<13)		32	
EPA 8270C SIM	Pyrene	µg/kg	**665**	**2600**	***1,800,000***	***23,000,000***	44		41		220		330		120		ND (<13)		93	
	Total Detectable PAHs	µg/kg	**4022**	**44792**			242	J	254	J	1358	J B	1463	J	542	J	0		686	J
Phenols and Phthalates																				
EPA 8270C SIM	2,4,5-Trichlorophenol	µg/kg	·	·	***6,300,000***	***82,000,000***	ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	2,4,6-Trichlorophenol	µg/kg	·	·	***49,000***	***210,000***	ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	2,4-Dichlorophenol	µg/kg	·	·	***190,000***	***2,500,000***	ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	2,4-Dimethylphenol	µg/kg	·	·	***1,300,000***	***16,000,000***	ND (<690)		ND (<740)		ND (<710)		ND (<740)		ND (<670)		ND (<630)		ND (<780)	
EPA 8270C SIM	2,4-Dinitrophenol	µg/kg	·	·	***130,000***	***1,600,000***	ND (<690)		ND (<740)		ND (<710)		ND (<740)		ND (<670)		ND (<630)		ND (<780)	
EPA 8270C SIM	2-Chlorophenol	µg/kg	·	·	***390,000***	***5,800,000***	ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	2-Methylphenol	µg/kg	·	·			ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	2-Nitrophenol	µg/kg	·	·			ND (<690)		ND (<740)		ND (<710)		ND (<740)		ND (<670)		ND (<630)		ND (<780)	
EPA 8270C SIM	3/4-Methylphenol	µg/kg	·	·			ND (<14)		ND (<15)		30		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	4,6-Dinitro-2-Methylphenol	µg/kg	·	·			ND (<690)		ND (<740)		ND (<710)		ND (<740)		ND (<670)		ND (<630)		ND (<780)	
EPA 8270C SIM	4-Chloro-3-Methylphenol	µg/kg	·	·			ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	4-Nitrophenol	µg/kg	·	·			ND (<690)		ND (<740)		ND (<710)		ND (<740)		ND (<670)		ND (<630)		ND (<780)	
EPA 8270C SIM	Pentachlorophenol	µg/kg	·	·	***1,000***	***4,000***	ND (<690)		ND (<740)		ND (<710)		18	J	ND (<670)		ND (<630)		ND (<780)	
EPA 8270C SIM	2,3,4,6-Tetrachlorophenol	µg/kg	·	·			ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	2,6-Dichlorophenol	µg/kg	·	·			ND (<14)		ND (<15)		ND (<14)		ND (<15)		ND (<13)		ND (<13)		ND (<16)	
EPA 8270C SIM	Bis(2-Ethylhexyl) Phthalate	µg/kg	·	·	***39,000***	***160,000***	49	J	480	B	550	B	1700	B	71	B	14	J B	270	B
EPA 8270C SIM	Butyl Benzyl Phthalate	µg/kg	·	·	***290,000***	***1,200,000***	22	J	25	J B	81	B	44	J B	22	J B	14	J B	58	J B
EPA 8270C SIM	Di-n-Butyl Phthalate	µg/kg	·	·	***6,300,000***	***82,000,000***	27	J	23	J B	25	J B	40	J B	28	J B	24	J B	150	B
EPA 8270C SIM	Di-n-Octyl Phthalate	µg/kg	·	·	***630,000***	***8,200,000***	ND (<69)		ND (<74)		ND (<71)		9.9	J	3.3	J	ND (<63)		11	J
EPA 8270C SIM	Diethyl Phthalate	µg/kg	·	·	***51,000,000***	***660,000,000***	3.1	J	3.6	J	6.3	J	3.9	J	8.5	J	3.5	J	5.1	J
EPA 8270C SIM	Dimethyl Phthalate	µg/kg	·	·			ND (<69)		ND (<74)		66	J	5.7	J	3.6	J	ND (<63)		6.3	J
Chlorinated Pesticides																				
EPA 8081A	2,4'-DDD	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	2,4'-DDE	µg/kg	·	·			1.3	J p	ND (<2.9)		ND (<2.8)		11		1.8	J p	ND (<2.7)		ND (<3.1)	
EPA 8081A	2,4'-DDT	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	4,4'-DDD	µg/kg	**2.0**	**20**	***1,900***	***9,600***	ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	4,4'-DDE	µg/kg	**2.2**	**27**	***2,000***	***9,300***	**11**	_	**7.9**	_	**11**	**p**	**14**		**19**		0.71	J	**20**	
EPA 8081A	4,4'-DDT	µg/kg	**1.0**	**7.0**	***1,900***	***8,500***	ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	

Table 4-1b. King Harbor Analytical Chemistry Results (Continued)

			Sediment Quality Guidelines				Dredging Areas												Placement Areas			
Analytical Method	Compound Name	Units	ERL (dry wt.)	ERM (dry wt.)	Human RSLs Residential	Human RSLs Industrial	OH-A-Composite		OH-B-Composite		OH-C-Composite		OH-D-Composite		B3-Composite		OH-G-Composite		IH-Composite	
	Total Detectable DDTs	µg/kg	1.58	46.1		-	12.3		7.9		11	p	25		20.8	J p	0.71	J	20	
EPA 8081A	Aldrin	µg/kg	·	·	*39*	*180*	ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Alpha-BHC	µg/kg	·	·			ND (<2.8)		ND (<2.9)		ND (<2.8)		ND (<3.0)		ND (<2.7)		ND (<2.5)		ND (<3.1)	
EPA 8081A	Beta-BHC	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Delta-BHC	µg/kg	·	·			ND (<2.8)		ND (<2.9)		ND (<2.8)		ND (<3.0)		ND (<2.7)		ND (<2.5)		ND (<3.1)	
EPA 8081A	Gamma-BHC	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Chlordane	µg/kg	0.5	6.0	*1,700*	*7,700*	2.5	J p	4.3	J	21		ND (<15)		12	J p	ND (<13)		11	J
EPA 8081A	Dieldrin	µg/kg	0.02	8.0	*34*	*140*	ND (<1.4)		ND (<1.5)		ND (<1.4)		0.5	J p	0.69	J p	ND (<1.3)		ND (<1.6)	
EPA 8081A	Trans-nonachlor	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Endosulfan I	µg/kg	·	·	*470,000*	*7,000,000*	ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Endosulfan II	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Endosulfan Sulfate	µg/kg	·	·	*380,000*	*4,900,000*	ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Endrin	µg/kg	·	·	*19,000*	*250,000*	ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Endrin Aldehyde	µg/kg	·	·			ND (<2.8)		ND (<2.9)		ND (<2.8)		ND (<3.0)		ND (<2.7)		ND (<2.5)		ND (<3.1)	
EPA 8081A	Endrin Ketone	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Heptachlor	µg/kg	·	·	*130*	*630*	ND (<1.4)		ND (<1.5)		ND (<1.4)		0.51	J	ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Heptachlor Epoxide	µg/kg	·	·	*70*	*330*	ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Methoxychlor	µg/kg	·	·	*320,000*	*4,100,000*	ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)	F2	ND (<1.6)	
EPA 8081A	Toxaphene	µg/kg	·	·	*490*	*2,100*	ND (<28)		ND (<29)		ND (<28)		ND (<30)		ND (<27)		ND (<25)		ND (<31)	
EPA 8081A	Alpha Chlordane	µg/kg	·	·			0.34	J p	ND (<1.5)		3.4	p	2.8	p	0.43	J p	ND (<1.3)		9.5	
EPA 8081A	Gamma Chlordane	µg/kg	·	·			ND (<2.8)		ND (<2.9)		ND (<2.8)		ND (<3.0)		ND (<2.7)		ND (<2.5)		12	p
EPA 8081A	Cis-nonachlor	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
EPA 8081A	Oxychlordane	µg/kg	·	·			ND (<1.4)		ND (<1.5)		ND (<1.4)		ND (<1.5)		ND (<1.3)		ND (<1.3)		ND (<1.6)	
Polychlorinated Biphenyl Congeners																				
EPA 8270C SIM PCB Congeners	PCB018	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB028	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB037	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB044	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB049	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		2.0		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB052	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		3.4		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB066	µg/kg	·	·			0.41		ND (<0.29)		0.64		2.5		ND (<0.27)		ND (<0.25)		1.3	

Table 4-1b. King Harbor Analytical Chemistry Results (Continued)

			Sediment Quality Guidelines				Dredging Areas										Placement Areas			
Analytical Method	Compound Name	Units	ERL (dry wt.)	ERM (dry wt.)	Human RSLs Residential	Human RSLs Industrial	OH-A-Composite		OH-B-Composite		OH-C-Composite		OH-D-Composite		B3-Composite		OH-G-Composite		IH-Composite	
EPA 8270C SIM PCB Congeners	PCB070	µg/kg	·	·			1.1		ND (<0.29)		2.6		4.9		ND (<0.27)		ND (<0.25)		1.0	
EPA 8270C SIM PCB Congeners	PCB074	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		1.8		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB077	µg/kg	·	·	***38***	***160***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB081	µg/kg	·	·	***12***	***48***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB087	µg/kg	·	·			0.51		ND (<0.29)		2.0		1.4		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB099	µg/kg	·	·			1.1		0.87		3.1		2.6		1.7		ND (<0.25)		2.3	
EPA 8270C SIM PCB Congeners	PCB101	µg/kg	·	·			1.8		1.8		5.6		4.8		2.5		ND (<0.25)		3.5	
EPA 8270C SIM PCB Congeners	PCB105	µg/kg	·	·	***120***	***490***	1.2		ND (<0.29)		2.8		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB110	µg/kg	·	·			1.8		1.9		4.7		4.9		1.9		ND (<0.25)		3.0	
EPA 8270C SIM PCB Congeners	PCB114	µg/kg	·	·	***120***	***500***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB118	µg/kg	·	·	***120***	***490***	1.9		1.4		4.8		4.8		1.7		ND (<0.25)		4.8	
EPA 8270C SIM PCB Congeners	PCB119	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB123	µg/kg	·	·	***120***	***490***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB126	µg/kg	·	·	***0.036***	***0.15***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB128	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB 132/153	µg/kg	·	·			2.3		3.8		7		6.4		2.3		ND (<0.50)		4.7	
EPA 8270C SIM PCB Congeners	PCB 138/158	µg/kg	·	·			2.7		3.8		7.3		6.5		ND (<0.54)		ND (<0.50)		3.9	
EPA 8270C SIM PCB Congeners	PCB149	µg/kg	·	·			1.4		1.9		4.1		3.1		ND (<0.27)		ND (<0.25)		2.5	
EPA 8270C SIM PCB Congeners	PCB151	µg/kg	·	·			ND (<0.28)		ND (<0.29)		2.3		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB156	µg/kg	·	·	***120***	***500***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB157	µg/kg	·	·	***120***	***500***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	

Table 4-1b. King Harbor Analytical Chemistry Results (Continued)

			Sediment Quality Guidelines				Dredging Areas										Placement Areas			
Analytical Method	Compound Name	Units	ERL (dry wt.)	ERM (dry wt.)	Human RSLs Residential	Human RSLs Industrial	OH-A-Composite		OH-B-Composite		OH-C-Composite		OH-D-Composite		B3-Composite		OH-G-Composite		IH-Composite	
EPA 8270C SIM PCB Congeners	PCB167	µg/kg	·	·	***110***	***380***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB168	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB169	µg/kg	·	·	***0.12***	***0.51***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB170	µg/kg	·	·			ND (<0.28)		1.1		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB177	µg/kg	·	·			ND (<0.28)		0.47		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB180	µg/kg	·	·			0.76		2.3		3.2		2.5		ND (<0.27)		ND (<0.25)		1.3	
EPA 8270C SIM PCB Congeners	PCB183	µg/kg	·	·			0.18	J	0.57		0.94		0.81		ND (<0.27)		ND (<0.25)		0.65	
EPA 8270C SIM PCB Congeners	PCB187	µg/kg	·	·			0.61		1.1		2.2		1.7		ND (<0.27)		ND (<0.25)		1.3	
EPA 8270C SIM PCB Congeners	PCB189	µg/kg	·	·	***130***	***520***	ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB194	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB201	µg/kg	·	·			ND (<0.28)		ND (<0.29)		ND (<0.28)		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
EPA 8270C SIM PCB Congeners	PCB206	µg/kg	·	·			ND (<0.28)		ND (<0.29)		3.1		ND (<0.30)		ND (<0.27)		ND (<0.25)		ND (<0.31)	
	Total PCB Congeners	µg/kg	**22.7**	**180**			19.0		22.0		**67.0**		**56.0**		10.0		ND (<0.50)		**31.0**	
Pyrethroids																				
EPA 8270D (M)/TQ/EI	Allethrin	µg/kg	·	·			ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		ND (<0.78)	
EPA 8270D (M)/TQ/EI	Bifenthrin	µg/kg	·	·	***950,000***	***12,000,000***	ND (<0.69)		0.53	J	1.9		1.6		ND (<0.67)		ND (<0.62)		0.97	
EPA 8270D (M)/TQ/EI	Cyfluthrin	µg/kg	·	·			ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		0.58	J
EPA 8270D (M)/TQ/EI	Cypermethrin	µg/kg	·	·			ND (<0.69)		ND (<0.74)		ND (<0.71)		0.41	J	ND (<0.67)		ND (<0.62)		ND (<0.78)	
EPA 8270D (M)/TQ/EI	Deltamethrin/Tralomethrin	µg/kg	·	·	***470,000***	***6,200,000***	ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		ND (<0.78)	
EPA 8270D (M)/TQ/EI	Fenpropathrin	µg/kg	·	·	***1,600,000***	***21,000,000***	ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		ND (<0.78)	
EPA 8270D (M)/TQ/EI	Fenvalerate/Esfenvalerate	µg/kg	·	·	***1,600,000***	***21,000,000***	ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		ND (<0.78)	
EPA 8270D (M)/TQ/EI	Fluvalinate	µg/kg	·	·	***630,000***	***8,200,000***	ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		ND (<0.78)	
EPA 8270D (M)/TQ/EI	lambda-Cyhalothrin	µg/kg	·	·	***63,000***	***820,000***	ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		ND (<0.78)	
EPA 8270D (M)/TQ/EI	Permethrin (cis/trans)	µg/kg	·	·	***3,200,000***	***41,000,000***	ND (<1.4)		ND (<1.5)		1.1	J	1.4	J	ND (<1.3)		ND (<1.2)		0.8	J
EPA 8270D (M)/TQ/EI	Phenothrin	µg/kg	·	·			ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		ND (<0.78)	
EPA 8270D (M)/TQ/EI	Resmethrin/Bioresmethrin	µg/kg	·	·	***1,900,000***	***25,000,000***	ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)	F1	ND (<0.78)	
EPA 8270D (M)/TQ/EI	Tetramethrin	µg/kg	·	·			ND (<0.69)		ND (<0.74)		ND (<0.71)		ND (<0.74)		ND (<0.67)		ND (<0.62)		ND (<0.78)	
	Total Pyrethroids	µg/kg	·	·			0.00		0.53	J	3.0		3.4	J	0.00		0.00		2.35	J

Table 4-1b. King Harbor Analytical Chemistry Results (Continued)

			Sediment Quality Guidelines				Dredging Areas										Placement Areas			
Analytical Method	Compound Name	Units	ERL (dry wt.)	ERM (dry wt.)	Human RSLs Residential	Human RSLs Industrial	OH-A-Composite		OH-B-Composite		OH-C-Composite		OH-D-Composite		B3-Composite		OH-G-Composite		IH-Composite	
Organotins																				
Organotins by Krone et al.	Dibutyltin	µg/kg	·	·	***19,000***	***250,000***	ND (<4.2)		4.7		ND(<4.3)		ND (<4.4)		4.3		ND (<3.8)		ND (<4.7)	
Organotins by Krone et al.	Monobutyltin	µg/kg	·	·			ND (<4.2)		ND(<4.3)		ND(<4.3)		ND (<4.4)		ND (<3.9)		ND (<3.8)		ND (<4.7)	
Organotins by Krone et al.	Tetrabutyltin	µg/kg	·	·			ND (<4.2)		ND(<4.3)		ND(<4.3)		ND (<4.4)		ND (<3.9)		ND (<3.8)		ND (<4.7)	
Organotins by Krone et al.	Tributyltin	µg/kg	·	·	***19,000***	***250,000***	ND (<4.2)		ND(<4.3)		ND(<4.3)		ND (<4.4)		ND (<3.9)		ND (<3.8)		ND (<4.7)	
	Total Organotins	µg/kg	·	·			0.0		4.7		0.0		0.0		4.3		0.0		0.0	
						Mean ERM quotient (mERMq)	0.131		0.147		0.326		0.219		0.243		0.114		0.292	

Notes
Analytes are reported to the reporting limit provided by Eurofins Calscience.
J Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
Totals for TPH were provided by analytical laboratory. Totals for PAHs, DDTs, PCBs, Pyrethroids, and Organotins were hand-calculated.
All values reported in dry weight.
Non-detects (ND) reported as ND (<reporting limit [RL]).
BOLD = value detected is above ERL
BOLD = value detected is above ERM
F1 = MS and/or MSD Recovery is outside acceptance limits.
ERL = Effects range-low
F2 = MS/MSD RPD exceeds control limits
ERM = Effects range-median
p = The %RPD between the primary and confirmation column/detector is >40%. The lower value has been reported% - percent
µg/kg - milligram(s) per kilogram
PAH - Polycyclic Aromatic Hydrocarbon
mg/kg - milligram(s) per kilogram
[1] RSL values for Nickel Soluble Salts
PCB - Polychlorinated Biphenyl
DDD - dichlorodiphenyldichloroethane
TPH - Total Petroleum Hydrocarbons
DDE - dichlorodiphenyldichloroethylene
TRPH - Total Recoverable Petroleum Hydrocarbons
DDT - dichlorodiphenyltrichloroet
ND - non-detect

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5.0 CONCLUSIONS

The Project proposes to dredge approximately 62,000 cy of dredged material from King Harbor at the City of Redondo Beach. The dredged material is proposed for placement at a nearshore USACE designated placement site or at an in-harbor placement location (Figure 1-1b). This Study was performed to evaluate sediments within the proposed dredge areas and the two placement sites to determine compatibility. The purpose of this investigation is to provide the SC-DMMT with the sediment quality information needed to evaluate the suitability of the proposed dredged material for placement at the preferred nearshore and/or in-harbor sites and to make a disposal suitability determination.

5.1 Discussion of Results

The grain size of sediment for the proposed dredge areas met nearshore placement requirements with over 96 percent of the individual samples and 100 percent of the composite samples containing 80 percent or more sand. Sediment grain sizes for all five dredged material composites are similar to those at the outer harbor placement site which was comprised of 98.89 percent sand. Conversely, sediments at the in-harbor placement site only contained 52.46 percent sand and the proportion of fines (Total Silt and Clay) exceeded the 10 percent compatibility threshold for placement of the dredged materials at this site. The proportion of fines in the dredged material composites ranges from 4.34 to 10.1 percent while the proportion of fines at the in-harbor placement site is 47.5 percent.

It is possible that the in-harbor placement site sediments are finer because only the surficial sediments were collected (the top 5 centimeters) for analysis. Deeper sediments at this location may be coarser and more like those collected within the dredge areas; however, this is currently unknown. Furthermore, the depression that occurs at the in-harbor placement site may collect fine-grained sediments that settle in this area because of its greater depth compared to other locations within the harbor. Although the dredged material may not be physically compatible with surface sediments at the in-harbor placement site, the placement of the dredge materials within this depression may prevent further scouring and help maintain a more consistent bottom depth for the harbor in this area.

Sediment chemistry results for the dredge area samples showed very few analytes present at concentrations above ERL guideline values and only one analyte above an ERM guideline (chlordane). Analytes above ERL guideline values were 4,4’-DDE, total DDTs (all dredge area composites and the IH placement area), chlordane (in composites OH-A and OH-B), and total PCB congeners (in composites OH-C and OH-D, only). Pesticides, particularly DDTs, are ubiquitous throughout Southern California and their presence is not unexpected at this location given its proximity to the land. Furthermore, the concentration of both total DDTs and chlordane did not exceed toxicity reference values (TRV) published for San Francisco Bay (50 and 37 µg/kg, respectively). This value is the concentration at which sediments collected in San Francisco Bay are required to undergo bioaccumulation testing to determine if there may be effects to marine organisms and their associated food chain. There are currently no site-specific TRV available for

Southern California. In addition to pesticides, total PCB congeners were detected at concentrations approximately two times the ERL of 22.7 µg/kg in the OH-C-Composite, OH-D-Composite, and the IH-Composite samples.

In general, the mERMq for the sediments does not appear to indicate that the dredged materials would cause adverse effects to the marine environment based on studies that have used this guideline as a screening tool in conjunction with other chemical-specific methods. These methods include a low occurrence of sediment quality guideline exceedances (i.e. less than 6 analytes detected above ERM) and one or more analytes detected at levels expected to be associated with biological effects (Phillips et al. 1998).

Overall none of the analytes exceed Human Health RSLs and are generally orders of magnitude below EPA RSLs for residential and industrial use for soils except for arsenic, which is common in Southern California and was found at concentrations less than the IH placement site (DTSC, 2020 and USEPA, 2019). This finding indicates that the dredged material is safe for human contact if it reaches the beach.

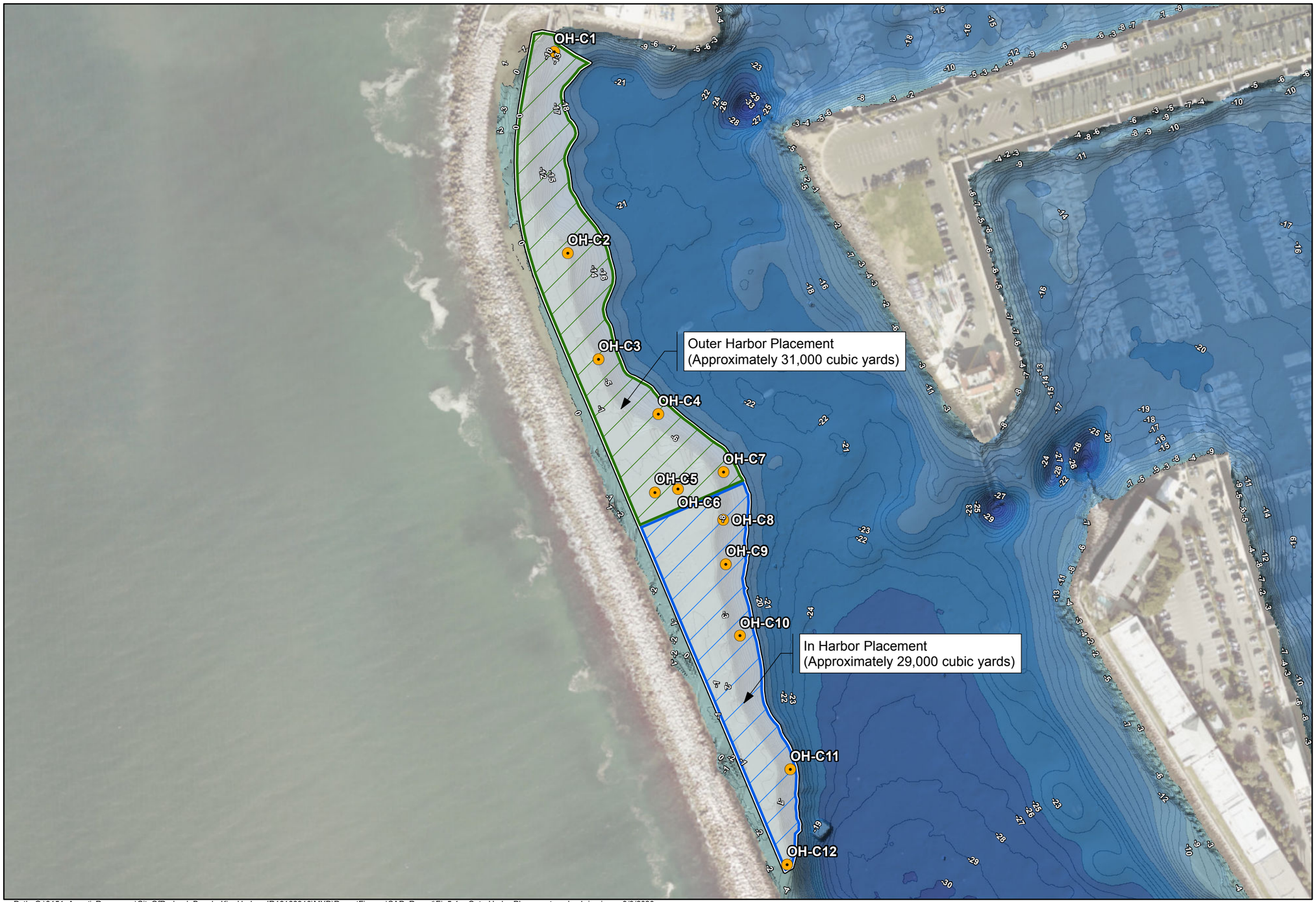
5.2 Conclusions

Overall the Study findings conclude:

- All of the proposed dredged materials meet grain size compatibility requirements for nearshore placement (i.e. ≥80 percent or more sand).
- Sediments for the dredged materials met compatibility requirements for the outer harbor placement site, but not the in-harbor (i.e., a proportion of fines within 10 percent of each other).
- Sediment chemistry for the outer harbor placement site did not have any elevated levels of chemicals; however, similar to the dredged materials from composite areas OH-C and OH-D, sediment chemistry for the In-Harbor placement site did contain elevated levels of DDT's and PCB congeners. This may indicate that some of the sediments, particularly from composite areas OH-C and OH-D are more suitable for in-harbor placement.

