Appendix A
Notice of Preparation and Initial Study

Notice of Preparation and Scoping Meeting for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020) Environmental Impact Report

DATE: November 18, 2019

TO: Reviewing Agencies and Other Interested Parties

FROM: City of Newport Beach, Community Development Department, 100 Civic Center Drive, Newport Beach, CA 92660

PROJECT TITLE/SUBJECT: Notice of Preparation (NOP) of an Environmental Impact Report (EIR) and Notice of Public Scoping Meeting for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020).

PROJECT APPLICANT: City of Newport Beach (City)

NOTICE OF PREPARATION REVIEW PERIOD: November 18, 2019, through January 17, 2020 (60 days)

SCOPING MEETING: December 4, 2019, at 6:00 p.m. in the Friends Room of the Newport Beach Public Library, 1000 Avocado Avenue, Newport Beach CA

REQUEST FOR COMMENTS ON THE SCOPE OF THE ENVIRONMENTAL IMPACT REPORT:

The purpose of this NOP is to notify potential Responsible Agencies (Agencies) that the Lead Agency, the City, will prepare an EIR for the proposed Lower Newport Harbor CAD Facility Construction Project (Project) and to solicit comments and suggestions regarding: (1) the scope and content of the EIR and (2) the environmental issues and alternatives to be addressed in the EIR (California Environmental Quality Act [CEQA] Guidelines Section 15082). This NOP also provides notice to interested parties, organizations, and individuals of the preparation of the EIR and requests comments on the scope and contents of the environmental document. An Initial Study (IS) has been prepared to support the NOP.

PROJECT LOCATION:

The Project Site is located in Newport Beach, which is located at the western edge of Orange County (County) adjacent to the Pacific Ocean, and is bordered by Costa Mesa to the northwest, Huntington Beach to the west, Irvine to the northeast, and unincorporated portions of Orange County to the southeast. The Project Site encompasses approximately 844 acres of Lower Newport Harbor, encompassing the navigational channels and the proposed CAD facility. Lower Newport Harbor is a small craft harbor offering a wide range of recreational boating activities ranging from single-person kayaks to larger sailing and motor vessels capable of trans ocean navigation. Local beachfront and harbor-front communities support water-use recreational services.

PROJECT DESCRIPTION:

The City and U.S. Army Corps of Engineers (USACE) are conducting dredging within Lower Newport Harbor in Newport Beach. Newport Harbor is one of the largest recreational harbors in the United States, necessitating maintenance dredging to remove sediment that accumulates over time and impedes navigation. Because dredging will expose sediment that is unsuitable for open ocean disposal, dredging is not feasible without also identifying a practicable management option for the unsuitable sediment. Therefore, the City is proposing to construct a CAD facility as a solution for sediment dredged from within Lower Newport Harbor not suitable for open ocean placement or nearshore disposal. The location of the CAD facility would be within the anchorage east of Lido Isle as shown below in Figure 1.

Following initial construction of the CAD facility, the City and its residents would have an opportunity to place material dredged from outside the federal navigation channels into the CAD for a period of up to 10 years with agency approval under the City's Regional General Permit (RGP) 54 or individual permit. A more detailed project description is provided in the attached project summary.



Figure 1: Proposed Project Location, Lower Newport Harbor, Newport CA

AVAILABILITY OF THE NOTICE OF PREPARTION AND INITIAL STUDY:

The City has prepared a NOP and IS to provide an overview of the Project. The City has made a determination that a full-scope EIR, inclusive of all environmental topics, is required for the proposed Project. The NOP and IS can be accessed online at: http://www.newportbeachca.gov/ceqa. Copies are also available for review at the City of Newport Beach Public Works Department, 100 Civic Center Drive, Newport Beach, CA 92660, and at the following locations:

Newport Beach Public Library
Central Library
1000 Avocado Avenue
Newport Beach, CA 92660

Newport Beach Public Library
Mariners Branch
1300 Irvine Avenue
Newport Beach, CA 92660

Newport Beach Public Library
Balboa Branch
100 East Balboa Boulevard
Newport Beach, CA 92660

Newport Beach Public Library
Corona del Mar Branch
410 Marigold Avenue
Corona del Mar, CA 92625

NOTICE OF PUBLIC SCOPING MEETING:

The City will conduct a public scoping meeting in conjunction with this NOP in order to present the Project and the EIR process and to receive public comments and suggestions regarding the scope and content of the EIR. The meeting will be held on December 4, 2019, at 6:00 p.m. in the Friends Room of the Newport Beach Public Library, 1000 Avocado Avenue, Newport Beach, CA 92660.

RESPONDING TO THIS NOTICE:

The City requests your careful review and consideration of this notice, and it invites any and all input and comments from interested Agencies, persons, and organizations regarding the preparation of the EIR. Pursuant to CEQA Section 21080.4, Agencies must submit any comments in response to this notice no later than 60 days beginning November 18, 2019 and ending at close of business on January 17, 2020. All comments or other responses to this notice should be submitted in writing to:

Chris Miller, Public Works Manager
City of Newport Beach, Public Works Department
100 Civic Center Drive
Newport Beach, California 92660
cmiller@newportbeachca.gov
949.644.3043

Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020)

PROJECT SUMMARY

The City is the Lead Agency under the California Environmental Quality Act (CEQA) for the proposed Project. Section 15161 of the CEQA Guidelines states that an EIR "…should focus primarily on the changes in the environment that would result from the development of the project. The EIR shall examine all phases of the project including planning, construction, and operation."

Existing Setting

The Project Site is located in Newport Beach, which is located at the western edge of Orange County, adjacent to the Pacific Ocean, and is bordered by Costa Mesa to the northwest, Huntington Beach to the west, Irvine to the northeast, and unincorporated portions of Orange County to the southeast. The Project Site encompasses approximately 844 acres of Lower Newport Harbor, encompassing the navigational channels and the proposed CAD facility. Lower Newport Harbor is a small craft harbor offering a wide range of recreational boating activities ranging from single-person kayaks to larger sailing and motor vessels capable of trans ocean navigation.

General Plan and Zoning

The Project Site is designated as TS (Tidelands and Submerged Lands) land use designation of the Land Use Element of the General Plan. The Project Site is not located within a Zoning District since it is located within the City's harbor area.

Background

Newport Harbor requires periodic maintenance dredging to remove sediment that accumulates over time and impedes navigation and full use of the harbor. Lower Newport Harbor was last dredged between May 2012 and January 2013, when 600,000 cubic yards (cy) of sediment was removed. Unsuitable sediment was placed at the Port of Long Beach's Middle Harbor Fill Site, and clean sediment was placed at the LA-3 ocean disposal material disposal site (ODMDS). Prior to that (1998 to 1999), approximately 270,000 cy of sediment were removed from the Main Channel and the Upper Bay Channel and disposed of at the LA-3 ODMDS.

Maintenance dredging is necessary to remove approximately 1.2 million cy of sediment that has accumulated in the federal navigation channels for navigational safety and to allow continued use of the harbor for recreational activities. Sediment spoils from dredging are typically disposed of based on sediment characteristics at a variety of locations. The preferred sediment management alternative for clean sediment is beach nourishment. Sediment that is clean but not compatible with the receiver beach or nearshore area, and for which no other beneficial reuses are available, may be placed at an ODMDS. For sediment that is unsuitable for ocean disposal, the preferred management alternative is beneficial reuse in a fill project (nearshore confined disposal facility [CDF]). In the absence of a CDF, CAD sites have been shown to be an effective long-term management solution for contaminated sediment. A CAD facility is constructed underwater by placing contaminated sediment inside a depression, allowing it to settle, and capping it with clean sediment, typically to an elevation that matches the surrounding grade. In 2009, the City performed a CAD feasibility study[1] and determined that constructing a CAD in Lower Newport Harbor was the best alternative for managing the City's contaminated sediment. Therefore, the City is proposing to construct a CAD facility within the federal navigation channels.

[1] Anchor QEA (Anchor QEA, LLC), 2009. *Lower Newport Bay CAD Site Feasibility Study*. Prepared for the City of Newport Beach. April 2009.

Description of Project

The proposed Project includes the following elements:

- Dredging of approximately 300,000 cy of sediment to construct a CAD facility located in the central portion of the harbor between Lido Isle and Bay Island
  - The CAD facility will accommodate approximately 106,900 cy of unsuitable material.
- Disposal of an additional 50,000 cy in the CAD facility for a period of up to 10 years; only material dredged from Lower Newport Harbor would be permitted for disposal within the CAD facility
- Maintenance dredging of suitable and unsuitable material

Potential CAD site locations were selected based on preliminary feedback from the City's Harbor Commissioners. The Harbor Commissioners recommended siting the CAD facility adjacent to or within locations where sediment was determined unsuitable and would require placement in the CAD facility. While the recommendation was integral to the siting process, other factors were evaluated that included analysis of geotechnical data to demonstrate compliance with current engineering standards and practices, feasibility to design and construct the CAD facility based on the volume of sediment to be managed in the CAD, logistics during construction, disruption to existing harbor moorings and anchorages, and public outreach. Technical support for the design and operation of the CAD facility is included in the Basis of Design Report.

Construction

The proposed Project includes construction of a CAD facility and periodic placement of sediment by the City and its residents, as authorized under RGP 54 or through an individual permit. The CAD facility has been designed to accommodate approximately 106,900 cy of sediment previously determined unsuitable for unconfined ocean disposal (generated by the federal maintenance project and the City's dredging project). Additionally, the CAD facility has been designed to accommodate an additional 50,000 cy of material dredged from other locations within the harbor and outside the federal navigation channels. In order to accommodate the total volume—including contingency—and construct the CAD facility, excavation of approximately 307,000 cy is required. This incorporates side slopes and other engineering design considerations to safely achieve the desired size and capacity. Excavation of the CAD facility would occur using mechanical or hydraulic dredge equipment and material either disposed in the nearshore environment or at an approved open ocean disposal site.

Once the CAD facility is constructed, unsuitable sediment will be dredged using mechanical equipment and placed within the CAD facility using a bottom-dump barge. Sediment within the CAD facility will then be covered with clean sediment dredged from the remainder of the federal navigation channels as part of USACE's maintenance dredging program. This clean sediment will serve as an interim cap to isolate the unsuitable material disposed as part of the federal navigation channels dredging project. Once the interim cap is placed, the City and its residents will have an opportunity for up to 10 years to place 50,000 cy of material in the CAD. Following the 10-year period, the City will ensure that a clean layer is placed as a final cap.

The City will be developing a sediment management plan in coordination with the resource and regulatory agencies to manage disposal of the material in the CAD facility, including interim placement of clean sand during the 10-year period, and the final cap. The final elevation of the CAD facility will be at -22 feet mean lower low water.

Long-Term Disposal and Monitoring

As previously stated, following construction of the CAD, up to 50,000 cy of additional material could be dredged from various areas of Lower Newport Harbor and placed in the CAD facility using for up to 10 years. Most dredging would occur mechanically or hydraulically with sediment placed in the CAD facility from a barge or through a pump.

An Operations Management and Monitoring Plan for the CAD facility will be developed for implementation by the City. The plan will describe the management and monitoring objectives for the CAD facility, a communications plan covering the entire CAD facility construction and sediment disposal process, construction monitoring and post-disposal monitoring plans, contingency plans, annual monitoring plans, and long-term management plans for the CAD facility once it has been capped.

Alternatives to the Proposed Project

CEQA Guidelines Section 15126.6(a) requires that "an EIR describe a range of reasonable alternatives to the Project, or to the location of the Project, which would feasibly attain most of the basic objectives of the Project but would avoid or substantially lessen any of the significant effects of the Project, and evaluate the comparative merits of the alternatives." The alternatives, which will include the No Project Alternative and a Reduced Project Alternative, are introduced in the IS and will be analyzed as part of the EIR.

Discretionary Actions

Development of the proposed Project would require discretionary approvals from the following Agencies:

- **City:** EIR and Approval in Concept; Authorization of Project and construction contracts
- **USACE:** Reviews and authorizes CAD under Section 404 of the Clean Water Act; Section 103 of the Marine Protection, Research, and Sanctuaries Act; and Section 10 of the Rivers and Harbors Act
- **California Coastal Commission:** Reviews EIR documents to ensure compliance with the Coastal Zone Management Act and consistency with the California Coastal Act. Performs a federal Consistency Determination. Reviews and considers issuance of a Coastal Development Permit.

Santa Ana Regional Water Quality Control Board (RWQCB): Reviews Project for authorization under the Porter-Cologne Water Quality Control Act, Waste Discharge Requirements, and Clean Water Act Section 401 State Certification of Water Quality and Section 402: National Pollutant Discharge Elimination System Permit.

Probable Environmental Effects of the Proposed Project

The City has determined that the following environmental topics will be included and analyzed in the EIR for the proposed Project:

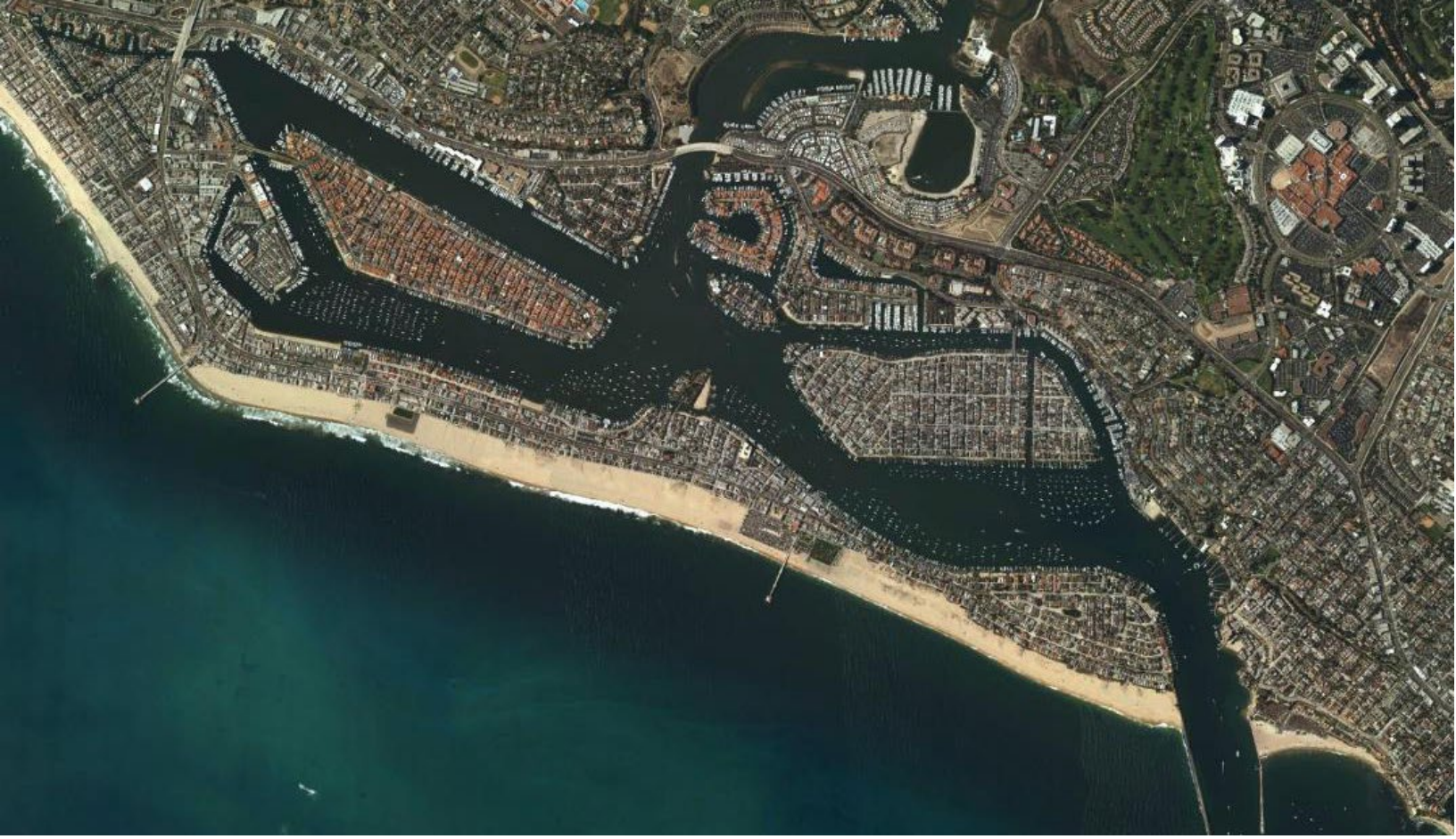
- Aesthetics
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Recreation
- Tribal Cultural Resources

Anticipated Schedule

The Project schedule, as currently envisioned, contemplates that the Draft EIR will be available for public review in spring of 2020. A 45-day public review period will be provided, after which responses to comments received will be prepared. The Newport Beach Harbor Commission will then hold a public hearing and make a recommendation on certification of the EIR to the City Council. Public hearings are anticipated to occur in mid-2020.

Conclusion

The City of Newport Beach requests the public's careful review and consideration of this NOP and IS, and it invites any and all input and comments from interested agencies and persons regarding the preparation and scope of the Draft EIR.



November 18, 2019

Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020)

Initial Study

Prepared for
City of Newport Beach
Public Works Department
100 Civic Center Drive
Newport Beach, CA 92660

Prepared by
Anchor QEA, LLC
9700 Research Drive
Irvine, CA 92618

Project Number: 180243-02.01

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ABBREVIATIONS

AB	Assembly Bill
Basin	South Coast Air Basin
BMP	best management practice
CAD	Confined Aquatic Disposal
CCA	California Coastal Act
CCC	California Coastal Commission
CDF	confined disposal facility
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CHRIS	California Historic Resources Information System
City	City of Newport Beach
CLUP	Coastal Land Use Plan
CSTF LTMS	*Los Angeles Contaminated Sediments Task Force Long-Term Management Strategy*
cy	cubic yard
DEIR	Draft Environmental Impact Report
DMMP	Los Angeles Regional Dredged Material Management Plan
EIR	Environmental Impact Report
FMP	Fish Management Plan
General Plan	City of Newport Beach General Plan
GHG	greenhouse gas
MLLW	mean lower low water
MRZ	Mineral Resource Zone
NAHC	Native American Heritage Commission
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
ODMDS	Ocean Dredged Material Disposal Site
proposed Project	Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020)
RGP 54	Regional General Permit 54
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SR	State Route
USACE	U.S. Army Corps of Engineers
VHFHSZ	Very High Fire Hazard Severity Zone

1 Project Overview

This Initial Study has been prepared to inform responsible and trustee agencies, public agencies, and the public that the City of Newport Beach (City), as the Lead Agency under the California Environmental Quality Act (CEQA), has independently determined that there are potential significant environmental impacts associated with the proposed Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020) (hereafter referred to as the proposed Project) and an Environmental Impact Report (EIR) is required.

1.1 Project Summary

The City and U.S. Army Corps of Engineers (USACE) are conducting dredging within Lower Newport Harbor in Newport Beach (Figure 1). Newport Harbor is one of the largest recreational harbors in the United States, necessitating maintenance dredging to remove sediment that accumulates over time and impedes navigation. Because dredging will expose sediment that is unsuitable for open ocean disposal, dredging is not feasible without also identifying a practicable management option for the unsuitable sediment (Figure 2). Therefore, the City is proposing to construct a CAD facility as a solution for sediment dredged from within Lower Newport Harbor not suitable for open ocean placement or nearshore disposal. The location of the CAD facility would be in the central portion of the harbor between Bay Island and Lido Isle (Figures 3 and 4).

Following authorization of the CAD facility, the City and its residents would have an opportunity to place material dredged from outside the federal navigation channels into the CAD for a period of up to 10 years with agency approval under the City's Regional General Permit (RGP) 54 or individual permits.

1.2 Project Setting

1.2.1 Regional Setting

The proposed Project is in Newport Beach, Orange County, California. Newport Beach is at the western edge of Orange County, adjacent to the Pacific Ocean. Newport Beach, a charter city with approximately 87,182 residents, is bordered by Costa Mesa to the northwest, Huntington Beach to the west, Irvine to the northeast, Laguna Beach to the south, and unincorporated portions of Orange County to the southeast.

1.2.2 Local Setting

Upon entering the harbor from the Pacific Ocean, the Main Channel runs the three-mile length of the harbor, down the inside of the Balboa Peninsula, and among the seven harbor islands that make up several residential communities and villages of Newport Beach. The Coast Highway Bridge serves as the unofficial boundary of the lower (Lower Newport Harbor) and upper portions of the harbor. The project area encompasses approximately 844 acres of Lower Newport Harbor, encompassing the

navigational channels and the proposed CAD facility. Lower Newport Harbor is a small craft harbor offering a wide range of recreational boating activities ranging from single-person kayaks to larger sailing and motor vessels capable of trans-ocean navigation. Local beachfront and harbor-front communities support water-use recreational services.

1.2.3 Regional General Permit 54

The USACE issued the current RGP 54 to the City in December 2015 (amended July 2019). RGP 54 authorizes small-scale maintenance dredging, dock and bulkhead repairs, and in-kind dock and bulkhead replacement projects in Newport Harbor. Specifically, RGP 54 covers the following regulated activities in eligible areas of Newport Harbor:

- Maintenance dredging under and adjacent to private, public, and commercial docks, floats, and piers
- Discharge of dredged material at adjacent beach sites for beach nourishment, the LA-3 Ocean Dredged Material Disposal Site (ODMDS) confined disposal facilities (CDFs), or at approved upland disposal sites

1.3 Project Background

Newport Harbor requires periodic maintenance dredging to remove sediment that accumulates over time and impedes navigation and full use of the harbor. Lower Newport Harbor was last dredged between May 2012 and January 2013, when 600,000 cubic yards (cy) of sediment were removed. Unsuitable sediment was placed at the Port of Long Beach's Middle Harbor Fill Site, and clean sediment was placed at LA-3 ODMDS. Prior to that (1998 to 1999), approximately 270,000 cy of sediment were removed from the Main Channel and the Upper Bay Channel and disposed of at the LA-3 ODMDS.

Based on the most recent 2018 USACE harbor-wide bathymetric surveys, sedimentation has occurred in many areas of Lower Newport Harbor such that dredging is needed within the federal navigation channels to maintain safe navigation. Maintenance dredging is necessary to remove approximately 1.2 million cy of sediment that have accumulated in the federal navigation channels for navigational safety and to allow continued use of the harbor for recreational activities. The USACE is proposing to dredge the federal navigation channels to the currently authorized design depths as part of the federal maintenance dredging program authorized by the Rivers and Harbors Act of 1937 (maintenance) and 1945, modified by the Water Resources Development Act of 1986. USACE's maintenance dredging project is analyzed in a separate Environmental Assessment (expected in 2020). Failure to remove this sediment could result in adverse impacts to navigational safety, resulting in loss of recreational boating opportunities.

Sediment spoils from dredging are typically disposed of based on sediment characteristics at a variety of locations. The preferred sediment management alternative for clean sediment is beach

nourishment. However, dredged sediment used to replenish eroding beaches must be clean and have comparable grain size and aesthetic characteristics to that of the beach under consideration. Sediment that is clean but not compatible with the receiver beach or nearshore area, and for which no other beneficial reuses are available, may be placed at an ODMDS. Prior to disposal, sediment must be tested in accordance with the *Evaluation for Dredged Material Proposed for Ocean Disposal – Testing Manual* (USEPA/USACE 1991). LA-3 is the closest ODMDS to Newport Harbor, located approximately 6 miles to the southwest.

Sediment management options in Southern California have been studied thoroughly and documented in two key regional documents: the *Los Angeles Contaminated Sediments Task Force Long-Term Management Strategy* (CSTF LTMS; CSTF 2005) and the *Los Angeles Regional Dredged Material Management Plan* (DMMP; USACE 2004). For sediment that is unsuitable for ocean disposal, the preferred management alternative, as outlined in the CSTF LTMS and DMMP, is beneficial reuse in a fill project (nearshore CDF). Nearshore CDFs are typically created by constructing a containment dike, placing contaminated dredged sediment and structural fill material (i.e., clean sand) behind a dike, using weirs to dewater the material, and covering the material with asphalt and/or concrete.

In absence of a CDF, CAD sites have been shown to be an effective long-term management solution for contaminated sediment (CSTF 2005). A CAD facility is constructed underwater by placing contaminated sediment inside a depression, allowing it to settle, and capping with clean sediment, typically to an elevation that matches the surrounding grade. Port of Hueneme, the Port of Long Beach Outer Harbor Sediment Placement and Ecosystem Restoration Site, and the North Energy Island Borrow Pit (City of Long Beach) are examples of regional CAD facilities used to manage contaminated sediment among other sites in the United States. These CAD sites locations have been constructed and/or are not available for additional capacity.

Based on Lower Newport Harbor sediment sampling, portions of sediment within the harbor have been determined unsuitable for open ocean disposal (Anchor QEA 2019a). In 2009, the City performed a CAD Feasibility Study and determined that constructing a CAD in Lower Newport Harbor was the best alternative for managing the City's contaminated sediment (Anchor QEA 2009). Therefore, the City is proposing to construct a CAD facility within the federal navigation channels.

1.4 Project Objectives

The proposed Project is being completed to meet the need for safe marine navigation, promote recreational maritime activities, and protect the marine environment from chemical contamination.

To accomplish this goal, the following key project objectives must be accomplished:

- Maintaining safe navigational depths to support recreational access
- Identifying a disposal location for dredged material that is unsuitable for ocean disposal; the location must be able to meet the following requirements:

  - Safely and permanently contain contaminated material
  - Be located within the Southern California area and be available for disposal
  - Accommodate material over a period of 10 years
- Disposing of unsuitable dredged sediment in a manner that is safe to human and ecological health and minimizes secondary environmental impacts

1.5 Proposed Project

The proposed Project includes the following elements:

- Dredging of approximately 300,000 cy of sediment to construct a CAD facility located in the central portion of the harbor between Lido Isle and Bay Island
  - CAD facility will accommodate approximately 106,900 cy of unsuitable material.
- Disposal of an additional 50,000 cy in the CAD facility for a period of up to 10 years; only material dredged from Lower Newport Harbor would be permitted for disposal within the CAD facility
- Maintenance dredging of suitable and unsuitable material

Potential CAD site locations were selected based on preliminary feedback from the City's Harbor Commissioners. The Harbor Commissioners recommended siting the CAD facility adjacent to or within locations where sediment was determined unsuitable and would require placement in the CAD facility. While the recommendation was integral to the siting process, other factors were evaluated that included analysis of geotechnical data to demonstrate compliance with current engineering standards and practices, feasibility to design and construct the CAD facility based on the volume of the sediment to be managed in the CAD, logistics during construction, disruption to existing harbor moorings and anchorages, and public outreach. Technical support for the design and operation of the CAD facility is included in the Basis of Design Report (Anchor QEA 2019b).

1.5.1 Project Construction

The proposed Project includes construction of a CAD facility and periodic placement of sediment by the City and its residents authorized under RGP 54 or through an individual permit. The CAD facility has been designed to accommodate approximately 106,900 cy of sediment previously determined unsuitable for unconfined ocean disposal (generated by the federal maintenance project and the City's dredging project). Additionally, the CAD has been designed to accommodate an additional 50,000 cy of material dredged from other locations within the harbor and outside the federal navigation channel. In order to accommodate the total volume—including contingency—and construct the CAD facility, excavation of approximately 307,000 cy is required. This incorporates side slopes and other engineering design considerations to safely achieve the desired size and capacity.

Excavation of the CAD facility would occur using mechanical or hydraulic dredge equipment and either disposed in the nearshore environment or open ocean LA 3 ODMDS.

Once the CAD facility is constructed, unsuitable sediment will be dredged using mechanical equipment and placed within the CAD facility using a bottom-dump barge. Sediment within the CAD facility will then be covered with clean sediment dredged from the remainder of the federal navigation channels as part of USACE's maintenance dredging program. This clean sediment will serve as an interim cap to isolate the unsuitable material disposed as part of the federal navigation channels dredging project. Once the interim cap is placed, the City will have an opportunity for up to 10 years to place 50,000 cy of material in the CAD. Following the 10-year period, the City will ensure that a clean layer be placed as a final cap. The City will be developing a Sediment Management Plan in coordination with the resource and regulatory agencies to manage disposal of the material in the CAD, including interim placement of clean sand during the 10-year period, and final cap.

The authorized depths within the harbor range from -10 feet mean lower low water (MLLW) to -20 feet in the main channel. The final elevation of the CAD facility will be at -22 feet MLLW, which is deeper than the current authorized depth of -15 MLLW.

1.5.2 Long-Term Disposal and Monitoring

As previously stated, following construction of the CAD, up to 50,000 cy of additional material could be dredged from various areas of Lower Newport Harbor and placed in the CAD facility using methods described in Section 1.5.1 for up to 10 years. Most dredging would occur mechanically or hydraulically with sediment placed in the CAD facility from a barge or through a pump.

An Operations Management and Monitoring Plan for the CAD facility will be developed for implementation by the City. The plan will describe the management and monitoring objectives for the CAD facility, a communications plan covering the entire CAD facility construction and sediment disposal process, construction monitoring and post-disposal monitoring plans, contingency plans, annual monitoring plans, and long-term management plans for the CAD facility once it has been capped.

1.5.3 Best Management Practices

The City is committed to avoiding or minimizing environmental effects during dredging and disposal activities. The following best management practices (BMPs) will be incorporated into the proposed Project plans and contract specifications as appropriate:

- Rules and methods set out by the CSTF LTMS BMP toolbox (CSTF 2005) during dredging activities shall be provided to the dredge contractor to satisfy federal and state water quality requirements.
- General construction BMPs, including removing floating debris, implementing a water quality monitoring plan, preventing barge overflow, adjusting dredge cycle time and bucket velocity as it is raised and lowered, modifying bucket size or type if necessary, modifying the

operation of the dredging equipment to minimize resuspension of sediment, and washing the bucket to remove cohesive sediment, will be implemented if necessary.

- Prior to construction, the proposed Project site will be surveyed for the invasive alga *Caulerpa taxifolia* and eelgrass in compliance with federal and state protocols.
- Contractors will be required to have emergency spill response plans and employ general BMPs regarding vessel and equipment maintenance and fueling.

1.6 Proposed CEQA Analysis

1.6.1 CEQA Baseline

Section 15125 of the CEQA Guidelines requires that an EIR include a description of the physical environmental conditions in the vicinity of the proposed Project as they exist at the time the NOP is published, or if no NOP is published, at the time the environmental analysis is commenced from both a local and regional perspective. These environmental conditions are referred to as the environmental setting. Further, Section 15125(a) of the CEQA Guidelines states that "the environmental setting normally constitutes the baseline physical conditions by which a Lead Agency determines whether an impact is significant." The CEQA baseline is the set of conditions that prevails at the time an NOP is published. At the time of the NOP's publication (November 2019), the proposed Project site is an active marine harbor with no dredging operations.

1.6.2 Proposed Alternatives

According to Section 15126.6 of the CEQA Guidelines, an EIR need only examine in detail those alternatives that could feasibly meet most of the basic objectives of the proposed Project. The purpose of the proposed Project is to construct a CAD facility within Lower Newport Harbor as a solution for sediment dredged from within Lower Newport Harbor not suitable for open ocean disposal. The following alternatives are currently being considered for further analysis in the EIR.

1.6.2.1 No Project Alternative: No Dredging

The No Project Alternative, which is required by CEQA, represents what would reasonably be expected to occur in the foreseeable future if the proposed Project were not approved. Under this alternative, no dredging of unsuitable material would occur, and material would remain in place

1.6.2.2 No CAD Construction Alternative

Under the No CAD Construction Alternative, CAD construction would not occur. Dredging of unsuitable material would occur, and any dredged sediment deemed unsuitable for open ocean disposal would be trucked to a permitted upland landfill facility

1.6.2.3 Reduced Project Alternative

The Reduced Project Alternative includes construction of a smaller CAD footprint. Under this reduced alternative, there could be two potential scenarios: either less dredging of unsuitable material would occur, or any dredged sediment deemed unsuitable for open ocean disposal that could not be placed into the smaller CAD site would be trucked to permitted upland facilities.

2 Agency Approvals and Public Outreach

This section describes the anticipated approvals and permits required for the proposed Project as well as existing agency and public coordination and outreach conducted as part of project development.

2.1 Anticipated Project Approvals and Permits

Projects or actions undertaken by the lead agency (in this case, the City) may require subsequent oversight, approvals, or permits from other public agencies. Other such agencies are referred to as responsible agencies and trustee agencies. Pursuant to CEQA Guidelines Sections 15381 and 15386, as amended, responsible and trustee agencies are defined as follows:

- A **responsible agency** is a public agency that proposes to carry out or approve a project for which a lead agency is preparing or has prepared an EIR or Negative Declaration. For the purposes of CEQA, the term "responsible agency" includes all public agencies other than the lead agency that have discretionary approval authority over a project (CEQA Guidelines Section 15381; see Table 1).
- A **trustee agency** is a state agency having jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California (CEQA Guidelines Section 15386). Trustee agencies have jurisdiction over natural resources held in trust for the people of California but do not have a legal authority over approving or carrying out a project. CEQA Guidelines Section 15386 designates only the following four agencies as potential trustee agencies for projects subject to CEQA:
  - California Department of Fish and Wildlife (CDFW), regarding fish and wildlife, native plants designated as rare or endangered, game refuges, and ecological reserves
  - California State Lands Commission, regarding state-owned "sovereign" lands, such as the beds of navigable waters and state school lands
  - California Department of Parks and Recreation, regarding units of the state park system
  - University of California, regarding sites within the Natural Land and Water Reserves System

Table 1 summarizes relevant regulatory agencies, their jurisdiction (i.e., trustee or responsible agency), and their statutory authority.

Table 1
Regulatory Agencies and Authority

Regulatory Agency	Jurisdiction	Statutory Authority/Implementing Regulations
Federal Agencies		
USACE	Responsible agency	Review and authorize CAD under the Clean Water Act Section 404 and Rivers, Section 103 of the Marine Protection, Research and Sanctuaries Act and Harbors Act Section 10

Regulatory Agency	Jurisdiction	Statutory Authority/Implementing Regulations
National Oceanic and Atmospheric Administration, National Marine Fisheries Service, and U.S. Navy	Responsible agency	Compliance with the Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act
State Agencies		
California State Lands Commission	Trustee agency	Reviews dredging and dredge material disposal activities in state tidelands. Would have oversight over the development of the CAD facility.
California Coastal Commission	Responsible agency	Reviews document to ensure compliance with the Coastal Zone Management Act and consistency with the California Coastal Act. Performs a federal Consistency Determination. Reviews and issues a Coastal Development Permit upon Project approval.
CDFW	Trustee agency	Reviews and submits recommendations in accordance with CEQA. City will consult with CDFW in accordance with the Fish and Wildlife Coordination Act.
Local Agencies		
Santa Ana Regional Water Quality Control Board	Responsible agency	Permitting authority for water quality, including point and non-point source discharges. Reviews project for authorization under the Porter-Cologne Water Quality Control Act, Waste Discharge Requirements, and Clean Water Act Section 401 State Certification of Water Quality and Section 402: National Pollutant Discharge Elimination System (NPDES) Permit.

2.2 Assembly Bill 52

Assembly Bill (AB) 52 became effective on July 1, 2015, requiring lead agencies to consider the effects of projects on tribal cultural resources and to conduct notification and consultation with federally and non-federally recognized Native American tribes and Native American Heritage Commission (NAHC) early in the environmental review process. Three Native American tribes, Gabrieleño Band of Mission Indians – Kizh Nation, Juañeno Band of Mission Indians – Acjachemen Nation, and San Gabriel Band of Mission Indians, have requested consultation on CEQA documentation for projects in the City. The City initiated consultation with the three tribes and requested a search of NAHC's Sacred Lands Information File in November 2019.

2.3 Public Outreach

Given the public interest in the proposed Project, the City conducted several public stakeholder outreach meetings in October and November 2019. These meetings were informational in nature and helped to define the project need. A full list of groups included in this outreach is as follows:

- Still Protecting Our Newport (SPON)
- Balboa Island Improvement Association
- Hill's Fuel Dock
- Newport Beach Harbormaster
- Balboa Yacht Club
- CoastKeeper
- Local Chambers of Commerce
- Coastal Bay Water Quality Committee

- City of Newport Beach Harbor Commission
- Lido Isle Mayor Town Hall
- Bay Island Homeowners Association
- Newport Harbor Yacht Club
- Island Marine
- Curci Companies
- Irvine Company

The City will conduct full CEQA scoping as part of the NOP, including a public scoping meeting on December 4, 2019.

3 Potential Environmental Impacts

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by the proposed Project, involving at least one impact that is potentially significant as indicated by the checklist.

☒ Aesthetics	☐ Agricultural and Forestry	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☐ Energy
☒ Geology/Soils	☒ Greenhouse Gas Emissions	☒ Hazards and Hazardous Materials
☒ Hydrology/Water Quality	☒ Land Use/Planning	☐ Mineral Resources
☒ Noise	☐ Population/Housing	☐ Public Services
☒ Recreation	☐ Transportation	☒ Tribal Cultural Resources
☐ Utilities/Service Systems	☐ Wildfire	☒ Mandatory Findings of Significance

3.1 Determination

On the basis of this initial evaluation:

☐ I find that the proposed subsequent activity could not have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

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

☐ I find that the subsequent activity may have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☒ I find that the proposed project may have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Chris Miller — Signature

11/15/19 — Date

Chris Miller — Printed Name

City of Newport Beach — For

3.1.1 Aesthetics

Except as provided in Public Resources Code Section 21099, would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Have a substantial adverse effect on a scenic vista?	☒	☐	☐	☐
b.	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings along a scenic highway?	☐	☐	☒	☐
c.	Substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☒	☐	☐	☐
d.	Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	☐	☐	☒	☐

3.1.1.1 Discussion

The City of Newport Beach General Plan identifies enhancement of the City's visual resources as important goals. The General Plan designates visual resources, scenic corridors, public viewpoints, ocean views, cliffs, and hillsides as important scenic resources. While the proposed Project would not substantially damage scenic resources on a scenic highway or conflict with applicable zoning and other regulations governing scenic quality, the proposed Project includes construction activities that may be visible from a scenic highway and the neighboring communities. Therefore, the proposed Project would have the potential to result in temporary impacts to scenic vistas and create temporary sources of light and glare. However, the proposed Project is not expected have a permanent impact on scenic vista in comparison to baseline conditions. To further analyze the potential for impacts, the DEIR will include a full analysis of the proposed Project's potential aesthetic impacts.

3.1.2 Agricultural and Forestry Resources

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b.	Conflict with existing zoning for agricultural use or conflict with a Williamson Act contract?	☐	☐	☐	☒

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
c.	Conflict with existing zoning for or cause rezoning of forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d.	Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e.	Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

3.1.2.1 Discussion

Neither the proposed Project site nor the immediate surrounding areas currently support agricultural use or forestry resources. There are no timberland zoned properties within the City as of 2019 (City 2019a); the nearest forest areas are the Cleveland National Forest and the San Bernardino National Forest (National Forest 2019), which are more than 65 and 75 miles away, respectively. The project site is located in a waterway and is not zoned. Thus, it is not designated for agriculture or forestry resources. All property surrounding the proposed project site has been developed for residential, commercial, special purpose, and mixed-use land uses.

3.1.2.2 Impact Evaluation

A: Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The proposed Project would not result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use. Therefore, there would be no impact.

B: Would the project conflict with existing zoning for agricultural use or conflict with a Williamson Act contract?

No Impact. No farmland exists in the proposed Project area. The project site is not zoned and is not subject to a Williamson Act contract. Therefore, there would be no impact.

C: Would the project conflict with existing zoning for, or cause rezoning of forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

No Impact. The proposed Project would not conflict with or change any zoning or use of forest land, timberland, or timberland zoned Timberland Production. Therefore, there would be no impact.

D: Would the project result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. The proposed Project would not result in the conversion of forest land or timberland to non-forest use. Therefore, there would be no impact.

E: Would the project involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

No Impact. No forest or farmlands exist near the proposed Project area. Therefore, there would be no impact.

3.1.3 Air Quality

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:		**Potentially Significant Impact**	**Less Than Significant Impact After Mitigation**	**Less Than Significant Impact**	**No Impact**
a.	Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b.	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard?	☒	☐	☐	☐
c.	Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
d.	Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☒	☐	☐	☐

3.1.3.1 Discussion

The proposed Project site is located within the South Coast Air Basin (Basin). The South Coast Air Quality Management District, together with the Southern California Association of Government, is responsible for formulating and implementing air pollution control strategies throughout the Basin. The proposed Project includes construction activities, including the use of diesel- and gas-powered

construction equipment, which would result in increased emissions of criteria air pollutants. Emissions associated with construction have the potential to exceed applicable thresholds, conflict with an applicable air quality plan, or expose sensitive receptors to substantial pollutant concentrations. Therefore, the DEIR will include a full analysis of the proposed Project's potential air quality impacts.

3.1.4 Biological Resources

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

3.1.4.1 Discussion

There are two Fish Management Plans (FMPs) that include waters adjacent to the proposed Project site: 1) the Coastal Pelagic FMP covering six species; and 2) the Pacific Groundfish FMP covering 89 species. In addition, birds protected under the Migratory Bird Treaty Act use the area for foraging. An eelgrass survey would be required prior to dredging. The proposed Project will not have a substantial adverse effect on state or federally protected wetlands as there are no such habitats in the project area. While the project area is largely developed and devoid of potential habitat for special-status species, portions of the project area may support, even temporarily, special-status species. Therefore, the DEIR will evaluate the potential for the Proposed project to impact biological resources.

3.1.5 Cultural Resources

	Would the project:	Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☐	☐	☒
b.	Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☒	☐	☐	☐
c.	Disturb any human remains, including those interred outside of dedicated cemeteries?	☒	☐	☐	☐

3.1.5.1 Discussion

The proposed Project is located in Newport Harbor. Prior to historic land modifications, the region was characterized by tidal flats and channels with dry land in the general vicinity available only on small hills and natural levees.

There are no structures in the project area, and the project does not include demolition or modification of any structure. Eleven properties in the City have been listed or designated eligible for listing on the National Register of Historic Places or California Register of Historical Resources, or otherwise listed as historic or potentially historic in the California Historic Resources Information System (CHRIS) maintained by the Office of Historic Preservation as well as seven properties in the City Register (City, 2006a) All identified properties are located outside the project area and there would be no impacts to historical resources.

There may be some potential for impacts to archaeological resources. Dredging activities began in the area in the early 1900s, and the major dredging and filling project that created the harbor was completed in 1936. Various maintenance dredging operations have occurred since that time. CAD

would be dredged below previously authorized depth and therefore would encounter native sediment. Though this sediment would have been in an active intertidal-beach area, there may be potential to encounter isolated archaeological artifacts or human remains. Therefore, the potential impact on cultural resources will be fully analyzed in the DEIR.

3.1.6 Energy

Would the project:			Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Result in a potentially significant environmental impact due to wasteful, inefficient or unnecessary consumption of energy resources during project construction or operation?		☐	☐	☐	☒
b.	Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?		☐	☐	☐	☒

3.1.6.1 Discussion

Senate Bill (SB) SX1-2 requires the State of California to produce 33% of its electricity from renewable sources by December 31, 2020; SB 350 requires the State to produce 50% of its electricity from renewable sources by December 31, 2030; and SB 100 requires the State to produce all electricity from renewable sources by 2045. A local partnership, the Orange County Cities Energy Partnership, identifies and creates projects to improve long-term energy efficiency and sustainability with a goal to reduce greenhouse gas (GHG) emissions and energy consumption by 15% from a 2010 baseline before 2020.

In order to comply with SB SX1-2 and SB 350 standards, the City has developed the *City of Newport Beach Energy Action Plan (EAP)* (Digital Energy Inc. 2013). The plan provides a roadmap for the City to reduce GHG through reductions in energy used in facility buildings and operations. Key objectives of the plan are as follows:

- Create a long-term vision for energy efficiency
- Provide and assess information related to City energy use and greenhouse gas emissions
- Highlight the City's major energy-using facilities
- Establish reduction targets for energy efficiency
- Identify and prioritize goals, policies, and actions to achieve energy reductions
- Provide a framework implementing the identified goals, policies, and actions

Southern California Edison and Southern California Gas Company are local providers in the vicinity of the proposed Project area.

3.1.6.2 Impact Evaluation

A: Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

No Impact. Proposed Project construction would involve equipment that consumes fossil fuels; however, the proposed Project would not require any unusual or excessive construction equipment or practices compared to projects of similar type and size. In addition, the proposed Project would comply with standard BMPs such as equipment idling restrictions and maintaining equipment according to manufacturers' specifications. As such, construction of the proposed Project would not result in wasteful, inefficient, or unnecessary consumption of energy. Operation of the CAD would require energy demands that would be negligible. Therefore, there would be no impact, and this issue will not be addressed further in the DEIR.

B: Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

No Impact. The City would employ standard BMPs during construction, and operation of the CAD would occur in compliance with federal, state, and local regulations pertaining to emissions and efficiency. These measures would ensure that consumption of associated fossil fuels occur in compliance with existing plans and regulations.

Continued implementation of the *City of Newport Beach Energy Action Plan (EAP)* (Digital Energy Inc. 2013) would ensure that the proposed Project does not conflict with state regulations pertaining to renewable energy. Therefore, there would be no impact, and this issue will not be addressed further in the DEIR.

3.1.7 Geology and Soils

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

3.1.7.1 Discussion

The proposed Project is located in the marine environment; therefore, there would be no impact to soil or land-based erosion as a result of the project. As discussed in Section 3.1.5, while unlikely to encounter paleontological resources because the area has been previously dredged and developed, because dredging would encounter native soil, there is the potential for impacts to a unique paleontological resource. Because the proposed Project is close to the Newport-Inglewood Fault Zone, the proposed CAD could potentially be impacted in the event of seismic ground shaking. In addition, the proposed Project area is located in an area with a liquefaction potential (City 2006b).

Therefore, the DEIR will fully evaluate the potential for the proposed Project to cause potential substantial adverse effects on geology and soils.

3.1.8 Greenhouse Gas Emissions

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

3.1.8.1 Discussion

The California Global Warming Solutions Act of 2006, widely known as AB 32, required the Air Resources Board to develop and enforce regulations for the reporting and verification of state-wide greenhouse gas (GHG) emissions. In 2014, the Air Resources Board adopted an update to the 2008 Scoping Plan, which builds upon the initial Scoping Plan with new strategies and recommendations. The 2008 Scoping Plan and 2014 Scoping Plan Update require that reductions in GHG emissions come from virtually all sectors of the economy and be accomplished from a combination of policies, regulations, market approaches, incentives, and voluntary efforts. The *City of Newport Beach Energy Action Plan (EAP)* (Digital Energy Inc. 2013) addresses energy consumption and GHG emission reductions. Because GHG emissions would be released from combustion sources associated with the proposed Project during construction, the DEIR will fully evaluate the potential for the proposed Project to generate GHG emissions that could have a significant impact on the environment. The DEIR will also analyze compliance with applicable state, regional, and local GHG reduction plans.

3.1.9 Hazards and Hazardous Materials

	Would the project:	Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☒	☐	☐	☐
b.	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
c.	Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?	☒	☐	☐	☐
d.	Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e.	For a project within an airport land use plan area or, where such a plan has not been adopted, be within 2 miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f.	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g.	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☐	☒

3.1.9.1 Discussion

The proposed Project is not within an airport land use plan area nor within 2 miles of a public airport or public use airport and therefore would not result in a safety hazard or excessive noise for people residing or working in the project area. The proposed Project site is not included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 (also known as the Cortese List). In addition, as a marine-based project, there would be no impacts due to wildland fires as a result of the project. However, because the proposed Project would manage unsuitable sediment, there is potential for hazards and hazardous materials-related impacts on the environment. Therefore, the DEIR will evaluate whether the proposed Project would create a significant hazard to the public or environment through the routine transport of hazardous materials. The potential for impacts associated with hazards and hazardous materials will be fully analyzed in the DEIR.

3.1.10 Hydrology and Water Quality

	Would the project:	Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☒	☐	☐	☐
b.	Substantially decrease groundwater supplies or interfere substantially with groundwater recharge, such that the project may impede sustainable groundwater management of the basin.	☐	☐	☐	☒
c.	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:				
	Result in substantial erosion or siltation on site or off site?	☒	☐	☐	☐
	Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on site or off site?	☐	☐	☐	☒
	Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
	Impede or redirect flood flows	☐	☐	☐	☒
d.	In flood hazard tsunami, or seiche zones, risk release of pollutants due to project inundation?	☒	☐	☐	☐
e.	Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☒	☐	☐	☐

3.1.10.1 Discussion

Generally, construction activities within the City would be regulated under the National Pollutant Discharge Elimination System (NPDES) program, as administered by the Santa Ana Regional Water Quality Control Board (RWQCB). The proposed Project will occur entirely within the marine environment and therefore would not affect groundwater or result in land-based erosion or runoff issues. However, while the proposed Project would include a number of BMPs to prevent impacts to water quality, because the proposed Project would result in dredging, it may result in potential effects to water quality, even temporarily. Therefore, the DEIR will fully evaluate whether the project would result in potential impacts to hydrology and water quality.

3.1.11 Land Use and Planning

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Physically divide an established community?	☐	☐	☐	☒
b.	Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☒	☐	☐	☐

3.1.11.1 Discussion

The City's General Plan (City 2006a) was adopted on July 25, 2006, and approved on November 7, 2006. The Plan provides both a comprehensive assessment of current land use and a forward-looking vision statement, which presents a description of the City that residents want Newport Beach to be in 2025. On January 8, 2019, the City Council conducted a study session to consider initiating a review and update of the General Plan. At the January 22, 2019, City Council meeting, the initiation and formation of a steering committee was approved, and an update meeting was held on September 25, 2019. While update planning is ongoing, the 2006 General Plan serves as the regulatory framework under which potential land use and planning impacts are assessed.

Newport Harbor is covered under several components in the 2006 General Plan, including the Harbor and Bay, Natural Resources, and Recreation, which address public access, water quality, and the environment.

The California Coastal Act (CCA) of 1976 (Public Resources Code §30000 et seq.) was enacted to establish policies and guidelines that provide direction for the conservation and development of the California coastline. The CCA established the California Coastal Commission (CCC) and created a state and local government partnership to ensure that public concerns regarding coastal development are addressed. The City's Coastal Land Use Plan (CLUP) was prepared in accordance with the CCA, approved in 2005, and amended several times by the CCC—the most recent amendment adopted in January 2019. The City's CLUP sets forth goals, objectives, and policies that govern the use of land and water in the coastal zone.

Because the proposed Project will be required to show compliance with the General Plan and the CLUP, the DEIR will include a full General Plan/CLUP policy analysis DEIR. Therefore, the DEIR will fully evaluate whether the proposed Project would result in potential impacts to land use and planning.

3.1.12 Mineral Resources

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

3.1.12.1 Discussion

Oil and gas seeps are common occurrences in many parts of Orange County, including in and around the proposed Project area. According to the California Department of Oil, Gas, and Geothermal Resources (2019), two separate production and reserve areas exist within the project area: the Newport oil field and the West Newport oil field. The project area is classified as a Mineral Resource Zone (MRZ)-1, an area where available geologic information indicates there is little or no likelihood for presence of significant mineral resources (City 2006b). Adequate information indicates that no significant mineral deposits are present, or it is judged that little likelihood exists for their presence. The proposed Project site does not contain any known mineral resources, including any rock, sand, or gravel resources.

3.1.12.2 Impact Evaluation

A: Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No Impact. The City's General Plan encourages consolidation of existing oil and gas activities (Policy Natural Resources [NR] 19.4) but contains policies (NR 19.1 through 19.4) that prohibit additional, future oil extraction within the City and oppose new offshore oil and gas drilling activities (City 2006a). Moreover, due to the proposed Project's location in an MRZ-1, continued development of the area would not limit access to any known mineral resources. As a result, the proposed Project would neither interfere with any existing extraction operations nor reduce the availability of any known mineral resources. Therefore, there would be no impact.

B: Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No Impact. The proposed Project area does not include a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. Therefore, there would be no impact.

3.1.13 Noise

Would the project result in:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?	☒	☐	☐	☐
b.	Generation of excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐
c.	For a project located within the vicinity of a private airstrip or an airport land use plan area, or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport and expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒

3.1.13.1 Discussion

The proposed Project would not be located within the vicinity of a private airstrip or an airport land use plan area, nor within 2 miles of a public airport or public use airport and therefore will not expose people residing or working in the project area to excessive noise levels in such areas. Construction activities for the proposed Project would require the use of numerous pieces of noise-generating equipment and equipment that could cause excess noise and vibration. These activities would temporarily increase ambient noise levels and vibration levels on an intermittent basis. Therefore, the DEIR will fully evaluate the potential impacts from noise and vibration associated with the proposed Project.

3.1.14 Population and Housing

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	☐	☒
b.	Displace a substantial number of existing people or housing units, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

3.1.14.1 Discussion

The City's General Plan designates the proposed project site for TS (Tidelands and Submerged Lands) (City 2006a). There is no housing within the project area, though a few residential areas are located near the project site (City 2006a). In 2018, the population of the City was approximately 87,182 people, and the number of housing units was 44,670 (SCAG 2019).

3.1.14.2 Impact Evaluation

A: Would the project induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?

No Impact. No new homes would be constructed as part of the proposed Project. While the project would include temporary construction jobs, the jobs would be limited and are expected to be served by the existing population. Therefore, no new housing to accommodate workers is necessary. The CAD facility would not induce population growth.

B: Would the project displace a substantial number of existing people or housing units, necessitating the construction of replacement housing elsewhere?

No Impact. There are no housing units in the proposed Project area. There are a few residential areas located near the proposed Project site. The proposed Project would have no effect on existing residential areas, and the site's zoning precludes the potential for future housing developments in the immediate harbor area. Therefore, the proposed Project would have no impact on housing.

3.1.15 Public Services

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

3.1.15.1 Discussion

3.1.15.1.1 Fire Protection

The City's Fire Department provides fire protection to the City and contiguous areas, including the proposed Project area. The Department has eight fire stations operating on a 24-hour basis, and each fire station has one fire engine. The response time goal for the department is to provide service within 5 minutes of notification (City 2019b). Nearby fire stations include Balboa Peninsula Fire Station #1 at 110 E. Balboa Boulevard and Lido Fire Station #2 at 475 32nd Street.

3.1.15.1.2 Police Protection

The City's Police Department provides police protection services throughout the City limits (53 square miles). The current City Police Department officer to citizen ratio is about 1 to 625 (Governing 2016).

3.1.15.1.3 Schools

The Newport-Mesa Unified School District is served by a total of 32 schools: 2 high schools, 2 middle schools, 22 elementary schools, and several other miscellaneous schools (Newport-Mesa Unified School District 2019). Several institutions of higher education are located within the Newport Beach area, including Interior Designers Institute, St-Francis School of Law, Janus University, and American Liberty University. The nearest school is Newport Elementary School, located approximately 0.25 mile to the southeast of the proposed Project site.

3.1.15.1.4 Parks

The City's General Plan land use designation for the proposed Project site is TS, and the surrounding environment is designated for various uses (City 2006a, 2019a). The nearest park to the project area is San Remo Park, located on Lido Isle, 0.3 mile west of the project CAD site.

3.1.15.2 Impact Evaluation

A1-5: Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services: 1) fire protection; 2) police protection; 3) schools; 4) parks; or 5) other public facilities?

No Impact. The proposed Project would not result in increased demand on any existing facilities or services, including fire protection, police, schools, or parks. The project area is adequately served by the City Fire Department and City Police Department. There would be no impact to fire protection, police, schools, parks, or other public facilities.

3.1.16 Recreation

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☒	☐	☐	☐
b.	Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☒	☐	☐	☐

3.1.16.1 Discussion

Newport Harbor is one of the largest recreational harbors in the United States. Over time, sediment accumulates and impedes navigation and full use of the berths. Maintenance dredging is therefore necessary to maintain recreational access. The proposed Project will enhance the long-term recreational access by dredging material not covered under the current maintenance dredging plan and constructing a CAD to accommodate dredged material during construction. However, temporary interference with recreational opportunities and the harbor anchorage are anticipated during CAD construction and filling activities. Therefore, the DEIR will evaluate the proposed Project's potential impacts on recreation.

3.1.17 Transportation

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Conflict with a program, plan, ordinance, or policy addressing the circulation system including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☒
b.	Conflict with or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	☐	☐	☐	☒
c.	Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d.	Result in inadequate emergency access?	☐	☐	☐	☒

3.1.17.1 Discussion

Newport Beach faces the Pacific Ocean, causing the City to have access from only three directions. In addition, Upper Bay acts as a barrier, resulting in only two east/west routes through Newport Beach (Highway 1 and the Bristol Street/State Route [SR] 73 corridor).

Regional access to the City is provided by the following highways:

- Interstate 405 freeway runs north to south within Southern California and intersects both SR 73 and SR 55.
- SR 55 extends south from SR 91 and terminates in the City at Finley Avenue
- SR 73 extends through the northerly part of the City, connecting SR 55 and Interstate 405 with Interstate 5.
- Highway 1 runs along the California coast and all the way through Newport Beach.

In addition to these major highways, there is an extensive network of City streets, such as Newport Boulevard, Balboa Boulevard, Jamboree Road, MacArthur Boulevard, Irvine Avenue, and Newport Coast Drive, that provide internal movement within the City.

3.1.17.2 Impact Evaluation

A: Would the project conflict with a program, plan, ordinance, or policy addressing the circulation system including transit, roadway, bicycle and pedestrian facilities?

No Impact. The proposed Project is a harbor maintenance dredging project using aquatic sediment management techniques (the CAD facility) and will have no significant impact on the City's street transportation, including transit, roadway, bicycle, and pedestrian facilities. Construction may include some truck trips for initial construction equipment staging. In addition, small amounts of debris (such

as rocks) may be removed from the proposed dredge footprint and, if so, will require transportation to a landfill. It is anticipated that a total of approximately five trucks will travel to and from the site over the entire construction period. These trips will not result in a substantial increase to traffic volume or vehicle trips nor will it affect the existing level of service standards. As for operation, no new vehicle trips would be required in the long term. Therefore, there would be no impact to existing traffic during construction and operation activities

B: Would the project conflict with or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

No Impact. The proposed Project is a harbor maintenance dredging project using aquatic sediment management techniques and will have no significant impact on the City's street transportation.

C: Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact. The proposed Project does not include any modifications to the existing transportation network. Therefore, there would be no impact.

D: Would the project result in inadequate emergency access?

No Impact. As stated above, the proposed Project would result in minor levels of new traffic during construction staging that would not affect area transportation levels of service. Therefore, there would be no impact to emergency access.

3.1.18 Tribal Cultural Resources

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
	Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☒	☐	☐	☐

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
	A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☒	☐	☐	☐

3.1.18.1 Discussion

CEQA establishes a formal consultation process for California Native American Tribes to identify potential significant impacts to tribal cultural resources, commonly known as the Assembly Bill 52 (AB 52) process. As specified in AB 52, lead agencies must provide notice to tribes that are traditionally and culturally affiliated with the geographic area of a proposed project if the tribe has submitted a written request to be notified. As discussed in Section 3.1.18, there are three tribes that have requested to be on the City's AB 52 list, and the City has provided notice to the tribes. The tribe must respond to the lead agency within 30 days of receipt of the notification if it wishes to engage in consultation on the project, and the lead agency must begin the consultation process within 30 days of receiving the request for consultation. Any consultation under AB 52 will be included in the DEIR.

3.1.19 Utilities and Service Systems

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Require or result in the relocation or construction of new or expanded water, wastewater treatment facilities, storm water drainage, electrical power, natural gas or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b.	Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c	Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒

Would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
d.	Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒
e.	Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

3.1.19.1 Discussion

3.1.19.1.1 Stormwater

Newport Beach has more than 95 miles of storm drainpipe, 3,224 catch basins, and 86 tidal valves (City 2019c). Stormwater flows into several storm drains located throughout the City.

3.1.19.1.2 Water Supply

Domestic water in Newport Beach is supplied by groundwater and imported surface water sources. In 2010, 60% of the water supplied by the City's service area was provided by groundwater from the Orange County Groundwater Basin; 37% percent of water supply was provided by the Municipal Water District of Orange County, which delivers water imported from the Colorado River and State Water Project; and 3% was recycled water (City 2011). The groundwater supply for the City's water system is extracted from two well sites established in Fountain Valley. It is projected that by 2035—which extends beyond the 10-year period for disposal of unsuitable material—the water supply mix will remain roughly the same (City 2011).

3.1.19.1.3 Wastewater Infrastructure

Wastewater service within the City is provided by the City, Irvine Ranch Water District, and Costa Mesa Sanitation District. Wastewater from the City's sewer system is treated by the Orange County Sanitation District (City 2006b).

3.1.19.1.4 Solid Waste

The majority of residential solid waste generated in the City is collected by the City's Refuse Division, and the remaining solid waste is collected by waste haulers and transported to a City-owned transfer station. Refuse is then consolidated and transported to a materials recovery facility where recyclable

materials are sorted from refuse by machines and other methods. The remaining solid waste (debris) is taken to one of three County landfills (Frank R. Bowerman, Prima Deshecha, and Olinda Alpha).

3.1.19.1.5 Electricity, Gas, and Telecommunications

Southern California Edison Company is the primary distribution provider for electricity in the proposed Project area. Southern California Gas Company provides natural gas service for the Project area. AT&T provides telecommunication services to the area.

3.1.19.2 Impact Evaluation

A: Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment facilities, storm water drainage, electrical power, natural gas or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

No Impact. The State of California Government Code 4126 mandates that anyone performing excavation work shall call at least 2 working days prior to commencement of any excavation. Notice of this Project will be provided to area fiber optic, communications, and electrical providers to request additional information on the location, if any, of private cables or utilities. Although not active and abandoned, known in-water or overhead City-provided utilities are located within the proposed Project area, the contractor will be required to confirm the locations, alignments, and depths of any utilities potentially located within the Project area prior to dredging. In addition, as part of the construction plan, all overhead and buried upland utility lines will need to be demarcated and avoided by the contractor prior to initiating construction.

The proposed Project may generate small amounts of construction debris during maintenance dredging such as abandoned utility lines. Debris encountered during the CAD facility excavation would be removed and appropriately disposed. For disposal of commercial debris, the City currently has an open franchise system, in which the contractor will select a City-approved hauler who will dispose of or recycle the debris appropriately (construction and demolition projects generate a high volume of recyclable material that is counted toward the City's recycling rate). The proposed Project will not affect utilities and service systems because it consists of removal of unsuitable sediment from the project for barge transport to the CAD location and does not result in additional demands on existing utilities and service systems or create future demand on them.

No potential direct or indirect impacts to utilities and service systems have been identified because no direct or indirect impacts will result from the proposed Project. It will also not result in cumulative impacts to utilities and service systems. The project will not generate wastewater or require treatment of wastewater and therefore will not exceed requirements of the Santa Ana RWQCB. The project will not require or result in the construction of new water or wastewater treatment facilities or

expansion of existing facilities. Therefore, the proposed Project will not require a determination by the wastewater treatment provider that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.

B: Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

No Impact. No potential direct or indirect impacts to water supplies have been identified because the project will not use potable water supplies to implement the project.

C: Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact. The project will not generate wastewater or require treatment of wastewater. Therefore, the proposed Project would not change the capacity of a wastewater treatment provider.

D: Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure or otherwise impair the attainment of solid waste reduction goals?

No Impact. The proposed project provides a safe means of disposal for unsuitable dredged materials within a CAD facility. Thus, the proposed Project would not generate significant solid waste requiring upland disposal and therefore would not affect the capacity of local solid waste landfill infrastructure or impair the attainment of solid waste reduction goals.

E: Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

No Impact. The proposed Project would be constructed within the parameters of applicable federal, state, and local solid waste regulations. The proposed Project may generate small amounts of construction debris during maintenance dredging such as abandoned utility lines. As described, area landfills are authorized to accept the types of waste potentially generated by proposed Project construction. Therefore, there would be no impact.

3.1.20 Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:		**Potentially Significant Impact**	**Less Than Significant Impact After Mitigation**	**Less Than Significant Impact**	**No Impact**
a.	Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
b.	Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c.	Require the installation or maintenance of associated infrastructure (such as roads,fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d.	Expose people or structures to significantrisks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes	☐	☐	☐	☒

3.1.20.1 Discussion

According to California Fire Prevention (2019), the proposed Project is not located in or near state responsibility areas. The closest state responsibility area is the Crystal Cove State Park, located about 4 miles south of the project area. According to the California Department of Forestry and Fire Protection (2019), the project is not located in a Very High Fire Hazard Severity Zone (VHFHSZ). The closest VHFHSZ is in Newport Beach, approximately 1 to 2 miles south of the Project area.

3.1.20.2 Impact Evaluation

A: Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

No Impact. The proposed Project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, there would be no impact, and this issue will not be addressed further in the DEIR.

B: Would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

No Impact. The risk of wildfire is related to a variety of parameters, including fuel loading (vegetation), fire weather (winds, temperatures, humidity levels, and fuel moisture contents) and topography. For instance, steep slopes can contribute to fire hazard by intensifying the effects of wind and making fire suppression difficult (Estes et al. 2017). Fuels such as grass are highly flammable (Estes et al. 2017). The proposed Project site is located in the harbor, which is not

considered at a risk of wildfire. Therefore, there would be no impact, and this issue will not be addressed further in the DEIR.

C: Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

No Impact. The proposed Project involves constructing a CAD facility and does not require the installation or maintenance of associated infrastructure such as roads, fuel breaks, emergency water sources, power lines, or other utilities that may exacerbate fire risk or result in temporary or ongoing impacts to the environment. The proposed Project site is located in the harbor, which is not considered at a risk of wildfire. Therefore, there would be no impact, and this issue will not be addressed further in the DEIR.

D: Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

No Impact. The proposed Project would not result of changes in runoff, post-fire slope instability, or drainage and therefore would not result in downstream flooding or landslides. The proposed Project site is located in the harbor, which is not considered at a risk of wildfire. There would be no impact, and this issue will not be addressed further in the DEIR.

3.1.21 Mandatory Findings of Significance

		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
a.	Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b.	Does the project have impacts that are individually limited but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☒	☐	☐	☐

		Potentially Significant Impact	Less Than Significant Impact After Mitigation	Less Than Significant Impact	No Impact
c.	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

3.1.21.1 Discussion

As described in preceding sections, the proposed Project could have the potential to result in potentially significant impacts on the environment. Therefore, the DEIR will evaluate whether the proposed Project has the potential to substantially degrade the quality of the environment, both at a project level and cumulatively. The proposed Project could result in adverse impacts on human beings through environmental impacts, either directly or indirectly. Therefore, the DEIR will evaluate whether the proposed Project would cause direct or indirect adverse effects on human beings and will include a full analysis of Mandatory Findings of Significance.

4 References

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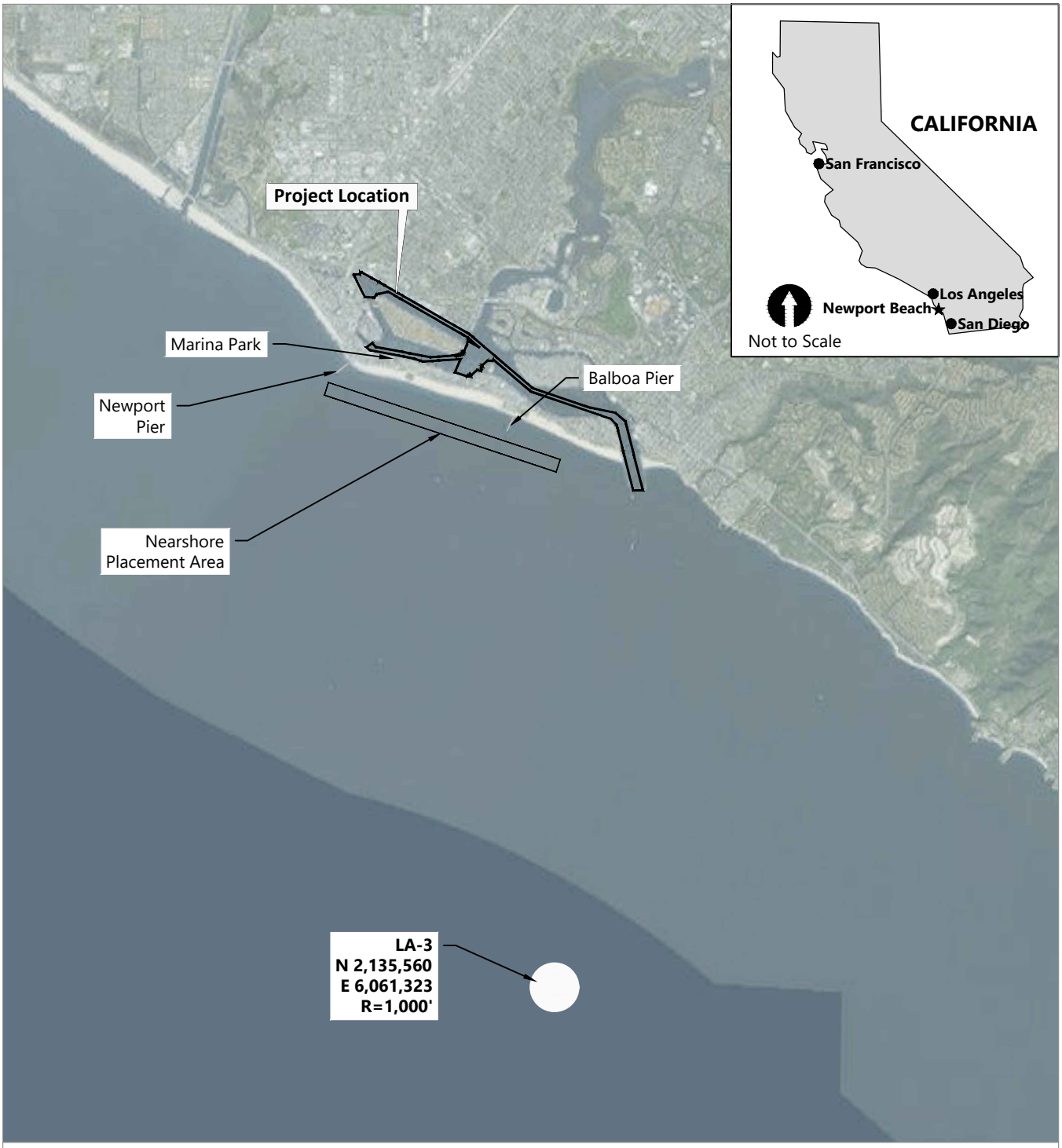
Figures



SOURCE: Image from Bing maps.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

Approximate Project Location:
33° 36.540', 117° 54.230'

0 8,000
Feet

Publish Date: 2019/11/12 4:45 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-001 VIC.dwg Figure 1

ANCHOR QEA

Figure 1
Vicinity Map

Lower Newport Bay Confined Aquatic Disposal Facility Construction Project



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

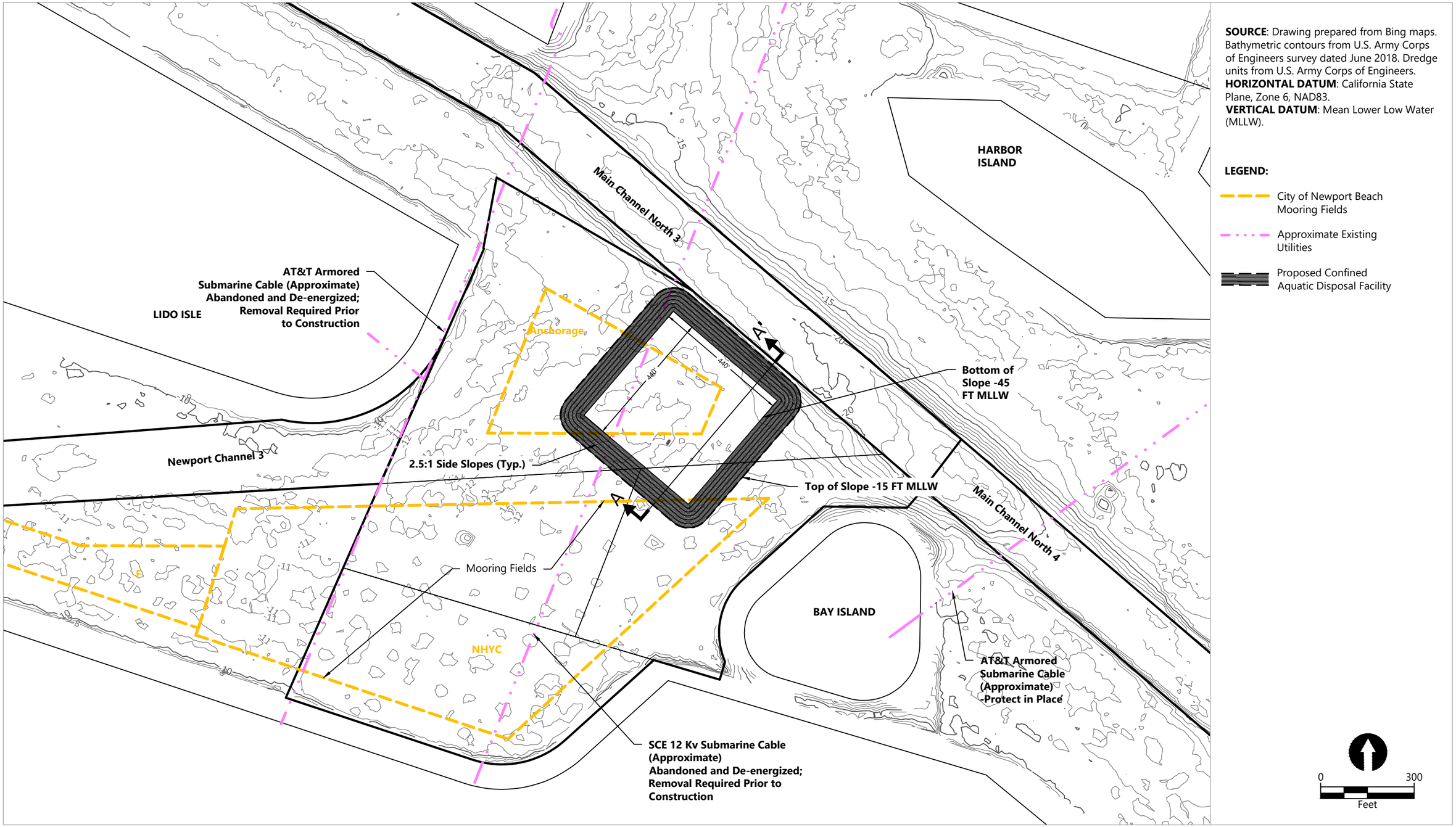
- Dredge Unit Boundary
- (-20) Design Depth
- —10— Existing Bathymetry
- Dredged Material Not Suitable for Open- Ocean Disposal
- Dredged Material Suitable for Open-Ocean Disposal
- Proposed Confined Aquatic Disposal Facility

0 1,800
Feet

Publish Date: 2019/11/12 4:51 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-010d SUITABILITY.dwg Figure 2

ANCHOR QEA

Figure 2
Federal Channels Maintenance Dredging Sediment Suitability Map
Lower Newport Bay Confined Aquatic Disposal Facility Construction Project



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2018. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

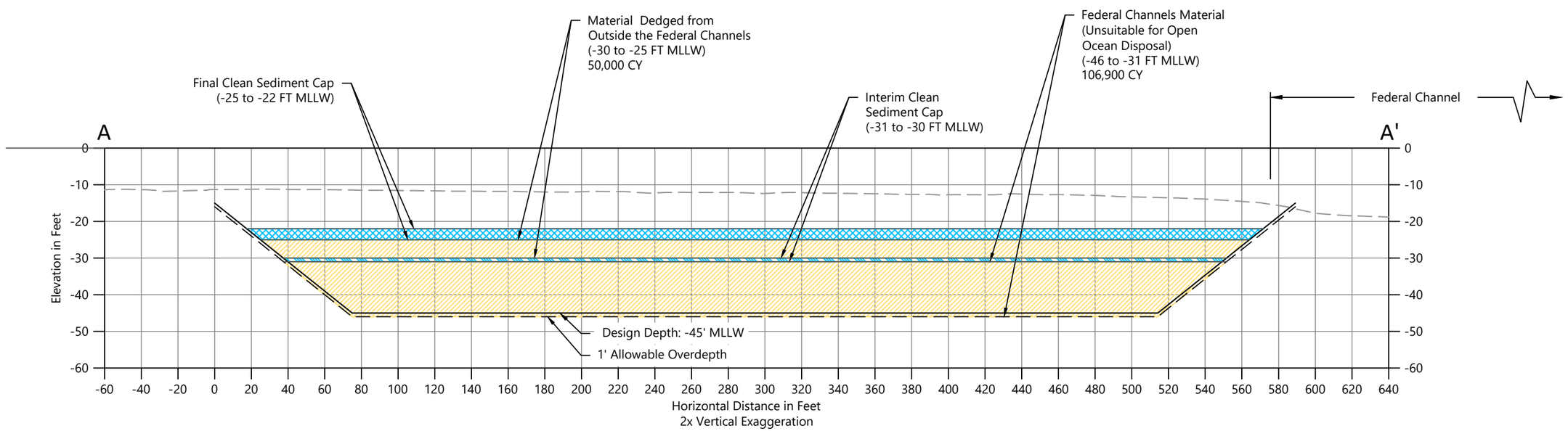
LEGEND:

- City of Newport Beach Mooring Fields
- Approximate Existing Utilities
- Proposed Confined Aquatic Disposal Facility

Publish Date: 2019/11/06 4:54 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-013 BAY ISLAND CAD.dwg Figure 3

ANCHOR QEA

Figure 3
Confined Aquatic Disposal Facility
Lower Newport Bay Confined Aquatic Disposal Facility Construction Project



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2018. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

Unsuitable for Open Ocean Disposal

Suitable for Open Ocean Disposal

Existing Mudline

0 60
Feet

Publish Date: 2019/11/06 4:55 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-013 BAY ISLAND CAD.dwg Figure 4

ANCHOR QEA

Figure 4
Confined Aquatic Disposal Facility Section
Lower Newport Bay Confined Aquatic Disposal Facility Construction Project

Appendix B
Public Involvement and Comment Letters

January 15, 2020

Chris Miller, Public Works Manager
City of Newport Beach, Public Works
Department
100 Civic Center Drive
Newport Beach, California 92660
949.644.3043

cmiller@newportbeachca.gov

LOWER NEWPORT HARBOR CONFINED AQUATIC DISPOSAL (CAD) FACILITY, CONSTRUCTION PROJECT PA2019-020: INITIAL STUDY, PROJECT NUMBER 180243-02.01

Dear Mr. Miller

In response to the solicitation of comments in the Notice of Preparation for the proposed Lower Newport Harbor CAD Facility Construction Project, the Santa Ana Water Board staff herein comment on the technical document submitted as a supplement to the Notice titled:

Overall general comment:

Santa Ana Water Board staff recommends that the City put together a Technical Advisory Committee or use the existing Southern California Dredged Material Management Team (SC-DMMT) to provide input into the proposed project design, the proposed Sediment Management Plan, and the Operations Management and Monitoring Plan, as was previously suggested in emails sent by Santa Ana Water Board staff to City staff in June and August of 2019.

Comments by section
Direct citations from Initial Study document are noted in quotes

Section 1.1

"Following authorization of the CAD facility, the City and its residents would have an opportunity to place material dredged from outside the federal navigation channels into the CAD for a period of up to 10 years with agency approval under the City's Regional General Permit (RGP) 54 or individual permits."

Santa Ana Water Board staff disagrees with this statement, which gives the impression that this proposed use of the CAD has been approved by State and federal agencies. There has been no discussion with Santa Ana Water Board staff about the duration of the potential use of the facility to dispose of RGP-54 dredged material to extend over the course of 10 years. The proposed disposal mechanism for contaminated sediment from general slip and dock maintenance projects into a CAD does not currently appear in the approved Clean Water Act section 401 water quality certification (Certification) for the current RGP-54 permit. What further complicates this CEQA analysis is that the City's request for certifying the renewal of the RGP-54 permit is being initiated prior to the development and finalization of the CAD CEQA document. We recommend that the City include the proposed expansion of RGP-54 coverage within the CEQA analysis of the CAD in order to adequately assess cumulative impacts of exposing potentially contaminated sediment from the dredging activities to create the CAD and from projects being proposed under an amended RGP-54.

Section 1.2.3

"RGP-54 covers the following regulated activities in eligible areas of Newport Harbor: Discharge of dredged material at adjacent beach sites for beach nourishment, the LA-3 Ocean Dredged Material Disposal Site (ODMDS) confined disposal facilities (CDFs), or at approved upland disposal sites."

This statement appears to be inaccurate because the current Certification for RGP-54 contains no language authorizing the disposal of material into confined disposal facilities (CDFs). Specifically, the Certification (amended SARWQCB Project No. 302014-03, signed December 20, 2018) states: "The SC-DMMT evaluated these data in November 2013, approving discharge of dredged material at adjacent beach sites (for beach nourishment) or disposal at the U.S. EPA's LA-3 Ocean Dredged Material Disposal Site (LA-3) for sediments from all areas except for the Balboa Yacht Basin and Promontory Bay. Sediments not approved for disposal at LA-3 will be disposed of at an upland landfill." It also states: "This certification is limited to areas characterized by sediment sampling and authorized for disposal at LA-3 discharge of dredged material at adjacent beach sites (for beach nourishment) or upland (U.S. EPA's suitability determinations in 2018)." In addition, there currently are no existing CDFs that could be used for dredged material disposal in Newport Bay. Please clarify the statement.

Section 1.4

"To accomplish this goal, the following key project objectives must be accomplished... Disposing of unsuitable dredged sediment in a manner that is safe to human and ecological health and minimizes secondary environmental impacts."

This statement can be vaguely interpreted to imply that it addresses the protection of beneficial uses and water quality objectives in the Lower Newport Bay as designated in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan, Chapter 3, updated June 2019). Address this more explicitly in the draft CEQA document.

Section 1.5

"The proposed Project includes the following elements... Disposal of an additional 50,000 cy in the CAD facility for a period of up to 10 years."

The implication, unstated, is that the additional 50,000 cy will be produced by RGP-54 dredging projects. There is no indication of how this volume was calculated, or whether the 10-year timespan was appropriate given changing conditions over the course of that period. For example, storm-associated sediment dynamics, sea level rise, and potential volume of additional non-RGP 54 associated contaminated sediment remediation in other highly contaminated sites in the Bay. More detail needs to be provided in the draft CEQA document.

Section 1.5.1

"The City will have an opportunity for up to 10 years to place 50,000 cy of material in the CAD."

The implication is that this 50,000 cy of material from RGP-54 projects has already been approved by the Santa Ana Water Board, and this is not the case.

"The City will be developing a Sediment Management Plan in coordination with the resource and regulatory agencies to manage disposal of the material in the CAD, including interim placement of clean sand during the 10-year period, and final cap."

Please note that Santa Ana Water Board staff will need to review and approve the Sediment Management Plan prior to any certification under Clean Water Act section 401 or issuance of Waste Discharge Requirements (WDRs) for construction and operation of the proposed facility. In the draft CEQA document, specify how and when clean sand will be applied as an interim cap. Also identify the depth needed to isolate the contaminated sediments from bioturbation and anthropogenic disturbance.

Section 1.5.2

"An Operations Management and Monitoring Plan for the CAD facility will be developed for implementation by the City. The plan will describe the management and monitoring objectives for the CAD facility, a communications plan covering the entire CAD facility construction and sediment disposal process, construction monitoring and post-disposal monitoring plans, contingency plans, annual monitoring plans, and long-term management plans for the CAD facility once it has been capped."

Santa Ana Water Board staff will need to review and approve the Operations Management and Monitoring Plan prior to any certification under Clean Water Act section 401 or issuance of WDRs for the construction and operation of the proposed facility.

Section 1.6.2.3

"The Reduced Project Alternative includes construction of a smaller CAD footprint. Under this reduced alternative, there could be two potential scenarios: either less dredging of unsuitable material would occur, or any dredged sediment deemed unsuitable for open ocean disposal that could not be placed into the smaller CAD site would be trucked to permitted upland facilities."

Santa Ana Water Board staff expects any alternatives to the project to be thoroughly scoped in the draft CEQA document because the volume capacity is an estimate that may be insufficient to contain the sediment planned for the facility.

Section 2.1, Table 1

The "Santa Ana Regional Water Quality Control Board" is listed as a Local Agency. This is incorrect. The Santa Ana Water Board enforces State statute under authority of the Porter-Cologne Water Quality Control Act and is, therefore, a State Agency. Furthermore, as is indicated in the table itself, the Santa Ana Water Board is delegated the authority to enforce compliance with federal law through the Clean Water Act sections 401 and 402. The Santa Ana Water Board should not be listed as a Local Agency.

Section 2.3

The City states that "several" public stakeholder meetings were held. The Santa Ana Water Board requests details of the meetings, including dates, locations, and lists of participants. Specific public comments from those meetings should be provided in writing to regulatory agencies.

A CEQA scoping meeting occurred on December 4, 2019. Staff of the Santa Ana Water Board attended the meeting and provided verbal and written comments. Santa Ana

Water Board staff anticipates that the draft CEQA document will address those comments or that the City will provide written responses to them.

The comments made by Santa Ana Water Board staff at that December 4th meeting, either verbally or in writing, are summarized below:

- The draft CEQA document should contain, in addition to mercury, an analysis of all other detected contaminants in the sediment cores taken from the planned dredge areas of Lower Newport Bay where the dredged material is intended for CAD disposal;

- We understand from the CEQA scoping meeting that all sediment characterization data are online or may be otherwise accessible to the general public; nevertheless, we request that relevant and referenced documents and reports be attached in full as appendices to the draft CEQA document for comprehensive public review;

- While mention of fill into the U.S. Department of the Navy's current revision of Anaheim Bay was brought up during the scoping meeting, note that volumes of sediment disposal and fill for the Navy Anaheim Bay Project have already been calculated and permitted, along with specific conditions, by the Santa Ana Water Board, the U.S. Army Corps of Engineers, the Coastal Commission, and other agencies;

- The City stated during the scoping meeting that disposal at LA-3 is being allowed by the U.S. Environmental Protection Agency for mercury levels as high as 1.5 ppm - above the typical threshold of 1.0 ppm - because a "Sediment Management Plan" exists for levels of mercury in the sediment higher than 1.5 ppm. The detected ranges are reported by the City to extend from 1.5 ppm to levels as high as 4 ppm. The draft CEQA document should thoroughly discuss the "Sediment Management Plan." No additional characterization is planned for sediments proposed for CAD disposal, so there is no guarantee that the worst quality sediments would be buried the deepest to minimize risk for mobilization and potential environmental impacts;

- From the "Initial Study" document, page 7, the Reduced Project Alternative was not identified as such during the scoping meeting and should be elaborated in the draft CEQA document. Santa Ana Water Board staff requests that all alternatives to the Project be presented and discussed sufficiently.

    - The Reduced Project Alternative of trucking the highest levels of contaminated sediment to a hazardous waste or special waste disposal facility is feasible. Placing sediment with lower levels of contaminants into

a smaller CAD footprint in Lower Newport Bay would be an option; and

- A Project Alternative put forth by Newport Bay residents suggested two CADs smaller than the one planned, positioned closer to areas of unsuitable dredged material (green areas in Figure 2 of the "Initial Study" document). The areas suggested were at the mouth of the Rhine Channel and in the "turnaround" northwest of Lido Isle (junction of Lido Channel and West Lido Channel). Dredged sediments from the most highly contaminated areas could be placed upon a treatment scow, then transferred to an onshore stockpile. Less-contaminated sediments that are dredged may also be separated into stockpiles but would go back into the new CADs;

- The Project CAD location is where almost all Lower Newport Bay traffic will cross, presenting hazards for dumping dredges. The City indicated during the scoping meeting that this site is projected to receive sediment migrating from Upper Newport Bay, accumulating within and then exiting the Bay. That influx of volume represents an unknown variable that was not quantified, which may offset calculated disposal capacity and capping material volume. Upstream sediment, with its own potential contaminants, should not obscure the actual CAD cover. Again, Santa Ana Water Board staff recommends that the draft CEQA document explore the economy of more than one CAD positioned out of the way, elsewhere in the Bay; and

- Please also note that while attending the scoping meeting, Santa Ana Water Board staff filled out a comment card, which captured much of what is expressed above, though we also ask City staff to consider the statements herein, as well.

Section 3.1

The checkbox indicates that the applicants determine that the project "1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets." Santa Ana Water Board staff does not find that the documentation submitted justifies this determination. Santa Ana Water Board staff agrees that "the subsequent activity may have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.".

Section 3.1.4

Despite the claim that the Lower Newport Bay is "devoid of potential habitat for special-status species," the RARE beneficial use is designated for this water body in the Basin Plan, as approved by the U.S. Environmental Protection Agency. Per the Basin Plan, "Rare, Threatened or Endangered Species (RARE) waters support the habitats necessary for the survival and successful maintenance of plant or animal species

designated under state or federal law as rare, threatened or endangered." The City indicates that the draft CEQA document will evaluate the potential for biological impacts. In that document, provide a thorough assessment of potential direct effects on benthic infauna and also indirect effects due to bioaccumulation and biomagnification of noted contaminants in high trophic level marine life and marine-dependent wildlife.

Figure 2 (Publish Date: 2019/11/12 4:51 PM | User: mpratschner)

This map indicates green areas where sediment is determined to be "not suitable for open-ocean disposal."

These areas are identified as being in the footprint of the proposed federal channel navigational project. The federal channel project has not yet been approved or permitted, nor has there been a Certification issued. Furthermore, no permit application has been received. Santa Ana Water Board staff has not been made aware of any final determination of the areas (shown in green in Figure 2) from which sediment could potentially be placed in the proposed CAD. There have been discussions with the SC-DMMT on this federal project; however, Santa Ana Water Board staff has not been informed of any decisions being made with regard to this project. The draft CEQA document will need to identify and discuss this project as part of its analysis of cumulative and significant impacts.

If we may clarify any of our comments or be of further assistance, please contact me at terri.reeder@waterboards.ca.gov or (951) 782-4995, or Dr. Jason Freshwater, at jason.freshwater@waterboards.ca.gov or (951) 321-4576, or Glenn Robertson, at glenn.robertson@waterboards.ca.gov or (951) 782-3259.

Sincerely,



Terri S. Reeder, P.G., C.E.G., C.H.G.
Senior Engineering Geologist
Supervisor, Coastal Waters Planning and CEQA Section
Santa Ana Regional Water Quality Control Board

cc:
City of Newport Beach, Dave Webb – dawebb@newportbeachca.gov
U.S. Fish and Wildlife Service, Carol Roberts – carol_a_roberts@fws.gov
U.S. Environmental Protection Agency, Melissa Scianni – scianni.melissa@epa.gov
U.S. Environmental Protection Agency, Allan Ota – ota.allan@epa.gov
U.S. Army Corps of Engineers, Larry Smith – lawrence.j.smith@usace.army.mil
California Coastal Commission, Larry Simon – larry.simon@coastal.ca.gov

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691 Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

November 18, 2019

Chris Miller
Newport Beach, City of
100 Civic Center Drive
Newport Beach, CA 92660

RE: SCH# 2019110340, Lower Newport Bay Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020), Orange County

Dear Mr. Miller:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
   a. A brief description of the project.
   b. The lead agency contact information.
   c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
   d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).
   a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
   a. Alternatives to the project.
   b. Recommended mitigation measures.
   c. Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
   a. Type of environmental review necessary.
   b. Significance of the tribal cultural resources.
   c. Significance of the project's impacts on tribal cultural resources.
   d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
   a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
   b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
    a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
    b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
        i. Planning and construction to avoid the resources and protect the cultural and natural context.
        ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
        i. Protecting the cultural character and integrity of the resource.
        ii. Protecting the traditional use of the resource.
        iii. Protecting the confidentiality of the resource.
    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
    a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
    b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
    a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
    b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
    c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address:

Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Staff Services Analyst

cc: State Clearinghouse

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

SENT VIA USPS AND E-MAIL: January 7, 2020

cmiller@newportbeachca.gov
Chris Miller, Manager
City of Newport Beach, Public Works Department
100 Civic Center Drive
Newport Beach, California 92660

Notice of Preparation of an Environmental Impact Report for the Proposed Lower Newport Harbor Confined Aquatic Disposal Facility Construction Project[1]

South Coast Air Quality Management District (South Coast AQMD) staff appreciates the opportunity to comment on the above-mentioned document. South Coast AQMD staff's comments are recommendations regarding the analysis of potential air quality impacts from the Proposed Project that should be included in the Environmental Impact Report (EIR). Please send South Coast AQMD a copy of the EIR upon its completion. Note that copies of the EIR that are submitted to the State Clearinghouse are not forwarded to South Coast AQMD. Please forward a copy of the EIR directly to South Coast AQMD at the address shown in the letterhead. **In addition, please send with the EIR all appendices or technical documents related to the air quality, health risk, and greenhouse gas analyses and electronic versions of all air quality modeling and health risk assessment files[2]. These include emission calculation spreadsheets and modeling input and output files (not PDF files). Without all files and supporting documentation, South Coast AQMD staff will be unable to complete our review of the air quality analyses in a timely manner. Any delays in providing all supporting documentation will require additional time for review beyond the end of the comment period.**

Air Quality Analysis

South Coast AQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. South Coast AQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from South Coast AQMD's Subscription Services Department by calling (909) 396-3720. More guidance developed since this Handbook is also available on South Coast AQMD's website at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ceqa-air-quality-handbook-(1993). South Coast AQMD staff also recommends that the Lead Agency use the CalEEMod land use emissions software. This software has recently been updated to incorporate up-to-date state and locally approved emission factors and methodologies for estimating pollutant emissions from typical land use development. CalEEMod is the only software model maintained by the California Air Pollution Control Officers Association (CAPCOA) and replaces the now outdated URBEMIS. This model is available free of charge at: www.caleemod.com.