In conclusion, the City proposes to dredge all 60,000 cy of sediments along the breakwater of King Harbor to a depth of -18 feet MLLW plus a 2-foot OD allowance and 2,000 cy of sediment within Basin 3 to a depth of -15 feet MLLW plus a 2-foot OD allowance. Proposed placement for the dredged materials up to approximately 29,000 cy of sediment with the 2-foot OD allowance within the In-Harbor Placement site (comprised of sediment from Composite C and D) and approximately 33,000 cy with the 2-foot OD allowance (comprised of all dredged sediment from OH-A, OH-B, and B3) within the USACE's outer harbor placement site (Figures 5.1a and b).[4] The final placement location for the dredged materials will be determined in consultation with the SC-DMMT.

[4] Dredge volumes are approximations and may be refined after dredge plans are confirmed.



Outer Harbor Dredge Area

In Harbor Placement

Outer Harbor Placement

Actual Sampling Locations

Vibracore

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: Q:\3151_AquaticResources\CityOfRedondoBeach_KingHarbor_IR18166910\MXD\ReportFigures\SAP_Report\Fig5-1a_OuterHarborPlacement.mxd, chris.nixon, 3/9/2020

wood.

Proposed Placement Options for Outer Harbor Dredged Material
King Harbor Maintenance Dredging
Redondo Beach, California

N

1 inch = 175 feet

0 175 Feet

FIGURE

5-1a

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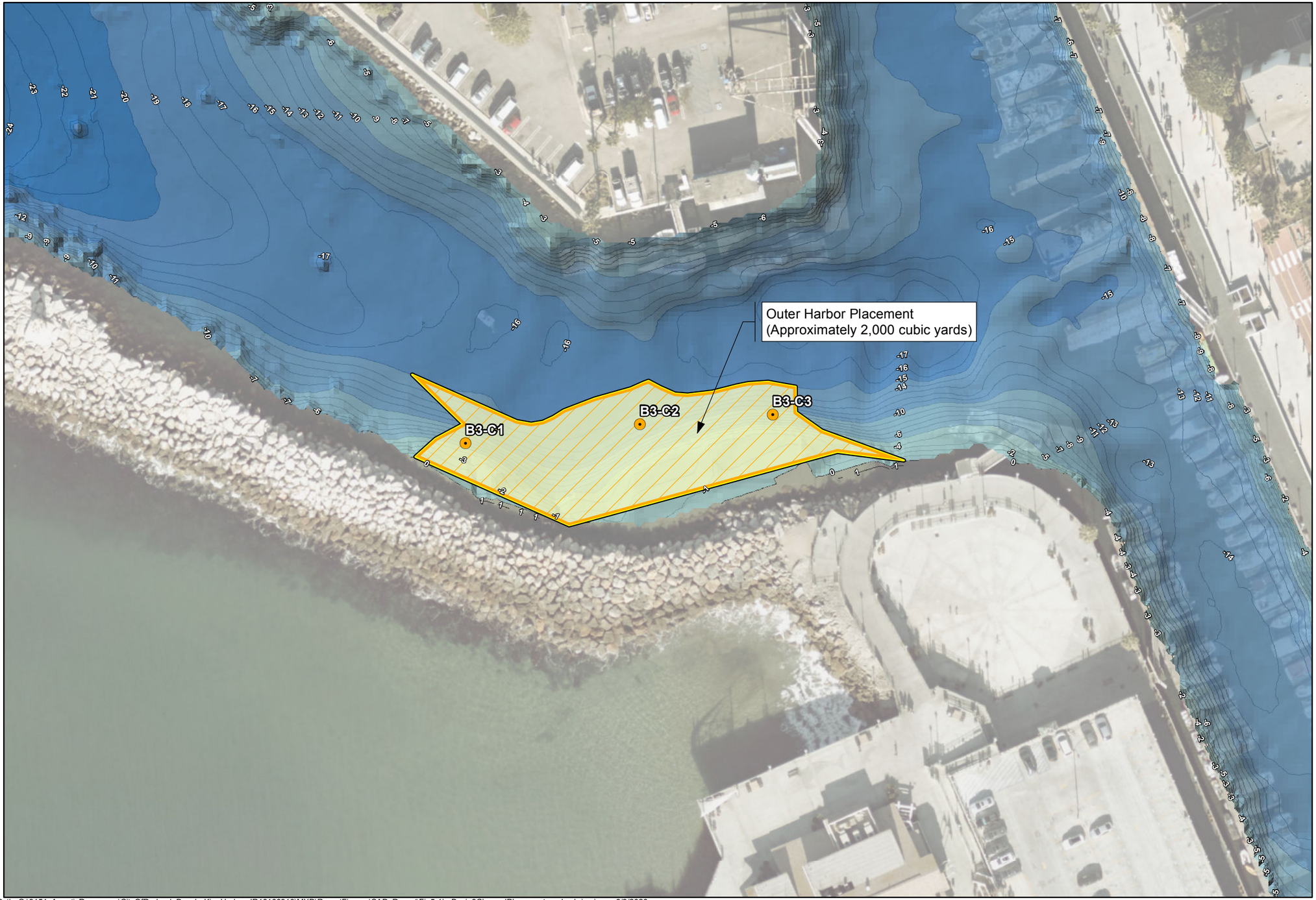

Basin 3 Dredge Area

Outer Harbor Placement

Actual Sampling Locations

Vibracore

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Path: Q:\3151_AquaticResources\CityOfRedondoBeach_KingHarbor_IR18166910\MXD\ReportFigures\SAP_Report\Fig5-1b_Basin3ChannelPlacement.mxd, chris.nixon, 3/9/2020

wood.

Proposed Placement Options for Basin 3 Dredged Material
King Harbor Maintenance Dredging
Redondo Beach, California

N

1 inch = 60 feet

0 60 Feet

FIGURE
5-1b

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5.3 Summary of SC-DMMT Meeting March 25, 2020

The Final SAP Report for the Study was presented to the SC-DMMT on March 25, 2020. In response to the presentation of results, several questions were raised by members of the SC-DMMT. The questions are listed and addressed in the Response to Comments provided as Table 5-1. In addition, appropriate sections of the Final SAP Report were updated to incorporate SC-DMMT comments including: Introduction, Site Description, and Site History. Updates to Site History include information for the Outer Harbor placement/borrow site and historical considerations of suitability for nearshore placement as opposed to direct beach nourishment. Overall, the SAP Report presents the following conclusions for the Project in response to SC-DMMT comments.

1) The proposed placement sites were considered and approved by the SC-DMMT in the final SAP dated August 2019. The sites were limited to the In-Harbor and Outer Harbor Placement Sites. No additional sites, including direct beach placement, were requested or proposed by the SC-DMMT at this time and therefore were not considered by the City.
2) The offshore borrow site (Outer Harbor Placement site) has been researched and has been used for dredging projects and beach replenishment projects performed by the County and USACE since 1968. Additional information related to the history of the borrow site is included in this SAP Report and can also be reviewed in the *Final Report Coast of California Storm and Tidal Waves Study, Los Angeles Region* prepared by Noble, for the USACE Los Angeles District in August 2016 and the County's 2017 *Coastal Regional Sediment Management Plan Los Angeles County* (Noble et al. 2017) which was provided to the SC-DMMT following review of the SAP in August, 2019.
3) In response to concerns regarding biological impacts from placement of the dredged materials at the borrow site, reference should be made to the biological report included as Appendix A of this SAP Report that shows no impact to sensitive biological species within the Outer Harbor Placement area and no broom tail seabass observed within the borrow site footprint. Furthermore, reference should be made to recent studies of juvenile seabass that show habitat to be primarily at the head of the Redondo Submarine Canyon, approximately 0.75 miles away from the proposed Outer Harbor placement site (Allen et al., 2019; Benseman and Allen, 2018).
4) Additional considerations of impacts to biological resources shall be considered in the preparation of a debris management plan for dredging and placement operations as part of the Los Angeles County Regional Water Quality Control Board Water Quality Certification. Special consideration will be made to the removal of trash or other potential debris that could affect the nearby Redondo Submarine Canyon.
5) It has been noted by previous dredging events that intermittent placement of small quantities of sand on South Redondo Beach (2004-2005) have been less successful then

larger direct beach nourishment projects (1968-1969). Furthermore, the current width of South Redondo Beach is adequate to provide shoreline protection to nearby structures.

Overall direct beach placement was not proposed for this Project for the following reasons:

1) Sand to be dredged from King Harbor may contain stone intermixed with the shoal material, as discovered during the 2004-2005 King Harbor project referenced in Section 2.1. It is recommended that the potential for stone to be present in the proposed dredge material be considered when preparing the debris management plan and dredge design for the current project. Furthermore, sand placement in the Outer Harbor placement area (i.e. the borrow site), would allow for sediment to be more effectively screened for debris before direct beach placement occurs.

2) There is no immediate need for sand placement at either the Redondo Canyon Reach located to the north of the Topaz Groin or the South Redondo Beach Reach between south of the Topaz Groin and Malaga Cove (Figure 1-1b). Although the Redondo Canyon Reach is almost always in need of nourishment, it is best to replenish this beach with a large nourishment (>80,000 cy). Furthermore, South Redondo Beach Reach has been extensively studied and is stable; therefore, no placement of sand will be needed at this location in the near future (Noble, 2016a).

3) If direct beach placement were employed, it is possible that sediment or other debris generated by the project could be directly lost to the nearby Redondo Submarine Canyon. Specific best management practices will need to be implemented to ensure minimal to no impact to this area during placement. Utilizing the Outer Harbor placement/borrow site allows for better screening of dredged materials to prevent this from occurring.

In summary, there is an immediate need to dredge King Harbor, but the quantity is not great enough to lead to a successful beach nourishment project at the beaches nearby. In addition, the borrow site is located close to King Harbor and has been previously approved by both the Corps and County for this purpose. By placing King Harbor dredged materials within the borrow site, it reserves this material for a larger beach nourishment project that would likely be more successful than placement of smaller quantities of material in several episodic events. It is also likely that there would be a large cost savings and less interruption to the public if beach placement is performed during a singular episode rather than in smaller projects. Furthermore, beach operation in this part of the Santa Monica Bay is within the jurisdiction of LA County, not the City of Redondo Beach, and so any beach nourishment event would be subject to the approval of LA County and in coordination with their long-term maintenance objectives. Those objectives include maintaining a wide and stabilized sandy beach and the identification and reservation of offshore sand sources that may be used

to maintain public beaches in the Santa Monica Bay (Noble, 2016b).

Table 5-1. Response to Comments – Southern California Dredged Material Management Team Meeting March 25, 2020

DMMP MEETING Wednesday, 25 March 2020 US Army Corps of Engineers - Los Angeles District Teleconference – 10:00 AM			
Response to Comments – King Harbor Maintenance Dredging Project City of Redondo Beach *Corps File No. SPL-2019-00541-VN*			
Attendees:	Larry Simon (California Coastal Commission) Andrew Winje (City of Redondo Beach) Geraldine Trivedi (City of Redondo Beach) Allan Ota (Environmental Protection Agency) Barry Snyder (John Wood Group PLC) Leanne Hirsch (John Wood Group PLC) Kimbrie Gobbi (John Wood Group PLC) Stephen Campbell (John Wood Group PLC) Ron Noble (Noble Consultants) Peter Von Langen (Regional Water Quality Control Board, Region 3) Emily Duncan (Regional Water Quality Control Board, Region 4) Marc Brown (Regional Water Quality Control Board, Region 8) Joseph (Joe) Ryan (U.S. Army Corps of Engineers, Engineering) Lawrence Smith (U.S. Army Corps of Engineers, Engineering) Stephen Estes (U.S. Army Corps of Engineers, Regulatory) Vanessa Navarro (U.S. Army Corps of Engineers, Regulatory) Loni Adams (California Department of Fish and Wildlife) Bryant Chesney (National Oceanic and Atmospheric Administration) Carol Roberts (U.S. Fish and Wildlife Service)		
Comment Number	Commenter, Affiliation	Comment	Response
1	Allan Ota, USEPA	Concerns about PCB concentrations in Composites C & D	Dredged material with elevated PCBs will be placed in the IH site, because sediments at this location contain similar concentrations.
2	Allan Ota, USEPA	How is the “In-Harbor” site considered “beneficial reuse?” Is there a biological beneficial reuse?	It is expected that by bringing the harbor bottom up to a similar grade to the surrounding area, circulation patterns will be increased. In addition, this area seems to potentially be a fine-sediment sink for contaminants. By covering this area with sandy material, it is expected that fine sediments currently at this site that contain elevated contaminants will be capped and future sediments will be flushed better within the harbor. In addition, all references to “beneficial reuse” have been changed to “nearshore replenishment” or “nearshore placement” in the updated draft SAP Report.
3	Allan Ota, USEPA	For the OH Placement site, the beneficial reuse is beach replenishment, correct? It seems like the material is actually just going to sit offshore.	According to the *Los Angeles County Regional Sediment Management Plan* (CRSM; Noble et al. 2017) and the USACE *Coast of California Storm and Tidal Waves Study, Los Angeles Region* (Tide and Wave Study; Noble, 2016) The Outer Harbor (OH) Placement site acts as a borrow pit that was created by the USACE in 1967-1968. This borrow pit was used to replenish the South Redondo Beach Reach with approximately 2 million cubic yards of sediment. This site has also been used for placement by the USACE in 2000 and 2012 to place dredged material from Marina del Rey projects.
4	(unknown)	If beach placement was the ultimate purpose, why not just place the material directly on the beach?	An extensive review of the Los Angeles County and USACE approved CRSM and the USACE Tide and Wave Study shows that the littoral circulation patterns and grade of the beach only allow for the area to maintain a certain width. The current beach width of approximately 130 feet maintains needed shoreline stabilization and protection; therefore, on beach placement is not needed at this time. Overall it appears that it is more judicious for the material to be placed in the borrow pit until larger sand quantities are available for beach placement and a more extensive widening project can be performed when it is needed, similar to historical events.

Table 5-1. Response to Comments – Southern California Dredged Material Management Team Meeting March 25, 2020 (Continued)

DMMP MEETING Wednesday, 25 March 2020 US Army Corps of Engineers - Los Angeles District Teleconference – 10:00 AM			
Response to Comments – King Harbor Maintenance Dredging Project City of Redondo Beach *Corps File No. SPL-2019-00541-VN*			
5	Bryant Chesney, NOAA	The bio concern I have is that we are moving a lot of sediment back and forth in a sensitive area, with a lot of unique features. You really need to justify using this site, given the sensitivity of the area.	The closest edge of the Redondo Submarine Canyon (now indicated on Figure 1-1b of the Revised Draft SAP Report) is approximately 0.3 miles from the center of the borrow site. The Redondo Submarine Canyon is part of the Redondo Canyon Reach located between King Harbor and north of the Topaz Groin, while the outer harbor (OH) placement site (i.e. the borrow site) is within the South Redondo Beach Reach located between Malaga Cove and south of the Topaz Groin. Research of this area performed for the USACE's Tide and Wave Study and the CRSM indicate that sediment at this site is stable and proposed dredged materials from King Harbor would not migrate into the canyon, especially given the coarse grain size (> 90 percent sand). In addition, because of lessons learned during historical dredging events, placement in the borrow site would enable dredged materials to be screened prior to being placed on the beach using a debris management plan. The debris management plan would contain specific measures to prevent any trash or other objects of concern from entering the canyon or affecting sensitive species within the vicinity of the project area. See more response to this comment under Response to Comment 6.
6	Allan Ota, USEPA	The history of the borrow pit needs to be included in the report.	An updated history of the borrow site has been included in the revised Draft SAP Report and can be found in the 2017 CRSM and 2016 USACE Tide and Wave Study. This area, as well as the surrounding coastline from Malaga Cove to Zuma Beach have been studied by the USACE since the early 1900s.
7	Loni Adams, CDFW	Just north of that OH site there is a nursery ground. I would be careful to make sure giant sea bass is not expanding down south into that area. As far as the outer placement site, associates surveyed that area and found that broomtail sea bass use that area quite often. Some studies have shown that they may be residents in that area, and not just migrating in and out.	A biological survey performed by Chambers Group to support this project in November 2018 cleared the site for dredged material placement with a finding of no impact to sensitive species in this area. The biological survey report is included as Appendix A to the Draft SAP Report. Further research of the release of the giant seabass and the location of broomtail sea bass shows these two species appear to exist closer to the head of the Redondo Submarine Canyon located approximately 0.75 miles to the North of the borrow site (Allen et al. 2018; Benseman and Allen, 2018). Overall, investigation of recent information related to seabass has shown that the essential fish habitat mentioned during the last DMMT meeting is located to the north of the placement area and would not be affected by dredging or placement operations. However, it is recommended that a dredged material management plan be prepared for dredging operations that outlines precautions taken to prevent impact to the juvenile seabass as well as provide a strict debris management plan to capture and prevent any potential project debris from falling into the canyon or sensitive habitat areas.
8	Carol Roberts, USFWS	We are in a perpetual search for good beach sand. It would be a shame to put good sand in a place where it might not ever make it to the beach. Why not put it in the surf zone so that we can be sure it will make it to the beach?	Beach placement was not considered for this project because of the existence of the borrow site, the nearby Redondo Submarine Canyon, and the fact that there is no immediate need for beach placement at South Redondo Beach. By placing King Harbor dredged materials within the borrow site, it allows for dredged materials to be screened for debris and reserved for a larger beach nourishment project that would likely be more successful then placement of smaller quantities of material in several episodic events. It is also likely that there would be a large cost savings to performing beach placement during a singular episode rather than in smaller projects. Furthermore, beach placement is within LA County's jurisdiction, not the City of Redondo Beach, and so beach placement would need to be performed in consultation with LA County. Unfortunately, there is an immediate need to dredge King Harbor but not an immediate need to place materials on the beach.
9	Lawrence Smith, USACE	Was there any consideration made for beach placement during the prep for the sampling plan?	
10	Larry Simone, CCC	If we've got clean, beach-compatible sand, it ought to go to the beach or near shore. We would support greatly a re-evaluation of this placement project to put it on the beach or near shore. We think that ought to be reexamined by the applicants.	

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5.4 Summary of SC-DMMT Meeting May 27, 2020

The Project Response to Comments (Table 5-1) was presented to the SC-DMMT at the meeting held May 27, 2020. The outcome of this meeting led to the following agency approvals for this report:

- USEPA, Alan Ota – Acceptable, given the relatively small volume going to the outer site, even though the median grain size seems smaller. As long as resource agencies do not have big issues with it, management practices will be implemented to keep the material further from the head of the canyon.
- California Coastal Commission (CCC), Larry Simon - Abstain, the material is suitable physically and chemically. I will leave it to my commission colleagues to work with city to decide what is best for disposal options.
- USACE, Larry Smith- It will get worked out during the permit process (in regards to Larry Simon's comment).
- Regional Water Quality Control Board (RWQCB) Region 4, Emily Duncan - Agree with Alan's comments and also Loni's.
- United States Fish and Wildlife Service (USFWS), Carol Roberts - No objections to the plan.

Agency correspondence (SC-DMMT meeting minutes) are included in Appendix E of this report.

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7.0 ACRONYMS AND ABBREVIATIONS

α	alpha
β	beta
Δ	delta
¥	gamma
>	greater than
<	less than
≥	equal to or greater than
≤	equal to or less than
#	number
%	percent
µg/kg	micrograms per kilogram
Aquatic Blue	Aquatic Blue Environmental
ASTM	ASTM International
B3	Basin 3
BHC	benzene hexachloride
C	core sample
C6-C44	carbon chain
CFR	Code of Federal Regulations
City	City of Redondo Beach
cm	centimeter(s)
CWA	Clean Water Act
cy	cubic yards
D	sample depth interval (U, M, L)
DCPA	Dacthal
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
dd/ddd°mm.mmm	degrees decimal minutes
DDT	dichlorodiphenyltrichloroethane
DGPS	Differential Global Positioning System
DoD-ELAP	United States Department of Defense Environmental Laboratory Accreditation Program
DTSC	Department of Toxic Substance Control

Dup.	Duplicate
ERL	Effects Range-Low
ERM	Effects Range-Median
ERMq	Effects Range-Median quotient
Eurofins Calscience	Eurofins Calscience Environmental Laboratories, Inc.
g	grams
G	grab sample
GC	gas chromatography
grab sampler	Van Veen grab sampler
ID	identification
IH	In-harbor
ITM	Inland Testing Manual (1998)
km	kilometers
L	lower, project design depth to the 2-foot overdredge allowance depth
LL	location
m	meter(s)
m^2	square meter(s)
M	middle; 2 feet below the sediment-water interface to project design depth
(M)	modified
MB	method blank
MDL	method detection limit
mERMq	mean Effects Range-Median quotient
mg/kg	milligrams per kilogram
MLLW	mean lower low water
mm	millimeter
m/sec	meter(s) per second
MS	mass spectrometry
MS	matrix spike
MSD	matrix spike duplicate
N/A	not applicable
ND	Non-detect
NELAP	National Environmental Laboratory Accreditation Program
Noble	Noble Consultants-GEC, Inc.

NH_3	ammonia
NOAA	National Oceanic and Atmospheric Administration
OD	overdredge
OH	Outer Harbor
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
ppb	parts per billion
ppm	parts per million
Project	City of Redondo Beach Maintenance Dredging Project at King Harbor with Potential Nearshore or In-Bay Placement
QA	quality assurance
QC	quality control
Regional Board	Los Angeles Regional Water Quality Control Board
RL	reporting limit
RPD	relative percent difference
RSL	Human Regional Screening Levels
SAP	Sampling and Analysis Plan
SAPr	Sampling and Analysis Plan Report
SC-DMMT	Southern California Dredged Material Management Team
SIM	selective ion monitoring
SM	standard method
SixSci	Six Scientific Service
Study	Project sediment characterization study
SWI	Sediment-water interface
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
TRV	toxicity reference values
U	upper; 0-2 feet below the sediment-water interface
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
Wood	Wood Environment & Infrastructure Solutions, Inc.

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ENR TOP 500 DESIGN FIRMS

Attachment D

Biological Resources Report

by Chambers Group, Inc.

BIOLOGICAL RESOURCES REPORT
FOR THE KING HARBOR MAINTENANCE DREDGING PROJECT
REDONDO BEACH, CALIFORNIA

Prepared for:

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November 2018

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APPENDICES

SECTION 1.0 – INTRODUCTION

Chambers Group was retained by Noble Consultants – G.E.C., Inc., to conduct a literature review as well as eelgrass (*Zostera marina*) and Caulerpa (*Caulerpa taxifolia*) underwater surveys for the King Harbor Maintenance Dredging Project (Project) in Redondo Beach (Figure 1) to document the existing biological resources and to assess the harbor and nearshore habitats present for their potential to support sensitive species.

A shoal area has developed in two general areas within the harbor: Outer Harbor and Basin 3 Channel, including the alternative Basin 3 site (Figure 2). The City of Redondo Beach proposes to conduct maintenance dredging by removing sediment deposits from these shoal areas. Sediment removed from the shoal areas may be disposed of in a deeper area of the harbor or offshore downcoast of the harbor (Figure 2).

The purpose of this report is to describe the biological resources and habitats in the vicinity of the shoal and in-water disposal areas. Section 2 describes the methods used for this analysis. Section 3 describes habitats and biological resources. Section 4 is the conclusions about potential effects of the rock removal project on habitats and resources. Section 5 is the literature consulted for this analysis.

1.1 PROJECT LOCATION

King Harbor is a small boat harbor located at the southern end of Santa Monica Bay in Redondo Beach, Los Angeles County, California (Figure 1). Within the harbor, four marinas provide approximately 1,400 slips for private boats. The Project is located within the *Redondo Beach* U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle in the Special Survey Section San Pedro-Dominguez. The survey area consisted of the four distinct project areas, specifically the Outer Harbor dredge area, Basin 3 Channel and alternative site, the Harbor Placement Site, and the Offshore Placement Area (Figure 2).