South Coast AQMD has also developed both regional and localized significance thresholds. South Coast AQMD staff requests that the Lead Agency quantify criteria pollutant emissions and compare the results

[1] The Proposed Project consists of construction of a facility to receive up to 156,900 cubic yards of ocean dredging materials offshore.

[2] Pursuant to the CEQA Guidelines Section 15174, the information contained in an EIR shall include summarized technical data, maps, plot plans, diagrams, and similar relevant information sufficient to permit full assessment of significant environmental impacts by reviewing agencies and members of the public. Placement of highly technical and specialized analysis and data in the body of an EIR should be avoided through inclusion of supporting information and analyses as appendices to the main body of the EIR. Appendices to the EIR may be prepared in volumes separate from the basic EIR document, but shall be readily available for public examination and shall be submitted to all clearinghouses which assist in public review.

to South Coast AQMD's CEQA regional pollutant emissions significance thresholds to determine air quality impacts. South Coast AQMD's CEQA regional pollutant emissions significance thresholds can be found here at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf. In addition to analyzing regional air quality impacts, South Coast AQMD staff recommends calculating localized air quality impacts and comparing the results to localized significance thresholds (LSTs). LSTs can be used in addition to the recommended regional significance thresholds as a second indication of air quality impacts when preparing a CEQA document. Therefore, when preparing the air quality analysis for the Proposed Project, it is recommended that the Lead Agency perform a localized analysis by either using the LSTs developed by South Coast AQMD staff or performing dispersion modeling as necessary. Guidance for performing a localized air quality analysis can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the Proposed Project and all air pollutant sources related to the Proposed Project. Air quality impacts from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, such as sources that generate or attract vehicular trips, should be included in the analysis.

In the event that the Proposed Project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the Lead Agency perform a mobile source health risk assessment. Guidance for performing a mobile source health risk assessment ("*Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*") can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mobile-source-toxics-analysis. An analysis of all toxic air contaminant impacts due to the use of equipment potentially generating such air pollutants should also be included.

In addition, guidance on siting incompatible land uses can be found in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Health Perspective*, which can be found at: http://www.arb.ca.gov/ch/handbook.pdf. CARB's Land Use Handbook is a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process. Guidance[3] on strategies to reduce air pollution exposure near high-volume roadways can be found at: https://www.arb.ca.gov/ch/rd_technical_advisory_final.PDF.

Mitigation Measures

In the event that the Proposed Project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize these impacts. Pursuant to CEQA Guidelines Section 15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed. Several resources are available to assist the Lead Agency with identifying potential mitigation measures for the Proposed Project, including:

[3] In April 2017, CARB published a technical advisory, *Strategies to Reduce Air Pollution Exposure Near High-Volume Roadways: Technical Advisory*, to supplement CARB's Air Quality and Land Use Handbook: A Community Health Perspective. This technical advisory is intended to provide information on strategies to reduce exposures to traffic emissions near high-volume roadways to assist land use planning and decision-making in order to protect public health and promote equity and environmental justice. The technical advisory is available at: https://www.arb.ca.gov/ch/landuse.htm.

- Chapter 11 "Mitigating the Impact of a Project" of South Coast AQMD'S *CEQA Air Quality Handbook* South Coast AQMD's CEQA web pages available here: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies
- South Coast AQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook for controlling construction-related emissions and Rule 1403 – Asbestos Emissions from Demolition/Renovation Activities
- South Coast AQMD's Mitigation Monitoring and Reporting Plan (MMRP) for the 2016 Air Quality Management Plan (2016 AQMP) available here (starting on page 86): http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2017/2017-mar3-035.pdf
- CAPCOA's *Quantifying Greenhouse Gas Mitigation Measures* available here: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

Alternatives

In the event that the Proposed Project generates significant adverse air quality impacts, CEQA requires the consideration and discussion of alternatives to the project or its location which are capable of avoiding or substantially lessening any of the significant effects of the project. The discussion of a reasonable range of potentially feasible alternatives, including a "no project" alternative, is intended to foster informed decision-making and public participation. Pursuant to CEQA Guidelines Section 15126.6(d), the EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the Proposed Project.

General Conformity Review Request and Determination

The Clean Air Act requires that federal agencies and public and private entities that receive approvals or funding from federal agencies such as airports and seaports undergo a General Conformity review and determination process in order to demonstrate that emissions from a proposed federal action will not interfere with a state or tribal implementation plan (SIP/TIP) for an area that has been designated by the United Sates Environmental Protection Agency (U.S. EPA) as a nonattainment or maintenance area for a National Ambient Air Quality Standard (NAAQS). The conformity determination process is intended to demonstrate that a proposed federal action will not: (1) cause or contribute to new violations of a NAAQS; (2) interfere with provisions in the applicable SIP for maintenance of any NAAQS; (3) increase the frequency or severity of existing violations of any standard; or (4) delay the timely attainment of any standard[4].

In the event that the Proposed Project requires a general conformity determination by South Coast AQMD, the Proposed Project's annual emissions from commencement of construction to full operation, with supporting data, will be needed for review before a conformity determination can be made by South Coast AQMD staff. Any questions related to the South Coast AQMD General Conformity review process and determination can be directed to Dr. Sang-Mi Lee, Program Supervisor, at slee@aqmd.gov.

Permits

If implementation of the Proposed Project requires a permit from South Coast AQMD, South Coast AQMD should be identified as a Responsible Agency for the Proposed Project in the EIR. For more information on permits, please visit South Coast AQMD's webpage at: http://www.aqmd.gov/home/permits. Questions on permits can be directed to South Coast AQMD's Engineering and Permitting staff at (909) 396-3385.

[4] United States Environmental Protection Agency. *General Conformity*. Accessed at: https://www.epa.gov/general-conformity/what-general-conformity.

Data Sources

South Coast AQMD rules and relevant air quality reports and data are available by calling South Coast AQMD's Public Information Center at (909) 396-2001. Much of the information available through the Public Information Center is also available at South Coast AQMD's webpage at: http://www.aqmd.gov.

South Coast AQMD staff is available to work with the Lead Agency to ensure that project's air quality and health risk impacts are accurately evaluated and mitigated where feasible. If you have any questions regarding this letter, please contact me at lsun@aqmd.gov.

Sincerely,

Lijin Sun

Lijin Sun, J.D.
Program Supervisor, CEQA IGR
Planning, Rule Development & Area Sources

LS
ORC191120-02
Control Number

OC Public Works
Integrity, Accountability, Service, Trust
Shane L. Silsby, Director

January 8, 2019

NCL-19-039

Chris Miller, Public Works Manager
City of Newport Beach
Public Works Department
100 Civic Center Drive
Newport Beach, CA 92660

Subject: Notice of Preparation and Scoping Meeting for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project Environmental Impact Report.

Dear Mr. Miller:

The County of Orange has reviewed the proposed Notice of Preparation and Scoping Meeting for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project Environmental Impact Report and has no comments at this time. We would like to be advised of further developments on the project. Please continue to keep us on the distribution list for future notifications related to the project.

If you have any questions regarding these comments, please contact Cindy Salazar at (714) 667-8870 in OC Development Services.

Sincerely,

Richard Vuong, Manager, Planning Division
OC Public Works Service Area/OC Development Services
601 North Ross Street
Santa Ana, California 92701
Richard.Vuong@ocpw.ocgov.com

SCAG
INNOVATING FOR A BETTER TOMORROW

SOUTHERN CALIFORNIA
ASSOCIATION OF GOVERNMENTS
900 Wilshire Blvd., Ste. 1700
Los Angeles, CA 90017
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Transportation
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January 17, 2020

Mr. Chris Miller, Public Works Manager
City of Newport Beach, Public Works Department
100 Civic Center Drive
Newport Beach, California 92660
Phone: (949) 644-3043
E-mail: cmiller@newportbeachca.gov

RE: SCAG Comments on the Notice of Preparation of a Draft Environmental Impact Report for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project [SCAG NO. IGR10073]

Dear Mr. Miller,

Thank you for submitting the Notice of Preparation of a Draft Environmental Impact Report for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project ("proposed project") to the Southern California Association of Governments (SCAG) for review and comment. SCAG is the authorized regional agency for Inter-Governmental Review (IGR) of programs proposed for Federal financial assistance and direct Federal development activities, pursuant to Presidential Executive Order 12372. Additionally, SCAG reviews the Environmental Impact Reports of projects of regional significance for consistency with regional plans pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.

SCAG is also the designated Regional Transportation Planning Agency under state law, and is responsible for preparation of the Regional Transportation Plan (RTP) including the Sustainable Communities Strategy (SCS) pursuant to Senate Bill (SB) 375. As the clearinghouse for regionally significant projects per Executive Order 12372, SCAG reviews the consistency of local plans, projects, and programs with regional plans.[1] SCAG's feedback is intended to assist local jurisdictions and project proponents to implement projects that have the potential to contribute to attainment of Regional Transportation Plan/Sustainable Community Strategies (RTP/SCS) goals and align with RTP/SCS policies.

SCAG staff has reviewed the Notice of Preparation of a Draft Environmental Impact Report for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project in Orange County. The proposed project consists of constructing a Confined Aquatic Disposal (CAD) facility on an 844-acre project site as a solution for sediment dredged from within Lower Newport Harbor that is not suitable for open ocean placement or nearshore disposal. The facility would accommodate 106,900 cubic yards (CY) of unsuitable material and would entail the additional disposal of 50,000 CY for a period of up to 10 years to be processed by the facility.

When available, please send environmental documentation to *SCAG's Los Angeles office in Los Angeles (900 Wilshire Boulevard, Ste. 1700, Los Angeles, California 90017) or by email to au@scag.ca.gov* providing, at a minimum, the full public comment period for review.

If you have any questions regarding the attached comments, please contact the Inter-Governmental Review (IGR) Program, attn.: Anita Au, Associate Regional Planner, at (213) 236-1874 or au@scag.ca.gov. Thank you.

Sincerely,

Ping Chang
Manager, Compliance and Performance Monitoring

[1] Lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the 2016 RTP/SCS for the purpose of determining consistency for CEQA. Any "consistency" finding by SCAG pursuant to the IGR process should not be construed as a determination of consistency with the 2016 RTP/SCS for CEQA.

COMMENTS ON THE NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE LOWER NEWPORT HARBOR CONFINED AQUATIC DISPOSAL (CAD) FACILITY CONSTRUCTION PROJECT [SCAG NO. IGR10073]

CONSISTENCY WITH RTP/SCS

SCAG reviews environmental documents for regionally significant projects for their consistency with the adopted RTP/SCS. For the purpose of determining consistency with CEQA, lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the RTP/SCS.

Please note the Draft 2020 RTP/SCS (Connect SoCal) was released for public review on November 14, 2019 until January 24, 2019. The Final Connect SoCal is anticipated to be adopted in April 2020. Please refer to Connect SoCal goals and growth forecast for RTP/SCS consistency for future projects. The Draft Connect SoCal can be reviewed here: https://www.connectsocal.org/Pages/Connect-SoCal-Draft-Plan.aspx.

2016 RTP/SCS GOALS

The SCAG Regional Council adopted the 2016 RTP/SCS in April 2016. The 2016 RTP/SCS seeks to improve mobility, promote sustainability, facilitate economic development and preserve the quality of life for the residents in the region. The long-range visioning plan balances future mobility and housing needs with goals for the environment, the regional economy, social equity and environmental justice, and public health (see http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx). The goals included in the 2016 RTP/SCS may be pertinent to the proposed project. These goals are meant to provide guidance for considering the proposed project within the context of regional goals and policies. Among the relevant goals of the 2016 RTP/SCS are the following:

SCAG 2016 RTP/SCS GOALS	
RTP/SCS G1:	*Align the plan investments and policies with improving regional economic development and competitiveness*
RTP/SCS G2:	*Maximize mobility and accessibility for all people and goods in the region*
RTP/SCS G3:	*Ensure travel safety and reliability for all people and goods in the region*
RTP/SCS G4:	*Preserve and ensure a sustainable regional transportation system*
RTP/SCS G5:	*Maximize the productivity of our transportation system*
RTP/SCS G6:	*Protect the environment and health for our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking)*
RTP/SCS G7:	*Actively encourage and create incentives for energy efficiency, where possible*
RTP/SCS G8:	*Encourage land use and growth patterns that facilitate transit and active transportation*
RTP/SCS G9:	*Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies**
	**SCAG does not yet have an agreed-upon security performance measure.*

For ease of review, we encourage the use of a side-by-side comparison of SCAG goals with discussions of the consistency, non-consistency or non-applicability of the goals and supportive analysis in a table format. Suggested format is as follows:

SCAG 2016 RTP/SCS GOALS		
	Goal	Analysis
RTP/SCS G1:	*Align the plan investments and policies with improving regional economic development and competitiveness*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
RTP/SCS G2:	*Maximize mobility and accessibility for all people and goods in the region*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
etc.		etc.

2016 RTP/SCS STRATEGIES

To achieve the goals of the 2016 RTP/SCS, a wide range of land use and transportation strategies are included in the 2016 RTP/SCS. Technical appendances of the 2016 RTP/SCS provide additional supporting information in detail. To view the 2016 RTP/SCS, please visit: http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx. The 2016 RTP/SCS builds upon the progress from the 2012 RTP/SCS and continues to focus on integrated, coordinated, and balanced planning for land use and transportation that the SCAG region strives toward a more sustainable region, while the region meets and exceeds in meeting all of applicable statutory requirements pertinent to the 2016 RTP/SCS. These strategies within the regional context are provided as guidance for lead agencies such as local jurisdictions when the proposed project is under consideration.

DEMOGRAPHICS AND GROWTH FORECASTS

Local input plays an important role in developing a reasonable growth forecast for the 2016 RTP/SCS. SCAG used a bottom-up local review and input process and engaged local jurisdictions in establishing the base geographic and socioeconomic projections including population, household and employment. At the time of this letter, the most recently adopted SCAG jurisdictional-level growth forecasts that were developed in accordance with the bottom-up local review and input process consist of the 2020, 2035, and 2040 population, households and employment forecasts. To view them, please visit http://www.scag.ca.gov/Documents/2016GrowthForecastByJurisdiction.pdf. The growth forecasts for the region and applicable jurisdictions are below.

	Adopted SCAG Region Wide Forecasts			Adopted City of Newport Beach Forecasts		
	Year 2020	**Year 2035**	**Year 2040**	**Year 2020**	**Year 2035**	**Year 2040**
Population	19,663,000	22,091,000	22,138,800	89,300	92,300	92,700
Households	6,458,000	7,325,000	7,412,300	40,200	41,300	41,700
Employment	8,414,000	9,441,000	9,871,500	77,900	78,900	79,100

MITIGATION MEASURES

SCAG staff recommends that you review the Final Program Environmental Impact Report (Final PEIR) for the 2016 RTP/SCS for guidance, as appropriate. SCAG's Regional Council certified the Final PEIR and adopted the associated Findings of Fact and a Statement of Overriding Considerations (FOF/SOC) and Mitigation Monitoring and Reporting Program (MMRP) on April 7, 2016 (please see: http://scagrtpscs.net/Pages/FINAL2016PEIR.aspx). The Final PEIR includes a list of project-level performance standards-based mitigation measures that may be considered for adoption and implementation by lead, responsible, or trustee agencies in the region, as applicable and feasible. Project-level mitigation measures are within responsibility, authority, and/or jurisdiction of project-implementing agency or other public agency serving as lead agency under CEQA in subsequent project- and site- specific design, CEQA review, and decision-making processes, to meet the performance standards for each of the CEQA resource categories.

CITY OF NEWPORT BEACH
Water Quality/Coastal Tidelands Committee
100 Civic Center Drive
Newport Beach, California 92660

December 5, 2019

Honorable Mayor and Members of the Newport Beach City Council,

At its November 7, 2019 meeting, the Water Quality/Coastal Tidelands Committee of the Newport Beach City Council reviewed the proposed plans to dredge Lower Newport Harbor back to its original design depth in order to restore navigation. The Committee understands that this is a collaborative project between the federal government (Army Corps of Engineers) and the City of Newport Beach.

It should also be noted that an important byproduct of dredging the harbor to its original design depth will be the increased tidal exchange and flushing which in turn, promotes improved water quality. As such, the Committee supports this effort.

In addition, the Project also proposes to responsibly manage dredged sediment that is unsuitable for ocean disposal via the construction of a Confined Aquatic Disposal site. This plan will bury and encapsulate existing harbor material that is unsuitable for ocean disposal, but suitable for placement within the harbor. This is a proven technique and an agency-preferred method to manage aquatic sediment that otherwise would remain near or on the surface of the harbor, untreated.

The Committee supports the concept to place material in-harbor within a Confined Aquatic Disposal site because this directly addresses sediment that would otherwise not be suitable for ocean placement.

Thank you,

J. Herdman

Jeff Herdman, Council Member
Chair, Water Quality/Coastal Tidelands Committee

SURFRIDER FOUNDATION
NEWPORT BEACH

January 17, 2020

Mr. Chris Miller
Public Works Manager
City of Newport Beach, Public Works Department
100 Civic Center Drive
Newport Beach, CA 92660

Via Email Only – cmiller@newportbeachca.gov

RE: Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-202) Environmental Impact Report

Dear Mr. Miller,

On behalf of Surfrider Foundation's Newport Beach Chapter, we offer the following comments regarding the forthcoming Draft Environmental Impact Review (DEIR) for the Confined Aquatic Disposal (CAD) Facility as proposed by the City of Newport Beach and further outlined in the *Initial Study* prepared by ANCHOR QUE dated November 19,2019. Surfrider Foundation is a national nonprofit focused on the protection of the world's ocean, beaches, and waves, and represents tens of thousands of Californians in our expansive activist network, including hundreds of members in the Newport Beach area. One of Surfrider Foundation's key priorities is the preservation of clean water for the betterment of public health and the environment.

After careful review of the *Initial Study*, we find numerous sections of Chapter 3 particularly concerning, most notably section 3.1.21, in which the "Mandatory Findings of Significance" (a. environmental impact, b. individually limited or cumulatively considerable impacts, and c. public health) are all graded with "Potentially Significant Impact." Surfrider Foundation therefore advocates for the DEIR to address the full suite of alternatives to a water-based storage facility.

We thank you for the opportunity to provide feedback on this project and look forward to further updates.

Regards,

Michelle Giron
Chair
Newport Beach Chapter

John Wadsworth
Vice Chair
Newport Beach Chapter

Bill Hickman
Regional Manager
Southern California

January 7, 2020

Chris Miller, Public Works Manager
City of Newport Beach, Public Works Department
100 Civic Center Drive
Newport Beach, California 92660

SUBJECT: The California Environmental Quality Act (CEQA) scoping the Enviromental Impact Report PA2019-020 proposing construction of a Confined Aquatic Disposal (CAD) in Newport Harbor.

Mr. Miller,

On behalf of Lido Isle Community Association (LICA), Board of Directors, representing the residents of Lido Island we are in support of the City and U.S. Army Corps of Engineers (USACE) phase II dredging in Newport Harbor, the importance of dredging is understood. We strongly oppose a Confined Aquatic Disposal (CAD) Facility or any other type of dump site in our harbor. The concern is how do we dredge so problems don't reoccur.
All toxic, contaminated, and unsuitable materials should be permanently removed. Further studies need to be done to Investigate reduced dredge volume alternatives based on vertical gradients of contaminants so offshore and/or upland disposal with accurate quantities can be analyzed. The best alternative is to take the unsuitable materials offshore or upland.

Water Quality will be significantly compromised when digging up the unsuitable material and then again when dumping the unsuitable material into a CAD thereby doubling the negative impact. The plan to leave the CAD available for a ten-year period is unacceptable. The disposal of "unsuitable" dredged materials is a potential long-term danger to the Harbor, the residents, visitors and future legal exposure for the City.

This should be registered as an official response in opposition to the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) and Notice of Public Scoping Meeting for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project. Moving contaminated and unsuitable materials into any clean area of the bay is not an acceptable alternative.

Sincerely,

Eric Henn, President
Lido Isle Community Association
Board of Directors

Subject: Dredging Project for Balboa Bay starting in 2020

To: Dave Webb and Chris Miller

From Bob Yates, Fleet Captain for Harbor 20 Sailboats

Date: December 5, 2019, revised December 13, 2019

Thank you for the informative meeting that you held last night regarding the dredging of the Bay. We appreciate that this is an opportune time with funding becoming available, and with the alignment of many Government Agencies for approving the work. Fortunately we all have a strong interest in using and maintaining the Bay for many years into the future, and appreciate the hard work that you have been doing to find an ideal manner in which to perform the dredging operation. However, we feel that the Plan that has been developed by you and your staff should be reconsidered.

Chris, you apologized for giving all the "numbers" regarding the work to be done. Personally, I liked them, and better understand the magnitude of the task ahead because of them. I hear that the future dredging will remove approximately twice the amount of materials as the dredging project of a few years ago. This is big, and a lot time and effort should be spent on this project before implementation. However, for now I want to focus on one key point of your Plan-----digging/dredging up the Mercury "contaminated" soil at the West end of the Bay and placing it into a Confined Aquatic Disposal (CAD) suite which would be 450 feet x 450 feet x 46 feet deep (the size of four football fields), and located right in the middle of the Bay at the "Five Corners" intersection. This Plan calls for large dredgers and multiple barges working for years into the future for removing nearly 300,000 yards of good soil from this site, relocating/storing/disposing it, and then digging up and placing contaminated soil from the West end of the Bay in the place of the good soil that was removed, and finally after many years (10 years was mentioned), putting a cap over the entire pit. This process will severely impact the recreational use of this part of the Bay for years to come.

In my case, I represent the one hundred and forty Harbor 20 sailors who belong to Fleet #1 and who participate in sailing activities on well over 100 days a year in the same "Five Corners" location as the proposed CAD site. Presently, we share this area throughout the year with many hundreds of children sailing sabots, numerous Commercial Tour Boats, High School Sailing Teams, kayaks, paddleboards, Duffy Electric Boats, the Orange Coast College and the Sea Base (Boy Scout) sailing school programs, the recreational boaters, and the transit boats going to and from the Back Bay. In total, there are many tens of thousands (could it be hundreds of thousands?) of user hours in this area each year. For all of us, this is the center of the Bay, and nearly all traffic and activities must happen here. To the sailors it is the only space in the Bay that will accommodate a fair sailing course when we have a southerly wind, which is nearly fifty percent of the time. To the commercial operators and the other boaters, it is the only transit area from one end of the Bay to the other. To the sailing students it is the open area where they can develop their skills in a large and safe area. This is the corner of Main Street and Main Street as one attendee said, and never would a construction project on land be planned to obstruct usage in the manner of this project.

Some possible alternatives were discussed at the meeting. First, since nearly all of the mercury laden soil is located in areas at the West end of the two channels adjacent to Lido Isle, it was suggested that smaller CAD sites be dug in the immediate vicinity of the contaminated areas. These areas are not nearly as crowded as the Five Points Area. Most importantly, the contaminated soil would NOT have to be transported to a clean remote location, saving money and, I believe, the possibility of spreading contamination throughout clean areas in other parts of the Bay. Also, being smaller suites, the work could be scheduled to be done one site at a time and more quickly. Work on one site could be completed before the second site is started thereby saving inconvenience for the residents and users of the Bay. We realize that a lot of planning will need to take place to create an effective plan to do this, but it does not have the onerous consequences of the aforementioned plan.

A second possibility is to proceed with the dredging of the CLEAN sand throughout the Bay, and to NOT dredge the so-called “contaminated” sand which has about 1 to 4 parts per million of Mercury. Your “experts” explained that the mercury is a heavy metal and will sink deeper into the sand with time, and will not migrate to other areas of the Bay thereby causing a health or safety issue. When, in the future, a disposal site for contaminated soil becomes available, the dredging of this soil will be performed and disposed of in an appropriate manner. In the meantime, let’s not compromise the use of our Bay for a problem that (fortunately) does not exist.

In our recent meeting at City Hall we agreed upon the importance of careful planning and coordinating of the dredging with the boating community in mind, whatever Plan is implemented. The AOCYC Calendar might be a template. This schedule provides for coordination for all the sailing activities on every day of the year. I suggested that you take a look at the Calendar, and see the impact that dredging will have on all the scheduled sailing activities. Perhaps a similar type of schedule can be developed for coordinating dredging with ALL of the boating community so as to minimize the conflicts between the barges and boaters. Our Fleet members will be glad to work with you on developing this scheduling and communication process.

Please consider the people that use and appreciate the Bay the most by giving alternative proposals, good planning and communications serious consideration. The Bay is our great resource. Don’t take it away from the people who appreciate it the most.

Thank you, Bob Yates

From: anitaafg@aol.com
Sent: Friday, January 17, 2020 3:11 PM
To: Miller, Chris
Subject: bay dredging

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Hi Chris, I have been a resident of Newport Beach for over 50 years. The bay has always been dredged and the material was taken way out in the ocean. The dredging you are proposing would interfere with all sailing programs in Bay for years.
All of your possible alternatives you listed should be considered. I would also include a vote of all residents should be considered.
Sincerely,
Anita M Gillett

From: Jim Mosher <jimmosher@yahoo.com>
Sent: Friday, January 17, 2020 4:59 PM
To: Miller, Chris
Subject: Comments on NOP: Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020) EIR

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

* The notice of preparation is extremely unclear as to whether the EIR is intended to assess the potential impacts of *just* the CAD, *or* of the larger dredging project as well.

* As to the CAD itself, I assume testing has been done to ensure the feasibility of construction at the indicated site, but I hope the EIR will consider what will be done if: (1) unsuitable material is found during the CAD excavation, and/or (2) unexpected obstacles are discovered to digging to the intended depth (for example, hitting bedrock).

* As to the larger project of dredging to the "design depth," that, obviously, assumes there is a design. I hope the EIR will address what the design depths were designed for and their relevance to current uses in the harbor.

* Also as to the larger project, I hope the EIR will discuss its consistency with the City's Harbor Area Management Plan, a document that no longer seems to be readily accessible from the City's website, but which I thought had been adopted to provide an integrated approach to maintaining the harbor.

* I have heard the larger dredging project is expected to improve circulation and tidal flushing in the bay, yet there is an argument on the other side that it will create a greater volume of water that needs to be exchanged and hence could result in less complete flushing. The City's Water Quality/Coastal Tidelands committee (mis-listed as "Coastal Bay Water Quality Committee" on page 9 of the Initial Study) has heard from researchers at UCI who said they had prepared three-dimensional digital models of circulation in the bay, presumably far more sophisticated than those available when the HAMP was prepared. I hope the EIR will use those to evaluate whether the proposed dredging will indeed improve circulation, or instead have unexpected detrimental effects. Likewise, I hope the EIR will use that modelling consider if any adjustments to the design of the larger project might make it more beneficial from a tidal flushing perspective.

Yours sincerely,

Jim Mosher

From: Elizabeth Decker <betsymorandecker@gmail.com>
Sent: Friday, January 17, 2020 1:21 PM
To: Miller, Chris
Subject: Newport Harbor CAD Site Location

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Dear City of Newport Beach,

I am writing as a concerned resident of Newport Beach. As an active sailor and enjoyer of our beautiful bay I strongly urge you not to dump toxic soil in our turning basin. My three children, all very active sailors, and our family regularly use the turning basin for swimming, sailing and water activities. Toxic soil should not be dumped in such a heavily utilized area where recreation occurs throughout the year.
Best,

Betsy Decker
949-922-9006

From: ROGER MACGREGOR <macboats@pacbell.net>
Sent: Thursday, January 16, 2020 3:12 PM
To: Miller, Chris
Cc: info@tattooyachts.com; brookannsharp@gmail.com
Subject: RELOCATION OF TOXIN MATERIALS IN NEWPORT HARBOR

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Digging out the contaminated waste in the Rhino channel and dumping it in a highly used area of the bay appears to be the dumbest idea I have your heard in years.

That sediment has been buried away in relatively deep water for many decades, and has presented no health problems, or problems of any kind, over the years. The old adage applies here: “Let sleeping dogs lay”.

The act of digging it out and dumping it in a new location is fraught with peril. In the transfer, the toxins will be spread into our water, and the strong tidal currents will carry them to the shallow areas and beaches throughout the harbor, where there they will guaranteed human exposure. As a longtime Lido Isle waterfront property owner, my objection is strong and personal.

Even after the transfer, the toxins will be of no less risk than they are in their present location.

If the authorities don’t think this stuff belongs in the deep and almost limitless ocean, it certainly does not belong in the tight confines of our bay.

The act of digging a big hole in which to dump this goop it is, in itself, a potential disaster. I have witnessed the digging of deep holes for garages for large buildings near the water’s edge. The exposure of this pre-dinosaur slime results in unbelievable stench and all kinds of new and scary pollution.

If this plan is pursued, you can expect a massive and powerful reaction from the local citizenry. It will likely be a likely hot issue it will for any forthcoming Newport election.

Roger MacGregor

From: John Clement <john.clement@venturepointinc.com>
Sent: Thursday, January 16, 2020 5:24 PM
To: Miller, Chris
Subject: Vote Against CAD in Newport Harbor

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Hello Chris,

Thank you for everything you do for our city and harbor, greatly appreciated.

It is rare I speak up on political matters, but the proposed CAD site in the turning basin off the tip of Lido is a material concern.

I have been a resident of Newport for over 40 years and a resident of Lido over 25 years. I am an avid boater and sailor, owning 4 boats, and Rear Commodore of the LIYC. I am also an engineer in the land development business and often involved in environmental clean-up.

I ask you to reconsider the current proposal to use a CAD approach for polluted material in our bay (and I understand bringing in outside waste). The negative effect of this on the environment and residents is far greater than the theoretical solution it may provide. I will not get into the weeds of my basis for this, but I wanted you to know of my strong disagreement. There is also a large silent majority of residents that feel the same way.

I propose waiting for a proper method of relocating waste to a receiver location that is certified and safe, outside of the largest pleasure-boat harbor in the country.

Best,

John E. Clement
President

VENTUREPOINT
PROPERTY
ASSET MANAGEMENT ♦ INVESTMENT ♦DEVELOPMENT

4685 MacArthur Court, Suite 375, Newport Beach, CA 92660
Tel: 949.673.4660 Fax: 949.220.0566
Email: john.clement@venturepointinc.com
Website: www.venturepointinc.com

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From: Brooke Sharp <sailingdirector@liyc.net>
Sent: Thursday, January 16, 2020 12:11 PM
To: Miller, Chris
Subject: [EXTERNAL]Newport Harbor CAD Site Opposition

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Chris,

As a resident of Orange County, Sailing Director for Lido Isle Yacht Club and someone who grew up swimming and sailing in Newport Bay, I would like to voice my vehement opposition to the proposed CAD site in the Turning Basin.

I run the Lido Isle Yacht Club Junior Sailing Program and this puts our children at unnecessary risk. We have over 150 children in our program each summer who regularly swim and sail in the vicinity of the Turning Basin. We are one of 4 major yacht clubs that run summer Junior Programs. Not only would disturbing the unsuitable sediment create a health risk to our kids, it would negatively impact the surrounding community for years - both recreationally and for businesses throughout Newport Harbor. Either leave the sediment alone or bring it to the ocean to dilute it. The Turning Basin is not a suitable location.

Please let me know if you would like any further input.

Best,

Brooke Sharp
Sailing Director, LIYC
sailingdirector@liyc.net
Office: 949.673.5119

From: Lawrence Cunningham <ljcunningham123@gmail.com>
Sent: Tuesday, January 14, 2020 3:48 PM
To: Miller, Chris
Cc: eric henn; Shana Conzelman; Mike Oshea; Marion Smith; Marsha Ferrall; Leslie Thompson
Subject: Lower Newport Harbor CAD Facility

Dear Mr. Miller,

I do not have the technical background to provide the reasons why we should not place the CAD in the middle of our harbor, however my family has lived on Lido Isle since 1953 and it is from this perspective that I address this letter to you.

I cannot recall at anytime the water quality being as polluted as it has been in the past few years. Adding CAD to the central Bay Area versus moving it out of the harbor only adds to the degradation of our bay.

It is my fervent hope that our city representatives will work towards the only acceptable option which is to move the contaminated sand offshore.

Thanking you for considering this request.

Respectfully,

Lawrence Cunningham
Lido Isle

From: info@tattooyachts.com
Sent: Tuesday, January 14, 2020 7:10 AM
To: Miller, Chris
Cc: Brooke Sharp; Roger MacGregor
Subject: Newport Harbor CAD site

We vehemently object to moving polluted sediment to a new area of the bay. If it is unsuitable to be moved to the open ocean it has no place in the turning basin, which is the most actively used area, and where our children and grandchildren sail. the anchorage will also be affected.

Either leave it undisturbed or move it to a large open ocean water area where it will be diluted.

Best regards,
Paul and Laura Sharp

Sent from my T-Mobile 4G LTE Device

From: David Alderfer <dsalderfer3@gmail.com>
Sent: Wednesday, January 15, 2020 4:34 PM
To: Miller, Chris
Subject: NO DUMPSITE IN NEWPORT HARBOR

NO DUMPSITE IN NEWPORT HARBOR

From: Alice Brewer <abrewer3@me.com>
Sent: Sunday, January 12, 2020 4:29 PM
To: Miller, Chris
Subject: Dumpsite in Newport Bay!

No Dumpsite in Newport Harbor!

Dear City Manager and Newport City Council Members,

Please don't put contaminated materials in our beautiful bay.
Haul it away to a landfill that is designated for this purpose.
The bay is not a dumpsite.
Please, please vote against this proposal.

Regards,
Dick and Alice Brewer
222 Via Lido Nord
Newport Beach, CA

From: Leslie Ellis <lmellis333@gmail.com>
Sent: Sunday, January 12, 2020 5:57 PM
To: Miller, Chris
Subject: hello

Yes I agree let's dredge….

Leslie Ellis
lmellis333@gmail.com
(949)683-7266 – Cell
Broker Lic.# 01240785

From: Bruce Major <major4445@gmail.com>
Sent: Sunday, January 12, 2020 7:49 AM
To: Miller, Chris
Cc: ddixon@dixonfornewport.com
Subject: No Dumpsite in Newport Harbor

You can't be serious! Has anyone done a serious in-depth risk assessment of this project? Dumping in Newport Harbor; ridiculous!

Bruce & Janie Major
228 Via Ithaca
Newport Beach, CA

From: Gail Reisman <gailreisman@hotmail.com>
Sent: Sunday, January 12, 2020 8:49 AM
To: Miller, Chris
Subject: Harbor Dredging

As Lido Isle residents, we are concerned about the current dredging plan. We strongly recommend that you find a more acceptable disposal solution before you begin the process.
Respectfully
Drs. Gail and Sorel Reisman
112 Via Havre

From: Marion Smith <newportmarion@hotmail.com>
Sent: Sunday, January 12, 2020 12:10 PM
To: ddixon@dianedixonnb.com; bavery@newporbeachca.gov; Duffield, Duffy; Muldoon, Kevin; Herdman, Jeff; O'Neill, William; Miller, Chris
Subject: LETTER SUPPORTING NO DREDGING NO CAD IN OUR NEWPORT BEACH BAY

Chris Miller, Public Works Manager
City of Newport Beach - Public Works Department
100 Civic Center Drive
Newport Beach, CA 92660

RE: Dredging and putting a CAD at the East Turning Basis

Dear Chris Miller, Mayor O'Neill, and City Council,

I agree that dredging in our bay is good to keep the channels open for all forms of watercraft and for the wildlife. I am however 100% against having dredging of CONTAMINTED materials from one part of the bay and depositing it into a perfectly clean area of our bay. CAD or no cad, this should not be moved in our bay in such a way to provide just a dumping ground and spreading around the contaminated materials! This is the major area of Newport Beach Bay whereby boaters young and old boat, sail, moor for the weekend, kayak, canoe, paddleboard, and swim.

It doesn't make any sense at all to take contaminated materials and place them in this safe clean area. I used to live right there on the bay and am very familiar with the traffic and the continual tide changes/currents and how they affect Lido Isle, Bay Island, Harbor Island and the drifting of the sand that occurs.

If there are contaminated materials you MUST find another suitable area other than depositing back into the bay. Please dredge it and take it to a land fill. Find the experts to support the safe and proper removal of the contamination.

Thank you for hearing the citizens of Newport Beach.

Kindest regards, Marion Smith
110 Via Quito

Lido Isle, CA 92663

From: M Stoddard <twanonrevs@yahoo.com>
Sent: Sunday, January 12, 2020 5:40 PM
To: Dept - City Council; Miller, Chris
Subject: NO DUMPSITE IN NEWPORT HARBOR

My wife and I own residential property on Lido Isle and we are opposed to dumping or burying mercury tainted sediment in Newport Harbor.

Kent Stoddard
949-723-6077

Marine Vie

Subject: FW: December meeting
Attachments: 19-11-12 LNB Outreach - Lido Isle.pdf

From: Miller, Chris <CMiller@newportbeachca.gov>
Sent: Friday, November 15, 2019 5:18 PM
To: 'Shana Conzelman' <sconzelman@gmail.com>
Subject: RE: December meeting

Shana,

1. The notice period for the CEQA process officially starts on Monday the 18th. However, I was already planning on updating the City's calendar by close of business today, and I am confirming this has been done. Within this calendar notice is a link to a folder where the CEQA documents will be posted on Monday.
2. The calendar lists the information you were looking for, but it is here as well: The Public Scoping Meeting will be on Wednesday, December 4, 2019 at 6:00 p.m. at the Friends Room of the Newport Beach Public Library, 1000 Avocado Avenue, adjacent to the Civic Center.
3. Per your request, attached is a digital copy of my presentation to the Lido community on Tuesday.
4. The EPA hasn't published a report, but I am assuming you might be looking for the City's report on the sediment chemistry that we submitted to the EPA for approval. If so, the instructions to access the FTP site are below (the files are very large):

   To access the FTP site via web browser please follow the steps below.
   Click on the following link: https://ftp.anchorqea.com/aq
   Username: 170243-02.01@170243-02.01
   Password: SuperSilver42!

As promised, I will reach out to you on Monday or so to see if we can arrange a meeting to further discuss the project. I'll check everyone's schedules and suggest a couple days/times.

Thank you,
Chris

From: Shana Conzelman <sconzelman@gmail.com>
Sent: Friday, November 15, 2019 1:09 AM
To: Miller, Chris <CMiller@newportbeachca.gov>
Subject: December meeting

Chris,
I do not see the December Community Dredge II information meeting on any calendars or referenced on the CNB website. Please provide the date, time and location

as soon as possible. I would like a digital copy of your presentation and the EPA report.

Shana Conzelman
(714) 651-2044

Marine Vie

Subject: FW: Newport Bay Dredging comments

From: Miller, Chris <CMiller@newportbeachca.gov>
Sent: Monday, December 9, 2019 8:53 AM
To: 'S Trainor' <d4md4m@gmail.com>
Subject: RE: Newport Bay Dredging comments

Hi Shelly,

Thank you for your interest and for providing comments on our dredging project.

Regarding your concerns about the bay beach sand cycle on Balboa Island, the dredging our project proposes is out in the center channel, and won't affect the beach sand nor it's movement, at all.

Also, 50 years ago, the dock permittees around the harbor and the island could more easily dredge under their docks to replenish the beach sand that had sloughed off down. Apparently, this was done on a more regular cycle than in today's times. In addition, the City pushes sand from the low tide line to the bulkhead each year to help replenish our beaches and maintain that sand that you remember.

Thank you for your comments.

Chris

From: S Trainor <d4md4m@gmail.com>
Sent: Saturday, December 07, 2019 10:34 AM
To: Miller, Chris <CMiller@newportbeachca.gov>
Subject: Newport Bay Dredging comments

Hello Chris
While I don't like the idea of CAD, my concern is about dredging overall.

What I don't understand is the dynamics of the bay. It seems to me that if the channel is dredged, the tidal water flow (and storms) will move the sand from the beaches (particularly Balboa Island) into the hole that is created (as has happened on Grand Canal). Then sand is brought in to replenish the beaches and the cycle of movement continues. Is there an equilibrium point or is this a constant series of repeating costs (dredging then sand replenishment) for the foreseeable future?

I vacationed on Balboa Island as a child and now live here full time. I was not aware of dredging and sand replenishment issues as a child, but I do seem to recall that beaches had more sand 50+ years ago and that there were plenty of boats. Was it the same then or is this a recent phenomenon? If it is recent, then the price tag to have sand and channel depth seems to me to be extreme.

Shelly Trainor
202 Pearl Ave,

From: Laura Thomson <Nbjacks@aol.com>
Sent: Tuesday, December 31, 2019 3:47 PM
To: Miller, Chris
Subject: Dredging

Hi Cris

I believe that the majority of residents and visitors that come to Newport Beach would strongly agree that the turning basin is the heart and soul of this harbor.

To drill this area in order to dispose dredged up mercury waste (not suitable for ocean disposal) from an already polluted backwater 2 miles away, can't possibly seem like a reasonable solution.

I'm wondering who it is that will gain financially? Is there some kind of money grab where the army corps of engineers says use it or loose it, and that is why alternatives are not being thought through?

There is plenty of dredging of material that is suitable for open ocean disposal to allow for deep keel boats or large yachts to benefit from approx. 90% of the dredging.

Why not leave the remaining mercury tainted soil lay deep and undisturbed as it has since the mercury was dumped there to begin with? And with the rising sea levels, maybe dredging anything in this harbor is a moot point 😊.

Thank you for taking your time to hear from others before decisions will be made.

Sincerely,

Laura Thomson

Sent from my iPhone Laura Thomson

From: Jack Thomson <jackt@dollarselfstorage.com>
Sent: Wednesday, January 01, 2020 4:28 PM
To: Miller, Chris
Subject: FW: Dredging Proposal

From: Jack Thomson
Sent: Wednesday, January 1, 2020 4:26 PM
To: Chris Miller (CMiller@city.newport-beach.ca.us>) <CMiller@city.newport-beach.ca.us>>
Cc: Laura Thomson (NBJacks@aol.com) <NBJacks@aol.com>
Subject: Dredging Proposal

Chris

I read an article in the Lido Islander regarding a proposal afoot to yet again dredge the harbor and had several questions if you don't mind.

First, it seems like we just dredged a few years ago, why are we doing it so soon? Is it filling in that fast?

If, as the City has been saying for years, the sea is rising rapidly, why do we need to dredge at all?

It seems the areas into which the materials too dangerous to put into the ocean is much larger that the area from which it is being taken. Am I interpreting that correctly?

The last time we dredged we chose to encapsulate the material in place, why are we choosing to take the risk of stirring it all up now?

How do you actually propose to get these wet soils onto a barge and move them? This dredging is messy by nature and I would anticipate much leakage of contaminated soils into the bay, and therefore the ocean.

And finally, could you explain how you plan to encapsulate the material? Please understand that we live at the vortex of the Newport Inglewood fault and the San Juan Hills Blind Thrust Fault with the last major movement at the mouth of the Santa Ana River in 1933. The next, and every time there is a movement, soil and sand liquefaction is highly likely, turning a soil structure into mush.

Thank You in advance for your time.

Regards
Jack Thomson
853 Via Lido Soud, NB

Marine Vie

Subject: FW: Dredging Our Bay

-----Original Message-----
From: Miller, Chris <CMiller@newportbeachca.gov>
Sent: Monday, January 6, 2020 8:05 AM
To: Adam Gale <agale@anchorqea.com>
Subject: FW: Dredging Our Bay

-----Original Message-----
From: Frances Farrer <nbmimi@aol.com>
Sent: Sunday, January 05, 2020 5:17 PM
To: Miller, Chris <CMiller@newportbeachca.gov>
Subject: Dredging Our Bay

Dear Mr. Miller:
With reference to the choice of location to dredge our beautiful bay, the proposed choice, in the clean and heavily trafficked area, makes absolutely no sense.
Why fill the clean area with unsuitable material when there are more appropriate areas? Why take away the area that is enjoyed not only by our residents but by tourists worldwide? Why take away from people when there is no good reason? An area that people from every other place in the world find as a source of enjoyment, you decide to refuse that to them with absolutely no evidence of necessity.
How sad to pick an unspoiled area, loved by thousands, when there are other areas, ones that are much more appropriate. Please do not cause such disappointment.
Sincerely,
Frances Farrer
212 Via Koron
Newport Beach, Ca 93663

From: Debbie Robson <drobson@salushomecare.com>
Sent: Monday, January 06, 2020 10:42 AM
To: Miller, Chris
Cc: Mark Robson
Subject: Opposition - Newport Beach CAD Site Location

Chris,

I am not usually one to write to the City of Newport Beach to support one cause or another, for instance when the city decided to spend far too much taxpayer money on the silly bunnies at the then newly relocated Newport Beach City Hall. While it was certainly annoying, frivolous and in poor taste, it was not harmful to the residents or the environment. Having said that, the decision for the City of Newport Beach Public Work Departments to move forward with a full-scope EIR for a CAD site in the Newport Harbor is in extremely poor judgement and irresponsible.

What are you thinking? How can any of you think this is a good idea? I would have loved to be in attendance at the city meeting where the brainstorming (minus the brain) first took place. To take contaminated dredge soil, that has been found to be too dangerous to put in the ocean, to put it in the Newport Harbor near homes, boats and people. The problems are obvious, however, there are other solutions.

Please do not move forward with this EIR, recognize that it is a mistake and take an alternate course of action. The hazardous materials MUST be removed from the harbor and taken to a more suitable place outside the water. If a CAD is the only answer, then place them where the unsuitable material is located, not in the clean areas of the harbor. DO NOT choose a CAD location such as the proposed site that is the MOST HEAVILY trafficked area of our bay!

Please prove to me, as a resident of Newport Beach, that you should be entrusted with the safety and security of our citizens and visitors.

Sincerely,

Debbie Robson, RN, BSN, MBA-HCM
Vice President / Healthcare Organization

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ACS ARCHITECTURAL
CONSTRUCTION
SERVICES
INC

January 7, 2020

Chris Miller, Public Works Manager
cmiller@newportbeachca.gov
City of Newport Beach, Public Works Department
100 Civic Center Drive
Newport Beach, California 92660

Re: Notice of Preparation and Scoping Meeting
For the Lower Newport Harbor CAD Facility

Copy: citycouncil@newportbeachca.gov
harborcommission@newportbeachca.gov

Dear Mr. Miller,

I am an architect in the city of Newport Beach and a Lido Isle resident having lived on the Isle beginning in 1987. I am also Staff Commodore of LIYC 1997. I am not a marine architect, although I have been involved in a number of projects over the years with CEQA. Most of my involvement with CEQA has centered on the issues dealing with traffic in vehicular and pedestrian intersections. That is why I question the appropriateness of placing a CAD at the intersection of what is a marine version of "Main & Main". I stated this in the City's scoping meeting December 4, 2019.

I am quite familiar with the activities in that part of our harbor. Along with being a boater, as Commodore, I was previously responsible for running our youth and adult sailing programs involving nearly 200 sailors. Limiting the use of that area for any sustained period of time much less ten years would devastate the quality of small boat regattas and thus all but curtail the youngest of our youth sailing programs. Running them adjacent to the equipment at the CAD site if even possible would be much too dangerous. Running regattas entirely in front of LIYC or Newport YC would be nearly impossible as the courses would be too short to be considered in almost all conditions. Running our regatta's from other areas of the harbor such as the western turning basin would cause logistical problems as well as being too distant for the younger of our sailors.

While placing the CAD in the middle of our harbor greatly perplexes me, I have other concerns. When I attended the scoping meeting various quantities of dredged material were mentioned. Frankly, it was obvious that the city did not have (does not have) a clear understanding of the amount of material that will be placed into the CAD nor the amount of "unsuitable material" that will be dredged. Many of the assumptions that have been made regarding the quantity of material are purely that, assumptions. In my world as an architect when I am designing foundations, I need to have a comprehensive soils study done including several borings to identify the limits and depth of the material. It appears to me that this has not been done and as a result assumptions have been made that appear to be overstated. One would likely say that this is done as a factor of safety but the result of which leads to a conclusion that since so much material should be dredged that the CAD solution is the only viable option.

I don't believe for a minute this is true. At least not without a thorough analysis. The CEQA guidelines require alternative solutions to be considered. Although I have nothing against

ATLANTA
MILWAUKEE
NEWPORT BEACH

101 Shipyard Way
Suite B
Newport Beach CA
92663

acs-architects.com

Anchor QEA, LLC, having the same company furnish the analysis that will provide the work is a conflict of interest and entirely inappropriate. I have heard that Anchor is a CAD expert. Good for them. That may however lead, if not appear to lead, them to be predisposed to a CAD solution. Why not have an independent third party provide the analysis?

To be clear I have no objection to dredging and understand its need. However I believe a CAD should be a last resort due to its permanency. It's interesting that our own Harbor Commissioners recommended siting the CAD facility adjacent to the contaminated material not in the middle of Main and Main. Although I haven't seen alternative solutions, if the decision is to utilize a CAD solution it seems appropriate to deal with the problem adjacent to where it occurs. None of this material occurs in the relatively clean area of the Eastern turning basin. So why bring contaminated material there?

Back to my concern regarding the calculation of the amount of "unsuitable material" to be dredged. If the city were to further analyze the material through core samples and testing it may turn out that the unsuitable material is approximately 20,000 CY or even less. In that case there would likely be no need for a CAD as the material could be disposed of off-site or with further testing possibly at LA3.

In the City's Notice of Preparation dated November 18, 2019, it states that the City will be developing a sediment management plan in coordination with the regulatory agencies to manage the CAD. Isn't this putting the cart before the horse? In my opinion creating a "comprehensive" sediment management plan should be the first part of any plan, much as in my business we create a master plan and program before executing a design. To do otherwise is foolish at best and incompetent in my opinion.

I am not into conspiracy theories, however the fact that the City is accepting the "assumption" that there is a larger amount of material (lacking true data) and the stated fact 1) of the size of the CAD, and 2) that it will be open for ten years, leads me to believe there is a more to understand about the City's intention. Can the residents of Newport Beach be assured of the type of "future material" placed in the CAD?

I know this is an emotional issue for many. I have tried to take the emotion out of this and look only at the facts which I feel we are short of. If however I am wrong or any of my concerns are ill-founded please point me to the material that refutes them. I look forward to hopefully seeing a comprehensive study of the alternatives and the creation of a plan that does not disrupt the recreational quality of our lives. A plan the residents and the city of Newport Beach can stand behind. One in which we can be proud of working out together.

Respectfully Submitted,



David Rhodes, AIA
President

ATLANTA
MILWAUKEE
NEWPORT BEACH

101 Shipyard Way
Suite B
Newport Beach CA
92663

acs-architects.com

Comment Card

Friends Room of the Newport Beach Public Library
1000 Avocado Avenue, Newport Beach, CA 92660
Scoping Meeting
December 4, 2019

City of Newport Beach, Public Works Department

Lower Newport Harbor Channel Dredging and Confined Aquatic Disposal Facility Construction Project EIR

Written comments may be submitted tonight during the meeting or mailed to Chris Miller, Public Works Manager, City of Newport Beach, Public Works Department. Comments must be received by no later than **January 17, 2020 at 5:00 pm.**

Chris Miller, Public Works Manager
City of Newport Beach
Public Works Department
100 Civic Center Drive
Newport Beach, CA 92660

cmiller@newportbeachca.gov

Your info (required):

Name: Glenn Robertson

Affiliation/Organization: Santa Ana Regional Water Quality Control Board

Address: 3737 Main St, Ste 500
Riverside CA 92501

Phone: 951-782-3259

Comments (use reverse for more space):

For EIR: For Alternatives Section, all alternative disposal ideas should be analyzed; The Reduced Project Alternative where what could not be placed into smaller CAD site would be trucked.

(1)

2

Comments (continued):

Alternatives

- Full trucking (with various degrees of treatment) to Casmalia, Kettleman Hills, or appropriate special waste site.
- Smaller CAD locations closer to sources of highest (green on maps) Hg levels.
- Any other alternatives

2) Permitting — our Certification group understands that RPG 54 does not apply to private slips (bulkhead out to end of dock). Please state in EIR if federal channel work and small jobs really are expected to be combined in one 404 Permit. We would expect to write Waste Discharge Requirements, not 401 Certification, to cover all locations/dredging jurisdictions (Feds, City responsibility)

3) Please put in EIR the analyses of all parameters from areas to be dredged — Hg, Pb, Cd, DDT, As etc

4) I work the Navy's Anaheim Bay 401 Cert — no more outside fill to go in.

CA STATE LANDS COMMISSION
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

JENNIFER LUCCHESI, Executive Officer
916.574.1800 Fax 916.574.1810

California Relay Service TDD **800.735.2929**
from Voice Phone **800.735.2922**

Contact Phone: 916.574.2255

March 11, 2020

File Ref: G 09-02.16

Sent via electronic mail

Chris Miller, Public Works Manager
City of Newport Beach, Public Works Department
100 Civic Center Drive
Newport Beach CA 92660
cmiller@newportbeachca.gov

Subject: Maintenance Dredging to remove up to 300,000 cubic yards of sediment, within Lower Newport Harbor, Newport Beach, Orange County, California.

Dear Mr. Miller:

This letter is in response to a Notice of Preparation and Scoping Meeting for the Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility Construction Project (PA2019-020) involving proposed dredging within Lower Newport Harbor. A portion of the proposed project involves dredging on legislatively granted public trust lands held in trust by the City of Newport Beach with mineral interests reserved to the State. Therefore, the City will need to provide additional information to the California State Lands Commission regarding the proposed dredging activity, as further described below on page 2.

The Commission has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways. The Commission also has certain residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions (PRC §6301 and §6306). All tidelands and submerged lands granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the Common Law Public Trust Doctrine.

As general background, the State of California acquired sovereign ownership of all tide and submerged lands upon its admission to the United States in 1850. The State holds these lands for the benefit of all people of the State for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation,

and open space. On tidal waterways, the State's sovereign fee ownership extends landward to the mean high tide line, except for areas of fill or artificial accretion or where the boundary has been fixed by agreement or a court. Such boundaries may not be readily apparent from present day site inspections.

After review of in-house records, staff has determined that the proposed dredging location is located within lands the State granted to the City of Newport Beach pursuant to Chapter 74, Statutes of 1978, and as amended, minerals reserved as provided (revenues received from mineral production or freed parcels or property bought by trustee with trust monies shall be paid to the State).

Legislation that took effect January 1, 2014, Chapter 104, Statutes of 2013 (AB 727, Stone), eliminated the requirement of a lease from the Commission for dredging on granted public trust lands where minerals are reserved to the State, if the dredged material is disposed at an approved on or offshore disposal site, is not sold, and is consistent with the proper management of the granted lands. Under this legislation, if a grantee or project applicant desires to dredge on granted lands where minerals are reserved, they are required to notify the Commission of their intent to dredge in writing at least 120 days prior to dredging. The notice must include the following information:

1. A description of the dredging to be conducted on those lands, including a map and land description showing the area and project site.

2. A description of the amount of material to be dredged, disposal amount, location, and means of disposal, if available.

3. The time and manner in which dredging is to occur.

4. The relevant permits, authorizations, and approvals that exist or must be obtained to complete dredging, or, if applicable, demonstration of compliance with a dredged materials management office plan that is administered by the United States Army Corps of Engineers.

5. A declaration that the dredging is necessary for the proper management of the grant consistent with the public trust for commerce, navigation, and fisheries, or a statement of why the dredging is necessary to be undertaken for other purposes and a declaration that the dredging is consistent with the statutory grant.

6. A statement with supporting documents that explains whether the trustee anticipates receipt of any revenues from the materials to be dredged, and, if so, in what amounts.

This determination is without prejudice to any future assertion of State ownership or public rights, should circumstances change, or should additional information come to our attention. In addition, this letter is not intended, nor should it be construed as, a waiver or limitation of any right, title, or interest of the State of California in any lands under its jurisdiction.

I look forward to receiving the above requested information. If you have any questions concerning this letter or the grant to the https://www.slc.ca.gov/granted-public-trust-lands/grantees/newport-beach/, please do not hesitate to contact me at 916.574.2255 or by email at Michaela.Moser@slc.ca.gov.

Sincerely,



Michaela Moser
External Affairs and Granted Lands

From: Linda Merrifield <lmerrifield120@gmail.com>
Sent: Sunday, March 08, 2020 4:11 PM
To: Miller, Chris
Subject: NO CAD OFF LIDO ISLAND

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Dear Mr Miller,

Moving unsuitable contaminants into a clean, heavily trafficked area of the public anchorage is unacceptable. These areas of contaminants should be taken out of the bay and properly mitigated, taken to a commercial CAD system or removed while being monitored. If a CAD is the only answer the City of Newport Beach can come up with they need to place two CAD's in the same area the unsuitable materials are located and bury them there. Placing this CAD in our clean anchorage, uprooting causing a pluming effect while removing and again while burying is irresponsible, this area is used by residents and visitors from all over, this is not the answer. Once the CAD is placed this area can never be dredged again. As presented at the informational meetings held by CNB the CAD is proposed to be left available/open for up to ten years for future dumping. Dredging is always good and can be done (according to the Army Corp of Engineers) without uprooting these areas that by the way are mostly in commercial arenas.

Sincerely,

Linda Merrifield

From: Nancy Helm <nancyhelm@hotmail.com>
Sent: Sunday, January 19, 2020 4:52 PM
To: Dixon, Diane; Avery, Brad; Duffield, Duffy; Muldoon, Kevin; Herdman, Jeff; joy@newportbeachca.goc; O'Neill, William
Cc: Miller, Chris; Nancy Helm
Subject: Dumping Tainted Sediment in Newport Harbor

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

I do not understand why the city wants to deposit dredged sediment that is mercury contaminated in Newport Harbor. There must be alternatives. The obvious question is why not transport it to an area where it would be less of an environmental concern? Is the answer that it would be too expensive? Is our city government putting a price on safety and the environment? In the past, government entities have often claimed something is safe only to later find they were mistaken. Why take the chance that this could become a huge issue in the future, one that would be difficult to remedy?

The residents of Newport Beach will be furious if the city proceeds with this plan. We must not dump contaminated sediment in Newport Harbor!

Nancy Helm
200 Via Koron
Newport Beach CA 92663
949-683-9123

January 22, 2020

Chris Miller, Public Works Manager
City of Newport Beach, Public Works Department
100 Civic Center Drive
Newport Beach, California 92660

Re: Lower Newport Harbor Confined Aquatic Disposal (CAD) Facility
Construction Project (PA2019-020) Environmental Impact Report

Dear Mr. Miller

I reside with my family at 733 Via Lido Soud Newport Beach Ca which is on the bay front close to the location of the proposed project as referenced above.

I would like to express my concerns for this project as follows:

1) I have worked on contaminated sites in the development business with the DTSC and RWQCB to secure clean closure plans. It has been my experience that once soil is disturbed the contaminants are released into the atmosphere or adjacent areas where they are difficult to control. For this reason, any EIR should address the issues related to soil disturbance from dredging especially in light of the recreational swimming use in the immediate area at the Lido Island club house and the public park across the bay. Specifically what measure are being considered for monitoring of air quality and capturing/containing greenhouse gas emissions as well as soil contaminates from being released into the bay from dredging.

2) Since the dredged material is not suited for open ocean placement or near shore disposal, then the EIR should consider the alternative of disposal at an acceptable disposal site such as in the Port of Long Beach which was used in the previous dredging of the Newport Bay.

3) I understand the need to keep the bay available for navigation purposes as I am a boat owner with a slip on the bay who appreciates the efforts by the City of Newport Beach in this regard. However, any EIR should also address the source of the sediments and contaminants flowing into the Newport Bay for any possible cost sharing with adjacent cities and counties.

4) Finally, the EIR should address the impacts to the surrounding residential residences in terms of noise, water quality, hours of dredging operations, storage of dredged material, fill cap reliability, projections for additional dredging requirements, bulk head impacts, global warming including rise in sea levels.

Sincerely,
H Roger Heartman

From: Marsha Ferrall <marshaferrall@gmail.com>
Sent: Thursday, January 23, 2020 2:21 PM
To: Miller, Chris
Subject: CAD proposal
Attachments: letter to city CAD.pdf

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

hello mr miller.
i am a resident of lido and also on the board of directors. i listened to you speak at our town hall meeting a while ago.
i have written a letter in opposition to the proposed recommendation concerning the contaminated materials in our bay. i have attached this letter to this email as i have been told the deadline is tomorrow, friday, jan 24, and does not allow to come via regular mail.
thank you for your consideration.

january 23, 2020

chris miller, public works manager
city of newport beach, public works department
100 civic center drive
newport beach, ca 92660

SUBJECT: the california environmental quality act (CEQA) scoping the environmental impact report PA2019-020 proposing construction of a confined aquatic disposal (CAD) in newport harbor.

mr miller,

while i support and understand the purpose of dredging our bay, i am opposed to the CAD facility or any other dump site in our harbor. i do not believe enough research for the long time viability of the containment of such material has been done.

the digging up and moving of such material seems to have major flaws in it's core conception. while i am not suggesting we make our contamination someone else's problem, i am thinking the wiser move would be to leave that material as is until such time an opening at an existing disposal site again becomes available.

i am a member of the board of directors for LICA and concur with the letter written by our president, eric henn. i have been a resident in newport beach for over 40 years and on lido for the past 31. we need to protect our beautiful bay.

thank you for your consideration.

marsha ferrall
LICA board of directors

From: Clark, Ronda <Ronda.Clark@am.jll.com>
Sent: Friday, January 24, 2020 9:54 AM
To: Miller, Chris
Subject: No Dredging and Dumpsite in Newport Harbor

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Chris,
I am a Newport Beach resident, 130 Via Xanthe, and also own an investment property in Newport Beach. I would like you to advise you that I am in disagreement with the plan to have a dumpsite in the harbor. My disagreement is based upon environmental concerns and overall disagreement with this approach to resolving the issue. Please note my opposition and consider this in the decision regarding this matter.

Best,

Ronda Clark
Managing Director
JLL
4 Park Plaza, Suite 900
Irvine, CA 92614
main +1 949 885-2900 fax +1 949 885-2901
direct +1 949 885-2991 cell +1 949 697 6642
ronda.clark@am.jll.com
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License # 01143949





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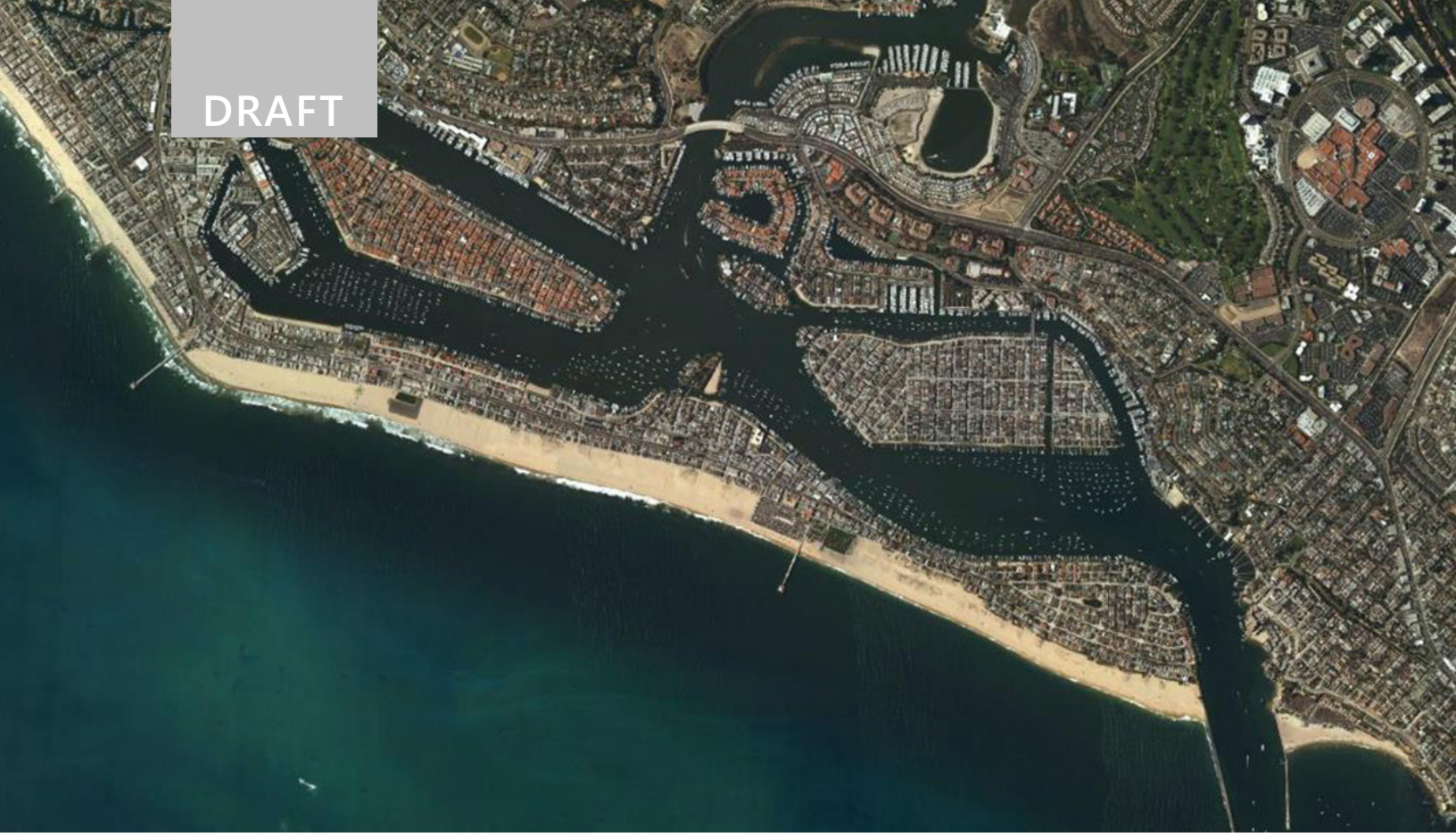
Appendix C
Basis of Design Report

DRAFT



November 24, 2020
Lower Newport Harbor Bay Federal Channels

ANCHOR QEA

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal

Prepared for City of Newport Beach

DRAFT

November 24, 2020
Lower Newport Harbor Bay Federal Channels

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal

Prepared for
City of Newport Beach
100 Civic Center Drive
Newport Beach, California 92660

Prepared by
Anchor QEA, LLC
9700 Research Drive
Irvine, California 92618

Project Number: 180243-02.01

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Appendix F Geotechnical Investigations
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Appendix H Operations, Management, and Monitoring Plan

ABBREVIATIONS

µg/L	micrograms per liter
BODR	Basis of Design Report
CAD	confined aquatic disposal
CAD facility	confined aquatic disposal facility
CCR	California Code of Requirements
CEQA	California Environmental Quality Act
City	City of Newport Beach
cy	cubic yard
EIR	Environmental Impact Report
ERM	effects range median
Federal Channels	Lower Newport Bay Federal Channels
FS	factor of safety
LA-3	LA-3 Ocean Dredged Material Disposal Site
MLLW	mean lower low water
NEPA	National Environmental Policy Act
OMMP	Operations, Management, and Monitoring Plan
PCB	polychlorinated biphenyl
RGP 54	Regional General Permit 54
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers

1 Introduction

1.1 Purpose

This Draft Basis of Design Report (Draft BODR) was prepared by Anchor QEA, LLC, on behalf of the City of Newport Beach (City) to support the upcoming maintenance dredging efforts at the Lower Newport Bay Federal Channels (herein referred to as Federal Channels). The overall intent of the maintenance dredging is to achieve current federally authorized design depths throughout Lower Newport Bay. Figure 1-1 shows a vicinity map of Newport Beach and the project location.

Based on recent sediment suitability evaluations, most of the dredged material is suitable for offshore disposal at approved open ocean or nearshore placement sites. However, the remaining sediment is considered unsuitable for open ocean or nearshore placement and requires an alternative disposal option. Anchor QEA is supporting the City and U.S. Army Corps of Engineers (USACE) with the engineering design, environmental documentation, and development of management requirements for the material's placement and permanent confinement in a subaqueous confined aquatic disposal facility (CAD facility) within the Federal Channels.

There are no cost-effective alternatives for disposal of unsuitable sediments in southern California currently. While an upland landfill exists, its use is less practical for the following reasons:

- **Cost-benefit differential**: The total expenditure to dispose to an upland landfill is much more expensive compared to placing sediments within a CAD facility, LA-3, or the nearshore placement area due to offloading, dewatering, re-handling, transport, and disposal costs.
- **Environmental and community toll**: Hauling unsuitable sediments to an upland landfill could cause significant environmental and community effects due to the number of trucks hauling this material over city and state roadways.

Therefore, this Draft BODR presents the basis for designing and constructing a unique solution to this problem where resources of the City and USACE are combined into one large innovative project. As a key component to this larger project, a CAD facility is constructed to contain sediment that is otherwise unsuitable for open ocean and nearshore disposal. This approach is far more cost effective than landfilling, as it requires minimal transportation costs, no tipping fees, and no need for sediment re-handling. The CAD facility is proposed near the center of Lower Newport Bay between Bay Island, Lido Isle, and Harbor Island, as illustrated in Figure 1-2. The CAD facility will be excavated to a sufficient size and depth to hold the material unsuitable for open ocean disposal from the Federal Channels.

Excavating the CAD facility will produce clean, sandy materials that can be placed at a predetermined nearshore placement area or at LA-3 Ocean Dredged Material Disposal Site (LA-3). Subsequently, sediments dredged from the Federal Channels that are not suitable for open ocean or nearshore placement will be placed within the CAD facility. This material would then be covered with clean

sediments, which can be obtained from the remainder of the Federal Channels and possibly augmented by sand from additional sources (e.g., elsewhere in Lower Newport Bay—as permitted under the City's Regional General Permit 54 [RGP 54] program—or from the Santa Ana River that borders Newport Beach and Huntington Beach, California).

Additional capacity has been included in the design to accommodate additional material from Lower Newport Bay that is not suitable for open ocean or nearshore disposal. The CAD facility will be completed and closed by placing an appropriately thick layer of clean material to function as a permanent confining cap.

1.2 Design Objective

Field studies and engineering analyses have been conducted by Anchor QEA, acting as a technical design consultant to the City and USACE, to evaluate the overall technical feasibility of this project, to investigate key technical details associated with the proposed work, to evaluate necessary design features and a feasible construction approach, and to develop and implement a permitting strategy for the various parties. Anchor QEA has prepared this Draft BODR on behalf of the City and in close coordination with the USACE, Los Angeles District.

Key technical details that were investigated included the subsurface conditions and soil types within and near the proposed location of the CAD facility, the required size of the CAD facility, the ability of the CAD facility to provide long-term isolation of sediments, the stability of the CAD facility dredging and adjacent features, the equipment types that would be associated with the project, and the overall permitting strategy. Furthermore, numeric modeling has been used to evaluate potential scour forces acting on the various surface cap layers that will be installed, including an assessment of wind waves, storm waves, vessel wakes, and propeller wash forces from vessels passing through. All analyses have purposefully been conducted using reasonably conservative assumptions and engineering judgment to design the CAD facility to continue to function properly over the long term.

This Draft BODR documents these analyses and their results. Construction drawings and technical specifications for the Federal Channels maintenance dredging and CAD facility will be included following further design development and once the City's California Environmental Quality Act (CEQA) environmental review process is complete.

1.3 Basis of Design Report Organization

The remaining sections of this Draft BODR are organized as follows:

- **Section 1: Introduction**. This section describes the purpose and objectives of the draft BODR.
- **Section 2: Maintenance Dredging of Federal Channels**. This section describes overall site and sediment characteristics and provides an overview of the dredging requirements for the Federal Channels.

- **Section 3: Sediment Disposal Alternatives**. This section includes a feasibility review of various sediment disposal alternatives for materials both suitable and unsuitable for open ocean or nearshore placement. This includes the alternative sediment placement strategy of confined aquatic disposal.
- **Section 4: Concept for CAD Facility in Lower Newport Bay**. This section describes how a CAD facility could be constructed and managed within Lower Newport Bay and a rationale for where it should be located to minimize impacts and costs while maximizing its benefit.
- **Section 5: Design of CAD Facility for Long-Term Environmental Protection**. This section describes the technical basis for the design of the CAD facility dredging, filling, and overall protectiveness, including discussions of the following:
  - Ability of capping material to isolate contaminants of concern in underlying sediments
  - Stability of capping material against erosive forces and anchoring
  - Stability of CAD facility dredging and adjacent facilities
  - Consolidation of sediments in the CAD facility over time
  - Protection against bioturbation
- **Section 6: Engineering Analysis of CAD Facility Dredging and Filling**. This section provides information on the engineering analyses conducted as part of the design of the CAD facility.
- **Section 7: Short-Term Water Quality Impacts from Construction**. This section evaluates potential short-term water quality impacts from construction and sediment disposal.
- **Section 8: Permitting Strategy**. This section describes the permitting process for the CAD facility.
- **Section 9: Construction Sequencing and Anticipated Schedule**. This section provides information on the anticipated construction sequencing and schedule for the Federal Channels and CAD facility construction.
- **Section 10: Operations, Management, and Monitoring Plan**. This section describes the management and monitoring processes to be employed during dredging as well as long-term monitoring of the CAD facility.
- **Section 11: References**. This section provides references for the materials cited in this Draft BODR.

The following appendices are supplemental documents to the Draft BODR:

- Appendix A: 2019 Bathymetric Condition Survey
- Appendix B: Sampling and Analysis Program Report
- Appendix C: Utility Location Report (RES 2012)
- Appendix D: Chemical Isolation Cap Analysis
- Appendix E: Vessel Scour Analysis
- Appendix F: Geotechnical Investigations
- Appendix G: Analysis of Short-Term Water Quality Impacts During Construction
- Appendix H: Operations, Management, and Monitoring Plan

2 Maintenance Dredging of Federal Channels

2.1 Site and Project Background

Newport Bay occupies the oceanward end of the Newport Bay/San Diego Creek watershed, located in Central Orange County in the southwest corner of the Santa Ana River Basin, about 35 miles southeast of Los Angeles and 70 miles north of San Diego (Figure 1-1). The watershed encompasses 154 square miles and includes portions of the cities of Newport Beach, Irvine, Laguna Hills, Lake Forest, Tustin, Orange, Santa Ana, and Costa Mesa. Mountains encircle the watershed on three sides; runoff from these mountains drains across the Tustin Plain and enters Newport Bay via San Diego Creek.

Newport Bay is a combination of two distinct waterbodies, Lower and Upper Newport Bay, that are divided by the Pacific Coast Highway Bridge. Most of the commercial and recreational boating occurs in Lower Newport Bay, which is highly developed. Upper Newport Bay has a diverse mix of development in its lower reach and an undeveloped ecological reserve in its upper reach.

2.2 Navigational Needs and Authorized Depths in the Federal Channels

The USACE is responsible for maintaining authorized navigation depths for navigational purposes within federally defined channels in Lower Newport Bay. Figure 2-1 illustrates the authorized limits and depths of the Federal Channels, which have been subdivided into different areas (dredge units) based on historical nomenclature, anticipated dredge volumes, and sediment suitability for open ocean disposal. Authorized design depths within the Federal Channels range from -10 to -20 feet mean lower low water (MLLW;). Table 2-1 includes information on the authorized depths for dredge units proposed for dredging as part of the Federal Channels dredging program.

Table 2-1
Authorized Depths for Dredge Units within the Federal Channels

Federal Channels Dredge Unit	Authorized Depth (feet MLLW)
Entrance Channel	-20
Main Channel North 1 through 5	-20
Turning Basin	-20
Bay Island Area	-15
Newport Channel 1 through 3	-15

Note:
1. Areas within the Federal Channels that are authorized to -10 feet MLLW are not proposed for maintenance dredging.

2.3 Previous Dredging and Disposal Activities

In 2009, in preparation for maintenance dredging activity in Lower Newport Bay, the USACE commissioned a dredged sediment evaluation for nine federal channels within Lower Newport Bay to determine their suitability for open ocean disposal at LA-3 (Newfields 2009). After reviewing this evaluation, the Dredged Material Management Team determined that most sediments from the Federal Channels were suitable for ocean disposal except those representing portions of Main Channel North, Bay Island Middle (below -13 feet MLLW), and Balboa Channel due to elevated mercury concentrations. In 2012 and 2013, large portions of the Federal Channels were dredged to depths of -10 to -17 feet MLLW. Sediment unsuitable for open ocean disposal was placed at the Port of Long Beach's Middle Harbor Fill Site, and the remaining majority of dredged sediment was placed at LA-3.

2.4 Current Maintenance Dredging Needs

Updated harbor-wide multibeam surveys were performed by the USACE in July 2019 (Appendix A). The resulting data were processed to generate a bathymetric map which indicates that dredging is required in multiple areas to achieve authorized design depths, as summarized in Figure 2-1.

Areas that require the most dredging include the Entrance Channel, Main Channel North 1 through 5, Bay Island Area, Turning Basin, and Newport Channel 1 through 3 (Figure 2-1). Dredging each of these areas is estimated to result in the sediment volumes summarized in Table 2-2, which includes dredging to the authorized design depths, plus 2 feet of overdredge allowance.

Because most of the Turning Basin is already at design depth, only the shoaled spots around the periphery of the Turning Basin are proposed for dredging. Therefore, a design depth of -19 feet MLLW, plus 2 feet of overdredge allowance, is applied for the Turning Basin.

Table 2-2
Estimated Dredging Volumes and Suitability for Ocean or Nearshore Placement

Federal Channels	Design Depth (feet MLLW)	Estimated Volume to Design Depth (cy)	2-Foot Overdredge Allowance Volume (cy)	Total Volume (cy)	Suitable for Open Ocean Disposal (cy)	Not Suitable for Open Ocean Disposal or Nearshore Placement (cy)
Entrance Channel	-20	51,700	19,200	70,900	70,900[1]	0
Main Channel North 1	-20	36,600	26,600	63,200	43,200	20,000
Main Channel North 2	-20	37,600	23,200	60,800	40,400	20,400
Main Channel North 3	-20	44,600	38,800	83,400	83,400	0
Main Channel North 4	-20	28,300	26,700	55,000	55,000	0
Main Channel North 5	-20	50,200	39,600	89,800	89,800	0
Turning Basin	-19	5,200	14,300	19,500	0	19,500
Bay Island Area	-15	210,900	135,900	346,800	346,800	0
Newport Channel 1	-15	28,300	18,700	47,000	0	47,000
Newport Channel 2	-15	85,800	39,600	125,400	125,400	0
Newport Channel 3	-15	54,200	24,600	78,800	78,800	0
Totals		**633,400**	**407,200**	**1,040,600**	**933,700**	**106,900**

Notes:
All volumes include 3H:1V perimeter side slopes.
Volumes are based on the June 2018 conditional survey conducted by the USACE for the City.
1. Suitable for nearshore placement and open ocean disposal

2.5 Suitability of Sediments in Federal Channels for Open Ocean or Nearshore Disposal

In December 2017, the City—as the local sponsor—initiated a sediment characterization study to determine the suitability of proposed dredged sediment from the Federal Channels for open ocean disposal at the LA-3 offshore disposal site. Sediment from the Entrance Channel was also evaluated to determine compatibility for nearshore placement at beaches north of the harbor entrance and up to the Santa Ana River.

Sediments from the Federal Channels were characterized in 2018 and 2019 (Anchor QEA 2019). Sediment sampling locations and corresponding core logs are included in the *Sampling and Analysis Program Report* (Anchor QEA 2019), which is provided as Appendix B. In general, the sediment to be removed from the Federal Channels consists of silts underlain by silty sands. Trace shells were encountered in the silty sand layer.

Grain size analysis was conducted on composited samples within each dredge area to provide information on the physical characteristics of the sediments. In general, composited sediment from the areas sampled consisted primarily of fines (68.6% to 98.2% silt and clay) except for the Entrance Channel (98.1% sand).

Chemical testing of the sediments indicated multiple contaminants of concern, including mercury, DDTs, and polychlorinated biphenyls (PCBs). Areas of the Federal Channels with elevated concentrations include the following:

- Mercury exceeded the effects range median (ERM) value in sediment from the Turning Basin; Main Channel North 1, 2, and 3; and Newport Channel 1.
- Total DDTs exceeded the ERM value in all areas except the Entrance Channel.
- Total PCBs exceeded the ERM in the Turning Basin.

Based on the Dredged Material Management Team's review of sediment chemistry results and effects-based testing (i.e., toxicity and bioaccumulation), sediments from Main Channel North 3, 4, and 5, Bay Island Area, Newport Channel 2 and 3, and the Entrance Channel were deemed suitable for open ocean disposal (Figure 1-2). Grain size of the Entrance Channel and proposed nearshore placement area (Newport Pier to the West Newport Jetty) were similarly evaluated to determine compatibility, indicating that sediments from the Entrance Channel are also suitable for nearshore placement.

However, due to elevated concentrations of mercury and/or PCBs, the Turning Basin, portions of Main Channel North 1 and 2, and Newport Channel 1 were deemed not suitable for open ocean disposal (Figure 1-2). These sediments require an alternate disposal option where the sediments are

sufficiently isolated from contact with marine organisms. Table 2-2 includes the estimated volumes of sediments suitable and unsuitable for open ocean disposal within the Federal Channels.

2.6 Existing Utilities

Ten utilities were identified during past dredging projects within Lower Newport Bay. Existing utilities include cable and water that traverse locations where Federal Channels maintenance dredging will occur. The City has been working with AT&T and Southern California Edison to remove all de-energized cables that lie within the footprint of the Federal Channels maintenance dredging. It is anticipated that these cables will be removed during the Federal Channels maintenance dredging. Table 2-3 includes a list of the known utilities within the Federal Channels maintenance dredging footprint identified by the dredging contractor prior to the 2012 Federal Channels dredging program (Appendix C). Prior to the Federal Channels dredging, the contractor will be required to conduct a new utility locate investigation.

Table 2-3
Existing Utilities Within the Federal Channels Maintenance Dredging Footprint

Utility Company	Utility Type	Location in Federal Channels
Southern California Edison	Cable	Newport Channel 2
AT&T	Cable	Bay Island Area
AT&T	Cable	Bay Island Area
City	Water	Main Channel North 2
Southern California Edison	Cable	Bay Island Area
AT&T	Cable	Main Channel North 4
AT&T	Cable	Main Channel North 4
City	Water	Main Channel North 4
City	Water	Main Channel North 5
AT&T	Cable	Main Channel North 5
Southern California Edison	Cable	Entrance Channel

Note:
Further information is provided in Appendix C to the Draft BODR.

3 Sediment Disposal Alternatives

The project originates from the need to identify a cost-effective solution for the disposal of suitable and unsuitable sediments in Federal Channels. Past maintenance dredging efforts included the combination of ocean disposal, nearshore placement, and disposal of unsuitable sediment at a fill site located in the Port of Long Beach, California. Unfortunately, this fill site is not an option for this round of maintenance dredging and thus other cost-effective options need to be considered. Disposal alternatives evaluated for the project are discussed in Sections 3.1 and 3.2.

3.1 Sediments Suitable for Open Ocean or Nearshore Placement

3.1.1 Open Ocean Disposal

Based on the sediment characterization described in Section 2, select sediment from Main Channel North1 and Main Channel North 2 and all sediment in the Entrance Channel, Main Channel North 3, Main Channel North 4, Main Channel North 5, Bay Island Area, Newport Channel 2, and Newport Channel 3 are suitable for open ocean disposal (Table 2-2; Figure 1-2). These sediments underwent testing per the *Evaluation for Dredged Material Proposed for Ocean Disposal: Testing Manual* (USEPA and USACE 1991).

Open ocean disposal is a cost-effective alternative that is widely used at maintenance dredging projects in southern California. Because ocean-disposed dredged sediment does not require a re-handling step, sediment can be dredged and placed directly into a bottom-dump barge, hauled to one of several U.S. Environmental Protection Agency-managed open ocean disposal sites, and discharged. The closest open ocean disposal location to Newport Harbor, located approximately 6 miles to the south (Figure 1-1) from the Entrance Channel, is the LA-3 offshore placement site.

3.1.2 Beneficial Reuse

Promoting beneficial reuse of dredged sediment is considered a national goal of the resource agencies. Beach renourishment, frequently used by USACE in southern California, is one example of sediment reuse, but other possibilities include the use of dredged sediment in the development or manufacturing of commercial, industrial, horticultural, agricultural or other products. Reuse of dredged sediment can be categorized into the options presented in Table 3-1.

Table 3-1
Typical Options for Dredged Sediment Reuse

Description	Example
Landfilling	Daily cover
Landscaping	Grading/topsoil
Agricultural	Amendment to farms
Reclamation	Mines/quarries/brownfields
Engineered fill	Parking lots/roads/embankment

Many of the options in Table 3-1 require additives and/or treatment of the sediment, at least one re-handling step, and significant amounts of available area for the processing equipment and sediment stockpiling. There are also many processing technologies that can be used to increase the suitability of dredged material, particularly for materials that are impacted to some degree by contaminants of concern, including the following:

- Sand separation (hydrocyclones)
- Composting (biosolids or cellulose)
- Solidification/stabilization (e.g., cement, lime, fly ash)
- Soil washing (BioGenesis)
- High-temperature thermal treatment (e.g., Ecomelt, lightweight aggregate, bricks)

Typically, such approaches have proven to be cost-prohibitive for projects of this magnitude because they require the construction of large treatment facilities on site to process the material. This is particularly problematic in Lower Newport Bay, a densely populated public/private harbor where readily available upland space immediately adjacent to the harbor shoreline is extremely limited or nonexistent.

3.1.3 Beach Nourishment

Beach nourishment can be a more practical use case than the reuse options listed above in Table 3-1 for Lower Newport Bay sediments that are free of chemical contaminants and have comparable grain size and aesthetic characteristics to that of the beach under consideration. Sandy sediments with appropriate characteristics can be placed on eroding beaches or in nearshore areas to widen, build-out, and/or protect the ocean-facing beach areas.

Based on the sediment characterization for the Federal Channels maintenance dredging, sandy sediment from the Entrance Channel has chemical and physical characteristics deemed as suitable for nearshore nourishment.

3.2 Sediments Not Suitable for Open Ocean or Beach/Nearshore Placement

Options exist for disposing of sediments that are determined not suitable for open ocean disposal, including upland landfill disposal and confined aquatic disposal. These options range in application and associated costs and are discussed in further detail in Sections 3.2.1 and 3.2.2.

3.2.1 Upland Landfill Disposal

For sediments that do not qualify for open ocean disposal, beneficial reuse, or beach nourishment, more costly disposal scenarios must be considered. One commonly used alternative is to haul the sediment to an upland permitted landfill facility. Two factors to consider in determining the suitability of a specific permitted landfill for disposal of dredged sediment are the concentration of contaminants in the sediment and the total quantity of sediment to be disposed. In addition, the dredged sediment disposed at a landfill typically needs to pass the "paint filter" test, which requires that the sediment must be sufficiently dewatered after dredging to prevent drainage during transport and to minimize excess infiltration during disposal.

The concentration of contaminants in dredged sediment determines its waste type and therefore the class of landfill that can accept the material. In California, landfills are identified as Class I, II, or III:

- Class I landfills can accept materials that are classified by the State of California as hazardous wastes under Title 22 of the California Code of Requirements (CCR).
- Class II landfills are similar in design to Class I landfills but accept only designated waste that has been determined to be below hazardous waste criteria concentrations.
- Class III landfills can accept sediment with relatively lower concentrations of contaminants depending on the individual landfill design and location. Each Class III site operator must maintain a certification with the California State Integrated Waste Management Board specifying the facility's waste acceptance criteria and testing requirements in accordance with applicable state and federal discharge regulations.

Sediments in the Federal Channels that are not suitable for open ocean disposal meet the qualifications for disposal at a Class III landfill. This alternative, however, is very expensive for several reasons. First, the sediment must be dewatered prior to transport in order to meet the paint filter test. The dewatering can be accomplished either actively using a mechanical dewatering device (e.g., belt presses, centrifugation, hydro cyclones, or via additives) or passively by constructing a large containment area to hold the sediment until the water evaporates or drains. Next, the sediment must be trucked or shipped via truck or railcar to the landfill. Lastly, the sediment would be subjected to a tipping fee similar to any other waste product that the landfill receives.

Costs, while high, are not the only perceived disadvantage of upland landfill disposal for Federal Channels sediments unsuitable for open disposal. A potentially more significant factor on the greater public is the effect of numerous truck hauling trips, carrying chemically impacted sediments, over City streets and roads for an extended period of time. This activity will pose impacts on noise, emissions, traffic, public street use, and increased wear and tear on road surfacing. For example, at 12 cy per truck, approximately 8,900 truck trips would be required to dispose Federal Channels sediments unsuitable for open ocean disposal without factoring any bulking by the addition of sediment additives for dewatering purposes. Furthermore, about 1 to 2 acres will need to be set aside for the project duration to allow for transfer of sediments onto land, their stockpiling, dewatering and drying, water treatment, truck staging, and placement into the trucks; the Lower Newport Harbor area does not currently have any areas well suited to this purpose.

3.2.2 Alternative Sediment Placement Strategy: Confined Aquatic Disposal

Because of the high costs and environmental impacts associated with upland landfill disposal, an alternative management strategy is desirable for Lower Newport Bay sediments that are not otherwise suitable for open ocean disposal, reuse, or beach placement. The City therefore has committed to evaluating potential alternative disposal techniques and locations.

Sediment disposal guidance for the region is available, as contaminated sediment management options in southern California have been studied thoroughly and documented in two key regional documents: the Los Angeles Contaminated Sediments Task Force Long-Term Management Strategy (CSTF 2005) and the Los Angeles Regional Dredged Material Management Plan (Everest and Anchor QEA 2009). These documents address not only the sediment disposal options already discussed in this section, but also the application of a novel (but not unprecedented) strategy: the use of confined aquatic disposal.

Development of a CAD facility has been shown to be an effective long-term management solution for chemically impacted sediment under the right set of conditions. A CAD facility is constructed underwater by excavating a depression into the existing seabed into which sediment can be placed, and then it is capped with a sufficient type and thickness of clean material (e.g., imported sand or dredged sediment) to keep the underlying sediments permanently isolated from the environment.

The CAD facility concept has been used successfully locally, including the following projects listed below in southern California over the last 20 years:

- At Port Hueneme, which was jointly developed by the U.S. Navy, the USACE, and the Oxnard Harbor District
- At the City of Long Beach (North Energy Island Borrow Pit)

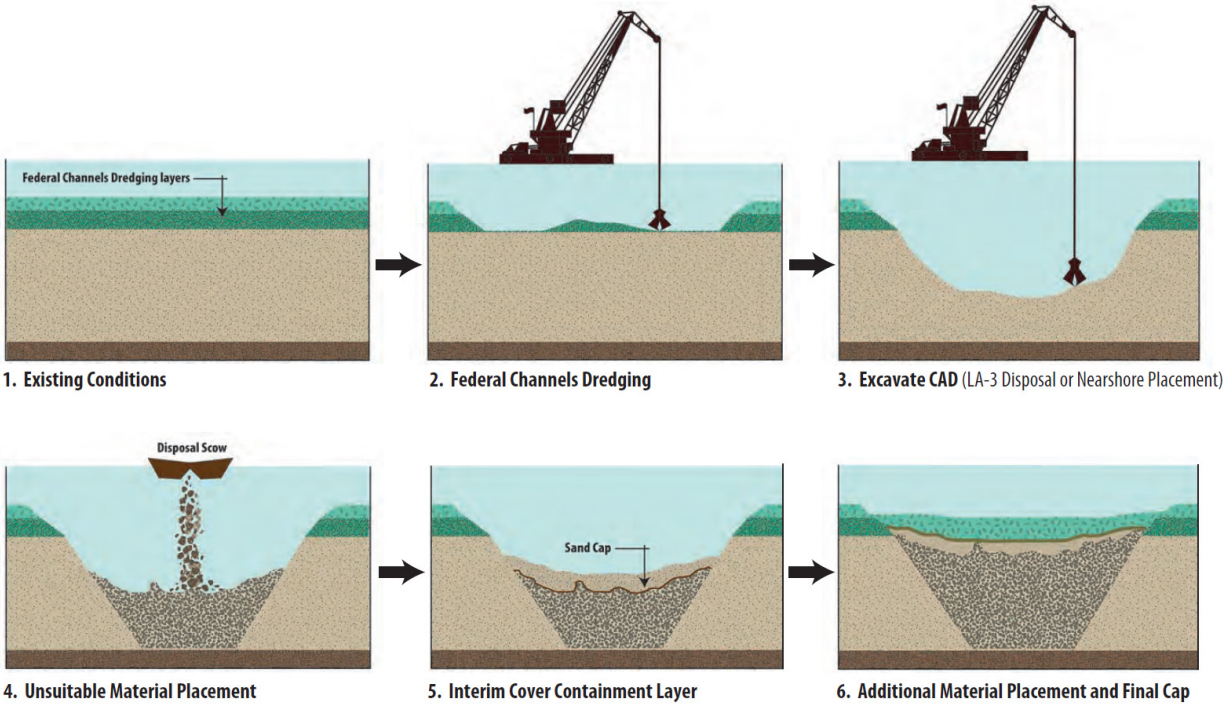
In addition, multiple CAD facilities have been constructed across the country—including harbors in Boston, Massachusetts; Providence, Rhode Island; the Puget Sound Naval Shipyard in Bremerton, Washington; the St. Louis River–Duluth Tar Site, Duluth, Minnesota—and internationally (e.g., a Hong Kong airport; Fredette 2005).