Figure 1: Project Vicinity

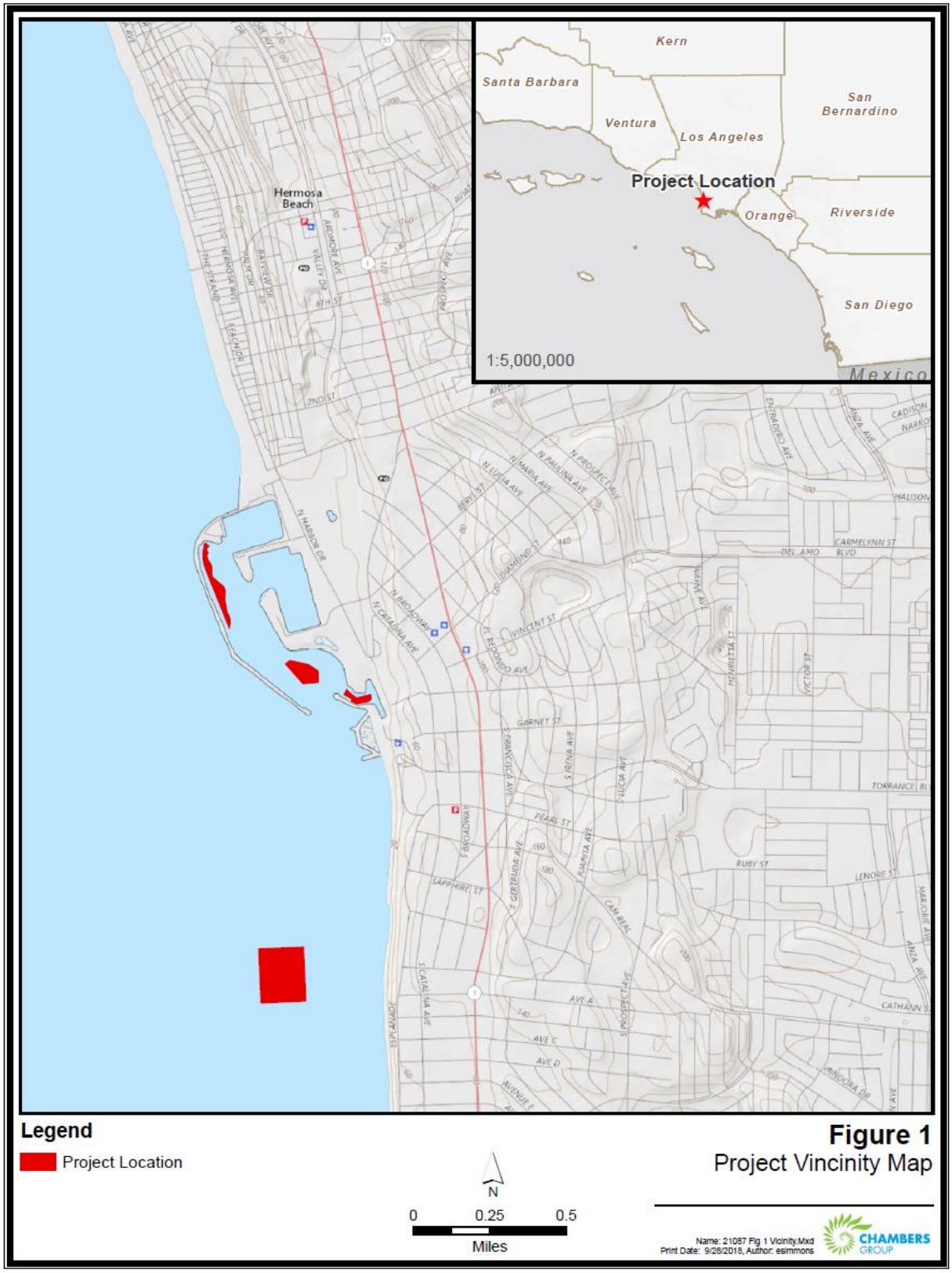


Figure 2: Project Location

SECTION 2.0 – METHODS

The analysis in this report is based on a literature review and an underwater reconnaissance survey of the shoal and disposal areas. The literature review included reports about marine resources in King Harbor and information on sensitive marine species that occur in the vicinity of the harbor.

2.1 LITERATURE REVIEW

Prior to conducting the biological reconnaissance survey, Chambers Group biologists reviewed existing available literature for the Project site. Chambers Group conducted database searches to determine which species, both terrestrial and marine, are known to occur within the Project vicinity. The most recent records of the California Natural Diversity Database (CNDDB, California Department of Fish and Wildlife [CDFW] 2018) and records of Critical Habitat and Species Occurrences through the Information for Planning and Consultation (United States Fish and Wildlife Service [USFWS]) were reviewed for the quadrangles containing and surrounding the Project site, which included *Redondo Beach, Venice, Inglewood, Torrance, San Pedro,* and *Redondo Beach OE S* California USGS 7.5-minute quadrangles. These databases contain records of reported occurrences of federally and state listed endangered or threatened or proposed endangered or threatened species, California Species of Special Concern (SSC), and otherwise sensitive species or habitats that may occur within or in the immediate vicinity of the Project site. A list of sensitive species potentially occurring within the Project site was developed from the database searches and the potential for occurrence of sensitive plant and wildlife species, including species listed as threatened or endangered, and sensitive habitats was assessed.

2.2 UNDERWATER SURVEYS

The survey was conducted according to the California Eelgrass Mitigation Policy (National Marine Fisheries Service [NMFS] 2014) and the NMFS Caulerpa Survey Protocol, Version 4, 2008. The methods utilized for the survey included scuba diver transects and GPS (Global Positioning System) mapping conducted by certified marine biologists employing agency-approved transect techniques for conducting eelgrass and invasive algae surveys.

Diver surveys were conducted by biologists using in-water GPS units to map any Caulerpa and eelgrass patches encountered in the study areas. Biologist-divers swam along underwater transects while a topside boat operator in the research vessel *Bula* remained at anchor nearby to monitor other vessel traffic and render assistance to the divers. Two divers swam side by side at a distance dependent on the given visibility at that time. Scuba diver transects were conducted at intervals sufficient to assure at least 50 percent coverage of the bottom.

Field conditions noted during the survey were recorded during the diver surveys at each of the study sites and included characteristic marine flora and fauna, the presence or absence of Caulerpa and eelgrass, depth ranges, and bottom physical attributes. Underwater still photographs and video were taken at each of the study sites. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the NOAA tidal survey station at the entrance of Los Angeles Harbor.

SECTION 3.0 – RESULTS

The pre-construction field survey using scuba diver transects was conducted on September 22, 2018, by Anghera Environmental and Ecomarine Consulting staff. Field personnel included Mr. Mike Anghera (Senior Marine Biologist-Diver), Dr. Kimo Morris (Senior Marine Biologist-Diver), and Mr. Clint Nelson (Senior Marine Biologist-Diver-Boat Operator).

3.1 SENSITIVE SPECIES

The CNDDB search resulted in a list of 20 sensitive wildlife species known to occur on or within the Redondo Beach USGS 7.5 minute quads containing the Project site (Figure 3). Of these 20 species, 5 are federally and/or state listed as endangered or threatened (Appendix A). Four of these five species were identified by IPaC as species that potentially may be affected by activities in this location: Pacific pocket mouse (*Perognathus longimembris pacificus*), coastal California gnatcatcher (*Polioptila californica californica*), western snowy plover, and El Segundo blue butterfly (*Euphilotes battoides allyni*). After a literature review and the assessment of the various habitat types on the Project site and within the surrounding area, all but one sensitive wildlife species, western snowy plover (foraging), were considered **absent** from the Project site due to lack of suitable habitat. The USFWS IPaC identified no critical habitat within the Project Area, either at the harbor or offshore disposal site (Figure 4). Critical habitat for western snowy plover (*Charadrius nivosus nivosus*) does occur upcoast of the Project boundary at Hermosa Beach, but Proposed Project activities would not directly or indirectly affect snowy plover.

Invertebrates

The federally endangered black abalone (*Haliotis cracherodii*) may occur in the vicinity of King Harbor. Black abalone is a marine snail that occurs in rocky habitats from the intertidal to about 25 foot water depth (NOAA Fisheries 2011). This species was once common along California shores but populations have been decimated by overfishing and a wasting disease. The Palos Verdes peninsula, south of King Harbor, has been designated as Critical Habitat for black abalone. Black abalone would not be expected in the shoal area or the potential in-water disposal area because of a lack of appropriate rocky habitat.

Birds

King Harbor supports a variety of water-associated birds. Examples of water-associated bird species that may be observed at King Harbor include gulls (*Larus* spp.), California brown pelican (*Pelecanus occidentalis californicus*), and cormorants (*Phalacrocorax* spp.). Appendix A lists bird species identified in the IPaC assessment.

The federally threatened western snowy plover is a small shorebird that breeds on sand beaches, mudflats, and salt flats. Snowy plovers do not breed at King Harbor and King Harbor is not listed as Critical Habitat for snowy plovers (USFWS 2012). As mentioned above, Hermosa State Beach, approximately 0.25 miles north of King Harbor, is listed as Critical Habitat, because it supports a wintering flock of about 25 snowy plovers. The closest snowy plover breeding areas to King Harbor are Ormond Beach in Ventura County and Bolsa Chica in Orange County. There is a slight chance that wintering snowy plovers could forage on the shoal when it is exposed at low tide. However, because most of the shoal area is normally covered with water, the chances of snowy plovers using the shoal area are remote.

In addition, the state and federally endangered California least tern (*Sterna antillarum browni*) may occur in the vicinity of King Harbor. The state and federally endangered California least tern nests in unvegetated sandy areas on the ocean shore or in bays and lagoons between April and August. After the breeding season, they migrate south to their wintering grounds. California least terns do not breed at King Harbor. The nearest least tern breeding areas to King Harbor are Venice Beach, approximately 9 miles to the north, and Los Angeles Harbor, approximately 12 miles to the southeast (Marschalek 2012). King Harbor is not close enough to these colonies for least terns to forage there during nesting. Least terns may occasionally forage in King Harbor during migration.

Sea Turtles

Four species of sea turtles listed by the federal government have **no to low** potential to occur in Project area waters at the offshore disposal site. These species are the federally listed as threatened loggerhead sea turtle (*Caretta caretta*), the federally listed as threatened Pacific Ridley sea turtle (*Lepidochelys olivacea*), the federally listed as threatened green sea turtle (*Chelonian mydas*), and the federally listed as endangered leatherback sea turtle (*Dermochelys coriacea*). All of these turtles have the centers of their populations elsewhere, but they are seen occasionally off the southern California coast. Leatherback sea turtles are the most common sea turtle in United States waters north of Mexico. The National Marine Fisheries Service recently has designated Critical Habitat for leatherback sea turtles (NMFS 2012); however, the Los Angeles County coast is not within the designated Critical Habitat.

Marine Mammals

Two species of pinniped federally designated as threatened and six species of whales federally listed as endangered have **no to low** potential to occur in the nearshore waters off Redondo County Beach. The threatened pinnipeds are the Guadalupe fur seal (*Arctocephalus townsendi*) and the Stellar sea lion (*Eumetopias jubatus*). The endangered whales are blue whale (*Balaenoptera musculus*), sei whale (*B. borealis*), fin whale (*B. physalus*), humpback whale (*Megaptera novaeangliae*), northern right whale (*Balaena glacialis*), and sperm whale (*Physeter macrocephalus*). Although any of these species potentially could occur in Project area waters, their presence would be unlikely and are not expected.

3.2 FISH AND ESSENTIAL FISH HABITAT

The Essential Fish Habitat (EFH) Mapper (NOAA 2018) identified the harbor as EFH for all life stages for Finfish, Krill – *Thysonoessa Spinifera*, Krill – *Euphausia Pacifica*, Other Krill Species, Coastal Pelagic Species, and Groundfish. The offshore disposal site is identified for all the life stages for the species management units listed above plus Common Thresher Shark and Dorado. The EFH Mapper identified there are no Habitat Areas of Particular Concern and no EFH Areas Protected from Fishing at either the harbor or offshore disposal site. MarineBIOS (CDFW 2018) identifies the harbor as Riprap and Sheltered Man-Made Structures and the beach nearest the offshore disposal site as Fine to Medium Grained Sand Beaches (Figure 5).

In accordance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act, the U.S. Army Corps of Engineers, before it issues its section 404 permit for the project, will need to consult with NOAA Fisheries regarding impacts to Essential Fish Habitat. The project site is located within an area designated as Essential Fish Habitat for two Fishery Management Plans: Coastal Pelagic Species Fishery Management Plan and Pacific Coast Groundfish Fishery Management Plan.

King Harbor supports a diverse and abundant fish community. Many of the species federally managed under these management plans are known or expected to occur in the area and could be affected by sediment removal and in-water disposal. Species managed under the Coastal Pelagic Species Fishery Management Plan that may have the potential to occur in King Harbor include northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symeetricus*), and market squid (*Doryteuthis opalescens*). Species managed under the Pacific Coast Groundfish Fishery Management Plan that may have the potential to occur in the project area include leopard shark (*Triakis semifasciata*), big skate (*Raja binoculata*), spiny dogfish (*Squalus acanthias*), cabezon (*Scorpaenichthys marmoratus*), two species of flatfish (*Pleuronichthys decurrens, Pleuronectes vetulis*) and at least 9 species of rockfish (*Sebastes chrysomelas, S. auriculatus, S. caurinus, S. rastrelliger, S. atrovirens, S. dalli, S. serranoides, S. serriceps* and *Scorpaena guttata*).

California grunion spawn on southern California sand beaches between March and September during the highest nighttime tides. Although there is sandy beach near the offshore disposal site, the Proposed Project activities would not occur during the times of spawning and would [not?] interfere directly or indirectly with the sandy beach and would not affect California grunion.

Sediment removal activities, as well as in-water disposal, would temporarily disturb fishes in the project area. It is anticipated that many fishes will avoid the shoal and disposal areas when activities are occurring but will re-occupy the areas when sediment removal is completed at the end of each day and/or at project completion. A lower number of fish species would be expected to occur post-construction compared to pre-dredging numbers; however, the number of fish would be expected to return to pre-dredging levels within a few months (Soule et al. 1993).

Based on the underwater surveys, no eelgrass or Caulerpa were found within the Project Area (Appendix B). The shoal areas and in-water disposal areas are primarily soft bottom and do not contain any eelgrass beds, kelp beds, or rocky reefs that would be expected to support a high diversity and abundance of fishes. Any boulders in the shoal area would be small and scattered and do not function as reefs. The habitat of the shoal and disposal sites would be soft bottom following project completion and would be expected to support a fish population similar to the one that currently occurs in these areas.

Figure 3: CNDDB Documented Occurrences

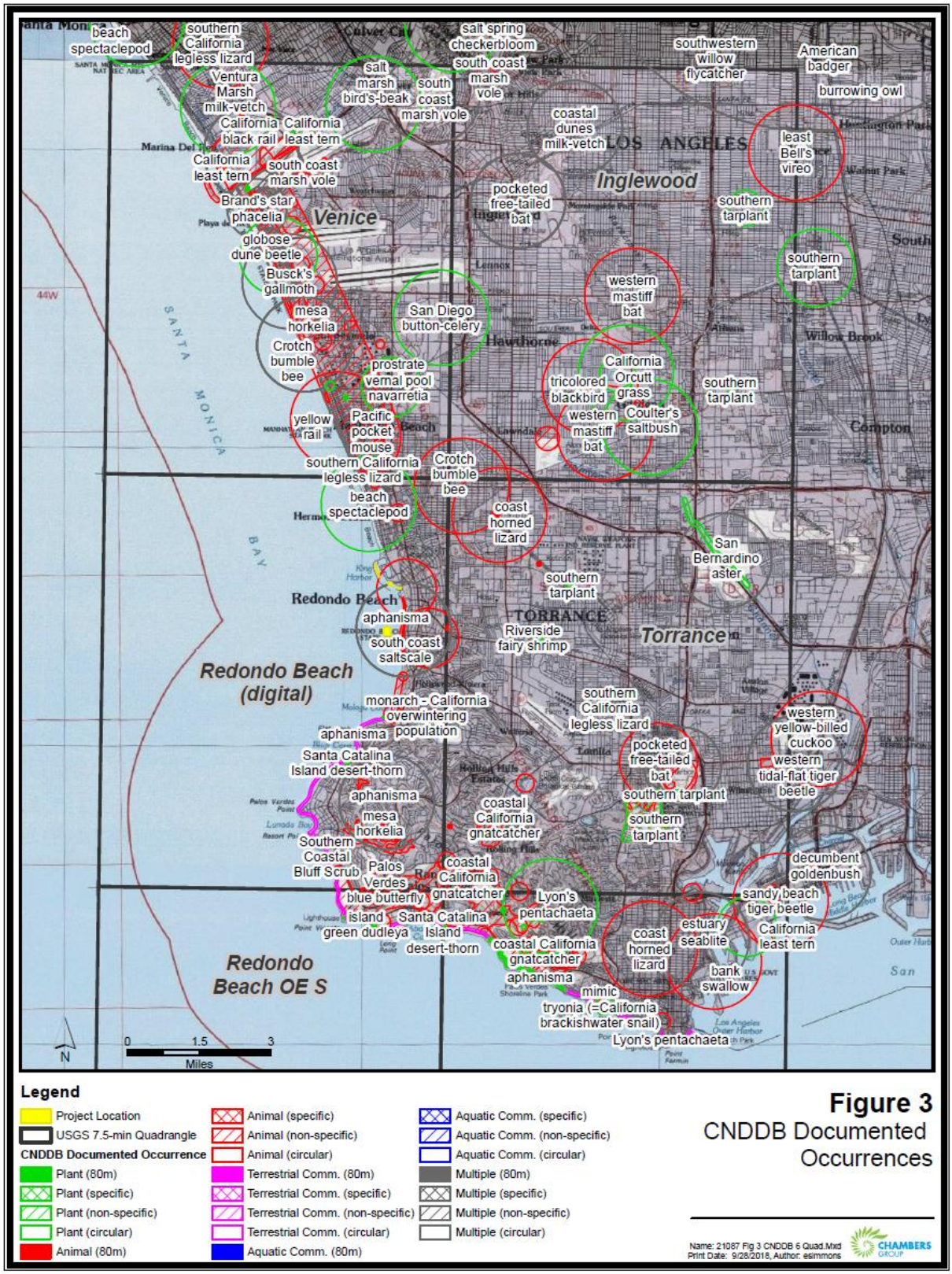


Figure 4: USFWS Critical Habitat and USFWS Documented Occurrences

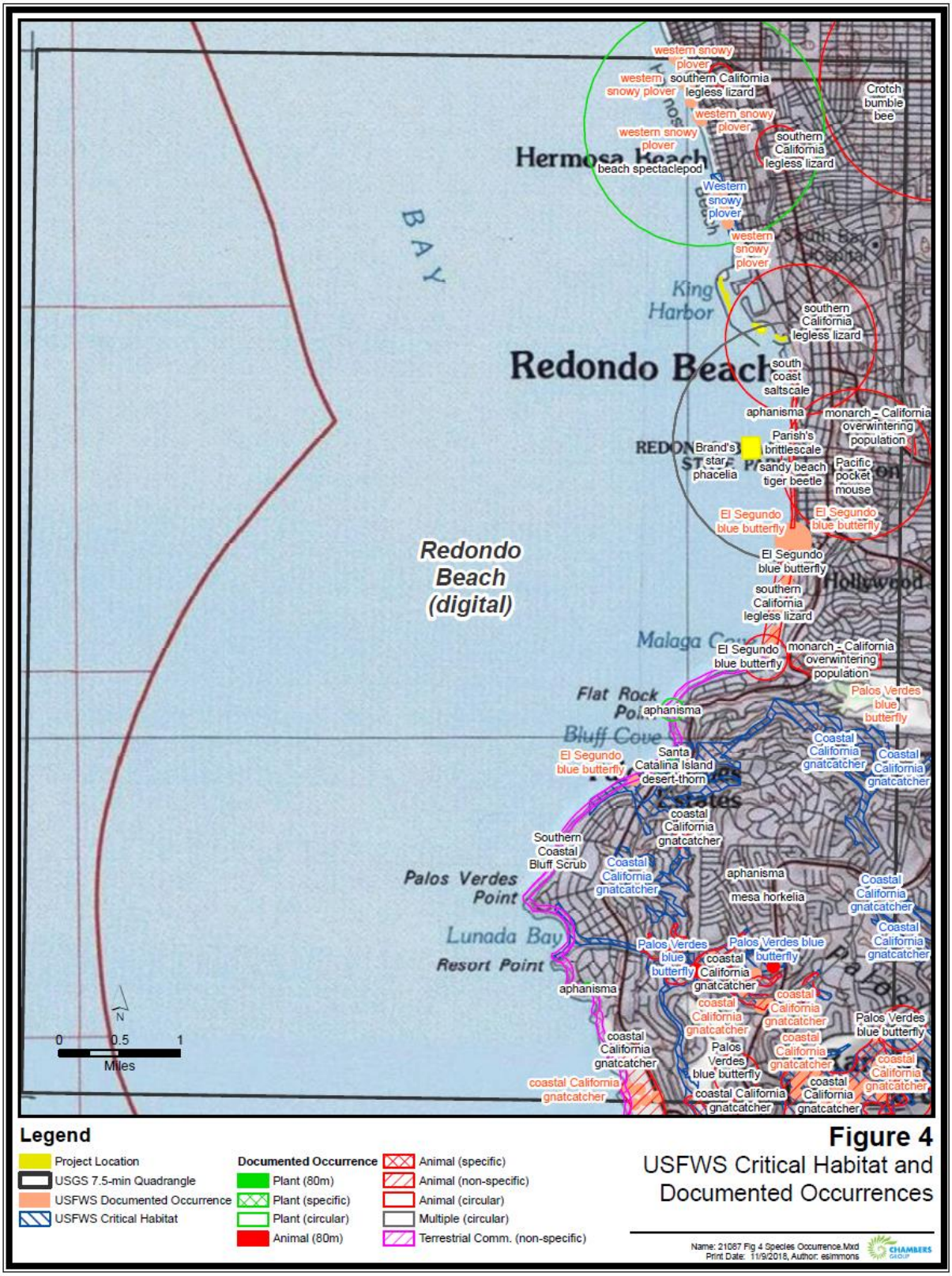
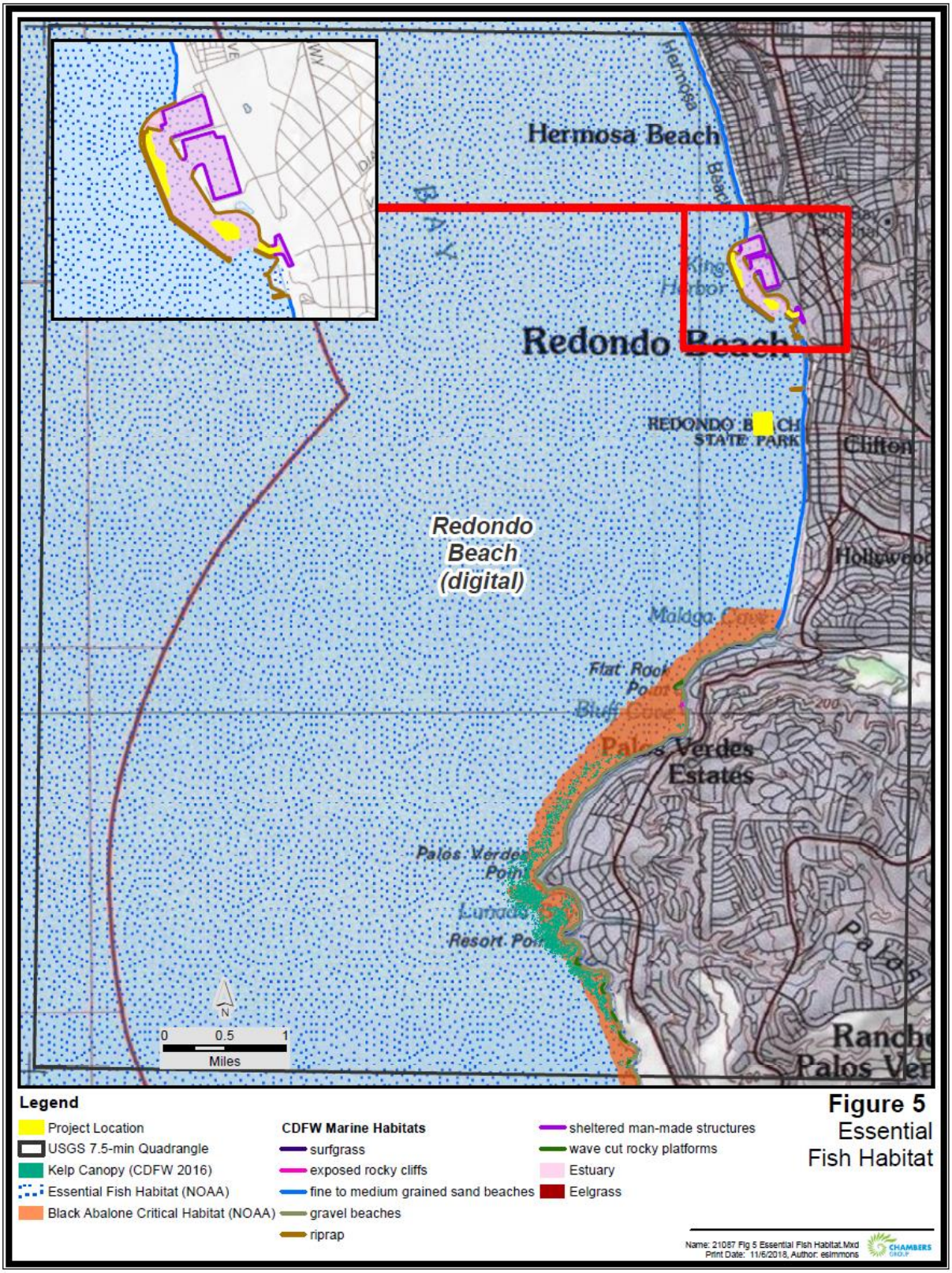


Figure 5: Essential Fish Habitat



SECTION 4.0 – CONCLUSIONS

This section summarizes the findings of the biological reconnaissance-level surveys of the project site. The King Harbor Maintenance Dredging Project would not be expected to affect any listed species or special marine habitats. No eelgrass or Caulerpa were found within the Project Area.

Sedentary and slow moving marine organisms that live in or on the sand in the shoal area would be removed with the sediments that are removed. Sedentary and slow-moving organisms in the in-water disposal area would be buried by the placement of sediment at the offshore site. Following shoal removal, both the shoal and disposal sites would be colonized by organisms similar to those that presently occur at these sites. Most benthic macroinvertebrates are short-lived and many are rapid colonizers. In addition to invertebrates directly removed by dredging, soft bottom invertebrates living adjacent to the dredging area may be indirectly affected by burial and turbidity of sediments disturbed by the dredge. The dredging would not be expected to result in a long-term change in the diversity, density, or species composition of soft bottom benthic communities in King Harbor. The impacts of the Project on the marine resources of King Harbor are expected to be temporary.

Fishes and large mobile invertebrates would be expected to vacate the shoal and disposal areas, as well as adjacent areas, when in-water activities are occurring. Fishes within the proposed dredging area will be disturbed by the dredging. Many fishes may be able to avoid the dredging areas, but fishes that remain in the area may be subjected to suspended sediment from the dredge. In addition to the turbidity, the noise and disturbance associated with the dredging could cause fishes to avoid the dredging area. Dredging would be expected to cause a temporary decrease in fish diversity, but fish communities would return to normal within a few months.

The turbidity from dredging as well as the physical presence of the dredge could interfere with foraging by waterbirds by causing birds to temporarily avoid the dredging area. It is expected that birds would only avoid the areas very near to the dredge and would use parts of the harbor more distant from the dredging operations. Turbidity will be controlled during dredging so that it does not increase turbidity in the harbor more than 20 percent above ambient. In addition, some birds may be drawn to the potential prey that may be exposed in the plumes as sediment is disturbed. Therefore, turbidity plumes that could interfere with the foraging of waterbirds would be minimal. Impacts to birds from the proposed harbor dredging would be short term and limited to the immediate dredging area.

SECTION 5.0 – REFERENCES

California Department of Fish and Wildlife (CDFW)

2018 California Natural Diversity Database (CNDDB). RareFind Version 5.2.14. Database Query for the *Redondo Beach, Venice, Inglewood, Torrance, San Pedro, and Redondo Beach OE S* California USGS 7.5-minute quadrangles. Wildlife and Habitat Data Analysis Branch.

2018 Marine BIOS. Kelp canopy 2016. https://map.dfg.ca.gov/marine/

National Oceanic and Atmospheric Administration National Marine Fisheries Service

2018 Essential Fish Habitat Mapper. Habitat Conservation. https://www.habitat.noaa.gov/protection/efh/efhmapper/

U.S. Fish and Wildlife Service (USFWS)

2018 Information for Planning and Consultation. https://ecos.fws.gov/ipac/location/YAEHR4XU7ZGNRGLA6HOXKHDLLA/resources

APPENDIX A – RESULTS FROM CNDDB, USFWS, AND NOAA FISHERIES DATABASES

SNAME	CNAME	PRESENCE	OCCTYPE	OCCRANK	SENSITIVE	FEDLIST	CALLIST	GRANK	SRANK	R PLANT RANK	CDFWS TATUS	SITEDATE
Perognathus longimembris pacificus	**Pacific pocket mouse**	Extirpated	Natural/Native occurrence	None	N	Endangered	None	G5T1	S1		SSC	19310905
Dithyrea maritima	**beach spectaclepod**	Extirpated	Natural/Native occurrence	None	N	None	Threatened	G1	S1	1B.1		19980701
Cicindela hirticollis gravida	**sandy beach tiger beetle**	Extirpated	Natural/Native occurrence	None	N	None	None	G5T2	S2			1979XXXX
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	Extirpated	Natural/Native occurrence	None	N	Endangered	None	G5T1	S1			1988XXXX
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	Extirpated	Natural/Native occurrence	None	N	Endangered	None	G5T1	S1			1988XXXX
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	Extirpated	Natural/Native occurrence	None	N	Endangered	None	G5T1	S1			1988XXXX
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	Extirpated	Natural/Native occurrence	None	N	Endangered	None	G5T1	S1			1988XXXX

SNAME	CNAME	LOCATION	LOCDETAILS	ECOLOGICAL	THREAT	GENERAL
Perognathus longimembris pacificus	**Pacific pocket mouse**	CLIFTON, EAST OF REDONDO STATE BEACH.				HISTORIC SITE. 3 SBMNH SPECIMENS AND 1 MVZ SPECIMEN (MALE, #47325), ALL COLLECTED IN SEP 1931.
Dithyrea maritima	**beach spectaclepod**	HERMOSA BEACH, 2 MILES NORTH OF REDONDO.	EXACT LOCATION UNKNOWN. MAPPED BY CNDDB IN GENERAL VICINITY OF HERMOSA BEACH. INCLUDES COLLECTIONS FROM "NEAR REDONDO," "REDONDO BEACH," AND "2 MILES NORTH OF REDONDO."	SAND DUNES.		TYPE LOCALITY. OCCURRENCE IS BASED ON COLLECTIONS FROM 1892, 1894, 1898, 1899, & 1902. EXTIRPATED AT THIS SITE ACCORDING TO P. AIGNER; SURVEYED FROM PLAYA DEL REY TO PALOS VERDES PENINSULA IN 1998.
Cicindela hirticollis gravida	**sandy beach tiger beetle**	REDONDO BEACH.		INHABITED CLEAN, DRY, LIGHT-COLORED SAND IN THE UPPER ZONE.	SENSITIVE TO CONTACT WITH HUMANS.	HISTORICAL LOCATION.
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	ALTA VISTA WAY WEST OF HAWTHORNE BLVD; RANCHO PALOS VERDES.		FORMERLY A LARGE, UNDISTURBED COASTAL TERRACE.		EXTIRPATED BY HOUSING DEVELOPMENT & ROAD CONSTRUCTION IN 1978; NO ADULTS OR LARVAL FOODPLANTS FOUND IN 1979. IN 1976, ASTRAGALUS FROM THIS LOCATION WERE SALVAGED & REPLANTED IN PORTUGUESE CYN. REINTRODUCTION WOULD REQUIRE CONTINUAL MGMT.
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	ALTAMIRA CANYON, NEAR NARCISSA DR, ALONG FOOT TRAIL; RANCHO PALOS VERDES.				ASTRAGALUS FOUND HERE IN 1982; NO PVBB OBSERVED. CURRENTLY, THIS SITE REMAINS OPEN SPACE/COASTAL SAGE SCRUB HABITAT, BUT MAY BE DEVELOPED IN THE FUTURE. NO ASTRAGALUS FOUND IN 1986. GOOD AREA FOR RE-ESTABLISHMENT OF ASTRAGALUS.
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	AGUA AMARGA CANYON, 0.4 KM UP CANYON; RANCHO PALOS VERDES/PALOS VERDES ESTATES.		WEED MANAGEMENT NECESSARY FOR SUCCESSFUL REINTRODUCTION OF FOODPLANT. NO ASTRAGALUS SEEN HERE 1981 THROUGH 1988.	GOPHERS AND WEEDS EXTIRPATED ASTRAGALUS.	DESIGNATED CRITICAL HABITAT IN 1980. ONLY KNOWN COLONY OF PVBB AND ASTRAGALUS TO GO EXTINCT FROM DIRECT HUMAN ALTERATION OF HABITAT. AREA CONTINUED TO BE OPEN SPACE WITH NO DEVELOPMENT; CANYON TOO STEEP FOR DISKING.
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	FRED HESSE PARK, WEST OF HAWTHORNE BLVD AT LOCHLEMA LANE, RANCHO PALOS VERDES.	ABOUT 15 ACRES AT THE WEST END OF SITE REMAINS UNDEVELOPED AND SOME IS DESIGNATED A NATIVE PLANT/NATURE STUDY AREA BY THE CITY; REMAINDER IS DISKED ANNUALLY.	NO ASTRAGALUS SEEN HERE 1983 THROUGH 1988.		DESIGNATED CRITICAL HABITAT IS 1980. RESTORATION OF NATURAL AREA POSSIBLE. THE BUTTERFLY AND ASSOCIATED LARVAL FOODPLANT EXTIRPATED BY PARK DEVELOPMENT IN 1982. MATTOON COUNTED 6 ADULTS ON 20 FOOD PLANTS ON BEST DAY IN SPRING 1982.

SNAME	CNAME	PRESENCE	OCCTYPE	OCCRANK	SENSITIVE	FEDLIST	CALLIST	GRANK	SRANK	R PLANT RANK	CDFWS TATUS	SITEDATE
Horkelia cuneata var. puberula	**mesa horkelia**	Possibly Extirpated	Natural/Native occurrence	None	N	None	None	G4T1	S1	1B.1		19310326
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	Possibly Extirpated	Natural/Native occurrence	None	N	Endangered	None	G5T1	S1			1988XXXX
Bombus crotchii	**Crotch bumble bee**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G3G4	S1S2			19380710
Phacelia stellaris	**Brand's star phacelia**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G1	S1	1B.1		18970320
Atriplex pacifica	**south coast saltscale**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G4	S2	1B.2		19031015
Anniella stebbinsi	**southern California legless lizard**	Presumed Extant	Natural/Native occurrence	Poor	N	None	None	G3	S3		SSC	19650702

SNAME	CNAME	LOCATION	LOCDETAILS	ECOLOGICAL	THREAT	GENERAL
Horkelia cuneata var. puberula	**mesa horkelia**	PALOS VERDE HILLS.	EXACT LOCATION UNKNOWN. MAPPED AS A BEST GUESS.	HILLSIDE.	THERE HAS BEEN MUCH DEVELOPMENT IN THIS AREA SINCE COLLECTIONS WERE MADE, POSSIBLY EXTIRPATED.	SITE BASED ON TWO 1931 PURER COLLECTIONS.
Glaucopsyche lygdamus palosverdesensis	**Palos Verdes blue butterfly**	NEAR INTERSECTION OF SEACREST DRIVE, CRENSHAW BLVD AND CREST RD; RANCHO PALOS VERDES.				SITE DISCOVERED IN 1981; GRADING DESTROYED MOST OF HABITAT IN 1982-83. IN 1983, 6 ASTRAGALUS PLANTS SURVIVED IN TWO PATCHES, BUT LATER GRADING REDUCED # OF PLANTS TO ONLY TWO. NO PALOS VERDES BLUE BUTTERFLIES OBSERVED SINCE 1982.
Bombus crotchii	**Crotch bumble bee**	NORTH REDONDO.	EXACT LOCATION UNKNOWN. MAPPED BY CNDDB IN THE NORTHERN PORTION OF THE CITY OF REDONDO BEACH.			COLLECTIONS WERE MADE IN THIS VICINITY IN JUN 1938 AND ON 10 JUL 1938.
Phacelia stellaris	**Brand's star phacelia**	NEAR REDONDO.	EXACT LOCATION UNKNOWN. ORIGINAL LABEL CITES "NEAR RIDONDO," MAPPED AS BEST GUESS BY CNDDB NEAR PRESENT-DAY REDONDO BEACH.			ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS AN 1897 COLLECTION BY MCCLATCHIE. NEEDS FIELDWORK.
Atriplex pacifica	**south coast saltscale**	REDONDO.	EXACT LOCATION UNKNOWN. MAPPED AS BEST GUESS BY CNDDB IN VICINITY OF REDONDO BEACH.			ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS A 1903 COLLECTION BY BRANDEGEE. NEEDS FIELDWORK.
Anniella stebbinsi	**southern California legless lizard**	VICINITY OF PIER AVE AND PACIFIC COAST HIGHWAY (HIGHWAY 1), HERMOSA BEACH.	COLLECTED AT VACANT LOT. AREA WELL DEVELOPED IN 1960 & 1965 AERIALS. THE N SIDE OF PIER AVE JUST W OF HIGHWAY WAS RESIDENTIAL HOUSES, ONE LOT APPEARED UNDEVELOPED IN AERIALS NEAR 703 PIER AVE. HISTORIC HERMOSA BEACH SPECIMENS INCLUDED HERE.	COLLECTED FROM A VACANT LOT. AERIAL IMAGERY FROM 1952, 1960, AND 1965 SHOWS THAT MOST OF THE AREA WAS PRIMARILY DEVELOPED AT THE TIME WITH ESSENTIALLY LITTLE TO NO OPEN SPACE HABITAT.	DEVELOPMENT.	HISTORIC HERMOSA BEACH COLLECTIONS FROM 1943 AND 1965. TWO COLLECTED FROM A VACANT LOT IN THIS AREA ON ON 2 JUL 1965 (CARL GANS COLLECTION #CG 3364, #CG 3365).

SNAME	CNAME	PRESENCE	OCCTYPE	OCCRANK	SENSITIVE	FEDLIST	CALLIST	GRANK	SRANK	R PLANT RANK	CDFWS TATUS	SITEDATE
Anniella stebbinsi	**southern California legless lizard**	Presumed Extant	Natural/Native occurrence	Poor	N	None	None	G3	S3		SSC	19760301
Southern Coastal Bluff Scrub	**Southern Coastal Bluff Scrub**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G1	S1.1			19900901
Anniella stebbinsi	**southern California legless lizard**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G3	S3		SSC	20010422
Anniella stebbinsi	**southern California legless lizard**	Presumed Extant	Natural/Native occurrence	Poor	N	None	None	G3	S3		SSC	20020818
Polioptila californica californica	**coastal California gnatcatcher**	Presumed Extant	Natural/Native occurrence	Good	N	Threatened	None	G4G5T2Q	S2		SSC	20060610

SNAME	CNAME	LOCATION	LOCDETAILS	ECOLOGICAL	THREAT	GENERAL
Anniella stebbinsi	**southern California legless lizard**	REDONDO BEACH.	COLLECTION SITES UNKNOWN. MAPPED TO GENERAL AREA NEAR HISTORIC POST OFFICE THAT WAS LESS DEVELOPED UNTIL ABOUT 1968. MOST SPECIFIC SITE STATED, 625 CATALINA AVE, IS UNCERTAIN IF N CATALINA OR S CATALINA; 625 N CATALINA AVE WITHIN POLYGON.	ONE COLLECTED IN A SANDY AREA FROM UNDER A BOARD. GRINNELL MENTIONS IN GRI07A0001 THAT HIS COLLECTION FROM 1904 WAS "FROM THE SAND DUNES NEAR REDONDO."	DEVELOPMENT.	COLLECTED IN 1904, 1915, 1963, AND 1976.
Southern Coastal Bluff Scrub	**Southern Coastal Bluff Scrub**	BLUFFS OF PALOS VERDES PENINSULA FROM MALAGA COVE TO CABRILLO BEACH.	ALONG BLUFFS AND STEEP SLOPES OF IMMEDIATE COAST; DISTRIBUTION PATCHY WITHIN BOUNDED AREA DUE TO DEVELOPMENT AND DISTURBANCE.	NATIVE SPP INCLUDE RHUS INTEGRIFOLIA, ENCELIA CA, ISOCOMA MENZIESII, LYCIUM CALIFORNICA, ATRIPLEX LENTIFORMIS, ISOMERIS, OPUNTIA SPP., ERIOGONUM CINEREUM, DUDLEYA VIRENS; W/LOWER PORTIONS OF SLOPES, SUAEDA. 15-90% COVER.	DEVELOPMENT AND DISTURBANCE ASSOCIATED WITH RECREATION, INVASIVE EXOTICS.	CONDITION AND COMPOSITION VARIES ALONG THE PENINSULA; LARGE PORTIONS WITH INVASIVE EXOTICS. SEE WWW.DFG.CA.GOV/BIOGEODATA/VEGCAMP/NATURAL_COMM_BACKGROUND.ASP TO INTERPRET AND ADDRESS THE PRESENCE OF RARE COMMUNITIES.
Anniella stebbinsi	**southern California legless lizard**	TORRANCE COUNTY BEACH, NORTH OF THE PALOS VERDES ESTATES AND SOUTH OF REDONDO BEACH.	MAPPED NON-SPECIFICALLY TO BEACH AREA FROM MALAGA COVE NORTH TO MIRAMAR PARK.			ONE COLLECTED ON 22 APR 2001.
Anniella stebbinsi	**southern California legless lizard**	VICINITY OF VALLEY PARK, END OF MORNINGSIDE DRIVE, CITY OF HERMOSA BEACH.				ONE COLLECTED ON 18 AUG 2002.
Polioptila californica californica	**coastal California gnatcatcher**	PALOS VERDES PENINSULA NEAR PT VINCENTE & LONG PT, NE TO CREST RD (INCLUDING MCCARRELLS CYN), RANCHO PALOS VERDES.	ALONG PALOS VERDES DR W, PALOS VERDES DR S, & HAWTHORNE BLVD. RECENT DATA FROM PT VINCENTE PARK/CIVIC CENTER ('98 & 06), PENINSULA POINTE (ALBERO CT, '97-06), & BARKENTINE CYN PRESERVE ('00 & 06). UPDATED W/ 56 DIGITAL 80 M POLYS FROM FWS.	MOST FOUND IN AREAS OF SAGEBRUSH OR CACTUS SCRUB IN 1993-95 PENINSULA SURVEY. DOMINATED BY ARTEMISIA CALIFORNICA, ERIOGONUM FASCICULATUM, & SALVIA MELLIFERA. SOME AREAS NOW OPEN SPACE (PVPLC.ORG). MCCARRELL'S CYN (BARKENTINE) SIG HABITAT.	THREATENED BY ONGOING URBAN DEVELOPMENT AND FREE-ROAMING DOMESTIC CATS.	1980: 5PRS & 1IND. '90: 24BRDS, 6TERR. '91: 2PRS. '95: 8PRS. '97: 5TERR, 6 NESTS, 19 FLDG. '98: 4PRS. '00: 12 AD, 12 JUV; 5 OBS. '01: 7PRS, 1 FLDG. '02: 7TERR, 2 FLDG. '03: 7PRS, 3UKN. '04: 11 AD, 2UKN. '06: 9 AD (ALBERO), 58 OBS.

SNAME	CNAME	PRESENCE	OCCTYPE	OCCRANK	SENSITIVE	FEDLIST	CALLIST	GRANK	SRANK	R PLANT RANK	CDFWS TATUS	SITEDATE
Polioptila californica californica	**coastal California gnatcatcher**	Presumed Extant	Natural/Native occurrence	Unknown	N	Threatened	None	G4G5T2Q	S2		SSC	20060809
Aphanisma blitoides	**aphanisma**	Presumed Extant	Natural/Native occurrence	Good	N	None	None	G3G4	S2	1B.2		20080308
Aphanisma blitoides	**aphanisma**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G3G4	S2	1B.2		20090405
Atriplex coulteri	**Coulter's saltbush**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G3	S1S2	1B.2		20120601
Lycium brevipes var. hassei	**Santa Catalina Island desert-thorn**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G5T1Q	S1	3.1		20130408
Aphanisma blitoides	**aphanisma**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G3G4	S2	1B.2		193004XX
Polioptila californica californica	**coastal California gnatcatcher**	Presumed Extant	Natural/Native occurrence	Unknown	N	Threatened	None	G4G5T2Q	S2		SSC	1980XXXX

SNAME	CNAME	LOCATION	LOCDETAILS	ECOLOGICAL	THREAT	GENERAL
Polioptila californica californica	**coastal California gnatcatcher**	AGUA AMARGA CANYON, PALOS VERDES PENINSULA, PALOS VERDES ESTATES & RANCHO PALOS VERDES.	1993-95 STUDY: AGUA AMARGA CYN WAS 1 OF 3 CYN'S THAT SUPPORTED MOST OF THE PALOS VERDES PENINSULA BREEDING POPULATION. FWS DIGITAL DATA: 9 AUG 06 SITE NAME PORTUGUESE BEND NATURE PRESERVE; 9 APR 06 AT 29941 HAWTHORNE BLVD.	HABITAT IS COASTAL SAGE SCRUB, DOMINATED BY ARTEMISIA CALIFORNICA, ERIOGONUM FASCICULATUM, AND SALVIA MELLIFERA. THIS AREA IS CRITICAL TO THE SURVIVAL OF GNATCATCHERS ON THE PALOS VERDES PENINSULA. MUCH NOW IN OPEN SPACE PRESERVES IN 2008.	THREATENED BY ONGOING URBAN DEVELOPMENT.	1980: 3 PRS OBS, 5-10 PRS EST. 1995: 4 PRS OBS. POOR SURVIVAL OF ADULTS & JUV'S DURING WINTER OF 1994-95. 2006: 2 DETECTED ON 9 APR BY S. REED (TERACOR), 3 GROUPS OF 1 & 2 GROUP OF 2 DETECTED ON 9 AUG BY J. TURNBULL ET AL (DUDEK).
Aphanisma blitoides	**aphanisma**	PALOS VERDES; PASEO DEL MAR & VIA NEVE.	TRAILHEAD DOWN CLIFFSIDE, WHERE PASEO DEL MAR CROSSES VIA NEVE.	COASTAL BLUFF SCRUB. CALANDRINIA MARITIMA AND ANTIRRHINUM NUTTALLIANUM ALSO AT THIS SITE.	LANDSLIDE AREA.	8 PLANTS SEEN IN 2008.
Aphanisma blitoides	**aphanisma**	FLAT ROCK POINT, PALOS VERDES ESTATES.	EXACT LOCATION UNKNOWN. MAPPED BY CNDDB AS BEST GUESS AT FLAT ROCK POINT.	COASTAL BLUFF SCRUB.		~100 PLANTS IN 2009.
Atriplex coulteri	**Coulter's saltbush**	PALOS VERDES ESTATES; MALAGA COVE IMMEDIATELY SW OF THE PALOS VERDES BEACH AND ATHLETIC CLUB.	MAPPED ACCORDING TO 2012 GEORGE COORDINATES.	JUST ABOVE HIGH TIDE LINE ON ROCKY BEACH CUT FROM STORM SURGE.		ONLY SOURCE OF INFORMATION FOR THIS SITE IS A 2012 GEORGE COLLECTION.
Lycium brevipes var. hassei	**Santa Catalina Island desert-thorn**	BLUFF COVE; NEAR INTERSECTION OF PASEO DEL MAR AND PALOS VERDES DR, PALOS VERDES PENINSULA.	MAPPED AS 2 POLYGONS FROM 2011 AND 2013 RIEFNER COORDINATES, IN THE NORTH HALF OF SECTION 36.	ON BLUFF-TOP AND ALONG TRAIL IN COASTAL BLUFF SCRUB.	TRAIL OR ROAD MAINTENANCE.	WEST POLYGON: 2 THICKET-FORMING SHRUBS OBSERVED IN 2011. EAST POLYGON: "LOCALLY COMMON" IN 2010, 10 PLANTS OBSERVED IN 2013.
Aphanisma blitoides	**aphanisma**	PALOS VERDES HILLS.	EXACT LOCATION UNKNOWN. MAPPED BY CNDDB IN THE VICINITY OF PALOS VERDES HILLS.			ONLY SOURCE OF INFORMATION FOR THIS SITE IS A 1930 CATEY COLLECTION. NEEDS FIELDWORK.
Polioptila californica californica	**coastal California gnatcatcher**	BETWEEN VIA ZURITA & VIA CORONEL, CORONELL CANYON, PALOS VERDES PENINSULA.	MAPPED TO PROVIDED MAP. LOCALITY: CORONELL CANYON; REFERENCE #: 357.	FROM 2007 AERIAL IMAGE, APPEARS TO BE A REMNANT PATCH (APPROX. 10 ACRES) OF COASTAL SAGE SCRUB, NOW CITY PARKLAND.		1 PAIR DETECTED DURING FIELD WORK CONDUCTED BETWEEN DEC 1979 - DEC 1980 IN WINTER, SPRING & FALL.