In 2009, the City performed a Feasibility Study for dredged sediment and determined that constructing a CAD facility in Lower Newport Bay was the most cost-effective alternative for managing the City's contaminated sediment (Anchor QEA 2009). In addition, CAD facilities are viewed favorably by regulatory agencies as potential alternatives for management of chemically impacted sediments. Lower Newport Bay offers a unique opportunity to develop a CAD facility in large part for the following reasons:

- Newport Harbor is large enough to accommodate such an approach.
- The sediment that would be removed to create the confined aquatic disposal depression appears to be a good match for nearby beaches—which are in need of nourishment—and would provide a low-cost disposal alternative for suitable sands dredged from within the CAD facility.

This alternative also has the advantage of requiring no rehandling, as unsuitable dredged sediments can be placed directly into a bottom-dump haul barge, moved over the CAD facility, and dropped into the depression, similar to the process that would be used for open ocean disposal (and with a much smaller transportation distance). It provides a cost-effective solution for otherwise unsuitable dredging sediment required to be dredged from the Federal Channels by greatly shortening the sediment haul distance.

Illustration 1
CAD Construction Overview



4 Concept for CAD Facility in Lower Newport Bay

As discussed in Section 3, of the disposal options introduced for otherwise unsuitable sediments, the CAD facility alternative has the greatest potential to be cost effective and environmentally appropriate for Lower Newport Bay. Its cost effectiveness results primarily from the negligible sediment haul distance, the fact that no sediment pretreatment is necessary, and the lack of landfill tipping fees. Furthermore, costs for dredging of the CAD facility can be partially lessened by the reuse of dredged sediment (as appropriate) for a nearby nearshore placement location in Newport Beach.

The basic concept for the CAD facility is that it be excavated to a selected depth and size and then be filled with sediments dredged from the Federal Channels that are not suitable for open ocean or nearshore disposal. These sediments would be overlain by a cap layer consists of clean material that is intended to permanently isolate the underlying sediments from the waters of Newport Bay and the environment.

In order to increase the benefits of the CAD facility for the Newport Beach community, the City also intends to provide additional capacity for subsequent placement of materials dredged from other locations within Lower Newport Bay, which are also unsuitable for open ocean or nearshore disposal. The CAD facility would thereby accommodate additional fill volume from future maintenance dredging projects conducted as part of the City's RGP 54 program as well as sediment that is not covered as part of the program and thus requires an alternative disposal option. At this stage of the design, the City considers 50,000 cy to be a reasonable target capacity for this nonfederal sediment.

During the time that the CAD facility is open (i.e., during placement of the unsuitable material in the CAD facility), the City and its residents would have an initial opportunity to place material dredged from outside the federal navigation channels into the CAD facility; this would be permitted through either the City's RGP 54 program or through an Individual Permit.

Approximately 2 years following construction of the CAD facility and placement of an interim cover containment layer, there would be a second opportunity during a 6-month period for the City and its residents to place material determined unsuitable for unconfined ocean disposal in the CAD facility. The combined total allowance for the initial and second opportunity would be 50,000 cy. If there is remaining capacity (within this 50,000 allowance) at the end of this 6-month period, the City and its residents would be able to place material from the RGP 54 Plan Area determined suitable for unconfined ocean disposal in the CAD facility. This opportunity would provide a more cost-effective and convenient disposal location within the harbor and would bolster the CAD facility's final cap layer.

Figure 4-1 depicts a cross section of the CAD facility concept. The final elevation of the CAD facility infill would be restricted to an elevation that is at or below the water depths necessary for navigation within the harbor.

4.1 Determination of Suitable CAD Location in Lower Newport Bay

Potential CAD facility locations were selected based on preliminary feedback from the City's Harbor Commissioners. The Harbor Commissioners recommended siting the CAD facility next to or within locations where sediment was determined unsuitable and would require placement in the CAD facility. While the recommendation was integral to the siting process, other factors were evaluated that included analysis of geotechnical data to demonstrate CAD facility excavation compliance with current engineering standards and practices, suitability of material for beneficial reuse, feasibility to design and construct the CAD facility based on the volume of sediment to be managed in the CAD facility, logistics during construction, disruption to existing harbor moorings, anchorages, navigation and the public, and public outreach.

The open and relatively large area near the center of Lower Newport Bay—between Lido Isle, Bay Island, and Harbor Island—appears best suited to a CAD facility, as it provides a sufficiently large area in which to excavate the CAD facility and fill it with the appropriate volumes of sediment and capping material. Figure 4-2 shows a plan view of the proposed location and its relation to surrounding harbor features. Additional factors that led to the selection of this location for the CAD facility include its relatively central location within Lower Newport Bay and proximity to the Main Channel, reducing overall transit distances for dredged sediments and providing access for deeper water that allows the barges to be filled to their capacity. This in turn reduces construction duration, costs, and emissions from barge travel due to tugboat operations.

Figure 4-2 shows a plan view of the CAD facility and existing mooring fields and anchorage area used for temporary, short-term anchoring only. The City would coordinate with the public if any vessels within the public mooring area require relocation during construction. In addition, it is anticipated that the anchorage area would be temporarily relocated to the Turning Basin during construction as the City previously did during 2012 Federal Channels dredging.

One known utility (Southern California Edison 12Kv Submarine Cable) requires removal to facilitate the dredging of the CAD facility. The submarine cable, presumed to be currently de-energized, would be removed prior to or during construction of the CAD facility.

The next step is to develop the appropriate scientific and engineering design details for the CAD facility to fully and permanently isolate sediments unsuitable for open ocean disposal from the environment and to avoid any disruptions to the ongoing and future uses of Lower Newport Bay. The evaluation of these details, which results in the fill thicknesses and elevations depicted in Figure 4-1, are the subject of Section 5.

5 Design of CAD Facility for Long-Term Environmental Protection

Section 5 describes the various scientific studies and engineering analyses that were conducted to evaluate and design a permanent cap layer for a CAD facility in Lower Newport Bay that would allow it to physically contain and chemically isolate sediments unsuitable for open ocean disposal. This section also details the development of engineering design elements that are essential for the long-term environmental protectiveness of a CAD facility situated in Lower Newport Bay. A properly designed capping layer—to provide long-term isolation of underlying chemically impacted sediments—requires consideration of several factors and must follow established national standards for CAD facility design and use. In particular, the USACE has published guidance on designing CAD facilities and cap layers to permanently isolate chemically impacted sediments from overlying waters and the environment (Palermo et al. 1998a, 1998b).

The following subsections describe scientific and engineering evaluations involving long-term environmental isolation of sediments below a material cap:

- **Section 5.1** discusses potential erosive forces acting on the CAD facility's surface from the movements of vessels and mooring anchorages in Lower Newport Bay.
- **Section 5.2** discusses protection against bioturbation from burrowing organisms and biota residing in the overlying water column under long-term scenarios.
- **Section 5.3** discusses modeling analyses conducted to predict the ability of surficial capping sediment to chemically isolate the underlying sediments.
- **Section 5.4** integrates the previously described analyses to develop the selected design of the environmentally protective final cap layer and considers possible material sources for the final cap layer.
- **Section 5.5** presents an overview of studies of regional and underlying groundwater aquifers and their positions and depths relative to the CAD facility, focusing on the CAD facility's overall protectiveness of existing groundwater resources.

5.1 Protection Against Physical Disturbance

Vessels travelling over the proposed CAD facility produce propeller-generated currents (i.e., propeller wash) whose magnitude at the seabed depends on vessel characteristics and water depths. Vessels with larger operating power and propeller size in combination with shallower water depths would result in relatively larger forces upon the seabed. As a result, exposure to propeller wash may scour the CAD facility surface material, depending on the sediment properties, tide conditions, and vessel characteristics. This section summarizes the evaluation of the physical stability of the CAD facility surface under various elevations to better understand how vessels may impact the CAD facility's cap.

5.1.1 Propeller Wash

A propeller wash scour model was used to estimate scour depths from propeller wash and evaluate impacts to the CAD facility's surface physical stability and thickness.

Propeller wash scour depths were estimated at three elevations—interim cover containment layer at -30 feet MLLW, material outside the Federal Channels at -25 feet MLLW, and final cap layer elevation at -22 feet MLLW—that are intended to represent a range of fill and cap elevations within the CAD facility. Representative sediment properties were determined based on sediment data (collected in 2013 and 2019) from the proposed cap sources (Anchor QEA 2013, 2018, and 2019). Hydrodynamic conditions based on water levels were evaluated using representative tide conditions (i.e., mean higher high water and MLLW) and one extreme condition (i.e., lowest observed water). Commonly used vessels in Lower Newport Bay were analyzed and included the following:

- Sailboats (50- and 70-feet)
- Tugboat
- Charter boat (e.g., Hornblower)
- Powerboats (90- and 135-feet)

Vessel characteristics from the list above were used to calculate propeller wash velocities, including vessel draft, propeller diameter, and operating power. For the top of each fill and cap layer in the CAD facility, combinations of water levels and vessel operating power were used to provide a range of propeller wash velocities. The corresponding scour depths were then estimated based on the properties of the fill surface existing in the CAD facility at that point.

At an elevation of -25 feet MLLW—the surface of the layer with a combination of sediments under the City's RGP 54 program, along with sediment not covered as part of the City's RGP 54 program—propeller-induced scour depths will be negligible for vessel operations at 25% power. At 50% power, the scour depth is estimated to be 0.1 foot during low tide conditions when water levels are less than 0 foot MLLW. Over the duration of the material placements for this layer, impacts from vessel traffic over the proposed CAD facility are expected to be minimal.

Initially, material placement will have negligible impacts from propeller wash due to the deeper water depths and likely remain negligible most of the time. Propeller-induced scour depths of about 0.1 foot could start occurring at the completion of the interim cover containment layer. After the designed elevation for this layer is achieved, the CAD facility surface will be stable given the relatively small scour depths. Impacts to this layer from vessel traffic may be minimized by limiting the time between completion of this layer and placement of the final cap layer.

Maximum scour depths of the final cap layer are estimated to range from 0.1 to 0.3 foot, which occur at water levels less than 0 foot MLLW. Vessels that may impact the final cap layer include the tugboat, charter boat, 90-foot powerboat, and 135-foot powerboat.

Full details of the scour analysis are provided in Appendix E.

5.1.2 Anchoring Does Not Permanently Affect CAD Facility Surface

The proposed CAD facility would be located near the Newport Harbor Yacht Club mooring area and within a portion of the harbor's anchorage area between Lido Island and Bay Island, so it is expected that vessel anchoring will occur within the CAD facility and capped area footprint. Private vessels anchoring in this area of Lower Newport Bay are likely to penetrate up to one foot into the seabed. However, repeated anchoring events of this sort over time are not considered to cause any permanent effect on the cap integrity. As described in the *Guidance for Subaqueous Dredged Material Capping* (Palermo et al. 1998a), for areas traveled by recreational vessels such as Lower Newport Bay, the impact area from anchoring tends to be relatively small, and after anchors are removed, the area disturbed by the anchor is quickly filled back in by surrounding clean cap sediments and new accumulation.

In the short-term temporary timeframe, individual anchoring events will only disturb the uppermost portion of the cap. Previous studies of ship anchoring (Maushake 2013; Anchor QEA 2016a) have shown that even for vessels much larger than those typically anchoring in Lower Newport Bay (e.g., a 960-foot cargo ship with a 18,000-pound AC-14 anchor), the anchors are only likely to penetrate approximately 2 feet into the seabed, significantly less than the planned cap thickness for the CAD facility in Lower Newport Bay. In reality, the smaller vessels in Lower Newport Bay use smaller anchor types (Ultra anchors; up to 350 pounds), which penetrate more shallowly into the seabed surface.

5.2 Protection Against Bioturbation

In soft bottom marine substrates, bioturbation is the mixing and overturning of sediments caused by organisms residing in the sediments (i.e., benthic organisms). Consistent with Palermo et al. (1998a, 1998b), cap thickness design needs to include a component of thickness that is sufficient to prevent substantial bioturbation of sediments underlying the cap. As such, a cap intending to isolate sediments unsuitable for open ocean disposal should have a thickness greater than or equivalent to the depth where the future bioturbation rate is expected to be close to zero.

A common method of estimating the lower extent of bioturbation (to determine adequate cap design thickness) is to examine those organisms present or likely to be present at the site and identify the deepest burrowers. Applying the most extreme estimate of burrowing depth for a given location tends to be an overly conservative approach because many burrowing organisms are primarily suspension feeders that do little to mix or churn the sediment on a continual basis.

In terms of relative abundance, diversity, and biomass, the majority of benthic organisms reside in the upper 4 to 6 inches of the surface sediments (Berner 1980), which is commonly referred to as the mixed zone. Bioturbation is expected to decrease rapidly below the mixed zone and approaches zero at greater depths where it is so sporadic or infrequent that it is inconsequential and immeasurable.

Although uncommon, in some situations, a small amount of mixing may occur at greater depths because some organisms burrow in sediments deeper than 6 inches. Ghost shrimp (*Neotrypaea californiensis*) and other shrimp of this genus are known to burrow to considerable depths in sediments. However, the preferred habitat for dense beds of ghost shrimp is sandy or muddy intertidal to extremely shallow subtidal estuarine bays. The proposed final cap layer for the CAD facility would be more than 20 feet deep, well below the preferred depth range for burrowing ghost shrimp. Existing regional information collected during 12 years of monitoring at a similar CAD facility in Long Beach indicates that a genus of *Neotrypaea* was present, but only in very low densities (about 1 per 10 square feet), and their presence on the cap did not result in burrows deep enough to affect the integrity of the final cap layer (Anchor QEA 2016b).

Altogether, these factors suggest that substantial bioturbation by ghost shrimp is not expected at the proposed CAD facility location. For the CAD facility proposed at Lower Newport Bay, a more appropriate design depth for bioturbation is estimated as 6 inches where most benthic organisms reside.

5.3 Protection Against Chemical Breakthrough

Chemical isolation modeling was conducted following U.S. Environmental Protection Agency and USACE guidance to simulate the transport of mercury, DDTs, and PCBs through the final cap layer (Palermo et al. 1998a). Model simulations were performed to assess the performance of the cap over a 100-year period. Model-predicted concentrations 6 inches below the surface of the final cap are predicted to remain below the porewater criteria (California Toxics Rule for porewater) and sorbed phase criteria (ERM) for more than 100 years. The model used to evaluate the performance of the interim and final caps and the results are presented in Appendix D.

5.4 Selection and Rationale for Final Cap Layer Material and Thickness

Results of the previously presented analyses indicate the following thickness requirements for the cap layers:

- Up to 0.3 foot (3.6 inches) to protect against scour disturbance from vessel prop wash
- Six inches to protect against bioturbation
- Successful prevention of chemical breakthrough at a depth below the anticipated scouring depth

For the final cap layer, an additional 2 feet of thickness would be included, so that the specified thickness is 3 feet (36 inches). This is significantly greater than the minimum cap thickness required per the analyses conducted, thus providing additional distance between benthic organisms and the underlying sediment and an environmentally conservative, purposefully overdesigned approach to the final cap layer design. Additional overdesign features, such as additional cap thickness, could be readily incorporated initially or in the future, if appropriate.

It is expected that the final cap layer could be sourced from various locations within Lower Newport Bay, including Newport Channel 3 and the Entrance Channel. As such, analyses were conducted using the physical and chemical characteristics at both locations, and each location was determined as a suitable source for the final cap layer. Other potential sources exist, including clean sediments dredged under the City's RGP 54 program or future maintenance dredging efforts at Santa Ana River, though additional analyses would be required prior to approving these as appropriate cap sources.

5.5 Protection of Existing Groundwater Resources

The area of the planned CAD facility was evaluated for its proximity within and/or above significant groundwater sources and aquifers. The interpretation of the hydrogeology of the area was based on previous studies conducted at sites around Newport Beach and regionally.

The main source of groundwater in Orange County is the Main Groundwater Basin, which covers approximately 350 square miles and lies primarily under the Lower Santa Ana River Watershed. However, near the coast at Lower Newport Bay, most of the groundwater wells are in the surrounding area to the north and east of Newport Beach. The local groundwater regime in and around Lower Newport Bay does not have significant aquifers with the capability of producing more than a small amount to a domestic well or stock watering well (COCWMA 2012). Furthermore, the surrounding area of Orange County extracts groundwater from an aquifer that lies at depths of as much as 180 feet below the area, which is well below the depth of the proposed CAD facility.

The lack of groundwater production and use in the Lower Newport Bay area, and the relative depth of the aquifer in the region, suggest that the CAD facility would not affect groundwater resources. The lack of actively used aquifers and the relative depth of the Orange County main groundwater basin also suggest that negligible groundwater upwelling is expected in and through the CAD facility.

6 Engineering Analysis of CAD Facility Dredging and Filling

The following subsections describe the engineering analyses conducted as part of the design of the Lower Newport Bay CAD facility:

- **Section 6.1** discusses the physical and geotechnical properties of materials in which the CAD facility would be situated and the material's apparent suitability for beach placement.
- **Section 6.2** describes the selection of a stable angle of inclination for the CAD facility.
- **Section 6.3** discusses the process of filling the CAD facility with sediments and considerations related to the material's compression and stability.
- **Section 6.4** combines the results of the preceding analyses to determine target dimensions and depths of the CAD facility, as necessary, to contain the required volume of sediment and cap layers.

6.1 Sediment Types to be Dredged to Create CAD Facility

The local geology of Newport Bay consists of crystalline granular soils overlain by sequences of more recently deposited alluvial, fluvial, and marine sediments, which are the typical targeted materials for dredging activity. Myriad studies of subsurface conditions have been conducted over the past 15 years near the proposed location for the CAD facility, including the following:

- Geotechnical investigation in 2005 at Bay Island for a proposed seawall rehabilitation project
- Geotechnical investigation in 2009 for CAD facility locations during the feasibility stage of the project: Borings were conducted in Newport and Main Channel
- Sediment sampling in 2018 and 2019 to below the design depth of the Federal Channels limits to determine the extent of the non-native and native sediment

Locations of the geotechnical investigations and sediment sampling within the footprint of the CAD facility are shown in Figure 6-1. Sections 6.1.1 through 6.1.3 provide summaries of the three investigations and their findings. Detailed reports from each investigation event are provided in Appendix F.

6.1.1 2005 Bay Island Seawall Geotechnical Investigations

Bay Island is an island southwest of the proposed location for the CAD facility. In 2005, a geotechnical investigation was conducted for the proposed Bay Island Sea Wall and Bridge Rehabilitation Project (Diaz Yourman & Associates 2007). Borings were conducted at five locations around Bay Island as well as on each side of the bridge that connects Bay Island with Balboa Peninsula. Boring depths ranged from approximately 8 to 80 feet deep.

Information from this geotechnical investigation provides evidence on the subsurface characteristics of Lower Newport Bay in the general region of the CAD facility. Four of the borings (Bay Island

Seawall Boring 01, 02, 03, and 05) are located less than 1,000 feet from the center of the proposed CAD facility.

Generally, the geotechnical investigation concluded that the soils around Bay Island consist of silty sands to poorly graded sands underlain by sandstone. No bedrock was encountered in any of the explorations, including areas adjacent to the planned dredging depth of the CAD facility. The geotechnical report is included in Appendix F.

6.1.2 2009 Geotechnical Investigation for CAD Facility Feasibility Evaluation

In 2009, two borings were conducted—one in Newport Channel and other located in the Main Channel—to understand the subsurface conditions as part of a previously proposed CAD facility feasibility evaluation for the City (Anchor QEA 2009). Results indicated that the predominant sediment type present was fine to medium sand between and below the likely range of depths that would be excavated for a CAD facility, a sediment type that would likely be well suited for nearshore placement. Chemical analyses were also conducted on these sediments for several different analytes. All concentrations were below effects range low and ERM values. (Boring logs and laboratory results from the 2009 feasibility study [Anchor QEA 2009] are included in Appendix F.)

6.1.3 Additional Sediment Sampling in 2018 and 2019

As part of 2018 and 2019 sediment suitability investigations for the Federal Channels, several sediment cores were collected with vibracoring equipment in the proposed location of the CAD facility to below the dredging depths planned for the Federal Channels. Three cores were collected in the footprint of the proposed CAD facility location, and six cores (three to the north and three to the south) were collected nearby. Depths of the cores ranged from approximately -11 feet MLLW to -20 feet MLLW. Two distinct sediment types were apparent: an upper layer of soft silts and clays, underlain by a dense fine sand (Anchor QEA 2019). Field logs and grain size reports are included in Appendix F for sample locations within the CAD facility footprint.

6.1.4 Conclusions Regarding Suitability of Dredged Sediment for Beach Nourishment

According to the existing physical and chemical characteristics of the sediments within the CAD facility location, the sediments are suitable for open ocean disposal. Confirmatory sampling during construction for grain size is expected to be required in the technical specifications of the construction documents to determine the acceptability of sediments at nearshore placement areas. Because material below the upper layer of soft silts and clays may be relatively consolidated, the dredging contractor will need to be prepared to break up clumped or blocky materials (such as by use of a grizzly or other mechanical device) prior to nearshore placement or open ocean disposal.

6.2 Side Slopes of CAD Facility Dredging

Slope stability of the CAD facility dredging was evaluated using standard engineering methodology: the limit equilibrium method applied using the Rocscience Slide v2018.0 software package. The limit equilibrium method calculates a factor of safety (FS) for stability of a given slope as the resisting force (i.e., soil strength) divided by the driving force (i.e., weight of the soil mass plus other external loads). The FS was computed for a suite of assumed trial "slip surfaces" that were identified using a search routine in the software. The search routine iteratively optimized the geometry of the slip surfaces until the lowest FS was identified, and that surface was identified as the "critical" slip surface.

The target FS is the minimum recommended FS for long-term and short-term stability evaluations and is based on recommendations presented by USACE (2003) and Duncan and Wright (2005). The analysis concluded that a post-dredged slope of 2.5H:1V for the CAD facility would have an FS of 1.4, which exceeds the minimum recommended short-term FS of 1.3 (USACE 2003; Duncan and Wright 2005), indicating a sufficient level of stability during the period that the CAD dredging would be open and not yet completely filled.

6.3 Engineering Analysis of CAD Facility Filling

Sections 6.3.1 and 6.3.2 provide information on additional geotechnical analysis conducted on the cap stability and placement methods. In addition, compression of sediment was estimated after placement within the CAD facility to understand settlement of dredged material within the CAD facility.

6.3.1 Sediment Placement Methods

Rapid or irregular placement of sediment could potentially lead to instability of the CAD facility's underlying materials. This can be controlled by limiting the rate or methods of material placement. The technical specifications would require the contractor to place sediments in the CAD facility in individual layers that are of reasonably uniform thickness and free of large mounds. The contractor would be required to open the bottom-dump barge gradually in a controlled manner to minimize mixing of freshly placed sediment with previously placed material.

The contractor would be required to place sediment in individual lifts that are no more than 5 feet thick across the entire footprint of the CAD facility. Each lift would have no more than a 2-foot variation in its surface elevation. Surveys will be conducted throughout the placement process to verify the variance across the CAD facility as lifts progress. Frequent surveys were an effective quality assurance and control measure during material placement at the Port Hueneme CAD facility, If variance is outside the tolerance of the specifications, the contractor will be required to conduct corrective measures to be approved by the engineer.

6.3.2 Compression of Sediment After Confinement in CAD Facility

Sediment would be likely placed in the CAD facility by releasing it from a bottom-dump barge. Although the sediment would undergo some degree of initial "bulking" during the dredging and dumping process, this increase in volume is expected to be short in duration as additional sediment is added to the CAD facility and compresses the previously placed materials. During the placement of subsequent sediment and capping layers, the sediment is expected to undergo both initial and long-term consolidation. Based on expectations regarding the current (in situ) and post-excavation physical properties of the dredged sediment, the total amount of sediment consolidation is predicted to be 2 to 6 feet relative to its initial in situ volume. This consolidation of sediments could provide future opportunities to increase the thickness of the final cap layer if its thickness is observed to decrease over time. In addition, the expected compression of the CAD facility could provide the City with additional "overdesign" opportunities via future clean sediment dredging and placement, which would further increase the thickness of the clean final cap layer.

6.4 Selection of CAD Facility Size, Dredge Depth, and Clean Sediment Cap Elevation

The CAD facility size, depth, and final cap thicknesses were designed to achieve the following goals:

- Accommodates the full volume of sediment determined unsuitable for open ocean disposal that is dredged during the Federal Channels maintenance dredging
- Allowance for additional volume to accommodate materials dredged from outside the Federal Channels
- Allowance for a sufficiently thick final cap layer
- Allowance for sufficient water depth at the proposed location of the CAD facility

Once filled, the top elevation of the final cap layer needs to be deep enough to avoid precluding marine traffic in the area while accommodating the possibility of future harbor deepening activities. In the future, this area could be deepened to an elevation -20 feet MLLW (to match the adjacent Main Channel North 3 design depth), which would result in dredging to depths of -20 to -22 feet MLLW when a 2-foot allowance for overdredging is considered. This is deeper than the currently authorized depth of -15 feet MLLW within the proposed location of the CAD facility. It is desirable to maintain the top elevation of the final cap at or below this elevation range to avoid having the capping material inadvertently dredged during future maintenance dredging. Therefore, the highest extent of the final cap layer would be restricted to no more than -22 feet MLLW elevation.

The primary element in designing the CAD facility is to determine an appropriate volume capacity that is sufficient to contain the necessary volume of sediment to be deposited within it. Figure 4-1

shows a typical cross section through the CAD facility, incorporating the following individual layers, listed from bottom (deepest) to top (shallowest):

- Placement of 106,900 cy of Federal Channels sediment determined unsuitable for open ocean disposal
  - For this stage in the design, an additional 10% contingency has been included in this layer to be conservative, bringing the total dredged to approximately 117,600 cy.
- Placement of enough clean material to create a 1-foot-thick interim cover containment layer
- Placement of as much as 50,000 cy of sediment within Lower Newport Bay but outside the Federal Channels (permittable and not permittable under the City's RGP 54 program)
  - This would occur over predetermined time frames (pending agency approval) to allow for City residents and City maintenance dredging projects to take advantage of the CAD facility as a local solution for disposal.
- Placement of enough capping material for final isolation to create a final cap layer that is at least 3 feet thick

6.4.1 Effects of Sediment Consolidation

The volume occupied by sediment within the CAD facility would change over time because it occupies a larger volume in its initially "bulked" state and then gradually consolidates to lesser volumes. As a result, the sediment surface within the CAD facility may appear to be artificially "high" immediately after its placement, but subsequent settlement is to be expected and some of which would occur as the filling proceeds.

The volume of sediment initially placed within the CAD facility may undergo temporary "bulking," occupying a volume that is 20% higher than after compression has occurred. Over time, a consolidation analysis indicates that the placed materials within the CAD facility could undergo 2 to 6 feet of compression from its original pre-dredge volume, which may ultimately result in the CAD facility having additional volume capacity above those estimated here. The gap in time between the initial placement of sediment unsuitable for open ocean disposal and final clean sediment cap should provide enough time for the consolidation to occur (see Section 9 for additional information on construction sequencing). The final elevation of the CAD facility is designed to accommodate material to a final surface elevation of -22 feet MLLW. Sediment settlement would drop the final surface farther below this limiting elevation, thus providing additional capacity.

6.4.2 Selection of CAD Dimensions

The CAD facility dredging needs to have the following:

- Adequate sizing to contain the minimum estimated volume of sediment produced as a result of the various project components (as listed in Section 6.4)
- A final top surface that is no higher than -22 feet MLLW (as discussed previously)

A geometric analysis of a trapezoidal-shaped CAD facility with a base footprint of 435 feet by 435 feet, 2.5H:1V side slopes, and a base elevation of up to -46 feet MLLW will have about 222,400 cy of capacity below an elevation -22 feet MLLW. At the top of the CAD facility (-15 feet MLLW), the footprint is 590 feet by 590 feet. This footprint fits between Lido Isle, Bay Island, and Harbor Island, and it is well offset (more than 200 feet) from adjacent waterside facilities and seawalls.

It is expected that maintenance dredging within the Bay Island Area would take place prior to the CAD facility dredging. If the design depth of -15 feet MLLW plus 2 feet of overdredge is achieved during this phase of the maintenance dredging, the total dredging of the CAD facility itself (-17 feet MLLW down to a bottom elevation of -45 feet MLLW, plus 1 foot of overdredge allowance) would equate to approximately 282,400 cy.[1] If no dredging takes place within the Bay Island Area, the total dredging of the CAD facility itself from the existing mudline of approximately -13 feet MLLW to -45 feet MLLW, plus 1 foot of overdredge allowance, equates to approximately 340,700 cy based off the conditional survey conducted by the USACE in June 2018.

Additional details on the Federal Channels dredging and CAD facility design will be included in the construction drawings and technical specifications.

[1] For this stage of the design, maintenance dredging in Bay Island Area is expected to dredge to the full 2 foot overdredge allowance (-17 feet MLLW). If the contractor only dredges to the design depth (-15 feet MLLW), an additional 25,000 cy of dredging would be required.

7 Short-Term Water Quality Impacts from Construction

Short-Term Fate (STFATE) model scenarios were developed, executed, and evaluated to estimate the potential for sediment drift and loss of material during fill operations at the proposed CAD facility in Lower Newport Bay. The model includes the ability to evaluate potential water quality impacts relative to applicable water quality standards (e.g., California Toxics Rule saltwater continuous concentration). Results from five distinct scenarios were evaluated to estimate depositional patterns within the CAD facility during various tidal currents and the potential for water quality exceedances. The five scenarios evaluated are as follows:

1. The first scenario represented the layer of material consisting of sediment from areas determined unsuitable for open ocean disposal within the Federal Channels.
2. The second scenario represented the layer of material consisting of sediment from areas identified for use as either an interim containment layer or final cap layer from the Federal Channels program.
3. The third scenario represented the layer of material consisting of sediment determined unsuitable for open ocean disposal within the boundaries of the RGP 54 Plan Area.
4. The fourth scenario represented sediment from the Federal Channels identified as an alternative source for an interim containment layer or final cap layer (sediments associated with the Entrance Channel).
5. The fifth scenario represented material consisting of sediment from within Main Channel North 1 that was determined unsuitable for open ocean disposal and contained the greatest amount of fine-grained materials.

Key findings from these model simulations are as follows:

- There are no restrictions of placement events during neap tides (i.e., first and third quarters of the moon).
- During spring tides, best management practices should be implemented to limit placement events during non-peak tidal current velocities (i.e., plus or minus 2 hours from slack tide; Figure G-3 in Appendix G) to limit the horizontal distribution of fill material.
  - Disposal events occurring during non-peak ebbing tides result in 10% to 21% of material lost outside the proposed CAD facility.
    - Most of the material lost outside the proposed CAD facility would deposit within 75 feet (one model grid cell)
    - The greatest amount of material lost outside the proposed CAD facility occurred during ebbing tides when placement of material suitable for use as an interim cover containment layer or final cap layer (Scenarios 2 and 4) was occurring. Because this material would be sequenced after placement of unsuitable material, any material from Scenarios 2 and 4 deposited beyond the boundaries of the

proposed CAD facility would act as thin layer cover over any unsuitable material that may have been "lost" from the proposed CAD facility.

  - Disposal events occurring during non-peak flooding tides result in 6% to 9% of material to be lost outside the proposed CAD facility.
- The maximum observed thicknesses of deposited material ranged from 1.3 to 2.3 feet within the model grid cell directly associated with the placement location. Deposit thicknesses rapidly decreased in adjacent model grid cells (within 75 feet).
- The water quality standards for dissolved copper, dissolved mercury, and total PCBs were not violated.
- The water quality standard for total DDx was exceeded during the modeled disposal events for all material types. However, predicted water quality concentrations after 4 hours of material placement from Scenarios 1, 2, 3, and 4 were equal to the existing background water quality concentration (0.00130 micrograms per liter [µg/L]), and predicted water quality concentrations after 4 hours of material placement from Scenario 5 were only 0.0003 µg/L greater than background.
  - Predicted water column concentrations for total DDx do not exceed the Lower Newport Bay organochlorine compounds Total Maximum Daily Load (TMDL) acute water quality targets; however, they do exceed the TMDL's chronic water quality targets.
  - The removal, placement, and containment of DDx-contaminated Lower Newport Bay sediments at the proposed CAD facility provide a greater benefit than any short-term water quality impacts.
- Water quality monitoring following placement of materials from Scenarios 1 through 4 (listed above) may have limited practicality because predicted total DDx concentrations are similar to typical method detection limits currently achieved by regional analytical laboratories. Predicted total DDx concentrations following placement of materials from Scenario 5 (listed above) were greater than typical method detection limits. Strategies to minimize the volume of material from Scenario 5, such as mixing with material from other dredge units, should be used to minimize water quality impairments.

The full assessment and associated results and discussion are provided as Appendix G.

8 Permitting Strategy

Dredging of the USACE Federal Channels and CAD facility are subject to CEQA and NEPA review. The City is acting as the lead CEQA agency, and the USACE is acting as the lead NEPA agency. The process of obtaining project approvals and permits is complex, and the information presented in this section is intended only as a general summary of the permitting process for the project.

The first step of the City's CEQA process and the USACE NEPA process was to develop appropriate CEQA and NEPA documentation for the project.

The USACE is responsible for NEPA compliance for the Federal Channels maintenance dredging component of the overall project and is preparing a supplement to their existing Environmental Assessment. As the lead federal agency, and as part of the Federal Channels maintenance dredging, the USACE has assumed responsibility for coordinating with resource agencies such as the National Marine Fisheries Service and California Department of Fish and Wildlife and ensuring compliance with requirements of statutes such as the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Enhancement Act. In addition, the USACE assumed the lead role in addressing cultural and historic resource issues, including requirements of Section 106 of the National Historic Properties Act. The USACE will also be obtaining a federal consistency determination from the California Coastal Commission, which satisfies requirements of the Coastal Zone Management Act and Clean Water Act (Section 401) water quality certification from the Santa Ana Regional Water Quality Control Board.

Identification, design, permitting, and construction of an alternate disposal location is the responsibility of the City of Newport Beach as the local sponsor. In November 2019, the City released a Notice of Preparation and Initial Study, which initiated preparation of an Environmental Impact Report (EIR) under CEQA. The EIR will address construction of the CAD facility, dredging of unsuitable material and placement in the CAD facility, dredging of suitable material from within the Federal Channels to support the interim cover containment layer and final cap layer, and dredging of additional material from outside the Federal Channels. Following completion of the EIR public notice, the City will submit permit applications to the following agencies:

- **Coastal Development Permit:** The California Coastal Commission is the agency responsible for this permit.
- **Standard Individual Permit:** USACE will be the Lead Agency for the Rivers and Harbors Act Section 10 and Clean Water Act Section 404 permits as well as associated consultations for Endangered Species Act and Essential Fish Habitat. Additionally, pursuant to 33 United States Code 408 (Section 14 of the Rivers and Harbors Act of 1899, as amended) review under Section 408 will be required approval of any proposed activity that might interfere with, injure, or impair the use of a river or harbor improvement project. This approach furthers the

USACE's interest, expressed throughout the Rivers and Harbors Act of 1899, in protecting the navigability of United States waters by prohibiting the use or alteration of navigation or flood control works where contrary to the public interest or where it would impair those works' usefulness.

- **Clean Water Act Section 401 Water Quality Certification**: A Clean Water Act Section 401 Water Quality Certification will be required by the Santa Ana Regional Water Quality Control Board.
- **Surface Lease Agreement**: A Surface Lease Agreement may be required from the California State Lands Commission.

This permitting strategy has been coordinated extensively with the USACE in addition to the various regulatory agencies; however, pending additional public feedback during the CEQA EIR process and through subsequent coordination with the regulatory agencies, this permit strategy may be updated and revised.

9 Construction Sequencing and Anticipated Schedule

Section 9 describes the recommended construction sequencing for the Federal Channels maintenance dredging and CAD facility construction. The production rates, durations, and construction sequence reflected in Section 9 are based on professional judgment, similar project experience, and knowledge of the existing conditions in Lower Newport Bay.

9.1 Recommended Project Sequence

It is expected that the maintenance dredging portion of the project would be accomplished under a USACE contract and take place as several discrete dredging, disposal, and sediment placement events. The City would be responsible for the dredging of the CAD facility and all ancillary costs associated with the CAD facility dredging (e.g., surveys and water quality monitoring). These two projects (though independent) would require close coordination and planning during construction. It is anticipated that the CAD facility would be included in the final design for the Federal Channels project to accommodate the unsuitable sediment in Main Channel North 1, Main Channel North 2, the Turning Basin, and Newport Channel 1. Newport Channel 3 was selected for the interim cover containment layer and final cap layer due to its chemical composition and proximity to the proposed CAD facility location.[2]

The following list provides the recommended sequence of events to accomplish the goals of both projects (Sections 9.3 through 9.8 detail the processes for accomplishing each step):

- **Phase 1 (Section 9.3):** Entrance Channel Dredging and Placement in Nearshore Placement Area
- **Phase 2 (Section 9.4):** Lower Newport Bay Federal Channels Dredging (Suitable for Open Ocean Disposal) and Placement at LA-3
- **Phase 3 (Section 9.5):** CAD Facility Dredging and Placement at Nearshore Placement Area or LA-3
- **Phase 4 (Section 9.6):** Federal Channels Dredging (Unsuitable for Open Ocean Disposal) and Placement at CAD facility
- **Phase 5 (Section 9.7):** Newport Channel 3 Dredging and Placement in CAD Facility for Interim Cover Containment Layer
- **Phase 6 (Section 9.8):** Dredging Outside the Federal Channels and Placement in CAD Facility (To Be Conducted After Completion of Federal Channels)
- **Phase 7 (Section 9.9):** Newport Channel 3 Dredging and Placement in CAD Facility for Final Cap Layer (To Be Conducted After Completion of Federal Channels)

[2] If the City identifies additional sources for the final cap layer, material will require testing and confirmation that the sourced material meets the performance criteria of sediments tested and modelled as part of this Draft BODR.

9.2 Debris Removal

No debris within the Federal Channels were identified during the conditional survey conducted by the USACE in 2018. If debris is encountered during any elements of the dredging process, debris would be removed mechanically and placed onto a flat deck barge for appropriate disposal. Remnant timber piles would be required to be removed in their entirety, to the extent feasible. Debris would be transported to an on-site offloading location (e.g., at the end of the Rhine Channel) and placed into trucks for final transport and disposal at an approved disposal site.

9.3 Entrance Channel Dredging and Placement at Nearshore Placement Area

Approximately 70,900 cy of sediment will be dredged from the Entrance Channel in 2020 as part of the Federal Channels maintenance dredging project. The dredged sediments will be disposed of at an approved nearshore placement area. The volume estimates are based on a dredging template that includes dredging from the existing mudline to an authorized depth of -20 feet MLLW (plus 2 feet of overdredge allowance). The design slopes of the Entrance Channel are set at 3H:1V to minimize sloughing of material.

In addition to the Entrance Channel dredging, it is expected that the USACE will repair rock revetment along the jetties of the Entrance Channel during this phase of the project. However, it is outside the scope of this design and therefore not included in the Draft BODR.

9.3.1 Equipment

Maintenance dredging projects typically use mechanical dredges (crane utilizing a clamshell) to conduct dredging. Dredged sediments are placed into a bottom-dump barge, then the barge is transported to the nearshore placement area where the sediment is dumped within a predefined location.

9.3.2 Anticipated Production Rate

The dredging production rate (i.e., the volume of dredged materials removed per hour) for a crane utilizing a clamshell bucket was estimated for purposes of developing a schedule for Entrance Channel dredging. Factors that impact dredging productivity vary with equipment, site characteristics, and weather conditions. Production rates may be higher in some areas of the site and lower in others, depending on sediment type, water depths, and the presence of debris. In addition, production rates may also be impacted by turbidity control requirements stipulated in the permits.

The following assumptions were made to estimate the dredge production rate:

- Size of clamshell bucket is 15 to 18 cy

- Cycle time (i.e., the time to close the bucket with dredged material, pull it out of the water, place the dredged sediment into the barge/offloading area, and return the bucket to the water for the next dredge cut) equals 60 seconds per cycle
- Uptime (i.e., the time that the dredge is working, excluding routine maintenance, unexpected maintenance, dredge positioning, encountering unexpected debris, and the need to periodically switch out the barges used to transport dredged material) equals 70%
- Bucket load equals 60% in situ sediment and 40% water by volume

The assumptions in the aforementioned bullet list are based on engineering judgment, familiarity with harbor conditions, and discussions with dredging contractors. It is further assumed that dredging operations would be conducted 6 days per week for 10 hours a day, yielding a production rate of approximately 5,000 cy per day. This results in a total estimated dredging duration of approximately 15 days for the project for a total removal volume of 70,900 cy. The project schedule for dredging depends on the additional time required for mobilization and demobilization (including installation and removal of the turbidity barrier system, if required) and the number of dredges used, among other factors.

9.3.3 Dredging Limits

The dredging limits are defined by the target dredging surface and the horizontal limits of removal. Dredging limits, which define the volume and current disposition of sediment that must be removed, are defined by the Federal Channels limits. The development of the target dredging surface involves identifying the surface of the native sediment underlying the sediment to be dredged and specifying a cut back slope around the perimeter to minimize sloughing of materials into the dredging area. The horizontal dredging limit for the footprint was defined by the Federal Channels plus any additional extent resulting from side slopes. The design slopes of the Federal Channels dredging are set at 3H:1V to minimize sloughing of material. The vertical dredging limit was limited to an elevation of -20 feet MLLW (plus 2 feet of overdredge allowance).

9.4 Lower Newport Bay Federal Channels Dredging (Suitable for Open Ocean Disposal) and Placement at LA-3

Prior to dredging the CAD facility, it is expected that additional areas with sediment suitable for open ocean disposal (including Main Channel North 1 through 5, Bay Island Area, and Newport Channel 2) will be dredged and disposed at LA-3. Based on bathymetric data collected by the USACE in June 2018, approximately 784,000 cy of suitable sediment will be dredged from these locations as part of Federal Channels maintenance dredging. The dredged sediments will be disposed at an open ocean disposal site (LA-3). The volume estimates are based on a dredging template that includes dredging from the existing mudline to an authorized depth between -15 feet MLLW and -20 feet

MLLW (plus 2 feet of overdredge allowance). The design slopes are set at 3H:1V to minimize sloughing of material.

9.4.1 Equipment

Dredging mechanically using a crane (or other suitable equipment) mounted on a flatdeck barge has been selected as the preferred dredging method based on an evaluation of Federal Channels conditions. The mechanical dredge will be equipped with a clamshell bucket or equivalent for soft material. The specific make and model of the bucket to be employed (to be determined by the selected contractor) will be based on the sediment types present and the dredging requirements. However, due consideration will be given to the ability of the selected bucket and associated equipment to keep turbidity generation to within acceptable limits given the expected turbidity monitoring requirements at the Federal Channels and sediment characteristics.

Dredged sediment removed from the water will be placed into a split-hull material barge. Once filled, the split-hull material barge will transport the dredged sediment to LA-3 for disposal using a tender for power and maneuvering.

9.4.2 Anticipated Production Rate

The dredging production rate is assumed to be approximately 5,000 cy per day (i.e., the production rate used in Section 9.3.2 for clamshell dredging). This results in a total estimated dredging duration of approximately 157 days for the project with a total removal volume of 784,000 cy. The project schedule for dredging depends on the additional time required for mobilization and demobilization (including installation and removal of the turbidity barrier system) and the number of dredges used, among other factors.

9.4.3 Dredging Limits

The horizontal dredging limits for sediment suitable for open ocean disposal within Main Channel North 1 through 5, Bay Island Area, and Newport Channel 2 are defined by the Federal Channels and public and private marinas and jetties. The vertical dredging is set to an elevation between -15 feet MLLW and -20 feet MLLW with an overdredge allowance of 2 feet. The slopes are set at 3H:1V to minimize sloughing of material. The total dredging volume of Federal Channels sediment that is suitable for open ocean or nearshore placement is listed in Table 2-2.

9.5 CAD Facility Dredging and Placement at Nearshore Placement Area or LA-3

Based on bathymetric data collected by the USACE in June 2018, approximately 282,400 cy of sediment will require removal and disposal. Bay deposits will be transported to LA-3 for open ocean disposal and sand material (greater than 80%) will be transported to a predetermined nearshore

placement area along Newport Beach. The selection of design dimensions and volume capacity of the CAD facility is discussed in detail in Section 6.4.2.

9.5.1 Equipment

The contractor that will be selected to dredge in the previous section will likely be the same contractor that conducts the CAD facility dredging. Therefore, it is expected this dredging will occur with a mechanical dredge equipped with a clamshell bucket and split-hull barge for placement at an approved nearshore placement area or LA-3.

According to the sediment samples collected within the CAD facility footprint, silty material may be present to approximately -18 feet MLLW, which may require disposal at LA-3 pending sediment testing. Most of the sediment within the CAD facility footprint is expected to be sand and acceptable for placement at an approved nearshore placement area. In situ testing and monitoring of the dredge sediment will be required for confirmation of suitability for beach placement and will be included in the technical specifications.

9.5.2 Anticipated Production Rate

The dredging production rate is assumed to be approximately 5,000 cy or more per day (i.e., the production rate used in Section 9.3.2 for clamshell dredging). This results in a total estimated dredging duration of approximately 57 days for the project with a total removal volume of 282,400 cy. The total project schedule for dredging depends on the additional time required for mobilization and demobilization (including installation and removal of the turbidity barrier system, if required), and the number of dredges used, among other factors.

9.5.3 Dredging Limits

The dredging limits for the CAD facility are defined by the target dredging surface and the horizontal limits of removal. Dredging limits were determined by the following (see Section 6.4):

- The capacity necessary to contain dredged sediment from the Federal Channels that is unsuitable for open ocean disposal
- Additional sediment from Lower Newport Bay that is unsuitable for open ocean disposal
- An appropriate interim cover containment layer
- A final cap layer

The horizontal dredging limit for the CAD facility is designed to be within the boundary of the Bay Island Area and the dredge footprint of the Federal Channels. The vertical dredging limit is an elevation of -46 feet MLLW (includes 1 foot of allowable overdredge) to stay well above the principal aquifer in Newport Beach. The design slopes of the CAD facility dredging are set at 2.5H:1V to minimize sloughing of material while reducing the overall footprint of the CAD facility.

9.6 Federal Channels Dredging (Unsuitable for Open Ocean Disposal) and Placement at CAD Facility

Approximately 117,600 cy of sediment unsuitable for open ocean disposal (includes 10% contingency) will be removed from the Turning Basin, Main Channel North 1, Main Channel North 2, and Newport Channel 1. Volume estimates for select areas within Main Channel North 1 and North 2 that were determined unsuitable for open ocean disposal are based on a dredging template that includes dredging to the authorized depth of -20 feet MLLW with a 2 foot overdredge allowance. The Turning Basin volume estimates are based on a dredging template that includes an authorized depth of -19 feet MLLW with a 2 foot overdredge allowance. Newport Channel 1 volume estimates are based on a dredging template that includes an authorized depth of -15 feet MLLW with a 2 foot overdredge allowance.

9.6.1 Equipment

It is likely that the contractor selected to conduct maintenance and CAD facility dredging would also dredge the Federal Channels. Therefore, it is expected this dredging will occur with a mechanical dredge equipped a clamshell bucket and bottom-dump barge for placement within the CAD facility.

9.6.2 Anticipated Production Rate

The dredging production rate is assumed to be approximately 5,000 cy per day (i.e., the production rate used in Section 9.3.2 for clamshell dredging). This results in a total estimated dredging duration of approximately 24 days for the project with a total removal volume of 117,600 cy. The total project schedule for dredging depends on the additional time required for mobilization and demobilization (including installation and removal of the turbidity barrier system, if required) and the number of dredges used, among other factors.

9.6.3 Dredging Limits

The horizontal dredging limits for sediment unsuitable for open ocean disposal within Main Channel North 1 through 5, Turning Basin, and Newport Channel 1 are defined by the Federal Channels plus any additional extent resulting from side slopes. The vertical dredging limit was limited to an elevation of -15 feet MLLW and -20 feet MLLW with an overdredge allowance of 2 feet. The slopes are set at 3H:1V to minimize sloughing of material.

9.6.4 Dredging Volumes

Based on bathymetric data collected by the USACE in 2018 at Main Channel North1, Main Channel North 2, Turning Basin, and the Newport Channel 1 (Appendix A) and recent sampling performed by Anchor QEA (Appendix B), it is estimated that approximately 106,900 cy of dredged sediment will be removed from these locations. These volumes have been increased by 10% (117,600 cy) to provide a

more conservative capacity within this layer. Volumes for sediment unsuitable for open ocean disposal in Main Channel North 1, Main Channel North 2, Turning Basin, and the Newport Channel 1 are summarized in Table 2-2.

9.7 Newport Channel 3 Dredging and Placement at CAD Facility for Interim Cover Containment Layer

After sediments unsuitable for open ocean disposal have been removed and placed within the CAD facility, a 1-foot-thick interim cover containment layer will be placed to provide physical protection of the underlying sediments from any erosive forces imposed from vessel uses above. It is anticipated that interim cover containment layer would be sourced from the Federal Channels (e.g., Newport Channel 3) as the maintenance dredging continues. Approximately 9,900 cy of cover material will be required from the Federal Channels maintenance dredging to provide a 1-foot-thick interim cover containment layer. This could be achieved in a few days using a mechanical dredge with a clamshell bucket.

9.8 Dredging Outside Federal Channels and Placement at CAD Facility

As mentioned in Section 6.4, the CAD facility capacity was designed to accommodate additional sediment from Lower Newport Bay dredged outside of the Federal Channels and either permitted or not permitted under the City's RGP 54 program. This additional capacity has been estimated at approximately 50,000 cy. Sourcing for this sediment will be coordinated amongst the applicants, the City, and agencies but could include the following:

- Public and private marinas that do not pass chemical testing for open ocean disposal under the City's RGP 54 program
- City marinas that are not included under the RGP 54 program (Balboa Yacht Basin, Promontory Bay, etc.)

The City has agreed to develop a Sediment Management Plan for sediment that is unsuitable for open ocean disposal and outside of the Federal Channels. At this stage of the design, it is assumed that the capacity limit for sediment is 50,000 cy.

Dredging is anticipated to be conducted using smaller mechanical dredging equipment with bottom-dump barges. Contractors will be required to follow the same permit conditions as those required under the larger CAD facility dredging and disposal project to minimize impacts to water quality and ensure accurate disposal within the CAD facility footprint. The contractors will also be required to obtain approval under the City's RGP 54 program or Individual Permit process.

Due to the timing uncertainties for this component of the project, the construction schedule in Section 9.9 expects this dredging to take place 2 years after the interim cover containment layer is placed. Production and duration will vary between projects and as such are not included in the

Draft BODR. Instead, a 6-month period is expected to be included after the 2-year period has passed to allow City applicants to obtain permits for their respective projects.

9.9 Newport Channel 3 Dredging and Placement at CAD Facility for Final Clean Cap Layer

After the dredging window for public and City projects closes, the final cap layer will be placed in the CAD facility by the City to chemically isolate the underlying sediments from burrowing organisms and biota residing in the overlying water column. This clean sediment cap has been designed to a thickness of 3 feet, equating to approximately 33,600 cy of additional sediment sourced by the City. Sourcing for this capping material would be coordinated between the City and agencies prior to construction. For this stage of the design, it is expected that the final cap layer will be sourced from undredged material within Newport Channel 3. Other sources to be considered include future dredging at the Entrance Channel, sediments dredged under the City's RPG 54 program, and maintenance dredging at the Santa Ana River.[3] This final cap layer could be constructed in 1 to 2 weeks using a mechanical dredge with a clamshell bucket.

If both the interim cover containment layer and final cap layer are sourced from Newport Channel 3, approximately 35,300 cy of material will remain within Newport Channel 3 after both layers have been placed within the CAD facility. To achieve the authorized designed depth plus 2 feet of overdredge allowance, additional dredging and disposal at LA-3 would be required within Newport Channel 3.

9.10 Construction Schedule

A draft construction schedule is presented in Figure 9-1. This schedule—developed based on current design knowledge, professional judgment, and experience from other similar projects—may be modified as part of subsequent design development. CAD facility placement activities discussed in Sections 9.8 and 9.9 are estimates since the time frame for these activities would be determined after consultation with the City and agencies. As such, it is expected that these two layers would be completed as separate projects.

[3] If the City identifies additional sources for the final cap layer, material will require testing and confirmation that the sourced material meets the performance criteria of sediments tested and modelled as part of this Draft BODR.

10 Operations, Management, and Monitoring Plan

An Operations, Management, and Monitoring Plan (OMMP) has been developed to present the City's planned approach for managing the site as a disposal facility for use by the City and USACE during a single combined dredging project. The OMMP, provided as Appendix H, includes the following elements:

- Overview of the OMMP objectives, establishment of the OMMP, and the proposed CAD facility description (Sections 2 to 4)
- Discussion of the legal authority and responsibility for the City to operate a CAD facility within Lower Newport Bay (Section 3)
- Discussion of associated regulatory permits needed for creation and operation of the CAD facility (Section 5)
- Explanation of communications plan and operating requirements for site use (Section 6)
- Presentation of an environmental monitoring program (Section 7)
- Details for proposed annual reporting (Section 7)
- Discussion of contingency plans to address unexpected construction issues or long-term stability should they become a concern (Section 8)

11 References

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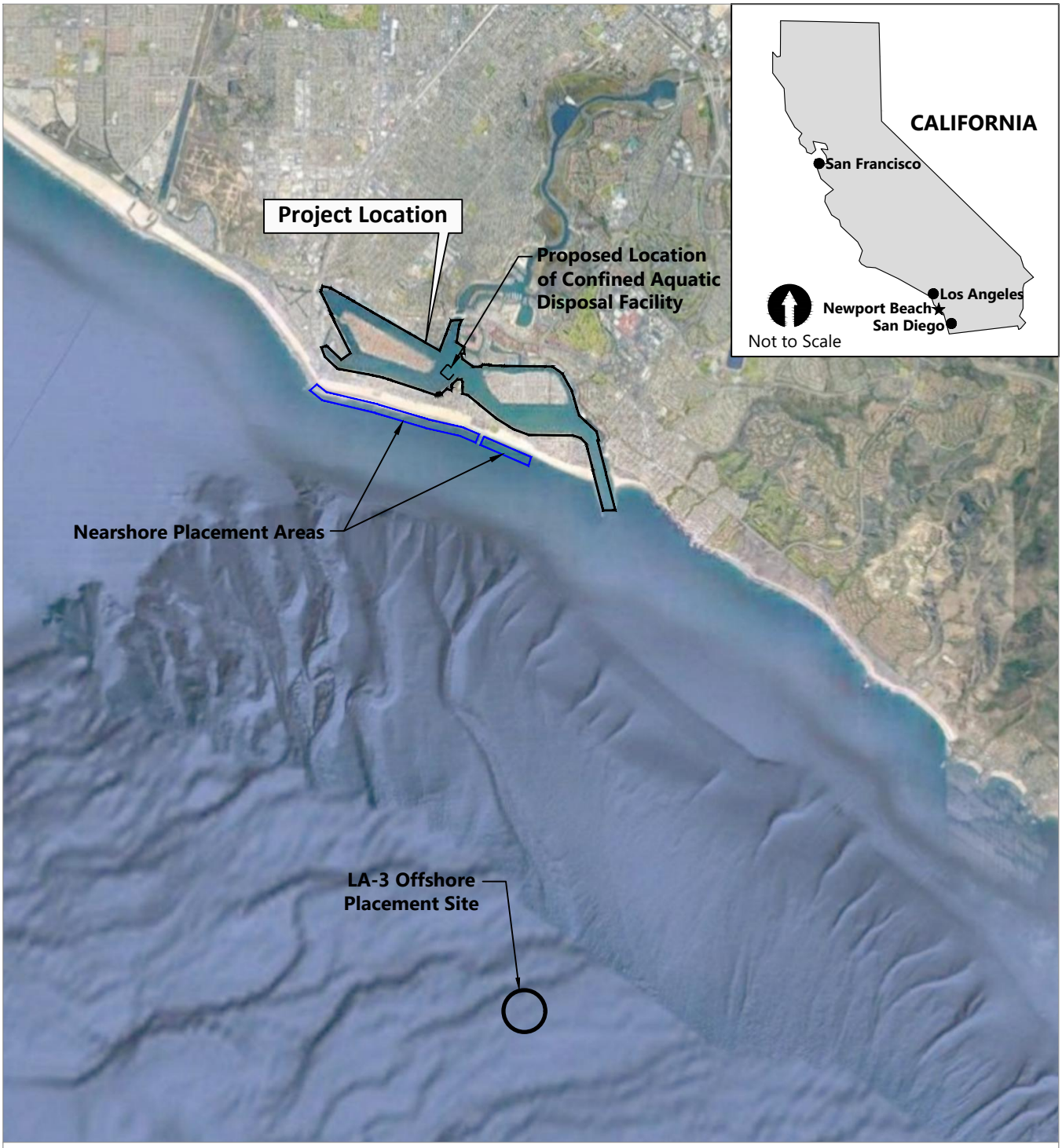
Figures

Figures



SOURCE: Image from Bing maps.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

Approximate Project Location:
33° 36.540', 117° 54.230'

0 1.5
Miles

Publish Date: 2020/04/24 12:13 PM | User: hmerrick
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-001 BODR VIC.dwg Figure 1-1

ANCHOR QEA

Figure 1-1
Vicinity Map

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal
Lower Newport Harbor Bay Federal Channels



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Authorized Federal Channel Limits and Dredge Unit Boundaries
- (-20) Authorized Depth
- —-10— Existing Bathymetry
- Dredged Material Not Suitable for Open Ocean or Nearshore Disposal
- Dredged Material Suitable for Open Ocean or Nearshore Disposal
- Proposed Confined Aquatic Disposal Facility
- Nearshore Placement Area

0 1,800
Feet

Publish Date: 2020/04/24 12:14 PM | User: hmerrick
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-018 BODR SUITABILITY.dwg Figure 1-2

ANCHOR QEA

Figure 1-2
Federal Channels Maintenance Dredging Sediment Suitability Map

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal
Lower Newport Harbor Bay Federal Channels



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Authorized Federal Channel Limits and Dredge Unit Boundaries
- -20 Authorized Depth
- Areas requiring dredging, based on June 2018 bathymetric survey
- -10 Existing Bathymetry

0 1,400
Feet

Publish Date: 2020/04/24 12:14 PM | User: hmerrick
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-014 BODR DREDGE UNITS.dwg FIG 2-1

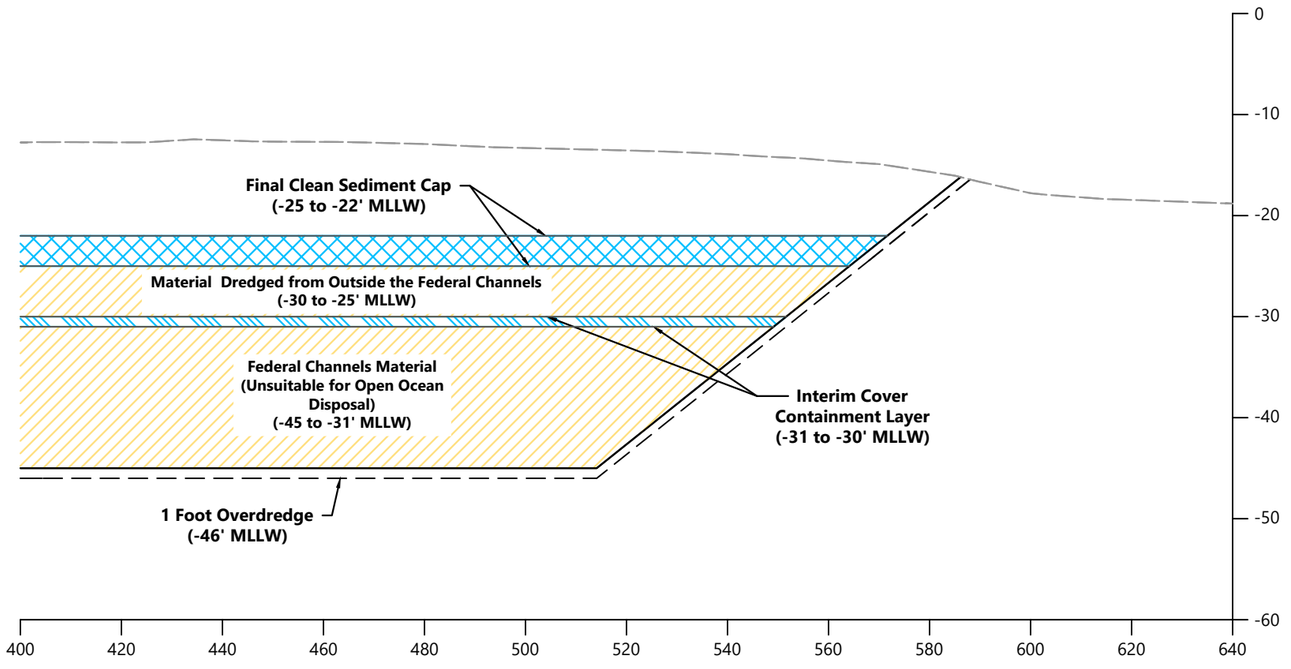
ANCHOR QEA

Figure 2-1
Overview of Authorized Design Depths, Dredge Units, and Bathymetry
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal
Lower Newport Harbor Bay Federal Channels

SOURCE: Ariel from Bing Maps, 2018.
HORIZONTAL DATUM: California State Plane, Zone 6, North American Datum of 1983 (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Required Dredge Elevation
- Allowable Overdepth Elevation
- Existing Mudline



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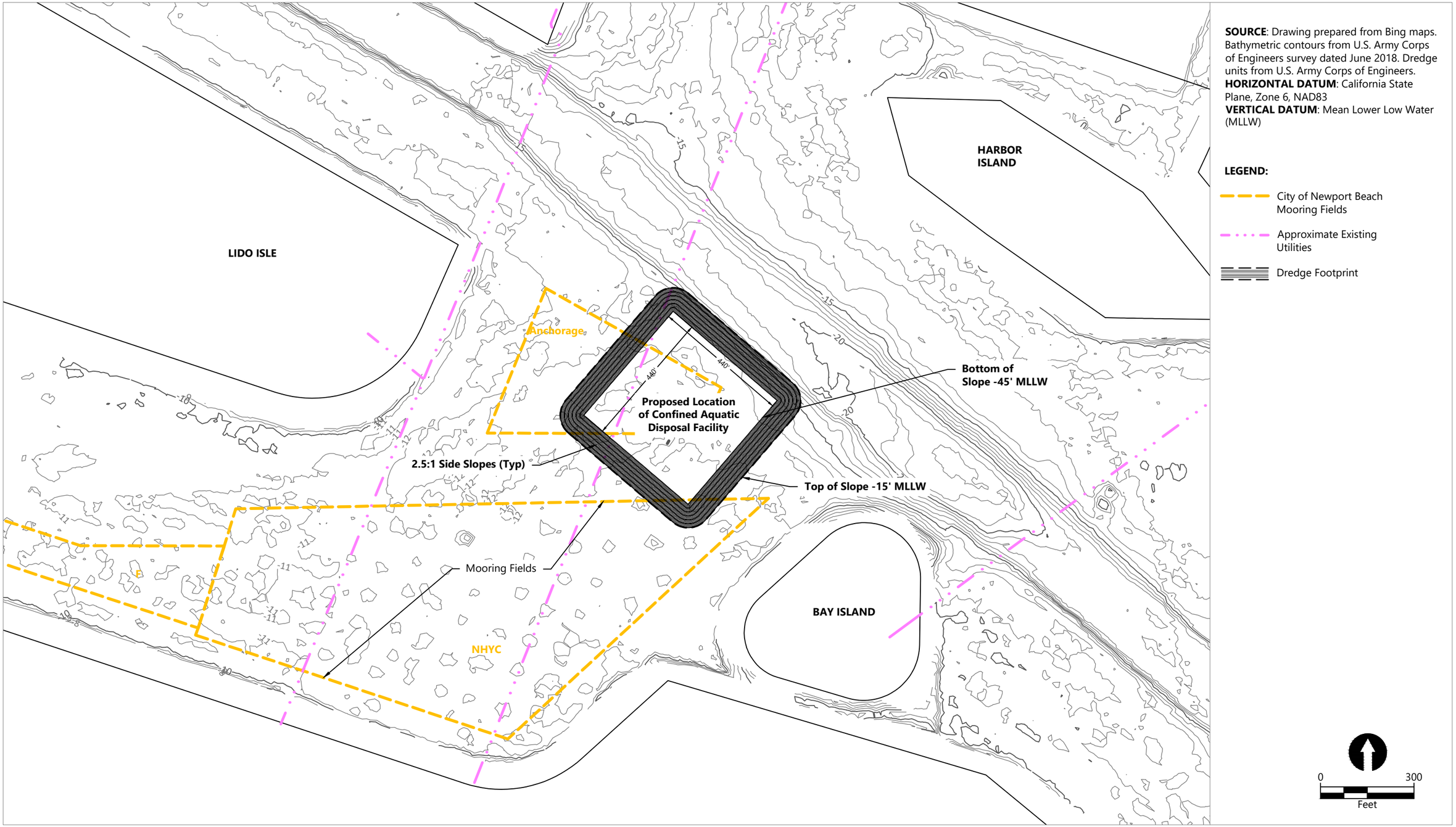
Publish Date: 2020/04/24 12:14 PM | User: hmerrick
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-016 BODR CAD SEC.dwg Figure 4-1

ANCHOR QEA

Figure 4-1
Cross Section of CAD Facility

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal
Lower Newport Harbor Bay Federal Channels



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2018. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- City of Newport Beach Mooring Fields
- Approximate Existing Utilities
- Dredge Footprint

Publish Date: 2020/04/24 2:12 PM | User: hmerrick
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-017 BODR BAY ISLAND CAD.dwg Figure 4-2

ANCHOR QEA

Figure 4-2
Plan View of CAD Facility

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal
Lower Newport Harbor Bay Federal Channels



SOURCE: Drawing prepared from Bing maps.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- ⊙-# Subsurface Sediment Sampling (Anchor QEA 2019)
- ⊙-# Geotechnical Borings (DYA 2007)
- Proposed Confined Aquatic Disposal Facility

0 300
Feet

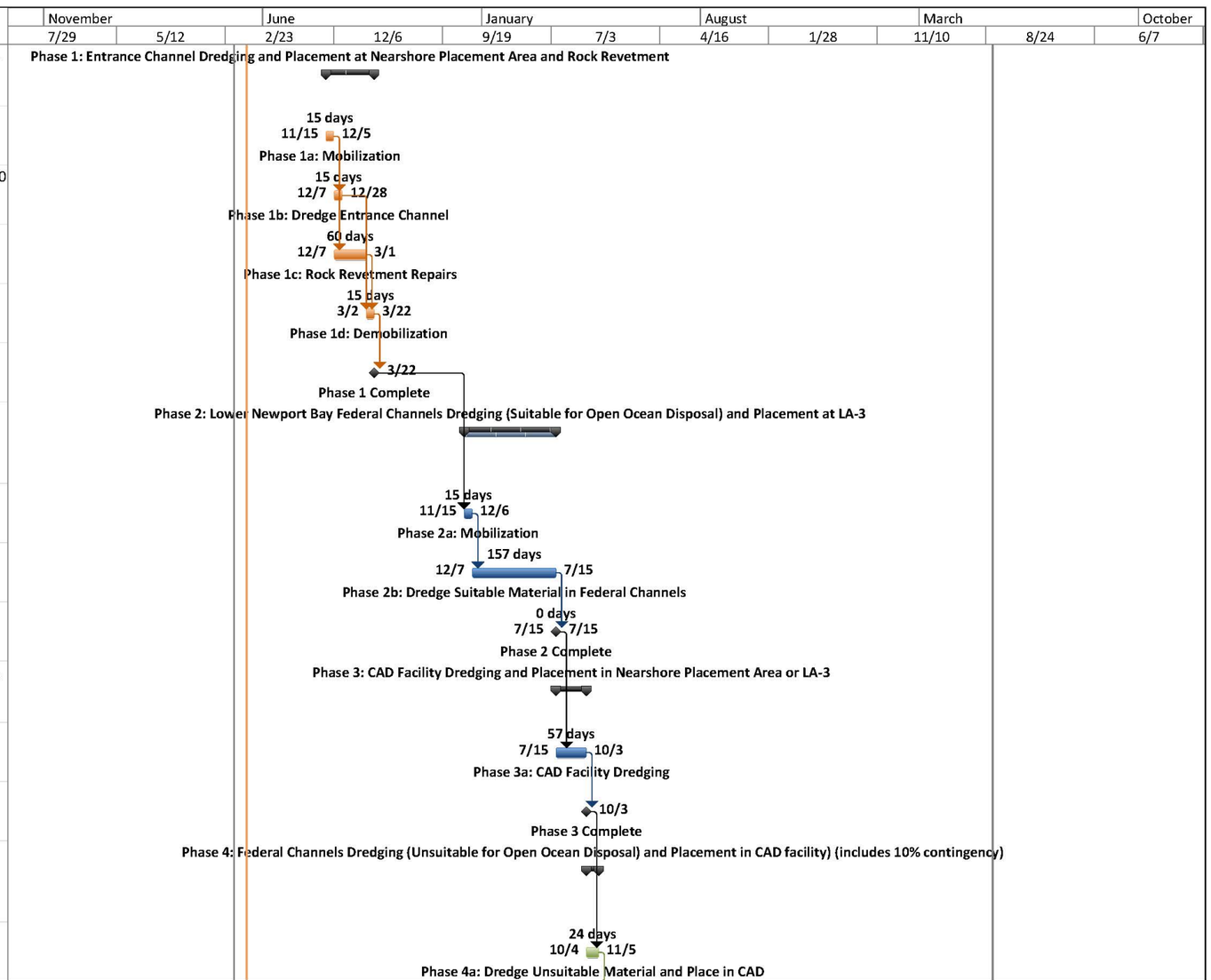
Publish Date: 2020/04/24 12:15 PM | User: hmerrick
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-021 BODR BAY ISLAND.dwg Figure 6-1

ANCHOR QEA

Figure 6-1
Subsurface Sediment and Geotechnical Sampling

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal
Lower Newport Harbor Bay Federal Channels

ID	Task Name	Duration	Start	Finish
1	**Phase 1: Entrance Channel Dredging and Placement at Nearshore Placement Area and Rock Revetment**	**89.2 days**	**Sun 11/15/20**	**Mon 3/22/21**
2	Phase 1a: Mobilization	15 days	Sun 11/15/20	Sat 12/5/20
3	Phase 1b: Dredge Entrance Channel	15 days	Mon 12/7/20	Mon 12/28/20
4	Phase 1c: Rock Revetment Repairs	60 days	Mon 12/7/20	Mon 3/1/21
5	Phase 1d: Demobilization	15 days	Tue 3/2/21	Mon 3/22/21
6	Phase 1 Complete	0 days	Mon 3/22/21	Mon 3/22/21
7	**Phase 2: Lower Newport Bay Federal Channels Dredging (Suitable for Open Ocean Disposal) and Placement at LA-3**	**171.8 days**	**Mon 11/15/21**	**Fri 7/15/22**
8	Phase 2a: Mobilization	15 days	Mon 11/15/21	Mon 12/6/21
9	Phase 2b: Dredge Suitable Material in Federal Channels	157 days	Tue 12/7/21	Fri 7/15/22
10	Phase 2 Complete	0 days	Fri 7/15/22	Fri 7/15/22
11	**Phase 3: CAD Facility Dredging and Placement in Nearshore Placement Area or LA-3**	**57 days**	**Fri 7/15/22**	**Mon 10/3/22**
12	Phase 3a: CAD Facility Dredging	57 days	Fri 7/15/22	Mon 10/3/22
13	Phase 3 Complete	0 days	Mon 10/3/22	Mon 10/3/22
14	**Phase 4: Federal Channels Dredging (Unsuitable for Open Ocean Disposal) and Placement in CAD facility) (includes 10% contingency)**	**24 days**	**Tue 10/4/22**	**Sat 11/5/22**
15	Phase 4a: Dredge Unsuitable Material and Place in CAD	24 days	Tue 10/4/22	Sat 11/5/22



Project: LNB - Construction Sched
Date: Mon 4/20/20

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

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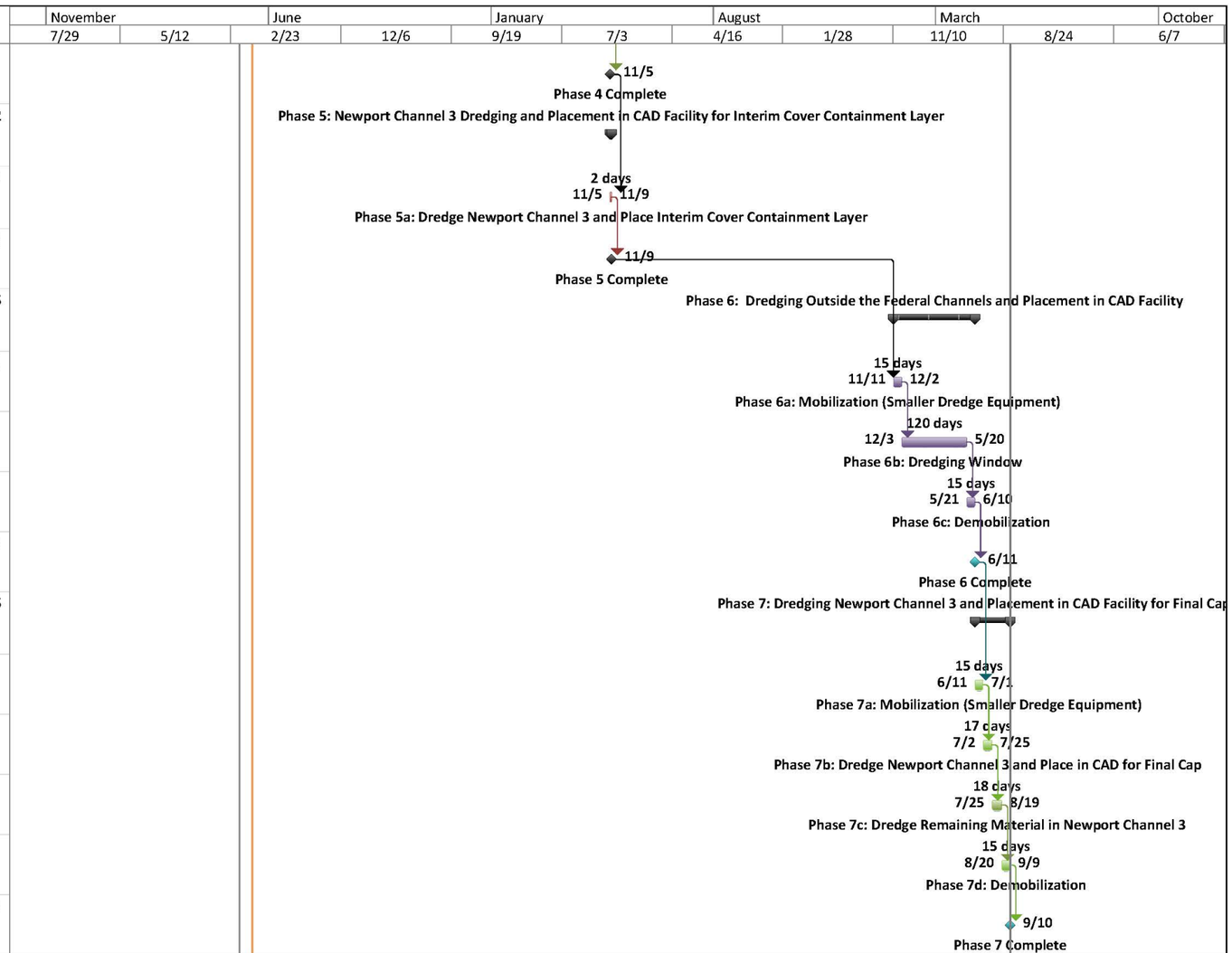
ID	Task Name	Duration	Start	Finish
16	Phase 4 Complete	0 days	Sat 11/5/22	Sat 11/5/22
17	**Phase 5: Newport Channel 3 Dredging and Placement in CAD Facility for Interim Cover Containment Layer**	**2 days**	**Sat 11/5/22**	**Wed 11/9/22**
18	Phase 5a: Dredge Newport Channel 3 and Place Interim Cover Containment Layer	2 days	Sat 11/5/22	Wed 11/9/22
19	Phase 5 Complete	0 days	Wed 11/9/22	Wed 11/9/22
20	**Phase 6: Dredging Outside the Federal Channels and Placement in CAD Facility**	**150 days**	**Mon 11/11/24**	**Wed 6/11/25**
21	Phase 6a: Mobilization (Smaller Dredge Equipment)	15 days	Mon 11/11/24	Mon 12/2/24
22	Phase 6b: Dredging Window	120 days	Tue 12/3/24	Tue 5/20/25
23	Phase 6c: Demobilization	15 days	Wed 5/21/25	Tue 6/10/25
24	Phase 6 Complete	0 days	Wed 6/11/25	Wed 6/11/25
25	**Phase 7: Dredging Newport Channel 3 and Placement in CAD Facility for Final Cap Layer**	**65 days**	**Wed 6/11/25**	**Wed 9/10/25**
26	Phase 7a: Mobilization (Smaller Dredge Equipment)	15 days	Wed 6/11/25	Tue 7/1/25
27	Phase 7b: Dredge Newport Channel 3 and Place in CAD for Final Cap	17 days	Wed 7/2/25	Fri 7/25/25
28	Phase 7c: Dredge Remaining Material in Newport Channel 3	18 days	Fri 7/25/25	Tue 8/19/25
29	Phase 7d: Demobilization	15 days	Wed 8/20/25	Tue 9/9/25
30	Phase 7 Complete	0 days	Wed 9/10/25	Wed 9/10/25



Project: LNB - Construction Sched
Date: Mon 4/20/20

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

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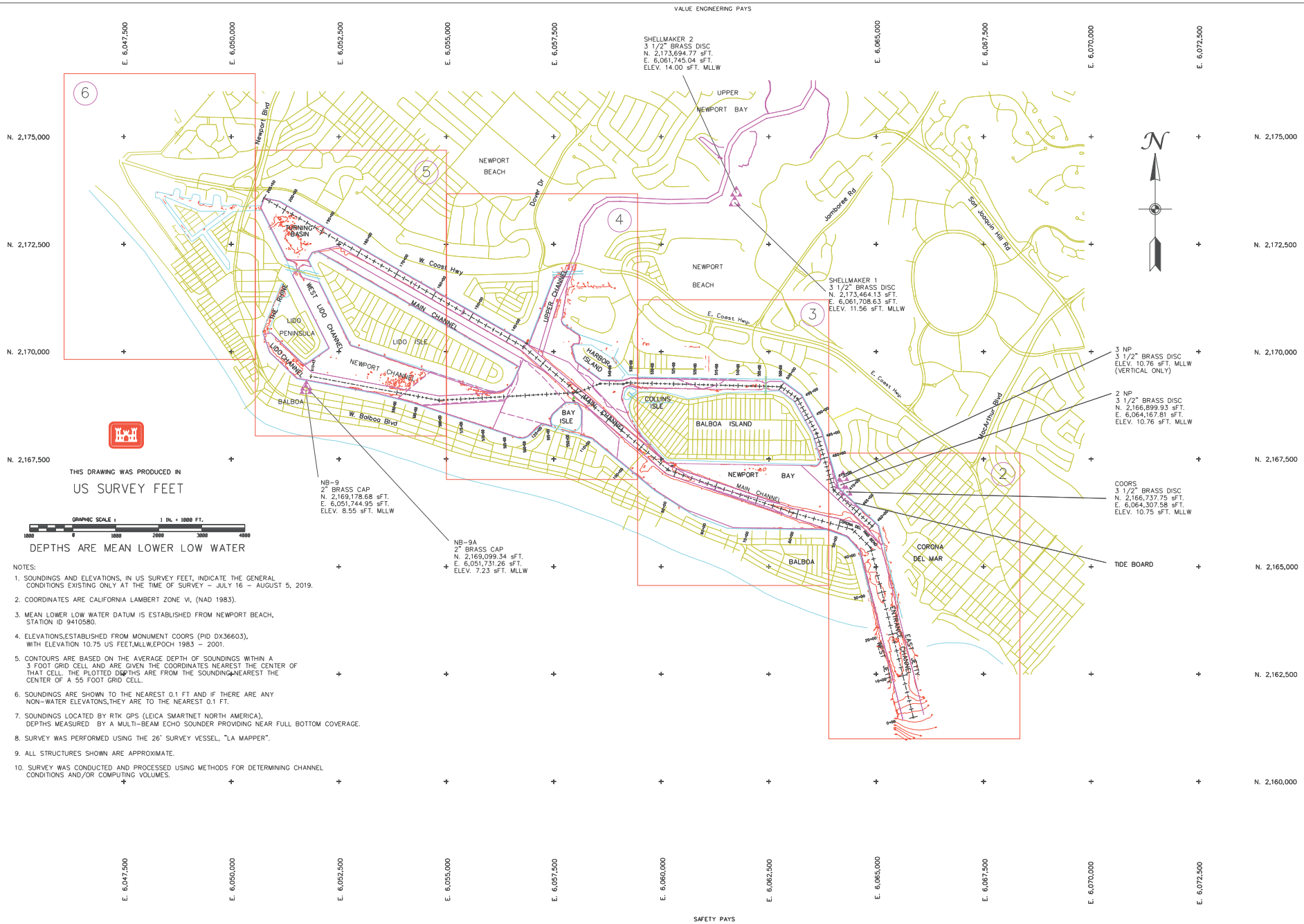
Appendix A
2019 Bathymetric Condition Survey



THIS DRAWING WAS PRODUCED IN

US SURVEY FEET

GRAPHIC SCALE : 1 IN. = 1000 FT.

1000 0 1000 2000 3000 4000

DEPTHS ARE MEAN LOWER LOW WATER

NOTES:

1. SOUNDINGS AND ELEVATIONS, IN US SURVEY FEET, INDICATE THE GENERAL CONDITIONS EXISTING ONLY AT THE TIME OF SURVEY – JULY 16 – AUGUST 5, 2019.
2. COORDINATES ARE CALIFORNIA LAMBERT ZONE VI, (NAD 1983).
3. MEAN LOWER LOW WATER DATUM IS ESTABLISHED FROM NEWPORT BEACH, STATION ID 9410580.
4. ELEVATIONS,ESTABLISHED FROM MONUMENT COORS (PID DX3660 3), WITH ELEVATION 10.75 US FEET,MLLW,EPOCH 1983 – 2001.
5. CONTOURS ARE BASED ON THE AVERAGE DEPTH OF SOUNDINGS WITHIN A 3 FOOT GRID CELL AND ARE GIVEN THE COORDINATES NEAREST THE CENTER OF THAT CELL. THE PLOTTED DEPTHS ARE FROM THE SOUNDING NEAREST THE CENTER OF A 55 FOOT GRID CELL.
6. SOUNDINGS ARE SHOWN TO THE NEAREST 0.1 FT AND IF THERE ARE ANY NON-WATER ELEVATONS,THEY ARE TO THE NEAREST 0.1 FT.
7. SOUNDINGS LOCATED BY RTK GPS (LEICA SMARTNET NORTH AMERICA), DEPTHS MEASURED BY A MULTI-BEAM ECHO SOUNDER PROVIDING NEAR FULL BOTTOM COVERAGE.
8. SURVEY WAS PERFORMED USING THE 26' SURVEY VESSEL, "LA MAPPER".
9. ALL STRUCTURES SHOWN ARE APPROXIMATE.
10. SURVEY WAS CONDUCTED AND PROCESSED USING METHODS FOR DETERMINING CHANNEL CONDITIONS AND/OR COMPUTING VOLUMES.

US ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT

SUBMITTED BY:
ALAN B. NICHOLS, P.L.S.
CHIEF, SURVEY & MAPPING SEC.

CHECKED BY:
AMICK.CAMERON.J.1261743385
CAMERON J. AMICK

DRAWN BY:
OVERMIRE.TYLER.T.1393620990
TYLER T. OVERMIRE

PLOT DATE: NOVEMBER 8, 2019
DISTRICT FILE NO.: 81
PLOT SCALE: 1 IN. = 1000 FT.