SNAME	CNAME	PRESENCE	OCCTYPE	OCCRANK	SENSITIVE	FEDLIST	CALLIST	GRANK	SRANK	R PLANT RANK	CDFWS TATUS	SITEDATE
Euphilotes battoides allyni	**El Segundo blue butterfly**	Presumed Extant	Natural/Native occurrence	Unknown	N	Endangered	None	G5T1	S1			1990XXXX
Euphilotes battoides allyni	**El Segundo blue butterfly**	Presumed Extant	Natural/Native occurrence	Unknown	N	Endangered	None	G5T1	S1			2007XXXX
Danaus plexippus pop. 1	**monarch - California overwintering population**	Presumed Extant	Natural/Native occurrence	Good	N	None	None	G4T2T3	S2S3			201411XX
Danaus plexippus pop. 1	**monarch - California overwintering population**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G4T2T3	S2S3			201411XX
Aphanisma blitoides	**aphanisma**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G3G4	S2	1B.2		XXXXXXXX
Atriplex parishii	**Parish's brittlescale**	Presumed Extant	Natural/Native occurrence	Unknown	N	None	None	G1G2	S1	1B.1		XXXXXXXX

SNAME	CNAME	LOCATION	LOCDETAILS	ECOLOGICAL	THREAT	GENERAL
Euphilotes battoides allyni	**El Segundo blue butterfly**	MALAGA COVE, JUST NORTH OF THE PALOS VERDES PENINSULA.	AREA IS APPROXIMATELY 1 ACRE (1983). PRIVATE LAND ALONG THE BASE OF THE BLUFFS SUPPORT ERIOGONUM PARVIFOLIUM AND THE EL SEGUNDO BLUE BUTTERFLY.	THE SITE WITH THE MOST ERIOGONUM PARVIFOLIUM WAS DAMAGED BY EROSION CONTROL DURING THE WINTER OF 1994/95.	SITE HEAVILY OVERGROWN WITH ICEPLANT AND ERODED.	DISCOVERED AT THIS SITE IN 1983 BY J. MORTON AND T. LEIGH. 1984: ONE DAY POPULATION COUNT OF 60; FEWER THAN 50 PLANTS WITH 30,000 FLOWERHEADS. 1990 SURVEY INDICATED THE STATUS HAD REMAINED UNCHANGED SINCE 1984.
Euphilotes battoides allyni	**El Segundo blue butterfly**	MIRAMAR PARK, REDONDO BEACH.				BUTTERFLIES OBSERVED AT MIRAMAR PARK DURING 2007.
Danaus plexippus pop. 1	**monarch - California overwintering population**	VIA LA SELVA, FROM ITS WEST END NEAR PALOS VERDES BLVD TO THE VIA PASCUAL INTERSECTION, PALOS VERDES ESTATES.	TREATED AS TWO SITES IN MONARCH PROGRAM/XERCES SOCIETY COUNTS: VIA LA SELVA & VIA CAPAY (XERCES SITE #2893) AND #2817 VIA LA SELVA (XERCES SITE #2894). (XERCES ALSO HAS OVERALL SITE, #2880 BASED ON OLD CNDDB OCCURRENCE).	EUCALYPTUS WINDROWS IN YARDS OF PRIVATE RESIDENCES ON BOTH SIDES OF THE STREET; ROOST SITES VARY FROM YEAR TO YEAR. IN 1998, AT LEAST, CLUSTERS WEREN'T LOCATED BUT NUMBER OF FLYERS INDICATED THERE WERE AGGREGATIONS NEARBY.		REPORTS OF LARGE CLUSTERS IN 1960S. 30K REPORTED, DEC 1984. 10S ON 17 JAN 1986. AT VIA CAPAY: 3K/1985, 300/1998, 150/2000, 10/2001. 3/2003, 0/2014. AT #2817: 800/1998, 0/2000, 10/2001, 6/2003, 0/2014.
Danaus plexippus pop. 1	**monarch - California overwintering population**	WILDERNESS PARK, NORTH OF SEPULVEDA BLVD, 0.5 MILE WEST OF PALOS VERDES BLVD, REDONDO BEACH.	XERCES SITE #2881.	ROOST TREES ARE EUCALYPTUS.		CLUSTERS OBSERVED, NOV 1989. 200 OBS, 15 NOV 1997. 300 OBS, 8 NOV 1998. 0 OBS 7 DEC 2000. 35 OBS 30 NOV 2001. 20 OBS IN 2003, 12 IN 2007, 2 IN 2008, AND 2 IN 2014 DURING THANKSGIVING COUNTS.
Aphanisma blitoides	**aphanisma**	REDONDO.	EXACT LOCATION UNKNOWN. MAPPED BY CNDDB AS BEST GUESS IN THE VICINITY OF REDONDO BEACH, LOS ANGELES.			ONLY SOURCE OF INFORMATION FOR THIS SITE IS AN UNDATED RUSSELL COLLECTION. NEEDS FIELDWORK.
Atriplex parishii	**Parish's brittlescale**	REDONDO (BEACH?).	EXACT LOCATION UNKNOWN. MAPPED BY CNDDB AS BEST GUESS AT REDONDO BEACH.			MAIN SOURCE OF LOCATION INFORMATION FOR THIS SITE IS AN UNDATED BRAUNTON COLLECTION. NEEDS FIELDWORK.

EFH Data Notice: Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional Fishery Management Councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

West Coast Regional Office
Alaska Regional Office

Query Results

Map Scale = 1:18,056
Degrees, Minutes, Seconds: Latitude = 33º50'42" N, Longitude = 118º23'57" E
Decimal Degrees: Latitude = 33.85, Longitude = -118.40

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

EFH

Show	Link	Data Caveats	Species/Management Unit	Life stage(s) Found at Location	Management Council	FMP
			Finfish	ALL	Pacific	Null
			Krill - Thysanoessa Spinifera	ALL	Pacific	Null
			Krill - Euphausia Pacifica	ALL	Pacific	Null
			Other Krill Species	ALL	Pacific	Null
			Coastal Pelagic Species	ALL	Pacific	Null
			Groundfish	ALL	Pacific	Groundfish

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.
****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.
****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**

Pacific Coastal Pelagic Species,
Jack Mackerel,
Pacific (Chub) Mackerel,
Pacific Sardine,
Northern Anchovy - Central Subpopulation,
Northern Anchovy - Northern Subpopulation,
Pacific Highly Migratory Species,
Bigeye Thresher Shark - North Pacific,
Bluefin Tuna - Pacific,
Dolphinfish (Dorado or Mahimahi) - Pacific,
Pelagic Thresher Shark - North Pacific,
Swordfish - North Pacific,
West Coast Salmon,
All species and stocks

EFH Data Notice: Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional Fishery Management Councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

West Coast Regional Office
Alaska Regional Office

Query Results

Map Scale = 1:18,056
Degrees, Minutes, Seconds: Latitude = 33º49'43" N, Longitude = 118º23'48" E
Decimal Degrees: Latitude = 33.83, Longitude = -118.40

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

EFH

Show	Link	Data Caveats	Species/Management Unit	Life stage(s) Found at Location	Management Council	FMP
			Common Thresher Shark	ALL	Pacific	Null
			Finfish	ALL	Pacific	Null
			Krill - Thysanoessa Spinifera	ALL	Pacific	Null
			Krill - Euphausia Pacifica	ALL	Pacific	Null
			Other Krill Species	ALL	Pacific	Null
			Coastal Pelagic Species	ALL	Pacific	Null
			Groundfish	ALL	Pacific	Groundfish
			Dorado	ALL	Pacific	Null

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

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****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**

Pacific Coastal Pelagic Species,
Jack Mackerel,
Pacific (Chub) Mackerel,
Pacific Sardine,
Northern Anchovy - Central Subpopulation,
Northern Anchovy - Northern Subpopulation,
Pacific Highly Migratory Species,
Bigeye Thresher Shark - North Pacific,
Bluefin Tuna - Pacific,
Dolphinfish (Dorado or Mahimahi) - Pacific,
Pelagic Thresher Shark - North Pacific,
Swordfish - North Pacific,
West Coast Salmon,
All species and stocks

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Los Angeles County, California

Local office

Carlsbad Fish And Wildlife Office

(760) 431-9440
(760) 431-5901

2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385

http://www.fws.gov/carlsbad/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Pacific Pocket Mouse Perognathus longimembris pacificus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8080	Endangered

Birds

NAME	STATUS
Coastal California Gnatcatcher Polioptila californica californica There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8178	Threatened
Western Snowy Plover Charadrius nivosus nivosus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8035	Threatened

Insects

NAME	STATUS
El Segundo Blue Butterfly Euphilotes battoides allyni There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/3135	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Black-vented Shearwater *Puffinus opisthomelas* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

Bonaparte's Gull Chroicocephalus philadelphia — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Brown Pelican Pelecanus occidentalis — Breeds Jan 15 to Sep 30

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/6034

Clark's Grebe Aechmophorus clarkii — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Loon gavia immer — Breeds Apr 15 to Oct 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/4464

Common Murre Uria aalge — Breeds Apr 15 to Aug 15

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Common Tern Sterna hirundo — Breeds May 10 to Sep 10

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/4963

Double-crested Cormorant phalacrocorax auritus — Breeds Apr 20 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/3478

Herring Gull Larus argentatus — Breeds Apr 20 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Least Tern Sterna antillarum — Breeds Apr 20 to Sep 10
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Northern Fulmar Fulmarus glacialis — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Parasitic Jaeger Stercorarius parasiticus — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Pomarine Jaeger Stercorarius pomarinus — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-breasted Merganser Mergus serrator — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-necked Phalarope Phalaropus lobatus — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-throated Loon Gavia stellata — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ring-billed Gull Larus delawarensis — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Royal Tern Thalasseus maximus — Breeds Apr 15 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Surf Scoter Melanitta perspicillata — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

White-winged Scoter Melanitta fusca — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any

week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

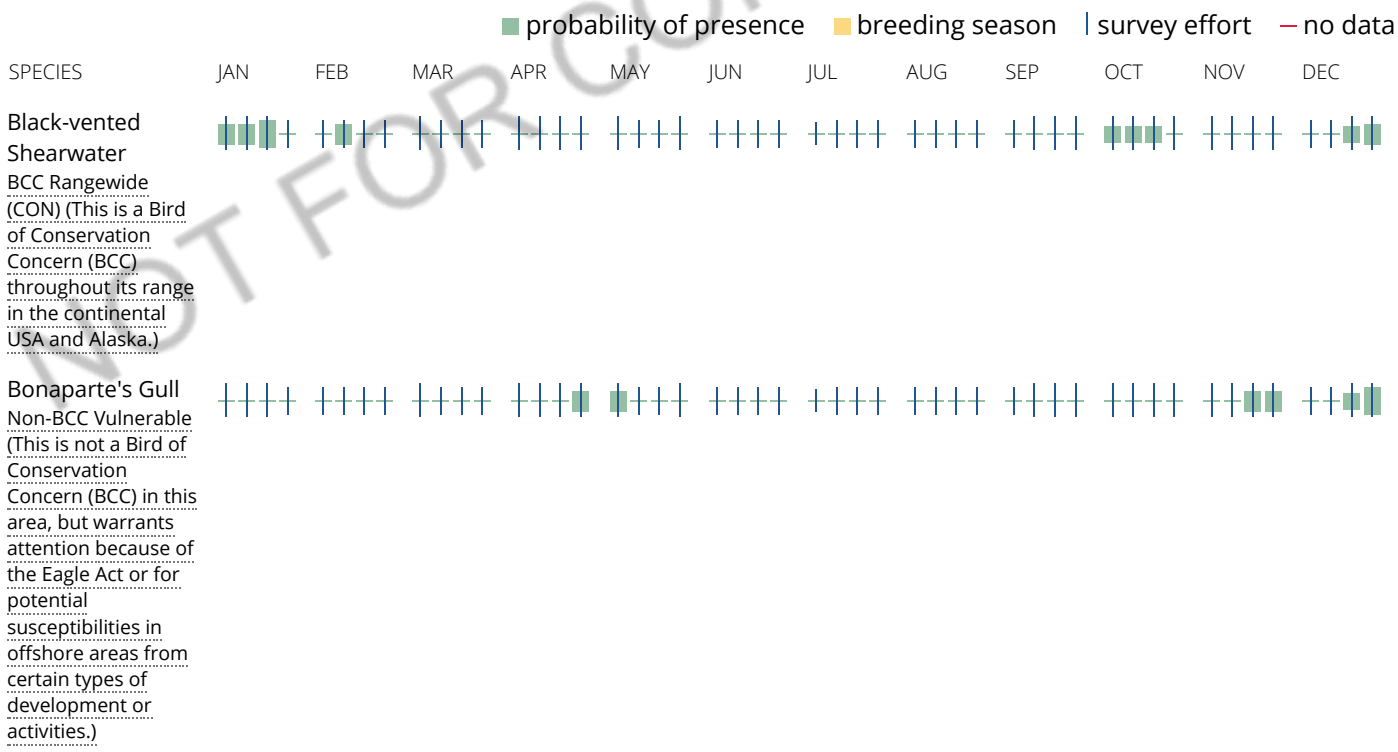
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

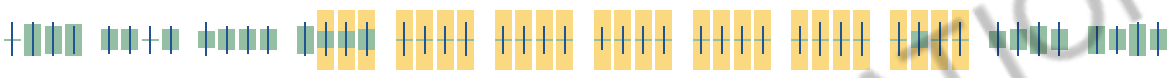
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Brown Pelican
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

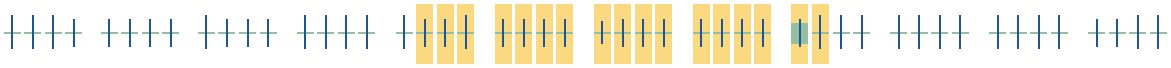
Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Common Loon
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

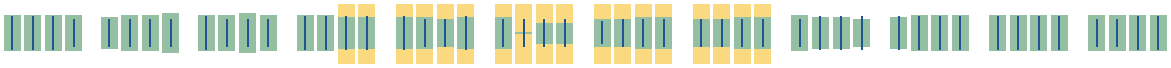


Common Murre
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

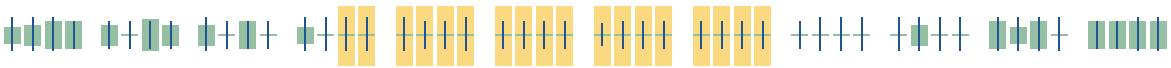
Common Tern
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Double-crested Cormorant
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Herring Gull
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Least Tern
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Northern Fulmar
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Parasitic Jaeger
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Pomarine Jaeger
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

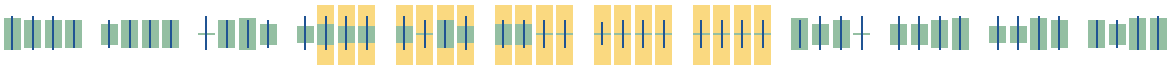
Red-breasted Merganser
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Red-necked Phalarope
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Red-throated Loon
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Ring-billed Gull
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Royal Tern
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Surf Scoter
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

White-winged Scoter
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

Wildlife refuges and fish hatcheries

REFUGE AND FISH HATCHERY INFORMATION IS NOT AVAILABLE AT THIS TIME

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

- M1UBL
- E1UBL
- E1UBLx

ESTUARINE AND MARINE WETLAND

- M2USN
- E2RSPr
- M2RSPr
- E2USMh
- E2USPh
- M2USP

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX B – EELGRASS AND CAULERPA UNDERWATER SURVEY REPORT

Eelgrass (*Zostera marina*) and *Caulerpa taxifolia*
Pre Construction
Survey Report

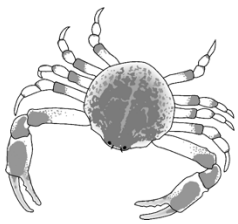
KING HARBOR DREDGE PROJECT

KING HARBOR, CALIFORNIA

Survey Date: September 22, 2018

Prepared for:
Chambers Group, Inc.
5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707
Contact: Lisa Louie

Prepared by: Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
805 698 1004



ECOMARINE
CONSULTING LLC

Anghera
Environmental

TABLE OF CONTENTS

1. INTRODUCTION

Anghera Environmental (Anghera) and Ecomarine Consulting (Ecomarine), was retained by Chambers Group, Inc. (Chambers Group) to conduct pre-dredge eelgrass survey and impact assessment for the dredging of multiple areas in King Harbor, Los Angeles County, California.

This report presents the results of focused surveys conducted on September 22, 2018 (pre-construction) to identify the distribution and abundance of eelgrass (*Zostera marina*) and *Caulerpa taxifolia* within the project area and limits of dredging, as well as identify potential project impacts on eelgrass. The results of both eelgrass and *Caulerpa taxifolia* surveys are summarized in this document but presented in full in separate reports for each of the target study areas in and around King Harbor.

Figure 1. Regional Project Location.

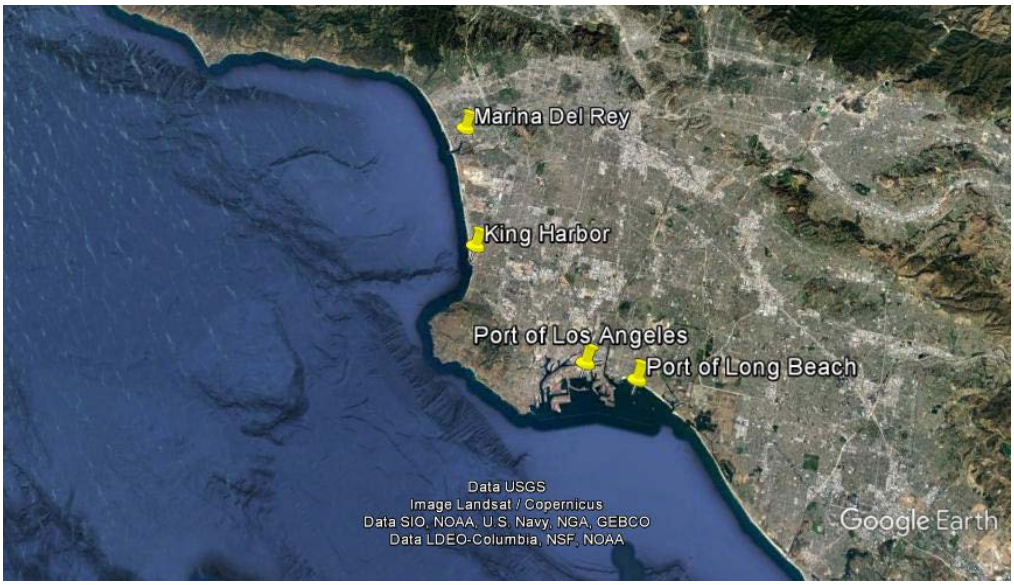
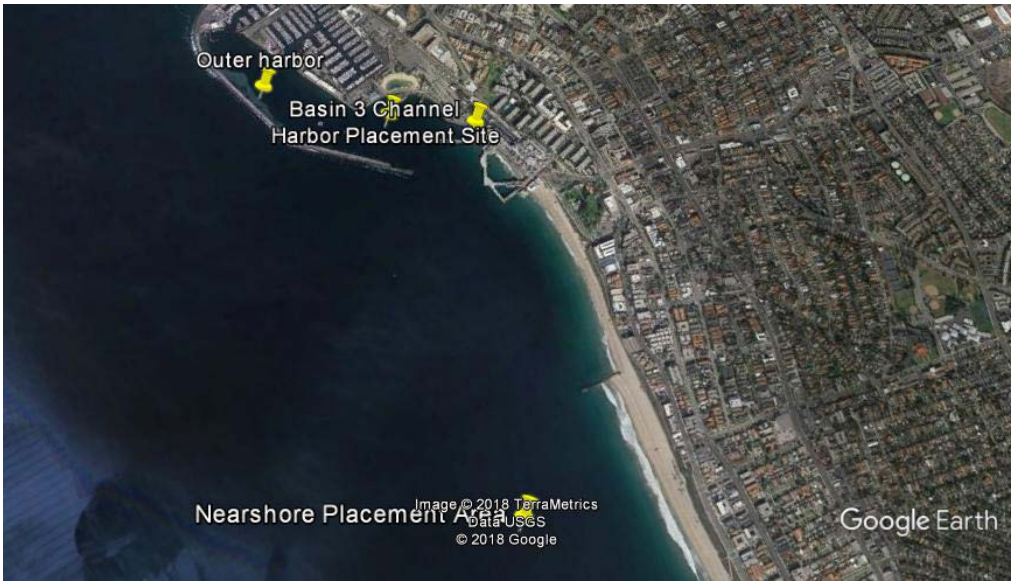


Figure 2. Project Survey Areas, King Harbor.



2. INVASIVE ALGAE (CAULERPA TAXIFOLIA)

Invasive algae *Caulerpa taxifolia* has a potential to cause ecosystem-level impacts on California's bays and nearshore systems due to its extreme ability to out-compete other algae and seagrasses. *Caulerpa taxifolia* grows as a dense smothering blanket, covering and killing all native aquatic vegetation in its path when introduced tomarine habitat. It was introduced into southern California in 2000 (Agua Hedionda Lagoon and Huntington Harbour) by way of individuals likely dumping their aquaria waters into storm drains, or directly into the lagoons. While outbreaks have been contained, the State Water Resources Control Board, through the National Marine Fisheries Service and the California Department of Fish and Wildlife require that projects that have potential to spread this species through dredging and other bottom-disturbing activities, conduct pre-construction surveys to determine if this species is present and, if so, to eradicate the species prior to conduct of the construction project, using standard agency-approved protocols and by National Marine Fisheries Service/California Department of Fish and Wildlife Certified Field Surveyors.

Figure 3. The Invasive Algae, *Caulerpa taxifolia*. Source: NOAA/NMFS

3. SURVEY METHODS

The pre-construction field survey using scuba diver transects was conducted on September 22, 2018, by Anghera and Ecomarine staff. Field personnel included Mr. Mike Anghera (Senior Marine Biologist-Diver), Dr. Kimo Morris (Senior Marine Biologist-Diver) and Mr. Clint Nelson (Senior Marine Biologist-Diver-Boat Operator).

Mr. Anghera served as the field leader for this project. Mr. Anghera has had extensive experience in monitoring marine ecosystems and conducting projects in a wide variety of habitats. Mr. Anghera was responsible for the overall conduct of the proposed survey and for the quality, accuracy, and timeliness of the results. Mr. Anghera is currently certified by the California Department of Fish & Wildlife to conduct *Caulerpa* surveys and ensured that the subtidal survey program was conducted safely and adhered to accepted criteria of the Southern California Eelgrass Monitoring Policy (1991).

Mr. Anghera, Dr. Morris and Mr. Nelson are current members in good standing with the American Academy of Underwater Sciences (AAUS) and conducted all surveys in accordance with the safe diving standards as outlined in the current AAUS Scientific Diving Manual.

Underwater scientists using scuba diver transects were conducted at intervals sufficient to assure at least 50% coverage of the bottom. Track lines were maintained by differential-GPS and compass bearings at either end of the transect lines. Any eelgrass or *Caulerpa* noted were to be marked and GPS coordinates taken to exactly relocate the position to measure the size of the patch or patches.

4. SURVEY AREAS

The project area was comprised of four distinct survey areas based on the project footprints in each zone of the Harbor (Figures 4-7). These survey zones included the Outer Harbor dredge area (Figure 4), Basin 3 Channel and alternative site (Figure 5), the Harbor Placement Site (Figure 6) and the Offshore Placement Area (Figure 7).

Figure 4. Project Survey Area: Outer Harbor

Figure 5. Project Survey Area: Basin 3 Channel and Alternative.

Figure 6. Project Survey Area: Harbor Placement Site.

Figure 7. Project Survey Area: Offshore Placement Area.

5. FIELD SURVEY METHODS

The survey was conducted according to the California Eelgrass Mitigation Policy (National Marine Fisheries Service [NMFS] 2014) and the NMFS *Caulerpa* Survey Protocol, Version 4, 2008. The methods utilized for the survey included scuba diver transects and GPS (Global Positioning System) mapping conducted by certified marine biologists employing agency-approved transect techniques for conducting eelgrass and invasive algae surveys.

Diver surveys were conducted by biologists using in water GPS units to map any Caulerpa and eelgrass patches encountered in the study areas. Underwater transects were swam by biologist-divers while a topside boat operator in the research vessel Bula remained at anchor nearby to monitor other vessel traffic and render assistance to the divers.

Field conditions noted during the survey included characteristic marine flora and fauna, the presence or absence of *Caulerpa* and eelgrass, depth ranges, and bottom physical attributes, were recorded during the diver surveys at each of the study sites. Underwater still photographs and video were taken at each of the study sites.

Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the NOAA tidal survey station at the entrance of Los Angeles Harbor.

Figures 8-11 depict the diver transects at each of the study areas. Two divers swam side by side at a distance dependent on the given visibility at that time.

Figure 8. Project Survey Area and Diver Transects-Outer Harbor

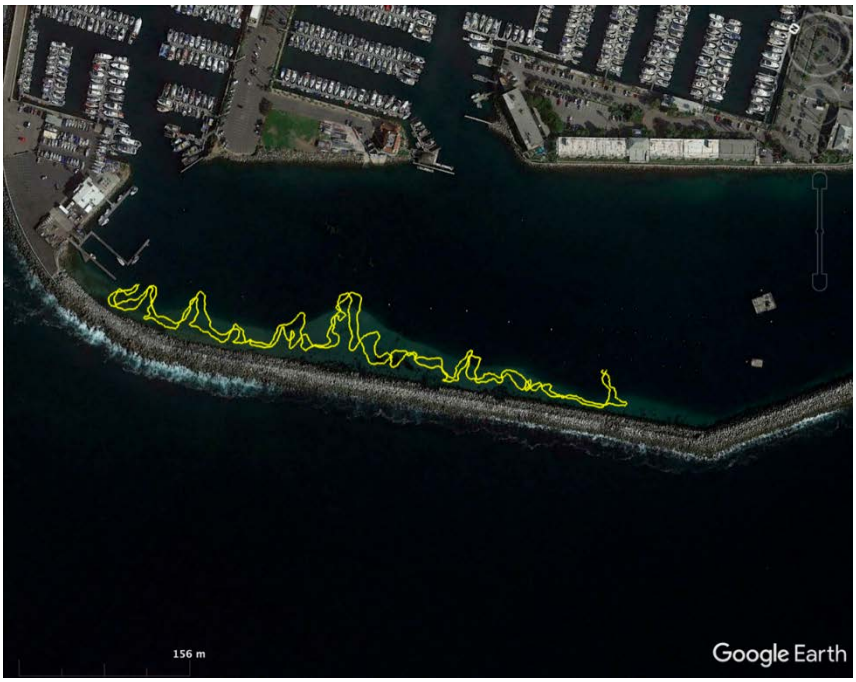


Figure 9. Project Survey Area and Diver Transects- Basin 3 Channel and Alt

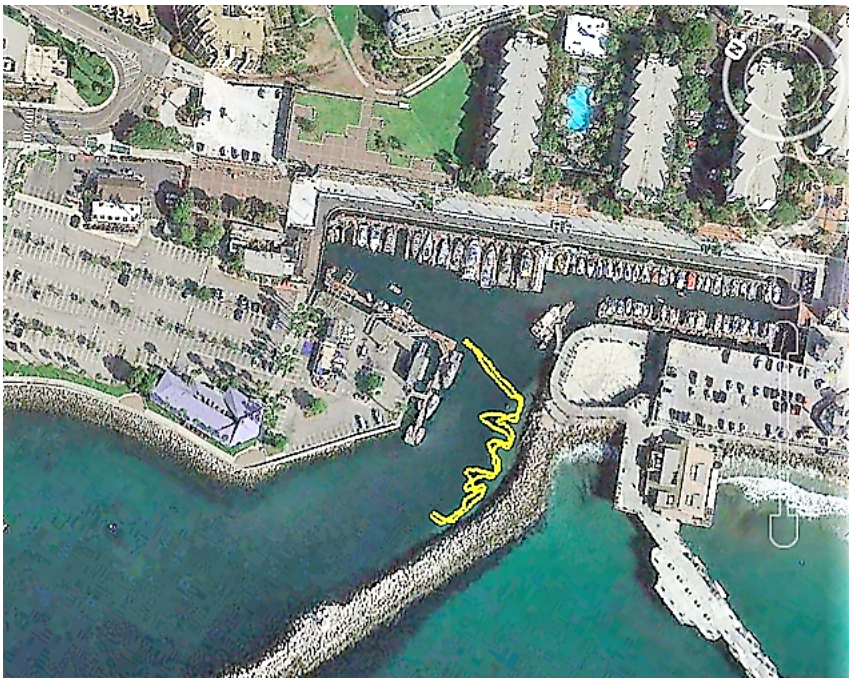
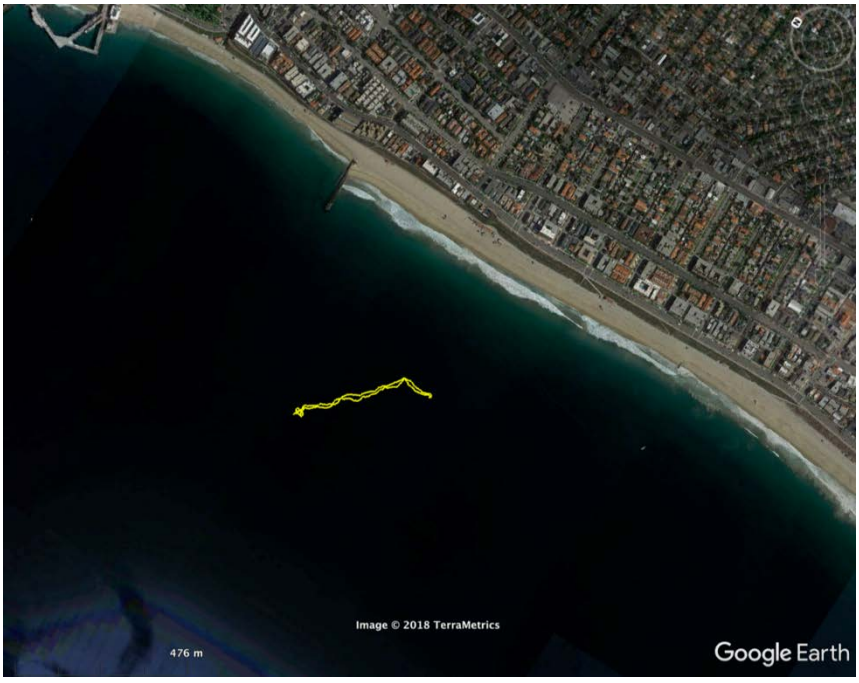


Figure 10. Project Survey Area and Diver Transects- Harbor Placement Site

Figure 11. Project Survey Area and Diver Transects- Offshore Placement Area



6. RESULTS

Habitat types in the project areas include shallow subtidal soft bottom sediments, mudflats, and rocky rip rap that was exposed at the time of the survey.

Caulerpa taxifolia. *Caulerpa* was **not** observed in any of the study sites during the diver surveys. Divers surveyed covered at least 70% of each project area. A 20% minimum covered is required in non-infected systems when *Caulerpa* pre-and-post construction surveys are conducted. Please refer to the individual *Caulerpa* reporting forms for each of the project locations.

Zostera marina. *Zostera* was **not** observed in any of the study sites during the diver surveys. Divers surveyed covered at least 70% of each project area. A 50% minimum covered is required when *Zostera* pre-and-post construction surveys are conducted. Please refer to the individual *Zostera marina* reporting forms for each of the project locations.

7. UNDERWATER CONDITIONS

Water temperatures at the bottom during the survey ranged from 16.78° C (62.2° F) to 21.6° C (70.9° F) . The range of depths that were surveyed by divers varied between 0.0 to -46 ft (-14m) MLLW.

Sediment types were highly variable. Multiple benthic transition zones were observed within the study areas in the harbor. In the shallows, a transition zone between hard packed sand and weathered sand was often seen. Very little growth was observed in the hard packed sand along with little evidence of infauna tubes. The weathered sand continued out to varying distances from the where the sediment transitioned to soft mud. Evidence of burrowing infauna was more typical, with infauna burrows seen throughout. Within the deeper channels fine silt was predominant, while at the offshore placement area, only coarse sand was observed.

8. SITE SPECIFIC OBSERVATIONS

OUTER HARBOR

Pictures taken of: Benthos, transition zones, rip rap, surfgrass on rip rap, bacteria mats
Personnel: Mike Anghera, Kimo Morris, Clint Nelson
Weather: Sunny, clear, no wind, 0.5-1' swell
Time on Site: 0845
Time in water: 0855
BT: 35 minutes
Max Depth: 21'
Water Temp: 70°
Viz: 5-10'

Rip rap present on west side of channel, rubble and shell debris to 5-6' depth. From 6' to 8' depth hard coarse sand bar, fine silt to 20' and beyond. Observed movement of water through rocks due to swell. Bacterial mats present in 8'-10' depths. *Phyllospadix torrey* on rip rap boulders. Lots of algal detritus offshore in 20' of water consisting of *Phyllospadix, torrey and Gelidium robustum*.

Species Observed:

	Common Name	Scientific Name
Algae	Sea Grass	*Phyllospadix torrey*
	Corraline algae	*Corralina sp.*
	Brown bubbles	*Colpomenia sp.*
	Sargassum	*Sargassum muticum*
	Seaweed	*Dictyota sp.*
Inverts	Sponges	*Haliclona sp.*
	Sea Slugs	*Navanax inermis*
	Oysters	*Ostrea pacifica*
	Ornate Tube Worm	*Diopatra Ornata*
	Sand Dollar	*Dendraster excentricus*
	Lewis's Moon Snail	*Neverita lewisii*
	Purple Olive Snail	*Callianax biplicata*
	Sea Snail	*Chlorostoma sp.*
	California Spiny Lobster	*Panulirus interruptus*
	Bubble Snail	*Haminoea sp.*
	Western Banded Tegula	*Tegula eiseni*
	Bubble Snail	*Bulla sp.*
	Blue Banded Hermit Crab	*Paugurus samuelis*
Fish	Round Stingrays	*Urobatis halleri*
	Rainbow Surfperch	*Hypsurus* sp.
	Opaleye Perch	*Girella nigricans*
	Kelp Bass	*Paralabrax clathrantus*
	Anchovies	*Engraulis mordax*

OUTER HARBOR

Species Observed:

	Common Name	Scientific Name
Fish	Top Smelt	*Atherinops affinis*
	Sargo	*Diplodus* sp.
	Spotted Bay Bass	*Paralabrax masculatofasciatus*
	Garibaldi	*Hypsypops rubicundus*
	Salema	*Haemulon californiensis*
	Fantail Sole	*Xystreurys liolepsis*
	Spotted Turbot	*Pleuronichthys ritteri*
	California Halibut	*Paralichthys californicus*
	Rock Wrasse	*Halichoeres semicinctus*
	Black Surf Perch	*Embiotoca jacksoni*
	Zebra Perch	*Hermosilla azure*

BASIN 3 CHANNEL AND ALTERNATIVE SITE

Pictures taken of: Benthos, transition zones, rip rap,
Personnel: Mike Anghera, Kimo Morris, Clint Nelson
Weather: Sunny, clear, no wind, 0.5-1' swell
Time on Site: 1155
Time in water: 1205
BT: 25 minutes
Max Depth: 24'
Water Temp: 70^{o}
Viz: 10-15'

Rip rap present on east side of channel with encrusting corraline agae, rubble and shell debris to 5-6' depth. From 6' to 8' depth hard coarse sand bar, fine silt to 20' and beyond. Lots of algal detritus offshore in 20' of water consisting of *Phyllospadix, torrey, Macrocystis pyrifera and Sargassum muticum*.

Species Observed:

	Common Name	Scientific Name
Algae	Encrusting red algae	*Corralina sp.*
Inverts	Tube Dwelling Anemone	*Pachycerianthus sp.*
	Sea Slugs	*Navanax inermis*
	Nudibranchs	*Acanthodoris luteus*
	Oysters	*Ostrea pacifica*
Fish	Round Stingrays	*Urobatis halleri*
	Rainbow Surfperch	*Hypsurus sp.*

BASIN 3 CHANNEL AND ALTERNATIVE SITE

Species Observed:

Fish	Common Name	Scientific Name
	Opaleye Perch	*Girella nigricans*
	Garibaldi	*Hypsypops rubicundus*
	Top Smelt	*Atherinops affinis*
	Spotted Turbot	*Pleuronichthys ritteri*
	Rock Wrasse	*Halichoeres semicinctus*
	Zebra Perch	*Hermosilla azure*

HARBOR PLACEMENT SITE

Pictures taken of: Benthos
Personnel: Mike Anghera, Kimo Morris, Clint Nelson
Weather: Sunny, clear, no wind, 0.5-1' swell
Time on Site: 1045
Time in water: 1050
BT: 30 minutes
Max Depth: 39'
Water Temp: 62°
Viz: 5-10'

Benthos consisted of fine silt with many burrows. Lots of plastic and metal trash mixed with algal detritus

Species Observed:

	Common Name	Scientific Name
Algae	Red Sea Grapes	*Botryocladia* sp.
Inverts	Tube Dwelling Anemone	*Pachycerianthus* sp.
	Sea Pen	*Ptilosarcus* sp
	Sea Cucumber	*Apostichopus californicus*
	Kellet's Whelk	*Kelletia* sp.
	Mitre shells	*Mitridae* sp.
	Bubble Snail	*Haminoea* sp.
Fish		
	Blue Banded Goby	*Lythrypnus dalli*
	Senorita	*Oxyjulis californica*
	Kelp Bass	*Paralabrax clathrantus*

OFFSHORE PLACEMENT SITE

Pictures taken of: Benthos
Personnel: Mike Anghera, Kimo Morris, Clint Nelson
Weather: Sunny, clear, wind 10-15 kts, 1-2' swell
Time on Site: 1240
Time in water: 1255
BT: 35 minutes
Max Depth: 46'
Water Temp: 63°
Viz: 15-20'

Benthos consisted of three distinct zones:
46'-43': Coarse sand with shell rubble.
43'-41': Dense mat of algal detritus composed of pieces of *Macrocystis, Egegia, Eisenia, Phyllospadix, Sargassum and Gelidium.*
41'-38': San dollar bed with coarse sand and well-defined sand ridges.

Species Observed:

	Common Name	Scientific Name
Inverts		
	Tube Dwelling Anemone	*Pachycerianthus* sp.
	Ornate Tube Worm	*Diopatra Ornata*
	Giant Sea Star	*Pisaster* sp.
	Sand Dollar	*Dendraster excentricus*
	Sea Pansy	*Ranilla* sp.
	Sea Pen	*Ptilosarcus* sp.
Fish	Senorita	*Oxyjulis californica*
	Kelp Bass	*Paralabrax clathrantus*

9. IMPACT ASSESSMENT

No eelgrass or Caulerpa was observed in the any of the study areas for this project during this survey. Therefore, planned dredging activities should not negatively affect any eelgrass beds in the project areas.

9.0 LITERATURE CITED

National Marine Fisheries Service. 2008. *Caulerpa* control protocol. Version 4, March 28th, 2008. National Marine Fisheries Service Southwest Region, Long Beach, CA. 7 pp.

National Marine Fisheries Service. 2014. California Eelgrass Mitigation Policy and Implementing Guidelines. National Marine Fisheries Service, West Coast Region. Long Beach, CA. 45 pp.

October 10, 2018

Dear Ms. Louie,

Please find Anghera Environmental's eelgrass (*Zostera marina*) report for the Basin 3 Channel Area in King Harbor, California.

We did not find any eelgrass in the project area during this survey. Please do not hesitate to give me a call if you have any questions.

Sincerely,

M. Anghera

Mike Anghera
Anghera Environmental
President/Senior Marine Biologist

Zostera marina Survey Reporting Form
Basin 3 Channel Project
King Harbor, California
Survey Date: September 22, 2018

Prepared for:

Lisa Louie

Senior Project Manager

Chambers Group, Inc.

5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707

t | 949.261.5414 x7289

Prepared by:

Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
(805) 698-1004

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This form is required to be submitted for any surveys conducted for the eelgrass, *Zostera marina*, that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers and the Coastal Commission. The form has been designed to assist in identifying eelgrass while ensuring that the required information is consistently documented. Surveys required to be conducted for this species are subject to modification through publication of revisions to the eelgrass survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, contact: Bryant Chesney National Marine Fisheries Service, 562-980-4037, or William Paznokas, California Department of Fish & Wildlife 858-467-4218.

Site Name:	Basin 3 Channel Area, King Harbor, California. See Figure 1
Survey Contact:	Mike Anghera, Senior Marine Biologist, Anghera Environmental. (805) 698 1004 mikeanghera@gmail.com Client Contact: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289
Permit Reference:	TBD
Hydrographic System:	King Harbor, Los Angeles County, California. See Figure 1
Specific Location:	33. 84179 º N 118. 39200º W to 33. 84151 º N 118. 39279º W NAD 83. Accuracy within 1 meter. See Figure 1
Was Eelgrass Detected:	**NO, Eelgrass was not found at this site.**
Description of Permitted Work:	**Maintenance Dredging Project** **Source**: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289

<table>
<tr><td>Description of Site:
(describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</td><td>Depth range:</td><td>The depths encountered on the dive ranged from 13ft depth just south of the docks north of the main channel, to a gradually sloped exposed sandy beach to the south.</td></tr>
<tr><td></td><td>Substrate type and underwater visibility:</td><td>Hard packed coarse-grain sand was observed in shallow zone of the study site, while a mixture of fine sand and soft muddy sediment was present in the main channel.
On all swim transects, we had an unobstructed view of the bottom. Turbidity throughout the study site was low with decent visibility, giving us a clear view of the areal extent of eelgrass in the area relative to the dock structure.</td></tr>
<tr><td></td><td>Temperature:</td><td>The water temperature during the survey was 21.6° C (70.9° F).</td></tr>
<tr><td></td><td>Salinity:</td><td>Harbor Range: 25-33 ppt</td></tr>
<tr><td></td><td>Dominant flora:</td><td><table><tr><th></th><th>Common Name</th><th>Scientific Name</th></tr><tr><td>Algae</td><td>Encrusting red algae</td><td>Corralina sp.</td></tr></table></td></tr>
<tr><td></td><td>Dominant fauna:</td><td><table><tr><th></th><th>Common Name</th><th>Scientific Name</th></tr><tr><td>Inverts</td><td>Tube Dwelling Anemone</td><td>Pachycerianthus sp.</td></tr><tr><td></td><td>Sea Slugs</td><td>Navanax inermis</td></tr><tr><td></td><td>Nudibranchs</td><td>Acanthodoris luteus</td></tr><tr><td></td><td>Oysters</td><td>Ostrea pacifica</td></tr><tr><td></td><td></td><td></td></tr><tr><td>Fish</td><td>Round Stingrays</td><td>Urobatis halleri</td></tr><tr><td></td><td>Rainbow Surfperch</td><td>Hypsurus sp.</td></tr><tr><td></td><td>Opaleye Perch</td><td>Girella nigricans</td></tr><tr><td></td><td>Garibaldi</td><td>Hypsypops rubicundus</td></tr><tr><td></td><td>Top Smelt</td><td>Atherinops affinis</td></tr><tr><td></td><td>Spotted Turbot</td><td>Pleuronichthys ritteri</td></tr><tr><td></td><td>Rock Wrasse</td><td>Halichoeres semicinctus</td></tr><tr><td></td><td>Zebra Perch</td><td>Hermosilla azure</td></tr></table></td></tr>
</table>

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	Exotic species encountered:	**No noxious weed (*Caulerpa taxifolia*) was observed anywhere in the vicinity of the study area. No least terns or brown pelicans were seen in the vicinity of the project area. No marine mammals were observed in the area prior to beginning the survey.**
	Other site description notes:	**Small channel with multiple vessels en route at time of survey**
Description of Survey Effort: [illegible]	Survey date and time period:	The survey was conducted on September 22, 2018 between 1200 and 1230 hrs.
	Survey type and methods:	The survey was conducted by marine biologists using SCUBA and agency-approved transect techniques for conducting the eelgrass and invasive algae survey. Field conditions noted during the survey included bottom type, common marine life, and the presence or absence of *Caulerpa* and eelgrass. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the Los Angeles tidal station.
	Survey personnel:	Mr. Mike Anghera, Senior Marine Biologist Dr. Kimo Morris, Senior Marine Biologist
.	Horizontal visibility in water: Survey density:	Dive conditions during the survey were good, with adequate light throughout the day and good visibility (4-5 m in all directions on the bottom). On all swim transects, we had an unobstructed view of the bottom. Biologist-divers swam a continuous transect within the project area and approximately 15m beyond where possible. Approximately 90% of the project area was surveyed. Refer to Figure 2 for transect locations.
	Survey Limitations:	Multiple vessels operating in the study area during survey, necessary precautions were taken to insure the safety of the diver/biologists.

Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.) .	See attached project figures. Figure 1. Regional Project Location Figure 2. Dive Transects

□

Figure 1. Project Location.
King Harbor, Los Angeles County, California

Figure 2. Project Survey Area and Diver Transects

October 10, 2018

Dear Ms. Louie,

Please find Anghera Environmental's eelgrass (*Zostera marina*) report for the Harbor Placement site in King Harbor, California.

We did not find any eelgrass in the project area during this survey. Please do not hesitate to give me a call if you have any questions.

Sincerely,

M. Anghera

Mike Anghera
Anghera Environmental
President/Senior Marine Biologist

Zostera marina Survey Reporting Form
Harbor Placement Site
King Harbor, California
Survey Date: September 22, 2018

Prepared for:

Lisa Louie

Senior Project Manager

Chambers Group, Inc.

5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707

t | 949.261.5414 x7289

Prepared by:
Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
(805) 698-1004

Anghera Environmental

□ .

This form is required to be submitted for any surveys conducted for the eelgrass, *Zostera marina*, that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers and the Coastal Commission. The form has been designed to assist in identifying eelgrass while ensuring that the required information is consistently documented. Surveys required to be conducted for this species are subject to modification through publication of revisions to the eelgrass survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, contact: Bryant Chesney National Marine Fisheries Service, 562-980-4037, or William Paznokas, California Department of Fish & Wildlife 858-467-4218.

Site Name:	Harbor Placement Site, King Harbor, California. See Figure 1
Survey Contact:	Mike Anghera, Senior Marine Biologist, Anghera Environmental. (805) 698 1004 mikeanghera@gmail.com Client Contact: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289
Permit Reference:	TBD
Hydrographic System:	King Harbor, Los Angeles County, California. See Figure 1
Specific Location:	33º 50’ 36.27” N 118º 23’ 47.46” W to 33º 50’ 31.50” N 118º 23’ 38.83”W NAD 83. Accuracy within 1 meter. See Figure 1
Was Eelgrass Detected:	**NO, Eelgrass was not found at this site.**
Description of Permitted Work:	**Maintenance Dredging Project** **Source**: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289

<table>
<tr><td>Description of Site:
(describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</td><td>Depth range:</td><td>The depths encountered on the dive ranged from 31’ to 39’</td></tr>
<tr><td></td><td>Substrate type and underwater visibility:</td><td>Fine sand and soft muddy sediment was present in the study area.

On all swim transects, we had an unobstructed view of the bottom. Turbidity throughout the study site was low with decent visibility, giving us a clear view of the bottom.</td></tr>
<tr><td></td><td>Temperature:</td><td>The water temperature during the survey was 16.78° C (62.2° F)</td></tr>
<tr><td></td><td>Salinity:</td><td>Harbor Range: 25-33 ppt</td></tr>
<tr><td></td><td>Dominant flora:</td><td><table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td>Algae</td><td>Red Sea Grapes</td><td>Botryocladia sp.</td></tr>
</table></td></tr>
<tr><td></td><td>Dominant fauna:</td><td><table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td>Inverts</td><td>Tube Dwelling Anemone</td><td>Pachycerianthus sp.</td></tr>
<tr><td></td><td>Sea Pen</td><td>Ptilosarcus sp</td></tr>
<tr><td></td><td>Sea Cucumber</td><td>Apostichopus californicus</td></tr>
<tr><td></td><td>Kellet's Whelk</td><td>Kelletia sp.</td></tr>
<tr><td></td><td>Mitre shells</td><td>Mitridae sp.</td></tr>
<tr><td></td><td>Bubble Snail</td><td>Haminoea sp.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Fish</td><td></td><td></td></tr>
<tr><td></td><td>Blue Banded Goby</td><td>Lythrypnus dalli</td></tr>
<tr><td></td><td>Senorita</td><td>Oxyjulis californica</td></tr>
<tr><td></td><td>Kelp Bass</td><td>Paralabrax clathrantus</td></tr>
</table></td></tr>
</table>

□ ·

	Exotic species encountered:	**No noxious weed (*Caulerpa taxifolia*) was observed anywhere in the vicinity of the study area. No least terns or brown pelicans were seen in the vicinity of the project area. No marine mammals were observed in the area prior to beginning the survey.**
	Other site description notes:	**Medium navigational channel with multiple vessels in the area at time of survey**
Description of Survey Effort: [illegible]	Survey date and time period:	The survey was conducted on September 22, 2018 between 1045 and 1130 hrs.
	Survey type and methods:	The survey was conducted by marine biologists using SCUBA and agency-approved transect techniques for conducting the eelgrass and invasive algae survey. Field conditions noted during the survey included bottom type, common marine life, and the presence or absence of *Caulerpa* and eelgrass. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the Los Angeles tidal station.
	Survey personnel:	Mr. Mike Anghera, Senior Marine Biologist Dr. Kimo Morris, Senior Marine Biologist
.	Horizontal visibility in water: Survey density:	Dive conditions during the survey were good, with adequate light throughout the day and good visibility (2-3 m in all directions on the bottom). On all swim transects, we had an unobstructed view of the bottom. Biologist-divers swam a continuous transect within the project area and approximately 5m beyond where possible. Approximately 90% of the project area was surveyed. Refer to Figure 2 for transect locations.
	Survey Limitations:	Multiple vessels operating in the study area during survey, necessary precautions were taken to insure the safety of the diver/biologists.

Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.) .	See attached project figures. Figure 1. Regional Project Location Figure 2. Dive Transects

□

Figure 1. Project Location.
King Harbor, Los Angeles County, California

Figure 2. Project Survey Area and Diver Transects

October 10, 2018

Dear Ms. Louie,

Please find Anghera Environmental's eelgrass (*Zostera marina*) report for the Offshore Disposal area near King Harbor, California.

We did not find any eelgrass in the project area during this survey. Please do not hesitate to give me a call if you have any questions.

Sincerely,

M. Anghera

Mike Anghera
Anghera Environmental
President/Senior Marine Biologist

Anghera Environmental.
1274 Alta Vista Dr, Vista Ca 92084 805 698 1004

Zostera marina Survey Reporting Form
Offshore Disposal Area
King Harbor, California
Survey Date: September 22, 2018

Prepared for:

Lisa Louie

Senior Project Manager

Chambers Group, Inc.

5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707

t | 949.261.5414 x7289

Prepared by:
Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
(805) 698-1004

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This form is required to be submitted for any surveys conducted for the eelgrass, *Zostera marina*, that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers and the Coastal Commission. The form has been designed to assist in identifying eelgrass while ensuring that the required information is consistently documented. Surveys required to be conducted for this species are subject to modification through publication of revisions to the eelgrass survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, contact: Bryant Chesney National Marine Fisheries Service, 562-980-4037, or William Paznokas, California Department of Fish & Wildlife 858-467-4218.

Site Name:	Offshore Disposal Area, King Harbor, California. See Figure 1
Survey Contact:	Mike Anghera, Senior Marine Biologist, Anghera Environmental. (805) 698 1004 mikeanghera@gmail.com Client Contact: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289
Permit Reference:	TBD
Hydrographic System:	King Harbor, Los Angeles County, California. See Figure 1
Specific Location:	33º 49' 42.97" N 118º 23' 54.18" W to 33º 49' 42.27" N 118º 23' 42.26"W NAD 83. Accuracy within 1 meter. See Figure 1
Was Eelgrass Detected:	**NO, Eelgrass was not found at this site.**
Description of Permitted Work:	**Maintenance Dredging Project** **Source**: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289

<table>
<tr><td>Description of Site:
(describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</td><td>Depth range:</td><td>The depths encountered on the dive ranged from 46ft to 38’</td></tr>
<tr><td></td><td>Substrate type and underwater visibility:</td><td>Coarse sand was present throughout the study area.