SURVEYED BY: MR. OVERMIRE, MR. SANCHEZ

DISTRICT FILE NAME: NB2019_07_cond_1.dgn

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
SURVEY & MAPPING SECTION

NAVIGATION IMPROVEMENT
ORANGE COUNTY, CALIFORNIA
HYDROGRAPHIC SURVEY

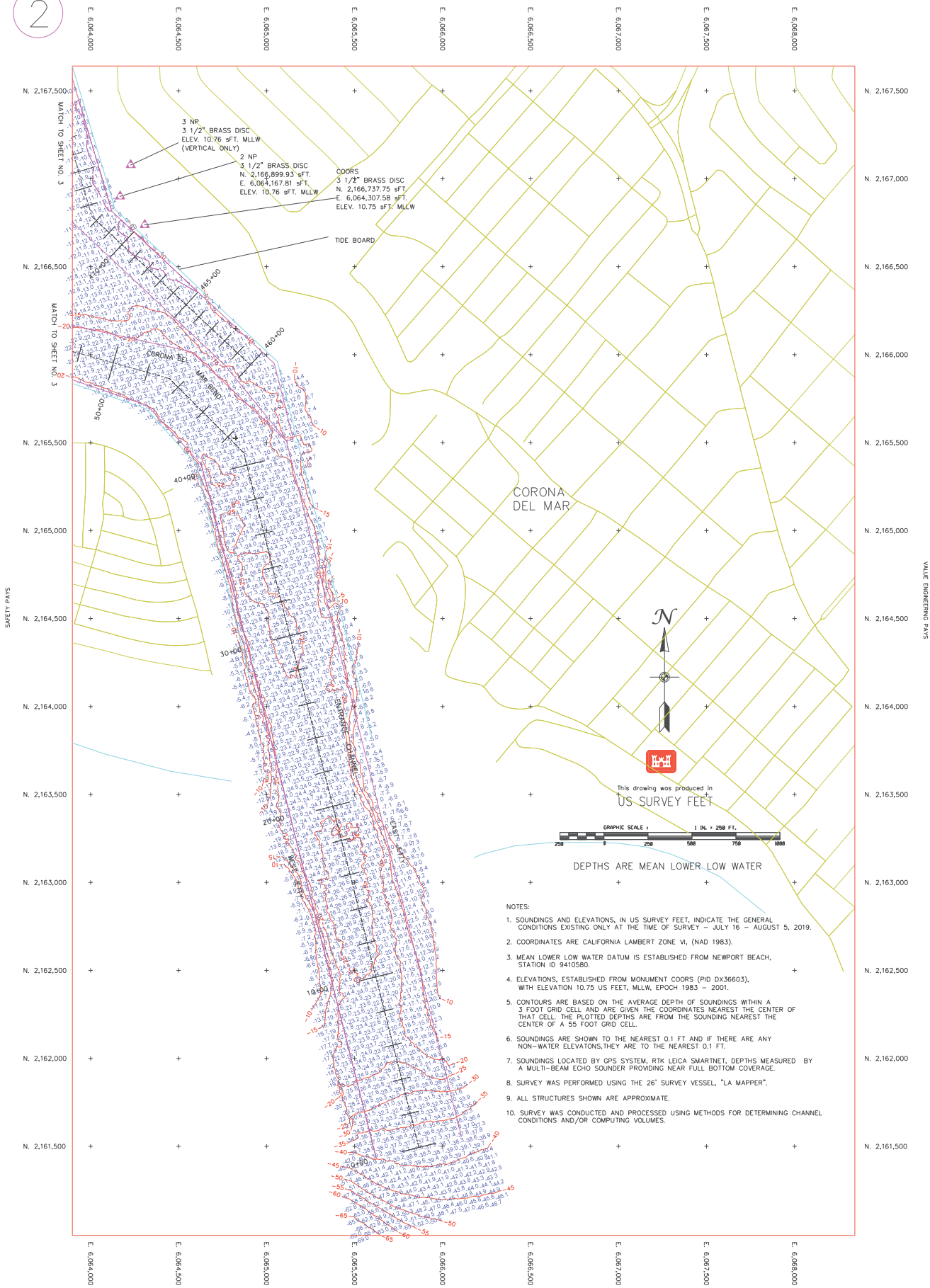
LOWER NEWPORT BAY

CONDITION SURVEY

JULY-AUGUST 2019

SHEET REFERENCE NUMBER: 1

SHEET 1 OF 6



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LOWER NEWPORT BAY
CONDITION SURVEY
JULY-AUGUST 2019

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
SURVEY & MAPPING SECTION

NAVIGATION IMPROVEMENT
ORANGE COUNTY, CALIFORNIA
HYDROGRAPHIC SURVEY

SURVEYED BY:
MR. UMUKORO
MR. OVERMIRE

PLOT DATE: NOVEMBER 8, 2019
DISTRICT FILE NO: I-814
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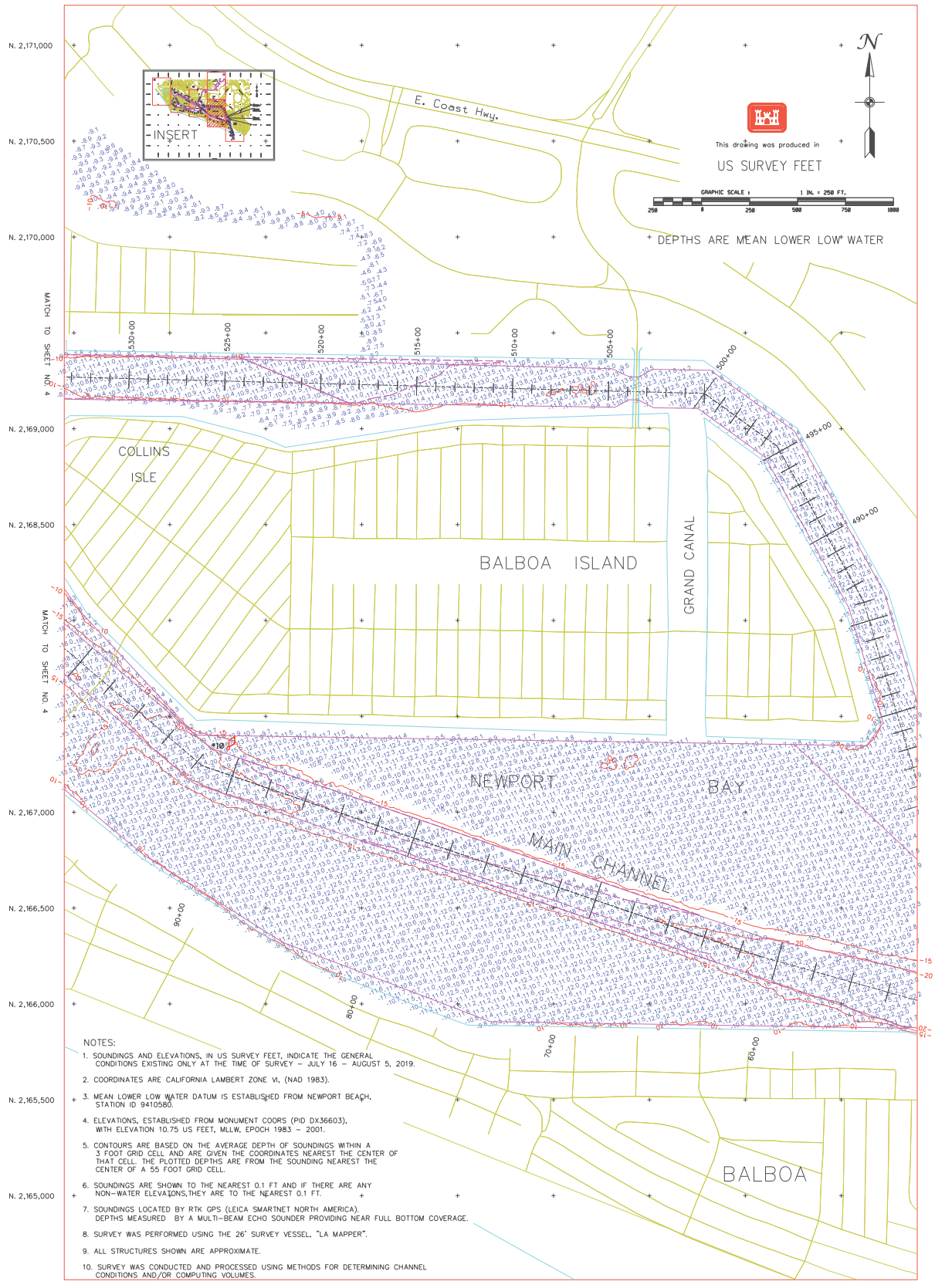

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CONDITION SURVEY
JULY-AUGUST 2019

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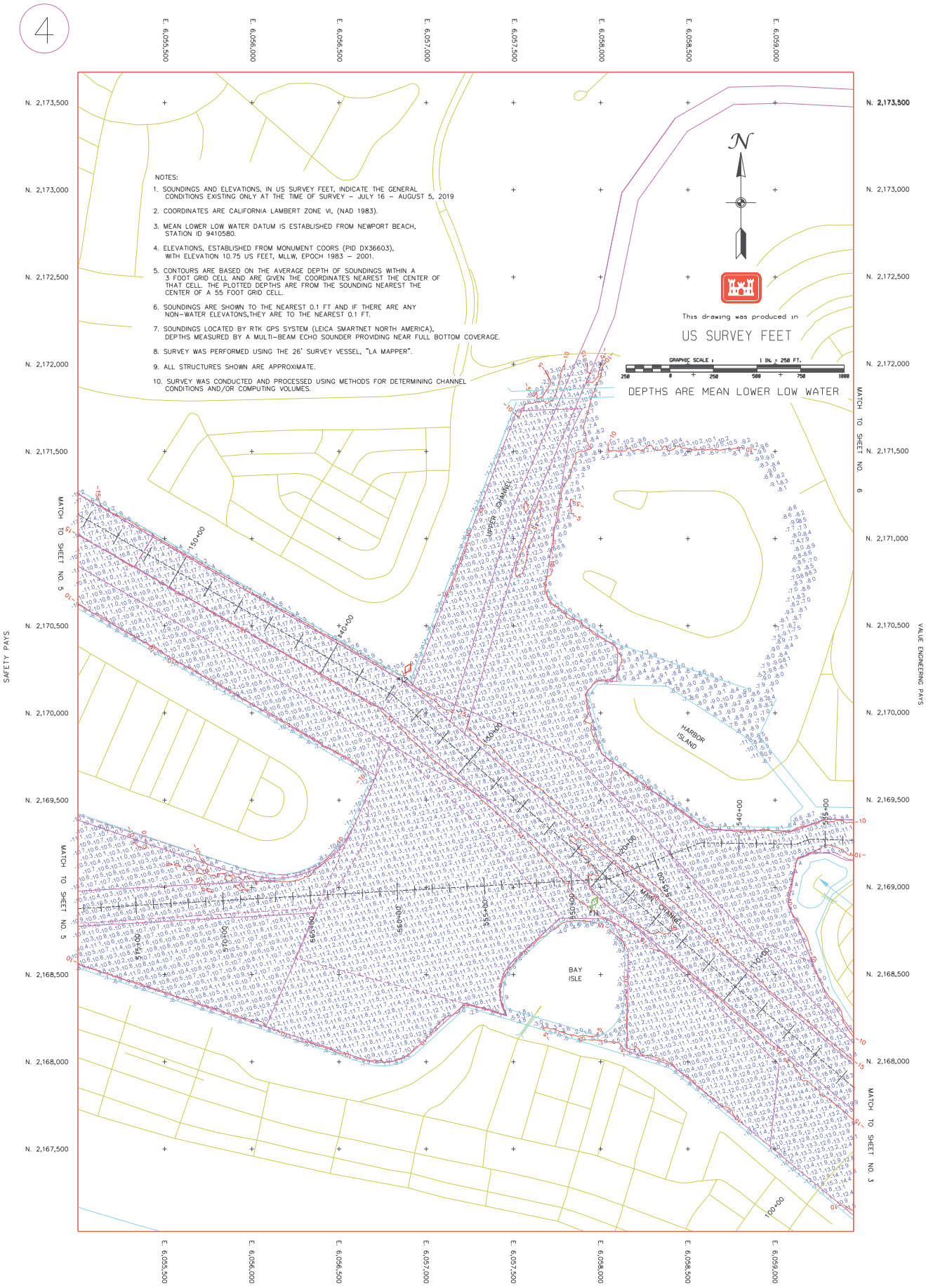

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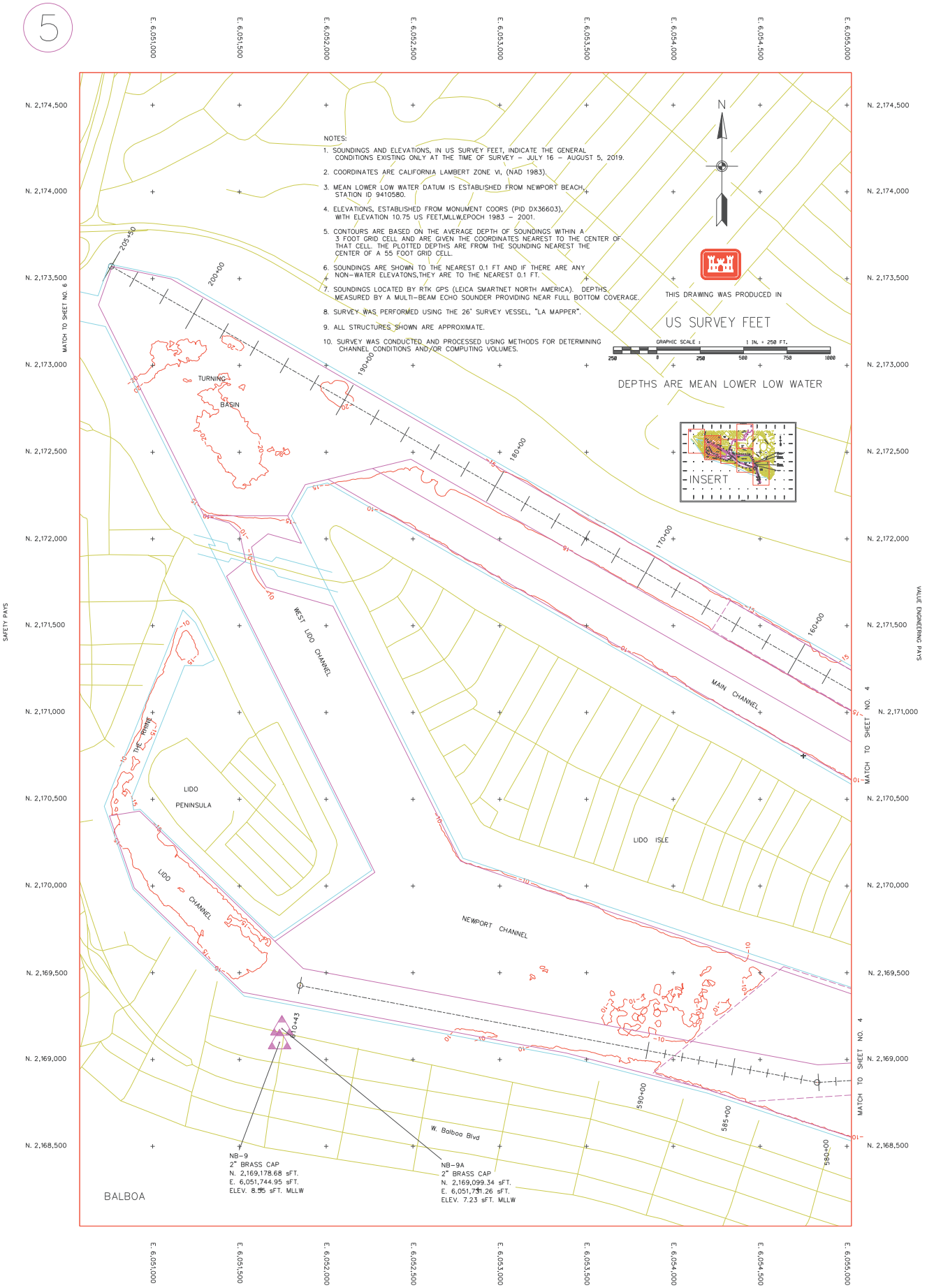

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LOWER NEWPORT BAY
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JULY-AUGUST 2019

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ORANGE COUNTY, CALIFORNIA
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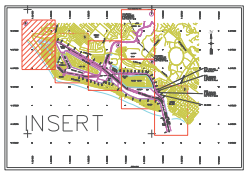

SAFETY PATS

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VALUE ENGINEERING PATS



This drawing was produced in

US SURVEY FEET

GRAPHIC SCALE : 1 IN. = 250 FT.

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DEPTHS ARE MEAN LOWER LOW WATER

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LOWER NEWPORT BAY
CONDITION SURVEY
JULY-AUGUST 2019

U.S. ARMY CORPS OF ENGINEERS
LOS ANGELES DISTRICT
SURVEY & MAPPING SECTION

NAVIGATION IMPROVEMENT
ORANGE COUNTY, CALIFORNIA
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MR. OVERMIRE

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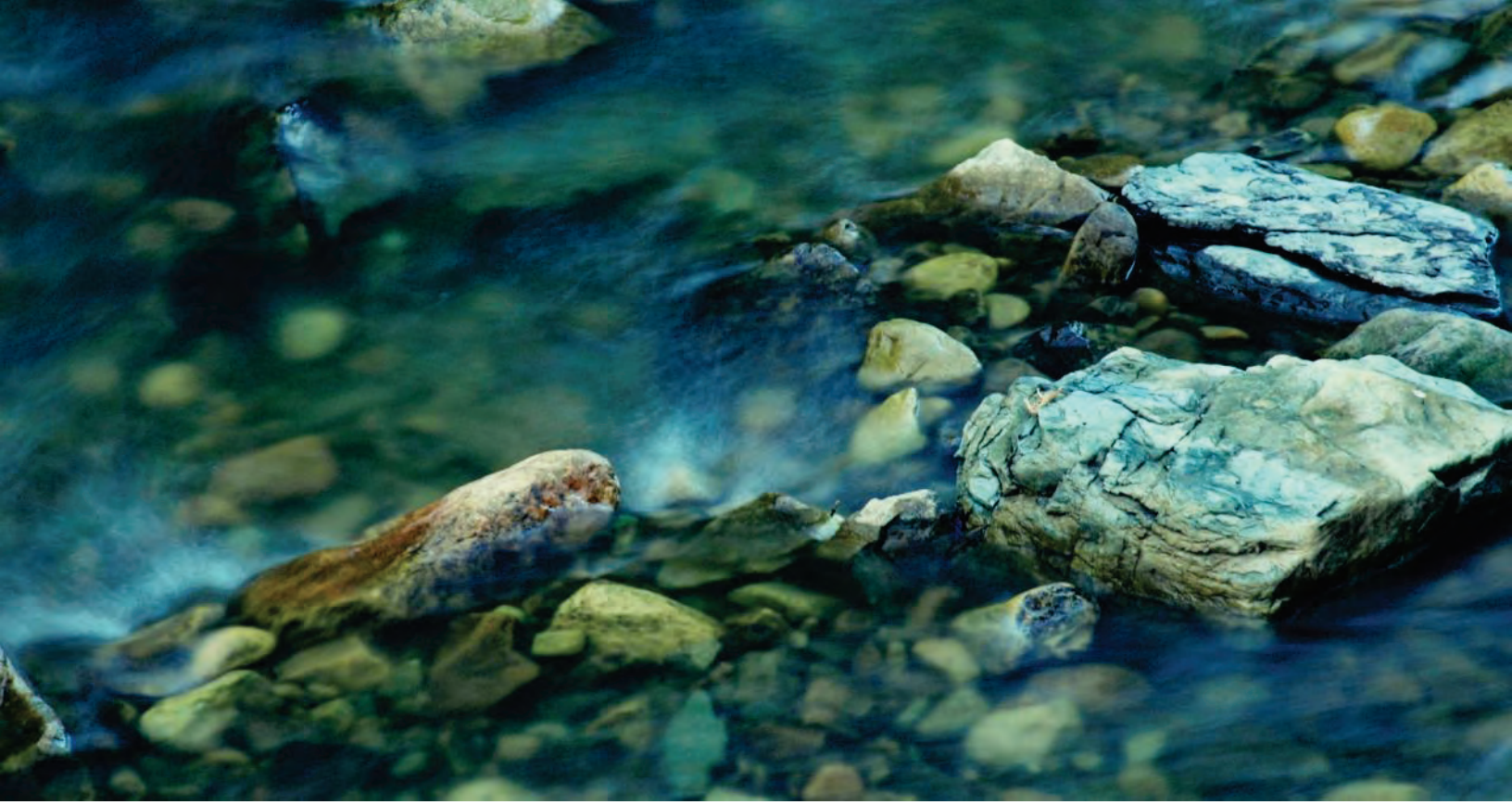
Appendix B
Sampling and Analysis Program Report



Updated June 2019
Lower Newport Bay Federal Channels Dredging

ANCHOR QEA

Sampling and Analysis Program Report

Prepared for City of Newport Beach

Updated June 2019
Lower Newport Bay Federal Channels Dredging

Sampling and Analysis Program Report

Prepared for
City of Newport Beach
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Newport Beach, California 92660

Prepared by
Anchor QEA, LLC
9700 Research Drive
Irvine, California 92618

Project Number: 180243-02.01

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ABBREVIATIONS

µg/kg	microgram per kilogram
µg/L	microgram per liter
ANOVA	analysis of variance
BP	bioaccumulation potential
City	City of Newport Beach
cy	cubic yard
DU	dredge unit
EC_{50}	median effective concentration
ERED	Environmental Residue-Effects Database
ERL	effects range low
ERM	effects range median
FDA	U.S. Food and Drug Administration
ITM	*Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual*
LC_{50}	median lethal concentration
LCS	laboratory control sample
LNB	Lower Newport Bay
LPC	limiting permissible concentration
MDL	method detection limit
mg/kg	milligram per kilogram
mg/L	milligram per liter
MLLW	mean lower low water
MS	matrix spike
MSD	matrix spike duplicate
NOEC	no observed effect concentration
ODMDS	Ocean Dredged Material Disposal Site
OTM	*Evaluation for Dredged Material Proposed for Ocean Disposal – Testing Manual*
QA/QC	quality assurance/quality control
R/V	research vessel
RL	reporting limit
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SAPR	Sampling and Analysis Program Report
SC-DMMT	Southern California Dredged Material Management Team
SP	solid phase
SPP	suspended particulate phase

SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TOC	total organic carbon
TRV	toxicity reference value
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1 Introduction

The City of Newport Beach (City) and U.S. Army Corps of Engineers (USACE) are proposing to conduct dredging within the federal channels in Lower Newport Bay (LNB), California (Figures 1 and 2). Dredging is needed in areas of increased shoaling to improve navigation and maintain federal authorized design depths. The federal channels were most recently dredged between May 2012 and January 2013, at which time dredging to depths of -10 to -17 feet mean lower low water (MLLW) was performed throughout large areas of LNB. Contaminated material was placed at the Port of Long Beach's Middle Harbor Fill Site, and clean material was placed at the U.S. Environmental Protection Agency (USEPA)-designated LA-3 Ocean Dredged Material Disposal Site (ODMDS) (Figure 1). Based on the most recent USACE harbor-wide bathymetric surveys, sedimentation has occurred in many areas of LNB such that dredging is needed within the federal channels to maintain safe navigation. The City is pursuing this program—in partnership with the USACE—to dredge the LNB federal channels to the currently authorized design depths. Sediment from LNB federal channels was characterized to determine suitability for ocean disposal at LA-3 ODMDS (Figure 1). Sediment from the Entrance Channel was also evaluated to determine compatibility for nearshore placement.

Sediment core sampling was conducted within the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel in January 2018. The Sampling and Analysis Program Report (SAPR) was presented to the Southern California Dredged Material Management Team (SC-DMMT) in July 2018. At this meeting, USEPA requested supplemental information to support a suitability determination, including mass loading calculations and a compilation of historical data from Newport Bay. Mass loading calculations and a compilation of historical data were provided to USEPA in April 2019 and are included as part of this updated SAPR.

Newport Channel was not initially included in this sediment characterization program or the previous federal channels investigation in 2009 (Newfields 2009) due to historical contamination and amphipod toxicity in 2003 and 2006 (Weston 2007). During the federal channels sampling in January 2018, exploratory sampling was conducted within Newport Channel and results were cleaner than expected. Based on these results, the City expanded the federal channels characterization to include Newport Channel. The sampling and analysis approach for Newport Channel was presented to the SC-DMMT in June 2018 (Anchor QEA 2018a), and additional sampling was conducted in January 2019. This SAPR summarizes both sediment sampling events and evaluates data results for LNB federal channels, including Newport Channel.

The SAPR was presented to the SC-DMMT on May 22, 2019. At this meeting, USEPA identified an alternate toxicity reference value (TRV) for mercury that met their selection requirements. The SAPR was updated for completeness to reflect this updated TRV. All tissue concentrations were less than the TRV; therefore, this slight change does not affect the overall suitability determinations for sediment from LNB federal channels.

1.1 Project Summary

The July 2018 USACE harbor-wide bathymetry data from LNB shows that dredging is required in multiple areas to achieve authorized design depths (Figure 3). Areas that require the most dredging include the Entrance Channel, Main Channel North, Bay Island, Turning Basin, West Lido, and Newport Channel. West Lido was not included as part of this sediment characterization or the previous federals channels investigation in 2009 (Newfields 2009) due to historical contamination and amphipod toxicity in 2003 and 2006 (Weston 2007). As previously described, Newport Channel was also not initially included as part of this sediment characterization program. Eleven dredge units (DUs) were identified within the Entrance Channel, Main Channel North, Bay Island, and Turning Basin for sampling and analysis activities (Anchor QEA 2017a). Three DUs were identified within Newport Channel for sampling and analysis activities (Anchor QEA 2018b). For Newport Channel, DU boundaries were finalized in coordination with USEPA based on the results of individual core chemistry. DU boundaries and existing bathymetry are shown in Figure 4.

Dredging is planned within LNB federal channels to design depths ranging from -15 to -20 feet MLLW, plus 2 feet of overdepth allowance (1 foot paid and 1 foot unpaid). The total volume of material proposed for dredging is estimated to be 1,224,300 cubic yards (cy), consisting of 716,430 cy above design depth and 507,870 cy of allowable overdepth. Table 1 summarizes the proposed dredging volumes for LNB federal channels. Proposed dredged material volume estimates were slightly updated from those presented in the Sampling and Analysis Plan (SAP; Anchor QEA 2017a) and sampling and analysis approach for Newport Channel (Anchor QEA 2018a) based on new condition surveys completed by USACE in June 2018, plus 10% contingency to account for sediment accumulation prior to dredging. In addition, some DU boundaries were slightly refined (i.e., removed marina in northwest corner of Turning Basin). Overall, the updated total volume of dredged material is within 10% of the original estimates (1,116,200 cy) presented in the SAP (Anchor QEA 2017a) and sampling and analysis approach for Newport Channel (Anchor QEA 2018a).

Table 1
Proposed Dredging Volumes

Dredge Unit	Dredge Unit Code	Design Depth (feet MLLW)	Estimated Volume to Design Depth (cy)	2-Foot Overdepth Allowance Volume (cy)	Total Volume (cy)	Dredge Unit Area (acres)
Turning Basin	TB	-20	23,100	68,800	91,900[1]	26.5
Main Channel North 1	MCN1	-20	36,600	26,600	63,200	8.2
Main Channel North 2	MCN2	-20	37,600	23,200	60,800	7.2
Main Channel North 3	MCN3	-20	44,600	38,800	83,400	13.8
Main Channel North 4	MCN4	-20	28,300	26,700	55,000	8.9
Main Channel North 5	MCN5	-20	50,200	39,600	89,800	12.9

Dredge Unit	Dredge Unit Code	Design Depth (feet MLLW)	Estimated Volume to Design Depth (cy)	2-Foot Overdepth Allowance Volume (cy)	Total Volume (cy)	Dredge Unit Area (acres)
Bay Island North	BIN	-15	77,900	55,800	133,700	18.5
Bay Island Middle East	BIME	-15	41,500	25,500	67,000	8.6
Bay Island Middle West	BIMW	-15	41,200	24,300	65,500	7.7
Bay Island South	BIS	-15	50,300	30,300	80,600	9.5
Entrance Channel	EC	-20	51,700	19,200	70,900	7.2
Newport Channel 1	NC1	-15	28,300	18,700	47,000	7.3
Newport Channel 2	NC2	-15	85,800	39,600	125,400	12.3
Newport Channel 3	NC3	-15	54,200	24,600	78,800	7.6
Total	**--**	**--**	**651,300**	**461,700**	**1,113,000**	**156**
Total (with 10% Contingency)	**--**	**--**	**716,430**	**507,870**	**1,224,300**	**--**

Note:

1. The majority of volume within the Turning Basin consists of overdepth. Actual construction will focus on high spots versus thin veneer. Focusing on material above -19 feet MLLW within the Turning Basin results in a total volume of 19,500 cy (includes 2 feet of overdepth).

1.2 Objectives

The purpose of this sediment investigation was to determine the suitability of the proposed dredged material for ocean disposal. If suitable, dredged material will be placed at LA-3 ODMDS. In addition, sediment from the Entrance Channel was evaluated to determine compatibility of the proposed dredged material for nearshore placement. If compatible, dredged material will be placed at a nearshore placement site along beaches north of the harbor entrance and up to the Santa Ana River. Testing for ocean disposal included physical, chemical, and biological analyses in accordance with guidelines specified in the *Evaluation for Dredged Material Proposed for Ocean Disposal – Testing Manual* (OTM; USEPA/USACE 1991). The evaluation for nearshore placement followed guidance provided in the *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual: Inland Testing Manual* (ITM; USEPA/USACE 1998), the Sand Compatibility Opportunistic Use Program (Moffatt & Nichol 2006), and *Requirements for Sampling, Testing and Data Analysis of Dredged Material* (USACE 1989).

2 Methods

This section presents a summary of methods and procedures used to characterize sediments from LNB federal channels. Sampling and analysis for the federal channels was implemented in accordance with the SAP (Anchor QEA 2017a). The SAP was presented to the SC-DMMT on December 13, 2017. The SAP was revised based on comments received at this meeting and subsequently approved by USEPA on January 3, 2018. The sampling and analysis approach for Newport Channel, including exploratory sampling results, was presented to and approved by the SC-DMMT on June 27, 2018 (Anchor QEA 2018a).

2.1 Sample Collection and Handling

All sample collection, handling, and processing procedures were implemented in accordance with the SAP (Anchor QEA 2017a) and sampling and analysis approach for Newport Channel (Anchor QEA 2018a).

2.1.1 Sediment Core Sampling

Sediment cores were collected using an electrically powered vibracore during two distinct sampling events, including January 2018 and January 2019. Station coordinates, mudline elevation, estimated penetration, retrieved core lengths, and sample intervals for each station are summarized in Table 2. Field logs and core photographs are provided in Appendix A.

2.1.1.1 January 2018 Sampling Event

The first sampling event was conducted from January 8 to 19, 2018, and included the Turning Basin, Main Channel North, Bay Island, and Entrance Channel. Sediment cores were collected at 48 stations within 11 DUs. Core sampling locations are shown in Figures 5 through 15. Sampling was performed from the research vessel (R/V) *Leviathan*, operated by Leviathan Environmental Services, LLC. The vessel is 28 feet long and equipped with an A-frame, moonpool, and winch for sample collection. The vibracore was deployed and recovered through the moonpool. Two to four cores were required from each station to obtain sufficient volume for analysis. Sediment cores were collected to the authorized dredge depth plus 2 feet of overdepth allowance and the Z-layer, unless refusal was encountered. Within the Entrance Channel, refusal was encountered at all stations due to dense sand throughout the area, which resulted in bent core tubes and low sample recovery. After three attempts, the longest cores were retained for analysis. Only station EC-04 from this DU was sampled to the target sampling depth. Within the other DUs, all stations were sampled to the project depth plus overdepth and Z-layer.

Sediment cores were processed as summarized in Table 3. Composite samples were created for each DU (to the design depth plus overdepth allowance) for physical and chemical analyses and biological testing. For Bay Island Middle East and West, two vertical composites were created based on historical mercury concentrations in lower depth intervals (Newfields 2009) and comments received

at the SC-DMMT meeting on December 13, 2017. The upper composite consisted of sediment from the mudline to 3 feet below the mudline, and the lower composite consisted of sediment from 3 feet below the mudline to the design depth plus overdepth allowance. Based on sediment chemistry results, the two vertical composites were combined for biological testing. Sediment from each core (to the authorized dredge depth) and the Z-layer were archived to allow for additional chemical analysis, if necessary. For the Entrance Channel, a subsample of each core or core interval, if stratification observed, was collected for grain size sieve analysis to support the evaluation for nearshore placement. All cores within the Entrance Channel were predominantly sand; therefore, subsamples were not collected for Atterberg limits or hydrometer analysis.

2.1.1.2 January 2019 Sampling Event

The second sampling event was conducted from January 8 to 19, 2018, and included only Newport Channel. Sediment cores were collected at 12 stations within three DUs. Core sampling locations are shown in Figure 16. Sampling was performed from the R/V *Innovation*, operated by Marine Taxonomic Services, LTD. The vessel is 30 feet long and equipped with an A-frame, moonpool, and winch for sample collection. The vibracore was deployed and recovered through the moonpool. Two cores were required from each station to obtain sufficient volume for analysis. Sediment cores were collected to the authorized dredge depth plus 2 feet of overdepth allowance and the Z-layer, unless refusal was encountered. Within Newport Channel, refusal was encountered at most stations due to dense sand underneath the overlying silt layer, which resulted in bent core tubes and low sample recovery. After three attempts, the longest cores were retained for analysis. Only stations NC1-02 and NC3-02 achieved the target sampling depth. However, station NC1-02 was inadvertently sampled 0.5 feet beyond the target depth. Because this station was later eliminated from the sediment characterization for ocean disposal due to elevated mercury, this deviation does not affect the overall results of this sampling program.

Sediment cores were processed as summarized in Table 4. Sediment from each core (to the authorized dredge depth and overdepth) was submitted for physical and chemical analyses. The Z-layer from each core was archived to allow for additional chemical analysis, if necessary. If the Z-layer depth was not achieved, the bottom 0.5 foot of the core was archived. Based on individual core sediment chemistry results, two composite samples (NC2-COMP and NC3-COMP) were created in coordination with USEPA (Appendix B) for physical and chemical analyses and biological testing. Stations NC1-01 and NC1-02 were eliminated from the sediment characterization due to elevated mercury, and no further testing for ocean disposal was performed.

Table 2
Station Coordinates, Mudline Elevations, Estimated Penetration, Retrieved Core Lengths, and Sample Intervals for Each Station

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
January 2018 Sampling Event												
TB-01	1	33° 37.201'	117° 55.694'	-17.8	-22	6.2	5.8	-22.0	TB-01-011218	0 to 4.2	Archive, composite	N/A
									TB-01-Z-011218	4.2 to 4.7	Z layer archive	
	2	33° 37.201'	117° 55.694'	-17.8	-22	6.2	4.5	-22.0	TB-01-011218	0 to 4.2	Composite	N/A
TB-02	1	33° 37.222'	117° 55.634'	-18.0	-22	6.0	5.7	-22.0	TB-02-011218	0 to 4.0	Archive, composite	N/A
									TB-02-Z-011218	4.0 to 4.5	Z layer archive	
	2	33° 37.221'	117° 55.631'	-18.0	-22	5.8	4.9	-22.0	TB-02-011218	0 to 4.0	Composite	N/A
TB-03	1	33° 37.148'	117° 55.476'	-18.4	-22	5.6	5.1	-22.0	TB-03-011218	0 to 3.6	Archive, composite	N/A
									TB-03-Z-011218	3.6 to 4.1	Z layer archive	
	2	33° 37.148'	117° 55.476'	-18.4	-22	5.0	3.6	-22.0	TB-03-011218	0 to 3.6	Composite	N/A
TB-04	1	33° 37.026'	117° 55.592'	-18.9	-22	5.1	4.6	-22.0	TB-04-011218	0 to 3.1	Archive, composite	N/A
									TB-04-Z-011218	3.1 to 3.6	Z layer archive	
	2	33° 37.026'	117° 55.592'	-18.9	-22	5.1	4.2	-22.0	TB-04-011218	0 to 3.1	Composite	N/A
TB-05	1	33° 37.088'	117° 55.351'	-19.2	-22	4.8	4.2	-22.0	TB-05-011218	0 to 2.8	Archive, composite	N/A
									TB-05-Z-011218	2.8 to 3.3	Z layer archive	
	2	33° 37.089'	117° 55.350'	-19.0	-22	4.5	4.0	-22.0	TB-05-011218	0 to 3.0	Composite	N/A
TB-06	1	33° 37.098'	117° 55.636'	-19.3	-22	4.8	4.6	-22.0	TB-06-011218	0 to 2.7	Archive, composite	N/A
									TB-06-Z-011218	2.7 to 3.2	Z layer archive	
	2	33° 37.098'	117° 55.636'	-19.3	-22	2.0	1.7	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 37.098'	117° 55.637'	-20.1	-22	4.1	3.3	-22.0	TB-06-011218	0 to 1.9	Composite	Slightly moved
MCN1-01	1	33° 37.040'	117° 55.245'	-18.0	-22	7.5	6.2	-22.0	MCN1-01-T-011518	0 to 4.0	Archive, composite	N/A
									MCN1-01-Z-011518	4.0 to 4.5	Z layer archive	
	2	33° 37.040'	117° 55.245'	-18.0	-22	6.0	4.1	-22.0	MCN1-01-T-011518	0 to 4.0	Composite	N/A
MCN1-02	1	33° 36.994'	117° 55.189'	-17.4	-22	6.1	5.1	-22.0	MCN1-02-T-011518	0 to 4.6	Archive, composite	Refusal
									MCN1-02-Z-011518	4.6 to 5.1	Z layer archive	
	2	33° 36.994'	117° 55.189'	-17.4	-22	6.1	5.1	-22.0	MCN1-02-T-011518	0 to 4.6	Composite	Refusal
MCN1-03	1	33° 36.975'	117° 55.109'	-17.9	-22	7.0	6.1	-22.0	MCN1-03-T-011518	0 to 4.1	Archive, composite	Refusal
									MCN1-03-Z-011518	4.1 to 4.6	Z layer archive	
	2	33° 36.975'	117° 55.109'	-17.9	-22	6.1	5.3	-22.0	MCN1-03-T-011518	0 to 4.1	Composite	N/A
MCN1-04	1	33° 36.934'	117° 55.061'	-16.1	-22	8.9	7.0	-22.0	MCN1-04-T-011518	0 to 5.9	Archive, composite	Refusal
									MCN1-04-Z-011518	5.9 to 6.4	Z layer archive	
	2	33° 36.934'	117° 55.061'	-16.1	-22	9.4	7.6	-22.0	MCN1-04-T-011518	0 to 5.9	Composite	Refusal
MCN2-01	1	33° 36.919'	117° 55.003'	-18.0	-22	5.3	5.0	-22.0	MCN2-01-T-011518	0 to 4.0	Archive, composite	Refusal
									MCN2-01-Z-011518	4.0 to 4.5	Z layer archive	
	2	33° 36.919'	117° 55.003'	-18.0	-22	5.2	5.0	-22.0	MCN2-01-T-011518	0 to 4.0	Composite	Refusal
MCN2-02	1	33° 36.884'	117° 54.939'	-16.6	-22	7.3	5.5	-22.0	MCN2-02-T-011518	0 to 5.4	Archive, composite	Refusal
									MCN2-02-Z-011518	5.4 to 5.5	Z layer archive	
	2	33° 36.884'	117° 54.939'	-16.6	-22	6.9	5.4	-22.0	MCN2-02-T-011518	0 to 5.4	Composite	Refusal
MCN2-03	1	33° 36.861'	117° 54.860'	-17.0	-22	8.0	6.4	-22.0	MCN2-03-T-011518	0 to 5.0	Archive, composite	Refusal
									MCN2-03-Z-011518	5.0 to 5.5	Z layer archive	
	2	33° 36.861'	117° 54.860'	-17.0	-22	8.2	6.3	-22.0	MCN2-03-T-011518	0 to 5.0	Composite	Refusal
MCN2-04	1	33° 36.816'	117° 54.791'	-17.6	-22	7.9	6.4	-22.0	MCN2-04-T-011618	0 to 4.4	Archive, composite	N/A
									MCN2-04-Z-011618	4.4 to 4.9	Z layer archive	
	2	33° 36.816'	117° 54.791'	-17.6	-22	6.9	6.0	-22.0	MCN2-04-T-011618	0 to 4.4	Composite	N/A

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
MCN3-01	1	33° 36.788'	117° 54.711'	-17.6	-22	6.9	6.4	-22.0	MCN3-01-011918	0 to 4.4	Archive, composite	N/A
									MCN3-01-Z-011918	4.4 to 4.9	Z layer archive	
	2	33° 36.789'	117° 54.711'	-18.0	-22	5.5	5.1	-22.0	MCN3-01-011918	0 to 4.0	Composite	N/A
MCN3-02	1	33° 36.730'	117° 54.610'	-18.0	-22	6.0	5.6	-22.0	MCN3-02-011918	0 to 4.0	Archive, composite	N/A
									MCN3-02-Z-011918	4.0 to 4.5	Z layer archive	
	2	33° 36.730'	117° 54.610'	-18.4	22	5.0	4.9	-22.0	MCN3-02-011918	0 to 3.6	Composite	N/A
MCN3-03	1	33° 36.683'	117° 54.487'	-18.1	-22	5.9	5.9	-22.0	MCN3-03-011918	0 to 3.9	Archive, composite	N/A
									MCN3-03-Z-011918	3.9 to 4.4	Z layer archive	
	2	33° 36.682'	117° 54.487'	-18.0	-22	5.5	3.8	-22.0	MCN3-03-011918	0 to 3.8	Composite	N/A
MCN3-04	1	33° 36.598'	117° 54.392'	-18.0	-22	5.1	4.1	-22.0	MCN3-04-011918	0 to 4.0	Archive, composite	Refusal
	2	33° 36.598'	117° 54.392'	-17.9	-22	5.6	5.1	-22.0	MCN3-04-011918	0 to 4.1	Composite	Refusal
									MCN3-04-Z-011918	4.1 to 4.6	Z layer archive	
MCN4-01	1	33° 36.436'	117° 54.120'	-16.9	-22	7.1	5.6	-22.0	MCN4-01-011918	0 to 5.1	Archive, composite	N/A
									MCN4-01-Z-011918	5.1 to 5.6	Z layer archive	
	2	33° 36.435'	117° 54.119'	-17.7	-22	6.6	5.6	-22.0	MCN4-01-011918	0 to 4.3	Composite	N/A
MCN4-02	1	33° 36.390'	117° 54.063'	-17.9	-22	6.1	5.6	-22.0	MCN4-02-011818	0 to 4.1	Archive, composite	N/A
									MCN4-02-Z-011818	4.1 to 4.6	Z layer archive	
	2	33° 36.390'	117° 54.063'	-17.9	-22	5.6	5.3	-22.0	MCN4-02-011818	0 to 4.1	Composite	N/A
MCN4-03	1	33° 36.351'	117° 54.001'	-18.1	-22	NR	4.9	-22.0	MCN4-03-011818	0 to 3.9	Archive, composite	N/A
									MCN4-03-Z-011818	3.9 to 4.4	Z layer archive	
	2	33° 36.351'	117° 54.001'	-18.1	-22	6.0	4.2	-22.0	MCN4-03-011818	0 to 3.9	Composite	N/A
MCN4-04	1	33° 36.314'	117° 53.941'	-18.0	-22	7.0	5.8	-22.0	MCN4-04-011818	0 to 4.0	Archive, composite	N/A
									MCN4-04-Z-011818	4.0 to 4.5	Z layer archive	
	2	33° 36.314'	117° 53.941'	-18.0	-22	5.6	4.5	-22.0	MCN4-04-011818	0 to 4.0	Composite	N/A
MCN5-01	1	33° 36.198'	117° 53.711'	-18.5	-22	5.5	5.2	-22.0	MCN5-01-011818	0 to 3.5	Archive, composite	N/A
									MCN5-01-Z-011818	3.5 to 4.0	Z layer archive	
	2	33° 36.198'	117° 53.711'	-18.5	-22	5.5	4.4	-22.0	MCN5-01-011818	0 to 3.5	Composite	N/A
MCN5-02	1	33° 36.158'	117° 53.551'	-18.1	-22	5.9	5.6	-22.0	MCN5-02-011818	0 to 3.9	Archive, composite	N/A
									MCN5-02-Z-011818	3.9 to 4.4	Z layer archive	
	2	33° 36.158'	117° 53.551'	-18.1	-22	5.9	5.8	-22.0	MCN5-02-011818	0 to 3.9	Composite	N/A
MCN5-03	1	33° 36.134'	117° 53.470'	-18.3	-22	5.7	5.4	-22.0	MCN5-03-011818	0 to 3.7	Archive, composite	N/A
									MCN5-03-Z-011818	3.7 to 4.2	Z layer archive	
	2	33° 36.134'	117° 53.470'	-18.3	-22	5.0	4.2	-22.0	MCN5-03-011818	0 to 3.7	Composite	N/A
MCN5-04	1	33° 36.103'	117° 53.359'	-18.8	-22	5.2	4.8	-22.0	MCN5-04-011818	0 to 3.2	Archive, composite	N/A
									MCN5-04-Z-011818	3.2 to 3.7	Z layer archive	
	2	33° 36.103'	117° 53.359'	-18.8	-22	5.0	3.8	-22.0	MCN5-04-011818	0 to 3.2	Composite	N/A
BIN-01	1	33° 36.610'	117° 54.480'	-11.8	-17	9.4	6.6	-17.0	BIN-01-T-011618	0 to 5.2	Archive, composite	Refusal
									BIN-01-Z-011618	5.2 to 5.7	Z layer archive	
	2	33° 36.610'	117° 54.480'	-11.8	-17	9.5	8.1	-17.0	BIN-01-T-011618	0 to 5.2	Composite	Refusal
BIN-02	1	33° 36.555'	117° 54.418'	-12.1	-17	7.0	6.5	-17.0	BIN-02-T-011618	0 to 4.9	Archive, composite	Refusal
									BIN-02-Z-011618	4.9 to 5.4	Z layer archive	
	2	33° 36.555'	117° 54.418'	-12.1	-17	6.4	5.2	-17.0	BIN-02-T-011618	0 to 4.9	Composite	Refusal
BIN-03	1	33° 36.522'	117° 54.352'	-11.9	-17	7.8	6.8	-17.0	BIN-03-T-011618	0 to 5.1	Archive, composite	Refusal
									BIN-03-Z-011618	5.1 to 5.6	Z layer archive	
	2	33° 36.522'	117° 54.352'	-11.9	-17	6.5	5.1	-17.0	BIN-03-T-011618	0 to 5.1	Composite	Refusal
BIN-04	1	33° 36.501'	117° 54.544'	-11.4	-17	9.8	8.5	-17.0	BIN-04-T-011618	0 to 5.6	Archive, composite	Refusal
									BIN-04-Z-011618	5.6 to 6.1	Z layer archive	

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
	2	33˚ 36.501'	117˚ 54.544'	-11.4	-17	7.6	7.2	-17.0	BIN-04-T-011618	0 to 5.6	Composite	N/A
BIN-05	1	33˚ 36.520'	117˚ 54.442'	-11.8	-17	9.2	7.3	-17.0	BIN-05-T-011618	0 to 5.2	Archive, composite	Refusal
									BIN-05-Z-011618	5.2 to 5.7	Z layer archive	
	2	33˚ 36.520'	117˚ 54.442'	-11.8	-17	7.6	6.7	-17.0	BIN-05-T-011618	0 to 5.2	Composite	N/A
BIN-06	1	33˚ 36.563'	117˚ 54.512'	-11.9	-17	9.1	8.1	-17.0	BIN-06-T-011718	0 to 5.1	Archive, composite	Refusal
									BIN-06-Z-011718	5.1 to 5.6	Z layer archive	
	2	33˚ 36.563'	117˚ 54.512'	-11.9	-17	6.9	3.1	N/A	N/A	N/A	N/A	Sample discarded
	3	33˚ 36.563'	117˚ 54.512'	-11.9	-17	6.6	6.3	-17.0	BIN-06-T-011718	0 to 5.1	Composite	N/A
BIME-01	1	33˚ 36.461'	117˚ 54.409'	-11.3	-17	9.2	8.6	-17.0	BIME-01-T-011018	0 to 3.0	Archive, upper composite	Refusal
									BIME-01-M-011018	3.0 to 5.7	Archive, lower composite	
									BIME-01-Z-011018	5.7 to 6.2	Z layer archive	
	2	33˚ 36.461'	117˚ 54.409'	-11.3	-17	7.2	6.5	-17.0	BIME-01-T-011018	0 to 3.0	Upper composite	N/A
									BIME-01-M-011018	3.0 to 5.7	Lower composite	
	3	33˚ 36.461'	117˚ 54.409'	-11.3	-17	7.2	6.2	-17.0	BIME-01-T-011018	0 to 3.0	Upper composite	N/A
									BIME-01-M-011018	3.0 to 5.7	Lower composite	
	4	33˚ 36.461'	117˚ 54.409'	-11.3	-17	7.2	6.9	-17.0	BIME-01-T-011018	0 to 3.0	Upper composite	N/A
									BIME-01-M-011018	3.0 to 5.7	Lower composite	
BIME-02	1	33˚ 36.479'	117˚ 54.331'	-12.0	-17	7.7	7.0	-17.0	BIME-02-T-011018	0 to 3.0	Archive, upper composite	N/A
									BIME-02-M-011018	3.0 to 5.0	Archive, lower composite	
									BIME-02-Z-011018	5.0 to 5.5	Z layer archive	
	2	33˚ 36.479'	117˚ 54.331'	-12.0	-17	6.5	5.5	-17.0	BIME-02-T-011018	0 to 3.0	Upper composite	N/A
									BIME-02-0M-011018	3.0 to 5.0	Lower composite	
	3	33˚ 36.479'	117˚ 54.331'	-12.0	-17	6.5	3.1	N/A	N/A	N/A	N/A	Sample discarded
	4	33˚ 36.479'	117˚ 54.331'	-12.0	-17	6.5	5.9	-17.0	BIME-02-T-011018	0 to 3.0	Upper composite	N/A
									BIME-02-0M-011018	3.0 to 5.0	Lower composite	
	5	33˚ 36.479'	117˚ 54.331'	-12.0	-17	6.5	6.0	-17.0	BIME-02-T-011018	0 to 3.0	Upper composite	N/A
									BIME-02-0M-011018	3.0 to 5.0	Lower composite	
BIME-03	1	33˚ 36.409'	117˚ 54.434'	-11.5	-17	9.0	7.7	-17.0	BIME-03-T-011118	0 to 3.0	Archive, upper composite	N/A
									BIME-03-M-011118	3.0 to 5.5	Archive, lower composite	
									BIME-03-Z-011118	5.5 to 6.0	Z layer archive	
	2	33˚ 36.409'	117˚ 54.434'	-11.5	-17	7.0	6.6	-17.0	BIME-03-T-011118	0 to 3.0	Upper composite	N/A
									BIME-03-M-011118	3.0 to 5.5	Lower composite	
	3	33˚ 36.409'	117˚ 54.434'	-11.5	-17	7.0	6.3	-17.0	BIME-03-T-011118	0 to 3.0	Upper composite	N/A
									BIME-03-M-011118	3.0 to 5.5	Lower composite	
	4	33˚ 36.409'	117˚ 54.434'	-11.5	-17	7.0	6.6	-17.0	BIME-03-T-011118	0 to 3.0	Upper composite	N/A
									BIME-03-M-011118	3.0 to 5.5	Lower composite	
BIME-04	1	33˚ 36.453'	117˚ 54.375'	-11.5	-17	7.7	7.5	-17.0	BIME-04-T-011118	0 to 3.0	Archive, upper composite	Refusal
									BIME-04-M-011118	3.0 to 5.5	Archive, lower composite	
									BIME-04-Z-011118	5.5 to 6.0	Z layer archive	
	2	33˚ 36.453'	117˚ 54.375'	-11.5	-17	7.0	6.5	-17.0	BIME-04-T-011118	0 to 3.0	Upper composite	N/A
									BIME-04-M-011118	3.0 to 5.5	Lower composite	
	3	33˚ 36.453'	117˚ 54.375'	-11.5	-17	7.0	6.5	-17.0	BIME-04-T-011118	0 to 3.0	Upper composite	N/A
									BIME-04-M-011118	3.0 to 5.5	Lower composite	
	4	33˚ 36.453'	117˚ 54.375'	-11.5	-17	7.0	6.6	-17.0	BIME-04-T-011118	0 to 3.0	Upper composite	N/A
									BIME-04-M-011118	3.0 to 5.5	Lower composite	
BIMW-01	1	33˚ 36.457'	117˚ 54.541'	-11.8	-17	8.7	7.6	-17.0	BIMW-01-T-010818	0 to 3.0	Archive, upper composite	N/A
									BIMW-01-M-010818	3.0 to 5.2	Archive, lower composite	
									BIMW-01-Z-010818	5.2 to 5.7	Z layer archive	

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
	2	33˚ 36.457'	117˚ 54.541'	-11.8	-17	6.2	5.5	-17.0	BIMW-01-T-010818	0 to 3.0	Upper composite	N/A
									BIMW-01-M-010818	3.0 to 5.2	Lower composite	
	3	33˚ 36.457'	117˚ 54.541'	-11.8	-17	6.2	5.2	-17.0	BIMW-01-T-010818	0 to 3.0	Upper composite	N/A
									BIMW-01-M-010818	3.0 to 5.2	Lower composite	
	4	33˚ 36.457'	117˚ 54.541'	-11.8	-17	6.2	5.7	-17.0	BIMW-01-T-010818	0 to 3.0	Upper composite	N/A
									BIMW-01-M-010818	3.0 to 5.2	Lower composite	
BIMW-02	1	33˚ 36.473'	117˚ 54.458'	-11.6	-17	7.8	7.4	-17.0	BIMW-02-T-010918	0 to 3.0	Archive, upper composite	N/A
									BIMW-02-M-010918	3.0 to 5.4	Archive, lower composite	
									BIMW-02-Z-010918	5.4 to 5.9	Z layer archive	
	2	33˚ 36.473'	117˚ 54.458'	-11.6	-17	7.0	5.0	-16.6	BIMW-02-T-010918	0 to 3.0	Upper composite	N/A
									BIMW-02-M-010918	3.0 to 5.0	Lower composite	
	3	33˚ 36.473'	117˚ 54.458'	-11.6	-17	6.4	6.2	-17.0	BIMW-02-T-010918	0 to 3.0	Upper composite	N/A
									BIMW-02-M-010918	3.0 to 5.4	Lower composite	
	4	33˚ 36.473'	117˚ 54.458'	-11.6	-17	6.4	5.3	-16.9	BIMW-02-T-010918	0 to 3.0	Upper composite	N/A
									BIMW-02-M-010918	3.0 to 5.3	Lower composite	
BIMW-03	1	33˚ 36.447'	117˚ 54.567'	-11.9	-17	8.1	7.1	-17.0	BIMW-03-T-011018	0 to 3.0	Archive, upper composite	N/A
									BIMW-03-M-011018	3.0 to 5.1	Archive, lower composite	
									BIMW-03-Z-011018	5.1 to 5.6	Z layer archive	
	2	33˚ 36.447'	117˚ 54.567'	-11.9	-17	6.1	5.9	-17.0	BIMW-03-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-03-M-011018	3.0 to 5.1	Lower composite	
	3	33˚ 36.447'	117˚ 54.567'	-11.9	-17	6.1	5.9	-17.0	BIMW-03-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-03-M-011018	3.0 to 5.1	Lower composite	
	4	33˚ 36.447'	117˚ 54.567'	-11.9	-17	6.1	4.9	-16.8	BIMW-03-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-03-M-011018	3.0 to 4.9	Lower composite	
BIMW-04	1	33˚ 36.433'	117˚ 54.471'	-12.1	-17	8.4	6.5	-17.0	BIMW-04-T-011018	0 to 3.0	Archive, upper composite	Refusal
									BIMW-04-M-011018	3.0 to 4.9	Archive, lower composite	
									BIMW-04-Z-011018	4.9 to 5.4	Z layer archive	
	2	33˚ 36.433'	117˚ 54.471'	-12.1	-17	8.1	6.9	-17.0	BIMW-04-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-04-M-011018	3.0 to 4.9	Lower composite	
	3	33˚ 36.433'	117˚ 54.471'	-12.1	-17	6.5	5.7	-17.0	BIMW-04-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-04-M-011018	3.0 to 4.9	Lower composite	
	4	33˚ 36.433'	117˚ 54.471'	-12.1	-17	6.4	5.5	-17.0	BIMW-04-T-011018	0 to 3.0	Upper composite	N/A
									BIMW-04-M-011018	3.0 to 4.9	Lower composite	
BIS-01	1	33˚ 36.398'	117˚ 54.568'	-11.8	-17	6.7	6.0	-17.0	BIS-01-011118	0 to 5.2	Archive, composite	Refusal
									BIS-01-Z-011118	5.2 to 5.7	Z layer archive	
	2	33˚ 36.398'	117˚ 54.568'	-11.8	-17	6.2	5.8	-17.0	BIS-01-011118	0 to 5.2	Composite	N/A
BIS-02	1	33˚ 36.385'	117˚ 54.481'	-11.9	-17	7.1	6.9	-17.0	BIS-02-011118	0 to 5.1	Archive, composite	N/A
									BIS-02-Z-011118	5.1 to 5.6	Z layer archive	
	2	33˚ 36.385'	117˚ 54.481'	-11.9	-17	6.6	5.1	-17.0	BIS-02-011118	0 to 5.1	Composite	N/A
BIS-03	1	33˚ 36.376'	117˚ 54.602'	-11.6	-17	7.4	6.6	-17.0	BIS-03-011118	0 to 5.4	Archive, composite	N/A
									BIS-03-Z-011118	5.4 to 5.9	Z layer archive	
	2	33˚ 36.376'	117˚ 54.602'	-11.6	-17	6.9	6.1	-17.0	BIS-03-011118	0 to 5.4	Composite	N/A
BIS-04	1	33˚ 36.357'	117˚ 54.532'	-11.8	-17	7.2	6.8	-17.0	BIS-04-011118	0 to 5.2	Archive, composite	N/A
									BIS-04-Z-011118	5.2 to 5.7	Z layer archive	
	2	33˚ 36.357'	117˚ 54.532'	-11.8	-17	6.7	5.4	-17.0	BIS-04-011118	0 to 5.2	Composite	N/A
EC-01	1	33˚ 35.737'	117˚ 52.786'	-18.0	-22	3.0	2.7	-20.7	EC-01-011718	0 to 2.7	Archive, grain size, composite	Refusal
	2	33˚ 35.737'	117˚ 52.786'	-18.0	-22	3.7	3.3	-21.3	EC-01-011718	0 to 3.3	Composite	Refusal
	3	33˚ 35.737'	117˚ 52.786'	-18.0	-22	4.3	3.3	-21.3	EC-01-011718	0 to 3.3	Composite	Refusal

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
EC-02	1	33˚ 35.638'	117˚ 52.752'	-10.1	-22	1.0	0.0	N/A	N/A	N/A	N/A	Refusal; sample washed out
	2	33˚ 35.638'	117˚ 52.752'	-10.1	-22	2.0	1.8	-11.9	EC-02-011718	0 to 1.8	Composite	Refusal
	3	33˚ 35.638'	117˚ 52.752'	-10.1	-22	2.0	1.6	-11.7	EC-02-011718	0 to 1.6	Composite	Refusal
	4	33˚ 35.638'	117˚ 52.752'	-10.1	-22	2.5	2.2	-12.3	EC-02-011718	0 to 2.2	Archive, grain size, composite	Refusal
EC-03	1	33˚ 35.535'	117˚ 52.715'	-14.9	-22	3.5	2.5	-17.4	EC-03-11718	0 to 2.5	Archive, grain size, composite	Refusal; core tube bent
	2	33˚ 35.535'	117˚ 52.715'	-14.9	-22	2.5	1.6	-16.5	EC-03-11718	0 to 1.6	Composite	Refusal; core tube cracked (liner intact)
	3	33˚ 35.535'	117˚ 52.715'	-14.9	-22	2.5	1.6	-16.5	EC-03-11718	0 to 1.6	Composite	Refusal
EC-04	1	33˚ 35.430'	117˚ 52.687'	-16.6	-22	NR	6.1	-22.0	EC-04-011718	0 to 5.4	Archive, grain size, composite	Refusal; core tube bent
									EC-04-Z-011718	5.4 to 5.9	Z layer archive	
	2	33˚ 35.430'	117˚ 52.687'	-16.6	-22	3.0	1.5	-18.1	EC-04-011718	0 to 1.5	Composite	Refusal
	3	33˚ 35.430'	117˚ 52.687'	-16.6	-22	3.0	1.6	-18.2	EC-04-011718	0 to 1.6	Composite	Refusal
January 2019 Sampling Event												
NC1-01	1	33° 36.547'	117° 55.450'	-12.3	-17	3.3	2.2	N/A	N/A	N/A	N/A	Refusal; core tube bent; sample discarded
	2	33° 36.550'	117° 55.458'	-12.3	-17	2.8	2.4	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.549'	117° 55.451'	-12.7	-17	10.0	3.2	-15.9	NC1-01-012319	0 to 3.2	Chemistry	Refusal
									NC1-01-Z-012319	2.6 to 3.2	Archive of bottom 0.5 feet[2]	
NC1-02	1	33° 36.537'	117° 55.371'	-12.4	-17	10.0	6.6	-17.5[3]	NC1-02-012319	0 to 5.1[3]	Chemistry	N/A
									NC1-02-Z-012319	5.1 to 5.6[4]	Z layer archive	
	2	33° 36.548'	117° 55.371'	-12.9	-17	10.0	4.8	N/A	N/A	N/A	N/A	Sample discarded
NC1-03	1	33° 36.526'	117° 55.277'	-11.4	-17	5.0	3.4	-14.8	NC1-03-012319	0 to 3.4	Composite	Refusal
	2	33° 36.527'	117° 55.277'	-11.2	-17	5.0	2.6	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.527'	117° 55.278'	-11.2	-17	5.0	3.6	-14.8	NC1-03-012319	0 to 3.6	Chemistry, composite	Refusal
									NC1-03-Z-012319	3.1 to 3.6	Archive of bottom 0.5 feet[2]	
NC1-04	1	33° 36.512'	117° 55.171'	-11.2	-17	6.0	3.8	-15.0	NC1-04-012319	0 to 3.8	Chemistry, composite	Refusal
									NC1-04-Z-012319	3.3 to 3.8	Archive of bottom 0.5 feet[2]	
	2	33° 36.513'	117° 55.173'	-11.3	-17	6.0	3.6	-14.9	NC1-04-012319	0 to 3.6	Composite	N/A
NC2-01	1	33° 36.496'	117° 55.076'	-10.0	-17	4.9	2.6	-12.6	NC2-01-012419	0 to 2.6	Composite	Refusal
	2	33° 36.496'	117° 55.077'	-10.4	-17	5.3	2.5	-12.9	NC2-01-012419	0 to 2.5	Chemistry, composite	Refusal; core tube bent
									NC2-01-Z-012419	2.0 to 2.5	Archive of bottom 0.5 feet[2]	
	3	33° 36.495'	117° 55.078'	-10.3	-17	4.4	2.3	N/A	N/A	N/A	N/A	Refusal; core tube bent; sample discarded
NC2-02	1	33° 36.490'	117° 55.013'	-11.1	-17	6.6	3.7	-14.8	NC2-02-012419	0 to 3.7	Composite	Refusal
	2	33° 36.490'	117° 55.013'	-11.0	-17	7.8	3.7	-14.7	NC2-02-012419	0 to 3.7	Chemistry, composite	Refusal
									NC2-02-Z-012419	3.2 to 3.7	Archive of bottom 0.5 feet[2]	
	3	33° 36.491'	117° 55.014'	-11.0	-17	7.2	3.0	N/A	N/A	N/A	N/A	Refusal; sample discarded
NC2-03	1	33° 36.473'	117° 54.972'	-11.6	-17	6.7	3.3	-14.9	NC2-03-012419	0 to 3.3	Composite	Refusal
	2	33° 36.474'	117° 54.972'	-11.4	-17	8.6	3.0	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.474'	117° 54.972'	-11.2	-17	7.3	4.7	-15.9	NC2-03-012419	0 to 4.7	Chemistry, composite	Refusal
									NC2-03-Z-012419	4.2 to 4.7	Archive of bottom 0.5 feet[2]	
NC2-04	1	33° 36.480'	117° 54.904'	-10.7	-17	7.2	4.5	-15.2	NC2-04-012219	0 to 4.5	Chemistry, composite	Refusal; slightly moved due to vessel
									NC2-04-Z-012219	4.0 to 4.5	Archive of bottom 0.5 feet[2]	
	2	33° 36.481'	117° 54.904'	-10.6	-17	8.0	4.0	N/A	N/A	N/A	N/A	Sample discarded
	3	33° 36.481'	117° 54.904'	-10.5	-17	8.0	4.3	-14.8	NC2-04-012219	0 to 4.3	Composite	Refusal

Station ID	Attempt	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
NC3-01	1	33° 36.485'	117° 54.835'	-10.7	-17	7.8	3.4	N/A	N/A	N/A	N/A	Refusal; sample discarded
	2	33° 36.485'	117° 54.836'	-10.8	-17	7.6	4.9	-15.7	NC3-01-012219	0 to 4.9	Chemistry, composite	Refusal
									NC3-01-Z-012219	4.4 to 4.9	Archive of bottom 0.5 feet[2]	
	3	33° 36.486'	117° 54.835'	-10.8	-17	8.0	4.1	-14.9	NC3-01-012219	0 to 4.1	Composite	Refusal
NC3-02	1	33° 36.478'	117° 54.763'	-10.9	-17	8.6	6.3	-17.0	NC3-02-012219	0 to 6.1	Chemistry, composite	N/A
									NC3-02-Z-012219	6.1 to 6.3	Z layer archive	
	2	33° 36.479'	117° 54.764'	-10.9	-17	9.0	6.1	-17.0	NC3-02-012219	0 to 6.1	Composite	N/A
NC3-03	1	33° 36.494'	117° 54.685'	-10.1	-17	7.6	2.8	N/A	N/A	N/A	N/A	Refusal; sample discarded
	2	33° 36.494'	117° 54.685'	-10.1	-17	7.6	5.6	-15.7	NC3-03-012219	0 to 5.6	Chemistry, composite	Refusal
									NC3-03-Z-012219	5.1 to 5.6	Archive of bottom 0.5 feet[2]	
	3	33° 36.494'	117° 54.686'	-10.1	-17	7.8	4.4	-14.5	NC3-03-012219	0 to 4.4	Composite	Refusal
NC3-04	1	33° 36.499'	117° 54.596'	-10.6	-17	4.9	0.0	N/A	N/A	N/A	N/A	Refusal; core tube bent; no recovery
	2	33° 36.499'	117° 54.596'	-11.1	-17	7.6	4.5	-15.6	NC3-04-012319	0 to 4.5	Chemistry, composite	Refusal
									NC3-04-Z-012319	4.0 to 4.5	Archive of bottom 0.5 feet[2]	
	3	33° 36.499'	117° 54.597'	-11.2	-17	8	3.6	-14.8	NC3-04-012319	0 to 3.6	Composite	Refusal
	4	33° 36.499'	117° 54.597'	-11.1	-17	7.8	3.4	N/A	N/A	N/A	N/A	Sample discarded

Notes:
1. Based on North American Datum 1983
2. Z layer depth was not achieved; archived bottom 0.5 foot.
3. Additional 0.5 foot beyond overdepth inadvertently retained in composite sample.
4. Z-layer sample inadvertently collected 0.5 foot below actual Z-layer.

Table 3
Sediment Sample Compositing Scheme and Testing Strategy for Sediment Cores from January 2018 Sampling Event

Dredge Unit	Composite Sample ID	Core ID	Archive	Grain Size Sieve Analysis, Hydrometer Analysis, and Atterberg Limits[1]	Sediment Chemistry	Tier III Biological Testing[2]
Turning Basin	TB-COMP	TB-01 TB-02 TB-03 TB-04 TB-05	Individual cores and Z-layers	N/A	Composite	Composite
Main Channel North 1	MCN1-COMP-T	MCN1-01-T MCN1-02-T MCN1-03-T MCN1-04-T	Individual cores and Z-layers	N/A	Composite	Composite
Main Channel North 2	MCN2-COMP-T	MCN2-01-T MCN2-02-T MCN2-03-T MCN2-04-T	Individual cores and Z-layers	N/A	Composite	Composite
Main Channel North 3	MCN3-COMP	MCN3-01 MCN3-02 MCN3-03 MCN3-04	Individual cores and Z-layers	N/A	Composite	Composite
Main Channel North 4	MCN4-COMP	MCN4-01 MCN4-02 MCN4-03 MCN4-04	Individual cores and Z layers	N/A	Composite	Composite
Main Channel North 5	MCN5-COMP	MCN5-01 MCN5-02 MCN5-03 MCN5-04	Individual cores and Z-layers	N/A	Composite	Composite
Bay Island North	BIN-COMP-T	BIN-01-T BIN-02-T BIN-03-T BIN-04-T BIN-05-T	Individual cores and Z-layers	N/A	Composite	Composite

Dredge Unit	Composite Sample ID	Core ID	Archive	Grain Size Sieve Analysis, Hydrometer Analysis, and Atterberg Limits[1]	Sediment Chemistry	Tier III Biological Testing[2]
Bay Island Middle East	BIME-COMP-T (upper interval)	BIME-01-T BIME-02-T BIME-03-T BIME-04-T	Upper core intervals (mudline to 3 feet below the mudline)	N/A	Upper composite	Based on sediment chemistry results, upper and lower composites were combined for biological testing
	BIME-COMP-M (lower interval)	BIME-01-M BIME-02-M BIME-03-M BIME-04-M	Lower core intervals (3 feet below the mudline to design depth plus overdepth allowance) and Z-layers	N/A	Lower composite	
Bay Island Middle West	BIMW-COMP-T (upper interval	BIMW-01-T BIMW-02-T BIMW-03-T BIMW-04-T	Upper core intervals (mudline to 3 feet below the mudline)	N/A	Upper composite	Based on sediment chemistry results, upper and lower composites were combined for biological testing
	BIMW-COMP-M (lower interval)	BIMW-01-M BIMW-02-M BIMW-03-M BIMW-04-M	Lower core intervals (3 feet below the mudline to design depth plus overdepth allowance) and Z-layers	N/A	Lower composite	
Bay Island South	BIS-COMP	BIS-01 BIS-02 BIS-03 BIS-04	Individual cores and Z-layers	N/A	Composite	Composite
Entrance Channel	EC-COMP	EC-01 EC-02 EC-03 EC-04	Individual cores and Z-layers	Grain size on individual cores or core intervals if stratification observed; Atterberg limits and hydrometer analysis on fine-grained intervals	Composite	Composite
N/A	LA-3 ODMDS Reference	N/A	N/A	N/A	Yes	Yes (SP and BP testing only)

Notes:
1. Compatibility analysis for nearshore placement
2. Biological testing for ocean disposal

Table 4
Sediment Sample Compositing Scheme and Testing Strategy for Sediment Cores from January 2019 Sampling Event

Dredge Unit	Composite Sample ID	Core ID	Archive	Sediment Chemistry	Tier III Biological Testing[1]
Newport Channel 1	N/A	NC1-01 NC1-02	Individual Z-layers	Individual cores	N/A
Newport Channel 2	NC2-COMP	NC1-03 NC1-04 NC2-01 NC2-02 NC2-03 NC2-04	Individual Z-layers	Individual cores and composite	Composite
Newport Channel 3	NC3-COMP	NC3-01 NC3-02 NC3-03 NC3-04	Individual Z-layers	Individual cores and composite	Composite
N/A	LA-3 ODMDS Reference	N/A	N/A	Yes	Yes (SP and BP testing only)

Note:
1. Biological testing for ocean disposal

2.1.1.3 Sediment Core Sampling and Handling

All sediment samples were placed into jars appropriate for physical and chemical analyses. Biological testing samples were placed into clean food-grade polyethylene bags. Physical, chemical, and biological samples were stored in coolers with ice and delivered to the appropriate laboratories for analysis. Chemistry samples were delivered to Eurofins Calscience, Inc., located in Garden Grove, California. Biological testing samples were delivered to Enthalpy Analytical (formerly Nautilus Environmental), in San Diego, California. Grain size sieve analysis samples were stored at ambient temperatures and delivered to Smith-Emery Laboratories in Los Angeles, California. Proper chain-of-custody procedures were followed.

2.1.2 Reference and Site Water Sampling

Reference sediment and site water was collected for both sediment core sampling events. Reference sediment was collected on January 6, 2018, and February 12, 2019. Site water was collected on January 8 and 17, 2018, and January 24, 2019. Reference material was collected by Seaventures Inc., at the LA-3 ODMDS reference site using a pipe dredge. Site water was collected from LNB using a Van Dorn bottle and transferred to low-density polyethylene cubitainers.

2.1.3 Nearshore Receiver Site Grab Sampling

Nearshore receiver site surface sediment grab samples were collected as part of the City's Regional General Permit 54 sediment characterization program on February 2 and March 8, 2018 (Anchor QEA 2018b). Grab samples were collected at 32 stations along four transects perpendicular to the shore. Stations were positioned at 6-foot increments in elevation from 12 to -30 feet MLLW. Based on a request from the City, four additional stations were sampled at an elevation of -36 feet MLLW. The deeper sampling locations were included due to potential health and safety concerns with material placement near existing piers.[1] Grab sampling locations are shown in Figure 17. Station coordinates and mudline elevation for each station are summarized in Table 5. Field logs are provided in Appendix A.

Grab samples above the water line were collected using a stainless-steel scoop. Grab samples below the water line were collected using a stainless-steel scoop by wading out into the water or using a petite Ponar grab sampler deployed from Anchor QEA's sampling vessel. A 1-liter subsample of each grab was collected for grain size analysis and placed in a zip-top bag. Grain size samples were stored in coolers at ambient temperature and delivered to Smith-Emery Laboratories, located in Los Angeles, California. Proper chain-of-custody procedures were followed.

Table 5
Station Coordinates and Mudline Elevations for Each Station from Nearshore Receiver Site

Transect	Station ID	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Sample ID	Analysis
A	A-01	33˚ 36.386'	117˚ 55.610'	12	A-01-020218	Grain size
	A-02	33˚ 36.358'	117˚ 55.622'	6	A-02-020218	Grain size
	A-03	33˚ 36.338'	117˚ 55.630'	0	A-03-020218	Grain size
	A-04	33˚ 36.329'	117˚ 55.633'	-6	A-04-020218	Grain size
	A-05	33˚ 36.250'	117˚ 55.680'	-12	A-05-030718	Grain size
	A-06	33˚ 36.232'	117˚ 55.676'	-18	A-06-030718	Grain size
	A-07	33˚ 36.201'	117˚ 55.686'	-24	A-07-030718	Grain size
	A-08	33˚ 36.179'	117˚ 55.703'	-30	A-08-030718	Grain size
	A-09	33˚ 36.148'	117˚ 55.71'	-36	A-09-030718	Grain size
B	B-01	33˚ 36.228'	117˚ 54.934'	12	B-01-020218	Grain size
	B-02	33˚ 36.224'	117˚ 54.935'	6	B-02-020218	Grain size
	B-03	33˚ 36.206'	117˚ 54.935'	0	B-03-020218	Grain size
	B-04	33˚ 36.198'	117˚ 54.948'	-6	B-04-020218	Grain size

[1] Percent fines of deeper stations were within the range of the other elevations and, therefore, did not affect the overall grain size envelope.

Transect	Station ID	Latitude (Degrees, Decimal Minutes)[1]	Longitude (Degrees Decimal Minutes)[1]	Mudline Elevation (feet MLLW)	Sample ID	Analysis
B	B-05	33˚ 36.172'	117˚ 54.995'	-12	B-05-030718	Grain size
	B-06	33˚ 36.157'	117˚ 54.994'	-18	B-06-030718	Grain size
	B-07	33˚ 36.130'	117˚ 55.004'	-24	B-07-030718	Grain size
	B-08	33˚ 36.113'	117˚ 55.012'	-30	B-08-030718	Grain size
	B-09	33˚ 36.068'	117˚ 55.018'	-36	B-09-030718	Grain size
C	C-01	33˚ 36.054'	117˚ 54.160'	12	C-01-020218	Grain size
	C-02	33˚ 36.049'	117˚ 54.164'	6	C-02-020218	Grain size
	C-03	33˚ 36.038'	117˚ 54.170'	0	C-03-020218	Grain size
	C-04	33˚ 36.032'	117˚ 54.171'	-6	C-04-020218	Grain size
	C-05	33˚ 35.998'	117˚ 54.182'	-12	C-05-020219	Grain size
	C-06	33˚ 35.974'	117˚ 54.190'	-18	C-06-020220	Grain size
	C-07	33˚ 35.946'	117˚ 54.205'	-24	C-07-020221	Grain size
	C-08	33˚ 35.922'	117˚ 54.215'	-30	C-08-020222	Grain size
	C-09	33˚ 35.893'	117˚ 54.222'	-36	C-09-030718	Grain size
D	D-01	33˚ 35.839'	117˚ 53.516'	12	D-01-020218	Grain size
	D-02	33˚ 36.831'	117˚ 53.519'	6	D-02-020218	Grain size
	D-03	33˚ 35.823'	117˚ 53.523'	0	D-03-020218	Grain size
	D-04	33˚ 35.818'	117˚ 53. 525'	-6	D-04-020218	Grain size
	D-05	33˚ 35.775'	117˚ 53.546'	-12	D-05-030718	Grain size
	D-06	33˚ 35.748'	117˚ 53.550'	-18	D-06-030718	Grain size
	D-07	33˚ 35.737'	117˚ 53.559'	-24	D-07-030718	Grain size
	D-08	33˚ 35.700'	117˚ 53.563'	-30	D-08-030718	Grain size
	D-09	33˚ 35.664'	117˚ 53.569'	-36	D-09-030718	Grain size

Note:
1. Based on North American Datum 1983

2.2 Physical and Chemical Analyses of Sediment

Physical and chemical analyses of sediment in this testing program were selected to determine the suitability of proposed dredged material for ocean disposal or nearshore placement. Composite samples, individual cores from Newport Channel, and reference sediment were submitted for analysis of total solids, grain size, total organic carbon (TOC), metals, PAHs, PCB congeners, organochlorine pesticides, organotins, and pyrethroids. Based on composite sample results, archives from individual cores were analyzed for mercury, PCB, and DDTs to further delineate the extent of contamination (Table 6). Based on individual core sample results from Newport Channel, composite samples were created for physical and chemical analyses and biological testing. PCBs included the Southern

California Coastal Water Research Project list of 41 congeners used for the Bight '13 Regional Monitoring Program, which is the same list used in Southern California Total Maximum Daily Loads and recommended by USEPA for dredge material evaluations in Southern California.

All analytical methods used followed USEPA, Standard Method, or ASTM International protocols. Analytical methods and target method detection limits (MDLs) and reporting limits (RLs) are presented in Table 7 of the SAP (Anchor QEA 2017a). Results of chemical analyses were compared to effects range low (ERL) and effects range median (ERM) values developed by Long et al. (1995). In addition, mercury concentrations were compared to the USEPA-recommended threshold of 1 milligram per kilogram (mg/kg).

Table 6
Summary of Analysis Performed on Individual Core Archive Samples

Dredge Unit	Individual Core Chemistry
Turning Basin	Mercury, PCBs
Main Channel North 1	Mercury, DDTs
Main Channel North 2	Mercury, DDTs,
Main Channel North 3	Mercury, DDTs
Main Channel North 4	DDTs
Main Channel North 5	N/A
Bay Island North	DDTs
Bay Island Middle East	DDTs
Bay Island Middle West	DDTs
Bay Island South	DDTs
Entrance Channel	N/A

2.3 Biological Testing

Biological testing was conducted to determine suitability of proposed dredged material for ocean disposal at the USEPA-designated LA-3 ODMDS. Testing included two solid phase (SP), three suspended particulate phase (SPP), and two bioaccumulation potential (BP) tests, as specified in Table 7. All testing was performed by Enthalpy Analytical (formerly Nautilus Environmental). In January 2018, reference sediment and 11 composite samples from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel were submitted for testing. In January 2019, reference sediment and two composite samples from Newport Channel were submitted for testing. Control samples were tested with each species to evaluate test acceptability. All testing was performed in accordance with OTM (USEPA/USACE 1991) guidelines. Test methods, conditions, and acceptability criteria are presented in the SAP (Anchor QEA 2017a).

Table 7
Summary of Biological Testing Performed on Composite Sediment Samples

Test Type	Organism		Reference Sediment	Control Material	Reference Toxicant Test
	Type	Taxon			
SP	Amphipod	*Ampelisca abdita*	LA-3 ODMDS	Native or clean sediment	Cadmium chloride and ammonium chloride
	Polychaete	*Neanthes arenaceodentata*	LA-3 ODMDS	Native or clean sediment	Cadmium chloride
SPP	Bivalve larvae	*Mytilus galloprovincialis*	N/A	Filtered seawater	Ammonium chloride
	Inland silverside fish	*Menidia beryllina*	N/A	Filtered seawater	Copper chloride
	Mysid shrimp	*Americamysis bahia*	N/A	Filtered seawater	Copper chloride
BP	Clam	*Macoma nasuta*	LA-3 ODMDS	Native or clean sediment	N/A
	Polychaete	*Nereis virens*	LA-3 ODMDS	Native or clean sediment	NA

Interstitial ammonia concentrations were measured on project sediments prior to testing. Ammonia concentrations in composite samples from Bay Island North (21.7 milligrams per liter [mg/L]), Bay Island Middle East (26.1 mg/L), Bay Island Middle West (27.8 mg/L), and Bay Island South (26.1 mg/L) were at levels of potential concern for the amphipod SP test (greater than 15 mg/L; USACE et al. 2001). Test sediments were purged to reduce the ammonia concentrations prior to testing by performing daily seawater exchanges per ITM guidance (USEPA/USACE 1998). The test was initiated following 5 days of acclimation when interstitial ammonia concentrations were reduced to 14.0, 17.2, 18.2, and 19.2 mg/L, respectively. In addition, a water-only ammonia reference toxicant test was conducted with the amphipod test to evaluate the contribution of elevated ammonia concentrations on test organism survival. An ammonia reference toxicant test was also run with the bivalve larval development bioassay due to the sensitivity of *Mytilus galloprovincialis* to elevated ammonia concentrations.

2.4 Chemical Analysis of Tissue Residues

Chemical analysis of tissue residues was conducted to determine the bioaccumulation of sediment contaminants. Based on results of sediment chemistry, a subset of chemicals was approved by USEPA for analysis (Appendix B). Tissue samples were analyzed for lipids, mercury, dibutyltin, DDTs, and PCBs (Table 8). Due to the high percentage of sand (98.12%) and low concentrations of contaminants (all concentrations less than the ERL), tissue analysis was not required for the Entrance Channel. Composite samples from each replicate were analyzed separately. Analytical methods and target MDLs and RLs for tissues (reported in wet weight) are presented in Table 7 of the SAP (Anchor QEA 2017a).

Table 8
Summary of Analysis Performed on Tissue Samples

Dredge Unit	Tissue Analysis
Time Zero (T0)	Lipids, Mercury, Dibutyltin, DDTs, PCBs
LA3-REF	Lipids, Mercury, Dibutyltin, DDTs, PCBs
Turning Basin	Lipids, Mercury, Dibutyltin, DDTs, PCBs
Main Channel North 1	Lipids, Mercury, DDTs, PCBs
Main Channel North 2	Lipids, Mercury, DDTs, PCBs
Main Channel North 3	Lipids, Mercury, DDTs, PCBs
Main Channel North 4	Lipids, Mercury, DDTs, PCBs
Main Channel North 5	Lipids, Mercury, DDTs, PCBs
Bay Island North	Lipids, Mercury, DDTs, PCBs
Bay Island Middle East	Lipids, Mercury, DDTs, PCBs
Bay Island Middle West	Lipids, Mercury, DDTs, PCBs
Bay Island South	Lipids, Mercury, DDTs
Entrance Channel	N/A
Newport Channel 2	Lipids, Mercury
Newport Channel 3	Lipids, Mercury

Results of chemical analysis of tissue residues were initially compared against applicable U.S. Food and Drug Administration (FDA) action levels for poisonous or deleterious substances in fish and shellfish for human food, when such levels have been set. In the absence of action levels, or if tissue contaminant concentrations were less than action levels, results were statistically compared to tissue concentrations of organisms exposed to reference sediment in accordance with Section 13.3 of the OTM (USEPA/USACE 1991). Tissue organic chemical concentrations were normalized to lipid concentrations prior to analysis. Data were log-transformed if necessary and assessed for normality using the Shapiro-Wilk test. Homogeneity of variance was assessed using Levene's test. Normally or log-normally distributed data were evaluated using analysis of variance (ANOVA) and Dunnett's multiple comparison tests (if applicable). Non-normally distributed data were assessed using the non-parametric Wilcoxon/Kruskal-Wallis tests and non-parametric Wilcoxon multiple comparisons method (if applicable).

No statistical analysis was performed on chemistry data if both project area data and reference data were non-detects or if the mean concentration of the project area sample was less than the mean concentration in the reference sample or the time zero sample. For situations in which all replicates from the reference area were non-detect and detection limits were identical for each replicate within an analyte group, estimated data values were calculated based on a symmetrical breakdown of the

data range and in such a way that the mean of the estimates centered around a value one-half of the detection limit. This statistical manipulation of data was required to generate means and variances needed to compare project area data to reference data.

If tissue concentrations of organisms exposed to test sediment were statistically elevated compared to organisms exposed to reference sediment, a weight-of-evidence approach was used. This approach included a comparison to TRVs provided in the Environmental Residue-Effects Database (ERED; 2018). TRV selection followed guidelines described in *Support for Sediment Bioaccumulation Evaluation: Toxicity Reference Values for San Francisco Bay* (Lin and Davis 2018). When available, TRVs identified in this document were used. In general, criteria used to select TRVs were as follows:

- Tissue residue effects concentrations for marine invertebrates.
- Ecologically relevant effects (reproduction, survival, development, and growth).
- Lowest concentrations in ERED with endpoint of lowest observable effect dose (LOED), where possible; other endpoints also considered. Where LOEDs were not available, an uncertainty factor was used to estimate the LOED (USACHPPM 2000).
- Measured concentrations in whole organisms, where possible; measurements in specific tissues of the organisms also considered.

The mercury TRV used in this evaluation included the value selected by USEPA at the DMMT meeting on May 22, 2019 (effect on reproduction of the copepod *Acartia tonsa* [0.1 mg/kg]).

3 Results

3.1 Physical and Chemical Analyses of Sediment

In January 2018, reference and composite sediment samples from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel were analyzed for the physical and chemical parameters specified in Table 7 of the SAP (Anchor QEA 2017a). Based on composite sample results, individual core archive samples were analyzed for mercury, PCB, and DDTs, as shown in Table 6. In January 2019, individual core samples from Newport Channel were analyzed for the full suite of physical and chemical parameters. Based on individual core sample results, composite samples were created in coordination with USEPA for ocean disposal testing. Results of physical and chemical analyses of sediment samples are presented below. MDLs, RLs, and raw data for the analyses are presented in the laboratory reports in Appendix C.

3.1.1 Reference and Composite Sediment from January 2018 Sampling Event

Results of physical and chemical analyses of reference and composite sediment samples from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are presented in Table 9. All results are expressed in dry weight unless otherwise indicated.

3.1.1.1 LA-3 ODMDS Reference

Grain size of reference sediment consisted primarily of fines (silt and clay), totaling 76.8%. TOC was measured at a concentration of 2.7%.

Metals, PAHs, pesticides, and PCBs were detected in reference sediment. All metals concentrations were less than ERL values, except nickel. All PAH and PCB concentrations were less than ERL values. One DDT derivative (4,4'-DDE) and total DDTs exceeded ERL values. All concentrations were less than ERM values. Organotins and pyrethroids were not detected in reference sediment.

3.1.1.2 Composite Sediment

Composite sediment from the Turning Basin, Main Channel North, and Bay Island consisted primarily of fines (68.6% to 98.2% silt and clay). Composite sediment from the Entrance Channel consisted primarily of sand (98.1%). TOC ranged from non-detect to 1.9%.

Metals, organotins, pyrethroids, PAHs, pesticides, and PCBs were detected in composite sediment. Mercury exceeded the ERM value in four samples (Turning Basin, and Main Channel North 1, 2, and 3). Dibutyltin and/or tributyltin were detected in all samples, except the Bay Island Middle East (lower depth interval) and Entrance Channel. Dibutyltin ranged from non-detect to 40 micrograms per kilogram (µg/kg), with the highest concentration measured in the Turning Basin. Tributyltin concentrations were lower, ranging from non- detect to 6.8 µg/kg. Bifenthrin, cyfluthrin, cypermethrin, fluvalinate, and permethrin were measured in at least one composite sample. Several

PAHs were detected in composite samples at low concentrations (less than ERL values). Total DDTs exceeded the ERM value in all samples, except the Entrance Channel. Total chlordane exceeded the ERM value in all samples, except the Entrance Channel and Main Channel North 1. Total PCBs exceeded the ERM in the Turning Basin.