On all swim transects, we had an unobstructed view of the bottom. Turbidity throughout the study site was low with decent visibility, giving us a clear view of the areal extent of eelgrass in the area relative to the dock structure.</td></tr>
<tr><td></td><td>Temperature:</td><td>The water temperature during the survey was 17.44° C (63.4° F)</td></tr>
<tr><td></td><td>Salinity:</td><td>Ocean Range: 32-33 ppt</td></tr>
<tr><td></td><td>Dominant flora:</td><td>No attached algae were observed in the study area. Algal detritus consisting of pieces of Macroscystis pyrifera, Phyllospadix torrey, Egregia Eisenia and Gelidium robustum were found between the 43’ and 41’ isobaths.</td></tr>
<tr><td></td><td>Dominant fauna:</td><td>
<table>
<tr><td></td><td>Common Name</td><td>Scientific Name</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Inverts</td><td></td><td></td></tr>
<tr><td></td><td>Tube Dwelling Anemone</td><td>Pachycerianthus s</td></tr>
<tr><td></td><td>Ornate Tube Worm</td><td>Diopatra Ornata</td></tr>
<tr><td></td><td>Giant Sea Star</td><td>Pisaster sp.</td></tr>
<tr><td></td><td>Sand Dollar</td><td>Dendraster excent</td></tr>
<tr><td></td><td>Sea Pansy</td><td>Ranilla sp.</td></tr>
<tr><td></td><td>Sea Pen</td><td>Ptilosarcus sp</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Fish</td><td>Senorita</td><td>Oxyjulis californica</td></tr>
<tr><td></td><td>Kelp Bass</td><td>Paralabrax clathra</td></tr>
</table>
</td></tr>
</table>

□ ·

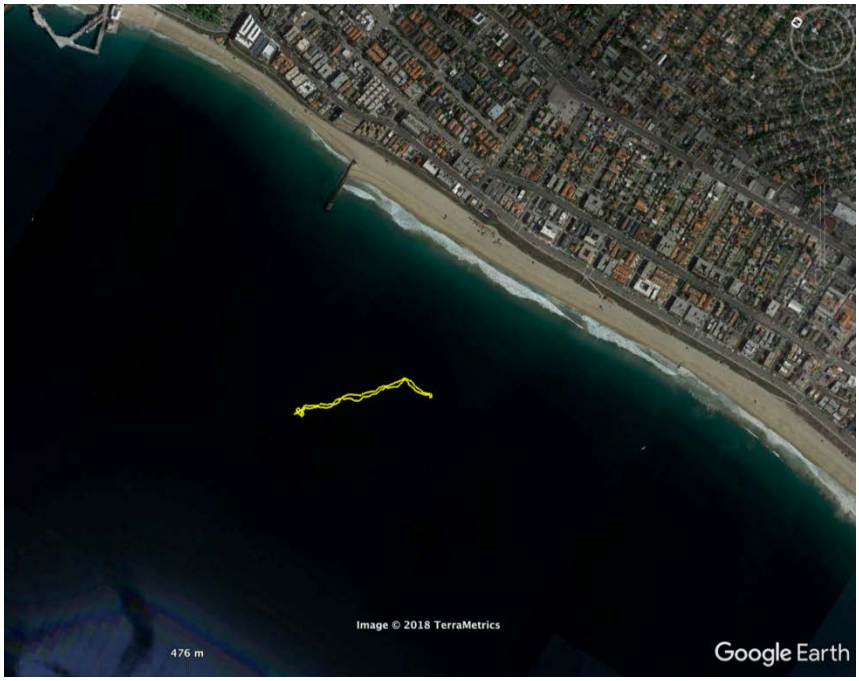
	Exotic species encountered:	**No noxious weed (*Caulerpa taxifolia*) was observed anywhere in the vicinity of the study area. No least terns or brown pelicans were seen in the vicinity of the project area. No marine mammals were observed in the area prior to beginning the survey.**
	Other site description notes:	**Near coastal ocean site with no other vessels in the vicinity.**
Description of Survey Effort: [illegible]	Survey date and time period:	The survey was conducted on September 22, 2018 between 1240 and 1330 hrs.
	Survey type and methods:	The survey was conducted by marine biologists using SCUBA and agency-approved transect techniques for conducting the eelgrass and invasive algae survey. Field conditions noted during the survey included bottom type, common marine life, and the presence or absence of *Caulerpa* and eelgrass. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the Los Angeles tidal station.
	Survey personnel:	Mr. Mike Anghera, Senior Marine Biologist Dr. Kimo Morris, Senior Marine Biologist
.	Horizontal visibility in water: Survey density:	Dive conditions during the survey were good, with adequate light throughout the day and good visibility (5-7 m in all directions on the bottom). On all swim transects, we had an unobstructed view of the bottom. Biologist-divers swam a continuous transect within the project area and approximately 15m beyond where possible. Approximately 90% of the project area was surveyed. Refer to Figure 2 for transect locations.
	Survey Limitations:	Near coastal ocean site, all necessary precautions were taken to insure the safety of the diver/biologists.

Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.) .	See attached project figures. Figure 1. Regional Project Location Figure 2. Dive Transects

□

Figure 1. Project Location.
King Harbor, Los Angeles County, California

Figure 2. Project Survey Area and Diver Transects



October 10, 2018

Dear Ms. Louie,

Please find Anghera Environmental's eelgrass (*Zostera marina*) report for the Outer Harbor dredging site in King Harbor, California.

We did not find any eelgrass in the project area during this survey. Please do not hesitate to give me a call if you have any questions.

Sincerely,

M. Anghera

Mike Anghera
Anghera Environmental
President/Senior Marine Biologist

Zostera marina Survey Reporting Form
Outer Harbor Dredging Project
King Harbor, California
Survey Date: September 22, 2018

Prepared for:

Lisa Louie

Senior Project Manager

Chambers Group, Inc.

5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707

t | 949.261.5414 x7289

Prepared by:
Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
(805) 698-1004

Anghera Environmental

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This form is required to be submitted for any surveys conducted for the eelgrass, *Zostera marina*, that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers and the Coastal Commission. The form has been designed to assist in identifying eelgrass while ensuring that the required information is consistently documented. Surveys required to be conducted for this species are subject to modification through publication of revisions to the eelgrass survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, contact: Bryant Chesney National Marine Fisheries Service, 562-980-4037, or William Paznokas, California Department of Fish & Wildlife 858-467-4218.

Site Name:	Outer Harbor Dredging Site, King Harbor, California. See Figure 1
Survey Contact:	Mike Anghera, Senior Marine Biologist, Anghera Environmental. (805) 698 1004 mikeanghera@gmail.com Client Contact: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289
Permit Reference:	TBD
Hydrographic System:	King Harbor, Los Angeles County, California. See Figure 1
Specific Location:	33º 50’ 55.94” N 118º 24’ 05.51” W to 33º 50’ 37.21” N 118º 23’ 56.73”W NAD 83. Accuracy within 1 meter. See Figure 1
Was Eelgrass Detected:	**NO, Eelgrass was not found at this site.**
Description of Permitted Work:	**Maintenance Dredging Project** **Source**: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289

<table>
<tr><td>Description of Site:
(describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</td><td>Depth range:</td><td>The depths encountered on the dive ranged from 21ft in the main channel, to a flat ledge at the base of the rip rap to the west.</td></tr>
<tr><td></td><td>Substrate type and underwater visibility:</td><td>Hard packed coarse-grain sand, shell debris and rubble was observed in shallow zone of the study site, while a mixture of fine sand and soft muddy sediment was present in the main channel.
On all swim transects, we had an unobstructed view of the bottom. Turbidity throughout the study site was low with decent visibility, giving us a clear view of the areal extent of the bottom.</td></tr>
<tr><td></td><td>Temperature:</td><td>The water temperature during the survey was 21.6° C (70.9° F).</td></tr>
<tr><td></td><td>Salinity:</td><td>Harbor Range: 25-33 ppt</td></tr>
<tr><td></td><td>Dominant flora:</td><td>
<table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td>Algae</td><td>Sea Grass</td><td>Phyllospadix torre</td></tr>
<tr><td></td><td>Corraline algae</td><td>Corralina sp.</td></tr>
<tr><td></td><td>Brown bubbles</td><td>Colpomenia sp.</td></tr>
<tr><td></td><td>Sargassum</td><td>Sargassum muticu</td></tr>
<tr><td></td><td>Seaweed</td><td>Dictyota sp.</td></tr>
</table>
</td></tr>
<tr><td></td><td>Dominant fauna:</td><td>
<table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td>Inverts</td><td>Sponges</td><td>Haliclona sp.</td></tr>
<tr><td></td><td>Sea Slugs</td><td>Navanax inermis</td></tr>
<tr><td></td><td>Oysters</td><td>Ostrea pacifica</td></tr>
<tr><td></td><td>Ornate Tube Worm</td><td>Diopatra Ornata</td></tr>
<tr><td></td><td>Sand Dollar</td><td>Dendraster excent</td></tr>
<tr><td></td><td>Lewis's Moon Snail</td><td>Neverita lewisii</td></tr>
<tr><td></td><td>Purple Olive Snail</td><td>Callianax biplicata</td></tr>
<tr><td></td><td>Sea Snail</td><td>Chlorostoma sp.</td></tr>
<tr><td></td><td>California Spiny Lobster</td><td>Panulirus interrup</td></tr>
<tr><td></td><td>Bubble Snail</td><td>Haminoea sp.</td></tr>
<tr><td></td><td>Western Banded Tegula</td><td>Tegula eiseni</td></tr>
<tr><td></td><td>Bubble Snail</td><td>Bulla sp.</td></tr>
<tr><td></td><td>Blue Banded Hermit Crab</td><td>Paugurus samueli</td></tr>
</table>
</td></tr>
</table>

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	Dominant fauna:		Common Name	Scientific Name
		Fish	Round Stingrays	Urobatis halleri
			Rainbow Surfperch	Hypsurus sp.
			Opaleye Perch	Girella nigricans
			Kelp Bass	Paralabrax clathrantus
			Anchovies	Engraulis mordax
			Top Smelt	Atherinops affinis
			Sargo	Diplodus sp.
			Spotted Bay Bass	Paralabrax masculatofascia
			Garibaldi	Hypsypops rubicundus
			Salema	Haemulon californiensis
			Fantail Sole	Xystreurys liolepsis
			Spotted Turbot	Pleuronichthys ritteri
			California Halibut	Paralichthys californicus
			Rock Wrasse	Halichoeres semicinctus
			Black Surf Perch	Embiotoca jacksoni
			Zebra Perch	Hermosilla azure
	Exotic species encountered:	**No noxious weed (*Caulerpa taxifolia*) was observed anywhere in the vicinity of the study area . No least terns or brown pelicans were seen in the vicinity of the project area. No marine mammals were observed in the area prior to beginning the survey.**		
	Other site description notes:	**Medium navigational channel with multiple vessels in the area at time of survey**		

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Description of Survey Effort:	Survey date and time period:	The survey was conducted on September 22, 2018 between 0845 and 1025 hrs.
	Survey type and methods:	The survey was conducted by marine biologists using SCUBA and agency-approved transect techniques for conducting the eelgrass and invasive algae survey. Field conditions noted during the survey included bottom type, common marine life, and the presence or absence of *Caulerpa* and eelgrass. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the Los Angeles tidal station.
	Survey personnel:	Mr. Mike Anghera, Senior Marine Biologist Dr. Kimo Morris, Senior Marine Biologist
	Horizontal visibility in water:	Dive conditions during the survey were good, with adequate light throughout the day and good visibility (3-4 m in all directions on the bottom). On all swim transects, we had an unobstructed view of the bottom.
	Survey density:	Biologist-divers swam a continuous transect within the project area and approximately 5m beyond where possible. Approximately 90% of the project area was surveyed. Refer to Figure 2 for transect locations.
.	Survey Limitations:	Multiple vessels operating in the study area during survey, necessary precautions were taken to insure the safety of the diver/biologists.

Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.) .	See attached project figures. Figure 1. Regional Project Location Figure 2. Dive Transects

Figure 1. Project Location.

King Harbor, Los Angeles County, California

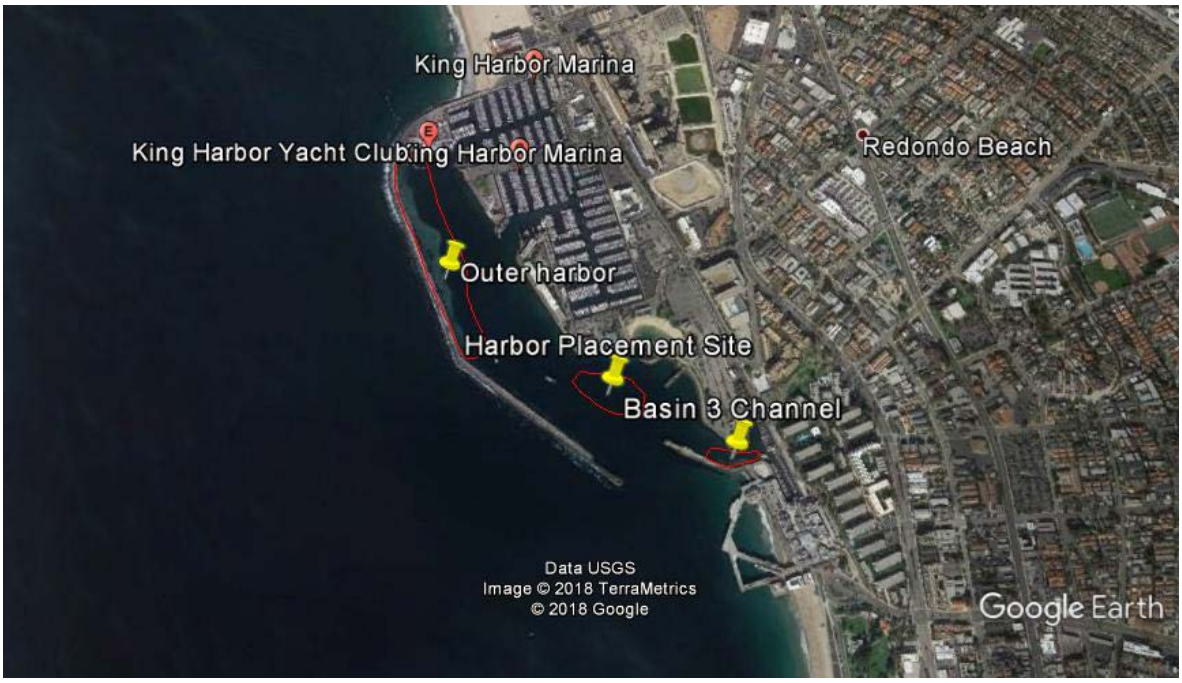

Figure 2. Project Survey Area and Diver Transects

October 10, 2018

Dear Ms. Louie,

Please find Anghera Environmental's invasive algae (*Caulerpa taxifolia*) report for the Basin 3 Channel site in King Harbor.

Caulerpa sp. was not observed within the project site during this survey. Please do not hesitate to give me a call if you have any questions.

Sincerely,

M. Anghera

Mike Anghera
Anghera Environmental
President/Senior Marine Biologist

Caulerpa taxifolia Survey Reporting Form
Basin 3 Channel Project
King Harbor, California
Survey Date: September 22, 2018

Prepared for:

Lisa Louie

Senior Project Manager

Chambers Group, Inc.

5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707

t | 949.261.5414 x7289

Prepared by:

Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
805 698 1004

Anghera Environmental

.

This form is required to be submitted for any surveys conducted for the invasive exotic alga *Caulerpa taxifolia* that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers or Regional Water Quality Control Boards (Regions 8 & 9). The form has been designed to assist in controlling the costs of reporting while ensuring that the required information necessary to identify and control any potential impacts of the authorized actions on the spread of *Caulerpa*. Surveys required to be conducted for this species are subject to modification through publication of revisions to the *Caulerpa* survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, please contact: Bryant Chesney, National Marine Fisheries Service (NOAA Fisheries), (562) 980-4037, or William Paznokas, California Department of Fish & Wildlife (858) 467-4218).

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Report Date:	October 10, 2018
Name of bay, estuary, lagoon, or harbor:	King Harbor, Los Angeles County, California. See Figure 1
Specific Location Name:	Basin 3 Channel, King Harbor, California. See Figure 1
Site Coordinates: (UTM, Lat./Long., datum, accuracy level, and an electronic survey area map or hard copy of the map **must** be included).	33. 84179 º N 118. 39200º W to 33. 84151 º N 118. 39279º W NAD 83. Accuracy within 1 meter. See Figure 1
Survey Contact: (name, phone, e-mail)	Mike Anghera, Senior Marine Biologist, Anghera Environmental (805) 698-1004 mikeanghera@gmail.com Client Contact: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289
Personnel Conducting Survey (if other than above): name, phone, email	Mr. Mike Anghera (certified *Caulerpa* surveyor) Dr. Kimo Morris (certified *Caulerpa* surveyor)
Permit Reference: (ACOE Permit No., RWQCB Order or Cert. No.)	TBD
Is this the first or second survey for this project?	First
Was *Caulerpa* Detected?: (if *Caulerpa* is found, please immediately contact NOAA Fisheries or CDFG personnel identified above)	**NO**

.

<table>
<tr><td>Description of Permitted Work: (describe briefly the work to be conducted at the site under the permits identified above)</td><td colspan="2">Maintenance Dredging Project
Source:
Lisa Louie
Chambers Group, Inc.
949.261.5414 x7289</td></tr>
<tr><td>Description of Site:</td><td>Depth range:</td><td>The depths encountered on the dive ranged from 13ft depth just south of the docks north of the main channel, to a gradually sloped exposed sandy beach to the south.</td></tr>
<tr><td rowspan="5">(describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</td><td>Substrate type:</td><td>Hard packed coarse-grain sand was observed in shallow zone of the study site, while a mixture of fine sand and soft muddy sediment was present in the main channel.</td></tr>
<tr><td>Temperature:</td><td>The water temperature during the survey was 21.6° C (70.9° F).</td></tr>
<tr><td>Salinity:</td><td>Harbor Range: 25-33 ppt</td></tr>
<tr><td>Dominant flora:</td><td>
<table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td>Algae</td><td>Encrusting red algae</td><td>Corralina sp.</td></tr>
</table>
</td></tr>
<tr><td>Dominant fauna:</td><td>
<table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td>Inverts</td><td>Tube Dwelling Anemone</td><td>Pachycerianthus sp.</td></tr>
<tr><td></td><td>Sea Slugs</td><td>Navanax inermis</td></tr>
<tr><td></td><td>Nudibranchs</td><td>Acanthodoris luteus</td></tr>
<tr><td></td><td>Oysters</td><td>Ostrea pacifica</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Fish</td><td>Round Stingrays</td><td>Urobatis halleri</td></tr>
<tr><td></td><td>Rainbow Surfperch</td><td>Hypsurus sp.</td></tr>
<tr><td></td><td>Opaleye Perch</td><td>Girella nigricans</td></tr>
<tr><td></td><td>Garibaldi</td><td>Hypsypops rubicundus</td></tr>
<tr><td></td><td>Top Smelt</td><td>Atherinops affinis</td></tr>
<tr><td></td><td>Spotted Turbot</td><td>Pleuronichthys ritteri</td></tr>
<tr><td></td><td>Rock Wrasse</td><td>Halichoeres semicinctus</td></tr>
<tr><td></td><td>Zebra Perch</td><td>Hermosilla azure</td></tr>
</table>
</td></tr>
</table>

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	Exotic species encountered (including any other Caulerpa species):	**The noxious weed (*Caulerpa taxifolia*) was NOT observed anywhere in the vicinity of the study area or reference site.** **No least terns or brown pelicans were seen in the vicinity of the project area.** **No marine mammals were observed in the area prior to beginning the survey.**
	Other site description notes:	**Small channel with multiple vessels en route at time of survey**
Description of Survey Effort: (please describe the surveys conducted including type of survey (SCUBA, remote video, etc.) and survey methods employed, date of work, and survey density (estimated percentage of the bottom actually viewed). Describe any limitations encountered during the survey efforts.	*Survey date and time period:*	**The survey was conducted on September 22, 2018 between 1200 and 1230 hrs.**
	Survey type and methods:	**The survey was conducted by marine biologists using SCUBA and agency-approved transect techniques for conducting the eelgrass and invasive algae survey. Field conditions noted during the survey included bottom type, common marine life, and the presence or absence of Caulerpa and eelgrass. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the Los Angeles tidal station.**
	Survey personnel:	**Mr. Mike Anghera, Senior Marine Biologist** **Dr. Kimo Morris, Senior Marine Biologist**
	Horizontal visibility in water:	**Dive conditions during the survey were good, with adequate light throughout the day and good visibility (4-5 m in all directions on the bottom). On all swim transects, we had an unobstructed view of the bottom.**
	Survey density:	**Biologist-divers swam a continuous transect within the project area and approximately 5m beyond where possible. Approximately 90% of the project area was surveyed. Refer to Figure 2 for transect locations.**
	Survey Limitations:	**Multiple vessels operating in the study area during survey, necessary precautions were taken to insure the safety of the diver/biologists.**
Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.)		**See attached project figures.** **Figure 1. Regional Project Location** **Figure 2. Project Area and Dive Transects**

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Figure 1. Project Location.
King Harbor, Los Angeles County, California

Figure 2. Project Survey Area
and Diver Transects

October 10, 2018

Dear Ms. Louie,

Please find Anghera Environmental's invasive algae (*Caulerpa taxifolia*) report for the Harbor Placement site in King Harbor.

Caulerpa sp. was not observed within the project site during this survey. Please do not hesitate to give me a call if you have any questions.

Sincerely,

M. Anghera

Mike Anghera
Anghera Environmental
President/Senior Marine Biologist

Caulerpa taxifolia Survey Reporting Form
Harbor Placement Site
King Harbor, California
Survey Date: September 22, 2018

Prepared for:

Lisa Louie

Senior Project Manager

Chambers Group, Inc.

5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707

t | 949.261.5414 x7289

Prepared by:

Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
805 698 1004

Anghera Environmental

.

This form is required to be submitted for any surveys conducted for the invasive exotic alga *Caulerpa taxifolia* that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers or Regional Water Quality Control Boards (Regions 8 & 9). The form has been designed to assist in controlling the costs of reporting while ensuring that the required information necessary to identify and control any potential impacts of the authorized actions on the spread of *Caulerpa*. Surveys required to be conducted for this species are subject to modification through publication of revisions to the *Caulerpa* survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, please contact: Bryant Chesney, National Marine Fisheries Service (NOAA Fisheries), (562) 980-4037, or William Paznokas, California Department of Fish & Wildlife (858) 467-4218).

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Report Date:	October 10, 2018
Name of bay, estuary, lagoon, or harbor:	King Harbor, Los Angeles County, California. See Figure 1
Specific Location Name:	Harbor Placement Site, King Harbor, California. See Figure 1
Site Coordinates: (UTM, Lat./Long., datum, accuracy level, and an electronic survey area map or hard copy of the map **must** be included).	33° 50' 36.27" N 118° 23' 47.46" W to 33° 50' 31.50" N 118° 23' 38.83"W NAD 83. Accuracy within 1 meter. See Figure 1
Survey Contact: (name, phone, e-mail)	Mike Anghera, Senior Marine Biologist, Anghera Environmental (805) 698-1004 mikeanghera@gmail.com Client Contact: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289
Personnel Conducting Survey (if other than above): name, phone, email	Mr. Mike Anghera (certified *Caulerpa* surveyor) Dr. Kimo Morris (certified *Caulerpa* surveyor)
Permit Reference: (ACOE Permit No., RWQCB Order or Cert. No.)	TBD
Is this the first or second survey for this project?	First
Was *Caulerpa* Detected?: (if *Caulerpa* is found, please immediately contact NOAA Fisheries or CDFG personnel identified above)	**NO**

.