Table 9
Results of Physical and Chemical Analyses for Composite Samples from January 2018 Sampling Event

Chemical	ERL	ERM	LA3-REF-010618 1/6/2018 SE	TB-COMP-011218 1/12/2018 SE	MCN1-COMP-T-011518 1/15/2018 SE	MCN2-COMP-T-011618 1/16/2018 SE	MCN3-COMP-011918 1/19/2018 SE	MCN4-COMP-011918 1/19/2018 SE	MCN5-COMP-011818 1/18/2018 SE	BIN-COMP-T-011718 1/17/2018 SE	BIME-COMP-T-011218 1/12/2018 SE	BIME-COMP-M-011218 1/12/2018 SE	BIMW-COMP-T-011018 1/10/2018 SE	BIMW-COMP-M-011018 1/10/2018 SE	BIS-COMP-011218 1/12/2018 SE	EC-COMP-011718 1/18/2018 SE
Conventional Parameters (%)																
Total organic carbon	--	--	**2.7**	**1.9**	0.038 U	**0.98**	**1.1 J**	0.032 U	**1.1 J**	**0.66 J**	**1.7**	**1.4**	**1.5**	**1.2**	**1.7**	**0.089 J**
Total solids	--	--	**52.3**	**45.1**	**45.5**	**48.8**	**52.3**	**54.8**	**54.7**	**51.9**	**49.2**	**53.7**	**48.9**	**52.9**	**47.5**	**82.4**
Grain Size (%)																
Gravel (>2 mm)	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sand (2.00 mm - 1.00 mm)	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.27**
Sand, coarse	--	--	**2.28**	0.01 U	0.01 U	0.01 U	**2.8**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**3.94**
Sand, medium	--	--	**2.44**	0.01 U	0.01 U	**0.22**	**14.85**	**0.64**	**0.092**	**4.14**	**0.01**	0.01 U	0.01 U	**0.02**	0.01 U	**28.92**
Sand, fine	--	--	**5.91**	**7.18**	**4.88**	**6.69**	**6.59**	**10.91**	**5.53**	**13.35**	**1.38**	0.01 U	**2.42**	**5.35**	**0.05**	**56.93**
Sand, very fine	--	--	**12.59**	**10.5**	**3.27**	**7.24**	**7.18**	**14.36**	**9.87**	**8.91**	**10.9**	**1.8**	**7.45**	**8.97**	**8.91**	**8.06**
Silt	--	--	**67.65**	**56.62**	**65.9**	**61.09**	**49.46**	**54.86**	**64.18**	**53.67**	**63.19**	**71.53**	**66.83**	**62.2**	**65.65**	**1.32**
Clay, <5 micron	--	--	**9.14**	**25.7**	**25.94**	**24.76**	**19.12**	**19.23**	**20.33**	**19.98**	**24.53**	**26.67**	**23.29**	**23.47**	**25.4**	**0.55**
Metals (mg/kg)																
Arsenic	8.2	70	**5.27**	**10**	**10.6**	**9.58**	**8.07**	**7.04**	**8.17**	**7.28**	**8.95**	**9.42**	**8.82**	**8.46**	**10.2**	**1.8**
Cadmium	1.2	9.6	**0.824**	**1.41**	**1.7**	**1.94**	**1.74**	**1.85**	**2**	**1.71**	**2.19**	**2.67**	**2.21**	**2.09**	**2.31**	**0.274**
Chromium	81	370	**38.5**	**45.2**	**47.6**	**42.5**	**39.3**	**37.3**	**39.6**	**34.3**	**41.7**	**43**	**43.1**	**41.7**	**41.7**	**6.41**
Copper	34	270	**21**	**127**	**83.7**	**64.1**	**52.1**	**39.9**	**48**	**46.3**	**55.2**	**45.3**	**54.1**	**51.4**	**55.2**	**3.22**
Lead	46.7	218	**9.54**	**85.8**	**50**	**46.8**	**37.3**	**40.4**	**41.6**	**38.9**	**40.2**	**45.2**	**44.4**	**55.5**	**41.3**	**2.47**
Mercury	0.15	0.71	**0.0494**	**3.64**	**1.18**	**1.04**	**0.797**	**0.181**	**0.205**	**0.431**	**0.142**	**0.69**	**0.153**	**0.658**	**0.233**	**0.0125 J**
Nickel	20.9	51.6	**21.6**	**26.6**	**30.3**	**27.5**	**23.7**	**23.5**	**25.4**	**22.8**	**27**	**29.7**	**28.3**	**26.9**	**28.8**	**3.87**
Selenium	--	--	**1.42**	**0.798**	**2.02**	**1.5**	**1.1**	**1.13**	**1.58**	**0.695**	**1.35**	**1.27**	**1.53**	**1.19**	**1.65**	**0.205**
Silver	1	3.7	**0.245**	**0.301**	**0.317**	**0.43**	**0.299**	**0.267**	**0.324**	**0.275**	**0.299**	**0.358**	**0.335**	**0.375**	**0.295**	0.038 U
Zinc	150	410	**82.9**	**208**	**251**	**169**	**143**	**132**	**155**	**144**	**173**	**149**	**174**	**165**	**171**	**17.1**
Organometallic Compounds (µg/kg)																
Butyltin (n-Butyltin)	--	--	2.6 U	3 U	2.9 U	2.8 U	2.6 U	2.4 U	2.5 U	2.7 U	2.8 U	2.6 U	2.8 U	2.6 U	2.9 U	0.83 U
Dibutyltin	--	--	1.4 U	**40**	**22**	**26**	**16**	**22**	**31**	**21**	**3.1 J**	1.4 U	**8.1**	**6.7**	**16**	0.44 U
Tetrabutyltin	--	--	1.4 U	1.6 U	1.6 U	1.5 U	1.4 U	1.3 U	1.3 U	1.4 U	1.5 U	1.4 U	1.5 U	1.4 U	1.6 U	0.45 U
Tributyltin	--	--	2.8 U	**6.8**	3.2 U	3 U	2.8 U	2.6 U	2.6 U	2.9 U	3 U	2.8 U	3 UJ	2.8 U	3.1 U	0.89 U
PAHs (µg/kg)																
1-Methylnaphthalene	--	--	4.4 U	5.2 U	5.1 U	4.7 U	4.4 U	4.2 U	4.2 U	4.4 U	4.7 U	4.3 U	4.8 U	4.4 U	4.9 U	2.8 U
2-Methylnaphthalene	70	670	4.4 U	5.2 U	5.1 U	4.7 U	4.4 U	4.2 U	4.2 U	4.4 U	4.7 U	4.3 U	4.8 U	4.4 U	4.9 U	2.8 U
Acenaphthene	16	500	4.5 U	5.2 U	5.1 U	4.8 U	4.5 U	4.3 U	4.3 U	4.5 U	4.8 U	4.3 U	4.8 U	4.4 U	5 U	2.8 U
Acenaphthylene	44	640	3.4 U	**8.1 J**	3.9 U	3.6 U	3.4 U	3.2 U	3.2 U	3.4 U	3.6 U	3.3 U	3.7 U	3.4 U	3.8 U	2.1 U
Anthracene	85.3	1,100	6.6 U	**19 J**	7.6 U	**7.6 J**	6.6 U	6.3 U	6.3 U	6.6 U	7 U	6.4 U	7.1 U	6.5 U	7.3 U	4.2 U
Benzo(a)anthracene	261	1,600	**7.4 J**	**50**	**17 J**	**16 J**	**14 J**	**17 J**	**18 J**	**16 J**	**16 J**	**14 J**	**16 J**	**17 J**	**22**	2.6 U
Benzo(a)pyrene	430	1,600	**7.9 J**	**130**	**32**	**31**	**24**	**28**	**30**	**25**	**25**	**19**	**25**	**26**	**33**	2.2 U
Benzo(b)fluoranthene	--	--	**8.7 J**	**180**	**43**	**37**	**31**	**34**	**38**	**30**	**33**	**28**	**30**	**35**	**43**	3.3 U
Benzo(g,h,i)perylene	--	--	**11 J**	**120**	**39**	**33**	**22**	**26**	**29**	**30**	**32**	**23**	**34**	**31**	**38**	1.8 U
Benzo(k)fluoranthene	--	--	**6.2 J**	**140**	**30**	**31**	**25**	**31**	**31**	**27**	**23**	**20**	**28**	**28**	**36**	3.3 U
Chrysene	384	2,800	**7.4 J**	**74**	**23**	**21**	**19 J**	**24**	**26**	**22**	**23**	**18 J**	**23**	**22**	**29**	2.7 U
Dibenzo(a,h)anthracene	63.4	260	3.7 U	**32**	**12 J**	**5.7 J**	**7.1 J**	**7 J**	**7.4 J**	**7.7 J**	**8.2 J**	**4.6 J**	**8.1 J**	**7.7 J**	**11 J**	2.3 U
Fluoranthene	600	5,100	**14 J**	**77**	**25**	**25**	**20**	**30**	**29**	**25**	**25**	**20**	**25**	**25**	**34**	2.2 U
Fluorene	19	540	5.9 U	6.9 U	6.8 U	6.4 U	5.9 U	5.6 U	5.7 U	5.9 U	6.3 U	5.8 U	6.4 U	5.9 U	6.6 U	3.7 U

Chemical	ERL	ERM	LA3-REF-010618 1/6/2018 SE	TB-COMP-011218 1/12/2018 SE	MCN1-COMP-T-011518 1/15/2018 SE	MCN2-COMP-T-011618 1/16/2018 SE	MCN3-COMP-011918 1/19/2018 SE	MCN4-COMP-011918 1/19/2018 SE	MCN5-COMP-011818 1/18/2018 SE	BIN-COMP-T-011718 1/17/2018 SE	BIME-COMP-T-011218 1/12/2018 SE	BIME-COMP-M-011218 1/12/2018 SE	BIMW-COMP-T-011018 1/10/2018 SE	BIMW-COMP-M-011018 1/10/2018 SE	BIS-COMP-011218 1/12/2018 SE	EC-COMP-011718 1/18/2018 SE
Indeno(1,2,3-c,d)pyrene	--	--	**7.7 J**	**96**	**29**	**25**	**18 J**	**21**	**24**	**23**	**25**	**18 J**	**26**	**24**	**30**	1.9 U
Naphthalene	160	2,100	6.6 U	7.7 U	7.6 U	7.1 U	6.6 U	6.3 U	6.3 U	6.6 U	7 U	6.4 U	7.1 U	6.5 U	7.3 U	4.2 U
Phenanthrene	240	1,500	**6.7 J**	**30**	**9.7 J**	**9.7 J**	**7.7 J**	**11 J**	**11 J**	**9.7 J**	**9 J**	**7.9 J**	**9.8 J**	**12 J**	**12 J**	2.7 U
Pyrene	665	2,600	**16 J**	**95**	**36**	**34**	**34**	**42**	**46**	**40**	**41**	**45**	**48**	**54**	**61**	2.7 U
Total HPAH (9 of 17) (U = 0)	1,700	9,600	**86.3 J**	**994**	**286 J**	**258.7 J**	**214.1 J**	**260 J**	**278.4 J**	**245.7 J**	**251.2 J**	**209.6 J**	**263.1 J**	**269.7 J**	**337 J**	3.3 U
Total LPAH (8 of 17) (U = 0)	552	3,160	**6.7 J**	**57.1 J**	**9.7 J**	**17.3 J**	**7.7 J**	**11 J**	**11 J**	**9.7 J**	**9 J**	**7.9 J**	**9.8 J**	**12 J**	**12 J**	4.2 U
Total PAH (17) (U = 0)	4,022	44,792	**93 J**	**1,051 J**	**295.7 J**	**276 J**	**221.8 J**	**271 J**	**289.4 J**	**255.4 J**	**260.2 J**	**217.5 J**	**272.9 J**	**281.7 J**	**349 J**	4.2 U
Pesticides (µg/kg)																
2,4'-DDD (o,p'-DDD)	--	--	0.54 U	0.63 U	**5.8**	**6.4**	**5.4**	**4.9**	**2.5**	**5.3**	**3.3**	**12**	**4.6**	**6.9**	**3.6**	0.34 U
2,4'-DDE (o,p'-DDE)	--	--	**2.7 J**	**5.2**	**7.8**	**9.5**	**7.3**	**7.9**	**6**	**7.1**	**5.3**	**12**	**6**	**9.9**	**7.4**	1.2 U
2,4'-DDT (o,p'-DDT)	--	--	0.6 U	0.69 U	0.68 U	0.64 U	0.59 U	0.57 U	0.57 U	0.6 U	0.63 U	0.58 U	0.64 U	0.59 U	**0.71 J**	0.38 U
4,4'-DDD (p,p'-DDD)	2	20	**1.2 J**	**12**	**32**	**37**	**36**	**30**	**14**	**27 J**	**20 J**	**100**	**31**	**51**	**27**	0.6 U
4,4'-DDE (p,p'-DDE)	2.2	27	**9.3**	**37**	**54**	**66**	**52**	**75**	**70**	**76**	**90**	**79**	**120**	**90**	**110**	**0.88 J**
4,4'-DDT (p,p'-DDT)	1	7	0.83 UJ	**5.6**	**3**	**2.2**	**2.3**	**3.4**	**4.3**	**5.4**	**6.6**	**4.6**	**3.5**	**1.9**	**6.5**	0.53 U
Aldrin	--	--	0.83 U	0.96 U	0.95 U	0.9 U	0.83 U	0.79 U	0.8 U	0.84 U	0.88 U	0.81 U	0.89 U	0.83 U	0.91 U	0.53 U
Chlordane, alpha- (Chlordane, cis-)	--	--	0.77 U	**1.4 J**	**1.1 J**	**1.4 J**	**2.2**	**1.9**	**1.3 J**	**2.3**	**3.1**	**2**	**2.8**	**1.6 J**	**1.5 J**	0.49 U
Chlordane, gamma- (Chlordane, trans-)	--	--	1.7 U	**2.1 J**	1.9 U	**2.2 J**	**2.1 J**	**4.5**	**3.4 J**	**3.9**	**4.9**	**6.9**	**4.8**	**5.7**	**2.8 J**	1.1 U
Dieldrin	0.02	8	*0.83 U*	**1.9 J**	**1.1 J**	**1.3 J**	**0.97 J**	**2**	*0.8 U*	**1.4 J**	**1.1 J**	**1.8 J**	**0.95 J**	**1.2 J**	*0.91 U*	*0.53 U*
Endosulfan sulfate	--	--	0.99 U	1.1 U	1.1 U	1.1 U	0.98 U	0.94 U	0.95 U	1 U	1 U	0.96 U	1.1 U	0.99 U	1.1 U	0.63 U
Endosulfan, alpha- (I)	--	--	0.75 U	0.87 U	0.86 U	0.81 U	0.75 U	0.72 U	0.72 U	0.76 U	0.79 U	0.73 U	0.81 U	0.75 U	0.83 U	0.48 U
Endosulfan, beta (II)	--	--	0.9 U	1 U	1 U	0.96 U	0.89 U	0.85 U	0.86 U	0.9 U	0.94 U	0.87 U	0.96 U	0.89 U	0.98 U	0.57 U
Endrin	--	--	0.92 U	1.1 U	1 U	0.99 U	0.91 U	0.87 U	0.88 U	0.92 U	0.96 U	0.89 U	0.98 U	0.91 U	1 U	0.58 U
Endrin aldehyde	--	--	1.2 U	1.3 U	1.3 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.1 U	1.2 U	1.1 U	**-- R**	0.73 U
Endrin ketone	--	--	0.96 U	1.1 U	1.1 U	1 U	0.95 U	0.91 U	0.91 U	0.96 U	1 U	0.93 U	1 U	0.95 U	1 U	0.6 U
Heptachlor	--	--	0.82 U	0.95 U	0.94 U	0.89 U	0.81 U	0.78 U	0.79 U	0.82 U	0.87 U	0.8 U	0.88 U	0.82 U	0.9 U	0.52 U
Heptachlor epoxide	--	--	**1.9 J**	**3.6 J**	**1.7 J**	**1.8 J**	1.4 U	1.3 U	1.3 U	1.4 U	1.5 U	1.4 U	1.5 U	1.4 U	1.5 U	0.89 U
Hexachlorocyclohexane (BHC), alpha-	--	--	1.4 U	1.6 U	1.6 U	1.5 U	1.4 U	1.3 U	1.3 U	1.4 U	1.5 U	1.4 U	1.5 U	1.4 U	1.5 U	0.89 U
Hexachlorocyclohexane (BHC), beta-	--	--	0.95 U	1.1 U	1.1 U	1 U	0.94 U	0.9 U	0.9 U	0.95 U	0.99 U	0.92 U	1 U	0.94 U	1 U	0.6 U
Hexachlorocyclohexane (BHC), delta-	--	--	1.7 U	1.9 U	1.9 U	1.8 U	1.7 U	1.6 U	1.6 U	1.7 U	1.8 U	1.6 U	1.8 U	1.7 U	1.8 U	1.1 U
Hexachlorocyclohexane (BHC), gamma- (Lindane)	--	--	0.85 U	0.98 U	0.97 U	0.91 U	0.84 U	0.81 U	0.81 U	0.85 U	0.89 U	0.82 U	0.91 U	0.84 U	0.93 U	0.54 U
Methoxychlor	--	--	1.1 UJ	1.2 U	1.2 U	1.1 U	1 U	1 U	1 U	1.1 U	1.1 U	1 U	1.1 U	1.1 U	1.2 U	0.67 U
Nonachlor, cis-	--	--	0.49 U	0.57 U	0.56 U	0.53 U	0.49 U	0.47 U	**1.2 J**	0.49 U	**1.4 J**	0.48 U	**2.3**	**2.1**	**1.3 J**	0.31 U
Nonachlor, trans-	--	--	0.52 U	**2.8**	**2.1 J**	**2.5**	**2.1**	**3.1**	**2.4**	**4.7**	**3.6**	**3.7**	**4.7**	**3.4**	**3.4**	0.33 U
Oxychlordane	--	--	0.51 U	0.59 U	0.59 U	0.55 U	0.51 U	0.49 U	0.49 U	0.51 U	0.54 U	0.5 U	0.55 U	0.51 U	0.56 U	0.32 U
Total Chlordane (U = 0)	0.5	6	*1.7 U*	**6.3 J**	**3.2 J**	**6.1 J**	**6.4 J**	**9.5**	**8.3 J**	**10.9**	**13 J**	**12.6**	**14.6**	**12.8 J**	**9 J**	*1.1 U*
Total DDx (U = 0)	1.58	46.1	**13.2 J**	**59.8**	**103**	**121**	**103**	**121**	**96.8**	**121 J**	**125 J**	**208**	**165**	**160**	**155 J**	**0.88 J**
Toxaphene	--	--	17 U	20 U	20 U	18 U	17 U	16 U	16 U	17 U	18 U	17 U	18 U	17 U	19 U	11 U
Pyrethroids (µg/kg)																
Allethrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Bifenthrin	--	--	0.57 U	**2.6**	**3.1**	**2.2**	**2.7**	0.55 U	0.54 U	0.57 UJ	**4.5**	0.56 U	0.61 U	0.56 U	0.63 U	0.36 U
Cyfluthrin	--	--	0.48 U	**1.4**	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	**0.63 J**	0.3 U
Cypermethrin	--	--	0.48 U	**1 J**	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Deltamethrin/Tralomethrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Fenpropathrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Fenvalerate	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U

Chemical	Sample ID		LA3-REF-010618	TB-COMP-011218	MCN1-COMP-T-011518	MCN2-COMP-T-011618	MCN3-COMP-011918	MCN4-COMP-011918	MCN5-COMP-011818	BIN-COMP-T-011718	BIME-COMP-T-011218	BIME-COMP-M-011218	BIMW-COMP-T-011018	BIMW-COMP-M-011018	BIS-COMP-011218	EC-COMP-011718
	Sample Date		1/6/2018	1/12/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/18/2018	1/17/2018	1/12/2018	1/12/2018	1/10/2018	1/10/2018	1/12/2018	1/18/2018
	Matrix		SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
	ERL	ERM														
Fluvalinate	--	--	0.48 U	**1.2**	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	**0.82 J**	0.3 UJ
Lambda-cyhalothrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Permethrin	--	--	0.96 U	**1.5 J**	1.1 U	1 U	0.95 U	0.91 U	0.9 U	0.95 UJ	1 U	0.93 U	1 U	0.94 U	1.1 U	**0.94 J**
Phenothrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Resmethrin/Bioresmethrin	--	--	0.81 U	0.94 U	0.93 U	0.87 U	0.81 U	0.78 U	0.77 U	0.81 UJ	0.86 U	0.79 U	0.86 U	0.8 U	0.89 U	0.51 U
Tetramethrin	--	--	0.57 U	0.67 U	0.66 U	0.61 U	0.57 U	0.55 U	0.54 U	0.57 UJ	0.61 U	0.56 U	0.61 U	0.56 U	0.63 U	0.36 U
PCB Congeners (µg/kg)																
PCB-018	--	--	0.12 U	**6.8**	0.14 U	0.13 U	**0.75**	0.12 U	0.12 U	0.12 U	0.13 U	0.12 U	0.13 U	0.12 U	0.14 U	0.078 U
PCB-028	--	--	0.13 U	**8.2**	0.15 U	0.14 U	**1.5**	0.13 U	0.13 U	0.13 U	0.14 U	**1.1**	0.14 U	**1.2**	0.15 U	0.083 U
PCB-037	--	--	0.11 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.11 U	0.12 U	0.12 U	0.11 U	0.12 U	0.11 U	0.13 U	0.072 U
PCB-044	--	--	0.29 U	**8**	**2.1**	**1.5**	**1.3**	0.27 U	**1.2**	0.29 U	**0.73**	**1.8**	0.31 U	**1.4**	**1.1**	0.18 U
PCB-049	--	--	0.094 U	**7.9**	**1.5**	**1.5**	**1.2**	**0.63**	**0.98**	**0.66**	**0.49**	**1.3**	0.1 U	**1.1**	**0.69**	0.059 U
PCB-052	--	--	0.36 U	**10**	**1.8**	**2**	**1.7**	**1.2**	**1.2**	**1.1**	**0.89**	**1.7**	**0.8**	**1.5**	**1.3**	0.23 U
PCB-066	--	--	0.23 U	**14**	**2.5**	**2.7**	**2.3**	**1.4**	**1.3**	**1.5**	**0.94**	**2.2**	**0.95**	**2**	**0.91**	0.15 U
PCB-070	--	--	0.14 U	**10**	**1.6**	**2**	**1.8**	**1.3**	**1**	**1.2**	**0.61**	**1.7**	**0.54**	**1.2**	**0.84**	0.086 U
PCB-074	--	--	0.17 U	**5.3**	**0.99**	**1.3**	**1**	**0.54**	0.16 U	**0.96**	0.18 U	**1.1**	0.18 U	**1.1**	0.19 U	0.11 U
PCB-077	--	--	0.22 U	**2.6**	0.25 U	0.24 U	0.22 U	0.21 U	0.21 U	0.22 U	0.23 U	**0.48**	0.24 U	0.22 U	0.24 U	0.14 U
PCB-081	--	--	0.17 U	0.2 U	0.2 U	0.18 U	0.17 U	0.16 U	0.16 U	0.17 U	0.18 U	0.17 U	0.18 U	0.17 U	0.19 U	0.11 U
PCB-087	--	--	0.21 U	**3.9**	0.24 U	0.23 U	**1.8**	**1.4**	**2.2**	**2.2**	**1.8**	**1.8**	**2.3**	**1.7**	**1.6**	0.13 U
PCB-099	--	--	0.09 U	**8.2**	**2.2**	**2.3**	**1.7**	**1**	**1.5**	**1.7**	**0.84**	**1.6**	**1.1**	**1.4**	**0.95**	0.057 U
PCB-101	--	--	0.084 U	**13**	**3.2**	**3.6**	**3**	**2.1**	**2.2**	**2.2**	**1.7**	**2.7**	**1.6**	**2.6**	**1.7**	0.053 U
PCB-105	--	--	0.1 U	**5.1**	0.12 U	0.11 U	0.1 U	0.097 U	0.097 U	0.1 U	0.11 U	**2.1**	0.11 U	**1.7**	0.11 U	0.064 U
PCB-110	--	--	0.064 U	**12**	**2.7**	**3.4**	**2.8**	**2.1**	**2.2**	**1.9**	**1.5**	**2.5**	**1.7**	**2.8**	**1.8**	0.04 U
PCB-114	--	--	0.14 U	0.16 U	0.16 U	0.15 U	0.14 U	0.13 U	0.13 U	0.14 U	0.15 U	0.14 U	0.15 U	0.14 U	0.16 U	0.089 U
PCB-118	--	--	**0.65**	**12**	**3.1**	**3.7**	**3**	**1.7**	**1.7**	**1.7**	**1.3**	**2**	**1.2**	**2.4**	**1.1**	0.041 U
PCB-119	--	--	0.12 U	0.14 U	0.14 U	0.13 U	0.12 U	0.11 U	0.11 U	0.12 U	0.13 U	0.12 U	0.13 U	0.12 U	0.13 U	0.075 U
PCB-123	--	--	0.14 U	0.16 U	0.16 U	0.15 U	0.14 U	0.13 U	0.13 U	0.14 U	0.15 U	0.13 U	**1.2**	0.14 U	0.15 U	0.087 U
PCB-126	--	--	0.1 U	0.12 U	0.12 U	0.11 U	0.1 U	0.099 U	0.099 U	0.1 U	0.11 U	0.1 U	0.11 U	0.1 U	0.12 U	0.066 U
PCB-128	--	--	0.23 U	0.27 U	0.26 U	0.24 U	0.23 U	0.22 U	0.22 U	0.23 U	0.24 U	0.22 U	0.25 U	0.23 U	0.25 U	0.14 U
PCB-132/153	--	--	**0.62 J**	**14**	**4.9**	**6.2**	**4.6**	**3.4**	**3.4**	**3.6**	**2.3**	**3.7**	**2.8**	**3.8**	**2.6**	0.19 U
PCB-138/158	--	--	0.67 U	**12**	**4.6**	**5.2**	**3.9**	**3.2**	**3.2**	**3.4**	**2.7**	**3.3**	**2.5**	**3.6**	**2.6**	0.42 U
PCB-149	--	--	**0.46**	**8.2**	**3.3**	**4.1**	**3.1**	**2.1**	**2.2**	**2.2**	**1.7**	**2.9**	**1.6**	**2.5**	**1.9**	0.14 U
PCB-151	--	--	0.17 U	**3.2**	0.19 U	**2**	**0.92**	**1**	**0.66**	**0.85**	**0.74**	**0.93**	**0.57**	**0.84**	0.18 U	0.1 U
PCB-156	--	--	0.15 U	0.17 U	0.17 U	0.16 U	0.15 U	0.14 U	0.14 U	0.15 U	0.16 U	0.14 U	0.16 U	0.15 U	0.16 U	0.092 U
PCB-157	--	--	0.16 U	0.19 U	0.19 U	0.17 U	0.16 U	0.15 U	0.15 U	0.16 U	0.17 U	0.16 U	0.17 U	0.16 U	0.18 U	0.1 U
PCB-167	--	--	0.25 U	0.29 U	0.29 U	0.27 U	0.25 U	0.24 U	0.24 U	0.25 U	0.27 U	0.25 U	0.27 U	0.25 U	0.28 U	0.16 U
PCB-168	--	--	0.27 U	0.32 U	0.31 U	0.29 U	0.27 U	0.26 U	0.26 U	0.27 U	0.29 U	0.26 U	0.29 U	0.27 U	0.3 U	0.17 U
PCB-169	--	--	0.12 U	**0.61**	0.14 U	0.13 U	0.12 U	0.12 U	0.12 U	0.12 U	0.13 U	0.12 U	0.13 U	0.12 U	0.14 U	0.078 U
PCB-170	--	--	0.21 U	**3.8**	0.24 U	**2.4**	**1.5**	**1.3**	**1**	0.21 U	**0.92**	0.2 U	**0.91**	**1.3**	0.23 U	0.13 U
PCB-177	--	--	0.22 U	**2.5**	0.26 U	**1.1**	**1.1**	**0.61**	**0.89**	**0.7**	**0.48**	**0.65**	**0.41**	**0.78**	0.25 U	0.14 U
PCB-180	--	--	0.17 U	**9.2**	**3.6**	**4.5**	**2.8**	**2.1**	**1.9**	**2.5**	**1.8**	**2.6**	**2**	**2.7**	**1.7**	0.11 U
PCB-183	--	--	0.18 U	**2.3**	**1.2**	**1.2**	**0.86**	**0.52**	**0.63**	**0.62**	**0.59**	**0.73**	**0.49**	**0.78**	**0.63**	0.11 U
PCB-187	--	--	0.19 U	**5.8**	**2.4**	**2.7**	**1.5**	**1.4**	**1.2**	**1.4**	**0.94**	**1.5**	**1.4**	**1.5**	**1.3**	0.12 U
PCB-189	--	--	0.12 U	0.14 U	0.14 U	0.13 U	0.12 U	0.12 U	0.12 U	0.12 U	0.13 U	0.12 U	0.13 U	0.12 U	0.14 U	0.077 U
PCB-194	--	--	0.14 U	**3**	0.16 U	0.15 U	0.14 U	0.13 U	0.13 U	0.14 U	0.15 U	0.14 U	0.15 U	**1.1**	0.16 U	0.088 U

Chemical	Sample ID Sample Date Matrix ERL	 ERM	LA3-REF-010618 1/6/2018 SE	TB-COMP-011218 1/12/2018 SE	MCN1-COMP-T-011518 1/15/2018 SE	MCN2-COMP-T-011618 1/16/2018 SE	MCN3-COMP-011918 1/19/2018 SE	MCN4-COMP-011918 1/19/2018 SE	MCN5-COMP-011818 1/18/2018 SE	BIN-COMP-T-011718 1/17/2018 SE	BIME-COMP-T-011218 1/12/2018 SE	BIME-COMP-M-011218 1/12/2018 SE	BIMW-COMP-T-011018 1/10/2018 SE	BIMW-COMP-M-011018 1/10/2018 SE	BIS-COMP-011218 1/12/2018 SE	EC-COMP-011718 1/18/2018 SE
PCB-201	--	--	0.064 U	**0.64**	0.074 U	0.069 U	0.065 U	0.061 U	0.062 U	0.065 U	0.069 U	0.063 U	0.07 U	0.064 U	0.072 U	0.041 U
PCB-206	--	--	0.22 U	**2.6**	0.25 U	0.24 U	0.22 U	0.21 U	0.21 U	0.22 U	0.23 U	0.21 U	0.24 U	0.22 U	0.24 U	0.14 U
Total PCB Congener (U = 0)	22.7	180	**1.73 J**	**195**	**41.7**	**53.4**	**44.1**	**29**	**30.6**	**30.4**	**23.0**	**40.4**	**24.1**	**41**	**22.7**	0.42 U

Notes:
All non-detect results are reported at the MDL.
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.
Gamma chlordane and trans-chlordane are synonymous and refer to CAS RN 5103-74-2.
Total chlordane is the sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane.
Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.
Total HPAH (9 of 17) is the sum of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthenes, benzo(k)fluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene (if analyzed).
Total LPAH (8 of 17) is the sum of 1-methylnaphthalene, 2-methylnapthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene (if analyzed).
Total PCB congeners is the sum of all PCB congeners listed in this table.
Detected concentration is greater than ERL screening level
Detected concentration is greater than ERM screening level
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
R: rejected
U: compound analyzed but not detected above detection limit

3.1.2 Individual Core Archive Samples from January 2018 Sampling Event

Based on composite sample results, individual core samples were analyzed for mercury, PCBs, and DDTs, as requested by USEPA (Table 6). Mercury, PCB, and DDT results for individual core samples are presented in Table 10. All results are expressed in dry weight unless otherwise indicated.

Within individual core samples, mercury ranged from 0.088 to 5 mg/kg. Mercury exceeded the ERM value in 13 samples. Total PCBs ranged from 74.5 to 403 µg/kg. Total PCBs exceeded the ERM value in three samples. Total DDTs ranged from 25.9 to 299 µg/kg. Total DDTs exceeded the ERM value in all samples, except two (MCN3-04 and BIN-03). Mercury, total DDT, and total PCB concentrations for individual core samples are shown in Figures 18, 19, and 20, respectively.

Table 10
Results of Mercury, DDT, and PCB Analysis for Individual Core Archive Samples from January 2018 Sampling Event

Chemical	Sample ID / Sample Date / Matrix	ERL	ERM	TB-01-011218 1/12/2018 SE	TB-02-011218 1/12/2018 SE	TB-03-011218 1/12/2018 SE	TB-04-011218 1/12/2018 SE	TB-05-011218 1/12/2018 SE	TB-06-011218 1/12/2018 SE	MCN1-01-T-011518 1/15/2018 SE	MCN1-02-T-011518 1/15/2018 SE	MCN1-03-T-011518 1/15/2018 SE	MCN1-04-T-011518 1/15/2018 SE	MCN2-01-T-011518 1/15/2018 SE	MCN2-02-T-011518 1/15/2018 SE	MCN2-03-T-011518 1/15/2018 SE	MCN2-04-T-011618 1/16/2018 SE	MCN3-01-011918 1/19/2018 SE	MCN3-02-011918 1/19/2018 SE	MCN3-03-011918 1/19/2018 SE	MCN3-04-011918 1/19/2018 SE	MCN4-01-011918 1/19/2018 SE	MCN4-02-011818 1/18/2018 SE	MCN4-03-011818 1/18/2018 SE
Conventional Parameters (%)																								
Total solids		--	--	57.2	57.3	51.7	43.1	44.2	52.3	43	51.1	42.8	46.6	40.4	44.7	50.6	48.1	52.1	51.4	50	63.7	58.8	55.3	54.8
Metals (mg/kg)																								
Mercury		0.15	0.71	2.54	2.72	5	0.776	1.4	3.37	1.66	1.41	0.525	0.547	1.67	0.603	2.2	0.775	1.15	1.57	0.4	0.088	--	--	--
Pesticides (µg/kg)																								
2,4'-DDD (o,p'-DDD)		--	--	--	--	--	--	--	--	2.2 J	5.9	3.1	4.1	7.4	4.4	2.5	4.6	7.1	4.8	4.2	1.4 J	5.3	4.3	3.2
2,4'-DDE (o,p'-DDE)		--	--	--	--	--	--	--	--	3.3 J	5.2	4.7	6.5	9.2	6.6	3.5 J	9.5	8.7	8.5	9.4	1.7 J	6.6	10	4.1
2,4'-DDT (o,p'-DDT)		--	--	--	--	--	--	--	--	0.73 U	0.62 U	0.73 U	0.68 U	0.77 U	0.7 U	0.62 U	0.65 U	0.6 U	0.61 U	0.62 U	0.49 U	0.54 U	0.57 U	0.57 U
4,4'-DDD (p,p'-DDD)		2	20	--	--	--	--	--	--	6.9	35	15	18	40	17 J	14	22	37	30	16 J	3.7	27	15 J	12 J
4,4'-DDE (p,p'-DDE)		2.2	27	--	--	--	--	--	--	50	34	63	64	54	81	24	97	57	55	66	18	85	76	67
4,4'-DDT (p,p'-DDT)		1	7	--	--	--	--	--	--	8.2	4.7	5.1 J	5	7.7	6.1	4.4	7.4	5	5.7	5.4	1.1 J	4.5	2.4	1.8
Total DDx (U = 0)		1.58	46.1	--	--	--	--	--	--	70.6 J	84.8	90.9 J	97.6	118	115.1 J	48.4 J	141	115	104	101 J	25.9 J	128	107.7 J	88.1 J
PCB Congeners (µg/kg)																								
PCB-018		--	--	5.1	3	25	1.2	2.8	2.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-028		--	--	5.7	4.6	29	3.1	3	5.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-037		--	--	0.11 U	0.11 U	4.2	0.14 U	0.14 U	0.12 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-044		--	--	7	5.2	24	2.3	3	5.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-049		--	--	4.3	3.5	24	2.8	2.6	5.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-052		--	--	9.4	6.3	32	3.7	4.4	6.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-066		--	--	9.7	8.8	43	5.2	4.8	9.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-070		--	--	9.7	6	31	2.8	3.3	6.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-074		--	--	4.8	3.9	15	2.1	1.9	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-077		--	--	1.5	0.2 U	3.2	1.6	0.26 U	1.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-081		--	--	0.16 U	0.16 U	0.17 U	0.21 U	0.2 U	0.17 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-087		--	--	7.4	4	5.2	2.6	2.2	4.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-099		--	--	7.2	5.5	16	4.4	3.9	6.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-101		--	--	16	9.6	23	7.2	5.6	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-105		--	--	8	3.9	7.8	2.4	1.8	5.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-110		--	--	15	9.3	21	6.5	5	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-114		--	--	0.13 U	0.13 U	0.14 U	0.17 U	0.17 U	0.14 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-118		--	--	15	9.7	20	5.9	4	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-119		--	--	0.11 U	0.11 U	0.12 U	0.14 U	0.14 U	0.12 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-123		--	--	0.13 U	0.13 U	0.14 U	0.17 U	0.16 U	0.14 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-126		--	--	0.096 U	0.095 U	0.11 U	0.13 U	0.12 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-128		--	--	3.8	0.21 U	2	1.7	0.27 U	2.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-132/153		--	--	17	10	18	9.8	6.4	15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-138/158		--	--	18	10	14	8.9	5.7	14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-149		--	--	11	7.2	9.9	6	3.6	9.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-151		--	--	4.2	2.7	3.5	2.5	1.4	3.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-156		--	--	2.1	1.2	1.8	0.18 U	0.17 U	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-157		--	--	0.15 U	0.15 U	0.16 U	0.2 U	0.19 U	0.16 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-167		--	--	0.23 U	0.23 U	0.26 U	0.31 U	0.3 U	0.25 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-168		--	--	0.25 U	0.25 U	0.28 U	0.33 U	0.32 U	0.27 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-169		--	--	2	1	0.95	0.15 U	0.15 U	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-170		--	--	6.1	3.8	4.1	3.1	1.9	5.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-177		--	--	2.7	2	2.6	2.2	0.26 U	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-180		--	--	15	6.5	8.8	6.6	3.7	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-183		--	--	3.7	1.6	2	2.1	0.93	2.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-187		--	--	9.3	4.1	6	4.8	2.6	6.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-189		--	--	0.11 U	0.11 U	0.12 U	0.15 U	0.14 U	0.12 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-194		--	--	7.1	2.5	2.8	2.3	0.17 U	4.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-201		--	--	1.8	0.059 U	0.066 U	0.079 U	0.077 U	0.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-206		--	--	9.6	2.1	3	1.7	0.26 U	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)		22.7	180	239	138	403	106	74.5	187	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Chemical	Sample ID / Sample Date / Matrix		MCN4-04-011818 1/18/2018 SE	BIME-01-TM-030518 3/5/2018 SE	BIME-02-TM-030518 3/5/2018 SE	BIME-03-TM-030518 3/5/2018 SE	BIME-04-TM-030518 3/5/2018 SE	BIMW-01-TM-030518 3/5/2018 SE	BIMW-02-TM-030518 3/5/2018 SE	BIMW-03-TM-030518 3/5/2018 SE	BIMW-04-TM-030518 3/5/2018 SE	BIN-01-T-011618 1/16/2018 SE	BIN-02-T-011618 1/16/2018 SE	BIN-03-T-011618 1/16/2018 SE	BIN-04-T-011618 1/16/2018 SE	BIN-05-T-011618 1/16/2018 SE	BIN-06-T-011618 1/17/2018 SE	BIS-01-011118 1/11/2018 SE	BIS-02-011118 1/11/2018 SE	BIS-03-011118 1/11/2018 SE	BIS-04-011118 1/11/2018 SE
	ERL	ERM																			
Conventional Parameters (%)																					
Total solids	--	--	53.7	50	52.2	49.4	49.6	49.7	52	48	48.1	53.1	57.3	57.7	49.8	49.3	58.6	52.2	48.1	46.6	47.5
Metals (mg/kg)																					
Mercury	0.15	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																					
2,4'-DDD (o,p'-DDD)	--	--	4	3.9	4.7	3.5	3.7	5.3	8.6	3.9	5.2	11	3.4	1.1 J	4.6	5.3	5	4.5	9.5	2.6	2.6
2,4'-DDE (o,p'-DDE)	--	--	6	4.9	5	7.1	4.6	12	7.3	5.4	2 U	12	5.3	1.7 J	6.6	8.6	6.8	5.4	7.8	2.7 J	3.6 J
2,4'-DDT (o,p'-DDT)	--	--	0.59 U	0.62 U	0.6 U	0.64 U	0.64 U	0.63 U	0.6 U	0.65 U	0.65 U	0.59 U	0.55 U	0.55 U	0.63 U	0.63 U	0.53 U	0.61 U	0.65 U	0.67 U	0.66 U
4,4'-DDD (p,p'-DDD)	2	20	20	32 J	35	21	29	41	56	24	41	80	24	5.8	33	41	31	33	77	14	17 J
4,4'-DDE (p,p'-DDE)	2.2	27	87	130	83	91	120	140	100	110	210	91	120	33	110	140	250	100	130	84	100
4,4'-DDT (p,p'-DDT)	1	7	4	3.9	3.7	4.9	3.8	7.2	5.5	5	4.3	5	4.4	1.9	6.9	5.2	6.2	6.7	7.5	4.5 J	4.7
Total DDx (U = 0)	1.58	46.1	121	174.7 J	131	128	161	206	177	148	261	199	157	43.5 J	161	200	299	150	232	107.8 J	127.9 J
PCB Congeners (µg/kg)																					
PCB-018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-028	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-044	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-049	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-052	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-066	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-070	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-074	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-077	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-081	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-087	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-099	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-101	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-105	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-114	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-119	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-123	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-126	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-132/153	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-138/158	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-151	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-157	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-167	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-168	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-169	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-177	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-183	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-187	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-189	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-194	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-201	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-206	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
All non-detect results are reported at the MDL.
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum. Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.
Total PCB congeners is the sum of all PCB congeners listed in this table.
Detected concentration is greater than ERL screening level
Detected concentration is greater than ERM screening level
Bold: detected result
J: estimated value
U: compound analyzed but not detected above detection limit

3.1.3 Individual Core Samples from January 2019 Sampling Event

Results of physical and chemical analyses of individual core samples from Newport Channel are presented in Table 11. All results are expressed in dry weight unless otherwise indicated.

Metals, organotins, pyrethroids, PAHs, pesticides, and PCBs were detected in individual core samples from Newport Channel. Mercury exceeded the ERM value in five samples. Butyltin, dibutyltin, and/or tributyltin were detected in all samples. Several PAHs were detected at low concentrations (total PAHs less than the ERL value in all samples). Total DDTs exceeded the ERM value in one sample (NC2-02). Total chlordane was less than the ERM value in all samples. Total PCBs were less than the ERM in all samples.

Based on individual core sample results, potential contaminants of concern within Newport Channel included mercury. Mercury ranged from 0.0905 to 2.49 mg/kg. Highest concentrations were measured at stations NC1-01 and NC1-02, in the western portion of Newport Channel near Rhine Channel. This is consistent with the exploratory sampling performed in January 2018. Mercury concentrations for individual core samples within Newport Channel are shown in Figure 21.

Based on individual core sample results, composite samples were created in coordination with USEPA for ocean disposal testing. The compositing scheme is presented in Table 4. Stations NC1-01 and NC1-02 were eliminated from further testing due to elevated mercury concentrations. Composite sediment chemistry results for Newport Channel are presented in Section 3.1.4.

Table 11
Results of Physical and Chemical Analyses for Individual Core Samples from January 2019 Sampling Event

Chemical	Sample ID / Sample Date / Matrix	ERL	ERM	NC1-01-012319 1/23/2019 SE	NC1-02-012319 1/23/2019 SE	NC1-03-012319 1/23/2019 SE	NC1-04-012319 1/23/2019 SE	NC2-01-012419 1/24/2019 SE	NC2-02-012419 1/24/2019 SE	NC2-03-012419 1/24/2019 SE	NC2-04-012219 1/22/2019 SE	NC3-01-012219 1/22/2019 SE	NC3-02-012219 1/22/2019 SE	NC3-03-012219 1/22/2019 SE	NC3-04-012319 1/23/2019 SE
Conventional Parameters (%)															
Total organic carbon		--	--	**0.75**	**0.91**	**0.41**	**0.42**	**0.42**	**0.84**	**0.27**	**0.5**	**0.3**	**0.39**	**0.025 J**	**0.63**
Total solids		--	--	**56.3**	**58.9**	**65.2**	**59.8**	**62.4**	**57.8**	**70.1**	**58.3**	**68.5**	**62.7**	**76.8**	**78.7**
Grain Size (%)															
Gravel (>2 mm)		--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**2.23**
Sand (2.00 mm - 1.00 mm)		--	--	0.01 U	0.01 U	**2.24**	0.01 U	**1.63**	0.01 U	**1.59**	0.01 U	**4.53**	**2.63**	**2.77**	**15.7**
Sand, coarse		--	--	**9.47**	0.01 U	**6.08**	**0.68**	**13.89**	**1.87**	**25.1**	**0.94**	**18.09**	**12.92**	**14.98**	**32.3**
Sand, medium		--	--	**19.59**	**1.36**	**17.24**	**10.44**	**26.95**	**4.74**	**24.21**	**13.11**	**33.79**	**35.17**	**31.61**	**31.67**
Sand, fine		--	--	**8.2**	**10.96**	**23.84**	**29.24**	**12.24**	**17.59**	**8.73**	**31.85**	**11.68**	**18.14**	**18.29**	**14.09**
Sand, very fine		--	--	**1.91**	**3.13**	**5.72**	**7.06**	**2.36**	**7.98**	**2.3**	**5.84**	**2.14**	**2.98**	**2.78**	**1.65**
Silt		--	--	**40.19**	**55.79**	**29.78**	**36.68**	**29.81**	**46.71**	**27.23**	**34.01**	**21.03**	**19.43**	**20.59**	**1.68**
Clay (<4 micron)		--	--	**20.62**	**28.76**	**15.11**	**15.91**	**13.12**	**21.1**	**10.84**	**14.25**	**8.74**	**8.73**	**8.98**	**0.69**
Metals (mg/kg)															
Arsenic		8.2	70	**8.11**	**9.72**	**5.84**	**6.26**	**5.7**	**7.29**	**3.46**	**6.03**	**4.33**	**4.08**	**3.01**	**2.75**
Cadmium		1.2	9.6	**0.515**	**0.568**	**0.309**	**0.461**	**0.444**	**0.884**	**0.324**	**0.487**	**0.387**	**0.423**	**0.179**	**0.148**
Chromium		81	370	**23.3**	**26.7**	**14.6**	**18.3**	**13.7**	**22**	**8.91**	**19.2**	**11.4**	**11.8**	**6.74**	**6.33**
Copper		34	270	**130**	**85.4**	**47.6**	**50.5**	**56.5**	**47.7**	**25.7**	**42.4**	**23.3**	**16.8**	**8.88**	**9.01**
Lead		46.7	218	**38.4**	**36.5**	**19.2**	**20.8**	**19.9**	**29.4**	**11.8**	**15.6**	**12.4**	**12.5**	**6.38**	**5.77**
Mercury		0.15	0.71	**2**	**2.49**	**0.708**	**0.81**	**0.402**	**1.52**	**1.26**	**0.267**	**0.245**	**0.19**	**0.144**	**0.0905**
Nickel		20.9	51.6	**13.7**	**16.6**	**9.18**	**11.8**	**9.48**	**16**	**5.94**	**12.3**	**7.44**	**7.68**	**4.24**	**3.87**
Selenium		--	--	**5.78**	**4.02**	**2.34**	**2.41**	**2.87**	**2.74**	**1.36**	**2.02**	**0.931**	**1.03**	**0.429**	**0.559**
Silver		1	3.7	**0.398**	**0.359**	**0.26**	**0.315**	**0.783**	**1.39**	**0.624**	**0.364**	**0.206**	**0.234**	**0.116 J**	**0.114 J**
Zinc		150	410	**151 J**	**130 J**	**95.8 J**	**92.3 J**	**87.4 J**	**102 J**	**48.2 J**	**100 J**	**59.8 J**	**49.5 J**	**25.3 J**	**23.5 J**
Organometallic Compounds (µg/kg)															
Butyltin (n-Butyltin)		--	--	2.4 U	2.3 U	**3.7 J**	2.2 U	2.2 U	2.3 U	2 U	2.3 U	2 U	2.1 U	1.7 U	1.8 U
Dibutyltin		--	--	**44**	**20**	**34**	**24**	**33**	**27**	**15**	**9**	**6.8**	**14**	**7.6**	**11**
Tetrabutyltin		--	--	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.3 U	1 U	1.2 U	1.1 U	1.2 U	0.94 U	0.94 U
Tributyltin		--	--	**3.8 J**	2.5 UJ	**2.8 J**	**3.9 J**	**7 J**	2.5 UJ	2.1 UJ	2.5 UJ	2.1 UJ	2.3 UJ	1.9 UJ	1.9 UJ
PAHs (µg/kg)															
1-Methylnaphthalene		--	--	4.1 UJ	3.9 UJ	3.5 UJ	**81 J**	3.7 UJ	4 UJ	3.3 UJ	3.9 U	3.4 U	3.7 U	3 U	2.9 UJ
2-Methylnaphthalene		70	670	4.1 U	3.9 U	3.5 U	**92**	3.7 U	4 U	3.3 U	3.9 U	3.4 U	3.7 U	3 U	2.9 UJ
Acenaphthene		16	500	4.2 U	3.9 U	**42**	**86**	3.7 U	4.1 U	3.3 U	4 U	3.4 U	3.8 U	3 U	2.9 U
Acenaphthylene		44	640	3.2 U	3 U	2.7 U	**91**	2.8 U	3.1 U	2.5 U	3 U	2.6 U	2.8 U	2.3 U	2.2 U
Anthracene		85.3	1,100	6.2 U	5.8 U	5.2 U	**88**	5.5 U	6 U	4.9 U	5.9 U	5 U	5.6 U	4.5 U	4.3 U
Benzo(a)anthracene		261	1,600	**8.7 J**	**11 J**	**4.5 J**	**98**	**7.5 J**	3.7 U	**3.8 J**	**8.1 J**	**6.9 J**	3.4 U	2.8 U	**5.3 J**
Benzo(a)pyrene		430	1,600	**18 J**	**24**	2.8 U	**110**	2.9 U	3.2 U	2.6 U	**14 J**	**10 J**	**6.7 J**	**4.2 J**	**5.5 J**
Benzo(b)fluoranthene		--	--	4.8 U	**27**	4.1 U	**97**	4.3 U	4.7 U	3.9 U	**8.7 J**	**8.5 J**	**6.1 J**	3.5 U	**5.2 J**
Benzo(g,h,i)perylene		--	--	**7.8 J**	**12 J**	2.3 U	**110**	**7.8 J**	2.7 U	2.2 U	**15 J**	**10 J**	**7.8 J**	**3.9 J**	**3.9 J**
Benzo(k)fluoranthene		--	--	**15 J**	**20 J**	4.2 UJ	**89 J**	4.4 UJ	4.8 UJ	3.9 UJ	**9.5 J**	**11 J**	**5 J**	3.6 U	**4.8 J**

Chemical	Sample ID Sample Date Matrix		NC1-01-012319 1/23/2019 SE	NC1-02-012319 1/23/2019 SE	NC1-03-012319 1/23/2019 SE	NC1-04-012319 1/23/2019 SE	NC2-01-012419 1/24/2019 SE	NC2-02-012419 1/24/2019 SE	NC2-03-012419 1/24/2019 SE	NC2-04-012219 1/22/2019 SE	NC3-01-012219 1/22/2019 SE	NC3-02-012219 1/22/2019 SE	NC3-03-012219 1/22/2019 SE	NC3-04-012319 1/23/2019 SE
	ERL	ERM												
Chrysene	384	2,800	**11 J**	**14 J**	**3.9 J**	**93**	**8.8 J**	**4.4 J**	**5 J**	**12 J**	**9 J**	**5.2 J**	2.9 U	**4.4 J**
Dibenzo(a,h)anthracene	63.4	260	3.4 U	3.3 U	2.9 U	**110**	3.1 U	3.4 U	2.8 U	3.3 U	2.8 U	3.1 U	2.5 U	2.4 UJ
Fluoranthene	600	5,100	**14 J**	**21**	**6.5 J**	**87**	**10 J**	**6.5 J**	**5.9 J**	**11 J**	**8.8 J**	**5.3 J**	**2.7 J**	**5.9 J**
Fluorene	19	540	5.5 U	5.2 U	4.7 U	**97**	4.9 U	5.4 U	4.4 U	5.3 U	4.5 U	5 U	4 U	3.9 U
Indeno(1,2,3-c,d)pyrene	--	--	**7.1 J**	**10 J**	2.4 U	**100**	**6.7 J**	2.7 U	2.2 U	**12 J**	**7.1 J**	**4.1 J**	**2.7 J**	**3.5 J**
Naphthalene	160	2,100	6.1 U	5.8 U	5.2 U	**86**	5.5 U	6 U	4.9 U	5.9 UJ	5 U	5.5 U	4.5 U	4.3 UJ
Phenanthrene	240	1,500	**6.3 J**	**8.4 J**	**4.3 J**	**90**	**3.9 J**	3.8 U	3.1 U	3.8 U	**3.5 J**	3.6 U	2.9 U	**3.3 J**
Pyrene	665	2,600	**15 J**	**25 J**	**11 J**	**87 J**	**13 J**	**7.4 J**	**6.4 J**	**16 J**	**12 J**	**9.2 J**	**3.5 J**	**6.4 J**
Total HPAH (9 of 17) (U = 0)	1,700	9,600	**96.6 J**	**164 J**	**25.9 J**	**981 J**	**53.8 J**	**18.3 J**	**21.1 J**	**106.3 J**	**83.3 J**	**49.4 J**	**17 J**	**44.9 J**
Total LPAH (8 of 17) (U = 0)	552	3,160	**6.3 J**	**8.4 J**	**46.3 J**	**630**	**3.9 J**	6 U	4.9 U	5.9 UJ	**3.5 J**	5.6 U	4.5 U	**3.3 J**
Total PAH (17) (U = 0)	4,022	44,792	**102.9 J**	**172.4 J**	**72.2 J**	**1611 J**	**57.7 J**	**18.3 J**	**21.1 J**	**106.3 J**	**86.8 J**	**49.4 J**	**17 J**	**48.2 J**
Pesticides (µg/kg)														
2,4'-DDD (o,p'-DDD)	--	--	0.5 U	0.48 U	0.43 U	0.47 U	0.46 U	0.49 U	0.41 U	0.48 U	0.41 U	0.45 U	0.36 U	0.36 U
2,4'-DDE (o,p'-DDE)	--	--	1.7 U	1.6 U	1.5 U	1.6 U	1.6 U	**3.5**	**1.5 J**	1.7 U	1.4 U	**2.4 J**	1.3 U	1.2 U
2,4'-DDT (o,p'-DDT)	--	--	0.55 U	0.52 U	0.47 U	0.52 U	0.5 U	0.54 U	0.45 U	0.53 U	0.45 U	0.49 U	0.4 U	0.4 U
4,4'-DDD (p,p'-DDD)	2	20	0.88 U	0.83 U	0.76 U	**5.5**	**1.3 J**	**19**	**8**	**2.2**	**6.3**	**11**	**2**	0.63 U
4,4'-DDE (p,p'-DDE)	2.2	27	**14**	**8.8**	**11**	**13**	**17**	**30**	**12**	**19**	**12**	**22**	**10**	**6.4 J**
4,4'-DDT (p,p'-DDT)	1	7	0.77 U	0.73 U	0.66 U	0.72 U	0.7 U	0.75 U	0.62 U	0.74 U	0.63 U	0.69 U	0.56 U	0.55 U
Aldrin	--	--	0.77 U	0.73 U	0.66 U	0.72 U	0.7 U	0.75 U	0.62 U	0.74 U	0.63 U	0.69 U	0.56 U	0.55 UJ
Chlordane, alpha- (Chlordane, cis-)	--	--	0.71 U	0.67 U	0.61 U	0.67 U	0.65 U	0.69 U	0.58 U	0.69 U	0.59 U	0.64 U	0.52 U	0.51 U
Chlordane, gamma- (Chlordane, trans-)	--	--	1.6 U	1.5 U	**1.7 J**	**2 J**	**2.3 J**	**2.2 J**	**2.3 J**	**2.2 J**	**1.5 J**	**2.6 J**	**1.7 J**	1.1 U
Dieldrin	0.02	8	*0.77 U*	*0.73 U*	*0.66 U*	*0.72 U*	*0.7 U*	*0.75 U*	*0.62 U*	*0.74 U*	*0.63 U*	*0.69 U*	*0.56 U*	*0.55 U*
Endosulfan sulfate	--	--	0.92 U	0.87 U	0.79 U	0.86 U	0.84 U	0.89 U	0.74 U	0.88 U	0.75 U	0.82 U	0.67 U	0.66 U
Endosulfan, alpha- (I)	--	--	0.7 U	0.66 U	0.6 U	0.65 U	0.64 U	0.68 U	0.56 U	0.67 U	0.57 U	0.62 U	0.51 U	0.5 U
Endosulfan, beta (II)	--	--	0.83 U	0.78 U	0.71 U	0.78 U	0.75 U	0.8 U	0.67 U	0.8 U	0.68 U	0.74 U	0.6 U	0.59 U
Endrin	--	--	0.85 U	0.8 U	0.73 U	0.79 U	0.77 U	0.82 U	0.68 U	0.81 U	0.7 U	0.76 U	0.61 U	0.61 U
Endrin aldehyde	--	--	1.1 U	1 U	0.91 U	1 U	0.97 U	1 U	0.86 U	1 U	0.87 U	0.95 U	0.77 U	0.76 U
Endrin ketone	--	--	0.88 U	0.84 U	0.76 U	0.83 U	0.81 U	0.86 U	0.71 U	0.85 U	0.73 U	0.79 U	0.64 U	0.63 U
Heptachlor	--	--	0.76 U	0.72 U	0.65 U	0.71 U	0.69 U	0.74 U	0.61 U	0.73 U	0.62 U	0.68 U	0.55 U	0.54 U
Heptachlor epoxide	--	--	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.3 U	1 U	1.2 U	1.1 U	1.2 U	0.94 U	0.93 U
Hexachlorocyclohexane (BHC), alpha-	--	--	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.3 U	1.1 U	1.3 U	1.1 U	1.2 U	0.94 U	0.93 U
Hexachlorocyclohexane (BHC), beta-	--	--	0.87 U	0.83 U	0.75 U	0.82 U	0.8 U	0.85 U	0.71 U	0.84 U	0.72 U	0.78 U	0.63 U	0.62 U
Hexachlorocyclohexane (BHC), delta-	--	--	1.5 U	1.5 U	1.3 U	1.4 U	1.4 U	1.5 U	1.2 U	1.5 U	1.3 U	1.4 U	1.1 U	1.1 U
Hexachlorocyclohexane (BHC), gamma- (Lindane)	--	--	0.78 U	0.74 U	0.67 U	0.73 U	0.71 U	0.76 U	0.63 U	0.75 U	0.64 U	0.7 U	0.57 U	0.56 U
Methoxychlor	--	--	0.98 U	0.93 U	0.84 U	0.92 U	0.89 U	0.95 U	0.79 U	0.94 U	0.81 U	0.88 U	0.71 U	0.7 U
Nonachlor, cis-	--	--	0.46 U	0.43 U	0.39 U	0.43 U	0.42 U	0.44 U	0.37 U	0.44 U	0.37 U	0.41 U	0.33 U	0.33 U
Nonachlor, trans-	--	--	0.48 U	0.45 U	0.41 U	0.45 U	0.43 U	0.46 U	0.38 U	0.46 U	0.39 U	0.43 U	0.35 U	0.34 U
Oxychlordane	--	--	0.47 U	0.45 U	0.41 U	0.44 U	0.43 U	0.46 U	0.38 U	0.46 U	0.39 U	0.42 U	0.34 U	0.34 U
Toxaphene	--	--	16 U	15 U	14 U	15 U	14 U	15 U	13 U	15 U	13 U	14 U	11 U	11 U
Total Chlordane (U = 0)	0.5	6	*1.6 U*	*1.5 U*	**1.7 J**	**2 J**	**2.3 J**	**2.2 J**	**2.3 J**	**2.2 J**	**1.5 J**	**2.6 J**	**1.7 J**	*1.1 U*
Total DDx (U = 0)	1.58	46.1	**14**	**8.8**	**11**	**18.5**	**18.3 J**	**52.5**	**21.5 J**	**21.2**	**18.3**	**35.4 J**	**12**	**6.4 J**

Chemical	Sample ID Sample Date Matrix ERL	ERM	NC1-01-012319 1/23/2019 SE	NC1-02-012319 1/23/2019 SE	NC1-03-012319 1/23/2019 SE	NC1-04-012319 1/23/2019 SE	NC2-01-012419 1/24/2019 SE	NC2-02-012419 1/24/2019 SE	NC2-03-012419 1/24/2019 SE	NC2-04-012219 1/22/2019 SE	NC3-01-012219 1/22/2019 SE	NC3-02-012219 1/22/2019 SE	NC3-03-012219 1/22/2019 SE	NC3-04-012319 1/23/2019 SE
Pyrethroids (µg/kg)														
Allethrin	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Bifenthrin	--	--	**1.4**	**0.63 J**	**0.48 J**	**0.9**	**1.3**	0.52 U	**0.85**	**1.6**	**0.9**	**0.75 J**	**0.41 J**	0.38 U
Cyfluthrin	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Cypermethrin	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Deltamethrin/Tralomethrin	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Fenpropathrin	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Fenvalerate	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Fluvalinate	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Lambda-cyhalothrin	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Permethrin	--	--	0.89 U	0.84 U	0.77 U	0.84 U	0.8 U	0.87 U	0.71 U	0.84 U	0.72 U	0.79 U	0.64 U	0.63 U
Phenothrin	--	--	0.44 U	0.42 U	0.38 U	0.42 U	0.4 U	0.43 U	0.35 U	0.42 U	0.36 U	0.4 U	0.32 U	0.32 U
Resmethrin/Bioresmethrin	--	--	0.75 U	0.72 U	0.65 U	0.71 U	0.68 U	0.74 U	0.6 U	0.72 U	0.61 U	0.67 U	0.55 U	0.54 U
Tetramethrin	--	--	0.53 U	0.51 U	0.46 U	0.5 U	0.48 U	0.52 U	0.43 U	0.51 U	0.43 U	0.48 U	0.38 U	0.38 U
PCB Congeners (µg/kg)														
PCB-018	--	--	0.11 U	**1.4**	0.098 U	0.11 U	0.1 U	0.11 U	0.092 U	0.11 U	0.094 U	0.1 U	0.084 U	0.081 U
PCB-028	--	--	**1.2**	**1.3**	0.1 U	0.12 U	0.11 U	**1.6**	0.098 U	0.12 U	0.1 U	0.11 U	0.089 U	0.086 U
PCB-037	--	--	0.11 U	0.1 U	0.091 U	0.1 U	0.096 U	0.1 U	0.086 U	0.1 U	0.088 U	0.097 U	0.078 U	0.076 U
PCB-044	--	--	**1.3**	**1.3**	0.23 U	0.25 U	0.24 U	0.26 U	0.21 U	0.26 U	0.22 U	0.24 U	0.2 U	0.19 U
PCB-049	--	--	**2.5**	0.083 U	0.075 U	0.083 U	0.078 U	0.085 U	0.07 U	0.084 U	0.072 U	0.079 U	0.064 U	0.062 U
PCB-052	--	--	**2.3**	**1.5**	0.29 U	0.32 U	0.3 U	0.33 U	0.27 U	0.32 U	0.27 U	0.3 U	0.25 U	0.24 U
PCB-066	--	--	**3.6**	**2.2**	**1.2**	0.21 U	0.19 U	0.21 U	0.17 U	0.21 U	**0.67**	0.2 U	0.16 U	0.15 U
PCB-070	--	--	0.13 U	**0.76**	0.11 U	0.12 U	0.11 U	0.12 U	0.1 U	0.12 U	**0.34**	0.11 U	0.092 U	0.089 U
PCB-074	--	--	**1.1**	**0.83**	0.14 U	0.15 U	0.14 U	0.16 U	0.13 U	0.15 U	**0.25 J**	0.14 U	0.12 U	0.11 U
PCB-077	--	--	0.2 U	0.19 U	0.17 U	0.19 U	0.18 U	0.2 U	0.16 U	0.2 U	0.17 U	0.18 U	0.15 U	0.14 U
PCB-081	--	--	0.16 U	0.15 U	0.14 U	0.15 U	0.14 U	0.16 U	0.13 U	0.15 U	0.13 U	0.14 U	0.12 U	0.11 U
PCB-087	--	--	**0.87**	0.19 U	0.17 U	0.19 U	0.18 U	0.19 U	0.16 U	0.19 U	0.16 U	0.18 U	0.14 U	0.14 U
PCB-099	--	--	**2.7**	**1.6**	**0.68**	0.079 U	0.075 U	0.082 U	0.067 U	**0.37**	0.069 U	0.076 U	0.061 U	**0.21 J**
PCB-101	--	--	**3.3**	**2.1**	0.067 U	**2.4**	0.07 U	0.076 U	0.063 U	0.075 U	0.064 U	0.071 U	0.057 U	0.055 U
PCB-105	--	--	0.094 U	0.089 U	0.08 U	0.089 U	0.084 U	0.092 U	0.075 U	0.09 U	0.077 U	0.085 U	0.069 U	0.067 U
PCB-110	--	--	**2.8**	**1.7**	**0.93**	0.057 U	0.053 U	**2.1**	0.048 U	**0.54**	**0.62**	**0.49**	0.044 U	**0.33**
PCB-114	--	--	0.13 U	0.12 U	0.11 U	0.12 U	0.12 U	0.13 U	0.1 U	0.13 U	0.11 U	0.12 U	0.096 U	0.092 U
PCB-118	--	--	**2.8**	**1.6**	**1**	0.058 U	**2.2**	**2.4**	**1.7**	0.058 U	**0.58**	0.055 U	0.045 U	0.043 U
PCB-119	--	--	0.11 U	0.1 U	0.094 U	0.1 U	0.099 U	0.11 U	0.088 U	0.11 U	0.09 U	0.1 U	0.081 U	0.078 U
PCB-123	--	--	0.13 U	0.12 U	0.11 U	0.12 U	0.12 U	0.13 U	0.1 U	0.12 U	0.11 U	0.12 U	0.094 U	0.091 U
PCB-126	--	--	0.097 U	0.092 U	0.083 U	0.092 U	0.087 U	0.095 U	0.078 U	0.093 U	0.079 U	0.088 U	0.071 U	0.068 U
PCB-128	--	--	0.21 U	0.2 U	0.18 U	0.2 U	0.19 U	0.21 U	0.17 U	0.2 U	0.17 U	0.19 U	0.15 U	0.15 U
PCB-132/153	--	--	**4.7**	**2.9**	**1.6**	0.27 U	0.26 U	0.28 U	0.23 U	**1.2**	**1.3**	**1.4**	**0.64**	**0.53**
PCB-138/158	--	--	**3.1**	**2.3**	**1.3**	0.59 U	**4.1**	0.61 U	0.5 U	**0.91**	**0.96**	**1.1**	0.45 U	0.44 U
PCB-149	--	--	**2.4**	**1.5**	**0.83**	0.2 U	0.19 U	0.2 U	0.17 U	**0.53**	**0.69**	**0.78**	**0.43**	**0.38**
PCB-151	--	--	**0.73**	0.15 U	0.13 U	0.15 U	0.14 U	0.15 U	0.12 U	0.15 U	0.13 U	0.14 U	0.11 U	0.11 U
PCB-156	--	--	0.14 U	0.13 U	0.12 U	0.13 U	0.12 U	0.13 U	0.11 U	0.13 U	0.11 U	0.12 U	0.1 U	0.096 U

Chemical	Sample ID Sample Date Matrix ERL	ERM	NC1-01-012319 1/23/2019 SE	NC1-02-012319 1/23/2019 SE	NC1-03-012319 1/23/2019 SE	NC1-04-012319 1/23/2019 SE	NC2-01-012419 1/24/2019 SE	NC2-02-012419 1/24/2019 SE	NC2-03-012419 1/24/2019 SE	NC2-04-012219 1/22/2019 SE	NC3-01-012219 1/22/2019 SE	NC3-02-012219 1/22/2019 SE	NC3-03-012219 1/22/2019 SE	NC3-04-012319 1/23/2019 SE
PCB-157	--	--	0.15 U	0.14 U	0.13 U	0.14 U	0.13 U	0.15 U	0.12 U	0.14 U	0.12 U	0.14 U	0.11 U	0.11 U
PCB-167	--	--	0.23 U	0.22 U	0.2 U	0.22 U	0.21 U	0.23 U	0.19 U	0.22 U	0.19 U	0.21 U	0.17 U	0.17 U
PCB-168	--	--	0.25 U	0.24 U	0.21 U	0.24 U	**3.7**	**5.6**	**3.3**	0.24 U	0.21 U	0.23 U	0.18 U	0.18 U
PCB-169	--	--	0.12 U	0.11 U	0.098 U	0.11 U	0.1 U	0.11 U	0.092 U	0.11 U	0.094 U	0.1 U	0.084 U	0.081 U
PCB-170	--	--	**0.86**	0.19 U	0.17 U	0.19 U	0.18 U	0.19 U	0.16 U	0.19 U	0.16 U	0.18 U	0.14 U	0.14 U
PCB-177	--	--	**0.8**	0.2 U	0.18 U	0.2 U	0.19 U	**1.2**	0.17 U	0.2 U	0.17 U	0.19 U	0.15 U	0.15 U
PCB-180	--	--	**2.2**	**1.7**	**1.7**	0.15 U	**1.8**	**4.2**	**1.6**	0.16 U	**0.66**	0.15 U	0.12 U	0.11 U
PCB-183	--	--	**0.62**	**0.36**	0.14 U	0.16 U	0.15 U	0.16 U	0.13 U	0.16 U	0.14 U	**0.29 J**	0.12 U	0.12 U
PCB-187	--	--	**1.8**	**1.1**	**0.99**	**1.2**	**1.7**	**1.8**	**1.7**	0.17 U	**0.43**	**0.47**	0.13 U	0.13 U
PCB-189	--	--	0.11 U	0.11 U	0.096 U	0.11 U	0.1 U	0.11 U	0.091 U	0.11 U	0.093 U	0.1 U	0.083 U	0.08 U
PCB-194	--	--	0.13 U	0.12 U	0.11 U	0.12 U	0.12 U	0.13 U	0.1 U	0.12 U	0.11 U	0.12 U	0.095 U	0.092 U
PCB-201	--	--	0.06 U	0.057 U	0.051 U	0.057 U	0.054 U	0.059 U	0.048 U	0.058 U	0.049 U	0.054 U	0.044 U	0.042 U
PCB-206	--	--	0.2 U	**0.69**	0.17 U	0.19 U	0.18 U	0.2 U	0.16 U	0.2 U	0.17 U	0.18 U	0.15 U	0.14 U
Total PCB Congener (U = 0)	22.7	180	**41.68**	**26.84**	**10.23**	**3.6**	**13.5**	**18.9**	**8.3**	**3.55**	**6.5 J**	**4.53 J**	**1.07**	**1.45 J**

Notes:
All non-detect results are reported at the MDL.
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.
Gamma chlordane and trans-chlordane are synonymous and refer to CAS RN 5103-74-2.
Total chlordane is the sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane.
Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.
Total HPAH (9 of 17) is the sum of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthenes, benzo(k)fluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene (if analyzed).
Total LPAH (8 of 17) is the sum of 1-methylnaphthalene, 2-methylnapthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene (if analyzed).
Total PCB congeners is the sum of all PCB congeners listed in this table.
Detected concentration is greater than ERL screening level
Detected concentration is greater than ERM screening level
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
U: compound analyzed but not detected above detection limit

3.1.4 Reference and Composite Sediment from January 2019 Sampling Event

Results of physical and chemical analyses of reference and composite sediment samples from Newport Channel are presented in Table 12. All results are expressed in dry weight unless otherwise indicated.

3.1.4.1 LA-3 ODMDS Reference

Reference sediment results were consistent with the previous reference sample collected in January 2018. Grain size consisted primarily of fines (silt and clay), totaling 82.9%. TOC was measured at a concentration of 2.2%.

Metals, PAHs, pesticides, and PCBs were detected in reference sediment. All metals concentrations were less than ERL values, except nickel. All PAH and PCB concentrations were less than ERL values. One DDT derivative (4,4'-DDE) and total DDTs exceeded ERL values. All concentrations were less than ERM values. Organotins and pyrethroids were not detected in reference sediment.

3.1.4.2 Composite Sediment

Composite sediment from Newport Channel consisted primarily of fines (81.9% and 85.2% silt and clay). TOC was 1.6% and 0.45%.

Metals, organotins, pyrethroids, PAHs, pesticides, and PCBs were detected in composite sediment. All metals were less than the ERM value. Dibutyltin was detected in both samples (13 and 6.6 µg/kg). Bifenthrin was detected in both samples. Several PAHs were detected in composite samples at low concentrations (less than ERL values). Total DDTs were less than the ERM value in both samples. Total PCBs were less than the ERM value in both samples.

Table 12
Results of Physical and Chemical Analyses for Composite Samples from January 2019 Sampling Event

	Sample ID Sample Date[1] Matrix		LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
Chemical	**ERL**	**ERM**			
Conventional Parameters (%)					
Total organic carbon	--	--	**2.2**	**1.6**	**0.45**
Total solids	--	--	**48.1**	**65.3**	**73.1**
Grain Size (%)					
Gravel (>2 mm)	--	--	0.01 U	0.01 U	0.01 U
Sand (2.00 mm - 1.00 mm)	--	--	0.01 U	0.01 U	0.01 U
Sand, coarse	--	--	0.01 U	0.01 U	0.01 U
Sand, medium	--	--	**0.037**	0.01 U	0.01 U
Sand, fine	--	--	**4.97**	**0.24**	**4.75**
Sand, very fine	--	--	**12.15**	**17.82**	**10.01**
Silt	--	--	**71.71**	**53.65**	**58.46**

Chemical	Sample ID Sample Date[1] Matrix ERL	ERM	LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
Clay (<4 micron)	--	--	**11.14**	**28.29**	**26.78**
Metals (mg/kg)					
Arsenic	8.2	70	**7.06**	**5.73**	**3.68**
Cadmium	1.2	9.6	**0.655**	**0.457**	**0.325**
Chromium	81	370	**38.6 J**	**16.5**	**9.19**
Copper	34	270	**24**	**45.2**	**16.8**
Lead	46.7	218	**10.1 J**	**19.9**	**10.2**
Mercury	0.15	0.71	**0.0742**	**0.529**	**0.173**
Nickel	20.9	51.6	**21.1**	**10.2**	**5.73**
Selenium	--	--	**1.41**	**1.07**	**0.556**
Silver	1	3.7	**0.261**	**0.113 J**	**0.0709 J**
Zinc	150	410	**81.4 J**	**82.7**	**39**
Organometallic Compounds (µg/kg)					
Butyltin (n-Butyltin)	--	--	2.9 U	2.1 U	1.9 U
Dibutyltin	--	--	1.5 U	**13**	**6.6**
Tetrabutyltin	--	--	1.5 U	1.1 U	1 U
Tributyltin	--	--	3.1 UJ	2.3 U	2 U
PAHs (µg/kg)					
1-Methylnaphthalene	--	--	4.7 U	3.5 U	3.2 U
2-Methylnaphthalene	70	670	4.7 U	3.5 U	3.2 U
Acenaphthene	16	500	4.8 U	3.6 U	3.2 U
Acenaphthylene	44	640	3.6 U	2.7 U	2.4 U
Anthracene	85.3	1,100	7.1 U	5.3 U	4.7 U
Benzo(a)anthracene	261	1,600	**7.8 J**	**9 J**	**6.1 J**
Benzo(a)pyrene	430	1,600	**7 J**	**14 J**	**9.2 J**
Benzo(b)fluoranthene	--	--	**8.2 J**	**18**	**9.1 J**
Benzo(g,h,i)perylene	--	--	**6.6 J**	**7.2 J**	**6.4 J**
Benzo(k)fluoranthene	--	--	5.7 U	**11 J**	**7 J**
Chrysene	384	2,800	**7.3 J**	**12 J**	**6.3 J**
Dibenzo(a,h)anthracene	63.4	260	4 U	3 U	2.6 U
Fluoranthene	600	5,100	**14 J**	**12 J**	**8.1 J**
Fluorene	19	540	6.4 U	4.7 U	4.2 U
Indeno(1,2,3-c,d)pyrene	--	--	**4.7 J**	**7 J**	**5.4 J**
Naphthalene	160	2,100	7.1 U	5.3 U	4.7 U
Phenanthrene	240	1,500	**7.3 J**	**5.2 J**	**3.8 J**
Pyrene	665	2,600	**19 J**	**16**	**11 J**
Total HPAH (9 of 17) (U = 0)	1,700	9,600	**74.6 J**	**106.2 J**	**68.6 J**
Total LPAH (8 of 17) (U = 0)	552	3,160	**7.3 J**	**5.2 J**	**3.8 J**
Total PAH (17) (U = 0)	4,022	44,792	**81.9 J**	**111.4 J**	**72.4 J**
Pesticides (µg/kg)					
2,4'-DDD (o,p'-DDD)	--	--	0.59 U	0.44 U	0.38 U
2,4'-DDE (o,p'-DDE)	--	--	**6.1**	1.5 U	1.3 U

Chemical	Sample ID Sample Date[1] Matrix ERL	ERM	LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
2,4'-DDT (o,p'-DDT)	--	--	0.65 U	0.48 U	0.42 U
4,4'-DDD (p,p'-DDD)	2	20	**1.8 J**	**7**	**4.9**
4,4'-DDE (p,p'-DDE)	2.2	27	**17 J**	**14 J**	**13**
4,4'-DDT (p,p'-DDT)	1	7	0.91 U	0.67 U	0.59 U
Aldrin	--	--	0.91 U	0.67 U	0.59 U
Chlordane, alpha- (Chlordane, cis-)	--	--	0.84 U	0.62 U	0.54 U
Chlordane, gamma- (Chlordane, trans-)	--	--	1.8 U	1.4 U	1.2 U
Dieldrin	0.02	8	*0.91 U*	*0.67 U*	*0.59 U*
Endosulfan sulfate	--	--	1.1 U	0.8 U	0.7 U
Endosulfan, alpha- (I)	--	--	0.82 U	0.6 U	0.53 U
Endosulfan, beta (II)	--	--	0.98 U	0.72 U	0.63 U
Endrin	--	--	1 U	0.73 U	0.65 U
Endrin aldehyde	--	--	1.3 U	0.92 U	0.81 U
Endrin ketone	--	--	1 U	0.77 U	0.67 U
Heptachlor	--	--	0.9 U	0.66 U	0.58 U
Heptachlor epoxide	--	--	1.5 U	1.1 U	0.99 U
Hexachlorocyclohexane (BHC), alpha-	--	--	1.5 U	1.1 U	0.99 U
Hexachlorocyclohexane (BHC), beta-	--	--	1 U	0.76 U	0.67 U
Hexachlorocyclohexane (BHC), delta-	--	--	1.8 U	1.3 U	1.2 U
Hexachlorocyclohexane (BHC), gamma-(Lindane)	--	--	0.93 U	0.68 U	0.6 U
Methoxychlor	--	--	1.2 U	0.85 UJ	0.75 U
Nonachlor, cis-	--	--	0.54 U	0.39 U	0.35 U
Nonachlor, trans-	--	--	0.56 U	0.41 U	0.36 U
Oxychlordane	--	--	0.56 U	0.41 U	0.36 U
Toxaphene	--	--	19 U	14 U	12 U
Total Chlordane (U = 0)	0.5	6	*1.8 U*	*1.4 U*	*1.2 U*
Total DDx (U = 0)	1.58	46.1	**24.9 J**	**21**	**17.9**
Pyrethroids (µg/kg)					
Allethrin	--	--	0.52 U	0.38 U	0.34 U
Bifenthrin	--	--	0.62 U	**1.1**	**0.69**
Cyfluthrin	--	--	0.52 U	0.38 U	0.34 U
Cypermethrin	--	--	0.52 U	0.38 U	0.34 U
Deltamethrin/Tralomethrin	--	--	0.52 U	0.38 U	0.34 U
Fenpropathrin	--	--	0.52 U	0.38 U	0.34 U
Fenvalerate	--	--	0.52 U	0.38 U	0.34 U
Fluvalinate	--	--	0.52 U	0.38 U	0.34 U
Lambda-cyhalothrin	--	--	0.52 U	0.38 U	0.34 U
Permethrin	--	--	1 U	0.77 U	0.68 U
Phenothrin	--	--	0.52 U	0.38 U	0.34 U
Resmethrin/Bioresmethrin	--	--	0.88 U	0.65 U	0.58 U
Tetramethrin	--	--	0.62 U	0.46 U	0.41 U

Chemical	Sample ID Sample Date[1] Matrix ERL	 ERM	LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
PCB Congeners (µg/kg)					
PCB-018	--	--	0.13 U	**0.95**	0.088 U
PCB-028	--	--	0.14 U	**0.97**	**0.21 J**
PCB-037	--	--	0.12 U	**0.17 J**	0.082 U
PCB-044	--	--	0.31 U	**0.66**	**0.23 J**
PCB-049	--	--	0.1 U	**0.87**	**0.25 J**
PCB-052	--	--	0.39 U	**0.81**	**0.55**
PCB-066	--	--	0.25 U	**1.3**	**0.35**
PCB-070	--	--	**0.37 J**	**0.66**	**0.2 J**
PCB-074	--	--	0.18 U	**0.54**	0.12 U
PCB-077	--	--	0.24 U	0.18 U	0.16 U
PCB-081	--	--	0.18 U	0.14 U	0.12 U
PCB-087	--	--	0.23 U	**0.74**	**0.41**
PCB-099	--	--	0.097 U	**1.2**	**0.31**
PCB-101	--	--	0.09 U	**1.3**	**0.63**
PCB-105	--	--	0.11 U	**0.65**	0.072 U
PCB-110	--	--	0.069 U	**1.2**	**0.61**
PCB-114	--	--	0.15 U	0.11 U	0.1 U
PCB-118	--	--	**0.57**	**1**	**0.56**
PCB-119	--	--	0.13 U	0.095 U	0.085 U
PCB-123	--	--	0.15 U	0.11 U	0.099 U
PCB-126	--	--	0.11 U	0.083 U	0.074 U
PCB-128	--	--	0.24 U	0.18 U	0.16 U
PCB-132/153	--	--	**0.79 J**	**2.3**	**0.78**
PCB-138/158	--	--	0.72 U	**1.5**	**0.87**
PCB-149	--	--	**0.41**	**1.4**	**0.6**
PCB-151	--	--	0.18 U	**0.58**	0.12 U
PCB-156	--	--	0.16 U	0.12 U	0.1 U
PCB-157	--	--	0.17 U	0.13 U	0.11 U
PCB-167	--	--	0.27 U	0.2 U	0.18 U
PCB-168	--	--	0.29 U	0.22 U	0.19 U
PCB-169	--	--	0.13 U	0.099 U	0.088 U
PCB-170	--	--	0.23 U	**0.75**	0.15 U
PCB-177	--	--	0.24 U	**0.49**	**0.36**
PCB-180	--	--	0.19 U	**1**	**0.66**
PCB-183	--	--	0.19 U	**0.37**	0.13 U
PCB-187	--	--	0.21 U	**0.93**	**0.42**
PCB-189	--	--	0.13 U	0.097 U	0.087 U
PCB-194	--	--	0.15 U	**0.41**	0.1 U
PCB-201	--	--	0.069 U	0.052 U	0.046 U
PCB-206	--	--	0.24 U	0.18 U	0.16 U
Total PCB Congener (U = 0)	22.7	180	**2.14 J**	**22.75 J**	**8 J**

Notes:
All non-detect results are reported at the MDL.
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.
Gamma chlordane and trans-chlordane are synonymous and refer to CAS RN 5103-74-2.
Total chlordane is the sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane.
Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.
Total HPAH (9 of 17) is the sum of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthenes, benzo(k)fluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene (if analyzed).
Total LPAH (8 of 17) is the sum of 1-methylnaphthalene, 2-methylnapthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene (if analyzed).
Total PCB congeners is the sum of all PCB congeners listed in this table.
Detected concentration is greater than ERL screening level
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
U: compound analyzed but not detected above detection limit
1. Based on composite date

3.1.5 Grain Size Compatibility for Nearshore Placement

Individual sediment cores from the Entrance Channel and grab samples from the nearshore receiver site were analyzed for grain size to determine compatibility for nearshore placement. Grain size was determined by sieve analysis. Grain size results for the Entrance Channel and receiver site are presented in Tables 13 and 14, respectively. Raw data for the analysis are presented in the laboratory reports in Appendix C.

Individual cores from the Entrance Channel consisted of 1.1% to 8.9% fines. Sediments were classified as poorly graded sand (SP) or poorly graded sand with silt (SP-SM). Individual grabs from the receiver site consisted of 0.2% to 21.3% fines. Sediments were classified as poorly graded sand (SP), poorly graded sand with silt (SP-SM), or silty sand (SM).

A grain size envelope was developed based on the information in Table 14 using the coarsest and finest gradation curves from the receiver site. Figure 22 illustrates the grain size envelope, represented as the shaded area falling between the coarsest and finest gradation curves from the receiver site. Source material samples were plotted against the grain size envelope to determine compatibility. A comparison of individual cores from the Entrance Channel to the grain size envelope is presented in Figure 23. The grain size distributions for the Entrance Channel fit within the grain size envelope. Percent fines of all stations were within 10% of the finest receiver site sample.

Table 13
Grain Size Results for Entrance Channel

Dredge Unit	Sample ID	Percent Fines[1]		
		Individual Samples	Weighted-Average	Grain Size Envelope[2]
Entrance Channel	EC-01-011718	8.9	3.3	0.2 to 21.3
	EC-02-011718	1.1		
	EC-03-011718	2.7		
	EC-04-011718	1.7		

Notes:
1. Percent passing #200 sieve (less than 0.074 mm)
2. Coarsest and finest gradation curves from the receiver site

Table 14
Grain Size Results for Receiver Site

Transect	Sample ID	Elevation (feet MLLW)	Percent Fines[1]
A	A-01-020218	12	0.8
	A-02-020218	6	0.9
	A-03-020218	0	0.9
	A-04-020218	-6	1.1
	A-05-030718	-12	2.4
	A-06-030718	-18	5.8
	A-07-030718	-24	9.5
	A-08-030718	-30	21.3
	A-09-030718	-36	15.7
B	B-01-020218	12	0.6
	B-02-020218	6	0.7
	B-03-020218	0	0.8
	B-04-020218	-6	0.8
	B-05-030718	-12	5.1
	B-06-030718	-18	6.5
	B-07-030718	-24	6.7
	B-08-030718	-30	11.9
	B-09-030718	-36	21.2
C	C-01-020218	12	0.8
	C-02-020218	6	0.4
	C-03-020218	0	0.7
	C-04-020218	-6	1.1
	C-05-030718	-12	2.5

Transect	Sample ID	Elevation (feet MLLW)	Percent Fines[1]
C	C-06-030718	-18	6.0
	C-07-030718	-24	9.8
	C-08-030718	-30	9.0
	C-09-030718	-36	8.9
D	D-01-020218	12	0.2
	D-02-020218	6	0.3
	D-03-020218	0	0.9
	D-04-020218	-6	1.8
	D-05-030718	-12	1.3
	D-06-030718	-18	6.6
	D-07-030718	-24	6.7
	D-08-030718	-30	3.6
	D-09-030718	-36	3.5
		Minimum (Coarsest Limit)	0.2
		Maximum (Finest Limit)	21.3

Note:
1. Percent passing #200 sieve (less than 0.074 mm)

3.2 Biological Testing

Biological test results for LNB federal channels sediment are presented below. Testing was performed for both the January 2018 and January 2019 sampling events. January 2018 included the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel. January 2019 included Newport Channel. The laboratory reports, including detailed results and raw data, are provided in Appendix D.

3.2.1 Solid Phase Testing

3.2.1.1 Amphipod Mortality Bioassay

Results of the 10-day amphipod SP tests are summarized in Table 15.

Testing for the January 2018 sampling event was performed in two batches. Mean survival in the controls were 98% and 97%, which met control acceptability criterion. Mean survival in the reference (LA3-REF) was 94%. Survival results in federal channels sediment were compared to survival in the reference to determine suitability for ocean disposal. Mean survival in composite samples ranged from 83% to 99% (Table 15). Lowest survival was measured at Bay Island South; however, an outlier was identified using the Grubbs' test. With the outlier removed, survival was 93.75%. All sample results were within 20% of the reference, indicating that test sediments from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are not acutely toxic to marine amphipods.

Testing for the January 2019 sampling event was performed in one batch. Mean survival in the control was 95%, which met control acceptability criterion. Mean survival in the reference (LA3-REF) was 100%. Survival results in Newport Channel sediment were compared to survival in the reference to determine suitability for ocean disposal. Mean survival in composite samples was 94% and 97% (Table 15). Both sample results were within 20% of the reference, indicating that test sediments from Newport Channel are not acutely toxic to marine amphipods.

Table 15
Summary of Solid Phase Test Results Using *Ampelisca abdita*

Treatment	Percent Survival in Test Replicates					Mean Survival (%)	Meets LPC for Ocean Disposal
	Rep A	Rep B	Rep C	Rep D	Rep E		
January 2018 Sampling Event – Batch 1							
Control	100	100	100	95	95	98	N/A
LA3-REF	100	100	100	80	90	94	N/A
TB-COMP	95	100	100	100	100	99	Yes
MCN1-COMP-T	100	95	100	100	95	98	Yes
MCN2-COMP-T	100	100	95	95	100	98	Yes
MCN3-COMP	95	100	100	100	100	99	Yes
MCN4-COMP	95	95	95	90	85	92	Yes
January 2018 Sampling Event – Batch 2							
Control	95	100	100	90	100	97	N/A
MCN5-COMP	90	100	100	85	100	95	Yes
EC-COMP	90	95	95	95	100	95	Yes
BIME-COMP-T-M	100	90	100	100	80	94	Yes
BIMW-COMP-T-M	100	95	100	100	95	98	Yes
BIN-COMP-T	100	90	85	100	100	95	Yes
BIS-COMP	95	95	40[1]	90	95	83	Yes
January 2019 Sampling Event							
Control	100	100	95	90	90	95	N/A
LA3-REF	100	100	100	100	100	100	N/A
NC2-COMP	95	95	100	95	100	**97**	Yes
NC3-COMP	90	95	95	90	100	**94**	Yes

Note:
Bold: value is significantly less than the reference ($p < 0.05$)
LPC: limiting permissible concentration
1. Replicate C identified as an outlier (40% survival) using Grubbs' test. Low survival possibly due to no/low aeration on Day 4.

3.2.1.2 Polychaete Mortality Bioassay

Results of the 10-day polychaete SP test are summarized in Table 16.

Testing for the January 2018 sampling event was performed in two batches. Mean survival in the controls were 100% for both batches, which met control acceptability criterion. Mean survival in the reference (LA3-REF) was 100%. Survival results in federal channels sediment were compared to survival in the reference to determine suitability for ocean disposal. Mean survival in composite samples ranged from 92% to 100% (Table 16). All sample results were within 10% of the reference, indicating that test sediments from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are not acutely toxic to marine polychaetes.

Testing for the January 2019 sampling event was performed in one batch. Mean survival in the control was 100%, which met acceptability criterion. Mean survival in the reference (LA3-REF) was 96%. Survival results in Newport Channel sediment were compared to survival in the reference to determine suitability for ocean disposal. Mean survival was 96% for both composite samples (Table 16). Both sample results were within 10% of the reference, indicating that test sediments from Newport Channel are not acutely toxic to marine polychaetes.

Table 16
Summary of Solid Phase Test Results Using *Neanthes arenaceodentata*

Treatment	Percent Survival in Test Replicates					Mean Survival (%)	Meets LPC for Ocean Disposal
	Rep A	Rep B	Rep C	Rep D	Rep E		
January 2018 Sampling Event – Batch 1							
Control	100	100	100	100	100	100	N/A
LA3-REF	100	100	100	100	100	100	N/A
TB-COMP	100	100	100	100	100	100	Yes
MCN1-COMP-T	100	100	100	100	100	100	Yes
MCN2-COMP-T	100	100	100	100	100	100	Yes
MCN3-COMP	100	100	100	100	100	100	Yes
MCN4-COMP	100	100	100	100	100	100	Yes
January 2018 Sampling Event – Batch 2							
Control	100	100	100	100	100	100	N/A
MCN5-COMP	100	100	100	100	100	100	Yes
EC-COMP	100	80	80	100	100	92	Yes
BIME-COMP-T-M	100	100	100	100	100	100	Yes
BIMW-COMP-T-M	100	100	100	100	100	100	Yes
BIN-COMP-T	80	100	100	100	100	96	Yes
BIS-COMP	100	100	100	100	100	100	Yes

Treatment	Percent Survival in Test Replicates					Mean Survival (%)	Meets LPC for Ocean Disposal
	Rep A	Rep B	Rep C	Rep D	Rep E		
January 2019 Sampling Event							
Control	100	100	100	100	100	100	N/A
LA3-REF	100	100	100	100	80	96	N/A
NC2-COMP	100	100	80	100	100	96	Yes
NC3-COMP	100	100	80	100	100	96	Yes

Note:
LPC: limiting permissible concentration

3.2.2 Suspended Particulate Phase Testing

3.2.2.1 Bivalve Larval Development Bioassay

Results for the 48-hour bivalve larval SPP test are summarized in Table 17.

Testing for the January 2018 sampling event was performed in six batches. Mean normal development in the laboratory controls ranged from 96.2% to 99.3%, and mean survival ranged from 91.8% to 98.1%. All control acceptability criteria were met. Mean normal development in the site water controls ranged from 97.5% to 98.7%, and mean survival ranged from 88.6% to 99.6%. In the 100% elutriate treatments, mean normal development ranged from 0% to 99.3%, and mean survival ranged from 76.5% to 98.4%. The median effective concentration (EC_{50}) ranged from 73.4% to greater than 100%, and the median lethal concentration (LC_{50}) was greater than 100% for all samples. Based on these results, samples from Turning Basin, Bay Island North, Entrance Channel, and Main Channel 1, 2, and 5 are not toxic to bivalve larvae, and further assessment is required for samples from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4. The effect on the development of *M. galloprovincialis* exposed to elutriate from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4 was not unexpected due to the elevated ammonia concentrations measured in these samples. As described in Section 2.3, ammonia reference toxicant tests were run with the bivalve larval development bioassay due to the sensitivity of *M. galloprovincialis* to elevated ammonia concentrations. Ammonia concentrations in the 100% elutriate treatments from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4 (3.8 to 10.5 mg/L) exceeded the no observed effect concentration (NOEC) in the associated ammonia reference toxicant tests (3.5 and 4.0 mg/L), indicating that ammonia likely contributed to the observed toxicity in these samples.

Testing for the January 2019 sampling event was performed in one batch. Mean normal development in the laboratory control was 97.0% and mean survival was 94.1%. All control acceptability criteria were met. Mean normal development in the site water control was 97.6%, and

mean survival was 97.3%. In the 100% elutriate treatments, mean normal development was 97.1% and 97.2%, and mean survival was 97.5% and 97.7%. The EC_{50} and LC_{50} were greater than 100% for both samples. Based on these results, samples from Newport Channel are not toxic to bivalve larvae.

Results were further analyzed using a water column toxicity mixing model (i.e., STFATE) to determine whether sediment from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4 meets limiting permissible concentration (LPC) requirements for ocean disposal. Results of STFATE modeling are presented separately in Section 3.3.

Table 17
Summary of Suspended Particulate Phase Test Results Using *Mytilus galloprovincialis*

Sample ID	Treatment (%)	Mean Normal Development (%)	Standard Deviation (%)	EC_{50} (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
January 2018 Sampling Event – Batch 1								
Laboratory Control	N/A	96.2	1.3	N/A	97.6	5.5	N/A	N/A
Site Water Control	N/A	97.1	1.5	N/A	99.6	1.0	N/A	N/A
BIMW-COMP-T-M	1	96.2	2.1	75.9	98.4	3.5	>100	Requires further assessment[1]
	10	96.7	1.2		98.1	2.0		
	50	97.3	2.0		93.8	8.2		
	100	**3.4**	1.9		**86.6**	7.7		
BIME-COMP-T-M	1	97.1	1.1	74.4	96.0	4.5	>100	Requires further assessment[1]
	10	97.1	1.6		99.1	1.2		
	50	93.5	1.9		85.8	7.6		
	100	**1.0**	1.2		90.4	8.5		
January 2018 Sampling Event – Batch 2								
Laboratory Control	N/A	96.6	0.9	N/A	98.1	2.4	N/A	N/A
Site Water Control	N/A	95.8	0.5	N/A	97.4	4.4	N/A	N/A
TB-COMP	1	96.9	1.2	>100	98.7	1.9	>100	Yes
	10	96.2	1.1		100	0.0		
	50	94.8	1.0		92.8	9.0		
	100	96.0	1.9		98.4	2.8		
BIS-COMP	1	97.5	0.9	75.0	98.4	2.3	>100	Requires further assessment[1]
	10	97.1	1.2		96.7	7.4		
	50	96.9	1.3		91.1	8.6		
	100	**0.0**	0.0		**76.5**	9.4		
January 2018 Sampling Event – Batch 3								
Laboratory Control	N/A	97.5	2.4	N/A	91.8	5.4	N/A	N/A

Sample ID	Treatment (%)	Mean Normal Development (%)	Standard Deviation (%)	EC_{50} (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
Site Water Control	N/A	97.5	1.9	N/A	94.1	5.2	N/A	N/A
MCN1-COMP-T	1	96.5	1.4	> 100	94.3	5.2	> 100	Yes
	10	96.8	1.2		93.9	5.6		
	50	98.0	2.0		86.2	8.8		
	100	96.7	3.3		87.2	4.4		
MCN2-COMP-T	1	97.1	1.0	>100	82.4	8.9	>100	Yes
	10	97.8	2.0		84.9	11.6		
	50	98.1	1.0		82.6	5.6		
	100	96.7	2.1		85.1	7.7		
January 2018 Sampling Event – Batch 4								
Laboratory Control	N/A	97.0	0.7	N/A	97.8	3.5	N/A	N/A
Site Water Control	N/A	98.0	1.0	N/A	88.6	8.3	N/A	N/A
BIN-COMP-T	1	97.8	0.6	>100	96.4	3.6	>100	Yes
	10	96.9	2.2		**84.5**	6.5		
	50	95.2	3.6		88.6	9.8		
	100	**52.7**	7.6		**81.2**	15		
EC-COMP	1	97.4	1.2	>100	**88.4**	6.7	>100	Yes
	10	98.0	1.2		90.9	7.8		
	50	97.1	1.4		**85.5**	9.1		
	100	97.2	1.3		**83.2**	1.5		
January 2018 Sampling Event – Batch 5								
Laboratory Control	N/A	99.2	0.9	N/A	95.7	4.2	N/A	N/A
Site Water Control	N/A	98.0	0.9	N/A	94.6	2.7	N/A	N/A
MCN3-COMP	**1**	98.9	0.9	73.4	97.2	3.9	>100	Requires further assessment[1]
	10	98.6	1.2		94.0	6.4		
	50	**90.2**	7.6		94.5	6.0		
	100	**3.9**	2.6		**77.6**	8.0		
MCN4-COMP	**1**	98.8	0.8	77.2	95.1	4.5	>100	Requires further assessment[1]
	10	98.9	0.9		98.9	2.5		
	50	**94.1**	3.3		97.3	4.8		
	100	**12.4**	3.1		89.3	4.5		
January 2018 Sampling Event – Batch 6								
Laboratory Control	N/A	99.3	0.4	N/A	93.1	7.9	N/A	N/A
Site Water Control	N/A	98.7	1.1	N/A	97.2	4.2	N/A	N/A

Sample ID	Treatment (%)	Mean Normal Development (%)	Standard Deviation (%)	EC_{50} (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
MCN5-COMP	1	99.0	1.1	>100	93.4	4.6	>100	Yes
	10	99.0	0.7		96.1	5.7		
	50	98.6	1.0		89.8	6.4		
	100	99.3	0.8		95.1	7.6		
January 2019 Sampling Event								
Laboratory Control	N/A	97.0	2.0	N/A	94.1	10.0	N/A	N/A
Site Water Control	N/A	97.6	1.3	N/A	97.3	1.1	N/A	N/A
NC2-COMP	1	95.8	1.6	>100	96.9	4.0	>100	Yes
	10	96.0	12		96.9	3.0		
	50	96.8	1.3		96.7	5.1		
	100	97.1	1.0		97.7	2.3		
NC3-COMP	1	97.3	0.9	>100	88.4	8.9	>100	Yes
	10	96.3	1.8		96.2	5.3		
	50	97.5	1.5		99.5	1.1		
	100	97.2	0.4		97.5	2.5		

Notes:
Bold: value is significantly less than the laboratory control ($P < 0.05$)
1. STFATE modeling was required to estimate whether disposal of sediment at the LA-3 ODMDS would negatively impact aquatic life.

3.2.2.2 Mysid Shrimp Bioassay

Results for the 96-hour mysid shrimp SPP test are summarized in Table 18.

Testing for the January 2018 sampling event was performed in five batches. Mean survival in the laboratory controls ranged from 96% to 100%, which met control acceptability criterion. Mean survival in the site water controls ranged from 96% to 100%. Mean survival in the 100% elutriate treatments ranged from 94% to 100%. The LC_{50} was greater than 100% for all samples. Based on these results, sediments from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are not toxic to mysid shrimp and meet LPC requirements for ocean disposal.

Testing for the January 2019 sampling event was performed in one batch. Mean survival in the laboratory control was 100%, which met control acceptability criterion. Mean survival in the site water control was 98%. Mean survival in the 100% elutriate treatments was 98% for both composite samples. The LC_{50} was greater than 100% for both samples. Based on these results, sediments from Newport Channel are not toxic to mysid shrimp and meet LPC requirements for ocean disposal.

Table 18
Summary of Suspended Particulate Phase Test Results Using *Americamysis bahia*

Sample ID	Treatment (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
January 2018 Sampling Event – Batch 1					
Laboratory Control	N/A	96	8.9	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
BIMW-COMP-T-M	10	98	4.5	>100	Yes
	50	98	4.5		
	100	98	4.5		
BIME-COMP-T-M	10	94	8.9	>100	Yes
	50	92.5	10		
	100	95	5.8		
January 2018 Sampling Event – Batch 2					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
TB-COMP	10	96	5.5	>100	Yes
	50	96	5.5		
	100	94	5.5		
BIS-COMP	10	96	5.5	>100	Yes
	50	98	4.5		
	100	100	0.0		
January 2018 Sampling Event – Batch 3					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	96	5.5	N/A	N/A
MCN1-COMP-T	10	100	0.0	>100	Yes
	50	98	4.5		
	100	96	5.5		
MCN2-COMP-T	10	100	0.0	>100	Yes
	50	100	0.0		
	100	96	5.5		
January 2018 Sampling Event – Batch 4					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
BIN-COMP-T	10	96	5.5	>100	Yes
	50	100	0.0		
	100	94	8.9		
EC-COMP	10	96	5.5	>100	Yes
	50	100	0.0		

Sample ID	Treatment (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
	100	96	5.5		
January 2018 Sampling Event – Batch 5					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	96	5.5	N/A	N/A
MCN3-COMP	10	98	4.5	>100	Yes
	50	94	8.9		
	100	98	4.5		
MCN4-COMP	10	96	5.5	>100	Yes
	50	96	5.5		
	100	98	4.5		
MCN5-COMP	10	98	4.5	>100	Yes
	50	96	5.5		
	100	98	4.5		
January 2019 Sampling Event					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	98	4.5	N/A	N/A
NC2-COMP	10	98	4.5	>100	Yes
	50	98	4.5		
	100	98	4.5		
NC3-COMP	10	98	4.5	>100	Yes
	50	100	0.0		
	100	98	4.5		

3.2.2.3 Juvenile Fish Bioassay

Results for the 96-hour juvenile fish SPP test are summarized in Table 19.

Testing for the January 2018 sampling event was performed in six batches. Mean survival in the laboratory controls ranged from 96% to 100%, which met control acceptability criteria. Mean survival in the site water controls ranged from 90% to 100%. Mean survival in the 100% elutriate treatments ranged from 86% to 100%. The LC_{50} was greater than 100% for all samples. Based on these results, sediments from the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel are not toxic to juvenile fish and meet LPC requirements for ocean disposal.

Testing for the January 2019 sampling event was performed in one batch. Mean survival in the laboratory control was 88%. Survival in the laboratory control was slightly less than control acceptability criteria of 90%; therefore, results were conservatively compared to the site water control

(94%). Mean survival in the 100% elutriate treatments was 86% and 90%. The LC_{50} was greater than 100% for both samples. Based on these results, sediments from Newport Channel are not toxic to juvenile fish and meet LPC requirements for ocean disposal.

Table 19
Summary of Suspended Particulate Phase Test Results Using *Menidia beryllina*

Sample ID	Treatment (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
January 2018 Sampling Event – Batch 1					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
BIMW-COMP-T-M	10	98	4.5	>100	Yes
	50	100	0.0		
	100	96	5.5		
BIME-COMP-T-M	10	100	0.0	>100	Yes
	50	96	5.5		
	100	98	4.5		
January 2018 Sampling Event – Batch 2					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	98	4.5	N/A	N/A
TB-COMP	10	100	0.0	>100	Yes
	50	98	4.5		
	100	100	0.0		
BIS-COMP	10	98	4.5	>100	Yes
	50	98	4.5		
	100	96	4.5		
January 2018 Sampling Event – Batch 3					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A
MCN1-COMP-T	10	96	5.5	>100	Yes
	50	98	4.5		
	100	94	5.5		
MCN2-COMP-T	10	98	4.5	>100	Yes
	50	96	8.9		
	100	100	0.0		
January 2018 Sampling Event – Batch 4					
Laboratory Control	N/A	98	4.5	N/A	N/A
Site Water Control	N/A	100	0.0	N/A	N/A

Sample ID	Treatment (%)	Mean Survival (%)	Standard Deviation (%)	LC_{50} (%)	Meets LPC for Ocean Disposal
BIN-COMP-T	10	100	0.0	>100	Yes
	50	94	8.9		
	100	92	8.4		
EC-COMP	10	100	0.0	>100	Yes
	50	100	0.0		
	100	98	4.5		
January 2018 Sampling Event – Batch 5					
Laboratory Control	N/A	96	5.5	N/A	N/A
Site Water Control	N/A	98	4.5	N/A	N/A
MCN3-COMP	10	98	4.5	>100	Yes
	50	92	11.0		
	100	86	11.0		
MCN4-COMP	10	92	4.8	>100	Yes
	50	94	5.5		
	100	100	0.0		
January 2018 Sampling Event – Batch 6					
Laboratory Control	N/A	100	0.0	N/A	N/A
Site Water Control	N/A	90	12.0	N/A	N/A
MCN5-COMP	10	90	10.0	>100	Yes
	50	94	8.9		
	100	94	8.9		
January 2019 Sampling Event					
Laboratory Control	N/A	88	11.0	N/A	N/A
Site Water Control	N/A	94	5.5	N/A	N/A
NC2-COMP	10	88	8.4	>100	Yes
	50	82	27.0		
	100	86	26.0		
NC3-COMP	10	**78**	15.0	>100	Yes
	50	98	4.5		
	100	90	0.0		

Note:
Bold: Value is significantly less than the site water control ($P < 0.05$).

3.2.3 Bioaccumulation Potential Testing

Test results for the 28-day BP tests are presented below. Following the 28-day exposure, organisms were placed into clean seawater for 24 hours to allow organisms to depurate the test sediment. After

this purging process, tissues were shipped frozen to Eurofins Calscience, Inc., for chemical analysis. Tissue chemistry results are presented separately in Section 3.4.

3.2.3.1 Bivalve Bioaccumulation Test

Test results for the 28-day bivalve BP test are presented in Table 20. For the January 2018 sampling event, mean survival in the control and reference sediment was 96.8% and 97.6%, respectively. Mean survival in composite samples ranged from 95.2% to 99.2%. For the January 2019 sampling event, mean survival in the control and reference sediment was 98.0% and 98.7%, respectively. Mean survival in composite samples was 98.0% and 96.7%. For both sampling events, sufficient tissue mass was available at test completion for chemical analysis.

Table 20
Summary of Bioaccumulation Potential Test Results Using *Macoma nasuta*

Treatment	Mean Survival (%)	Standard Deviation (%)
January 2018 Sampling Event		
Control	96.8	3.3
LA3-REF	97.6	3.6
TB-COMP	99.2	1.8
MCN1-COMP-T	96.8	3.3
MCN2-COMP-T	96.0	4.9
MCN3-COMP	99.2	1.8
MCN4-COMP	99.2	1.8
MCN5-COMP	95.2	6.6
EC-COMP	96.0	4.0
BIME-COMP-T-M	95.2	5.2
BIMW-COMP-T-M	98.4	2.2
BIN-COMP-T	97.6	2.2
BIS-COMP	98.4	2.2
January 2019 Sampling Event		
Control	98.0	1.8
LA3-REF	98.7	1.8
NC2-COMP	98.0	1.8
NC3-COMP	96.7	3.3

3.2.3.2 Polychaete Bioaccumulation Test

Test results for the 28-day polychaete BP test are presented in Table 21. For the January 2018 sampling event, mean survival in the control and reference sediment was 100% and 98%, respectively. Mean survival in composite samples ranged from 90% to 100%. For the January 2019 sampling event, mean

survival in the control and reference sediment was 90% and 92%, respectively. Mean survival in composite samples ranged from 66% to 76%. Although survival was somewhat reduced, sufficient tissue mass was available at test completion for chemical analysis; therefore, test acceptability criteria were met (see Section 4.3).

Table 21
Summary of Bioaccumulation Potential Test Results Using *Nereis virens*

Treatment	Mean Survival (%)	Standard Deviation (%)
January 2018 Sampling Event		
Control	100	0.0
LA3-REF	98	4.5
TB-COMP	100	0.0
MCN1-COMP-T	90	0.0
MCN2-COMP-T	100	0.0
MCN3-COMP	100	0.0
MCN4-COMP	98	4.5
MCN5-COMP	98	4.5
EC-COMP	100	0.0
BIME-COMP-T-M	100	0.0
BIMW-COMP-T-M	98	4.5
BIN-COMP-T	98	4.5
BIC-COMP	100	0.0
January 2019 Sampling Event		
Control	90	7.1
LA3-REF	92	11.0
NC2-COMP	66	17.0
NC3-COMP	76	15.0

3.3 Prediction of Water Column Toxicity During Disposal

STFATE is a data modeling tool used to evaluate the suitability of proposed dredged material for placement at an ODMDS. The model simulates the movement of disposed material through the water column to the ocean bottom and then as it becomes resuspended by the current. The model uses 0.01 of the LC_{50} or EC_{50} value to determine compliance with the LPC. The lowest endpoint value from bioassay testing was used in the model to provide the most conservative estimate of water column effects resulting from disposal activities. The EC_{50} value of Main Channel North 3 in the bivalve larval development test was calculated to be 73.4%; therefore, the toxicity criterion, or LPC, used in the model was 0.734%. Although ammonia likely contributed to the observed toxicity in this

sample and is not a contaminant of concern, STFATE modeling was performed to demonstrate LPC compliance. The guidance states that the concentration of dredged material must be less than 0.01 times the LC_{50} or EC_{50} after 4 hours within the disposal site and at all times outside the disposal site.

The input parameters for LA-3 ODMDS are listed in Table 22; complete results are included in Appendix E. Physical characteristics of sediment from Main Channel North 3 were used as inputs to the model. Site-specific input parameters used were derived from the *Final* Environmental *Impact* Statement: *Proposed Site Designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay, Orange County, California* (USEPA/USACE 2005).

Table 22
STFATE Model Input Parameters

Parameter	Units	LA-3 ODMDS Value
Site Description		
Number of Grid Points (left to right + z direction)	--	61
Number of Grid Points (top to bottom + x direction)	--	61
Grid Spacing (left to right)	feet	400
Grid Spacing (top to bottom)	feet	400
Water Depth Within Disposal Boundary	feet	1,600
Roughness Height at Bottom of Disposal Site	feet	0.005[1]
Bottom Slope (x-direction)	degrees	0[1]
Bottom Slope (z-direction)	degrees	0[1]
Number of Points in Density Profile	--	2
Density at Point One (depth = 0 feet)	grams/cubic centimeter	1.0247
Density at Point Three (depth = 1,600 feet)	grams/cubic centimeter	1.0282
Velocity		
Type of Velocity Profile	--	2-point velocity profile for constant depth
X-Direction Velocity (depth = 59 feet)	feet/second	0.85
Z-Direction Velocity (depth = 59 feet)	feet/second	0.85
X-Direction Velocity (depth = 950 feet)	feet/second	-0.12
Z-Direction Velocity (depth = 950 feet)	feet/second	-0.12
Disposal Operation		
Disposal Point Top of Grid	feet	12,000
Disposal Point Left Edge of Grid	feet	12,000
Dumping Over Depression	--	No

Parameter	Units	LA-3 ODMDS Value
Solid Fraction Volume Concentration	--	Gravel = 0.0, Sand = 0.151, Silt = 0.238, Clay = 0.089
Volume of Each Layer	cy	2,000
Length of Disposal Vessel Bin	feet	200
Width of Disposal Vessel Bin	feet	50
Pre-Disposal Draft	feet	14
Post-Disposal Draft	feet	5
Duration	seconds	14,400
Long-Term Time Step for Diffusion	seconds	3,600
Time to Empty Vessel	seconds	30
Location of Upper Left Corner of Disposal Site (distance from top edge)	feet	9,000
Location of Upper Left Corner of Disposal Site (distance from left edge)	feet	9,000
Location of Lower Right Corner of Disposal Site (distance from top edge)	feet	15,000
Location of Lower Right Corner of Disposal Site (distance from left edge)	feet	15,000
Coefficients		
Settling Coefficient	--	0.000[1]
Apparent Mass Coefficient	--	1.000[1]
Drag Coefficient	--	0.500[1]
Form Drag for Collapsing Cloud	--	1.000[1]
Skin Friction for Collapsing Cloud	--	0.010[1]
Drag for an Ellipsoidal Wedge	--	0.100[1]
Drag for a Plate	--	1.000[1]
Friction Between Cloud and Bottom	--	0.010[1]
4/3 Law Horizontal Diffusion Dissipation Factor	--	0.001[1]
Unstratified Water Vertical Diffusion Coefficient	--	0.0250[1]
Cloud/Ambient Density Gradient Ratio	--	0.250[1]
Turbulent Thermal Entrainment	--	0.235[1]
Entrainment in Collapse	--	0.100[1]
Stripping Factor	--	0.003[1]

Note:
1. Model default value

Modeled concentrations were compared to the LPC, established by regulatory requirements as no more than 1% of the EC_{50} (0.734%). After 4 hours, the dredged material plume moved outside the disposal boundary and the maximum predicted water column concentration on the entire grid was 0.000314%. The maximum concentration outside the disposal site boundary at any time was 0.00136%.

Based on STFATE modeling results, sediment from the federal channels meets the LPC requirements for ocean disposal.

3.4 Chemical Analysis of Tissue Residues

Sediment bioaccumulation tests were conducted using a bivalve (*M. nasuta*) and a polychaete (*N. virens*). Chemical analysis of tissue residues was conducted to determine the BP of sediment contaminants. Based on results of sediment chemistry, a subset of chemicals was selected for analysis that included mercury, dibutyltin, DDTs, and PCBs (Table 8). Due to the high percentage of sand (98.1%) and low concentrations of contaminants (all concentrations less than the ERL), tissue analysis was not required for the Entrance Channel. The data evaluation consisted of comparing tissue burdens to the following:

- FDA action levels
- Reference sediment tissue burdens
- TRVs from the ERED (USACE 2018)

Testing was performed for both the January 2018 and January 2019 sampling events. January 2018 included the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel. Results of chemical analysis of bivalve and polychaete tissue residues for the January 2018 sampling event are presented in Tables 23 and 24, respectively. January 2019 included Newport Channel. Results of the January 2019 sampling event are presented in Tables 25 and 26, respectively. All results are expressed in wet weight. MDLs, RLs, and raw data for the analyses are provided in the laboratory reports in Appendix C.

Table 23

Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2018

Chemical	Location ID Sample ID Sample Date Matrix FDA Action Level	Time Zero T0-A-MACOMA-012418 1/24/2018 TBIO	LA3-REF LA3-REF-A-MACOMA-022218 2/22/2018 TBIO	LA3-REF LA3-REF-B-MACOMA-022218 2/22/2018 TBIO	LA3-REF LA3-REF-C-MACOMA-022218 2/22/2018 TBIO	LA3-REF LA3-REF-D-MACOMA-022218 2/22/2018 TBIO	LA3-REF LA3-REF-E-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-A-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-B-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-C-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-D-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-E-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-A-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-B-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-C-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-D-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-E-MACOMA-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-A-MACOMA-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-B-MACOMA-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-C-MACOMA-022218 2/22/2018 TBIO
Conventional Parameters (%)																				
Lipids	--	**0.32**	**0.38**	**0.4**	**0.44**	**0.38**	**0.31**	**0.33**	**0.37**	**0.43**	**0.44**	**0.31**	**0.44**	**0.66**	**0.49**	**0.32**	**0.37**	**0.36**	**0.47**	**0.34**
Metals (mg/kg)																				
Mercury	1[1]	**0.00698 J**	**0.00612 J**	**0.00432 J**	**0.00357 J**	**0.00375 J**	**0.00501 J**	**0.0482**	**0.0391**	**0.0464**	**0.0372**	**0.0362**	**0.0156**	**0.0194**	**0.0181**	**0.0111**	**0.0227**	**0.012**	**0.0206**	**0.0192**
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	0.72 U	0.72 U	0.72 U	0.74 U	0.75 U	0.74 U	**4.5**	**3.9**	**5.2**	**3.1**	0.75 U	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	0.29 U	0.29 U	0.28 U	0.29 U	0.28 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.28 U	0.29 U	**0.58 J**	**0.43 J**	0.28 U	**0.53 J**	**0.78 J**	**0.78 J**	**0.38 J**
2,4'-DDE (o,p'-DDE)	5,000[2]	0.99 U	1 U	**1.4 J**	0.99 U	0.99 U	0.99 U	1 U	0.98 U	0.99 U	1 U	0.99 U	1 U	**1.1 J**	**1.2 J**	0.98 U	1 U	**1.3 J**	**1.7 J**	1 U
2,4'-DDT (o,p'-DDT)	5,000[2]	0.31 U	0.32 U	0.31 U	0.31 U	0.31 U	0.31 U	0.32 U	0.31 U	0.31 U	0.32 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U
4,4'-DDD (p,p'-DDD)	--	0.5 U	0.51 U	0.5 U	0.5 U	**0.54 J**	0.5 U	**0.76 J**	**2.7**	**1.7**	**2.3**	**1.9**	**8.1**	**12**	**9.6**	**1.8**	**7.4**	**13**	**18**	**7.4**
4,4'-DDE (p,p'-DDE)	5,000[2]	0.44 U	**5.1**	**4.1**	**5.1**	**4.3**	**2.9**	**4.3**	**9.5**	**6.3**	**10**	**7.8**	**16**	**23**	**18**	**4.8**	**14**	**25**	**29**	**17**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U
Total DDx (U = 0)	5,000[2]	0.99 U	**5.1**	**5.5 J**	**5.1**	**4.84 J**	**2.9**	**5.06 J**	**12.2**	**8**	**12.3**	**9.7**	**24.1**	**36.68 J**	**29.23 J**	**6.6**	**21.93 J**	**40.08 J**	**49.48 J**	**24.78 J**
PCB Congeners (µg/kg)																				
PCB-018	--	0.071 U	0.072 U	0.07 U	0.071 U	0.071 U	0.071 U	**0.59**	**0.37**	**0.81**	**0.33**	**0.63**	0.072 U	**0.43**	0.07 U	0.07 U	0.072 U	0.072 U	0.071 U	0.071 U
PCB-028	--	0.034 U	0.034 U	0.033 U	0.034 U	0.033 U	0.034 U	**1.9**	**1.6**	**2.2**	**1.6**	**1.6**	**0.48**	**0.71**	**0.94**	**0.68**	**0.75**	**0.76**	**0.57**	**0.69**
PCB-037	--	0.06 U	0.061 U	0.06 U	0.06 U	0.06 U	0.06 U	0.061 U	0.06 U	0.06 U	0.061 U	0.06 U	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.06 U	0.061 U
PCB-044	--	0.087 U	0.088 U	0.086 U	0.087 U	0.086 U	0.087 U	0.088 U	0.086 U	**0.66**	0.087 U	0.086 U	0.088 U	0.087 U	0.086 U	0.086 U	0.088 U	0.088 U	0.086 U	0.087 U
PCB-049	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.68**	**1.2**	**1**	**1.3**	**1.1**	**0.43**	**0.73**	**0.6**	0.11 U	**0.37**	**0.43**	**0.4**	**0.39**
PCB-052	--	0.063 U	0.063 U	0.062 U	0.063 U	0.062 U	0.063 U	**1.8**	**1.5**	**2.3**	**1.9**	**1.5**	**0.59**	**0.95**	**0.78**	**0.59**	**0.55**	**0.65**	**0.54**	**0.71**
PCB-066	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**2.6**	**2.5**	**3.4**	**2.7**	**2.5**	**0.86**	**1.2**	**1.1**	**0.83**	**0.86**	**0.95**	**0.7**	**0.68**
PCB-070	--	0.06 U	0.06 U	0.059 U	0.06 U	0.059 U	0.06 U	**1.9**	**1.8**	**2.5**	**1.8**	**1.8**	**0.49**	**0.72**	**0.65**	**0.44**	**0.46**	**0.62**	**0.45**	**0.51**
PCB-074	--	0.087 U	0.088 U	0.086 U	0.087 U	0.086 U	0.087 U	**1.2**	**1.1**	**1.5**	**1.1**	**1.1**	**0.35**	**0.52**	**0.43**	**0.35**	**0.38**	**0.39**	**0.29**	**0.34**
PCB-077	--	0.078 U	0.078 U	0.077 U	0.078 U	0.077 U	0.078 U	0.078 U	0.077 U	0.077 U	**0.3**	**0.29**	0.079 U	0.078 U	0.077 U	0.077 U	0.078 U	0.078 U	0.077 U	0.078 U
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.51**	**0.6**	**0.8**	**0.66**	**0.63**	**0.42**	**0.57**	**0.52**	**0.29**	**0.39**	**0.43**	**0.39**	**0.39**
PCB-099	--	0.061 U	0.061 U	0.06 U	0.061 U	0.06 U	0.061 U	**1.4**	**1.2**	**1.8**	**1.5**	**1.2**	**0.67**	**0.9**	**0.74**	**0.53**	**0.54**	**0.69**	**0.58**	**0.62**
PCB-101	--	0.098 U	0.099 U	0.097 U	0.098 U	0.097 U	0.098 U	**2**	**2.1**	**2.7**	**2**	**2**	**0.93**	**1.2**	**1.1**	**0.82**	**0.96**	**1.2**	**0.87**	**0.84**
PCB-105	--	0.055 U	0.055 U	0.054 U	0.055 U	0.054 U	0.055 U	**0.65**	**0.61**	**0.88**	**0.67**	**0.66**	**0.38**	**0.43**	**0.35**	**0.35**	**0.28**	**0.31**	**0.25**	**0.21**
PCB-110	--	0.046 U	0.046 U	0.045 U	0.046 U	0.046 U	0.046 U	**1.8**	**1.9**	**2.5**	**1.9**	**1.8**	**0.82**	**1.1**	**0.92**	**0.8**	**0.77**	**0.98**	**0.75**	**0.85**
PCB-114	--	0.082 U	0.083 U	0.081 U	0.082 U	0.082 U	0.082 U	0.083 U	0.081 U	0.082 U	0.082 U	0.082 U	0.083 U	0.082 U	0.081 U	0.081 U	0.083 U	0.083 U	0.082 U	0.082 U
PCB-118	--	0.084 U	0.085 U	**0.19 J**	0.084 U	**0.21**	0.084 U	**1.6**	**1.7**	**2.2**	**1.8**	**1.6**	**0.62**	**0.9**	**0.88**	**0.66**	**0.64**	**0.8**	**0.62**	**0.65**
PCB-119	--	0.094 U	0.095 U	0.094 U	0.094 U	0.094 U	0.094 U	0.095 U	0.094 U	0.094 U	0.095 U	0.094 U	0.096 U	0.095 U	0.094 U	0.094 U	0.095 U	0.095 U	0.094 U	0.095 U
PCB-123	--	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U
PCB-126	--	0.08 U	0.081 U	0.079 U	0.08 U	0.08 U	0.08 U	0.081 U	0.079 U	0.08 U	0.08 U	0.08 U	0.081 U	0.08 U	0.079 U	0.079 U	0.081 U	0.081 U	0.08 U	0.08 U
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.28**	0.1 U	**0.36**	**0.25**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB-132/153	--	0.17 U	**0.3 J**	**0.25 J**	**0.33 J**	**0.42**	**0.21 J**	**1.6**	**1.5**	**2.1**	**1.7**	**1.6**	**1**	**1.4**	**1.2**	**0.97**	**0.98**	**1.4**	**1**	**1.1**
PCB-138/158	--	0.094 U	0.095 U	**0.26 J**	0.094 U	**0.2 J**	0.094 U	**1.2**	**1.2**	**1.7**	**1.3**	**1.2**	**0.8**	**1.2**	**1**	**0.66**	**0.84**	**1**	**0.86**	**0.9**
PCB-149	--	0.098 U	0.099 U	0.097 U	0.098 U	0.097 U	0.098 U	**1**	**1**	**1.4**	**1**	**0.92**	**0.81**	**0.91**	**0.82**	**0.72**	**0.68**	**0.79**	**0.69**	**0.74**
PCB-151	--	0.067 U	0.068 U	0.067 U	0.067 U	0.067 U	0.067 U	**0.32**	**0.28**	**0.4**	**0.3**	**0.4**	**0.23**	**0.37**	**0.2**	0.067 U	**0.22**	**0.3**	**0.23**	**0.22**
PCB-156	--	0.058 U	0.058 U	0.057 U	0.058 U	0.057 U	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	0.057 U	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	0.058 U	0.057 U	0.058 U
PCB-157	--	0.052 U	0.053 U	0.052 U	0.052 U	0.052 U	0.052 U	0.053 U	0.052 U	0.052 U	0.053 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.052 U	0.053 U
PCB-167	--	0.062 U	0.062 U	0.061 U	0.062 U	0.061 U	0.062 U	0.062 U	0.061 U	0.061 U	0.062 U	0.061 U	0.063 U	0.062 U	0.061 U	0.061 U	0.062 U	0.062 U	0.061 U	0.062 U
PCB-168	--	0.049 U	0.049 U	0.048 U	0.049 U	0.048 U	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	0.048 U	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	0.049 U	0.048 U	0.049 U
PCB-169	--	0.061 U	0.062 U	0.06 U	0.061 U	0.061 U	0.061 U	0.062 U	0.06 U	0.061 U	0.061 U	0.061 U	0.062 U	0.061 U	0.06 U	0.06 U	0.062 U	0.062 U	0.061 U	0.061 U
PCB-170	--	0.063 U	0.064 U	0.063 U	0.063 U	0.063 U	0.063 U	0.064 U	0.063 U	**0.26**	0.064 U	0.063 U	0.064 U	0.064 U	0.063 U	0.063 U	0.064 U	0.064 U	0.063 U	0.064 U
PCB-177	--	0.087 U	0.088 U	0.086 U	0.087 U	0.087 U	0.087 U	0.088 U	0.086 U	0.087 U	0.088 U	0.087 U	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	0.087 U	0.088 U
PCB-180	--	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	**0.43**	0.042 U	0.042 U	0.042 U	0.042 U	0.043 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U
PCB-183	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.34**	0.11 U	**0.37**	**0.26**	**0.32**	0.11 U	**0.25**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-187	--	0.084 U	0.085 U	0.083 U	0.084 U	0.084 U	0.084 U	**0.58**	**0.46**	**0.69**	**0.57**	**0.73**	**0.46**	**0.57**	**0.42**	**0.28**	**0.4**	**0.35**	**0.26**	**0.33**
PCB-189	--	0.061 U	0.062 U	0.06 U	0.061 U	0.061 U	0.061 U	0.062 U	0.06 U	0.061 U	0.061 U	0.061 U	0.062 U	0.061 U	0.06 U	0.06 U	0.062 U	0.062 U	0.061 U	0.061 U

Table 23

Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2018

Chemical	Location ID Sample ID Sample Date Matrix FDA Action Level	Time Zero T0-A-MACOMA-012418 1/24/2018 TBIO	LA3-REF LA3-REF-A-MACOMA-022218 2/22/2018 TBIO	LA3-REF LA3-REF-B-MACOMA-022218 2/22/2018 TBIO	LA3-REF LA3-REF-C-MACOMA-022218 2/22/2018 TBIO	LA3-REF LA3-REF-D-MACOMA-022218 2/22/2018 TBIO	LA3-REF LA3-REF-E-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-A-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-B-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-C-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-D-MACOMA-022218 2/22/2018 TBIO	TB TB-COMP-E-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-A-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-B-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-C-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-D-MACOMA-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-E-MACOMA-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-A-MACOMA-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-B-MACOMA-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-C-MACOMA-022218 2/22/2018 TBIO
PCB-194	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-201	--	0.097 U	0.098 U	0.096 U	0.097 U	0.096 U	0.097 U	0.098 U	0.096 U	0.096 U	0.097 U	0.096 U	0.098 U	0.097 U	0.096 U	0.096 U	0.098 U	0.098 U	0.096 U	0.097 U
PCB-206	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Total PCB Congener (U = 0)	2,000[3]	0.19 U	**0.3 J**	**0.7 J**	**0.33 J**	**0.83 J**	**0.21 J**	**24.38**	**22.62**	**32.53**	**24.94**	**23.58**	**10.34**	**15.06**	**12.65**	**8.97**	**10.07**	**12.05**	**9.45**	**10.17**

Table 23

Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2018

Chemical	Location ID Sample ID Sample Date Matrix FDA Action Level	MCN2 MCN2-COMP-T-D-MACOMA-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-E-MACOMA-022218 2/22/2018 TBIO	MCN3 MCN3-COMP-A-MACOMA-022218 2/22/2018 TBIO	MCN3 MCN3-COMP-B-MACOMA-022218 2/22/2018 TBIO	MCN3 MCN3-COMP-C-MACOMA-022218 2/22/2018 TBIO	MCN3 MCN3-COMP-D-MACOMA-022218 2/22/2018 TBIO	MCN3 MCN3-COMP-E-MACOMA-022218 2/22/2018 TBIO	MCN4 MCN4-COMP-A-MACOMA-022218 2/22/2018 TBIO	MCN4 MCN4-COMP-B-MACOMA-022218 2/22/2018 TBIO	MCN4 MCN4-COMP-C-MACOMA-022218 2/22/2018 TBIO	MCN4 MCN4-COMP-D-MACOMA-022218 2/22/2018 TBIO	MCN4 MCN4-COMP-E-MACOMA-022218 2/22/2018 TBIO	MCN5 MCN5-COMP-A-MACOMA-022218 2/22/2018 TBIO	MCN5 MCN5-COMP-B-MACOMA-022218 2/22/2018 TBIO	MCN5 MCN5-COMP-C-MACOMA-022218 2/22/2018 TBIO	MCN5 MCN5-COMP-D-MACOMA-022218 2/22/2018 TBIO	MCN5 MCN5-COMP-E-MACOMA-022218 2/22/2018 TBIO	BIN BIN-COMP-T-A-MACOMA-022218 2/22/2018 TBIO	BIN BIN-COMP-T-B-MACOMA-022218 2/22/2018 TBIO
Conventional Parameters (%)																				
Lipids	--	**0.61**	**0.7**	**0.4**	**0.4**	**0.56**	**0.43**	**0.36**	**0.44**	**0.54**	**0.35**	**0.36**	**0.36**	**0.34**	**0.53**	**0.5**	**0.35**	**0.33**	**0.29**	**0.61**
Metals (mg/kg)																				
Mercury	1[1]	**0.0147**	**0.0165**	**0.00713 J**	**0.00996**	**0.0107**	**0.0125**	**0.00927 J**	0.00352 U	0.00367 U	**0.00469 J**	0.00336 U	**0.00357 J**	**0.00542 J**	**0.00369 J**	**0.00498 J**	**0.00405 J**	**0.00446 J**	0.00367 U	0.00342 U
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	**1.3**	**1.3**	**1.9**	**2.1**	**1.5**	**0.73 J**	**0.9 J**	**0.78 J**	**1.5**	**0.77 J**	**0.77 J**	**1.7**	**0.76 J**	**0.93 J**	**0.68 J**	**0.42 J**	0.29 U	0.29 U	**1.4**
2,4'-DDE (o,p'-DDE)	5,000[2]	**2.2**	**3.3**	**1.3 J**	**2.4**	**2.2**	0.99 U	**1.2 J**	**1.2 J**	**2.1**	**1.1 J**	**1.2 J**	**1.6 J**	1 U	**1.6 J**	**1.7 J**	**1.6 J**	1 U	1 U	**5.6**
2,4'-DDT (o,p'-DDT)	5,000[2]	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	**0.36 J**	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U
4,4'-DDD (p,p'-DDD)	--	**21**	**28**	**16**	**23**	**21**	**12**	**10**	**11**	**15 J**	**11**	**10**	**16 J**	**5.9**	**9.2**	**8.8**	**6.2**	**3.9**	**4.9**	**20**
4,4'-DDE (p,p'-DDE)	5,000[2]	**37**	**53**	**22**	**34**	**35**	**19**	**20**	**35**	**50**	**32**	**30**	**31**	**25**	**39**	**36**	**25**	**15**	**23**	**68**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U
Total DDx (U = 0)	5,000[2]	**61.5**	**85.6**	**41.2 J**	**61.5**	**59.7**	**31.73 J**	**32.46 J**	**47.98 J**	**68.6 J**	**44.87 J**	**41.97 J**	**50.3 J**	**31.66 J**	**50.73 J**	**47.18 J**	**33.22 J**	**18.9**	**27.9**	**95**
PCB Congeners (µg/kg)																				
PCB-018	--	0.071 U	0.071 U	0.071 U	0.072 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.072 U	0.072 U	0.071 U	0.072 U	0.072 U	0.071 U	0.071 U	0.071 U	0.072 U
PCB-028	--	**0.66**	**0.98**	0.034 U	**0.38**	**0.47**	0.034 U	**0.36**	0.034 U	0.033 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U
PCB-037	--	0.06 U	0.06 U	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.06 U	0.061 U	0.061 U	0.061 U
PCB-044	--	0.087 U	0.087 U	0.087 U	0.088 U	0.087 U	0.087 U	0.087 U	0.087 U	0.086 U	0.087 U	0.088 U	0.088 U	0.087 U	0.088 U	0.088 U	0.087 U	0.087 U	0.087 U	0.088 U
PCB-049	--	**0.68**	**0.88**	**0.33**	**0.44**	**0.44**	**0.27**	**0.23**	**0.26**	**0.3**	**0.25**	**0.2 J**	**0.25**	0.11 U	**0.27**	**0.21**	**0.19 J**	0.11 U	0.11 U	**0.31**
PCB-052	--	**0.93**	**1**	**0.55**	**0.5**	**0.62**	**0.59**	**0.47**	**0.51**	**0.51**	**0.4**	**0.46**	**0.41**	**0.27**	**0.26**	**0.32**	**0.3**	**0.3**	**0.31**	**0.42**
PCB-066	--	**0.98**	**1.3**	**0.56**	**0.75**	**0.72**	**0.71**	**0.56**	**0.35**	**0.41**	**0.47**	**0.42**	**0.44**	**0.38**	**0.45**	**0.35**	**0.49**	**0.31**	**0.42**	**0.52**
PCB-070	--	**0.62**	**0.9**	**0.45**	**0.39**	**0.45**	**0.45**	**0.44**	**0.38**	**0.35**	**0.38**	**0.33**	**0.25**	**0.27**	**0.27**	**0.35**	**0.21**	**0.24**	**0.27**	**0.32**
PCB-074	--	**0.45**	**0.54**	**0.28**	**0.29**	**0.31**	**0.38**	**0.24**	**0.26**	**0.25**	**0.21**	**0.25**	0.088 U	0.087 U	**0.28**	0.088 U	**0.23**	**0.22**	0.087 U	0.088 U
PCB-077	--	0.078 U	0.078 U	0.078 U	0.079 U	0.078 U	0.078 U	0.078 U	0.078 U	0.077 U	0.078 U	0.079 U	0.079 U	0.078 U	0.079 U	0.078 U	0.078 U	0.078 U	0.078 U	0.079 U
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
PCB-087	--	**0.57**	**0.92**	**0.46**	**0.49**	**0.46**	**0.49**	**0.35**	**0.63**	**0.54**	**0.45**	**0.36**	**0.46**	**0.53**	**0.49**	**0.43**	**0.44**	**0.31**	**0.28**	**0.79**
PCB-099	--	**0.76**	**1.1**	**0.53**	**0.5**	**0.6**	**0.59**	**0.46**	**0.4**	**0.41**	**0.38**	**0.21**	**0.29**	**0.43**	**0.38**	**0.31**	**0.3**	**0.29**	**0.28**	**0.46**
PCB-101	--	**1.2**	**1.6**	**0.71**	**0.97**	**0.86**	**0.9**	**0.76**	**0.53**	**0.63**	**0.64**	**0.51**	**0.66**	**0.45**	**0.59**	**0.61**	**0.5**	**0.47**	**0.5**	**0.73**
PCB-105	--	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.054 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U
PCB-110	--	**1**	**1.5**	**0.76**	**0.73**	**0.72**	**0.74**	**0.63**	**0.63**	**0.61**	**0.58**	**0.5**	**0.51**	**0.49**	**0.54**	**0.55**	**0.49**	**0.42**	**0.45**	**0.67**
PCB-114	--	0.082 U	0.082 U	0.082 U	0.083 U	0.082 U	0.082 U	0.082 U	0.082 U	0.082 U	0.082 U	0.083 U	0.083 U	0.082 U	0.083 U	0.083 U	0.082 U	0.082 U	0.082 U	0.083 U
PCB-118	--	**0.87**	**1.2**	**0.62**	**0.65**	**0.63**	**0.72**	**0.6**	**0.47**	**0.39**	**0.51**	**0.45**	**0.48**	**0.38**	**0.49**	**0.38**	**0.44**	**0.36**	**0.34**	**0.58**
PCB-119	--	0.094 U	0.094 U	0.095 U	0.096 U	0.094 U	0.094 U	0.095 U	0.094 U	0.094 U	0.095 U	0.096 U	0.096 U	0.095 U	0.096 U	0.095 U	0.094 U	0.095 U	0.095 U	0.096 U
PCB-123	--	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.1 U	0.11 U
PCB-126	--	0.08 U	0.08 U	0.08 U	0.081 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.081 U	0.081 U	0.08 U	0.081 U	0.081 U	0.08 U	0.08 U	0.08 U	0.081 U
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB-132/153	--	**1.3**	**1.9**	**1**	**1.1**	**1.2**	**1.1**	**0.86**	**0.89**	**0.76**	**0.79**	**0.73**	**0.76**	**0.73**	**0.87**	**0.74**	**0.59**	**0.72**	**0.58**	**0.92**
PCB-138/158	--	**1.1**	**1.4**	**0.73**	**0.86**	**0.91**	**0.85**	**0.71**	**0.74**	**0.7**	**0.72**	**0.6**	**0.65**	**0.62**	**0.83**	**0.62**	**0.57**	**0.53**	**0.62**	**0.74**
PCB-149	--	**1**	**1.4**	**0.72**	**0.6**	**0.75**	**0.83**	**0.6**	**0.59**	**0.57**	**0.62**	**0.48**	**0.7**	**0.64**	**0.63**	**0.47**	**0.51**	**0.48**	**0.58**	**0.65**
PCB-151	--	**0.27**	**0.37**	**0.26**	0.068 U	**0.22**	**0.24**	**0.22**	0.067 U	**0.25**	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.067 U	0.068 U	0.068 U	0.068 U
PCB-156	--	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.057 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U
PCB-157	--	0.052 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.052 U	0.053 U	0.053 U	0.053 U
PCB-167	--	0.062 U	0.062 U	0.062 U	0.063 U	0.062 U	0.062 U	0.062 U	0.062 U	0.061 U	0.062 U	0.063 U	0.063 U	0.062 U	0.063 U	0.062 U	0.062 U	0.062 U	0.062 U	0.063 U
PCB-168	--	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.048 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U
PCB-169	--	0.061 U	0.061 U	0.061 U	0.062 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.062 U	0.062 U	0.061 U	0.062 U	0.062 U	0.061 U	0.061 U	0.061 U	0.062 U
PCB-170	--	0.063 U	0.063 U	0.064 U	0.064 U	0.063 U	0.063 U	0.064 U	0.063 U	0.063 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.063 U	0.064 U	0.064 U	0.064 U
PCB-177	--	0.087 U	0.087 U	0.088 U	0.088 U	0.087 U	0.087 U	0.088 U	0.087 U	0.087 U	0.088 U	0.088 U	0.088 U	0.088 U	0.088 U	0.088 U	0.087 U	0.088 U	0.088 U	0.088 U
PCB-180	--	0.042 U	0.042 U	0.042 U	0.043 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.043 U	0.043 U	0.042 U	0.043 U	0.042 U	0.042 U	0.042 U	0.042 U	0.043 U
PCB-183	--	**0.21**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-187	--	**0.32**	**0.51**	**0.27**	**0.37**	**0.55**	**0.41**	**0.25**	**0.27**	**0.22**	**0.22**	0.086 U	**0.26**	**0.23**	**0.27**	**0.24**	0.084 U	0.085 U	0.085 U	**0.29**
PCB-189	--	0.061 U	0.061 U	0.061 U	0.062 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.062 U	0.062 U	0.061 U	0.062 U	0.062 U	0.061 U	0.061 U	0.061 U	0.062 U

Table 23

Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2018

Chemical	Location ID / Sample ID / Sample Date / Matrix	FDA Action Level	MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
			MCN2-COMP-T-D-MACOMA-022218 2/22/2018 TBIO	MCN2-COMP-T-E-MACOMA-022218 2/22/2018 TBIO	MCN3-COMP-A-MACOMA-022218 2/22/2018 TBIO	MCN3-COMP-B-MACOMA-022218 2/22/2018 TBIO	MCN3-COMP-C-MACOMA-022218 2/22/2018 TBIO	MCN3-COMP-D-MACOMA-022218 2/22/2018 TBIO	MCN3-COMP-E-MACOMA-022218 2/22/2018 TBIO	MCN4-COMP-A-MACOMA-022218 2/22/2018 TBIO	MCN4-COMP-B-MACOMA-022218 2/22/2018 TBIO	MCN4-COMP-C-MACOMA-022218 2/22/2018 TBIO	MCN4-COMP-D-MACOMA-022218 2/22/2018 TBIO	MCN4-COMP-E-MACOMA-022218 2/22/2018 TBIO	MCN5-COMP-A-MACOMA-022218 2/22/2018 TBIO	MCN5-COMP-B-MACOMA-022218 2/22/2018 TBIO	MCN5-COMP-C-MACOMA-022218 2/22/2018 TBIO	MCN5-COMP-D-MACOMA-022218 2/22/2018 TBIO	MCN5-COMP-E-MACOMA-022218 2/22/2018 TBIO	BIN-COMP-T-A-MACOMA-022218 2/22/2018 TBIO	BIN-COMP-T-B-MACOMA-022218 2/22/2018 TBIO
PCB-194	--		0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-201	--		0.097 U	0.097 U	0.097 U	0.098 U	0.097 U	0.097 U	0.097 U	0.097 U	0.096 U	0.097 U	0.098 U	0.098 U	0.097 U	0.098 U	0.098 U	0.097 U	0.097 U	0.097 U	0.098 U
PCB-206	--		0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U	0.2 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U
Total PCB Congener (U = 0)	2,000[3]		**12.92**	**17.5**	**8.23**	**9.02**	**9.91**	**9.27**	**7.74**	**6.91**	**6.9**	**6.62**	**5.5 J**	**6.12**	**5.42**	**6.62**	**5.58**	**5.26 J**	**4.65**	**4.63**	**7.4**

Table 23

Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2018

Chemical	Location ID Sample ID Sample Date Matrix FDA Action Level	BIN BIN-COMP-T-C-MACOMA-022218 2/22/2018 TBIO	BIN BIN-COMP-T-D-MACOMA-022218 2/22/2018 TBIO	BIN BIN-COMP-T-E-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-A-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-B-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-C-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-D-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-E-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-A-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-B-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-C-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-D-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-E-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-A-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-B-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-C-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-D-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-E-MACOMA-022218 2/22/2018 TBIO
Conventional Parameters (%)																			
Lipids	--	**0.29**	**0.46**	**0.32**	**0.55**	**0.44**	**0.65**	**0.37**	**0.41**	**0.53**	**0.5**	**0.36**	**0.42**	**0.41**	**0.34**	**0.44**	**0.48**	**0.37**	**0.39**
Metals (mg/kg)																			
Mercury	1[1]	0.00371 U	0.00339 U	0.00336 U	**0.00568 J**	0.00339 U	**0.0085 J**	0.00342 U	0.00363 U	0.00349 U	0.00342 U	0.00342 U	0.00352 U	0.00342 U	0.00352 U	0.00339 U	0.00336 U	0.00336 U	0.00359 U
Organometallic Compounds (µg/kg)																			
Dibutyltin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																			
2,4'-DDD (o,p'-DDD)	--	**0.37 J**	**0.95 J**	**0.49 J**	**2.3**	**2.7**	**3.3**	**0.77 J**	**1.8**	**1.4**	**2.3**	**0.68 J**	**1.4**	**0.94 J**	**0.74 J**	**0.3 J**	**1.3**	0.29 U	0.28 U
2,4'-DDE (o,p'-DDE)	5,000[2]	1 U	**2.6**	1 U	**2.8**	**2.9**	**3.7**	**1.4 J**	**1.8 J**	**4.6**	**2.7**	**1.3 J**	**2.8**	**2**	1 U	0.99 U	**2.8**	1 U	**1.3 J**
2,4'-DDT (o,p'-DDT)	5,000[2]	**0.6 J**	0.31 U	0.32 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U	0.31 U	0.31 U	0.31 U	0.32 U	0.31 U	0.31 U	0.32 U	0.31 U
4,4'-DDD (p,p'-DDD)	--	**7.3**	**15**	**7.8**	**26**	**27**	**31**	**17**	**23**	**26**	**25**	**14**	**21**	**17**	**11**	**6.3**	**18**	**6.2 J**	**11**
4,4'-DDE (p,p'-DDE)	5,000[2]	**26**	**40**	**28**	**52**	**52**	**64**	**35**	**55**	**68**	**62**	**34**	**45**	**41**	**31**	**24**	**55**	**17 J**	**30**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U
Total DDx (U = 0)	5,000[2]	**34.27 J**	**58.55 J**	**36.29 J**	**83.1**	**84.6**	**102**	**54.17 J**	**81.6 J**	**100**	**92**	**49.98 J**	**70.2**	**60.94 J**	**42.74 J**	**30.6 J**	**77.1**	**23.2 J**	**42.3 J**
PCB Congeners (µg/kg)																			
PCB-018	--	0.072 U	0.071 U	0.072 U	0.071 U	0.072 U	0.072 U	0.071 U	0.072 U	0.071 U	0.072 U	0.071 U	0.07 U	0.071 U	--	--	--	--	--
PCB-028	--	0.034 U	**0.34**	0.034 U	0.033 U	0.034 U	0.034 U	0.034 U	**0.59**	0.034 U	**0.46**	0.033 U	0.033 U	0.034 U	--	--	--	--	--
PCB-037	--	0.061 U	0.06 U	0.061 U	0.06 U	0.061 U	0.061 U	0.06 U	0.061 U	0.061 U	0.061 U	0.06 U	0.06 U	0.06 U	--	--	--	--	--
PCB-044	--	0.088 U	0.086 U	0.088 U	0.086 U	0.088 U	0.088 U	0.087 U	0.088 U	0.087 U	0.088 U	0.086 U	0.086 U	0.087 U	--	--	--	--	--
PCB-049	--	0.11 U	**0.25**	0.11 U	**0.39**	**0.33**	**0.36**	**0.21**	**0.32**	**0.34**	**0.41**	0.11 U	**0.28**	0.11 U	--	--	--	--	--
PCB-052	--	0.063 U	**0.6**	**0.44**	**0.56**	**0.53**	**0.52**	**0.41**	**0.5**	**0.56**	**0.61**	**0.46**	**0.43**	**0.4**	--	--	--	--	--
PCB-066	--	**0.43**	**0.53**	**0.44**	**0.66**	**0.63**	**0.59**	**0.67**	**0.67**	**0.75**	**0.65**	**0.58**	**0.57**	**0.43**	--	--	--	--	--
PCB-070	--	0.06 U	**0.4**	**0.41**	**0.49**	**0.4**	**0.56**	**0.39**	**0.43**	**0.46**	**0.43**	**0.38**	**0.36**	**0.22**	--	--	--	--	--
PCB-074	--	**0.21**	**0.21**	**0.28**	**0.33**	**0.33**	**0.24**	**0.27**	**0.3**	**0.3**	**0.37**	**0.29**	**0.2**	0.087 U	--	--	--	--	--
PCB-077	--	0.078 U	0.077 U	0.079 U	0.077 U	0.078 U	0.079 U	0.078 U	0.078 U	0.078 U	0.078 U	0.077 U	0.077 U	0.078 U	--	--	--	--	--
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	--	--	--	--	--
PCB-087	--	**0.27**	**0.46**	**0.41**	**0.65**	**0.65**	**0.79**	**0.62**	**0.66**	**0.74**	**0.57**	**0.37**	**0.57**	**0.35**	--	--	--	--	--
PCB-099	--	**0.45**	**0.48**	**0.46**	**0.47**	**0.42**	**0.44**	**0.4**	**0.54**	**0.51**	**0.38**	**0.38**	**0.32**	**0.28**	--	--	--	--	--
PCB-101	--	**0.41**	**0.7**	**0.66**	**0.75**	**0.86**	**0.82**	**0.7**	**0.81**	**0.83**	**0.93**	**0.53**	**0.7**	**0.41**	--	--	--	--	--
PCB-105	--	0.055 U	**0.33**	0.055 U	0.054 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.054 U	0.054 U	0.055 U	--	--	--	--	--
PCB-110	--	**0.52**	**0.6**	**0.61**	**0.8**	**0.76**	**0.86**	**0.67**	**0.73**	**0.78**	**0.78**	**0.66**	**0.59**	**0.44**	--	--	--	--	--
PCB-114	--	0.083 U	0.082 U	0.083 U	0.082 U	0.083 U	0.083 U	0.082 U	0.083 U	0.082 U	0.083 U	0.082 U	0.081 U	0.082 U	--	--	--	--	--
PCB-118	--	**0.41**	**0.55**	**0.37**	**0.6**	**0.63**	**0.63**	**0.54**	**0.64**	**0.6**	**0.55**	**0.45**	**0.52**	**0.37**	--	--	--	--	--
PCB-119	--	0.095 U	0.094 U	0.096 U	0.094 U	0.095 U	0.096 U	0.094 U	0.095 U	0.095 U	0.095 U	0.094 U	0.094 U	0.094 U	--	--	--	--	--
PCB-123	--	0.11 U	0.1 U	0.11 U	0.1 U	0.11 U	0.11 U	0.1 U	0.11 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	--	--	--	--	--
PCB-126	--	0.081 U	0.08 U	0.081 U	0.08 U	0.081 U	0.081 U	0.08 U	0.081 U	0.08 U	0.081 U	0.08 U	0.079 U	0.08 U	--	--	--	--	--
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	--	--	--	--	--
PCB-132/153	--	**0.68**	**0.9**	**0.86**	**1.1**	**1**	**1.2**	**0.89**	**1**	**1**	**0.96**	**0.75**	**0.88**	**0.53**	--	--	--	--	--
PCB-138/158	--	**0.55**	**0.8**	**0.68**	**0.83**	**0.83**	**0.88**	**0.7**	**0.88**	**0.84**	**0.81**	**0.82**	**0.76**	**0.54**	--	--	--	--	--
PCB-149	--	**0.46**	**0.65**	**0.64**	**0.79**	**0.8**	**0.8**	**0.66**	**0.79**	**0.64**	**0.8**	**0.64**	**0.56**	**0.39**	--	--	--	--	--
PCB-151	--	0.068 U	0.067 U	0.068 U	**0.29**	**0.29**	**0.28**	0.067 U	**0.23**	**0.25**	**0.23**	0.067 U	0.067 U	0.067 U	--	--	--	--	--
PCB-156	--	0.058 U	0.057 U	0.058 U	0.057 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	--	--	--	--	--
PCB-157	--	0.053 U	0.052 U	0.053 U	0.052 U	0.053 U	0.053 U	0.052 U	0.053 U	0.053 U	0.053 U	0.052 U	0.052 U	0.052 U	--	--	--	--	--
PCB-167	--	0.062 U	0.061 U	0.063 U	0.061 U	0.062 U	0.063 U	0.062 U	0.062 U	0.062 U	0.062 U	0.061 U	0.061 U	0.062 U	--	--	--	--	--
PCB-168	--	0.049 U	0.048 U	0.049 U	0.048 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	--	--	--	--	--
PCB-169	--	0.062 U	0.061 U	0.062 U	0.061 U	0.062 U	0.062 U	0.061 U	0.062 U	0.061 U	0.062 U	0.061 U	0.06 U	0.061 U	--	--	--	--	--
PCB-170	--	0.064 U	0.063 U	0.064 U	0.063 U	0.064 U	0.064 U	0.063 U	0.064 U	0.064 U	0.064 U	0.063 U	0.063 U	0.063 U	--	--	--	--	--
PCB-177	--	0.088 U	0.087 U	0.088 U	0.087 U	0.088 U	0.088 U	0.087 U	0.088 U	0.088 U	0.088 U	0.087 U	0.086 U	0.087 U	--	--	--	--	--
PCB-180	--	**0.2 J**	0.042 U	0.043 U	0.042 U	0.042 U	0.043 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	--	--	--	--	--
PCB-183	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	--	--	--	--	--
PCB-187	--	0.085 U	**0.32**	0.086 U	**0.22**	**0.24**	**0.27**	**0.22**	**0.35**	**0.47**	0.085 U	0.084 U	**0.38**	0.084 U	--	--	--	--	--
PCB-189	--	0.062 U	0.061 U	0.062 U	0.061 U	0.062 U	0.062 U	0.061 U	0.062 U	0.061 U	0.062 U	0.061 U	0.06 U	0.061 U	--	--	--	--	--

Table 23

Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2018

Chemical	Location ID Sample ID Sample Date Matrix FDA Action Level	BIN BIN-COMP-T-C-MACOMA-022218 2/22/2018 TBIO	BIN BIN-COMP-T-D-MACOMA-022218 2/22/2018 TBIO	BIN BIN-COMP-T-E-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-A-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-B-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-C-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-D-MACOMA-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-E-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-A-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-B-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-C-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-D-MACOMA-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-E-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-A-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-B-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-C-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-D-MACOMA-022218 2/22/2018 TBIO	BIS BIS-COMP-E-MACOMA-022218 2/22/2018 TBIO
PCB-194	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	--	--	--	--	--
PCB-201	--	0.098 U	0.096 U	0.098 U	0.096 U	0.098 U	0.098 U	0.097 U	0.098 U	0.097 U	0.098 U	0.096 U	0.096 U	0.097 U	--	--	--	--	--
PCB-206	--	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	--	--	--	--	--
Total PCB Congener (U = 0)	2,000[3]	**4.59 J**	**8.12**	**6.26**	**8.93**	**8.7**	**9.24**	**7.35**	**9.44**	**9.07**	**8.94**	**6.31**	**7.12**	**4.36**	--	--	--	--	--

Notes:

All non-detect results are reported at the method detection limit.

Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.

Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.

Total PCB congeners is the sum of all PCB congeners listed in this table.

USEPA Stage 2A data validation was completed by Anchor QEA.

Bold: detected result

Italicized: non-detected concentration is above one or more identified screening levels

J: estimated value

U: compound analyzed but not detected above detection limit

1. Action level for methyl mercury.

2. Action level for DDT and DDE (individually or in combination).

3. Tolerance level for PCBs. No action level.

Table 24

Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

Chemical	Location ID / Sample ID / Sample Date / Matrix / FDA Action Level	Time Zero T0-A-NEREIS-012418 1/24/2018 TBIO	LA3-REF LA3-REF-A-NEREIS-022218 2/22/2018 TBIO	LA3-REF LA3-REF-B-NEREIS-022218 2/22/2018 TBIO	LA3-REF LA3-REF-C-NEREIS-022218 2/22/2018 TBIO	LA3-REF LA3-REF-D-NEREIS-022218 2/22/2018 TBIO	LA3-REF LA3-REF-E-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-A-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-B-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-C-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-D-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-E-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-A-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-B-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-C-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-D-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-E-NEREIS-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-A-NEREIS-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-B-NEREIS-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-C-NEREIS-022218 2/22/2018 TBIO
Conventional Parameters (%)																				
Lipids	--	**0.61**	**1.1**	**0.74**	**1.1**	**0.92**	**0.75**	**0.46**	**0.52**	**0.55**	**0.71**	**0.71**	**0.79**	**0.69**	**0.93**	**0.82**	**0.62**	**0.72**	**0.9**	**0.81**
Metals (mg/kg)																				
Mercury	1[1]	**0.0218**	**0.0121**	**0.00973**	**0.00562 J**	**0.0374**	**0.0186**	**0.0164 J**	**0.0187**	**0.0163**	**0.0149**	**0.0124**	**0.012**	**0.0143**	**0.0215**	**0.0301**	**0.0118**	**0.027**	**0.0263**	**0.0242**
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	0.73 U	0.72 U	0.74 U	0.72 U	0.72 U	0.72 U	0.74 U	0.72 U	0.74 U	0.72 U	0.73 U	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.29 U	0.34 U	0.28 U	0.28 U	0.29 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U
2,4'-DDE (o,p'-DDE)	5,000[2]	**2 J**	1 U	0.98 U	**1.9 J**	1 U	**1.2 J**	1.2 U	0.98 U	0.97 U	0.99 U	1 U	**1.3 J**	**1 J**	0.98 U	**1.5 J**	**1.1 J**	**2.7**	**1.6 J**	**2.7**
2,4'-DDT (o,p'-DDT)	5,000[2]	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.37 U	0.31 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.31 U
4,4'-DDD (p,p'-DDD)	--	0.51 U	0.51 U	0.5 U	0.5 U	0.51 U	**1.7**	**5.1**	**4.3**	**5.7**	**6**	**5.4**	**5.9**	**9.6**	**5.7**	**9.5**	**10**	**15**	**23**	**20**
4,4'-DDE (p,p'-DDE)	5,000[2]	**1.8**	**0.98 J**	**1.6**	**1.2**	**1.2**	**2.6**	**3.7**	**3.5**	**4.2**	**4.2**	**2.5**	**5.8**	**6.4**	**4.5**	**6.8**	**4.4**	**6.6**	**9.8**	**8.7**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.44 U	0.44 U	0.43 U	0.43 U	**0.78 J**	0.44 U	0.51 U	0.43 U	0.43 U	0.44 U	0.44 U	0.45 U	0.43 U	0.43 U	0.44 U	0.45 U	0.43 U	0.43 U	0.44 U
Total DDx (U = 0)	5,000[2]	**3.8 J**	**0.98 J**	**1.6**	**3.1 J**	**1.98 J**	**5.5 J**	**8.8**	**7.8**	**9.9**	**10.2**	**7.9**	**13 J**	**17 J**	**10.2**	**17.8 J**	**15.5 J**	**24.3**	**34.4 J**	**31.4**
PCB Congeners (µg/kg)																				
PCB-018	--	0.072 U	0.072 U	0.07 U	0.07 U	0.072 U	0.072 U	**0.64**	**0.74**	**0.82**	**0.61**	**0.77**	**0.22**	**0.25**	0.07 U	**0.23**	**0.24**	0.07 U	0.07 U	0.071 U
PCB-028	--	0.034 U	0.034 U	0.033 U	0.033 U	0.034 U	0.034 U	**0.75**	**0.89**	**1.2**	**0.73**	**0.91**	0.034 U	0.033 U	**0.28**	0.034 U	0.034 U	**0.23**	0.033 U	0.034 U
PCB-037	--	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.071 U	0.06 U	0.059 U	0.06 U	0.061 U	0.062 U	0.06 U	0.06 U	0.061 U	0.062 U	0.059 U	0.06 U	0.06 U
PCB-044	--	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	**0.69**	**0.75**	**0.74**	**0.74**	**0.81**	0.089 U	**0.33**	0.086 U	0.088 U	0.089 U	0.085 U	**0.27**	0.087 U
PCB-049	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.66**	**0.68**	**0.83**	**0.71**	**0.86**	**0.23**	**0.44**	**0.35**	**0.33**	**0.37**	**0.33**	**0.28**	**0.25**
PCB-052	--	0.063 U	0.063 U	0.062 U	0.062 U	0.063 U	0.063 U	**1.8**	**2**	**2.6**	**2.2**	**2.5**	**0.85**	**1.2**	**0.7**	**0.72**	**0.67**	**0.86**	**0.97**	**0.77**
PCB-066	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**1.2**	**1.3**	**1.5**	**1.4**	**1.7**	**0.5**	**0.83**	**0.64**	**0.43**	**0.89**	**0.54**	**0.78**	**0.49**
PCB-070	--	0.06 U	0.06 U	0.059 U	0.059 U	0.06 U	0.06 U	**0.43**	**0.3**	**0.55**	**0.37**	**0.5**	0.061 U	**0.26**	0.059 U	0.06 U	0.061 U	0.058 U	0.059 U	0.06 U
PCB-074	--	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	**0.38**	**0.46**	**0.48**	**0.45**	**0.53**	**0.21**	**0.3**	0.086 U	**0.22**	**0.21**	**0.21**	**0.26**	0.087 U
PCB-077	--	0.078 U	0.078 U	0.077 U	0.077 U	0.078 U	0.078 U	**0.24**	0.077 U	0.076 U	0.078 U	**0.32**	0.079 U	0.077 U	0.077 U	0.078 U	0.079 U	0.076 U	0.077 U	0.078 U
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.14 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U	0.11 U	0.11 U	**0.26**	0.11 U	0.11 U	**0.24**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-099	--	**0.24**	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	**0.86**	**0.99**	**1**	**1**	**1.2**	**0.61**	**0.72**	**0.6**	**0.48**	**0.73**	**0.42**	**0.62**	**0.52**
PCB-101	--	**0.31**	**0.3**	0.097 U	0.097 U	0.099 U	**0.28**	**1.7**	**1.8**	**2**	**2**	**2.2**	**0.93**	**1.3**	**1**	**1**	**1.1**	**0.87**	**1.1**	**0.85**
PCB-105	--	0.055 U	0.055 U	0.054 U	0.054 U	0.055 U	0.055 U	0.064 U	0.054 U	0.054 U	0.055 U	0.055 U	0.056 U	**0.41**	**0.38**	**0.45**	**0.42**	**0.26**	**0.38**	**0.35**
PCB-110	--	0.046 U	0.046 U	0.045 U	0.045 U	0.046 U	0.046 U	**1.2**	**1.2**	**1.7**	**1.5**	**1.7**	**0.78**	**0.89**	**0.62**	**0.58**	**0.68**	**0.51**	**0.83**	**0.58**
PCB-114	--	0.083 U	0.083 U	0.081 U	0.081 U	0.083 U	0.083 U	0.096 U	0.081 U	0.08 U	0.082 U	0.083 U	0.084 U	0.081 U	0.081 U	0.083 U	0.084 U	0.08 U	0.081 U	0.082 U
PCB-118	--	**0.26**	**0.24**	0.083 U	0.083 U	0.085 U	0.085 U	**0.92**	**0.96**	**1.2**	**1.1**	**1.2**	**0.51**	**0.66**	**0.56**	**0.57**	**0.58**	**0.47**	**0.66**	**0.39**
PCB-119	--	0.095 U	0.095 U	0.094 U	0.094 U	0.095 U	0.095 U	0.11 U	0.094 U	0.093 U	0.094 U	0.095 U	0.096 U	0.094 U	0.094 U	0.095 U	0.096 U	0.093 U	0.094 U	0.094 U
PCB-123	--	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.12 U	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.1 U
PCB-126	--	0.081 U	0.081 U	0.079 U	0.079 U	0.081 U	0.081 U	0.094 U	0.079 U	0.078 U	0.08 U	0.081 U	0.082 U	0.079 U	0.079 U	0.081 U	0.082 U	0.078 U	0.079 U	0.08 U
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.12 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB-132/153	--	**1.1**	**1.1**	**0.73**	**0.81**	**0.7**	**0.99**	**2.2**	**2.1**	**2.3**	**2.4**	**2.6**	**1.8**	**2.1**	**1.7**	**1.9**	**2.1**	**1.6**	**2**	**1.6**
PCB-138/158	--	**0.84**	**0.75**	**0.54**	**0.56**	**0.46**	**0.56**	**1.5**	**1.6**	**1.8**	**1.8**	**1.9**	**1.2**	**1.7**	**1.3**	**1.4**	**1.5**	**1**	**1.5**	**1.2**
PCB-149	--	**0.38**	**0.39**	**0.3**	**0.35**	0.099 U	**0.31**	**1.2**	**1.3**	**1.3**	**1.4**	**1.4**	**1.2**	**1.2**	**0.95**	**0.97**	**1.1**	**0.86**	**1.2**	**0.95**
PCB-151	--	0.068 U	0.068 U	0.067 U	0.067 U	0.068 U	0.068 U	**0.38**	0.067 U	**0.43**	**0.47**	**0.4**	0.069 U	**0.31**	**0.26**	**0.3**	**0.43**	**0.23**	**0.36**	**0.3**
PCB-156	--	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	0.058 U	0.068 U	0.057 U	0.056 U	0.058 U	0.058 U	0.059 U	0.057 U	0.057 U	0.058 U	0.059 U	0.056 U	0.057 U	0.058 U
PCB-157	--	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.061 U	0.052 U	0.051 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.051 U	0.052 U	0.052 U
PCB-167	--	0.062 U	0.062 U	0.061 U	0.061 U	0.062 U	0.062 U	0.073 U	0.061 U	0.06 U	0.062 U	0.062 U	0.063 U	0.061 U	0.061 U	0.062 U	0.063 U	0.06 U	0.061 U	0.062 U
PCB-168	--	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	0.049 U	0.057 U	0.048 U	0.048 U	0.049 U	0.049 U	0.05 U	0.048 U	0.048 U	0.049 U	0.05 U	0.048 U	0.048 U	0.049 U
PCB-169	--	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.072 U	0.06 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.06 U	0.06 U	0.061 U
PCB-170	--	**0.29**	0.064 U	0.063 U	0.063 U	0.064 U	**0.22**	**0.3**	**0.44**	**0.5**	0.063 U	**0.42**	**0.34**	0.063 U	**0.33**	**0.32**	**0.44**	**0.32**	**0.39**	0.063 U
PCB-177	--	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	0.1 U	**0.23**	**0.28**	0.087 U	0.088 U	0.089 U	0.086 U	0.086 U	0.088 U	0.089 U	**0.24**	0.086 U	0.087 U
PCB-180	--	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.042 U	0.049 U	0.042 U	0.041 U	0.042 U	0.042 U	0.043 U	0.042 U	**0.69**	0.042 U	0.043 U	**0.64**	**0.85**	**0.61**
PCB-183	--	**0.26**	**0.21**	0.11 U	0.11 U	0.11 U	**0.24**	**0.29**	**0.29**	**0.31**	**0.33**	**0.43**	**0.21**	**0.4**	**0.32**	**0.29**	**0.32**	**0.24**	**0.31**	**0.2 J**
PCB-187	--	**0.57**	**0.55**	**0.35**	**0.32**	**0.31**	**0.48**	**0.8**	**0.77**	**0.97**	**0.83**	**0.78**	**0.67**	**0.79**	**0.65**	**0.68**	**0.79**	**0.6**	**0.88**	**0.59**
PCB-189	--	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.072 U	0.06 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.06 U	0.06 U	0.061 U

Table 24

Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

Chemical	Location ID Sample ID Sample Date Matrix FDA Action Level	Time Zero T0-A-NEREIS-012418 1/24/2018 TBIO	LA3-REF LA3-REF-A-NEREIS-022218 2/22/2018 TBIO	LA3-REF LA3-REF-B-NEREIS-022218 2/22/2018 TBIO	LA3-REF LA3-REF-C-NEREIS-022218 2/22/2018 TBIO	LA3-REF LA3-REF-D-NEREIS-022218 2/22/2018 TBIO	LA3-REF LA3-REF-E-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-A-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-B-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-C-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-D-NEREIS-022218 2/22/2018 TBIO	TB TB-COMP-E-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-A-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-B-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-C-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-D-NEREIS-022218 2/22/2018 TBIO	MCN1 MCN1-COMP-T-E-NEREIS-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-A-NEREIS-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-B-NEREIS-022218 2/22/2018 TBIO	MCN2 MCN2-COMP-T-C-NEREIS-022218 2/22/2018 TBIO
PCB-194	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.34**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-201	--	0.098 U	0.098 U	0.096 U	0.096 U	0.098 U	0.098 U	0.11 U	0.096 U	0.095 U	0.097 U	0.098 U	0.099 U	0.096 U	0.096 U	0.098 U	0.099 U	0.095 U	0.096 U	0.097 U
PCB-206	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.23 U	**0.29**	**0.27**	**0.29**	0.19 U	0.2 U	0.19 U	**0.22**	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U
Total PCB Congener (U = 0)	2,000[3]	**4.25**	**3.54**	**1.92**	**2.04**	**1.47**	**3.08**	**18.48**	**19.09**	**22.78**	**20.59**	**23.13**	**10.26**	**14.33**	**11.55**	**10.87**	**12.57**	**10.43**	**13.64**	**9.65 J**

Table 24

Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

Chemical	Location ID / Sample ID / Sample Date / Matrix	FDA Action Level
Conventional Parameters (%)		
Lipids	--	
Metals (mg/kg)		
Mercury	1[1]	
Organometallic Compounds (µg/kg)		
Dibutyltin	--	
Pesticides (µg/kg)		
2,4'-DDD (o,p'-DDD)	--	
2,4'-DDE (o,p'-DDE)	5,000[2]	
2,4'-DDT (o,p'-DDT)	5,000[2]	
4,4'-DDD (p,p'-DDD)	--	
4,4'-DDE (p,p'-DDE)	5,000[2]	
4,4'-DDT (p,p'-DDT)	5,000[2]	
Total DDx (U = 0)	5,000[2]	
PCB Congeners (µg/kg)		
PCB-018	--	
PCB-028	--	
PCB-037	--	
PCB-044	--	
PCB-049	--	
PCB-052	--	
PCB-066	--	
PCB-070	--	
PCB-074	--	
PCB-077	--	
PCB-081	--	
PCB-087	--	
PCB-099	--	
PCB-101	--	
PCB-105	--	
PCB-110	--	
PCB-114	--	
PCB-118	--	
PCB-119	--	
PCB-123	--	
PCB-126	--	
PCB-128	--	
PCB-132/153	--	
PCB-138/158	--	
PCB-149	--	
PCB-151	--	
PCB-156	--	
PCB-157	--	
PCB-167	--	
PCB-168	--	
PCB-169	--	
PCB-170	--	
PCB-177	--	
PCB-180	--	
PCB-183	--	
PCB-187	--	
PCB-189	--	

MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
MCN2-COMP-T-D-NEREIS-022218 2/22/2018 TBIO	MCN2-COMP-T-E-NEREIS-022218 2/22/2018 TBIO	MCN3-COMP-A-NEREIS-022218 2/22/2018 TBIO	MCN3-COMP-B-NEREIS-022218 2/22/2018 TBIO	MCN3-COMP-C-NEREIS-022218 2/22/2018 TBIO	MCN3-COMP-D-NEREIS-022218 2/22/2018 TBIO	MCN3-COMP-E-NEREIS-022218 2/22/2018 TBIO	MCN4-COMP-A-NEREIS-022218 2/22/2018 TBIO	MCN4-COMP-B-NEREIS-022218 2/22/2018 TBIO	MCN4-COMP-C-NEREIS-022218 2/22/2018 TBIO	MCN4-COMP-D-NEREIS-022218 2/22/2018 TBIO	MCN4-COMP-E-NEREIS-022218 2/22/2018 TBIO	MCN5-COMP-A-NEREIS-022218 2/22/2018 TBIO	MCN5-COMP-B-NEREIS-022218 2/22/2018 TBIO	MCN5-COMP-C-NEREIS-022218 2/22/2018 TBIO	MCN5-COMP-D-NEREIS-022218 2/22/2018 TBIO	MCN5-COMP-E-NEREIS-022218 2/22/2018 TBIO	BIN-COMP-T-A-NEREIS-022218 2/22/2018 TBIO	BIN-COMP-T-B-NEREIS-022218 2/22/2018 TBIO
0.85	**0.76**	**1.2**	**0.58**	**0.95**	**0.72**	**0.62**	**0.68**	**0.68**	**0.5**	**0.86**	**0.55**	**1.2**	**0.76**	**1**	**0.56**	**1**	**1**	**0.65**
0.0201	**0.0148**	**0.016**	**0.0134**	**0.0231**	**0.0191 J**	**0.0148 J**	0.00339 UJ	**0.00459 J**	**0.00726 J**	**0.0182 J**	0.00356 UJ	**0.0109 J**	**0.00754 J**	**0.00381 J**	**0.0182 J**	**0.00358 J**	**0.0219 J**	**0.0123 J**
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
0.29 U	0.28 U	0.28 U	0.28 U	0.29 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.29 U	0.28 U	0.29 U	0.29 U	0.29 U	0.28 U	0.29 U	0.29 U	0.29 U
1.7 J	**4.5**	**1.8 J**	**1.3 J**	**1.5 J**	**2.1**	**1.3 J**	**1.6 J**	**1.2 J**	**1 J**	**1.3 J**	**1.9 J**	0.99 U	**1.3 J**	1 U	**1 J**	**1.5 J**	**1.6 J**	**1.3 J**
0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U
23	**22**	**24**	**19**	**17**	**26**	**15**	**22**	**15**	**16**	**15**	**21**	**9.5 J**	**11**	**7.1**	**7.1**	**8.3 J**	**14**	**12**
7.6	**8.8**	**7**	**8.3**	**5.6**	**10**	**6**	**8.8**	**7.9**	**11**	**9.1**	**7.3 J**	**8.6 J**	**7.9 J**	**7.5**	**5.1**	**8.3 J**	**7.9 J**	**8**
0.44 U	0.43 U	0.43 U	0.43 U	0.44 U	0.44 U	0.45 U	0.43 U	0.43 U	0.44 U	0.45 U	0.43 U	0.44 U	0.45 U	0.44 U	0.43 U	0.45 U	0.45 U	0.44 U
32.3 J	**35.3**	**32.8 J**	**28.6 J**	**24.1 J**	**38.1**	**22.3 J**	**32.4 J**	**24.1 J**	**28 J**	**25.4 J**	**30.2 J**	**18.1 J**	**20.2 J**	**14.6**	**13.2 J**	**18.1 J**	**23.5 J**	**21.3 J**
0.071 U	**0.31**	**0.31**	**0.25**	0.071 U	**0.27**	0.073 U	0.07 U	0.07 U	0.072 U	**0.22**	0.07 U	0.071 U	0.073 U	0.072 U	0.07 U	0.073 U	0.073 U	0.072 U
0.034 U	0.033 U	0.033 U	0.033 U	0.034 U	0.034 U	0.034 U	0.033 U	0.033 U	0.034 U	0.034 U	0.033 U	0.034 U	0.034 U	0.034 U	0.033 U	0.034 U	0.034 U	0.034 U
0.06 U	0.06 U	0.059 U	0.06 U	0.06 U	0.061 U	0.062 U	0.059 U	0.06 U	0.061 U	0.062 U	0.059 U	0.06 U	0.062 U	0.061 U	0.059 U	0.062 U	0.062 U	0.061 U
0.087 U	0.086 U	**0.39**	0.086 U	0.087 U	0.088 U	0.089 U	0.085 U	0.086 U	0.088 U	0.089 U	**0.25**	0.087 U	0.089 U	0.088 U	0.085 U	0.089 U	0.089 U	0.088 U
0.11 U	**0.31**	**0.26**	**0.22**	0.11 U	0.11 U	**0.21**	**0.25**	**0.28**	0.11 U	0.11 U	**0.26**	**0.25**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
0.82	**0.9**	**0.89**	**0.55**	**0.64**	**1**	**0.46**	**0.32**	**0.56**	**0.52**	**0.66**	**0.43**	**0.53**	**0.65**	**0.39**	0.061 U	**0.44**	**0.55**	**0.41**
0.43	**0.6**	**0.6**	**0.39**	**0.28**	**0.49**	**0.42**	**0.27**	**0.56**	**0.35**	**0.21**	**0.5**	**0.27**	**0.22**	**0.28**	0.1 U	0.1 U	**0.36**	0.1 U
0.06 U	0.059 U	0.058 U	0.059 U	0.06 U	0.06 U	0.061 U	0.058 U	0.059 U	0.06 U	0.061 U	0.058 U	0.06 U	0.061 U	0.06 U	0.058 U	0.061 U	0.061 U	0.06 U
0.087 U	**0.26**	0.085 U	0.086 U	0.087 U	0.088 U	0.089 U	0.085 U	0.086 U	0.088 U	0.089 U	0.085 U	0.087 U	0.089 U	0.088 U	0.085 U	0.089 U	0.089 U	0.088 U
0.078 U	0.077 U	0.076 U	0.077 U	0.078 U	0.078 U	0.079 U	0.076 U	0.077 U	0.078 U	0.079 U	0.076 U	0.078 U	0.079 U	0.078 U	0.076 U	0.079 U	0.079 U	0.078 U
0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
0.45	**0.59**	**0.63**	**0.46**	**0.38**	**0.52**	**0.4**	**0.26**	**0.44**	**0.33**	**0.23**	**0.3**	**0.27**	**0.33**	**0.2**	**0.25**	**0.35**	**0.33**	**0.23**
0.98	**1**	**0.97**	**0.71**	**0.69**	**1**	**0.62**	**0.51**	**0.61**	**0.61**	**0.6**	**0.44**	**0.63**	**0.65**	**0.48**	**0.44**	**0.51**	**0.68**	**0.52**
0.49	**0.46**	**0.33**	0.054 U	0.055 U	**0.41**	0.056 U	0.054 U	0.054 U	0.055 U	0.056 U	0.054 U	0.055 U	0.056 U	0.055 U	0.054 U	0.056 U	0.056 U	0.055 U
0.53	**0.71**	**0.66**	**0.51**	**0.47**	**0.64**	**0.36**	**0.33**	**0.4**	**0.33**	**0.42**	**0.42**	**0.42**	**0.49**	**0.36**	**0.3**	**0.44**	**0.56**	**0.42**
0.082 U	0.081 U	0.08 U	0.081 U	0.082 U	0.083 U	0.084 U	0.08 U	0.081 U	0.083 U	0.084 U	0.08 U	0.082 U	0.084 U	0.083 U	0.08 U	0.084 U	0.084 U	0.083 U
0.37	**0.5**	**0.69**	**0.51**	**0.4**	**0.52**	**0.29**	**0.31**	**0.3**	**0.31**	**0.33**	**0.35**	**0.32**	0.086 U	**0.27**	**0.27**	0.086 U	**0.32**	**0.25**
0.094 U	0.094 U	0.093 U	0.094 U	0.094 U	0.095 U	0.096 U	0.093 U	0.094 U	0.095 U	0.096 U	0.093 U	0.094 U	0.096 U	0.095 U	0.093 U	0.096 U	0.096 U	0.095 U
0.1 U	0.1 U	**0.34**	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U	0.11 U
0.08 U	0.079 U	0.078 U	0.079 U	0.08 U	0.081 U	0.082 U	0.078 U	0.079 U	0.081 U	0.082 U	0.078 U	0.08 U	0.082 U	0.081 U	0.078 U	0.082 U	0.082 U	0.081 U
0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1.7	**1.9**	**2.2**	**1.5**	**1.5**	**2**	**1.5**	**1.5**	**1.7**	**1.6**	**1.2**	**1.4**	**1.5**	**1.5**	**1.3**	**1.1**	**1.4**	**1.4**	**1.3**
1.2	**1.5**	**1.9**	**1.3**	**1**	**1.7**	**1.1**	**1**	**1.2**	**0.95**	**0.94**	**0.92**	**1.3**	**1.1**	**0.87**	**0.75**	**1**	**1**	**1.1**
0.89	**1.1**	**1.2**	**0.82**	**0.91**	**1.1**	**0.75**	**0.87**	**0.9**	**0.7**	**0.7**	**0.82**	**0.76**	**0.77**	**0.64**	**0.59**	**0.71**	**0.85**	**0.78**
0.3	**0.33**	**0.35**	**0.25**	**0.21**	**0.36**	0.069 U	0.066 U	0.067 U	0.068 U	0.069 U	0.066 U	0.067 U	0.069 U	0.068 U	0.066 U	0.069 U	0.069 U	0.068 U
0.058 U	0.057 U	0.056 U	0.057 U	0.058 U	0.058 U	0.059 U	0.056 U	0.057 U	0.058 U	0.059 U	0.056 U	0.058 U	0.059 U	0.058 U	0.056 U	0.059 U	0.059 U	0.058 U
0.052 U	0.052 U	0.051 U	0.052 U	0.052 U	0.053 U	0.053 U	0.051 U	0.052 U	0.053 U	0.053 U	0.051 U	0.052 U	0.053 U	0.053 U	0.051 U	0.053 U	0.053 U	0.053 U
0.062 U	0.061 U	0.06 U	0.061 U	0.062 U	0.062 U	0.063 U	0.06 U	0.061 U	0.062 U	0.063 U	0.06 U	0.062 U	0.063 U	0.062 U	0.06 U	0.063 U	0.063 U	0.062 U
0.049 U	0.048 U	0.048 U	0.048 U	0.049 U	0.049 U	0.05 U	0.048 U	0.048 U	0.049 U	0.05 U	0.048 U	0.049 U	0.05 U	0.049 U	0.048 U	0.05 U	0.05 U	0.049 U
0.061 U	0.06 U	0.06 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.062 U	0.062 U	0.062 U
0.063 U	**0.42**	**0.56**	**0.27**	0.063 U	**0.48**	**0.31**	0.062 U	**0.34**	0.064 U	0.065 U	0.062 U	**0.44**	**0.37**	**0.29**	**0.27**	0.065 U	**0.37**	**0.27**
0.087 U	0.086 U	0.085 U	0.086 U	0.087 U	0.088 U	0.089 U	0.085 U	0.086 U	0.088 U	0.089 U	0.085 U	0.087 U	0.089 U	0.088 U	0.085 U	0.089 U	0.089 U	0.088 U
0.042 U	**0.83**	**1**	0.042 U	0.042 U	**0.73**	0.043 U	0.041 U	0.042 U	**0.71**	0.043 U	0.041 U	**0.67**	**0.6**	**0.49**	**0.39**	**0.65**	0.043 U	0.042 U
0.27	**0.26**	**0.4**	**0.23**	**0.26**	**0.35**	**0.27**	**0.39**	**0.31**	**0.29**	**0.26**	**0.31**	**0.25**	**0.22**	**0.2**	0.11 U	**0.22**	**0.26**	0.11 U
0.63	**0.7**	**0.84**	**0.62**	**0.64**	**0.86**	**0.54**	**0.55**	**0.73**	**0.57**	**0.61**	**0.54**	**0.69**	**0.69**	**0.56**	**0.43**	**0.61**	**0.65**	**0.38**
0.061 U	0.06 U	0.06 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.06 U	0.062 U	0.062 U	0.06 U	0.061 U	0.062 U	0.062 U	0.06 U	0.062 U	0.062 U	0.062 U

Table 24

Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

Chemical	Location ID / Sample ID / Sample Date / Matrix	FDA Action Level	MCN2 / MCN2-COMP-T-D-NEREIS-022218 / 2/22/2018 / TBIO	MCN2 / MCN2-COMP-T-E-NEREIS-022218 / 2/22/2018 / TBIO	MCN3 / MCN3-COMP-A-NEREIS-022218 / 2/22/2018 / TBIO	MCN3 / MCN3-COMP-B-NEREIS-022218 / 2/22/2018 / TBIO	MCN3 / MCN3-COMP-C-NEREIS-022218 / 2/22/2018 / TBIO	MCN3 / MCN3-COMP-D-NEREIS-022218 / 2/22/2018 / TBIO	MCN3 / MCN3-COMP-E-NEREIS-022218 / 2/22/2018 / TBIO	MCN4 / MCN4-COMP-A-NEREIS-022218 / 2/22/2018 / TBIO	MCN4 / MCN4-COMP-B-NEREIS-022218 / 2/22/2018 / TBIO	MCN4 / MCN4-COMP-C-NEREIS-022218 / 2/22/2018 / TBIO	MCN4 / MCN4-COMP-D-NEREIS-022218 / 2/22/2018 / TBIO	MCN4 / MCN4-COMP-E-NEREIS-022218 / 2/22/2018 / TBIO	MCN5 / MCN5-COMP-A-NEREIS-022218 / 2/22/2018 / TBIO	MCN5 / MCN5-COMP-B-NEREIS-022218 / 2/22/2018 / TBIO	MCN5 / MCN5-COMP-C-NEREIS-022218 / 2/22/2018 / TBIO	MCN5 / MCN5-COMP-D-NEREIS-022218 / 2/22/2018 / TBIO	MCN5 / MCN5-COMP-E-NEREIS-022218 / 2/22/2018 / TBIO	BIN / BIN-COMP-T-A-NEREIS-022218 / 2/22/2018 / TBIO	BIN / BIN-COMP-T-B-NEREIS-022218 / 2/22/2018 / TBIO
PCB-194	--		0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
PCB-201	--		0.097 U	0.096 U	0.095 U	0.096 U	0.097 U	0.098 U	0.099 U	0.095 U	0.096 U	0.098 U	0.099 U	0.095 U	0.097 U	0.099 U	0.098 U	0.095 U	0.099 U	0.099 U	0.098 U
PCB-206	--		0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	**0.42**	0.19 U	0.19 U	0.2 U	0.2 U	0.19 U
Total PCB Congener (U = 0)	2,000[3]		**9.06**	**12.68**	**14.52**	**8.59**	**7.38**	**12.43**	**7.23**	**6.56**	**8.33**	**7.27**	**6.38**	**6.94**	**8.3**	**8.01**	**6.33**	**4.79**	**6.33**	**7.33**	**5.66**

Table 24

Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

Chemical	Location ID Sample ID Sample Date Matrix FDA Action Level	BIN BIN-COMP-T-C-NEREIS-022218 2/22/2018 TBIO	BIN BIN-COMP-T-D-NEREIS-022218 2/22/2018 TBIO	BIN BIN-COMP-T-E-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-A-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-B-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-C-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-D-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-E-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-A-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-B-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-C-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-D-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-E-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-A-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-B-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-C-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-D-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-E-NEREIS-022218 2/22/2018 TBIO
Conventional Parameters (%)																			
Lipids	--	**1.2**	**1.2**	**0.84**	**0.89**	**0.81**	**0.59**	**1.2**	**0.9**	**0.73**	**0.74**	**0.96**	**0.94**	**1.1**	**0.65**	**0.87**	**1.1**	**0.86**	**0.86**
Metals (mg/kg)																			
Mercury	1[1]	**0.0247 J**	**0.0273 J**	**0.0173 J**	0.00336 UJ	0.00349 UJ	0.00356 UJ	**0.00637 J**	0.00345 UJ	**0.00434 J**	**0.00746 J**	**0.0118 J**	**0.0228 J**	**0.0238 J**	**0.0125 J**	**0.0214 J**	**0.0227 J**	**0.026 J**	**0.0144 J**
Organometallic Compounds (µg/kg)																			
Dibutyltin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																			
2,4'-DDD (o,p'-DDD)	--	0.28 U	0.28 U	0.29 U	0.28 U	0.29 U	0.29 U	0.29 U	0.29 U	0.28 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
2,4'-DDE (o,p'-DDE)	5,000[2]	**2.4**	**2.5**	**1.9 J**	**2.7**	**1.7 J**	**3.5**	**3.7**	**2.4**	**1.7 J**	**2.9**	**5**	**1.6 J**	**4.8**	**1.8 J**	**1.1 J**	**2.9**	**2**	**1.4 J**
2,4'-DDT (o,p'-DDT)	5,000[2]	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.32 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U
4,4'-DDD (p,p'-DDD)	--	**16**	**10**	**16**	**34**	**30**	**32**	**24**	**30**	**18**	**19**	**31**	**14**	**23**	**16**	**8.5**	**18**	**12**	**15**
4,4'-DDE (p,p'-DDE)	5,000[2]	**11**	**5.7**	**11**	**16**	**14**	**15**	**15**	**15**	**10**	**10**	**11**	**6.7**	**14**	**12**	**6.4**	**17**	**8**	**8.5**
4,4'-DDT (p,p'-DDT)	5,000[2]	0.43 U	0.43 U	0.44 U	0.43 U	0.44 U	0.45 U	0.44 U	0.45 U	0.43 U	0.44 U	0.45 U	0.44 U	0.44 U	0.45 U	0.45 U	0.44 U	0.44 U	0.44 U
Total DDx (U = 0)	5,000[2]	**29.4**	**18.2**	**28.9 J**	**52.7**	**45.7 J**	**50.5**	**42.7**	**47.4**	**29.7 J**	**31.9**	**47**	**22.3 J**	**41.8**	**29.8 J**	**16 J**	**37.9**	**22**	**24.9 J**
PCB Congeners (µg/kg)																			
PCB-018	--	**0.19 J**	0.07 U	0.071 U	**0.28**	**0.22**	**0.21**	**0.23**	0.073 U	0.07 U	0.072 U	0.073 U	0.071 U	0.071 U	--	--	--	--	--
PCB-028	--	0.033 U	0.033 U	0.034 U	**0.26**	**0.28**	0.035 U	0.034 U	**0.23**	0.033 U	0.034 U	0.034 U	0.034 U	0.034 U	--	--	--	--	--
PCB-037	--	0.059 U	0.059 U	0.06 U	0.059 U	0.06 U	0.062 U	0.061 U	0.062 U	0.06 U	0.061 U	0.062 U	0.06 U	0.06 U	--	--	--	--	--
PCB-044	--	0.085 U	0.085 U	0.087 U	0.085 U	0.087 U	0.09 U	**0.25**	0.089 U	0.086 U	0.088 U	0.089 U	0.087 U	0.087 U	--	--	--	--	--
PCB-049	--	**0.22**	0.11 U	0.11 U	**0.33**	**0.33**	**0.25**	**0.24**	**0.28**	0.11 U	0.11 U	0.11 U	0.11 U	**0.21**	--	--	--	--	--
PCB-052	--	**0.73**	**0.4**	**0.52**	**0.72**	**0.77**	**0.59**	**0.59**	**0.54**	**0.54**	**0.6**	**0.62**	**0.54**	**0.73**	--	--	--	--	--
PCB-066	--	**0.36**	**0.34**	**0.34**	**0.45**	**0.45**	**0.4**	**0.46**	**0.37**	**0.24**	**0.32**	**0.32**	0.1 U	**0.39**	--	--	--	--	--
PCB-070	--	0.058 U	0.058 U	0.06 U	0.058 U	0.06 U	0.061 U	0.06 U	0.061 U	0.059 U	0.06 U	0.061 U	0.06 U	**0.21**	--	--	--	--	--
PCB-074	--	0.085 U	0.085 U	0.087 U	0.085 U	0.087 U	0.09 U	0.088 U	0.089 U	0.086 U	0.088 U	0.089 U	0.087 U	0.087 U	--	--	--	--	--
PCB-077	--	0.076 U	0.076 U	0.078 U	0.076 U	0.078 U	0.08 U	0.078 U	0.079 U	0.077 U	0.078 U	0.079 U	0.078 U	0.078 U	--	--	--	--	--
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	--	--	--	--	--
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	--	--	--	--	--
PCB-099	--	**0.37**	**0.27**	**0.32**	**0.44**	**0.48**	**0.48**	**0.4**	**0.33**	**0.27**	**0.26**	**0.37**	**0.32**	**0.45**	--	--	--	--	--
PCB-101	--	**0.69**	**0.65**	**0.66**	**0.94**	**0.87**	**0.91**	**0.84**	**0.73**	**0.58**	**0.64**	**0.71**	**0.66**	**0.86**	--	--	--	--	--
PCB-105	--	0.054 U	**0.24**	0.055 U	**0.4**	0.055 U	**0.31**	0.055 U	**0.46**	0.054 U	**0.24**	**0.21**	0.055 U	0.055 U	--	--	--	--	--
PCB-110	--	**0.59**	**0.53**	**0.51**	**0.65**	**0.65**	0.047 U	**0.56**	**0.52**	**0.43**	**0.49**	**0.6**	**0.45**	**0.61**	--	--	--	--	--
PCB-114	--	0.08 U	0.08 U	0.082 U	0.08 U	0.082 U	0.085 U	0.083 U	0.084 U	0.081 U	0.083 U	0.084 U	0.082 U	0.082 U	--	--	--	--	--
PCB-118	--	**0.32**	**0.57**	**0.31**	**0.49**	**0.61**	**0.52**	**0.89**	0.086 U	**0.28**	**0.33**	**0.43**	**0.4**	**0.48**	--	--	--	--	--
PCB-119	--	0.093 U	0.093 U	0.094 U	0.093 U	0.094 U	0.097 U	0.095 U	0.096 U	0.094 U	0.095 U	0.096 U	0.094 U	0.094 U	--	--	--	--	--
PCB-123	--	0.1 U	**1.6**	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U	**0.26**	0.1 U	--	--	--	--	--
PCB-126	--	0.078 U	0.078 U	0.08 U	0.078 U	0.08 U	0.082 U	0.081 U	0.082 U	0.079 U	0.081 U	0.082 U	0.08 U	0.08 U	--	--	--	--	--
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	--	--	--	--	--
PCB-132/153	--	**1.9**	**1.6**	**1.5**	**2**	**1.7**	**1.6**	**1.7**	**1.7**	**1.5**	**1.4**	**1.6**	**1.4**	**1.8**	--	--	--	--	--
PCB-138/158	--	**1.4**	**1.4**	**1**	**1.4**	**1.4**	**1.3**	**1.3**	**1.3**	**0.98**	**1**	**1.3**	**0.99**	**1.3**	--	--	--	--	--
PCB-149	--	**1.1**	**0.83**	**0.84**	**1.1**	**1.2**	**1**	**0.93**	**0.92**	**0.81**	**0.79**	**0.91**	**0.69**	**0.98**	--	--	--	--	--
PCB-151	--	**0.24**	**0.41**	**0.22**	0.066 U	**0.31**	0.069 U	0.068 U	0.069 U	0.067 U	0.068 U	**0.29**	0.067 U	**0.29**	--	--	--	--	--
PCB-156	--	0.056 U	0.056 U	0.058 U	0.056 U	0.058 U	0.059 U	0.058 U	0.059 U	0.057 U	0.058 U	0.059 U	0.058 U	0.058 U	--	--	--	--	--
PCB-157	--	0.051 U	0.051 U	0.052 U	0.051 U	0.052 U	0.054 U	0.053 U	0.053 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	--	--	--	--	--
PCB-167	--	0.06 U	0.06 U	0.062 U	0.06 U	0.062 U	0.064 U	0.062 U	0.063 U	0.061 U	0.062 U	0.063 U	0.062 U	0.062 U	--	--	--	--	--
PCB-168	--	0.048 U	0.048 U	0.049 U	0.048 U	0.049 U	0.05 U	0.049 U	0.05 U	0.048 U	0.049 U	0.05 U	0.049 U	0.049 U	--	--	--	--	--
PCB-169	--	0.06 U	0.06 U	0.061 U	0.06 U	0.061 U	0.063 U	0.062 U	0.062 U	0.06 U	0.062 U	0.062 U	0.061 U	0.061 U	--	--	--	--	--
PCB-170	--	**0.51**	**0.37**	0.063 U	**0.4**	**0.47**	**0.36**	**0.3**	**0.38**	**0.37**	**0.29**	**0.35**	**0.21**	**0.36**	--	--	--	--	--
PCB-177	--	0.085 U	0.085 U	0.087 U	0.085 U	0.087 U	0.09 U	0.088 U	0.089 U	0.086 U	0.088 U	0.089 U	0.087 U	0.087 U	--	--	--	--	--
PCB-180	--	0.041 U	0.041 U	0.042 U	**0.76**	**0.78**	**0.9**	**0.6**	**0.75**	**0.72**	**0.45**	**0.59**	**0.5**	0.042 U	--	--	--	--	--
PCB-183	--	**0.29**	**0.31**	**0.29**	**0.26**	**0.26**	**0.29**	**0.28**	**0.28**	0.11 U	**0.21**	**0.26**	**0.23**	**0.31**	--	--	--	--	--
PCB-187	--	**0.81**	**0.72**	**0.52**	**0.7**	**0.69**	**0.52**	**0.69**	**0.74**	**0.71**	**0.55**	**0.66**	**0.56**	**0.74**	--	--	--	--	--
PCB-189	--	0.06 U	0.06 U	0.061 U	0.06 U	0.061 U	0.063 U	0.062 U	0.062 U	0.06 U	0.062 U	0.062 U	0.061 U	0.061 U	--	--	--	--	--

Table 24

Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

Chemical	Location ID Sample ID Sample Date Matrix FDA Action Level	BIN BIN-COMP-T-C-NEREIS-022218 2/22/2018 TBIO	BIN BIN-COMP-T-D-NEREIS-022218 2/22/2018 TBIO	BIN BIN-COMP-T-E-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-A-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-B-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-C-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-D-NEREIS-022218 2/22/2018 TBIO	BIME BIME-COMP-T-M-E-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-A-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-B-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-C-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-D-NEREIS-022218 2/22/2018 TBIO	BIMW BIMW-COMP-T-M-E-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-A-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-B-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-C-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-D-NEREIS-022218 2/22/2018 TBIO	BIS BIS-COMP-E-NEREIS-022218 2/22/2018 TBIO
PCB-194	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.12 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	--	--	--	--	--
PCB-201	--	0.095 U	0.095 U	0.097 U	0.095 U	0.097 U	0.1 U	0.098 U	0.099 U	0.096 U	0.098 U	0.099 U	0.097 U	0.097 U	--	--	--	--	--
PCB-206	--	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	--	--	--	--	--
Total PCB Congener (U = 0)	2,000[3]	**9.72 J**	**10.24**	**7.03**	**11.58**	**11.47**	**9.64**	**10.26**	**9.53**	**7.43**	**7.57**	**9.22**	**7.21**	**9.72**	--	--	--	--	--

Notes:

All non-detect results are reported at the method detection limit.

Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.

Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.

Total PCB congeners is the sum of all PCB congeners listed in this table.

USEPA Stage 2A data validation was completed by Anchor QEA.

Bold: detected result

Italicized: non-detected concentration is above one or more identified screening levels

J: estimated value

N: normal environmental sample

U: compound analyzed but not detected above detection limit

1. Action level for methyl mercury.

2. Action level for DDT and DDE (individually or in combination).

3. Tolerance level for PCBs. No action level.

Table 25
Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2019 Sampling Event

Chemicals	Location ID / Sample ID / Sample Date / Matrix / FDA Action Level	Time Zero T0-A-MACOMA-022619 2/26/2019 TBIO --	LA3-REF LA3-REF-A-MACOMA-032719 3/27/2019 TBIO --	LA3-REF LA3-REF-B-MACOMA-032719 3/27/2019 TBIO --	LA3-REF LA3-REF-C-MACOMA-032719 3/27/2019 TBIO --	LA3-REF LA3-REF-D-MACOMA-032719 3/27/2019 TBIO --	LA3-REF LA3-REF-E-MACOMA-032719 3/27/2019 TBIO --	NC2 NC2-COMP-A-MACOMA-032719 3/27/2019 TBIO --	NC2 NC2-COMP-B-MACOMA-032719 3/27/2019 TBIO --	NC2 NC2-COMP-C-MACOMA-032719 3/27/2019 TBIO --	NC2 NC2-COMP-D-MACOMA-032719 3/27/2019 TBIO --	NC2 NC2-COMP-E-MACOMA-032719 3/27/2019 TBIO --	NC3 NC3-COMP-A-MACOMA-032719 3/27/2019 TBIO --	NC3 NC3-COMP-B-MACOMA-032719 3/27/2019 TBIO --	NC3 NC3-COMP-C-MACOMA-032719 3/27/2019 TBIO --	NC3 NC3-COMP-D-MACOMA-032719 3/27/2019 TBIO --	NC3 NC3-COMP-E-MACOMA-032719 3/27/2019 TBIO --
Conventional Parameters (%)																	
Lipids	--	**0.72**	**0.63**	**0.32**	**0.39**	**0.53**	**0.38**	**0.34**	**0.32**	**0.38**	**0.34**	**0.49**	**0.25**	**0.54**	**0.38**	**0.44**	**0.48**
Metals (mg/kg)																	
Mercury	1[1]	**0.00535 J**	**0.00721 J**	**0.00707 J**	**0.0175 J**	**0.00919 J**	**0.0143 J**	**0.0197 J**	**0.0155 J**	**0.0224 J**	**0.0137 J**	**0.0228 J**	**0.0122 J**	**0.0127 J**	**0.015 J**	**0.0124 J**	**0.0144 J**

Notes:
All non-detect results are reported at the MDL.
USEPA Stage 2A data validation was completed by Anchor QEA.
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
U: compound analyzed but not detected above detection limit
1. Action level for methyl mercury.

Table 26
Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2019 Sampling Event

Chemicals	Location ID Sample ID Sample Date Matrix FDA Action Level	Time Zero T0-A-NEREIS-022619 2/26/2019 TBIO	LA3-REF LA3-REF-A-NEREIS-032719 3/27/2019 TBIO	LA3-REF LA3-REF-B-NEREIS-032719 3/27/2019 TBIO	LA3-REF LA3-REF-C-NEREIS-032719 3/27/2019 TBIO	LA3-REF LA3-REF-D-NEREIS-032719 3/27/2019 TBIO	LA3-REF LA3-REF-E-NEREIS-032719 3/27/2019 TBIO	NC2 NC2-COMP-A-NEREIS-032719 3/27/2019 TBIO	NC2 NC2-COMP-B-NEREIS-032719 3/27/2019 TBIO	NC2 NC2-COMP-C-NEREIS-032719 3/27/2019 TBIO	NC2 NC2-COMP-D-NEREIS-032719 3/27/2019 TBIO	NC2 NC2-COMP-E-NEREIS-032719 3/27/2019 TBIO	NC3 NC3-COMP-A-NEREIS-032719 3/27/2019 TBIO	NC3 NC3-COMP-B-NEREIS-032719 3/27/2019 TBIO	NC3 NC3-COMP-C-NEREIS-032719 3/27/2019 TBIO	NC3 NC3-COMP-D-NEREIS-032719 3/27/2019 TBIO	NC3 NC3-COMP-E-NEREIS-032719 3/27/2019 TBIO
Conventional Parameters (%)																	
Lipids	--	**0.96**	**0.82**	**0.9**	**0.86**	**0.77**	**0.52**	**0.71**	**0.54**	**0.5**	**0.68**	**0.54**	**1.1**	**0.41**	**0.42**	**0.96**	**0.52**
Metals (mg/kg)																	
Mercury	1[1]	**0.0302 J**	**0.00628 J**	**0.0218 J**	**0.00519 J**	**0.023 J**	**0.0254 J**	**0.0239 J**	**0.0213 J**	**0.00924 J**	**0.0235 J**	**0.011 J**	**0.0197 J**	**0.0229 J**	**0.0253 J**	**0.00842 J**	**0.0259 J**

Notes:
All non-detect results are reported at the MDL.
USEPA Stage 2A data validation was completed by Anchor QEA.
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
U: compound analyzed but not detected above detection limit
1. Action level for methyl mercury.

3.4.1 Comparison of Tissue Burdens to U.S. Food and Drug Administration Action Levels

A comparison of FDA action levels for poisonous or deleterious substances in fish and shellfish for human food is presented in Tables 23 through 26. The FDA action level for mercury is 1 mg/kg of methyl mercury. Methyl mercury is only a fraction of the total mercury concentration. All concentrations of mercury in tissues exposed to LNB federal channels sediments were less than this action level. The FDA action level for DDT and DDE (individually or in combination) is 5,000 µg/kg. All concentrations of DDTs in tissues exposed to LNB sediments were less than this action level. The FDA does not have action levels for PCBs or dibutyltin. Total PCB concentrations were compared to the FDA tolerance level of 2,000 µg/kg. All PCB concentrations in tissues exposed to federal channels sediments were less than this tolerance level. FDA actions levels were not exceeded or absent; therefore, results were also compared to tissue concentrations of organisms exposed to reference sediment.

3.4.2 Comparison of Tissue Burdens to Reference Sediment Tissue Burdens

Bioaccumulation data were analyzed by statistically comparing chemical concentrations in tissues of organisms exposed to project material to tissues of organisms exposed to reference sediment (Appendix F). Results of statistical analysis are presented in Tables 27 and 28.

3.4.2.1 Macoma nasuta

Mercury, four DDT derivatives (2,4′-DDD, 2,4′-DDE, 4,4′-DDD, and 4,4′-DDE), total DDTs, dibutyltin, several PCB congeners, and total PCBs were statistically elevated in *M. nasuta* tissue samples exposed to federal channels sediments. Mercury was statistically elevated in tissues from four DUs (Turning Basin and Main Channels 1, 2, and 3). The magnitudes of exceedances were low, with mean mercury concentrations ranging from 2.2 to 9.1 times greater than the reference. DDTs were statistically elevated in tissues from all DUs tested. Mean DDT derivative concentrations ranged from 1.8 to 80.3 times greater than the reference, while mean total DDT concentrations ranged from 7.8 to 17.3 times greater than the reference. Dibutyltin was statistically elevated in tissues from the Turning Basin. The mean dibutyltin concentration was 9.3 times greater than the reference. PCBs were statistically elevated in tissues from all DUs tested, except Bay Island South. Mean PCB congener concentrations ranged from 2.4 to 106 times greater than the reference, while mean total PCB concentrations ranged from 12.8 to 65.2 times greater than the reference.

3.4.2.2 Nereis virens

Three DDT derivatives (2,4′-DDE, 4,4′-DDD and 4,4′-DDE), total DDTs, several PCB congeners, and total PCBs were statistically elevated in *N. virens* tissue samples exposed to federal channels sediments. DDTs were statistically elevated in tissues from eight DUs (Main Channel North 2, 3, 4, and 5; and Bay Island North, Middle East and West, and South). Mean DDT derivative concentrations ranged from 2.9 to 55.4 times greater than the reference, while mean total DDT concentrations

ranged from 9.2 to 18.2 times greater than the reference. PCBs were statistically elevated in tissues from all DUs tested, except Bay Island South. Mean PCB congener concentrations ranged from 1.5 to 70.9 times greater than the reference, while mean total PCB concentrations ranged from 2.9 to 9.6 times greater than the reference.

3.4.3 Comparison of Tissue Burdens to Environmental Residue Effects Database

The comparison of day zero corrected project tissue concentrations to selected ERED TRVs is presented in Tables 27 and 28. All concentrations were less than selected ERED TRVs. A summary of the rationale for selection of each TRV is presented in Table 29.

Table 27
Summary of Statistically Elevated *Macoma nasuta* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Turning Basin	4,4'-DDE	µg/kg	2.2	0.22 U	4.3	7.58	0.0216	1.76	7.58	No relevant effects in ERED.	--	--
	Dibutyltin	µg/kg	0.75	0.36 U	0.367 U	3.42	0.0283	9.31	3.42	NOED: 48 µg/kg for reproduction in Atlantic dogwinkle *Nucella lapillus* (controlled laboratory study; single chemical exposure).	48	No
	Mercury	mg/kg	0.00371	0.00698	0.0046	0.0414	<.0001	9.10	0.0344	0.1 mg/kg: effect on reproduction (decreased egg production) of the copepod *Acartia tonsa.*	0.1	No
	PCB005/008	µg/kg	0.15	0.07 U	0.071 U	0.432	0.0122	6.08	0.432	No relevant effects in ERED.	--	--
	PCB018	µg/kg	0.072	0.0355 U	0.0355 U	0.546	0.0122	15.4	0.55	No relevant effects in ERED.	--	--
	PCB028	µg/kg	0.034	0.017 U	0.0168 U	1.78	0.0122	106	1.78	No relevant effects in ERED.	--	--
	PCB033	µg/kg	0.13	0.06 U	0.061 U	1.12	0.0122	18.3	1.12	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	1.06	0.0122	19.2	1.06	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.063	0.0315 U	0.0313 U	1.8	0.0122	57.5	1.8	No relevant effects in ERED.	--	--
	PCB056	µg/kg	0.13	0.065 U	0.064 U	0.724	0.01	11.31	0.724	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	2.74	0.0122	54.8	2.74	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.06	0.03 U	0.0298 U	1.96	0.0122	65.8	1.96	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	1.2	0.0122	27.6	1.2	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.640	0.0122	11.6	0.640	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	1.12	0.0122	15.3	1.12	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.069 U	0.820	<.0001	11.9	0.820	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.061	0.0305 U	0.0303 U	1.42	0.0122	46.9	1.42	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	2.16	0.0122	44.2	2.16	No relevant effects in ERED.	--	--
	PCB105	µg/kg	0.055	0.0275 U	0.0273 U	0.694	0.0122	25.4	0.694	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.046	0.023 U	0.0229 U	1.98	0.0122	86.5	1.98	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	1.78	0.0122	16.9	1.78	No relevant effects in ERED.	--	--
	PCB128	µg/kg	0.1	0.05 U	0.05 U	0.198	0.0472	3.96	0.198	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.17	0.085 U	0.302	1.7	0.0122	5.63	1.7	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.095	0.047 U	0.120	1.32	0.0122	11.0	1.32	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	1.06	<.0001	21.8	1.06	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.068	0.0335 U	0.0336 U	0.340	0.0122	10.1	0.340	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.085	0.042 U	0.042 U	0.606	0.0122	14.4	0.606	No relevant effects in ERED.	--	--
	Total PCB Congeners (ND = 0)	µg/kg	0.087	0.095 U	0.474	30.9	0.0122	65.2	30.9	1,620 µg/kg: significant difference in embryo development of *Asterias rubens.*	162[4]	No
Main Channel North 1	4,4'-DDD	µg/kg	2.5	0.25 U	0.309	7.78	0.0074	25.2	7.78	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	2.3	0.22 U	4.3	15.2	0.0122	3.53	15.2	No relevant effects in ERED.	--	--
	Mercury	mg/kg	0.00356	0.0070	0.0046	0.0174	<.0001	3.82	0.0104	0.1 mg/kg: effect on reproduction (decreased egg production) of the copepod *A. tonsa.*	0.1	No
	PCB028	µg/kg	0.034	0.017 U	0.0168 U	0.712	0.0122	42.4	0.712	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.437	0.0216	7.95	0.437	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.692	0.0122	22.1	0.692	No relevant effects in ERED.	--	--
	PCB056	µg/kg	0.13	0.065 U	0.064 U	0.198	0.0367	3.09	0.198	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.970	0.0122	19.4	0.970	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.552	0.0122	18.5	0.552	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	0.406	0.0122	9.35	0.406	No relevant effects in ERED.	--	--

Table 27
Summary of Statistically Elevated *Macoma nasuta* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.438	0.0122	7.96	0.438	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.622	0.0122	8.52	0.622	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.069 U	0.340	<.0001	4.93	0.340	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.676	0.0122	22.3	0.676	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	1.00	0.0122	20.5	1.00	No relevant effects in ERED.	--	--
	PCB105	µg/kg	0.055	0.0275 U	0.0273 U	0.358	0.0122	13.1	0.358	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.882	0.0122	38.5	0.882	No relevant effects in ERED.	--	--
Main Channel North 1	PCB118	µg/kg	0.085	0.042 U	0.105	0.740	0.0122	7.03	0.740	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	1.11	0.0122	3.68	1.11	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.1203	0.900	0.0119	7.48	0.900	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.788	<.0001	16.1	0.788	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.068	0.0335 U	0.0336 U	0.211	0.0216	6.27	0.211	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.042 U	0.042 U	0.426	0.0122	10.1	0.426	No relevant effects in ERED.	--	--
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	13.0	0.0122	27.3	13.0	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 2	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	0.908	0.0122	6.35	0.91	No relevant effects in ERED.	--	--
	2,4'-DDE	µg/kg	1	0.495 U	0.677	1.8	0.0367	2.66	1.8	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5	0.25 U	0.309	17.5	<.0001	56.6	17.5	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.4	0.22 U	4.3	32.2	0.0122	7.49	32.2	No relevant effects in ERED.	--	--
	Mercury	mg/kg	0.00371	0.0070	0.0046	0.0166	<.0001	3.65	0.0096	0.1 mg/kg: effect on reproduction (decreased egg production) of the copepod *A. tonsa.*	0.1	No
	PCB028	µg/kg	0.034	0.017 U	0.0168 U	0.732	0.0122	43.6	0.732	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.556	0.0122	10.1	0.556	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.063	0.0315 U	0.0313 U	0.766	0.0122	24.5	0.766	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.922	0.0122	18.4	0.922	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.06	0.03 U	0.0298 U	0.620	0.0122	20.8	0.620	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	0.402	0.0122	9.26	0.402	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.540	0.0122	9.82	0.540	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.652	0.0122	8.93	0.652	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.069 U	0.416	<.0001	6.03	0.416	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.061	0.0305 U	0.0303 U	0.750	0.0122	24.8	0.750	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	1.14	0.0122	23.4	1.14	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.046	0.023 U	0.0229 U	1.02	0.0122	44.4	1.02	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.828	0.0122	7.86	0.828	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.17	0.085 U	0.302	1.34	0.0122	4.44	1.34	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.095	0.047 U	0.120	1.05	0.0122	8.74	1.05	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.924	<.0001	18.9	0.924	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.068	0.0335 U	0.0336 U	0.278	0.0122	8.27	0.278	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.085	0.042 U	0.042 U	0.354	0.0122	8.43	0.354	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	52.3	<.0001	11.2	52.3	LD50: 2,690 µg/kg for mortality of the amphipod *Leptocheirus plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.087	0.095 U	0.474	14.0	0.0122	29.6	14.0	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No

Table 27
Summary of Statistically Elevated *Macoma nasuta* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Main Channel North 3	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	1.43	0.0122	9.97	1.43	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.25 U	0.309	16.4	<.0001	53.1	16.4	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	0.22 U	4.3	26	0.0122	6.05	26	No relevant effects in ERED.	--	--
	Mercury	mg/kg	0.00363	0.0070	0.0046	0.0099	<.0001	2.18	0.0029	0.1 mg/kg: effect on reproduction (decreased egg production) of the copepod *A. tonsa.*	0.1	No
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.342	0.0122	6.22	0.342	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.546	0.0122	17.4	0.546	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.660	0.0122	13.2	0.660	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.436	0.0122	14.6	0.436	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	0.300	0.0122	6.91	0.300	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.450	0.0122	8.18	0.450	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.494	0.0122	6.77	0.494	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.069 U	0.326	<.0001	4.72	0.326	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.536	0.0122	17.7	0.536	No relevant effects in ERED.	--	--
Main Channel North 3	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.840	0.0122	17.2	0.840	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.716	0.0122	31.3	0.716	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.644	0.0122	6.12	0.644	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	1.05	0.0122	3.48	1.05	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.1203	0.812	0.0122	6.75	0.812	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.700	<.0001	14.3	0.700	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.068	0.0335 U	0.0336 U	0.195	0.0367	5.80	0.195	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.042 U	0.042 U	0.370	0.0122	8.81	0.370	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	45.3	<.0001	9.67	45.3	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	9.82	0.0122	20.7	9.82	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 4	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	1.10	0.0122	7.72	1.10	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5	0.25 U	0.309	12.6	<.0001	40.8	12.6	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.4	0.22 U	4.3	35.6	0.0122	8.28	35.6	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.252	0.0119	4.58	0.252	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.458	0.0122	14.6	0.458	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.418	0.0122	8.36	0.418	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.338	0.0122	11.3	0.338	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	0.203	0.0367	4.67	0.203	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.488	0.0119	8.87	0.488	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.318	0.0122	4.36	0.318	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.338	0.0122	11.2	0.338	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.594	0.0122	12.1	0.594	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.566	0.0122	24.7	0.566	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.460	0.0122	4.37	0.460	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	0.786	0.0122	2.60	0.786	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.120	0.682	0.0122	5.67	0.682	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.592	<.0001	12.1	0.592	No relevant effects in ERED.	--	--

Table 27
Summary of Statistically Elevated *Macoma nasuta* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
	PCB187	µg/kg	0.086	0.042 U	0.042 U	0.203	0.0367	4.82	0.203	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	50.7	<.0001	10.8	50.7	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	6.82	0.0122	14.4	6.82	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 5	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	0.587	0.0216	4.10	0.587	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	2.5	0.25 U	0.309	6.8	0.0073	22.0	6.8	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	2.3	0.22 U	4.3	28	0.0122	6.51	28	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.156	0.0367	2.84	0.156	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.290	0.0122	9.27	0.290	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.396	0.0122	7.92	0.396	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.268	0.0122	8.99	0.268	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.440	0.0122	8.00	0.440	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.298	0.0122	4.08	0.298	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.342	0.0122	11.3	0.342	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.524	0.0122	10.7	0.524	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.498	0.0122	21.7	0.498	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.410	0.0122	3.89	0.410	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	0.730	0.0122	2.42	0.730	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.120	0.634	0.0122	5.27	0.634	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.546	<.0001	11.2	0.546	No relevant effects in ERED.	--	--
Main Channel North 5	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	36.3	<.0001	7.75	36.3	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	6.08	0.0122	12.8	6.08	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island North	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	0.671	0.0216	4.69	0.671	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.25 U	0.309	11	<.0001	35.6	11	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	0.22 U	4.3	37	0.0122	8.60	37	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.360	0.0216	11.5	0.360	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.468	0.0122	9.36	0.468	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.286	0.0216	9.60	0.286	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.442	0.0122	8.04	0.442	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.366	0.0119	5.01	0.366	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.426	0.0122	14.1	0.426	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.600	0.0122	12.3	0.600	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.570	0.0122	24.9	0.570	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.450	0.0122	4.27	0.450	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	0.788	0.0122	2.61	0.788	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.120	0.678	0.0122	5.64	0.678	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.596	<.0001	12.2	0.596	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	50.4	<.0001	10.8	50.4	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus* .	134[3]	No

Table 27
Summary of Statistically Elevated *Macoma nasuta* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	6.57	0.0122	13.9	6.57	1,620 µg/kg: significant difference in embryo development of *A. rubens*	162[4]	No
Bay Island Middle East	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	2.17	0.0122	15.2	2.17	No relevant effects in ERED.	--	--
	2,4'-DDE	µg/kg	1	0.495 U	0.677	2.52	0.0122	3.72	2.52	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.25 U	0.309	24.8	<.0001	80.3	24.8	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	0.22 U	4.3	51.6	0.0122	12.0	51.6	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.322	0.0122	5.85	0.322	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.504	0.0122	16.1	0.504	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.644	0.0122	12.9	0.644	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.061	0.03 U	0.0298 U	0.454	0.0122	15.2	0.454	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	0.294	0.0122	6.77	0.294	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.674	0.0122	12.3	0.674	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.458	0.0122	6.27	0.458	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.069 U	0.308	0.0007	4.46	0.308	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.0305 U	0.0303 U	0.454	0.0122	15.0	0.454	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.788	0.0122	16.1	0.788	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0229 U	0.764	0.0122	33.4	0.764	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.608	0.0122	5.77	0.608	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	0.085 U	0.302	1.04	0.0122	3.44	1.04	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.047 U	0.120	0.824	0.0122	6.85	0.824	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.768	<.0001	15.7	0.768	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.068	0.0335 U	0.0336 U	0.225	0.0367	6.69	0.225	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.042 U	0.042 U	0.260	0.0122	6.19	0.260	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	81.1	<.0001	17.3	81.1	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	0.095 U	0.474	9.62	0.0122	20.3	9.62	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island Middle West	2,4'-DDD	µg/kg	0.29	0.145 U	0.143 U	1.34	0.0122	9.40	1.34	No relevant effects in ERED.	--	--
	2,4'-DDE	µg/kg	1	0.495 U	0.677	2.68	0.0122	3.96	2.68	No relevant effects in ERED.	--	--
Bay Island Middle West	4,4'-DDD	µg/kg	5.1	0.25 U	0.309	20.6	<.0001	66.7	20.6	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	0.22 U	4.3	50	0.0122	11.6	50	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.063	0.0315 U	0.0313 U	0.492	0.0122	15.7	0.492	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.596	0.0122	11.9	0.596	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.06	0.03 U	0.0298 U	0.370	0.0122	12.4	0.370	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.088	0.0435 U	0.0434 U	0.241	0.0367	5.55	0.241	No relevant effects in ERED.	--	--
	PCB087	µg/kg	0.11	0.055 U	0.055 U	0.520	0.0122	9.45	0.520	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.386	0.0122	5.29	0.386	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.061	0.0305 U	0.0303 U	0.374	0.0122	12.3	0.374	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.099	0.049 U	0.0489 U	0.680	0.0122	13.9	0.680	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.046	0.023 U	0.0229 U	0.650	0.0122	28.4	0.650	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.085	0.042 U	0.105	0.498	0.0122	4.73	0.498	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.17	0.085 U	0.302	0.824	0.0122	2.73	0.824	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.095	0.047 U	0.120	0.754	0.0122	6.27	0.754	No relevant effects in ERED.	--	--

Table 27
Summary of Statistically Elevated *Macoma nasuta* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.606	<.0001	12.4	0.606	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	74.6	<.0001	15.9	74.6	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.087	0.095 U	0.474	7.80	0.0122	16.5	7.80	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island South	4,4'-DDD	µg/kg	5	0.25 U	0.309	10.5	<.0001	34.0	10.5	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	0.22 U	4.3	31.4	0.0122	7.30	31.4	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	0.495 U	4.69	43.2	<.0001	9.21	43.2	LD50: 2,690 µg/kg for mortality of the amphipod L. plumulosus.	134[3]	No

Notes:

Organics were normalized to percent lipids prior to statistical analysis.

U: non-detect; half the detection limit shown

1. If MDL differed between samples, maximum MDL is presented.

2. Tissue effects data from the ERED (USACE 2018)

3. An uncertainty factor of 20 was applied to ED50 and/or LD50 values to estimate LOED (USACHPPM 2000).

4. Full dose/response curve not measured; therefore, an uncertainty factor of 10 was applied to estimate LOED (Lin and Davis 2018; USACHPPM 2000).

Table 28
Summary of Statistically Elevated *Nereis virens* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Turning Basin	PCB018	µg/kg	0.084	0.036 U	0.0356 U	0.716	0.0122	20.1	0.716	No relevant effects in ERED.	--	--
	PCB028	µg/kg	0.039	0.017 U	0.0168 U	0.896	0.0122	53.3	0.896	No relevant effects in ERED.	--	--
	PCB044	µg/kg	0.1	0.044 U	0.0436 U	0.746	0.0122	17.1	0.746	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.13	0.055 U	0.055 U	0.748	0.0122	13.6	0.748	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.074	0.0315 U	0.0313 U	2.22	0.0122	70.9	2.22	No relevant effects in ERED.	--	--
	PCB056	µg/kg	0.15	0.065 U	0.063 U	0.49	0.0122	7.78	0.49	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.12	0.05 U	0.05 U	1.42	0.0122	28.4	1.42	No relevant effects in ERED.	--	--
	PCB070	µg/kg	0.07	0.03 U	0.0298 U	0.43	0.0122	14.4	0.43	No relevant effects in ERED.	--	--
	PCB074	µg/kg	0.1	0.044 U	0.0436 U	0.46	0.0122	10.6	0.46	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.17	0.075 U	0.073 U	1.6	0.0122	21.9	1.6	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.16	0.07 U	0.068 U	0.612	0.0119	9.00	0.612	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.071	0.24	0.0303 U	1.01	0.0122	33.3	0.77	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.12	0.31	0.145	1.94	0.0122	13.4	1.63	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.054	0.023 U	0.0228 U	1.46	0.0122	64.0	1.46	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.099	0.26	0.082	1.08	0.0122	13.2	0.816	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.2	1.1	0.866	2.32	<.0001	2.68	1.22	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.11	0.84	0.574	1.72	<.0001	3.00	0.88	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.11	0.38	0.280	1.32	<.0001	4.72	0.94	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.079	0.034 U	0.0338 U	0.343	0.0122	10.1	0.343	No relevant effects in ERED.	--	--
	PCB170	µg/kg	0.075	0.29	0.069	0.338	0.0216	4.87	0.048	No relevant effects in ERED.	--	--
	PCB183	µg/kg	0.13	0.26	0.123	0.33	<.0001	2.68	0.07	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.099	0.57	0.402	0.83	<.0001	2.06	0.26	No relevant effects in ERED.	--	--
	PCB206	µg/kg	0.23	0.095 U	0.095 U	0.212	0.0216	2.23	0.212	No relevant effects in ERED.	--	--
	Total PCB Congeners (ND = 0)	µg/kg	0.1	4.85	2.45	23.7	0.0122	9.64	18.8	1,620 µg/kg: significant difference in embryo development of *Asterias rubens* .	162[4]	No
Main Channel North 1	PCB049	µg/kg	0.11	0.055 U	0.055 U	0.344	0.0122	6.25	0.344	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.828	0.0122	26.5	0.828	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.658	0.0122	13.2	0.658	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.872	0.0122	11.9	0.872	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.068 U	0.304	0.0122	4.47	0.304	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.628	0.0122	20.7	0.388	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.145	1.07	0.0122	7.34	0.756	No relevant effects in ERED.	--	--
	PCB105	µg/kg	0.056	0.0275 U	0.0273 U	0.338	0.0216	12.4	0.338	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.71	0.0122	31.1	0.71	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.086	0.26	0.082	0.576	0.0122	7.06	0.316	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.92	<.0001	2.22	0.82	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.42	<.0001	2.47	0.58	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	1.08	<.0001	3.87	0.704	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.069	0.034 U	0.0338 U	0.267	0.0216	7.90	0.267	No relevant effects in ERED.	--	--
	PCB170	µg/kg	0.065	0.29	0.069	0.292	0.0216	4.21	0.002	No relevant effects in ERED.	--	--

Table 28
Summary of Statistically Elevated *Nereis virens* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Main Channel North 1	PCB183	µg/kg	0.11	0.26	0.123	0.308	0.0004	2.50	0.048	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.716	<.0001	1.78	0.146	No relevant effects in ERED.	--	--
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	13.3	0.0122	5.42	8.46	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 2	2,4'-DDE	µg/kg	0.99	2	0.918	2.64	0.0122	2.88	0.64	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	2.5	0.255 U	0.542	20.6	<.0001	38.0	20.6	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	2.2	1.8	1.52	8.3	0.001	5.47	6.5	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.063	0.0315 U	0.0313 U	0.864	0.0122	27.6	0.864	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.568	0.0122	11.4	0.568	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.83	0.0122	11.4	0.83	No relevant effects in ERED.	--	--
	PCB097	µg/kg	0.14	0.07 U	0.068 U	0.31	0.0122	4.56	0.31	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.061	0.24	0.0303 U	0.52	0.0122	17.2	0.28	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.098	0.31	0.145	0.96	0.0122	6.61	0.65	No relevant effects in ERED.	--	--
	PCB105	µg/kg	0.055	0.0275 U	0.0273 U	0.388	0.0122	14.21	0.388	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.046	0.023 U	0.0228 U	0.632	0.0122	27.7	0.632	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.084	0.26	0.082	0.478	0.0122	5.86	0.218	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.17	1.1	0.866	1.76	<.0001	2.03	0.66	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.094	0.84	0.574	1.28	<.0001	2.23	0.44	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.098	0.38	0.280	1	<.0001	3.57	0.62	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.067	0.034 U	0.0338 U	0.304	0.0122	8.99	0.304	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.084	0.57	0.402	0.68	0.0001	1.69	0.11	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	31.5	<.0001	12.0	27.7	LD50: 2,690 µg/kg for mortality of the amphipod *Leptocheirus plumulosus* .	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.086	4.85	2.45	12.2	0.0122	4.98	7.38	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel North 3	4,4'-DDD	µg/kg	2.6	0.255 U	0.542	20.2	<.0001	37.3	20.2	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	2.2	1.8	1.52	7.38	0.0017	4.87	5.58	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.708	0.0122	22.6	0.708	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.436	0.0122	8.72	0.436	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.664	0.0122	9.10	0.664	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.478	0.0122	15.8	0.238	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.1453	0.798	0.0122	5.49	0.488	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.528	0.0122	23.2	0.528	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.086	0.26	0.082	0.482	0.0122	5.91	0.222	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.74	<.0001	2.01	0.64	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.4	<.0001	2.44	0.56	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	0.956	<.0001	3.42	0.576	No relevant effects in ERED.	--	--
	PCB151	µg/kg	0.069	0.034 U	0.0338 U	0.241	0.0122	7.13	0.241	No relevant effects in ERED.	--	--
	PCB183	µg/kg	0.11	0.26	0.123	0.302	0.0014	2.46	0.042	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.7	<.0001	1.74	0.13	No relevant effects in ERED.	--	--

Table 28
Summary of Statistically Elevated *Nereis virens* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
Main Channel North 3	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	29.2	<.0001	11.1	25.4	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	10.9	0.0122	4.42	6.00	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Main Channel 4	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	17.8	<.0001	32.8	17.8	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	8.82	<.0001	5.82	7.02	No relevant effects in ERED.	--	--
	PCB018	µg/kg	0.073	0.036 U	0.0356 U	0.072	0.0361	2.03	0.072	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.498	0.0122	15.9	0.498	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.378	0.0122	7.56	0.378	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.46	0.0119	6.30	0.46	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.312	0.0122	10.3	0.072	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.1453	0.554	0.0122	3.81	0.244	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.38	0.0122	16.7	0.38	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.086	0.26	0.082	0.32	0.0122	3.92	0.06	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.48	<.0001	1.71	0.38	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.00	<.0001	1.75	0.162	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	0.798	<.0001	2.85	0.418	No relevant effects in ERED.	--	--
	PCB183	µg/kg	0.11	0.26	0.123	0.312	<.0001	2.54	0.052	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.6	<.0001	1.49	0.03	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	28.0	<.0001	10.6	24.2	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	7.60	0.0122	3.10	2.748	1,620 µg/kg: significant difference in embryo development of *A. rubens* .	162[4]	No
Main Channel North 5	4,4'-DDE	µg/kg	4.5	1.8	1.52	7.48	0.0133	4.93	5.68	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.408	0.0122	13.0	0.408	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.408	0.0122	5.59	0.408	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.28	0.0122	9.24	0.04	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.145	0.542	0.0122	3.73	0.232	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.402	0.0122	17.6	0.402	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.36	0.0047	1.57	0.26	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.00	0.0007	1.75	0.164	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	0.694	0.0188	2.48	0.314	No relevant effects in ERED.	--	--
	PCB180	µg/kg	0.043	0.021 U	0.021 U	0.56	0.0122	26.7	0.56	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.596	0.0129	1.48	0.026	No relevant effects in ERED.	--	--
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	7.16	0.0122	2.92	2.31	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island North	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	13.6	0.0067	25.1	13.6	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	8.72	0.0035	5.75	6.92	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.522	0.0122	16.7	0.522	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.1	0.05 U	0.05 U	0.29	0.0216	5.80	0.29	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.546	0.0122	7.48	0.546	No relevant effects in ERED.	--	--

Table 28
Summary of Statistically Elevated *Nereis virens* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.304	0.0122	10.0	0.064	No relevant effects in ERED.	--	--
Bay Island North	PCB101	µg/kg	0.1	0.31	0.145	0.64	0.0122	4.40	0.33	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.522	0.0122	22.9	0.522	No relevant effects in ERED.	--	--
	PCB118	µg/kg	0.086	0.26	0.082	0.354	0.0122	4.34	0.094	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.54	0.0022	1.78	0.44	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.096	0.84	0.574	1.18	0.0001	2.06	0.34	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	0.88	0.0022	3.14	0.5	No relevant effects in ERED.	--	--
	PCB170	µg/kg	0.065	0.29	0.069	0.310	0.0367	4.47	0.0203	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	24.3	0.0031	9.22	20.5	LD50: 2,690 µg/kg for mortality of the amphipod L. plumulosus.	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	8.58	0.0122	3.50	3.73	1,620 µg/kg: significant difference in embryo development of *A. rubens* .	162[4]	No
Bay Island Middle East	2,4'-DDE	µg/kg	1	2	0.918	2.8	0.0122	3.05	0.8	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	30	<.0001	55.4	30	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	15	<.0001	9.89	13.2	No relevant effects in ERED.	--	--
	PCB049	µg/kg	0.12	0.055 U	0.055 U	0.286	0.0122	5.20	0.286	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.065	0.0315 U	0.0313 U	0.642	0.0122	20.5	0.642	No relevant effects in ERED.	--	--
	PCB066	µg/kg	0.11	0.05 U	0.05 U	0.426	0.0122	8.52	0.426	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.704	0.0122	9.64	0.704	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.063	0.24	0.0303 U	0.426	0.0122	14.1	0.186	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.1453	0.858	0.0122	5.91	0.548	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.481	0.0122	21.1	0.481	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.74	<.0001	2.01	0.64	No relevant effects in ERED.	--	--
	PCB138/158	µg/kg	0.097	0.84	0.574	1.34	<.0001	2.33	0.5	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	1.03	<.0001	3.68	0.65	No relevant effects in ERED.	--	--
	PCB170	µg/kg	0.065	0.29	0.069	0.382	0.0216	5.50	0.092	No relevant effects in ERED.	--	--
	PCB180	µg/kg	0.043	0.021 U	0.021 U	0.758	0.0122	36.1	0.758	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.087	0.57	0.402	0.668	0.0006	1.66	0.098	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	47.8	<.0001	18.2	44	LD50: 2,690 µg/kg for mortality of the amphipod *L.* plumulosus.	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.089	4.85	2.45	11.4	0.0122	4.65	6.55	1,620 µg/kg: significant difference in embryo development of *A. rubens* .	162[4]	No
Bay Island Middle West	2,4'-DDE	µg/kg	1	2	0.918	3.2	0.0216	3.49	1.2	No relevant effects in ERED.	--	--
	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	21	<.0001	38.7	21	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	10.3	0.0001	6.82	8.54	No relevant effects in ERED.	--	--
	PCB052	µg/kg	0.064	0.0315 U	0.0313 U	0.606	0.0122	19.4	0.606	No relevant effects in ERED.	--	--
	PCB095	µg/kg	0.15	0.075 U	0.073 U	0.6	0.0122	8.22	0.6	No relevant effects in ERED.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.334	0.0122	11.0	0.094	No relevant effects in ERED.	--	--
	PCB101	µg/kg	0.1	0.31	0.1453	0.69	0.0122	4.75	0.38	No relevant effects in ERED.	--	--
	PCB110	µg/kg	0.047	0.023 U	0.0228 U	0.516	0.0122	22.6	0.516	No relevant effects in ERED.	--	--

Table 28
Summary of Statistically Elevated *Nereis virens* Tissue Residues

Dredge Unit	Analyte	Units	MDL[1]	Day 0 Tissue Concentration	Reference Mean Tissue Concentration	Project Area Mean Tissue Concentration	P Value	Project Area Mean: Reference Mean Ratio	Day 0 Corrected Project Area Mean Tissue Concentration	ERED[2]	TRV	Conclusion: Project Tissue > TRV?
	PCB118	µg/kg	0.086	0.26	0.082	0.384	0.0122	4.71	0.124	No relevant effects in ERED.	--	--
	PCB132/153	µg/kg	0.18	1.1	0.866	1.54	0.0004	1.78	0.44	No relevant effects in ERED.	--	--
Bay Island Middle West	PCB138/158	µg/kg	0.096	0.84	0.574	1.11	<.0001	1.94	0.274	No relevant effects in ERED.	--	--
	PCB149	µg/kg	0.1	0.38	0.280	0.836	0.0015	2.99	0.456	No relevant effects in ERED.	--	--
	PCB170	µg/kg	0.065	0.29	0.069	0.316	0.0216	4.55	0.026	No relevant effects in ERED.	--	--
	PCB187	µg/kg	0.086	0.57	0.402	0.644	0.0027	1.60	0.074	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	34.5	<.0001	13.1	30.7	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No
	Total PCB Congeners (ND = 0)	µg/kg	0.088	4.85	2.45	8.93	0.0122	3.64	4.08	1,620 µg/kg: significant difference in embryo development of *A. rubens.*	162[4]	No
Bay Island South	4,4'-DDD	µg/kg	5.1	0.255 U	0.542	13.9	0.0017	25.6	13.9	No relevant effects in ERED.	--	--
	4,4'-DDE	µg/kg	4.5	1.8	1.52	10.4	<.0001	6.85	8.58	No relevant effects in ERED.	--	--
	Total DDTs (ND = 0)	µg/kg	0.29	3.8	2.63	26.1	0.0003	9.92	22.3	LD50: 2,690 µg/kg for mortality of the amphipod *L. plumulosus.*	134[3]	No

Notes:

Organics were normalized to percent lipids prior to statistical analysis.

U: non-detect; half the detection limit shown

1. If MDL differed between samples, maximum MDL is presented.

2. Tissue effects data from the ERED (USACE 2018)

3. An uncertainty factor of 20 was applied to ED50 and/or LD50 values to estimate LOED (USACHPPM 2000).

4. Full dose/response curve not measured; therefore, an uncertainty factor of 10 was applied to estimate LOED (Lin and Davis 2018; USACHPPM 2000).

Table 29

Summary of Rationale for Selection of Toxicity Reference Values

Analyte	ERED[1]	TRV	Rationale
2,4'-DDD	No relevant effects in ERED	--	No marine invertebrate species in ERED
2,4'-DDE	No relevant effects in ERED	--	No marine invertebrate species in ERED
4,4'-DDD	No relevant effects in ERED	--	No marine invertebrate species in ERED
4,4'-DDE	No relevant effects in ERED	--	No marine invertebrate species in ERED
Total DDTs	LD50: 2,690 µg/kg for mortality of the amphipod *Leptocheirus plumulosus*	134 µg/kg[2]	TRV selected by Lin and Davis (2018) for San Francisco Bay
Dibutyltin	LOED: 18 µg/kg for imposex in gastropod *Hexaplex trunculus* (field study; exposure to mixture of organotins in sediment)	--	TRV selected by USEPA in 2017 (Anchor QEA 2017b). Following review of Pellizzato et al. (2004), it was determined that this was a field study in which gastropods were exposed to a mixture of organotins in situ; therefore, it was not clear whether some or all of the organotins or other confounding factors were the cause of the observed imposex (Anchor QEA 2017b). The updated ERED (2018) correlates observed effects in this study to tributyltin; therefore, this TRV has been removed.
	NOED: 48 µg/kg for reproduction in Atlantic dogwinkle *Nucella lapillus* (controlled laboratory study; single chemical exposure)	48 µg/kg	Although the endpoint documented is the NOED, which is not the preferred endpoint, the study involved controlled, single chemical exposures in the laboratory with a sensitive gastropod; results showed no effects associated with a water exposure (NOED = 48 µg/kg) or following injection with dibutyltin (NOED = 226 µg/kg).
Mercury	0.1 mg/kg: effect on reproduction (decreased egg production) of the copepod *Acartia tonsa*	0.1 mg/kg	TRV selected by USEPA at the DMMT meeting on May 22, 2019. Basis of selection was lowest significant effect in ERED for marine invertebrate with an ecologically relevant effect (i.e., growth, development survival, reproduction); whole body measurement. Based on communication with USEPA, the reproduction endpoint in this case would be considered a LOED; therefore, no uncertainty factor was applied.
PCB005/008	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB018	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB028	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB033	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB044	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB049	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB052	No relevant effects in ERED	--	No marine invertebrate species in ERED
PCB056	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB066	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED

Table 29

Summary of Rationale for Selection of Toxicity Reference Values

Analyte	ERED[1]	TRV	Rationale
PCB070	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB074	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB087	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB095	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB097	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB099	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB101	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB105	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB110	No relevant effects in ERED	--	No data for any aquatic organisms in ERED.
PCB118	No relevant effects in ERED	--	Only biochemical effects measured in marine invertebrate species (i.e., *Asteria rubens*)
PCB128	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED.
PCB132/153	No relevant effects in ERED	--	PCB153: Only biochemical effects measured in marine invertebrate species (i.e., *A. rubens*)
PCB138/158	No relevant effects in ERED	--	PCB138: Only marine invertebrate species in ERED was mussel (*Mytilus galloprovincialis*); effects were observed only for non-ecologically relevant (i.e., digestion) endpoints at 1,580 µg/kg.
PCB149	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB151	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB170	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB180	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB183	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB187	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
PCB206	No relevant effects in ERED	--	No data for any aquatic invertebrates in ERED
Total PCB Congeners	1,620 µg/kg: significant difference in embryo development of *A. rubens*	162 µg/kg[3]	TRV selected by Lin and Davis (2018). Total PCBs based on Clophen A50. Clophen A50 is similar to Aroclor 1254, which is representative of PCB congener profile in San Francisco Bay (Lin and Davis 2018).

Notes:

1. Tissue effects data from the ERED (USACE 2018)

2. An uncertainty factor of 20 was applied to ED50 and/or LD50 values to estimate LOED (USACHPPM 2000).

3. Full dose/response curve not measured; therefore, an uncertainty factor of 10 was applied to estimate LOED (Lin and Davis 2018; USACHPPM 2000).

4 Quality Assurance/Quality Control

A review of analytical results was conducted to evaluate the laboratories' performance in meeting quality assurance/quality control (QA/QC) guidelines outlined in the SAP (Anchor QEA 2017a).

4.1 Physical and Chemical Analyses of Sediment

The data validation reports prepared by Anchor QEA for physical and chemical analyses of sediment are presented in Appendix G. Samples were analyzed within the appropriate holding times, with only minor exceptions. Mercury analysis on individual core samples from the January 2018 sampling event was performed past the 28-day hold time for USEPA method 7471A; however, samples were stored frozen from the time of sample receipt at the laboratory until extraction. Based on the State Water Resources Control Board (SWRCB) Surface Water Ambient Monitoring Program (SWAMP) Quality Assurance Program Plan's Measurement Quality Objectives (SWRCB 2017), a 1-year hold time is allowed for mercury, if samples are stored frozen and analyzed within 14 days of thawing; therefore, this deviation is not expected to affect the overall results.

Generally, QA/QC sample results were within the project-specified control limits, with the following exceptions:

- Reference and composite sediment from January 2018 sampling event:
  - Selenium was detected in the method blank associated with sample LA3-REF, and chromium was detected in the method blank associated with sample BIN-COMP. Associated sample results were significantly greater than (five times) the concentrations in the method blanks, so no data were qualified.
  - The pyrethroid surrogate dibutyl chlorendate percent recovery value was below the control limit for sample BIN-COMP. Associated results were qualified to indicate a potentially low bias.
  - The matrix spike (MS) percent recovery value for TOC exceeded the control limit for sample BIN-COMP. Associated results were qualified to indicate a potentially high bias.
  - The matrix spike duplicate (MSD) percent recovery values for 4,4'-DDT and methoxychlor were below the control limit for sample LA3-REF, and the MS/MSD relative percent difference (RPD) values exceeded the control limit. The MS/MSD RPD value for 4,4'-DDD also exceeded the control limit for LA3-REF. Parent sample results were qualified to indicate a potentially low bias.
  - 4,4'-DDE did not recover in the MS and MSD for sample BIS-COMP. The sample concentration was greater than four times the spike concentration, so no data were qualified. Endrin aldehyde also did not recover in the MS and MSD for sample BIS-COMP. This compound was not detected in the parent sample, so the result was rejected.

  - The MS and MSD percent recovery values for 4,4′-DDD, 4,4′-DDE, and heptachlor epoxide exceeded the control limit for sample BIN-COMP. The parent sample result for 4,4′-DDD was qualified to indicate a potentially high bias. The sample concentration for 4,4′-DDE was greater than four times the spike concentration and heptachlor epoxide was not detected; therefore, no data were qualified.
  - The MS and MSD percent recovery values for tributyltin were below the control limit for sample BIMW-COMP. The parent sample result was qualified to indicate a potentially low bias.
  - The MS and/or MSD percent recovery values for several pyrethroids exceeded the control limit on sample BIS-COMP. Cyfluthrin was detected in the parent sample and was qualified to indicate a potentially high bias.
  - The MS/MSD RPD values for allethrin and resmethrin/bioresmethrin exceeded the control limit for sample EC-COMP. These compounds were not detected in the parent sample, so no data were qualified. The MSD percent recovery value for fluvinate was below the control limit for sample EC-COMP. The parent sample result was qualified to indicate a potentially low bias.
- Individual core samples from the January 2018 sampling event:
  - The pesticide surrogate decachlorobiphenyl percent recovery value exceeded the control limit for sample BIN-06. No data were qualified because the sample was analyzed at a high dilution.
  - The MSD percent recovery value for 4,4′-DDT was below the control limit for sample MCN1-03, and the MS/MSD RPD value exceeded the control limit. The MS and MSD percent recovery values for 4,4′-DDT were below 20% for sample BIS-03. Parent sample results were qualified to indicate a potentially low bias.
- Reference, composite and Individual core samples from the January 2019 sampling event:
  - The laboratory control sample (LCS) and laboratory control sample duplicate percent recovery values for tributyltin were below the control limit. Associated results were qualified to indicate a potentially low bias.
  - The LCS percent recovery values for benzo(k)fluoranthene, 1-methylnaphthalene, and pyrene were below the control limit. Associated results were qualified to indicate a potentially low bias.
  - The MS percent recovery value for naphthalene was below the control limit for sample NC2-04. The parent sample result was qualified to indicate a potentially low bias.
  - The MS and/or MSD percent recovery values for several pyrethroids and pesticides were above the control limit for sample LA3-REF. The parent sample results for 4,4′-DDD and 4,4′-DDE were qualified to indicate a potentially high bias. Other analytes were not detected in the parent sample, so no data were qualified.

- The MS and/or MSD percent recovery values for chromium, zinc, and lead were above the control limit for sample LA3-REF. Associated results were qualified to indicate a potentially high bias.
- The MS and/or MSD percent recovery values for several pyrethroids were above the control limit for samples NC3-04 and/or NC2-COMP. Parent sample results were not detected, so no data were qualified.
- The MS and MSD percent recovery values for zinc were above the control limit for sample LA3-REF. Associated results were qualified to indicate a potentially high bias.
- The MS and/or MSD percent recovery values for aldrin and 4,4'-DDE were below the control limit for sample NC3-04. Parent sample results were qualified to indicate a potentially low bias.
- The MS and/or MSD percent recovery values for methoxychlor and 4,4'-DDE were outside the control limit for sample NC2-COMP. Parent sample results were qualified to indicate they are estimated.
- The MS and/or MSD percent recovery values for several PAHs were below the control limit for samples NC3-04 and/or NC2-COMP. Parent sample results were qualified to indicate a potentially low bias.

Results of this assessment concluded that most data were acceptable as reported; all other data were acceptable as qualified, except for one endrin aldehyde result. Endrin aldehyde did not recover in the MS, MSD, or sample BIS-COMP, so this result was rejected. The sediment data reviewed from LNB federal channels met the data quality objective of 95% completeness.

4.2 Biological Testing

Biological testing of LNB federal channels sediments incorporated standard QA/QC procedures, consistent with OTM (USEPA/USACE 1991) and ITM (USEPA/USACE 1998) guidelines.

Sediments were stored at 4°C plus or minus 2°C and used within the 8-week holding period. All test organism responses within the negative (laboratory) controls met acceptability criteria, except one SPP testing using *M. beryllina* (initiated on February 27, 2019). Survival in the laboratory control (88%) was slightly less than control acceptability criterion of 90%; therefore, results were conservatively compared to the site water control (94%). All water quality conditions were within the appropriate limits. Raw water quality data are provided in Appendix D.

All SP reference toxicant tests LC_{50} values were within two standard deviations of the laboratory mean, indicating that sensitivity of test organisms was normal. However, amphipod control survival was less than 90% for each reference toxicant test associated with the January 2018 sampling event. Although control survival was reduced, the response to both toxicants (cadmium chloride and ammonium chloride) was normal based on historical tests, and mean survival in the laboratory

controls associated with project sediments met acceptability criterion. All SPP reference toxicant tests LC_{50} and/or EC_{50} values were within two standard deviations of the laboratory mean, with two exceptions. The LC_{50} value of one *A. bahia* reference toxicant test (initiated on February 21, 2018; 160.2 micrograms per liter [µg/L]) was below the control limit (175.9 µg/L), indicating organisms were slightly more sensitive when compared to historical tests. Therefore, if test performance was affected, these organisms would have shown a greater level of toxicity than other batches. The LC_{50} value of one *M. beryllina* reference toxicant test (initiated on February 22, 2018; 266.7 µg/L) was slightly above the control limit (266 µg/L), indicating organisms may have been slightly less sensitive when compared to historical tests. These minor deviations are not expected to affect the overall results.

As discussed in Section 2.3, interstitial ammonia concentrations were measured on project sediments prior to testing. Ammonia concentrations in composite samples from Bay Island North (21.7 mg/L), Bay Island Middle East (26.1 mg/L), Bay Island Middle West (27.8 mg/L), and Bay Island South (26.1 mg/L) were at levels of potential concern for the amphipod SP test (greater than 15 mg/L; USACE et al. 2001). Test sediments were purged to reduce ammonia concentrations prior to testing. In addition, a water-only ammonia reference toxicant test was conducted with the amphipod test to evaluate the contribution of elevated ammonia concentrations on test organism survival. An ammonia reference toxicant test was also run with the bivalve larval development bioassay due to the sensitivity of *M. galloprovincialis* to elevated ammonia concentrations. As described in Section 3.2.2, ammonia concentrations in the 100% elutriate treatments from Bay Island Middle East and West, Bay Island South, and Main Channel North 3 and 4 (3.8 to 10.5 mg/L) exceeded the NOEC in the associated ammonia reference toxicant tests (3.5 and 4.0 mg/L), indicating that ammonia likely contributed to the abnormal development of *M. galloprovincialis* in these samples.

In BP tests, mean survival of *N. virens* was slightly reduced in composite samples from Newport Channel 2 and 3 (66% and 76%, respectively). Upon arrival, test organisms appeared stressed; however, organisms were deemed acceptable for use based on low mortality, activity level, and overall size. Because reference toxicant tests are not performed with BP tests, the sensitivity of test organisms could not be evaluated. Although survival was somewhat reduced, sufficient tissue mass was available for the required chemical analysis; therefore, test acceptability criteria were met.

4.3 Chemical Analysis of Tissue Residues

The data validation reports prepared by Anchor QEA for chemical analysis of tissue residues are presented in Appendix G. Samples were analyzed within the appropriate holding times, with only minor exceptions. Mercury analysis for samples from the January 2018 sampling event was performed past the 28-day hold time for USEPA method 7471A; however, samples were stored frozen from the time of sample receipt at the laboratory until extraction. Based on the SWRCB SWAMP Quality Assurance Program Plan's Measurement Quality Objectives (SWRCB 2017), a 1-year hold time is allowed for

mercury, if samples are stored frozen and analyzed within 14 days of thawing; therefore, this deviation is not expected to affect the overall results.

Generally, QA/QC sample results were within the project-specified control limits, with the following exceptions:

- The MS and/or MSD percent recovery values for mercury were below the control limit for samples MCN3-COMP-D-NEREIS, BIMW-COMP-T-M-D-NEREIS, T0-A-NEREIS-022619, and NC3-COMP-D-NEREIS. Associated results were qualified to indicate a potentially low bias.
- 4,4′-DDD did not recover in the MS and MSD for sample MCN4-COMP-B-MACOMA. The parent sample result was qualified to indicate a potentially low bias.
- 4,4′-DDD exceeded the control limit and did not recover in the MSD for sample MCN4-COMP-E-MACOMA. The associated result was qualified to indicate an estimated concentration. The MS percent recovery value for 4,4′-DDT also exceeded the control limit for sample MCN4-COMP-E-MACOMA. This compound was not detected in the parent sample, so no data were qualified.
- The MS and MSD percent recovery values for 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT exceeded the control limit for sample BIS-COMP-D-MACOMA. Parent sample results for 4,4′-DDD and 4,4′-DDE were qualified to indicate a potentially high bias. 4,4′-DDT was not detected in the parent sample, so no data were qualified.
- The MS percent recovery value for 4,4′-DDT exceeded the control limit for sample BIS-COMP-E-MACOMA. This compound was not detected in the parent sample, so no data were qualified.

Results of this assessment concluded that most data were acceptable as reported; all other data were acceptable as qualified. The tissue data reviewed from LNB federal channels met the data quality objective of 95% completeness.

5 Discussion

LNB federal channels sediments were tested to determine suitability for ocean disposal at LA-3 ODMDS. In addition, sediment from the Entrance Channel was evaluated to determine compatibility for nearshore placement along beaches north of the harbor entrance and up to the Santa Ana River. Testing for ocean disposal included physical and chemical analyses and biological testing in accordance with guidelines specified in the OTM (USEPA/USACE 1991). To support the evaluation for nearshore placement, grain size data were collected from Newport Pier to the Newport Bay entrance channel to establish a grain size envelope for the nearshore receiver site.

5.1 Evaluation for Nearshore Placement

Sediments from the Entrance Channel and nearshore receiver site were analyzed for grain size to determine compatibility for nearshore placement. A grain size envelope was developed using the coarsest and finest gradation curves from the receiver site. Source material samples were plotted against the grain size envelope to determine compatibility. The grain size distributions for the Entrance Channel fit within the grain size envelope, and percent fines of all stations were within 10% of the finest receiver site sample. These results indicate the sediment from the Entrance Channel is compatible with the nearshore receiver site.

Composite sediment chemistry results indicated that sediment from the Entrance Channel is clean, with all concentrations less than the ERL. SP and SPP testing indicated that sediment from the Entrance Channel is not acutely toxic to marine organisms. Due to the high percentage of sand (98.12%) and low concentrations of contaminants, tissue analysis was not required. Based on the results of testing, sediment from the Entrance Channel should be considered suitable for nearshore placement.

5.2 Evaluation for Ocean Disposal

5.2.1 Turning Basin, Main Channel North, Bay Island, and the Entrance Channel

Sediment core sampling was conducted within the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel in January 2018. Sediment from all DUs were evaluated for ocean disposal. Sediment cores were collected at 48 stations, and 11 composite samples were created for physical and chemical analyses and biological testing. Based on composite sediment chemistry results, potential contaminants of concern included mercury, DDTs, dibutyltin, and PCBs. Mercury exceeded the ERM value in sediment from the Turning Basin and Main Channel North 1, 2, and 3. Total DDTs exceeded the ERM value in all DUs, except the Entrance Channel. Total PCBs exceeded the ERM in the Turning Basin. Dibutyltin ranged from non-detect to 40 µg/kg, with the highest concentration measured in the Turning Basin.

Based on composite sediment chemistry results, individual core samples were analyzed for mercury, DDTs, and PCBs, as requested by USEPA (Table 6). Mercury exceeded the USEPA-recommended threshold of 1 mg/kg at several stations within the Turning Basin and Main Channel North 1, 2, and 3 (Figure 18). Total DDTs exceeded the ERM value at all stations, except MCN3-04 and BIN-03 (Figure 19). Total PCBs exceeded the ERM value at three stations within the Turning Basin (Figure 20).

No toxicity was observed during SP testing with amphipods or polychaetes. Survival was greater than 90% in all test treatments. During SPP testing, sediment from Bay Island Middle East, Bay Island Middle West, Bay Island South, and Main Channel North 3 and 4 resulted in an effect on the development of *M. galloprovincialis*. Although ammonia likely contributed to the observed toxicity in these samples and is not a contaminant of concern, STFATE modeling was performed to demonstrate LPC compliance. Based on STFATE modeling, LNB federal channel sediments do not pose a toxicity risk to water column organisms after discharge. BP testing and tissue chemistry indicated significant bioaccumulation of mercury, dibutyltin, DDTs, and PCBs when compared to reference sediment; however, all concentrations were less than FDA action levels and selected TRVs that have been shown to cause toxicity to marine invertebrates. These results indicate that it is unlikely that exposure to LNB federal channel sediments would cause impairment to marine organisms.

The SAPR for Turning Basin, Main Channel North, Bay Island, and the Entrance Channel was initially presented to the SC-DMMT in July 2018. At this meeting, USEPA expressed concerns regarding mercury and PCB concentrations but indicated no material would be excluded from ocean disposal due to DDT concentrations. USEPA requested supplemental information to support a suitability determination, including mass loading calculations and a compilation of historical data from Newport Bay. Mass loading calculations and a compilation of historical data were provided to USEPA in April 2019.

The data compilation consists of a comprehensive summary of past data from Newport Bay, including historical sediment mercury, DDT, and PCB data; bioassay testing data; and bioaccumulation tissue data. The data compilation was developed using historical data from 2003 to 2019, including dredge material evaluations, post-dredge sediment sampling investigations, and a feasibility study (i.e., Rhine Channel). The data compilation is presented in Appendix H.

Mass loadings of mercury and PCBs were calculated for each DU. Mass loading calculations are presented in Appendix I. The calculations show that approximately 50% of the mercury loadings and nearly 40% of the total PCB loadings are attributed to Turning Basin and Newport Channel 1 DUs. As previously discussed, Newport Channel 1 (Stations NC1-01 and NC1-02) was eliminated from the evaluation for ocean disposal based on elevated mercury concentrations in individual cores.

5.2.2 Newport Channel

Newport Channel was not initially included in this sediment characterization program or the previous federal channels investigation in 2009 (Newfields 2009) due to historical contamination and amphipod toxicity in 2003 and 2006 (Weston 2007). During the federal channels sampling in January 2018, exploratory sampling was conducted within Newport Channel and results were cleaner than expected. Based on these results, the City expanded the federal channels characterization to include Newport Channel.

Sediment core sampling was conducted within Newport Channel in January 2019. Sediment cores were collected at 12 stations within three DUs. Sediment from each core was submitted for physical and chemical analyses. Based on individual core sediment chemistry results, two composite samples (NC2-COMP and NC3-COMP) were created in coordination with USEPA for physical and chemical analyses and biological testing. Stations NC1-01 and NC1-02 were eliminated from the sediment characterization for ocean disposal due to elevated mercury.

Based on composite sediment chemistry results, potential contaminants of concern included mercury. No toxicity was observed during SP testing with amphipods or polychaetes. Survival was greater than 90% in all test treatments. During SPP testing, no toxicity was observed with LC_{50} and/or EC_{50} values greater than 100% for all tests. For BP testing and tissue chemistry, all mercury concentrations were less than the FDA action level. All *N. virens* tissue concentrations were less than the time zero sample. *N. virens* and *M. nasuta* tissue concentrations were not statistically elevated when compared to the reference; therefore, no further evaluation of tissue samples was not performed. These results indicate that it is unlikely that exposure to Newport Channel 2 and 3 sediments would cause impairment to marine organisms.

6 Conclusions

Physical, chemical, and biological analyses were conducted to evaluate the suitability of LNB federal channels sediments for ocean disposal. In addition, sediment from the Entrance Channel was evaluated to determine compatibility for nearshore placement. Based on the results of analyses, the following conclusions may be drawn:

- Composite sediment chemistry and further chemical characterization of individual cores showed some areas with elevated mercury above the USEPA-recommended threshold of 1 mg/kg and PCBs above 100 µg/kg. These include Newport Channel 1 and areas within the Turning Basin and the Main Channel North.
- Results of SP testing indicate that no sediments were acutely toxic to benthic organisms and meet LPC requirements for ocean disposal.
- Results of SPP testing and STFATE modeling also suggest that sediments do not pose a toxicity risk to existing water column organisms after discharge and meet LPC requirements for ocean disposal.
- Tissue concentrations from the bioaccumulation tests showed levels less than established FDA action thresholds and concentrations that have been shown to cause toxicity to marine invertebrates.
- Grain size of composite sediments consisted primarily of fines (silt and clay), except for the Entrance Channel. Grain size of the Entrance Channel consisted primarily of sand, which was compatible with the nearshore receiver site.

7 References

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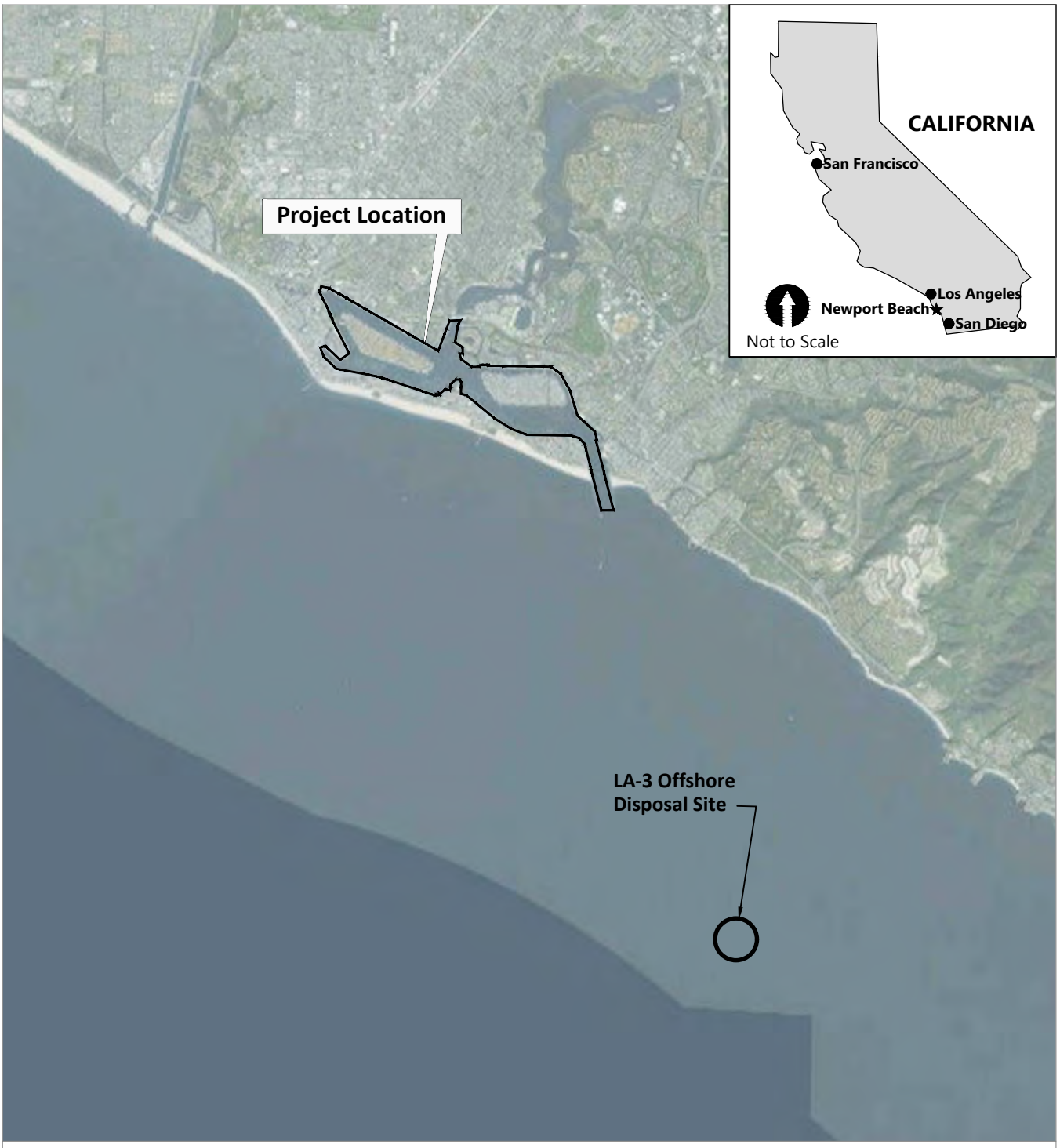
Figures



SOURCE: Image from Bing maps.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

Approximate Project Location:
33° 36.540', 117° 54.230'

0 1.5
Miles

Publish Date: 2017/11/20 1:26 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-001 VIC_recover.dwg AQ-A-VMAP

ANCHOR QEA

Figure 1
Vicinity Map
Lower Newport Bay Federal Channels Dredging

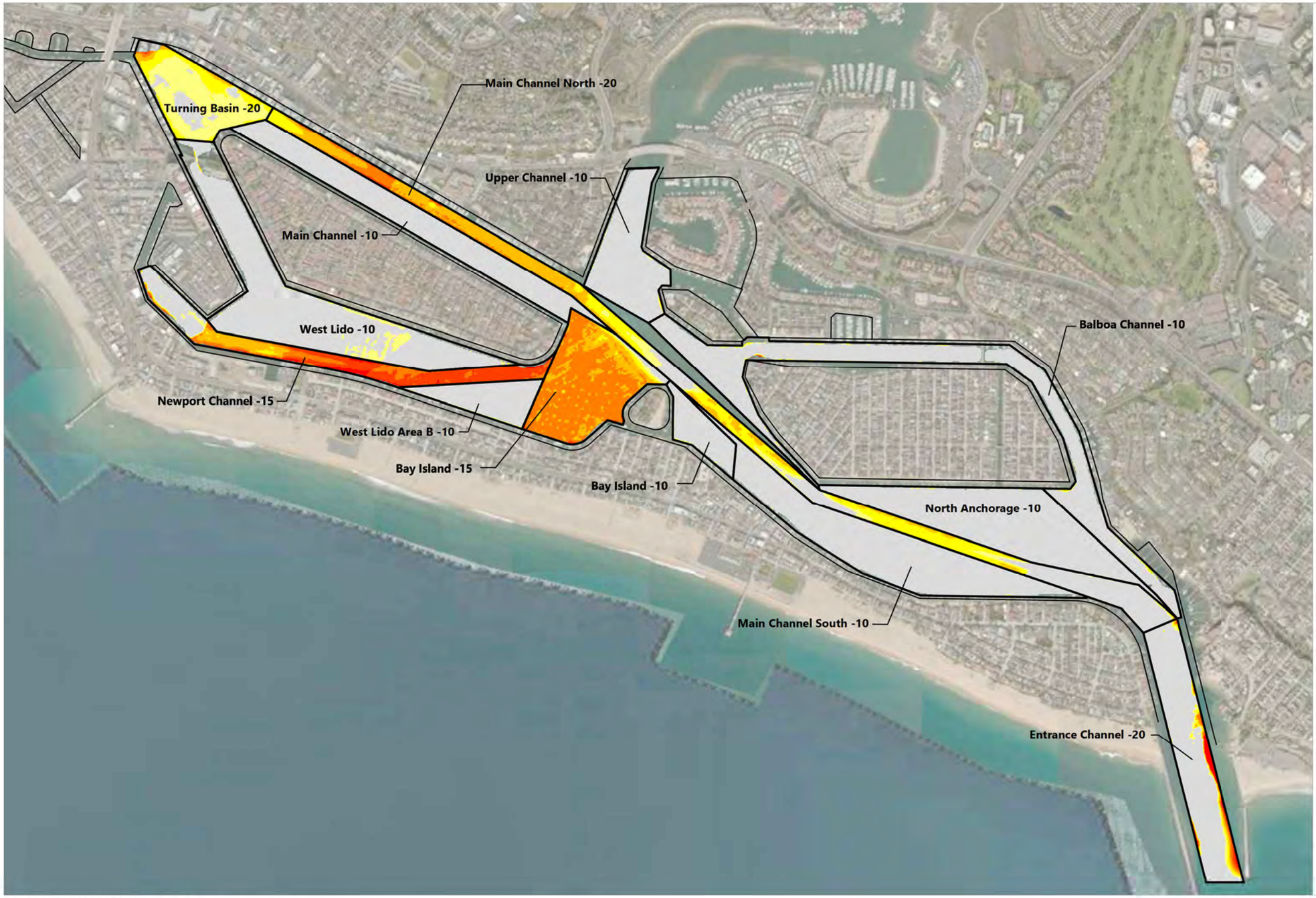


AERIAL SOURCE: Bing Maps 2016. Dredge depths and boundaries from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

Publish Date: 2017/12/18 3:47 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-012 FEDERAL CHANNELS.dwg *FIG 2*

ANCHOR QEA

Figure 2
Federal Channels and Authorized Design Depths
Lower Newport Bay Federal Channels Dredging



Difference between Existing Bathymetry (Base) and Authorized Depth (Comparison)	
Design Elevation Below Bathy (ft)	**Color**
At or Above Existing Bathy	
0.0 to - 1.0	
- 1.0 to - 2.0	
- 2.0 to - 3.0	
- 3.0 to - 4.0	
- 4.0 to - 5.0	
- 5.0 <	

0 1,400
Feet

AERIAL SOURCE: Bing Maps 2016
SURVEY SOURCE: U.S. Army Corps of Engineers survey dated June 2017. Dredge depths and boundaries from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

Publish Date: 2017/12/18 4:38 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-008 2017 ISOPACH.dwg FIG 3

ANCHOR QEA

Figure 3
Comparison of 2017 Harborwide Bathymetric Survey to Authorized Design Depths
Lower Newport Bay Federal Channels Dredging



Publish Date: 2019/05/10 3:31 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-010 DREDGING.dwg FIG 4

ANCHOR QEA

Figure 4
Overview of Dredge Units and Bathymetry
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- 20 — Design Depth
- Dredge Footprint
- ⊙-# — Actual Sampling Location
- —10— Existing Bathymetric Contour
- -16.5 — Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2019/05/02 3:39 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015A ACTUAL SAMPLING.dwg FIG 5

ANCHOR QEA

Figure 5
Dredge Unit, Bathymetry, and Actual Sampling Locations - Turning Basin
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- 20 — Design Depth
- Dredge Footprint
- ⊙-# — Actual Sampling Location
- -10 — Existing Bathymetric Contour
- -16.5 — Existing Bathymetric Sounding

0 300
Feet

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Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-0158 ACTUAL SAMPLING.dwg FIG 7

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Figure 6
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 1
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

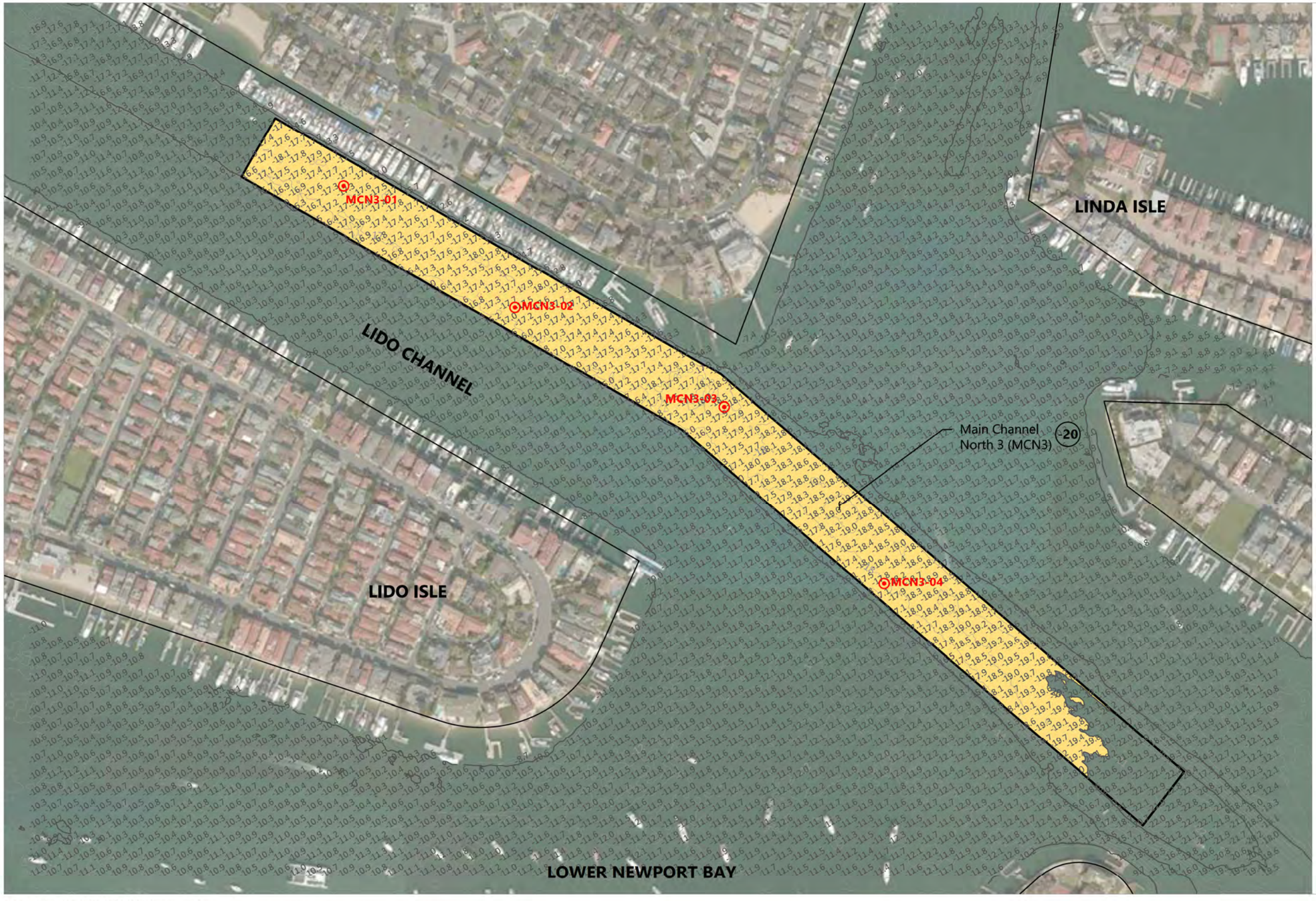
- Dredge Unit Boundary
- (20) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 9:11 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015C ACTUAL SAMPLING.dwg FIG 8

ANCHOR QEA

Figure 7
Dredge Unit, Bathymetry and Actual Sampling Locations - Main Channel North 2
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (20) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 10:36 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015D ACTUAL SAMPLING.dwg FIG 9

ANCHOR QEA

Figure 8
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 3
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

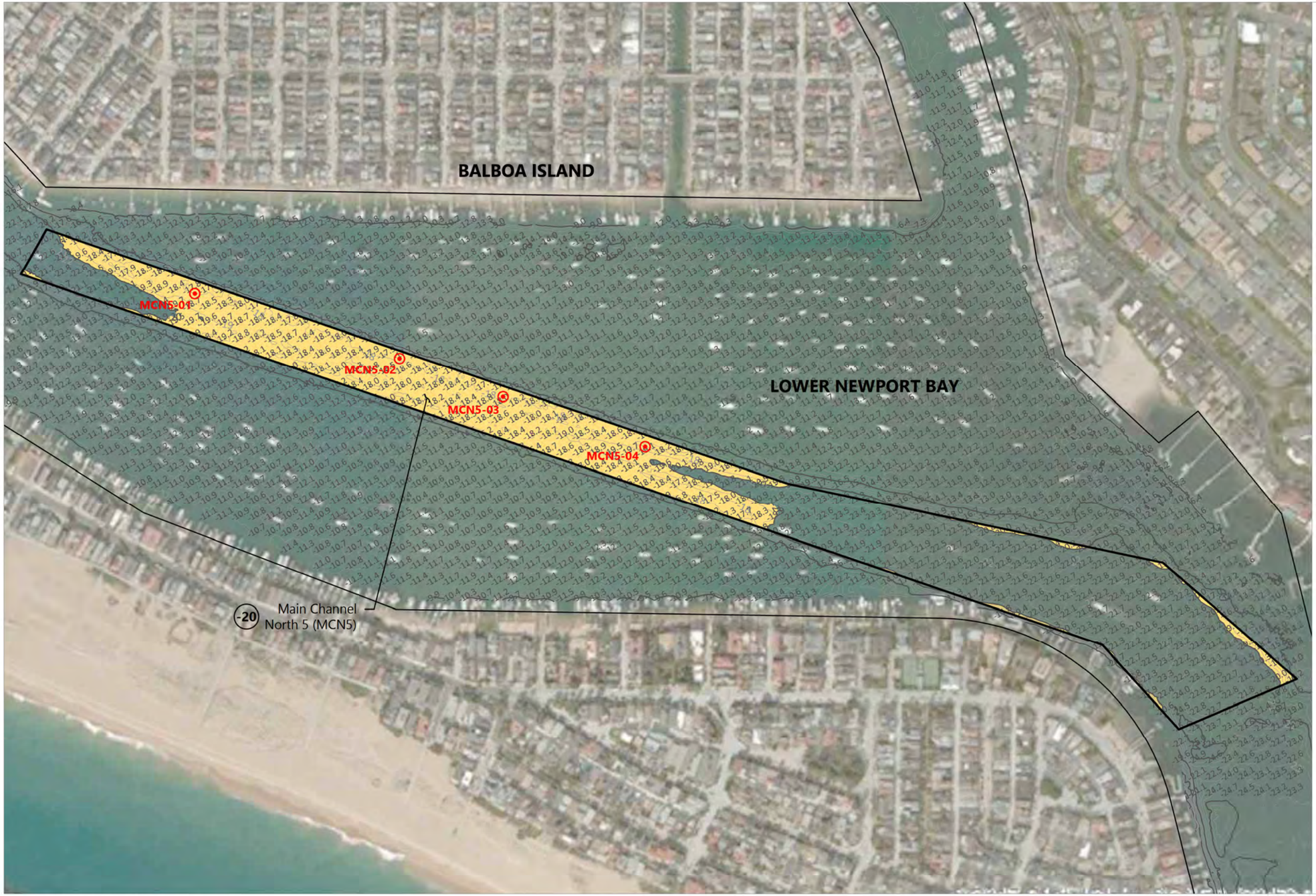
- Dredge Unit Boundary
- 20 — Design Depth
- Dredge Footprint
- ⊙-# — Actual Sampling Location
- —10— Existing Bathymetric Contour
- -16.5 — Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 12:43 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015I ACTUAL SAMPLING.dwg FIG 14

ANCHOR QEA

Figure 9
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 4
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- 20 — Design Depth
- Dredge Footprint
- ⊙-# — Actual Sampling Location
- -10 — Existing Bathymetric Contour
- -16.5 — Existing Bathymetric Sounding

0 400
Feet

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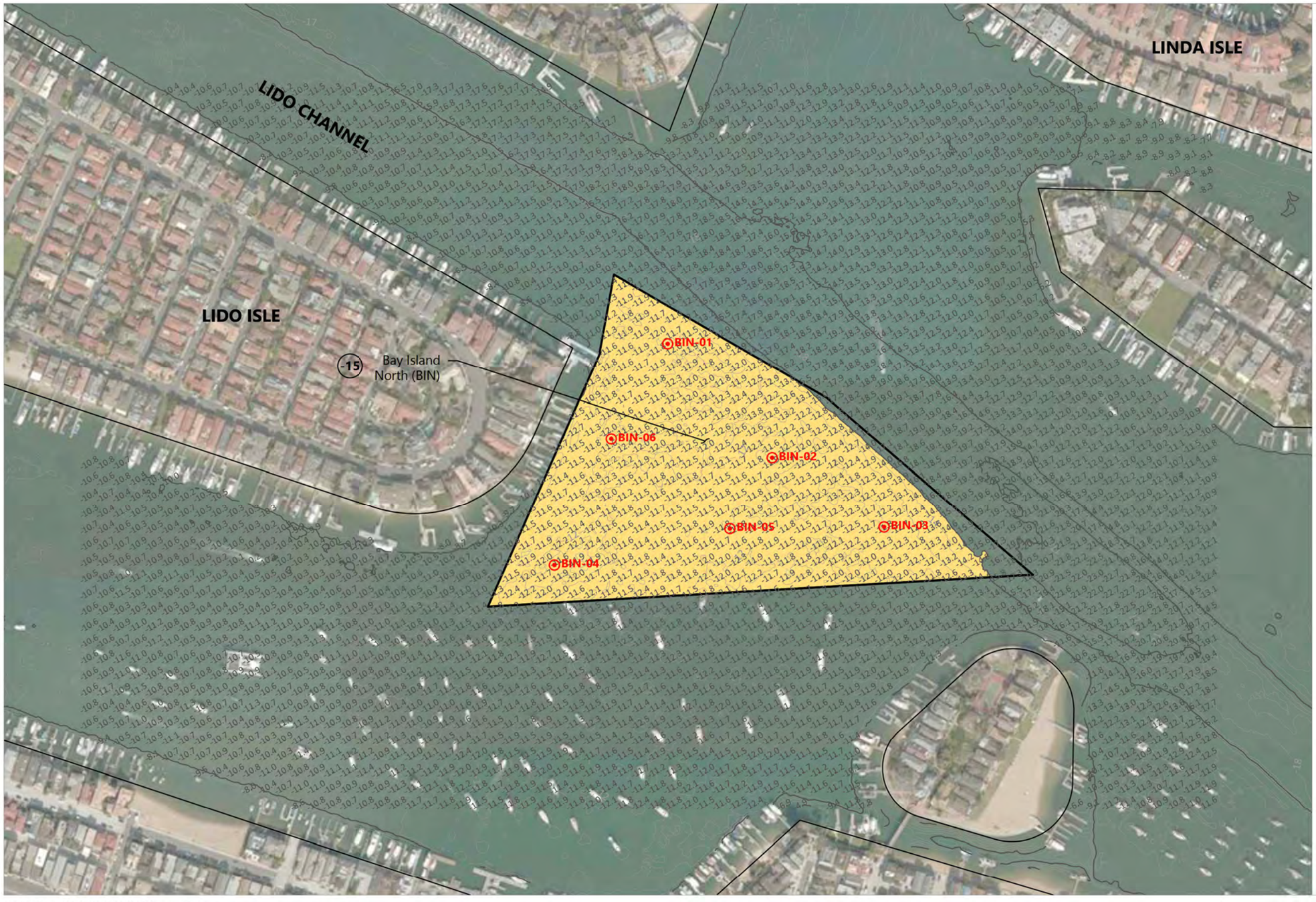
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015J ACTUAL SAMPLING.dwg FIG 15

ANCHOR QEA

Figure 10
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 5
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (15) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

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Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015E ACTUAL SAMPLING.dwg FIG 10

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Figure 11
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island North
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (15) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

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Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015G ACTUAL SAMPLING.dwg FIG 12

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Figure 12
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island Middle East
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

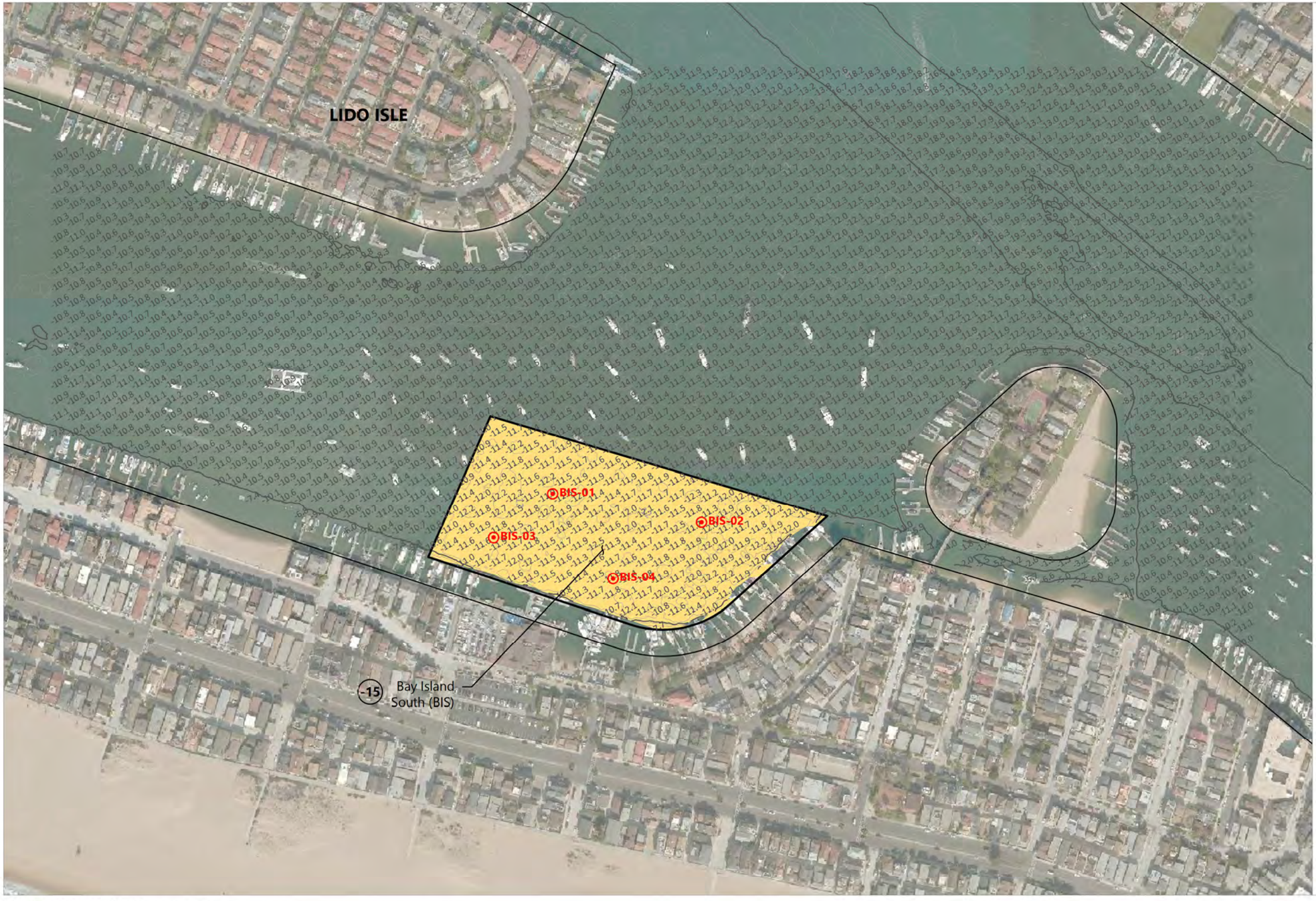
- Dredge Unit Boundary
- (15) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 3:57 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015F ACTUAL SAMPLING.dwg FIG 11

ANCHOR QEA

Figure 13
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island Middle West
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (15) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2019/05/10 3:52 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015H ACTUAL SAMPLING.dwg Figure 14

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Figure 14
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island South
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (20) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 500 Feet

Publish Date: 2018/02/09 1:09 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015K ACTUAL SAMPLING.dwg FIG 16

ANCHOR QEA

Figure 15
Dredge Unit, Bathymetry, and Actual Sampling Locations - Entrance Channel
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