<table>
<tr><td>Description of Permitted Work: (describe briefly the work to be conducted at the site under the permits identified above)</td><td colspan="2">Maintenance Dredging Project
Source:
Lisa Louie
Chambers Group, Inc.
949.261.5414 x7289</td></tr>
<tr><td rowspan="4">Description of Site:

(describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</td><td>Depth range:</td><td>The depths encountered on the dive ranged from 31ft to 39’</td></tr>
<tr><td>Substrate type:</td><td>Fine sand and soft muddy sediment was present in the study area.</td></tr>
<tr><td>Temperature:</td><td>The water temperature during the survey was 16.78° C (62.2° F).</td></tr>
<tr><td>Salinity:</td><td>Harbor Range: 25-33 ppt</td></tr>
<tr><td>Dominant flora:

Dominant fauna:</td><td colspan="2">
<table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td>Algae</td><td>Red Sea Grapes</td><td>Botryocladia sp.</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
<table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td>Inverts</td><td>Tube Dwelling Anemone</td><td>Pachycerianthus sp.</td></tr>
<tr><td></td><td>Sea Pen</td><td>Ptilosarcus sp</td></tr>
<tr><td></td><td>Sea Cucumber</td><td>Apostichopus californicus</td></tr>
<tr><td></td><td>Kellet's Whelk</td><td>Kelletia sp.</td></tr>
<tr><td></td><td>Mitre shells</td><td>Mitridae sp.</td></tr>
<tr><td></td><td>Bubble Snail</td><td>Haminoea sp.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Fish</td><td></td><td></td></tr>
<tr><td></td><td>Blue Banded Goby</td><td>Lythrypnus dalli</td></tr>
<tr><td></td><td>Senorita</td><td>Oxyjulis californica</td></tr>
<tr><td></td><td>Kelp Bass</td><td>Paralabrax clathrantus</td></tr>
</table>
</td></tr>
</table>

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	Exotic species encountered (including any other Caulerpa species):	**The noxious weed (*Caulerpa taxifolia*) was NOT observed anywhere in the vicinity of the study area or reference site.** **No least terns or brown pelicans were seen in the vicinity of the project area.** **No marine mammals were observed in the area prior to beginning the survey.**
	Other site description notes:	**Medium navigational channel with multiple vessels in the area at time of survey**
Description of Survey Effort: (please describe the surveys conducted including type of survey (SCUBA, remote video, etc.) and survey methods employed, date of work, and survey density (estimated percentage of the bottom actually viewed). Describe any limitations encountered during the survey efforts.	*Survey date and time period:*	**The survey was conducted on September 22, 2018 between 1045 and 1130 hrs.**
	Survey type and methods:	**The survey was conducted by marine biologists using SCUBA and agency-approved transect techniques for conducting the eelgrass and invasive algae survey. Field conditions noted during the survey included bottom type, common marine life, and the presence or absence of Caulerpa and eelgrass. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the Los Angeles tidal station.**
	Survey personnel:	**Mr. Mike Anghera, Senior Marine Biologist** **Dr. Kimo Morris, Senior Marine Biologist**
	Horizontal visibility in water:	**Dive conditions during the survey were good, with adequate light throughout the day and good visibility (2-3 m in all directions on the bottom). On all swim transects, we had an unobstructed view of the bottom.**
	Survey density:	**Biologist-divers swam a continuous transect within the project area and approximately 5m beyond where possible. Approximately 90% of the project area was surveyed. Refer to Figure 2 for transect locations.**
	Survey Limitations:	**Multiple vessels operating in the study area during survey, necessary precautions were taken to insure the safety of the diver/biologists.**
Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.)		**See attached project figures.** **Figure 1. Regional Project Location** **Figure 2. Project Area and Dive Transects**

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Figure 1. Project Location.
King Harbor, Los Angeles County, California

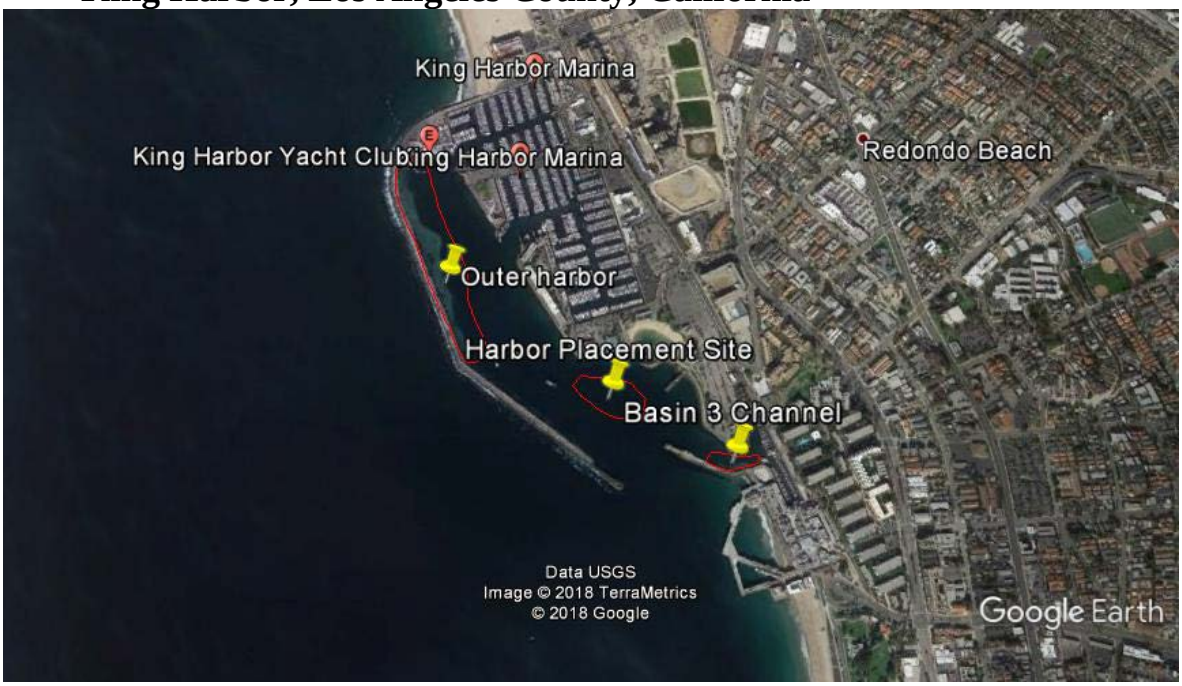

Figure 2. Project Survey Area
and Diver Transects

October 10, 2018

Dear Ms. Louie,

Please find Anghera Environmental's invasive algae (*Caulerpa taxifolia*) report for the Offshore Disposal area near King Harbor.

Caulerpa sp. was not observed within the project site during this survey. Please do not hesitate to give me a call if you have any questions.

Sincerely,

.

M. Anghera

Mike Anghera
Anghera Environmental
President/Senior Marine Biologist

Caulerpa taxifolia Survey Reporting Form
Offshore Placement Area
King Harbor, California
Survey Date: September 22, 2018

Prepared for:

Lisa Louie

Senior Project Manager

Chambers Group, Inc.

5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707

t | 949.261.5414 x7289

Prepared by:

Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
805 698 1004

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This form is required to be submitted for any surveys conducted for the invasive exotic alga *Caulerpa taxifolia* that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers or Regional Water Quality Control Boards (Regions 8 & 9). The form has been designed to assist in controlling the costs of reporting while ensuring that the required information necessary to identify and control any potential impacts of the authorized actions on the spread of *Caulerpa*. Surveys required to be conducted for this species are subject to modification through publication of revisions to the *Caulerpa* survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, please contact: Bryant Chesney, National Marine Fisheries Service (NOAA Fisheries), (562) 980-4037, or William Paznokas, California Department of Fish & Wildlife (858) 467-4218).

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Report Date:	October 10, 2018
Name of bay, estuary, lagoon, or harbor:	King Harbor, Los Angeles County, California. See Figure 1
Specific Location Name:	Offshore Placement Area, King Harbor, California. See Figure 1
Site Coordinates: (UTM, Lat./Long., datum, accuracy level, and an electronic survey area map or hard copy of the map **must** be included).	33° 49' 42.97" N 118° 23' 54.18" W to 33° 49' 42.27" N 118° 23' 42.26"W NAD 83. Accuracy within 1 meter. See Figure 1
Survey Contact: (name, phone, e-mail)	Mike Anghera, Senior Marine Biologist, Anghera Environmental (805) 698-1004 mikeanghera@gmail.com Client Contact: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289
Personnel Conducting Survey (if other than above): name, phone, email	Mr. Mike Anghera (certified *Caulerpa* surveyor) Dr. Kimo Morris (certified *Caulerpa* surveyor)
Permit Reference: (ACOE Permit No., RWQCB Order or Cert. No.)	TBD
Is this the first or second survey for this project?	First
Was *Caulerpa* Detected?: (if *Caulerpa* is found, please immediately contact NOAA Fisheries or CDFG personnel identified above)	**NO**

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<table>
<tr><td>Description of Permitted Work: (describe briefly the work to be conducted at the site under the permits identified above)</td><td colspan="2">Maintenance Dredging Project
Source:
Lisa Louie
Chambers Group, Inc.
949.261.5414 x7289</td></tr>
<tr><td>Description of Site:</td><td>Depth range:</td><td>The depths encountered on the dive ranged from 46ft to 38’</td></tr>
<tr><td rowspan="4">(describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).</td><td>Substrate type:</td><td>Coarse sand was present throughout the study area.</td></tr>
<tr><td>Temperature:</td><td>The water temperature during the survey was 17.44° C (63.4° F).</td></tr>
<tr><td>Salinity:</td><td>Ocean Range: 32-33 ppt</td></tr>
<tr><td>Dominant flora:

Dominant fauna:</td><td>No algae were observed.

<table>
<tr><th></th><th>Common Name</th><th>Scientific Name</th></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Inverts</td><td></td><td></td></tr>
<tr><td></td><td>Tube Dwelling Anemone</td><td>Pachycerianthus sp.</td></tr>
<tr><td></td><td>Ornate Tube Worm</td><td>Diopatra Ornata</td></tr>
<tr><td></td><td>Giant Sea Star</td><td>Pisaster sp.</td></tr>
<tr><td></td><td>Sand Dollar</td><td>Dendraster excentricus</td></tr>
<tr><td></td><td>Sea Pansy</td><td>Ranilla sp.</td></tr>
<tr><td></td><td>Sea Pen</td><td>Ptilosarcus sp</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Fish</td><td>Senorita</td><td>Oxyjulis californica</td></tr>
<tr><td></td><td>Kelp Bass</td><td>Paralabrax clathrantus</td></tr>
</table></td></tr>
</table>

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	Exotic species encountered (including any other Caulerpa species):	**The noxious weed (*Caulerpa taxifolia*) was NOT observed anywhere in the vicinity of the study area or reference site.** **No least terns or brown pelicans were seen in the vicinity of the project area.** **No marine mammals were observed in the area prior to beginning the survey.**
	Other site description notes:	**Near coastal ocean site with no other vessels in the vicinity.**
Description of Survey Effort: (please describe the surveys conducted including type of survey (SCUBA, remote video, etc.) and survey methods employed, date of work, and survey density (estimated percentage of the bottom actually viewed). Describe any limitations encountered during the survey efforts.	*Survey date and time period:*	**The survey was conducted on September 22, 2018 between 1240 and 1330 hrs.**
	Survey type and methods:	**The survey was conducted by marine biologists using SCUBA and agency-approved transect techniques for conducting the eelgrass and invasive algae survey. Field conditions noted during the survey included bottom type, common marine life, and the presence or absence of Caulerpa and eelgrass. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the Los Angeles tidal station.**
	Survey personnel:	**Mr. Mike Anghera, Senior Marine Biologist** **Dr. Kimo Morris, Senior Marine Biologist**
	Horizontal visibility in water:	**Dive conditions during the survey were good, with adequate light throughout the day and good visibility (5-7 m in all directions on the bottom). On all swim transects, we had an unobstructed view of the bottom.**
	Survey density:	**Biologist-divers swam a continuous transect within the project area and approximately 15m beyond where possible. Approximately 90% of the project area was surveyed. Refer to Figure 2 for transect locations.**
	Survey Limitations:	**Near coasta ocean site, all necessary precautions were taken to insure the safety of the diver/biologists.**
Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.)		**See attached project figures.** **Figure 1. Regional Project Location** **Figure 2. Project Area and Dive Transects**

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Figure 1. Project Location.
King Harbor, Los Angeles County, California

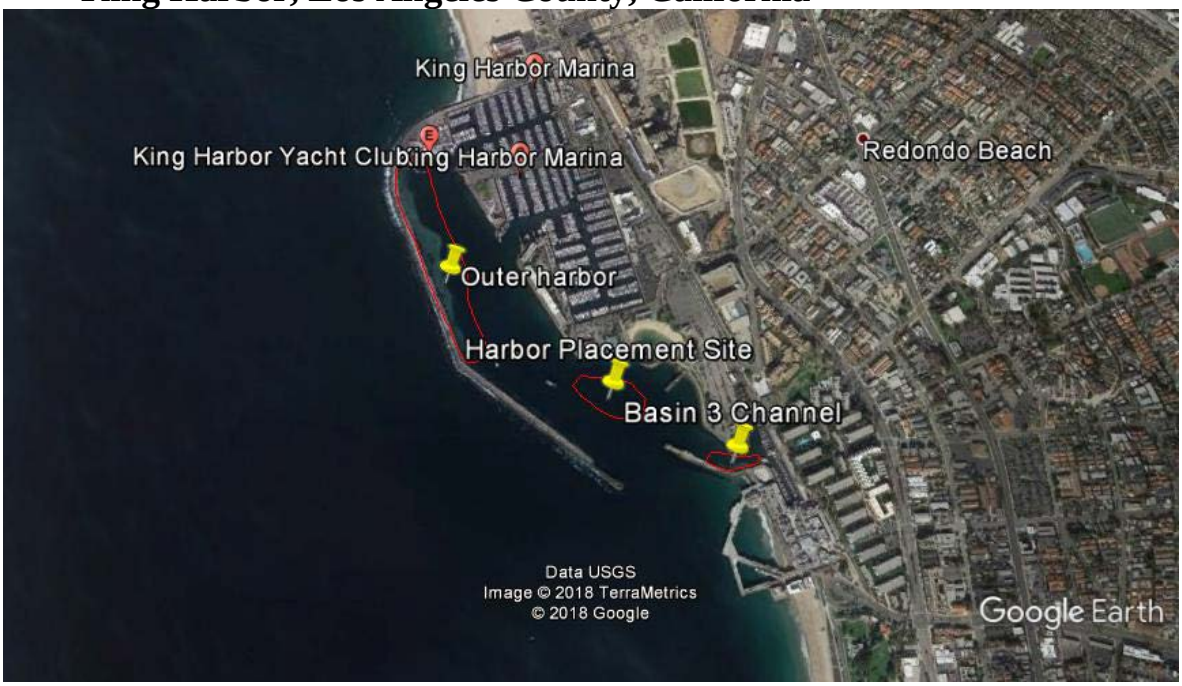
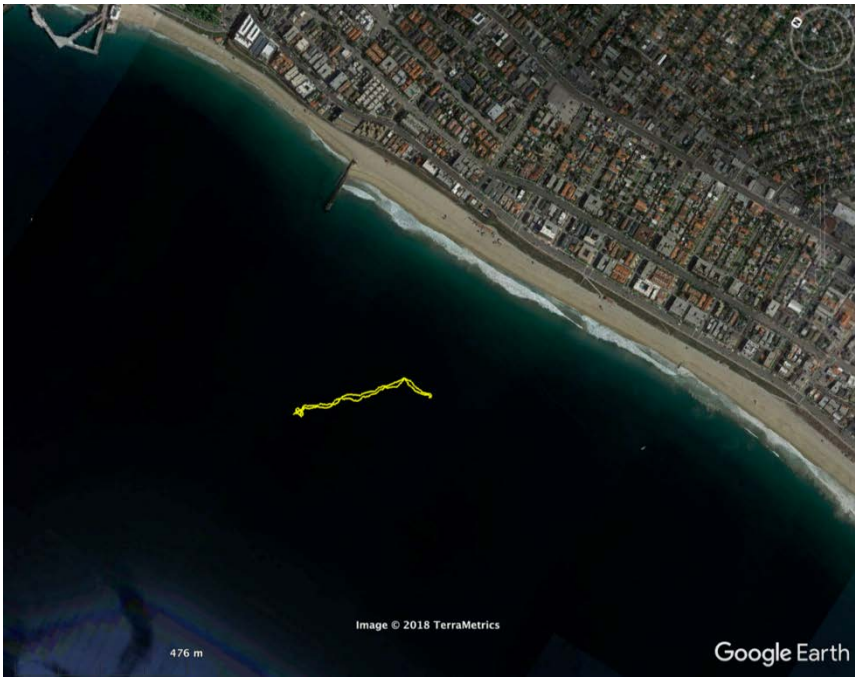


Figure 2. Project Survey Area
and Diver Transects



October 10, 2018

Dear Ms. Louie,

Please find Anghera Environmental's invasive algae (*Caulerpa taxifolia*) report for the Outer Harbor dredging site in King Harbor.

Caulerpa sp. was not observed within the project site during this survey. Please do not hesitate to give me a call if you have any questions.

Sincerely,

M. Anghera

Mike Anghera
Anghera Environmental
President/Senior Marine Biologist

Anghera Environmental.
1274 Alta Vista Dr, Vista Ca 92084 805 698 1004

Caulerpa taxifolia Survey Reporting Form
Outer Harbor Dredging Project
King Harbor, California
Survey Date: September 22, 2018

Prepared for:

Lisa Louie

Senior Project Manager

Chambers Group, Inc.

5 Hutton Centre Drive, Suite 750, Santa Ana, CA 92707

t | 949.261.5414 x7289

Prepared by:

Anghera Environmental
1274 Alta Vista Drive, California 92084
Contact: Mike Anghera
Senior Marine Biologist
805 698 1004

.

This form is required to be submitted for any surveys conducted for the invasive exotic alga *Caulerpa taxifolia* that are required to be conducted under federal or state permits and authorizations issued by the U.S. Army Corps of Engineers or Regional Water Quality Control Boards (Regions 8 & 9). The form has been designed to assist in controlling the costs of reporting while ensuring that the required information necessary to identify and control any potential impacts of the authorized actions on the spread of *Caulerpa*. Surveys required to be conducted for this species are subject to modification through publication of revisions to the *Caulerpa* survey policy. It is incumbent upon the authorized permittee to ensure that survey work is following the latest protocols. For further information on these protocols, please contact: Bryant Chesney, National Marine Fisheries Service (NOAA Fisheries), (562) 980-4037, or William Paznokas, California Department of Fish & Wildlife (858) 467-4218).

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Report Date:	October 10, 2018
Name of bay, estuary, lagoon, or harbor:	King Harbor, Los Angeles County, California. See Figure 1
Specific Location Name:	Outer Harbor Dredging Site, King Harbor, California. See Figure 1
Site Coordinates: (UTM, Lat./Long., datum, accuracy level, and an electronic survey area map or hard copy of the map **must** be included).	33° 50' 55.94" N 118° 24' 05.51" W to 33° 50' 37.21" N 118° 23' 56.73"W NAD 83. Accuracy within 1 meter. See Figure 1
Survey Contact: (name, phone, e-mail)	Mike Anghera, Senior Marine Biologist, Anghera Environmental (805) 698-1004 mikeanghera@gmail.com Client Contact: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289
Personnel Conducting Survey (if other than above): name, phone, email	Mr. Mike Anghera (certified *Caulerpa* surveyor) Dr. Kimo Morris (certified *Caulerpa* surveyor)
Permit Reference: (ACOE Permit No., RWQCB Order or Cert. No.)	TBD
Is this the first or second survey for this project?	First
Was *Caulerpa* Detected?: (if *Caulerpa* is found, please immediately contact NOAA Fisheries or CDFG personnel identified above)	**NO**

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Description of Permitted Work: (describe briefly the work to be conducted at the site under the permits identified above)	**Maintenance Dredging Project** **Source**: Lisa Louie Chambers Group, Inc. 949.261.5414 x7289	
Description of Site:	*Depth range:*	The depths encountered on the dive ranged from 21ft in the main channel, to a flat ledge at the base of the rip rap to the west.
(describe the physical and biological conditions within the survey area at the time of the survey and provide insight into variability, if known. Please provide units for all numerical information).	*Substrate type:*	Hard packed coarse-grain sand, shell debris and rubble was observed in shallow zone of the study site, while a mixture of fine sand and soft muddy sediment was present in the main channel.
	Temperature:	The water temperature during the survey was 21.6° C (70.9° F).
	Salinity:	Harbor Range: 25-33 ppt

Dominant flora:

	Common Name	Scientific Name
Algae	Sea Grass	*Phyllospadix torrey*
	Corraline algae	*Corralina sp.*
	Brown bubbles	*Colpomenia sp.*
	Sargassum	*Sargassum muticum*
	Seaweed	*Dictyota sp.*

Dominant fauna:

	Common Name	Scientific Name
Inverts	Sponges	*Haliclona sp.*
	Sea Slugs	*Navanax inermis*
	Oysters	*Ostrea pacifica*
	Ornate Tube Worm	*Diopatra Ornata*
	Sand Dollar	*Dendraster excentricus*
	Lewis's Moon Snail	*Neverita lewisii*
	Purple Olive Snail	*Callianax biplicata*
	California Spiny Lobster	*Panulirus interruptus*
	Western Banded Tegula	*Tegula eiseni*
	Bubble Snail	*Bulla sp.*
	Blue Banded Hermit Crab	*Paugurus samuelis*

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	Dominant fauna		Common Name	Scientific Name
		Fish	Round Stingrays	Urobatis halleri
			Rainbow Surfperch	Hypsurus sp.
			Opaleye Perch	Girella nigricans
			Kelp Bass	Paralabrax clathrantus
			Anchovies	Engraulis mordax
			Top Smelt	Atherinops affinis
			Sargo	Diplodus sp.
			Spotted Bay Bass	Paralabrax masculatofasciatus
			Garibaldi	Hypsypops rubicundus
			Salema	Haemulon californiensis
			Fantail Sole	Xystreurys liolepsis
			Spotted Turbot	Pleuronichthys ritteri
			California Halibut	Paralichthys californicus
			Rock Wrasse	Halichoeres semicinctus
			Black Surf Perch	Embiotoca jacksoni
			Zebra Perch	Hermosilla azure
	Exotic species encountered (including any other Caulerpa species):	**The noxious weed (*Caulerpa taxifolia*) was NOT observed anywhere in the vicinity of the study area or reference site.** **No least terns or brown pelicans were seen in the vicinity of the project area.** **No marine mammals were observed in the area prior to beginning the survey.**		
	Other site description notes:	**Medium navigational channel with multiple vessels in the area at time of survey**		

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Description of Survey Effort: (please describe the surveys conducted including type of survey (SCUBA, remote video, etc.) and survey methods employed, date of work, and survey density (estimated percentage of the bottom actually viewed). Describe any limitations encountered during the survey efforts.	*Survey date and time period:*	**The survey was conducted on September 22, 2018 between 0845 and 1025 hrs.**
	Survey type and methods:	**The survey was conducted by marine biologists using SCUBA and agency-approved transect techniques for conducting the eelgrass and invasive algae survey. Field conditions noted during the survey included bottom type, common marine life, and the presence or absence of Caulerpa and eelgrass. Depths were standardized to feet (ft) Mean Lower Low Water (MLLW) based upon time of observation and tidal corrections for the Los Angeles tidal station.**
	Survey personnel:	**Mr. Mike Anghera, Senior Marine Biologist** **Dr. Kimo Morris, Senior Marine Biologist**
	Horizontal visibility in water:	**Dive conditions during the survey were good, with adequate light throughout the day and good visibility (3-4 m in all directions on the bottom). On all swim transects, we had an unobstructed view of the bottom.**
	Survey density:	**Biologist-divers swam a continuous transect within the project area and approximately 5m beyond where possible. Approximately 90% of the project area was surveyed. Refer to Figure 2 for transect locations.**
	Survey Limitations:	**Multiple vessels operating in the study area during survey, necessary precautions were taken to insure the safety of the diver/biologists.**
Other Information: (use this space to provide any additional information or references to attached materials such as maps, reports, etc.)		**See attached project figures.** **Figure 1. Regional Project Location** **Figure 2. Project Area and Dive Transects**

.

Figure 1. Project Location.
King Harbor, Los Angeles County, California

Figure 2. Project Survey Area
and Diver Transects

NOBLE CONSULTANTS | GEC

201 Alameda Del Prado, Suite 301
Novato, CA 94949
(415) 884-0727 Fax (415) 884-0735
Ronald M. Noble, P.E., President

ENR TOP 500 DESIGN FIRMS

Attachment E

Exemption Declaration Pursuant to the California Environmental Quality Act

by the City of Redondo Beach

CITY OF REDONDO BEACH

EXEMPTION DECLARATION
PURSUANT TO THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

DATE: June 8, 2020

PROJECT LOCATION: King Harbor, Redondo Beach

PROPOSED PROJECT: The King Harbor Maintenance Dredging Project will remove shoals accumulated within King Harbor to provide safe vessel access to recreational craft and fishing boats. The proposed dredge volumes are approximately 46,300 cubic yards to the design depth, and 62,000 cubic yards when including the two-foot over dredge depth. A Sampling and Analysis Plan as well as the in-harbor and outer harbor placement of the dredging materials was reviewed and approved by the U.S. Army Corps of Engineers. A more detailed description is attached.

In accordance with Chapter 3, Title 10, Section 10-3.301(a) of the Redondo Beach Municipal Code, the above-referenced project is Categorically Exempt from the requirement for preparation of environmental review documents pursuant to:

Section 15300.1 of the Guidelines for Implementation of the California Environmental Quality Act (CEQA), which states, in part, that Section 21080 of the Public Resources Code exempts from the application of CEQA those projects over which public agencies exercise only ministerial authority. Since ministerial projects are already exempt, Categorical Exemptions should be applied only where a project is not ministerial under a public agency's statutes and ordinances.

This finding is supported by the fact that as a repair and maintenance activity, the project is exempt from issuance of a Coastal Development Permit (RBMC 10-5.2208 (a) (3)). The project involves routine maintenance dredging of 62,000 cubic yards. The last maintenance dredging occurred in 2004-2005. The placement of dredge spoils is not within an environmentally sensitive habitat area, or any sand area, within fifty (50) feet of the edge of a coastal bluff or environmentally sensitive habitat area, or within (20) twenty feet of coastal waters or streams. The removal and disposal of dredged spoils are not suitable for beach nourishment for any area in need of sand supply. As such, the dredging project is exempt from the requirement of a Coastal Development Permit and is thereby a ministerial action.

King Harbor is not designated as an historical resource. The dredging project is not a successive activity that will cause cumulative effects nor will the project cause significant effects due to unusual circumstances. The subject site is not located within an area designated as an environmental resource of hazardous or critical concern, or within an officially designated, state scenic highway, or within a hazardous waste site included on any list compiled pursuant to Section 65962.5 of the Government Code.

Brandy Forbes, AICP
Community Development Director