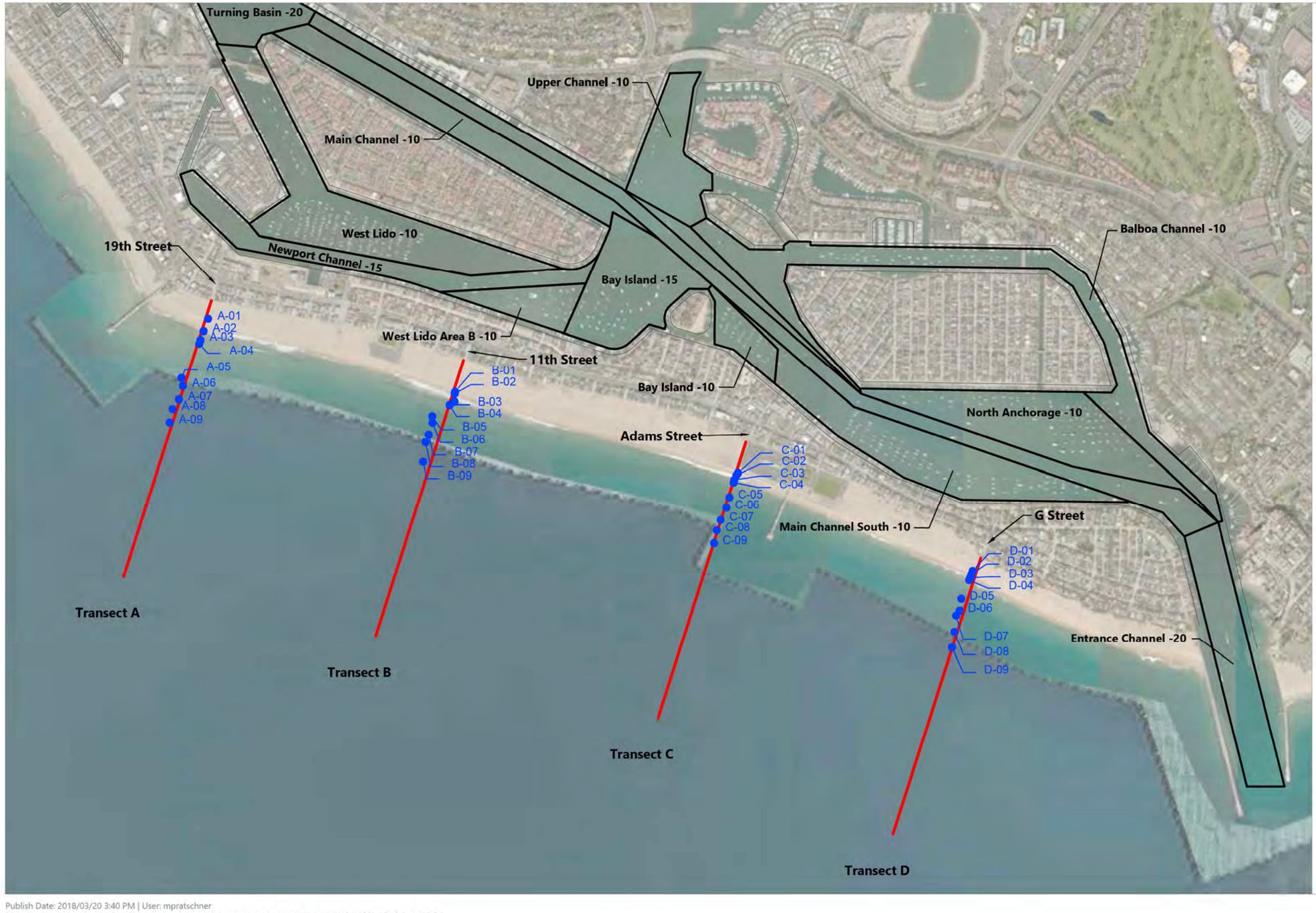
- Dredge Unit Boundary
- -15 Design Depth
- Dredge Footprint
- -12.8 Existing Bathymetry
- NC-# Actual Sampling Location

0 400 Feet

Publish Date: 2019/05/02 4:05 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-018 NEWPORT CHANNEL.dwg FIG 16

ANCHOR QEA

Figure 16
Dredge Units, Bathymetry, and Actual Sampling Locations - Newport Channel
Lower Newport Bay Federal Channels Dredging

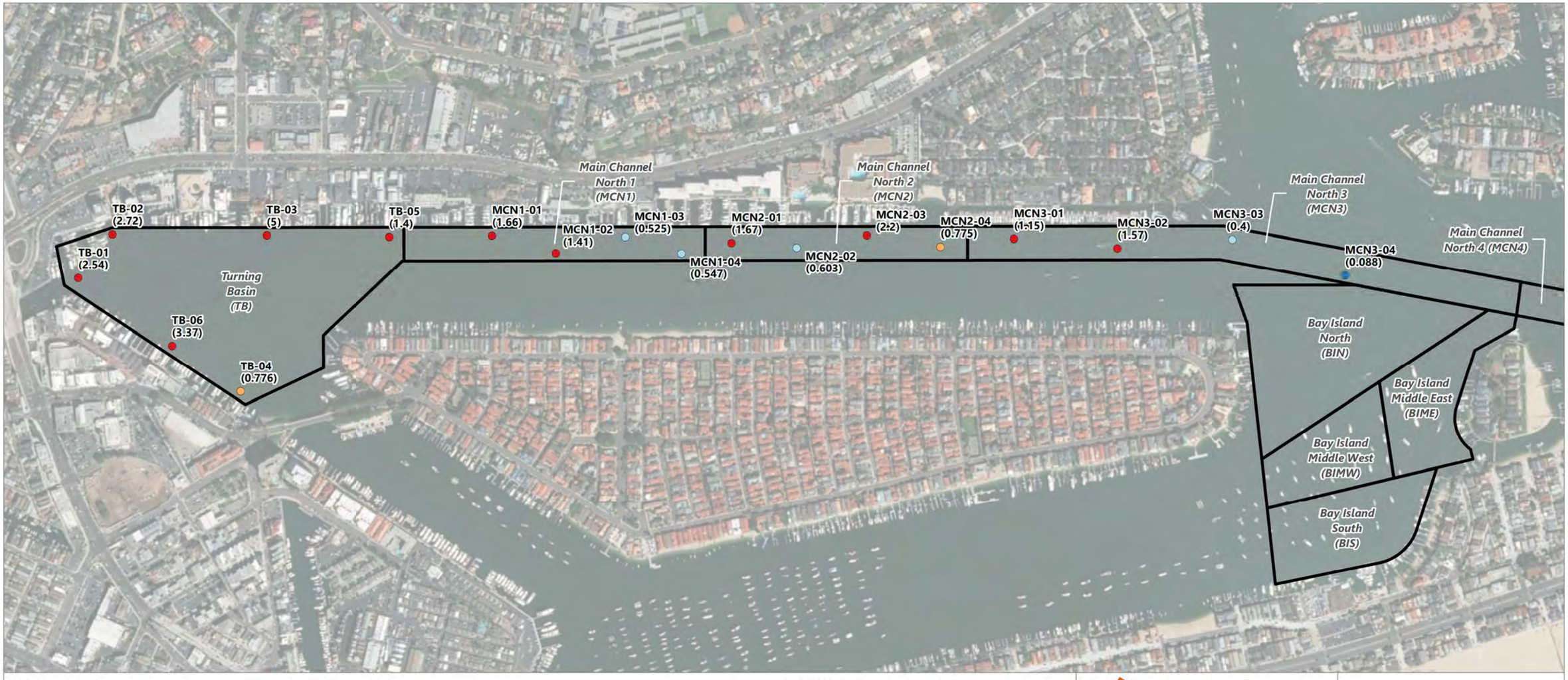


AERIAL SOURCE: Bing Maps 2016. Dredge depths and boundaries from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

Publish Date: 2018/03/20 3:40 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-016 ACTUAL TRANSECTS.dwg FIG 1

ANCHOR QEA

Figure 17
Newport Beach Transects with Actual Sampling Locations
Lower Newport Bay Federal Channels Dredging



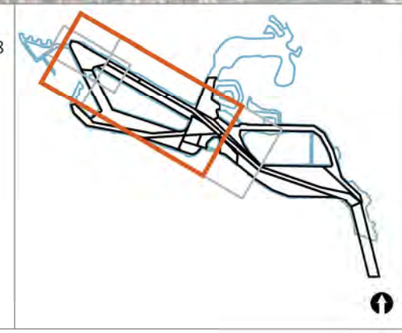
LEGEND:

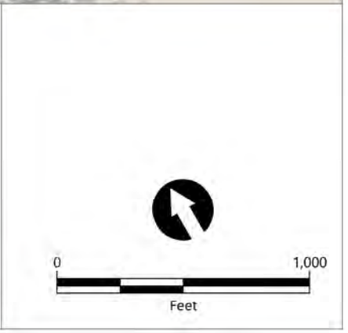
Mercury (mg/kg)

- 0.088 - 0.15 (< ERL)
- 0.151 - 0.71 (< ERM)
- 0.711 - 1 (< USEPA Recommended Threshold)
- 1.01 - 5 (> USEPA Recommended Threshold)

Dredge Units

NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI





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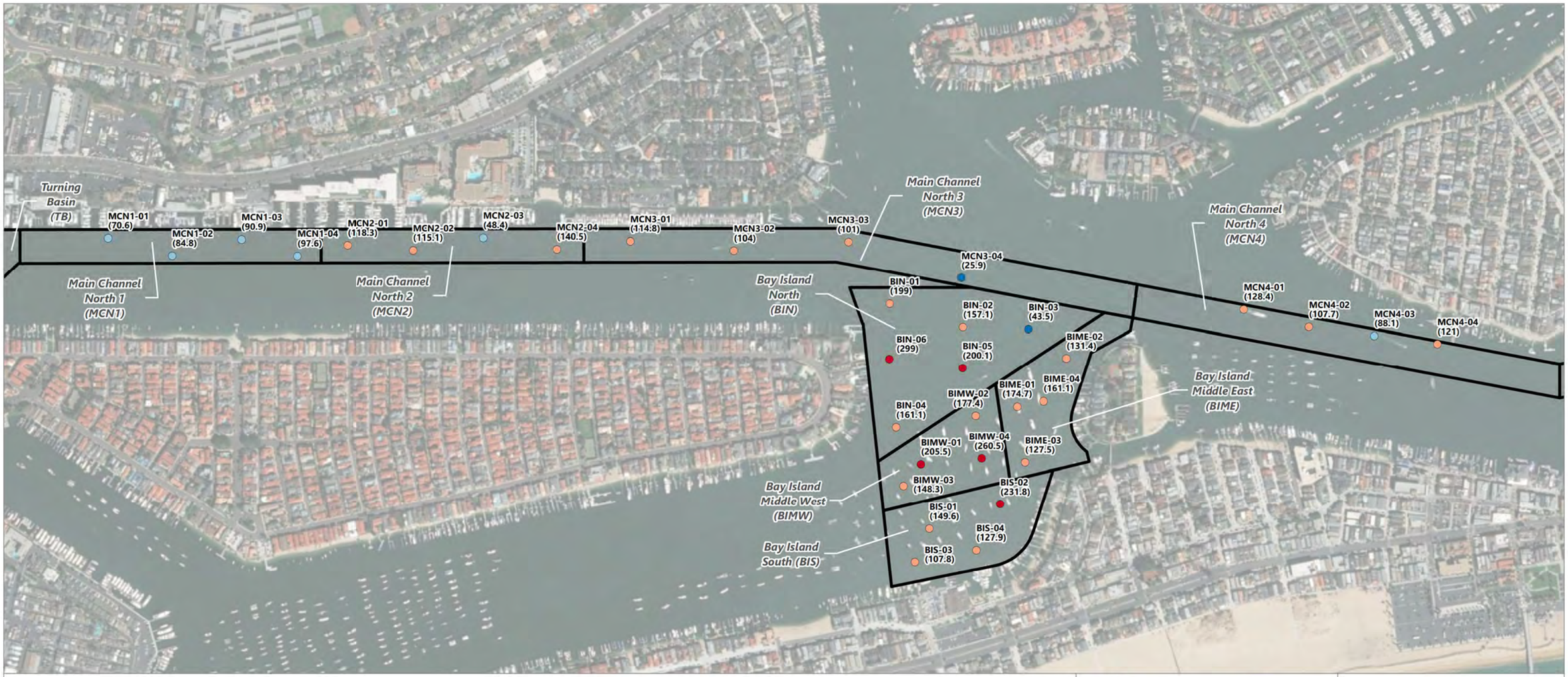
ANCHOR QEA

Figure 18
Mercury Concentrations for Individual Stations within Turning Basin and Main Channel North 1, 2, and 3
Lower Newport Bay Federal Channels Dredging



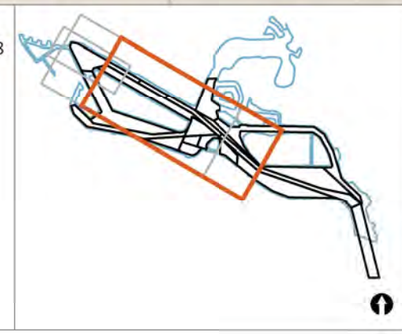
LEGEND:

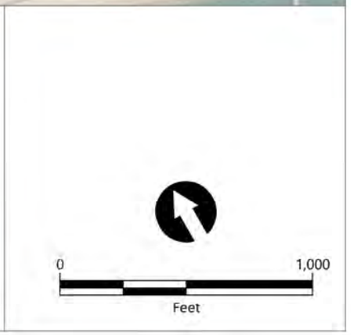
Total DDTs (µg/kg)

- 25.9 - 46.1 (< ERM)
- 46.2 - 100 (> ERM)
- 101 - 200
- 201 - 299

Dredge Units

NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI

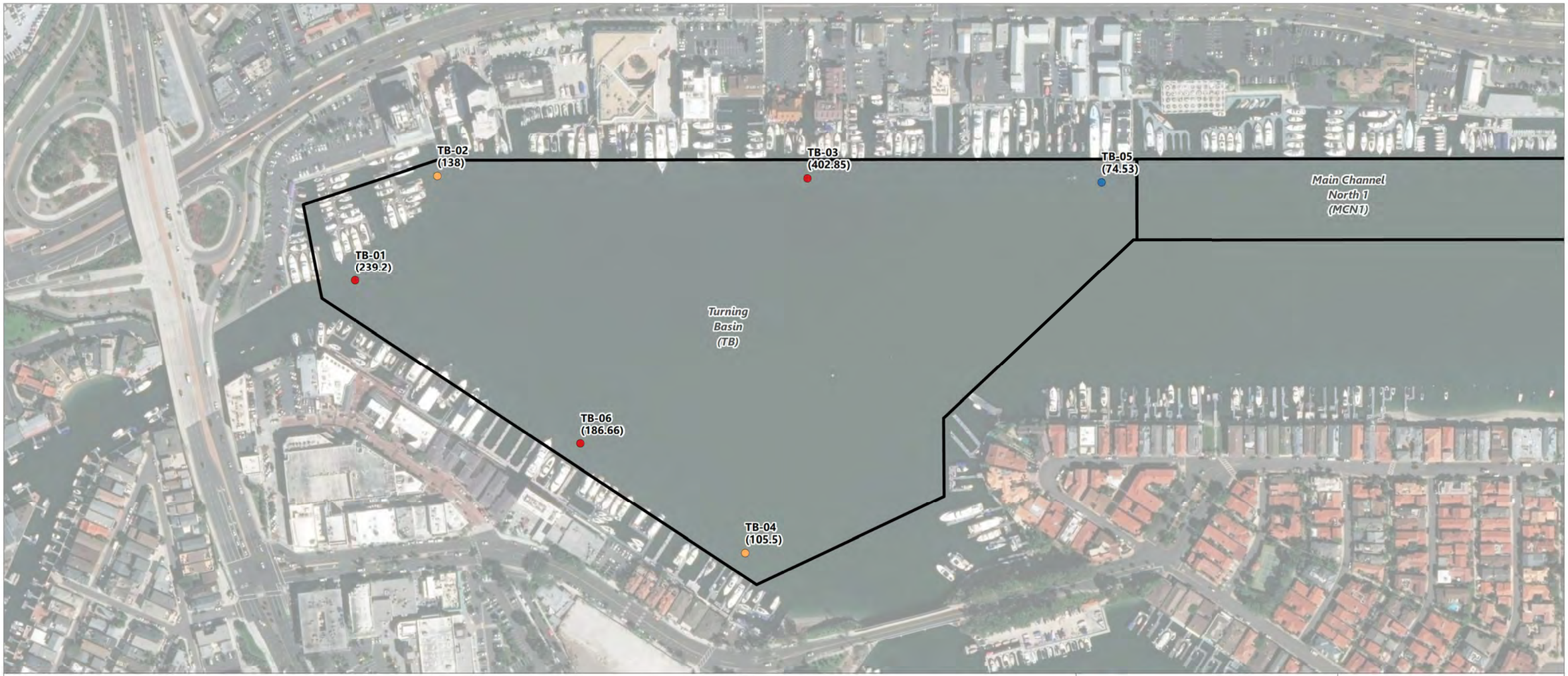




Publish Date: 2019/05/15, 12:41 PM | User: ckiblinger
Filepath: \\orcas\GIS\Jobs\City_of_Newport_Beach_0243\RGP_54_SedimentSampling\Maps\Core_Sediment\Core_Sed_Hg_PCB_DDT_Lower_Newport.mxd

ANCHOR QEA

Figure 19
Total DDT Concentrations for Individual Stations within Main Channel North 1, 2, 3, and 4, and Bay Island
Lower Newport Bay Federal Channels Dredging



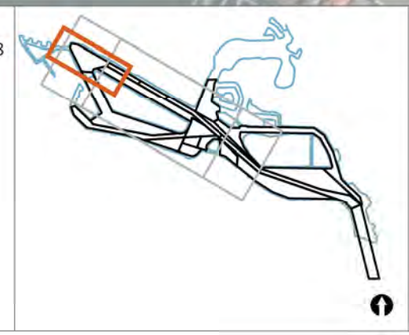
LEGEND:

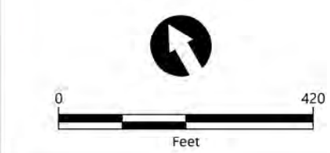
Total PCBs (µg/kg)

- 74.5 - 100
- 101 - 180 (< ERM)
- 181 - 403 (> ERM)

Dredge Units

NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI





Publish Date: 2019/05/15, 12:42 PM | User: ckiblinger
Filepath: \\orcas\GIS\Jobs\City_of_Newport_Beach_0243\RGP_54_SedimentSampling\Maps\Core_Sediment\Core_Sed_Hg_PCB_DDT_Lower_Newport.mxd

ANCHOR QEA

Figure 20
Total PCB Concentrations for Individual Stations within the Turning Basin
Lower Newport Bay Federal Channels Dredging



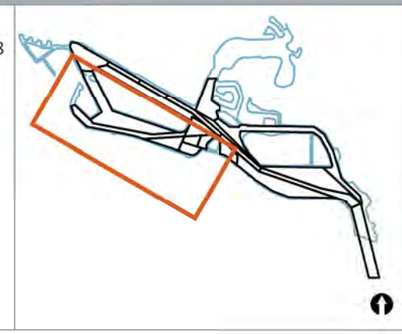
LEGEND:

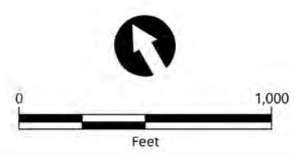
Mercury (mg/kg)

- 0.088 - 0.15 (< ERL)
- 0.151 - 0.71 (ERL - ERM)
- 0.711 - 1
- 1.01 - 5
- 2019 Stations
- 2018 Exploratory Stations

Dredge Units

NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI

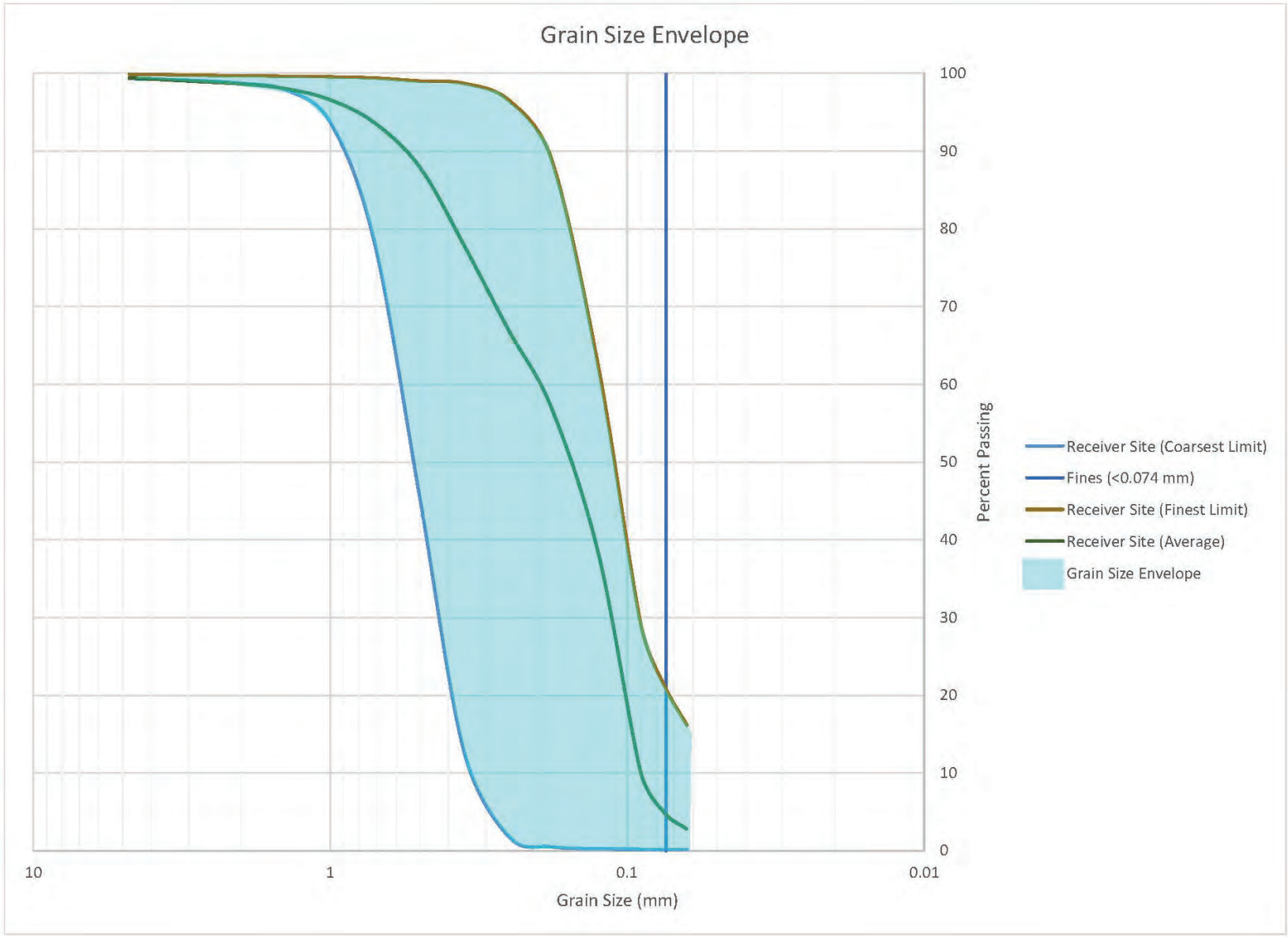




Publish Date: 2019/05/15, 12:39 PM | User: ckiblinger
Filepath: \\orcas\GIS\Jobs\City_of_Newport_Beach_0243\RGP_54_SedimentSampling\Maps\Core_Sediment\Core_Sed_Hg_Lower_Newport_201902_SAR.mxd

ANCHOR QEA

Figure 21
Mercury Concentrations for Individual Stations within Newport Channel
Lower Newport Bay Federal Channels Dredging



ANCHOR QEA

Figure 22
Grain Size Envelope for Newport Beach
Lower Newport Bay Federal Channels Dredging

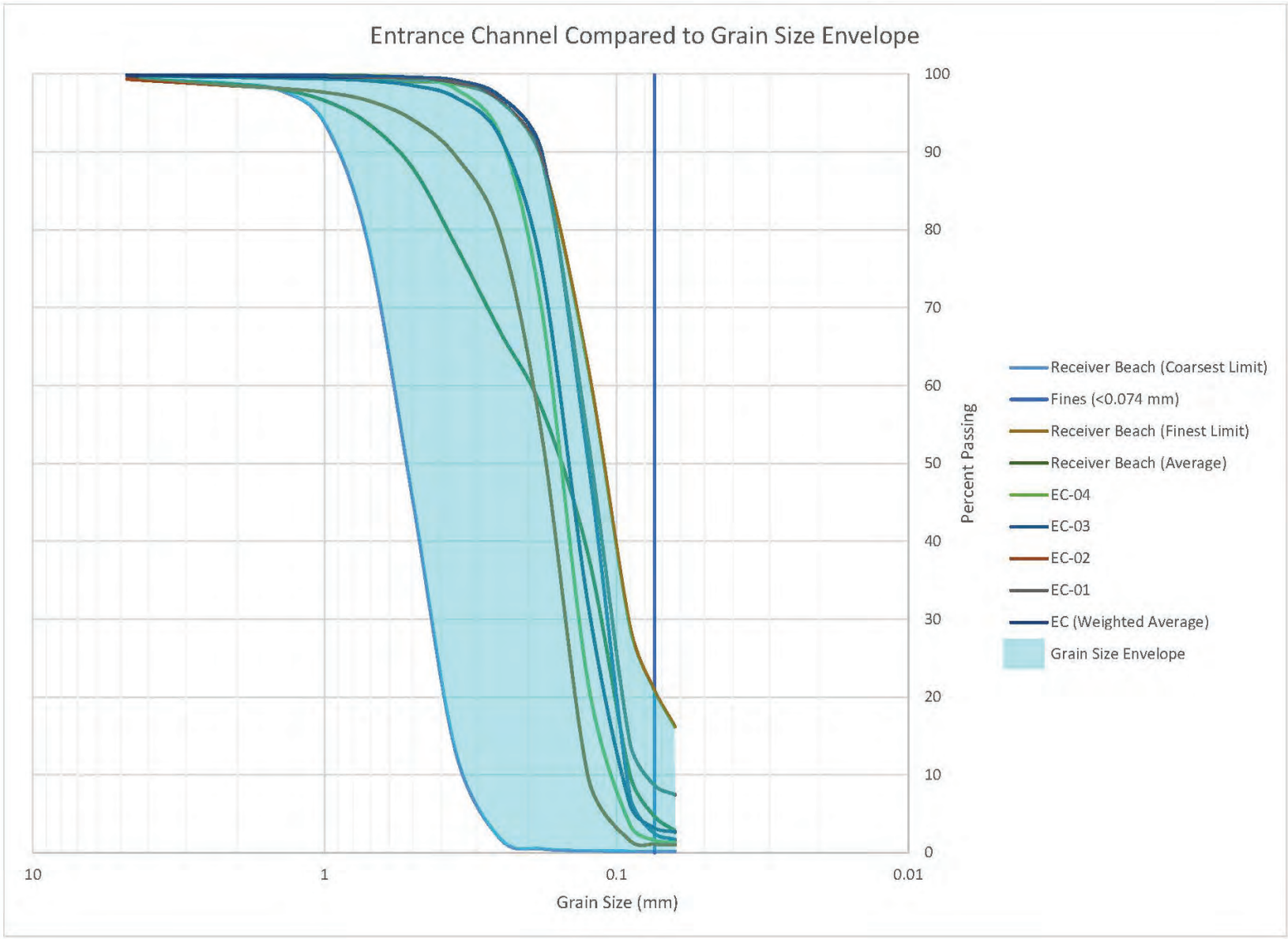


Figure 23
Comparison of Grain Size from the Entrance Channel to Grain Size Envelope
Lower Newport Bay Federal Channels Dredging

Appendix A
Field Logs and Photographs

Electronic copy available at www.newportbeachca.gov/ceqa.

Appendix B
USEPA Communication

From: Smith, Lawrence J Jr CIV USARMY CESPL (US) <Lawrence.J.Smith@usace.army.mil>
Sent: Friday, January 19, 2018 10:10 AM
To: Scianni, Melissa; Adam Gale; Larry.Simon@coastal.ca.gov; Ota, Allan; Jason.Freshwater@Waterboards.ca.gov; Steve Cappellino; Carol_A_Roberts@FWS.gov; Rogers, Bonnie L CIV USARMY CESPL (US); Ryan, Joseph A CIV CESPL CESPD (US); Fields, James A CIV USARMY CESPL (US); jzhu@waterboards.ca.gov
Cc: Chris Osuch; Steve Cappellino; Miller, Chris
Subject: RE: Lower Newport Bay Federal Channels Dredging: Request to Combine Intervals for Biological Testing

I agree with EPA's recommendation on Bay Island West. I don't see as much reason for concern with Bay Island East. Looking at the data, the difference between upper and lower is restricted to 4,4'-DDD. I don't think there would be a difference in toxicity, however, I also would not object to splitting these cores as a precautionary measure for purposes of bioassay testing. I'll leave that up to the city.

Larry Smith
Ecologist
Planning Division/Environmental Resources Branch/Environmental Policy Group Los Angeles District, U.S. Army Corps of Engineers lawrence.j.smith@usace.army.mil

Office: 213-452-3846
Government Mobile: 213-453-3205

-----Original Message-----
From: Scianni, Melissa [mailto:Scianni.Melissa@epa.gov]
Sent: Friday, January 19, 2018 9:47 AM
To: Adam Gale <agale@anchorqea.com>; Larry.Simon@coastal.ca.gov; Ota, Allan <Ota.Allan@epa.gov>; Jason.Freshwater@Waterboards.ca.gov; Smith, Lawrence J Jr CIV USARMY CESPL (US) <Lawrence.J.Smith@usace.army.mil>; Steve Cappellino <scappellino@anchorqea.com>; Carol_A_Roberts@FWS.gov; Rogers, Bonnie L CIV USARMY CESPL (US) <Bonnie.L.Rogers@usace.army.mil>; Ryan, Joseph A CIV CESPL CESPD (US) <Joseph.A.Ryan@usace.army.mil>; Fields, James A CIV USARMY CESPL (US) <James.A.Fields@usace.army.mil>; jzhu@waterboards.ca.gov
Cc: Chris Osuch <cosuch@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris <CMiller@newportbeachca.gov>
Subject: [EXTERNAL] RE: Lower Newport Bay Federal Channels Dredging: Request to Combine Intervals for Biological Testing

Hi Adam,

Allan and I spoke and we are ok with combing the vertical composites for Bay Island West. We recommend testing the vertical composites for Bay Island East separately due the difference in total DDX between the two areas. If you decide to combine the vertical composites for Bay Island East, please be aware that a failure in any one bioassay will result in a not suitable determination for the entire area. We will not be able to go back and make a determination for the top layer separate from the bottom layer. Also, we request individual core chemistry for the DDX's from all four of these

composites. If there are other composites with total DDX above 100 ppb please also run the individual cores for those composites. Please give either Allan or myself a call if you have any questions.

Thanks,

Melissa

_____

Melissa Scianni

Wetlands Office

US EPA, Region IX, Southern CA Field Office

600 Wilshire Blvd, Suite 1460

Los Angeles, CA 90017

(213) 244-1817

scianni.melissa@epa.gov

From: Adam Gale [mailto:agale@anchorqea.com]
Sent: Wednesday, January 17, 2018 7:53 PM
To: Larry.Simon@coastal.ca.gov; Ota, Allan <Ota.Allan@epa.gov>; Jason.Freshwater@Waterboards.ca.gov; lawrence.j.smith@usace.army.mil; Steve Cappellino <scappellino@anchorqea.com>; Carol_A_Roberts@FWS.gov; Rogers, Bonnie L CIV USARMY CESPL (US <Bonnie.L.Rogers@usace.army.mil>; Ryan, Joseph A CIV CESPL CESPD (US <Joseph.A.Ryan@usace.army.mil>; Fields, James A CIV USARMY CESPL (US <James.A.Fields@usace.army.mil>; Scianni, Melissa <Scianni.Melissa@epa.gov>; jzhu@waterboards.ca.gov
Cc: Chris Osuch <cosuch@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris <CMiller@newportbeachca.gov>
Subject: Lower Newport Bay Federal Channels Dredging: Request to Combine Intervals for Biological Testing

DMMT - The City of Newport Beach Lower Newport Bay Federal Channel SAP was presented to the DMMT for review in December 2017. Based on comments received from the EPA, the SAP was updated to prepare vertical interval composites for the Bay Island East and West dredge areas. The upper composite consisted of sediment from the mudline to 3 feet below the mudline, and the lower composite consisted of sediment from 3 feet below the mudline to the design depth plus overdepth. As agreed previously during review of the SAP, the upper and lower composites may be combined for biological testing if results from physical and chemical analyses indicated the sediments were similar.

Sampling commenced on January 8th and is still underway. Bay Island East and West DUs were sampled first and the four composites (upper and lower from each DU) were submitted for lab analysis as specified in the SAP. Preliminary physical and chemical results for each of the four composites are presented in the table attached. In general, the physical and chemical results from the upper and lower composites for each DU were similar. Key findings are summarized below:

* Bay Island East

o TOC ranged from 1.4 and 1.7%; and total solids ranged from 49.2 and 53.7%

o Grain size was predominantly fine-grained and ranged from 87.7 to 98.2%

o All metals were below ERM values. Mercury ranged from 0.142 to 0.690 mg/kg

o Only dibutyltin was detected in the upper composite with results estimated at 3.1 ug/kg

o Several individual PAH compounds were detected; but Total PAHs were below the ERL value.

o Total DDX compounds were detected above the ERM at concentrations ranging from 125.2 to 207.6 ug/kg (about 2.5 to 4.5 x the ERM - but relatively consistent between upper and lower composites)

o Total PCB congeners ranged from 22.97 to 40.4 ug/kg.

* Bay Island West

o TOC ranged from 1.2 and 1.5%; and total solids ranged from 48.9 and 52.9%

o Grain size was predominantly fine-grained and ranged from 85.7 to 90.1%

o All metals were below ERM values. Mercury ranged from 0.153 to 0.658 mg/kg

o Only dibutyltin was detected with results ranging from 6.7 to 8.1 ug/kg

o Several individual PAH compounds were detected; but Total PAHs were below the ERL value.

o Total DDX compounds were detected above the ERM at concentrations ranging from 159.7 to 165.1 ug/kg (about 3.5 x the ERM - but consistent between upper and lower composites)

o Total PCB congeners ranged from 24 to 41 ug/kg.

We are requesting that the upper and lower composites be combined for both the Bay Island East and West dredge areas. We have scheduled the bioaccumulation testing to commence on January 24, and would therefore appreciate a response to this proposal by Friday, January 19, so we may plan accordingly.

Looking forward, once analytical data from all DUs has been received and validated, we will coordinate with you to confirm tissue chemistry requirements per DU.

As always, we appreciate your input and willingness to work closely on these matters as they come up.

Thanks,

Adam

ANCHOR QEA, LLC
agale@anchorqea.com <mailto:agale@anchorqea.com>
27201 Puerta Real, Suite 350
Mission Viejo, CA 92691
T 949.334.9635
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ANCHOR QEA,LLC
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From: Ota, Allan <Ota.Allan@epa.gov>
Sent: Friday, January 19, 2018 10:43 AM
To: Scianni, Melissa; Adam Gale; Larry.Simon@coastal.ca.gov; Jason.Freshwater@Waterboards.ca.gov; lawrence.j.smith@usace.army.mil; Steve Cappellino; Carol_A_Roberts@FWS.gov; Rogers, Bonnie L CIV USARMY CESPL (US; Ryan, Joseph A CIV CESPL CESPD (US; Fields, James A CIV USARMY CESPL (US; jzhu@waterboards.ca.gov
Cc: Chris Osuch; Steve Cappellino; Miller, Chris
Subject: RE: Lower Newport Bay Federal Channels Dredging: Request to Combine Intervals for Biological Testing

Importance: High

Hi, Adam.
One additional clarification on the need to do individual core chemistry – keep in mind that the composite values presented in this preliminary table are average values, especially for the total DDx values in excess of 200 ppb, so we are concerned about potentially higher concentrations in individual cores. The cleanup target for a Superfund cleanup site in the San Francisco Bay region was about 400-500 ppb; the highest composite is about half-way there already… relative to the non-degradation management approach for the LA-3 ocean dredged material disposal site concentrations, currently with low to non-detect levels…
-Allan

==========
Allan Ota
Oceanographer / Regional Ocean Dumping Program Coordinator
Dredging and Sediment Management Team
U.S. Environmental Protection Agency, Region 9
Water Division
Mail Code: WTR-2-4
75 Hawthorne Street
San Francisco, CA 94105

415-972-3476 office
ota.allan@epa.gov
==========

If you have more than 20 MB worth of attachments to send to me,
please contact me first by email to make arrangements to share the files.

"Live simply, so that others may simply live." -- Mother Teresa

---

From: Scianni, Melissa
Sent: Friday, January 19, 2018 9:47 AM
To: Adam Gale <agale@anchorqea.com>; Larry.Simon@coastal.ca.gov; Ota, Allan <Ota.Allan@epa.gov>; Jason.Freshwater@Waterboards.ca.gov; lawrence.j.smith@usace.army.mil; Steve Cappellino <scappellino@anchorqea.com>; Carol_A_Roberts@FWS.gov; Rogers, Bonnie L CIV USARMY CESPL (US <Bonnie.L.Rogers@usace.army.mil>; Ryan, Joseph A CIV CESPL CESPD (US <Joseph.A.Ryan@usace.army.mil>; Fields,

James A CIV USARMY CESPL (US <James.A.Fields@usace.army.mil>; jzhu@waterboards.ca.gov
Cc: Chris Osuch <cosuch@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris <CMiller@newportbeachca.gov>
Subject: RE: Lower Newport Bay Federal Channels Dredging: Request to Combine Intervals for Biological Testing

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Thanks,
Melissa

_____

Melissa Scianni
Wetlands Office
US EPA, Region IX, Southern CA Field Office
600 Wilshire Blvd, Suite 1460
Los Angeles, CA 90017
(213) 244-1817
scianni.melissa@epa.gov

From: Adam Gale [mailto:agale@anchorqea.com]
Sent: Wednesday, January 17, 2018 7:53 PM
To: Larry.Simon@coastal.ca.gov; Ota, Allan <Ota.Allan@epa.gov>; Jason.Freshwater@Waterboards.ca.gov; lawrence.j.smith@usace.army.mil; Steve Cappellino <scappellino@anchorqea.com>; Carol_A_Roberts@FWS.gov; Rogers, Bonnie L CIV USARMY CESPL (US <Bonnie.L.Rogers@usace.army.mil>; Ryan, Joseph A CIV CESPL CESPD (US <Joseph.A.Ryan@usace.army.mil>; Fields, James A CIV USARMY CESPL (US <James.A.Fields@usace.army.mil>; Scianni, Melissa <Scianni.Melissa@epa.gov>; jzhu@waterboards.ca.gov
Cc: Chris Osuch <cosuch@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris <CMiller@newportbeachca.gov>
Subject: Lower Newport Bay Federal Channels Dredging: Request to Combine Intervals for Biological Testing

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- Bay Island East
    - TOC ranged from 1.4 and 1.7%; and total solids ranged from 49.2 and 53.7%

    - Grain size was predominantly fine-grained and ranged from 87.7 to 98.2%
    - All metals were below ERM values. Mercury ranged from 0.142 to 0.690 mg/kg
    - Only dibutyltin was detected in the upper composite with results estimated at 3.1 ug/kg
    - Several individual PAH compounds were detected; but Total PAHs were below the ERL value.
    - Total DDX compounds were detected above the ERM at concentrations ranging from 125.2 to 207.6 ug/kg (about 2.5 to 4.5 x the ERM – but relatively consistent between upper and lower composites)
    - Total PCB congeners ranged from 22.97 to 40.4 ug/kg.
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    - TOC ranged from 1.2 and 1.5%; and total solids ranged from 48.9 and 52.9%
    - Grain size was predominantly fine-grained and ranged from 85.7 to 90.1%
    - All metals were below ERM values. Mercury ranged from 0.153 to 0.658 mg/kg
    - Only dibutyltin was detected with results ranging from 6.7 to 8.1 ug/kg
    - Several individual PAH compounds were detected; but Total PAHs were below the ERL value.
    - Total DDX compounds were detected above the ERM at concentrations ranging from 159.7 to 165.1 ug/kg (about 3.5 x the ERM – but consistent between upper and lower composites)
    - Total PCB congeners ranged from 24 to 41 ug/kg.

We are requesting that the upper and lower composites be combined for both the Bay Island East and West dredge areas. We have scheduled the bioaccumulation testing to commence on January 24, and would therefore appreciate a response to this proposal by Friday, January 19, so we may plan accordingly.

Looking forward, once analytical data from all DUs has been received and validated, we will coordinate with you to confirm tissue chemistry requirements per DU.

As always, we appreciate your input and willingness to work closely on these matters as they come up.

Thanks,

Adam

ANCHOR QEA, LLC
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ANCHOR QEA,LLC
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From: Scianni, Melissa <Scianni.Melissa@epa.gov>
Sent: Tuesday, February 27, 2018 4:01 PM
To: Adam Gale; Ota, Allan; lawrence.j.smith@usace.army.mil; Rogers, Bonnie L CIV USARMY CESPL (US; Ryan, Joseph A CIV CESPL CESPD (US; Fields, James A CIV USARMY CESPL (US
Cc: Chris Osuch; Steve Cappellino; Miller, Chris
Subject: RE: Lower Newport - Tissue Analyte List

Hi Adam,

Thank you for sending the preliminary data. EPA concurs with your proposed tissue analyte list. However, we have significant concerns with the Turning Basin composite sediment chemistry. Both the Hg and PCBs are very high. For this composite, we request individual core Hg and PCB analysis. Even with the individual core data, it is very likely that we will be asking for additional higher resolution testing in the Turning Basin before providing an ocean suitability determination. Therefore, the Corps may want to hold off on analyzing the tissues for this composite until we have the individual core data. We also request the individual cores for composites MCN1, MCN2, and MCN3 be analyzed for Hg. We agree that it is not necessary to analyze the Entrance Channel composite tissues since this material would qualify for an exclusion from Tier III testing. We don't object to combing the Bay Island upper and lower composites for the individual core analyses since they were combined for the bioassays. However, as with the bioassays, we recommend they be analyzed separately. In summary, we request the following:

- Turning Basin individual core Hg and PCB analysis. Additional higher resolution testing will likely be necessary;
- Individual core Hg analysis for composites MCN1, MCN2, and MCN3;
- Analyzing the tissues for the EC composite is not necessary;
- Individual core DDT analysis for any composite that exceeds 100ppb; and
- We concur with the proposed tissue analyte list below.

Please let me know if you have any questions.
Melissa

_____

Melissa Scianni
Wetlands Office
US EPA, Region IX, Southern CA Field Office
600 Wilshire Blvd, Suite 940
Los Angeles, CA 90017
(213) 244-1817
scianni.melissa@epa.gov

From: Adam Gale [mailto:agale@anchorqea.com]
Sent: Tuesday, February 27, 2018 10:14 AM
To: Scianni, Melissa <Scianni.Melissa@epa.gov>; Ota, Allan <Ota.Allan@epa.gov>; lawrence.j.smith@usace.army.mil; Rogers, Bonnie L CIV USARMY CESPL (US <Bonnie.L.Rogers@usace.army.mil>; Ryan, Joseph A CIV CESPL CESPD (US <Joseph.A.Ryan@usace.army.mil>; Fields, James A CIV USARMY CESPL (US <James.A.Fields@usace.army.mil>
Cc: Chris Osuch <cosuch@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris <CMiller@newportbeachca.gov>
Subject: RE: Lower Newport - Tissue Analyte List

Thanks, Melissa. Please see attached.
-Adam

From: Scianni, Melissa [mailto:Scianni.Melissa@epa.gov]
Sent: Tuesday, February 27, 2018 9:59 AM
To: Adam Gale <agale@anchorqea.com>; Ota, Allan <Ota.Allan@epa.gov>; lawrence.j.smith@usace.army.mil; Rogers, Bonnie L CIV USARMY CESPL (US <Bonnie.L.Rogers@usace.army.mil>; Ryan, Joseph A CIV CESPL CESPD (US <Joseph.A.Ryan@usace.army.mil>; Fields, James A CIV USARMY CESPL (US <James.A.Fields@usace.army.mil>
Cc: Chris Osuch <cosuch@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris <CMiller@newportbeachca.gov>
Subject: RE: Lower Newport - Tissue Analyte List

Hi Adam,

It doesn't look the attachments came through. Can you please resend them.

Thanks,
Melissa

_____
Melissa Scianni
Wetlands Office
US EPA, Region IX, Southern CA Field Office
600 Wilshire Blvd, Suite 940
Los Angeles, CA 90017
(213) 244-1817
scianni.melissa@epa.gov

From: Adam Gale [mailto:agale@anchorqea.com]
Sent: Monday, February 26, 2018 4:36 PM
To: Ota, Allan <Ota.Allan@epa.gov>; Scianni, Melissa <Scianni.Melissa@epa.gov>; lawrence.j.smith@usace.army.mil; Rogers, Bonnie L CIV USARMY CESPL (US <Bonnie.L.Rogers@usace.army.mil>; Ryan, Joseph A CIV CESPL CESPD (US <Joseph.A.Ryan@usace.army.mil>; Fields, James A CIV USARMY CESPL (US <James.A.Fields@usace.army.mil>
Cc: Chris Osuch <cosuch@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris <CMiller@newportbeachca.gov>
Subject: Lower Newport - Tissue Analyte List

Hi Allan and Melissa,

Attached are the preliminary sediment chemistry results and composite area figure for Lower Newport Federal Channels. For bioassay and bioaccumulation testing, the City elected to combine the upper and lower vertical composites for both Bay Island Middle East (BIME) and Bay Island Middle West (BIMW). Preliminary solid phase testing results indicated no toxicity to polychaetes or amphipods for all composite areas. Polychaete survival ranged from 92 to 100%, and amphipod survival ranged from 83 to 99%. An outlier was identified in the amphipod test. With this outlier removed, amphipod survival ranged from 93.75 to 99%. Suspended particulate phase testing is still underway. Bioaccumulation testing ended last Wednesday and tissue samples were delivered to the chemistry lab on Friday. Based on preliminary sediment chemistry results (attached), we are proposing to analyze tissue samples for the analytes listed below in Table 1. PCBs are not included for Bay Island South (BIS) because total PCBs (22.72 µg/kg) are just above the ERL (22.7 µg/kg). For the Entrance Channel (EC), we would like to request an exclusion from analyzing tissue samples. The composite sample for this area is 98% sand and all concentrations are less than the ERL. Please let us know as soon as possible if you concur with the proposed tissue analyte list. Also, as previously discussed, we will move forward with analyzing DDTs on individual cores for composite areas with sediment concentrations greater than

100 µg/kg. Because the upper and lower vertical composites for Bay Island Middle East (BIME) and Bay Island Middle West (BIMW) were combined for bioassay and bioaccumulation testing, we are planning to combine the upper and lower intervals for individual core chemistry.

Table 1
Summary of Proposed Tissue Analysis

Sample	Tissue Analysis
Time Zero (T0)	Lipids, Mercury, Dibutyltin, DDTs, PCBs
LA3-REF	Lipids, Mercury, Dibutyltin, DDTs, PCBs
Turning Basin	Lipids, Mercury, Dibutyltin, DDTs, PCBs
Main Channel North 1	Lipids, Mercury, DDTs, PCBs
Main Channel North 2	Lipids, Mercury, DDTs, PCBs
Main Channel North 3	Lipids, Mercury, DDTs, PCBs
Main Channel North 4	Lipids, Mercury, DDTs, PCBs
Main Channel North 5	Lipids, Mercury, DDTs, PCBs
Bay Island North	Lipids, Mercury, DDTs, PCBs
Bay Island Middle East	Lipids, Mercury, DDTs, PCBs
Bay Island Middle West	Lipids, Mercury, DDTs, PCBs
Bay Island South	Lipids, Mercury, DDTs
Entrance Channel	Request exclusion from further testing (98.12% sand; all sediment concentrations less than ERL)

Thanks
Adam Gale

ANCHOR QEA, LLC
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From: Chris Osuch
To: Chris Osuch
Subject: FW: Newport Harbor Federal Dredging - Newport Channel Preliminary Results
Date: Monday, May 13, 2019 11:34:29 AM

From: Scianni, Melissa <Scianni.Melissa@epa.gov>
Sent: Thursday, February 21, 2019 3:04 PM
To: Adam Gale <agale@anchorqea.com>; Ota, Allan <Ota.Allan@epa.gov>; Ross, Brian <Ross.Brian@epa.gov>
Cc: Andy Martin <amartin@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris (CMiller@newportbeachca.gov) <CMiller@newportbeachca.gov>; lawrence.j.smith@usace.army.mil
Subject: RE: Newport Harbor Federal Dredging - Newport Channel Preliminary Results

Hi Adam,

Brian, Allan, and I have reviewed your request to change the NC2 composite line. We are ok with your proposal. However, we would like to note that two of the cores in the NC2 composite had Hg levels above 1ppm. Compositing these cores in with the others could affect the results. If the composite fails any one of the bioassays, the entire composite will be excluded from ocean disposal. In such a situation, we will not be able to approve the lower concentration areas for ocean disposal. In the past we have excluded areas with Hg concentrations above 1ppm from ocean disposal. We are still discussing with the City and Corps what material is suitable for ocean disposal, and it is possible cores NC2-03 and NC2-04 will be found not suitable. Therefore, we recommend considering whether these cores should also be left out of the bioassays composites.

Also, we were confused about the cores labeled NC-01, NC-02, and NC-03 on your figures. Were these the original exploratory cores? Is the sediment from those cores being included in the bioassays?

Please give me or Allan a call if you have any questions.
Melissa

_____
Melissa Scianni
Wetlands Office
US EPA, Region IX, Southern CA Field Office
600 Wilshire Blvd, Suite 940
Los Angeles, CA 90017
(213) 244-1817
scianni.melissa@epa.gov

From: Adam Gale <agale@anchorqea.com>
Sent: Thursday, February 14, 2019 9:45 AM
To: Scianni, Melissa <Scianni.Melissa@epa.gov>; Ota, Allan <Ota.Allan@epa.gov>; Ross, Brian <Ross.Brian@epa.gov>
Cc: Andy Martin <amartin@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris (CMiller@newportbeachca.gov) <CMiller@newportbeachca.gov>
Subject: Newport Harbor Federal Dredging - Newport Channel Preliminary Results

Brian, Mellissa, and Allan,

This email is regarding the Newport Harbor Federal Channel maintenance dredging. A Tier III dredged material

evaluation for all Federal Channel areas within Newport Harbor (excluding Newport Channel) was completed in 2018; results were presented to the DMMT in June and July. As part of the that sampling program, exploratory samples were also collected within Newport Channel and presented to the DMMT in June 2018 as part of an updated sampling and analysis approach for a full Tier III investigation with Newport Channel.

Sampling within Newport Channel was completed in January 2019. Preliminary chemistry results from the individual cores are attached, as a well as a map showing the core locations, associated mercury concentrations, and the previously proposed dredge unit boundaries (Figure 1).

Based on the preliminary chemistry results, we are proposing a slightly amended compositing scheme as presented in Figure 2.

- Dredge Unit NC1 would be managed through an alternate disposal option with no additional testing proposed.
- Dredge Unit NC2 would be expanded to the west to include core locations NC1-03 and NC1-04. While there are two cores within NC2 that had slightly elevated mercury concentrations, the average for all the cores in NC2 is 0.71 ppm
- Dredge Unit NC3 remains unchanged.

The volumes associated with these new dredge units are presented below:

Dredge Unit	**Design Depth (feet MLLW)**	**Estimated Volume to Design Depth (cy)**	**2-Foot Overdepth Volume (cy)**	**Total Volume (cy)**
Newport Channel 1 (No Further Testing)	-15	27,259	21,362	48,621
Newport Channel 2	-15	82,607	39,520	122,127
Newport Channel 3 (No Change)	-15	51,620	24,534	76,154
Total	**--**	**161,486**	**85,416**	**246,902**

We are requesting approval to proceed with this modified composite scheme, so that we can initiate additional Tier III tests as soon as possible. We will coordinate tissue chemistry analysis with you at a later date. The goal is to present the results to the DMMT in April 2019. At that time we'd also present the remainder of the Federal Channel data as previously presented.

Thank you very much for your consideration.

Adam Gale

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ANCHOR QEA,LLC

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From:	Scianni, Melissa
To:	Adam Gale; Simon, Larry@Coastal; Freshwater, Jason@Waterboards; "Carol_A_Roberts@FWS.gov"; Rogers, Bonnie L CIV USARMY CESPL (US; Ross, Brian; Ota, Allan
Cc:	Chris Osuch; Andy Martin; Steve Cappellino; Miller, Chris (CMiller@newportbeachca.gov); Cooke, Mark D CIV USARMY CESPL (US); lawrence.j.smith@usace.army.mil
Subject:	RE: Newport Harbor Federal Dredging - Newport Channel Tissue Analyte List
Date:	Tuesday, March 26, 2019 10:38:09 AM

Hi Adam,

EPA concurs with your proposal to test the Newport Channel tissues for Hg only. Not testing for DDT and PCBs is consistent with what we required for the material from the other channels (i.e. DDT tissue testing when sediments exceed the ERM and PCB tissue testing when the sediments exceed the ERL).

When do you expected the data compilation memo to be available? We would like to have that information in advance of an in person meeting.

Thank you,
Melissa

_____

Melissa Scianni
Wetlands Office
US EPA, Region IX, Southern CA Field Office
600 Wilshire Blvd, Suite 940
Los Angeles, CA 90017
(213) 244-1817
scianni.melissa@epa.gov

From: Adam Gale <agale@anchorqea.com>
Sent: Monday, March 25, 2019 2:44 PM
To: Simon, Larry@Coastal <Larry.Simon@coastal.ca.gov>; Freshwater, Jason@Waterboards <Jason.Freshwater@Waterboards.ca.gov>; 'Carol_A_Roberts@FWS.gov' <Carol_A_Roberts@FWS.gov>; Rogers, Bonnie L CIV USARMY CESPL (US <Bonnie.L.Rogers@usace.army.mil>; Scianni, Melissa <Scianni.Melissa@epa.gov>; Ross, Brian <Ross.Brian@epa.gov>; Ota, Allan <Ota.Allan@epa.gov>
Cc: Chris Osuch <cosuch@anchorqea.com>; Andy Martin <amartin@anchorqea.com>; Steve Cappellino <scappellino@anchorqea.com>; Miller, Chris (CMiller@newportbeachca.gov) <CMiller@newportbeachca.gov>; Cooke, Mark D CIV USARMY CESPL (US) <Mark.D.Cooke@usace.army.mil>; lawrence.j.smith@usace.army.mil
Subject: Newport Harbor Federal Dredging - Newport Channel Tissue Analyte List

Good afternoon DMMT,

Attached are the composite sediment chemistry results for Newport Channel. Sediment concentrations are relatively low, with all concentrations less than the ERM. All bioassay testing is

complete. Based on preliminary test results, no toxicity was observed in solid phase or suspended particulate phase testing. Bioaccumulation testing is ending this week; therefore, we would like to finalize the tissue analyte list. Based on composite sediment chemistry results, and consistent with EPA requirements for other LNB composite sediments samples with similar concentrations, we are proposing to analyze tissue samples from NC2 and NC3 for lipids and mercury. PCBs are not proposed for analysis because sediment concentrations are less than or just above the ERL. Please let us know as soon as possible if you concur with the proposed tissue analyte list.

Also, we are expecting tissue chemistry to be completed in mid-April and the City is requesting an in-person meeting during the week of April 22 at the EPA office in San Francisco to discuss the results as they relate to disposal suitability at the LA-3 site (this would be in advance of the anticipated May DMMT meeting). We'll coordinate specific dates and times directly with EPA, but if other DMMT representatives are interested in participating please let me know and we can make arrangements.

Thank you,
Adam

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Appendix C
Chemistry and Grain Size Laboratory Reports

Electronic copy available at www.newportbeachca.gov/ceqa.

Appendix D
Biological Laboratory Reports

Electronic copy available at www.newportbeachca.gov/ceqa.

Appendix E
STFATE Output

Electronic copy available at www.newportbeachca.gov/ceqa.

Appendix F
Statistical Analyses of Tissue Concentrations

Electronic copy available at www.newportbeachca.gov/ceqa.

Appendix G
Data Validation Reports

Electronic copy available at www.newportbeachca.gov/ceqa.

Appendix H
Lower Newport Bay Data Compilation

9700 Research Drive
Irvine, California 92618
949.347.2780

ANCHOR QEA

Memorandum

April 12, 2019

To: Melissa Scianni and Allan Ota, U.S. Environmental Protection Agency

From: Chris Osuch and Adam Gale, Anchor QEA, LLC

cc: Chris Miller, City of Newport Beach

Re: Lower Newport Bay Data Compilation

The City of Newport Beach and U.S. Army Corps of Engineers (USACE) are proposing to conduct maintenance dredging within the federal channels in Lower Newport Bay, California. Sediment core sampling was conducted in January 2018, and composite samples and individual cores were submitted for analysis. All composite samples passed bioassay and bioaccumulation testing; however, elevated concentrations of mercury, DDTs, and polychlorinated biphenyls (PCBs) were measured in sediment. Testing results were presented in a Sampling and Analysis Report (SAR) to the Dredged Material Management Team on July 25, 2018. Following this meeting, USEPA requested a comprehensive summary of past data from Newport Bay to support the suitability determination, including historical sediment mercury, DDT, and PCB data; bioassay testing data; and bioaccumulation tissue data. This memorandum presents the data compilation.

Historical sediment and tissue chemistry and bioassay testing results are presented in Table 1. Sampling locations are presented in Attachment A. The data compilation was developed using available historical data from 2003 to 2019, including dredge material evaluations, post-dredge sediment sampling investigations, and a feasibility study (i.e., Rhine Channel). The data compilation consisted of the following studies:

- Lower Newport Federal Channel Tier III evaluation in 2003 (Weston 2007)
- Rhine Channel sediment remediation feasibility study in 2004 and 2005 (Anchor 2006)
  - Sediment cores were segmented into multiple intervals to delineate contamination and aid in the remediation design. Contaminated material was later dredged in 2011.
- Regional General Permit (RGP) 54 dredged material evaluation in 2005 (Weston 2005)
- Lower Newport Federal Channel Tier IV evaluation in 2006 (Weston 2007)
  - Testing included side-by-side amphipod testing to further evaluate toxicity observed in 2003.
- Balboa Marina dock replacement dredged material evaluation in 2007 (Newfields 2007)
- Marina Park Master Plan dredged material evaluation in 2008 (Newfields 2009a)
- Lower Newport Federal Channels dredged material evaluation in 2009 (Newfields 2009b)
  - Due to the large number of individual core samples analyzed as part of this project, individual core data are presented separately in Attachment B.
- Harbor Island and Linda Isle Channels dredged material evaluation in 2011 (Newfields 2012a)

- RGP 54 dredged material evaluation in 2011 (Newfields 2012b)
- 43 Linda Isle dredged material evaluation in 2011 (Anchor QEA 2012)
- Rhine Channel post-dredge confirmatory sampling in 2012 (Anchor QEA 2013a)
- Lower Newport Federal Channels post-dredge sampling in 2012 and 2013 (Anchor QEA 2013b)
- RGP 54 dredged material evaluation in 2013, including preliminary testing to determine compositing scheme (Anchor QEA 2013c, 2013d)
- Balboa Marina West expansion dredged material evaluation (Newfields 2014)
- Balboa Marina West Tier I evaluation with confirmatory chemistry (Anchor QEA 2017)
- RGP 54 dredged material evaluation in 2018 (Anchor QEA 2018a)
- Lower Newport Federal Channels dredged material evaluation in 2018 (Anchor QEA 2018b)
- Newport Channel sampling in 2019, conducted as part of the Lower Newport Federal Channels project (Nautilus 2019; Anchor QEA 2019)
  - Tissue chemistry is currently underway. All data will be incorporated into an updated Lower Newport Federal Channels SAR.

References

Anchor (Anchor Environmental), 2006. *Rhine Channel Sediment Remediation Feasibility Study and Alternatives Evaluation, Newport Bay, California.* January 2006.

Anchor QEA (Anchor QEA, LLC), 2012. *Sampling and Analysis Report 43 Linda Isle Maintenance Dredging*. January 2012.

Anchor QEA, 2013a. Technical Memorandum to: Chris Miller, City of Newport Beach. Regarding: Post Dredge Confirmatory Sampling Results and Environmental Benefits of Dredging for the Rhine Channel Contaminated Sediment Cleanup Project. December 17, 2013.

Anchor QEA, 2013b. *Water Quality and Sediment Monitoring Report Lower Newport Bay Federal Dredging*. July 2013.

Anchor QEA, 2013c. Memorandum to: Allan Ota, U.S. Environmental Protection Agency; Cori Farrar, U.S. Army Corps of Engineers; Jack Gregg, California Coastal Commission. Regarding: RGP 54 Sediment Characterization: Preliminary Results for Sampling Compositing. July 22, 2013.

Anchor QEA, 2013d. *Sampling and Analysis Report Regional General Permit 54 Sediment Characterization.* October 2013.

Anchor QEA, 2017. *Sampling and Analysis Report Balboa Marina West Dredging and Public/Transient Dock Development.* December 2017.

Anchor QEA, 2018a. *RGP 54 Sediment Characterization Sampling and Analysis Report.* June 2018.

Anchor QEA, 2018b. *Lower Newport Bay Federal Channels Dredging Sampling and Analysis Program Report*. July 2018.

Anchor QEA, 2019. Validated Chemistry Tables for Newport Channel.

Nautilus, 2019. Preliminary Bioassay Tables for Newport Channel.

Newfields, 2007. *Dredged Material Evaluation for the Balboa Marina Dock Replacement Project*. November 2007.

Newfields, 2009a. *Dredged Material Evaluation for the Marina Park Master Plan Newport Beach, California*. November 2009.

Newfields, 2009b. *Dredged Material Evaluation of Lower Newport Bay, Newport Beach, California*. November 2009.

Newfields, 2012a. *Harbor Island and Linda Isle Channels Dredged Material Evaluation*. March 21, 2012.

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Newfields, 2014. *Balboa Marina West Expansion Project Dredged Material Evaluation Sampling and Analysis Report*. February 7, 2014.

Weston (Weston Solutions, Inc.), 2005. *Dredged Material Evaluation for the Renewal of Regional General Permit-54, Newport Beach, California*. November 2005.

Weston, 2007. *Tier IV Evaluation of the Lower Newport Bay Federal Newport Beach, California*. February 2007.

Table

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2003				2004-2005																			
	Project		Lower Newport Federal Channel Tier III (Weston 2007)				Rhine Channel Sediment Remediation Feasibility Study (Anchor QEA 2006)																			
	Sample ID		Area 1	Area 2	Area 3	Area 4	RS04-01-0-60 0-60 cm	RS04-01-60-120 60-120 cm	RS04-01-120-140 120-140 cm	RS04-01-140-150 140-150 cm	RS04-01-150-200 150-200 cm	RS04-02-0-30 0-30 cm	RS04-02-30-45 30-45 cm	RS04-02-45-59 45-59 cm	RS04-02-65-72 65-72 cm	RS04-03-0-30 0-30 cm	RS04-03-30-38 30-38 cm	RS04-03-38-68 38-68 cm	RS04-03-68-86 68-86 cm	RS04-04-0-25 0-25 cm	RS04-04-25-50 25-50 cm	RS04-04-50-99 50-99 cm	RS04-05-0-60 0-60 cm	RS04-05-60-134 60-134 cm	RS04-06-0-40 0-40 cm	RS04-06-40-120 40-120 cm	RS04-06-120-200 120-200 cm
	Sample Date		2003	2003	2003	2003	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004
	ERL	ERM																								
Metals (mg/kg, dry weight)																										
Mercury	0.15	0.71	**0.09**	**0.72**	**0.34**	**0.39**	**3.66**	**5.29**	**2.3**	**1.39**	**0.23**	**2.43**	**2.38**	**1.31**	**0.23**	**2.29**	**2.02**	**1.1**	**0.29**	**3.68**	**2.82**	**0.94**	**2.98**	**0.25**	**3.18**	**1.2**	**0.45**
PCBs (µg/kg, dry weight)																										
Total PCB Aroclors (U = 0)	22.7	180	10 U	10 U	10 U	10 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--	**51.6**	**364**	0.0	0.0	0.0	**75.2**	0.0	0.0	0.0	**122**	0.0	0.0	0.0	**151.8**	0.0	0.0	0.0	0.0	**75.1**	0.0	0.0
Pesticides (µg/kg, dry weight)																										
Total DDx (U = 0)	1.58	46.1	**29.6**	**67.3**	**38.9**	**162**	0.0	**193**	0.0	0.0	0.0	**36.8**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**32.4**	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Solid Phase Toxicity (% Survival)																										
Eohaustorius estuarius	--	--	41	54	51 / 23[2]	28 / 31[3] / 15[4]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	94	94	100	98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	No	No	No	No	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																										
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	>100 / >100	>100 / >100	>100 / >100	>100 / 79.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	>100	>100	>100	>100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	>100	>100	>100	>100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	Yes	Yes	Yes	Yes	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																										
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2004-2005																							
	Project		Rhine Channel Sediment Remediation Feasibility Study (Anchor QEA 2006)																							
	Sample ID		RS04-07-0-60 0-60 cm	RS04-07-60-171 60-171 cm	RS04-08-0-30 0-30 cm	RS04-08-30-90 30-90 cm	RS04-09-0-35 0-35 cm	RS04-09-35-110 35-110 cm	RS04-10-0-55 0-55 cm	RS04-10-55-83 55-83 cm	RS04-11-0-43 0-43 cm	RS04-11-50-63 50-63 cm	RS04-12-0-45 0-45 cm	RS04-12-66-99 66-99 cm	RS04-13-0-50 0-50 cm	RS04-13-50-83 50-83 cm	RS04-14-0-40 0-40 cm	RS04-14-40-59 40-59 cm	RS04-15-0-40 0-40 cm	RS04-15-40-80 40-80 cm	RS04-15-80-95 80-95 cm	RS04-16-0-50 0-50 cm	RS04-16-50-100 50-100 cm	RS04-16-100-150 100-150 cm	RS2-14-0-47 0-47 cm	RS2-14-70-86 70-86 cm
	Sample Date		11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	11/10/2004	2/9/2005	2/9/2005
	ERL	ERM																								
Metals (mg/kg, dry weight)																										
Mercury	0.15	0.71	**3.63**	**0.15**	**2.87**	**0.19**	**1.74**	**0.11**	**1.12**	**0.12**	**1.75**	**0.35**	**1.77**	**0.07**	**2.76**	**0.44**	**1.95**	**2.14**	**2.07**	**0.7**	**0.08**	**2.42**	**2.8**	**0.73**	**10**	**0.007**
PCBs (µg/kg, dry weight)																										
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	**35.2**	0.0	0.0	0.0	**37**	0.0	**49.4**	0.0	**116**	0.0	**47.6**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**382**	0.0	0.0	--	--
Pesticides (µg/kg, dry weight)																										
Total DDx (U = 0)	1.58	46.1	0.0	0.0	0.0	0.0	**5.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--
Solid Phase Toxicity (% Survival)																										
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																										
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																										
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

	Year		2004-2005				2005																		2006							
	Project		Rhine Channel Sediment Remediation Feasibility Study (Anchor QEA 2006)				Regional General Permit 54 (Weston 2005)																		Lower Newport Federal Channel Tier IV Evaluation (Weston 2007)							
	Sample ID		RS2-14-104-118 104-118 cm	RS2-16-0-53 0-53 cm	RS2-16-70-90 70-90 cm	RS2-16-130-140 130-140 cm	Area 1 Comp	Area 2 Comp	Area 3a Comp	Area 3b Comp	Area 4a Comp	Area 4b Comp	Station 2-1	Station 2-2	Station 2-3	Station 2-4	Station 2-5	Station 2-6	Station 2-7	Station 3-1	Station 3-2	Station 3-3	Station 3-4	Station 3-5	Station 3-6	Area 1	Area 2	Area 2b	Area 2c	Area 3	Area 3b	Area 4	Area 4b
	Sample Date		2/9/2005	2/9/2005	2/9/2005	2/9/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	5/2005	7/24-26/2006	7/24-26/2006	7/24-26/2006	7/24-26/2006	7/24-26/2006	7/24-26/2006	7/24-26/2006	7/24-26/2006
Parameter	**ERL**	**ERM**																														
Metals (mg/kg, dry weight)																																
Mercury	0.15	0.71	**0.064**	**4.81**	**0.132**	**0.063**	**0.82**	**0.29**	**0.14**	**0.35**	**0.18**	**0.13**	**0.31**	**0.31**	**0.57**	**0.47**	**0.3**	**0.32**	**0.12**	0.06 U	**0.8**	0.10 U	**0.2**	**0.18**	**0.2**	**0.21**	**0.73**	**1.42**	**0.2**	**0.6**	**0.15**	**0.25**	**0.12**
PCBs (µg/kg, dry weight)																																
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	**32**	20 U	20 U	**22**	20 U	20 U	19 U	**26**	**25**	20 U	20 U	19 U	20 U	19 U	**37**	*39 U*	20 U	*39 U*	19 U	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg, dry weight)																																
Total DDx (U = 0)	1.58	46.1	--	--	--	--	**28**	**34.5**	**48.4**	**34.8**	**24**	**16.3**	**3.1**	**73.2**	**35.2**	**58**	**18.1**	**29.3**	**10**	**25.4**	**25**	**29.4**	**24.1**	**92**	**64.4**	**60.4**	**42.5**	**61**	**67.2**	**55.6**	**46.8**	**95.6**	**76.8**
Solid Phase Toxicity (% Survival)																																
Eohaustorius estuarius	--	--	--	--	--	--	75	66 / 53	8 / 7	58 / 58	74	82	--	--	--	--	--	--	--	--	--	--	--	--	--	51	60	38	75	36	64	26	49
Ampelisca abdita	--	--	--	--	--	--	--	86	82	84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	63	61	74	57	61	59	50	47
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	90	94	87	91	93	91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	Yes	Yes	Yes	Yes	Yes	Yes										--	--	--	--	No	No	No	Yes (LA-3 only)	No	Yes (LA-3 only)	No	No
Suspended Particulate Phase Toxicity (%)																																
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	>100 / >100	>100 / >100	>100 / 67	>100 / 91	>100 / >100	>100 / >100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	>100	>100	>100	>100	>100	>100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	>100	>100	>100	>100	>100	>100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>100	>100	>100	74.1	>100	>100	57.9	62.8
Meets LPC (Yes/No)	--	--	--	--	--	--	Yes	Yes	Yes	Yes	Yes	Yes	--	--	--	--	--	--	--	--	--	--	--	--	--	Yes	Yes	Yes	No STFATE	Yes	Yes	No STFATE	No STFATE
Sediment-Water Interface (% Normal Alive)																																
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																																
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	0.0049 U	0.005 U	0.0047 U	0.0046 U	0.0047 U	0.0049 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	0.009 U - 0.01 U	0.01 U - 0.01 U	0.009 U - 0.01 U	0.009 U - 0.01 U	0.009 U - 0.01 U	0.009 U - 0.01 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	12.2	9.7	13.8	17.8	6.7	9.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	11 - 14	7.9 - 11	11 - 19	12 - 25	5.5 - 8.4	5 U - 17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																																
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	0.005 U	0.005 U	0.0048 U	0.005 U	0.0049 U	0.0049 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	0.01 U - 0.01 U	0.01 U - 0.01 U	0.009 U - 0.01 U	0.01 U - 0.01 U	0.009 U - 0.01 U	0.009 U - 0.01 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	33.2	29.6	30.5	32.4	20	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	28 - 35	23.9 - 36	24.8 - 42.5	28.2 - 35.1	16 - 22	15 - 17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2007				2008												2008					
	Project		Balboa Marina (Newfields 2007)				Marina Park (Newfields 2009a)												Marina Park (Newfields 2009a)					
	Sample ID		CH COMP	WM COMP	CM COMP	EM COMP	A-U COMP	A-L COMP	B-U COMP	B-L COMP	C-U COMP	C-L COMP	MP-10 Upper	MP-10 Lower	MP-12 Upper	MP-12 Lower	MP-14 Upper	MP-14 Lower	MP-16 Upper	MP-16 Lower	MP-13 Upper	MP-13 Lower	MP-15 Upper	MP-15 Lower
	Sample Date		5/30-31/07	5/30-31/07	5/30-31/07	5/30-31/07	11/28/2008	11/28/2008	11/28/2008	11/28/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008	12/12/2008
	ERL	ERM																						
Metals (mg/kg, dry weight)																								
Mercury	0.15	0.71	**0.23**	**0.29**	**0.24**	**0.2**	0.05 U	0.06 U	**0.05**	0.05 U	**0.36**	0.05 U	**0.1**	0.06 U	**0.31**	0.07 U	**0.85**	0.06 U	**0.07**	0.05 U	**1.11**	0.05 U	**3.35**	0.05 U
PCBs (µg/kg, dry weight)																								
Total PCB Aroclors (U = 0)	22.7	180	**53**	**198**	**110**	**55**	20 U	20 U	20 U	20 U	20 U	19 U	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--							--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg, dry weight)																								
Total DDx (U = 0)	1.58	46.1	**124**	**117**	**55.3**	**84**	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.9 U	--	--	--	--	--	--	--	--	--	--	--	--
Solid Phase Toxicity (% Survival)																								
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	90	88	87	92	--	--	--	--	87	89	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	84	84	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	88	88	82	90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	Yes	Yes	Yes	Yes	--	--	--	--	Yes	Yes	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																								
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	-- / 78.3	-- / >100	-- / >100	-- / >100	--	--	--	--	-- / >100	-- / >100	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	>100	>100	>100	>100	--	--	--	--	>100	>100	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	>100	>100	>100	>100	--	--	--	--	>100	>100	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	Yes	Yes	Yes	Yes	--	--	--	--	Yes	Yes	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																								
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																								
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	0.011	0.009	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	0.010 - 0.013	0.009 U - 0.01 U	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	30.4	27.1	20.8	24.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	NA[5]	NA[5]	NA[5]	NA[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	0	8.81	7.68	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	NA[5]	NA[5]	NA[5]	NA[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																								
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	0.01	0.009	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	0.009 U - 0.011	0.009 U - 0.01 U	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	103	105	70.1	77.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	NA[5]	NA[5]	NA[5]	NA[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	10.9	52.3	10.2	7.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	NA[5]	NA[5]	NA[5]	NA[5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2009												2011							
	Project		Lower Newport Bay (Newfields 2009b)[6]												Harbor Island and Linda Isle Channels (Newfields 2012a)							
	Sample ID		BR	HIR	LIN	LIS	WLB	YAN	YAM-U	YAM-L	YAS-U	YAS-L	UNC	BICI	BC	HILI-A	HILI-B	HT-5	HT-6	HT-7	HT-8	HT-9	HT-10
	Sample Date		5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	5/12-18/09	10/12/2011	10/12/2011	10/12/2011	10/12/2011	10/12/2011	10/12/2011	10/12/2011	10/12/2011
	ERL	ERM																					
Metals (mg/kg, dry weight)																							
Mercury	0.15	0.71	**0.23**	**0.25**	**1.06**	**0.46**	**0.58**	**0.29**	**0.16**	**0.56**	**0.26**	**0.46**	**0.26**	**0.42**	**1.62**	**0.56**	**1.15**	**0.27**	**0.59**	**0.91**	**0.99**	**0.48**	**1.82**
PCBs (µg/kg, dry weight)																							
Total PCB Aroclors (U = 0)	22.7	180	**28.9**	**31.8**	**50.0**	**35.4**	**38.5**	**42.9**	**24.0**	**67.0**	**35.6**	**69.0**	**27.5**	**35.8**	**85.0**	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	**24.4**	**34.4**	--	--	--	--	--	--
Pesticides (µg/kg, dry weight)																							
Total DDx (U = 0)	1.58	46.1	**63**	**115**	**57**	**47**	**69**	**107**	**71**	**152**	**77**	**126**	**39.3**	**67.9**	**86**	**73.3**	**43.7**	--	--	--	--	--	--
Solid Phase Toxicity (% Survival)																							
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	93	90	90	92	91	96	95	93	94	84	94	93	93	92	94	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	96	96	96	100	96	76 / 98	100	92	100	92	96	100	92	92	100	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																							
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-- / >100	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	>100	>100	>100	>100	>100	>100	--	>100	>100	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	>100	>100	>100	>100	>100	>100	--	>100	>100	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	>100	>100	>100	>100	>100	>100	--	>100	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	Yes	Yes	Yes	Yes	Yes	Yes	--	Yes	Yes	Yes	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																							
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																							
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	0.021	0.017	--	--	--	0.017	--	0.014	0.017	0.019	0.024	0.013	0.019	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	0.019 - 0.023	0.0.15 - 0.021	--	--	--	0.015 - 0.018	--	0.011 - 0.016	0.014 - 0.02	0.017 - 0.02	0.016 - 0.03	0.012 - 0.014	0.017 - 0.021	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	23.9	42.1	34.4	25.7	25.5	55.2	36.4	79.8	47.7	78.4	22.8	40.7	23.4	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	19 - 29	34 - 48	25.6 - 42	21.2 - 30.9	18.5 - 33.6	36.3 - 66	28 - 40.6	62 - 89.6	39.8 - 53	57 - 96	21.9 - 25.5	21.7 - 62	19.2 - 34	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																							
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	0.010	0.009	--	--	--	0.009	--	0.009	0.01	0.008	0.009	0.006	0.006	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	0.008 -0.012	0.007 - 0.01	--	--	--	0.008 - 0.009	--	0.008 - 0.01	0.008 - 0.011			0.005 - 0.006	0.006 - 0.007	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	43.2	62.2	63.6	26.1	37.4	61.5	35.5	94.2	52.4	113.4	29.7	40.7	21.5	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	27 - 53	55 - 70	59 - 67	13 - 51	22 - 61.6	22.6 - 84	23.5 - 65.3	59 - 140	34.5 - 73	98 - 131	15.5 - 44.5	28.7 - 48	13 - 36	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	2.0 U[7]	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2011											2012												
	Project		Regional General Permit 54 (Newfields 2012b)										43 Linda Isle (Anchor QEA 2012)	Rhine Channel Post-Dredge Confirmatory Sampling (Anchor QEA 2013a)												
	Sample ID		Area 1a	Area 2	Area 4	Area 1	A2	A3	A4	A1	A5	A6	LI-DU1-COMP	RC-01-SC-0.0-0.5	RC-01-SC_0.5-1.0	RC-01-SC_1.0-1.5	RC-02-SC_0.0-0.5	RC-02-SC_0.5-1.0	RC-02-SC_1.0-1.5	RC-03-SC-0.0-0.5	RC-03-SC_0.5-1.0	RC-03-SC_1.0-1.5	RC-04-SC_0.0-0.5	RC-04-SC_0.5-1.0	RC-04-SC_1.0-1.5	RC-05-SC-0.0-0.5	RC-05-SC_0.5-1.0
	Sample Date		5/3-6/2011	5/3-6/2011	5/3-6/2011	5/3-6/2011	5/3-6/2011	5/3-6/2011	5/3-6/2011	5/3-6/2011	5/3-6/2011	5/3-6/2011	8/30/2011	12/12/2012	12/12/2012	12/12/2012	12/11/2012	12/11/2012	12/11/2012	12/12/2012	12/12/2012	12/12/2012	12/11/2012	12/11/2012	12/11/2012	12/19/2012	12/19/2012
	ERL	ERM																								
Metals (mg/kg, dry weight)																										
Mercury	0.15	0.71	**0.18**	**0.6**	**0.06**	**0.19**	**0.07**	**0.52**	**0.18**	**1.36**	**1.07**	**1.67**	**0.171**	**8.6**	**0.686**	**0.202**	**1.2**	**3.52**	**12.4**	**3.2**	**0.53**	**0.997**	**3.6**	**1.87**	**1.96**	**1.3**	**0.738**
PCBs (µg/kg, dry weight)																										
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	**2.3**	**25.2**	**25.5**	0.9 U	0.9 U	**89.7**	**12.3**	--	--	--	0.1 U	**94.22 J**	**15.46 J**	**8.95 J**	**15.78 J**	**177.84 J**	**604.4**	**203.0**	**26.06 J**	**40.97 J**	**37.95 J**	**75.48 J**	**108.23 J**	**35.18 J**	**34.34 J**
Pesticides (µg/kg, dry weight)																										
Total DDx (U = 0)	1.58	46.1	**2.2**	**15.6**	**2.7**	**2.0**	1.8 U	**1.8**	**5.2**	--	--	--	**12.2**	**9.8**	**2.5**	**0.89 J**	**2.1**	**12.5**	**27.0**	**9.9**	**2.3**	**4.48 J**	**18.1**	**10.1 J**	**13.3J**	**5.49 J**	**4.42 J**
Solid Phase Toxicity (% Survival)																										
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	83	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	93	94	94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	98	98	98	--	--	--	--	--	--	--	100	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	Yes	Yes	Yes	--	--	--	--	--	--	--	Yes	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																										
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	-- / >100	-- / >100	-- / >100	--	--	--	--	--	--	--	-- / 50.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	>100	>100	>100	--	--	--	--	--	--	--	>100	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	>100	>100	>100	--	--	--	--	--	--	--	>100	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	Yes	Yes	Yes	--	--	--	--	--	--	--	Yes	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																										
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	0.025	0.021	0.009	--	--	--	--	--	--	--	0.022	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	0.013 - 0.016	0.018 - 0.023	0.01 - 0.015	--	--	--	--	--	--	--	0.019 - 0.024	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	67.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	28.8 - 52.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	0.010	0.011	0.012	--	--	--	--	--	--	--	0.003	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	0.009 - 0.012	0.009 - 0.012	0.01 - 0.015	--	--	--	--	--	--	--	0.002 - 0.003	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	3.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	1 U - 4.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2012																						
	Project		Rhine Channel Post-Dredge Confirmatory Sampling (Anchor QEA 2013a)																						
	Sample ID		RC-05-SC_1.0-1.5	RC-06-SC_0.0-0.5	RC-06-SC_0.5-1.0	RC-06-SC_1.0-1.5	RC-07-SC-0.0-0.5	RC-07-SC_0.5-1.0	RC-07-SC_1.0-1.5	RC-08-SC_0.0-0.5	RC-08-SC_0.5-1.0	RC-08-SC_1.0-1.5	RC-09-SC-0.0-0.5	RC-09-SC_0.5-1.0	RC-09-SC_1.0-1.5	RC-10-SC_0.0-0.5	RC-010-SC_0.5-1.0	RC-010-SC_1.0-1.5	RC-11-SC_0.0-0.5	RC-011-SC_0.5-1.0	RC-011-SC_1.0-1.5	RC-02-SG	RC-04-SG	RC-06-SG	RC-08-SG
	Sample Date		12/19/2012	12/11/2012	12/11/2012	12/11/2012	12/19/2012	12/19/2012	12/19/2012	12/11/2012	12/11/2012	12/11/2012	12/19/2012	12/19/2012	12/19/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012	12/11/2012
	ERL	ERM																							
Metals (mg/kg, dry weight)																									
Mercury	0.15	0.71	**0.813**	**0.68**	**0.49**	**0.557**	**0.49**	**0.258**	**1.29**	**3**	**0.372**	**0.204**	**1.8**	**1.39**	**1.09**	**1.3**	**0.101**	**0.827**	**0.37**	**0.202**	**0.0307**	**5.2**	**3.9**	**2.8**	**2.3**
PCBs (µg/kg, dry weight)																									
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	**30.83 J**	**16.53 J**	**20.42 J**	**21.26 J**	**37.223 J**	**8.85 J**	**41.94 J**	**23.21 J**	**31.61 J**	**13.41 J**	**39.69 J**	**83.85 J**	**45.86 J**	**9.53 J**	**5.04 J**	**39.18 J**	**2.37 J**	0.25 U	0.24 U	**31.36 J**	**43.5 J**	**21.18 J**	**22.49 J**
Pesticides (µg/kg, dry weight)																									
Total DDx (U = 0)	1.58	46.1	**2.5**	**1.3**	**4.7 J**	**1.2 J**	**2.4**	**0.67 J**	**3.44 J**	**2.2**	**1 J**	**0.55**	**6.34 J**	**10.5 J**	**14.3 J**	**1.8**	**1.51 J**	**4.79 J**	**1.7 J**	0.42 U	0.41 U	**11.0**	1.1 U	0.96 U	**4.3**
Solid Phase Toxicity (% Survival)																									
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																									
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																									
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																									
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																									
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2012								2012-2013											2013				
	Project		Rhine Channel Post-Dredge Confirmatory Sampling (Anchor QEA 2013a)								Lower Newport Federal Channels Post-Dredge Sampling (Anchor QEA 2013b)											Regional General Permit 54 - Preliminary Testing for Sample Compositing (Anchor QEA 2013c)				
	Sample ID		RC-10-SG	RC-11-SG	RC-12-SG	RC-13-SG	RC-14-SG	RC-15-SG	RC-16-SG	RC-17-SG	LW	LE	Y1	Y2	NC	WL	BR	CG	BE	LS	Y3	RGP-1-1b	RGP-1-1-t	RGP-1-4-b	RGP-1-4-t	RGP-1-5-b
	Sample Date		12/11/2012	12/11/2012	12/12/2012	12/12/2012	12/12/2012	12/12/2012	12/12/2012	12/12/2012	11/29/2012	11/29/2012	11/29/2012	11/29/2012	11/29/2012	11/29/2012	11/29/2012	11/29/2012	11/29/2012	2/28/2013	2/28/2013	7/10/2013	7/10/2013	7/10/2013	7/10/2013	7/10/2013
	ERL	ERM																								
Metals (mg/kg, dry weight)																										
Mercury	0.15	0.71	**1.6**	**1.1**	**5.6**	**6.3**	**4.9**	**4.3**	**3**	**1.3**	**0.15**	**0.15**	0.11	0.096	0.013	**0.22**	**0.1**	**0.12**	**1**	**0.282**	**0.117**	ND	**0.35**	**0.153**	**0.709**	**1.4**
PCBs (µg/kg, dry weight)																										
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	**14.57 J**	**10.35 J**	**69.93 J**	**86.79 J**	**79.33 J**	**53.4 J**	**14.08 J**	**3.76 J**	**2.37 J**	**6.50 J**	0.25 U	**5.83 J**	0.24 U	**3.45 J**	**5.13 J**	**10.57 J**	**32.53 J**	**20.04 J**	**28.83 J**	--	--	--	--	--
Pesticides (µg/kg, dry weight)																										
Total DDx (U = 0)	1.58	46.1	**4.1**	**9.6**	**10.0**	**13.0**	**12.0**	**13.0**	**6.5**	**5.5**	**21.23 J**	**17.8 J**	**21.52 J**	**19.15 J**	**20.1 J**	**13.56 J**	**28.1 J**	**8.1**	**28.1**	**7.3**	**7.4**	--	--	--	--	--
Solid Phase Toxicity (% Survival)																										
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																										
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																										
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	83.9	76.7	77.1	69.5	81.5	89.6	75.5	75.2	73.0	93.3	73.5	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2013								2013													
	Project		Regional General Permit 54 - Preliminary Testing for Sample Compositing (Anchor QEA 2013c)																					
	Sample ID		RGP-1-5-t	RGP-4-12-b	RGP-4-12-t	RGP-4-14-b	RGP-4-14-t	RGP-4-15-b	RGP-4-15-t	RGP-4-16-b	RGP-4-16-t	RGP-1a-COMP-b	RGP-1a-COMP-t	RGP-1b-COMP-b	RGP-1b-COMP-t	RGP-2-COMP-b	RGP-2-COMP-t	RGP-3-COMP-b	RGP-3-COMP-t	RGP-4a-COMP-b	RGP-4a-COMP-t	RGP-4b-COMP-b	RGP-4b-COMP-t	RGP-5-COMP
	Sample Date		7/10/2013	7/12/2013	7/12/2013	7/12/2013	7/12/2013	7/12/2013	7/12/2013	7/12/2013	7/10/2013	7/10/2013	7/10/2013	7/10/2013	7/10/2013	7/15/2013	7/15/2013	7/15/2013	7/15/2013	7/12/2013	7/12/2013	7/12/2013	7/12/2013	7/18/2013
	ERL	ERM																						
Metals (mg/kg, dry weight)																								
Mercury	0.15	0.71	**0.408**	**1.19**	**0.232**	**0.376**	**1.91**	0.098	**0.649**	**1.39**	**0.913**	0.104	**0.425**	**0.347**	**0.193**	**0.352**	**0.192**	**0.184**	**0.304**	**0.474**	**0.277**	**0.344**	**0.41**	**0.937**
PCBs (µg/kg, dry weight)																								
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg, dry weight)																								
Total DDx (U = 0)	1.58	46.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Solid Phase Toxicity (% Survival)																								
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																								
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																								
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																								
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																								
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2013									2017	2017-2018									
	Project		Regional General Permit 54 (Anchor QEA 2013d)					Balboa Marina West (Newfields 2014)				Balboa Marina West (Anchor QEA 2017)	Regional General Permit 54 (Anchor QEA 2018a)									
	Sample ID		RGP-1-COMP	RGP-2-COMP	RGP-3-COMP	RGP-4-COMP	RGP-5-COMP	Area A	Area B	Station B-1	Station B-3	BMW-COMP-100917	RGP-1-COMP-092817	RGP-2-COMP-092917	RGP-3-COMP-100317	RGP-4-COMP-10057	RGP-5-COMP-100617	RGP-1-1-092617	RGP-1-2-092617	RGP-1-3-092617	RGP-1-4-092617	RGP-1-4a-041118	RGP-1-5-092617
	Sample Date		7/10/2013	7/15/2013	7/15/2013	7/12/2013	7/18/2013	7/10-19/2013	7/10-19/2013	7/10-19/2013	7/10-19/2013	10/9/2017	09/28/2018	09/29/2017	10/3/2017	10/5/2017	10/6/2017	09/26/2017	09/26/2017	09/26/2017	09/26/2017	4/11/2018	09/26/2017
	ERL	ERM																					
Metals (mg/kg, dry weight)																							
Mercury	0.15	0.71	**0.35**	**0.4**	**0.18**	**0.41**	**0.94**	**0.17**	0.03 U	0.03 U	**0.06**	**0.249**	**0.966**	**0.569 J**	**0.109**	**0.308**	**1.07**	**0.827 J**	**0.776 J**	**0.0555 J**	**3.92 J**	**0.668 J**	**1.03 J**
PCBs (µg/kg, dry weight)																							
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	**--**	--	--	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Total PCB Congener (U = 0)	22.7	180	**40.6**	**13.5**	**17.72**	**14.55**	**6.35**	**20.7**	0.5 U	0.5 U	**7.0**	**17.87**	**100**	**33.7**	**29.2**	**25.9**	**31.7**	**45.03**	**33.56**	0.4 U	**54.96**	--	**11.5**
Pesticides (µg/kg, dry weight)																							
Total DDx (U = 0)	1.58	46.1	**21.4**	**39.2**	**59.1**	**12.4**	**1.9**	**20.0**	**6.5**	0.98 U	**5.0**	**21.54 J**	**25.7**	**57.5**	**78.4 J**	**10.8 J**	**7.0**	--	--	--	--	--	--
Solid Phase Toxicity (% Survival)																							
Eohaustorius estuarius	--	--	--	--	--	--	--	--	0.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	78	88	85	64 / 95 / 95[8]	83	88	0.0	--	--	--	90	93	92	96	93	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	100	100	100	94	98	96	100	--	--	--	96	96	96	100	100	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	Yes	Yes	Yes	Yes	Yes	Yes	No	--	--	--	Yes	Yes	Yes	Yes	Yes	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																							
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	>100/ >100	>100/ >100	>100/ >100	>100/ >100	>100/ >100	-- / >100	-- / >100	--	--	--	>100 / >100	>100 / >100	>100 / 76.0	>100 / >100	>100 / >100	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	>100	>100	>100	>100	>100	>100	>100	--	--	--	>100	>100	>100	>100	>100	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	>100	>100	>100	>100	>100	>100	>100	--	--	--	>100	>100	>100	>100	>100	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	Yes	Yes	Yes	Yes	Yes	Yes	Yes	--	--	--	Yes	Yes	Yes	Yes	Yes	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																							
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*										--	--												
Mercury - Mean (mg/kg, wet weight)[1]	--	--	0.003	0.00221	0.00315	0.00226	0.00817	0.012	--	--	--	--	0.0205	0.00484	27.55	0.01644	0.02338	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	0.00352 U - 0.00499 J	0.00352 U - 0.00403 J	0.00352 U - 0.00550 J	0.00352 U - 0.00424 J	0.00454 J - 0.01150	0.010 - 0.013	--	--	--	--	0.01600 - 0.02370	0.00339 U - 0.00731 J	24.22 J - 34.26 J	0.00919 J - 0.03740	0.01740 - 0.03760	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	5.17	19.11	31.83	6.61	2.14	--	--	--	--	--	--	23.07	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	4.40 - 5.78	17.55 - 23.85	26.34 - 35.10	5.41 - 7.81	1.40 - 2.96	--	--	--	--	--	--	19.48 J - 29.04 J	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	17.06	--	--	--	--	--	--	--	--	--	25.55	9.53	7.07	5.54	6.19	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	15.09 - 19.74	--	--	--	--	--	--	--	--	--	22.98 - 28.65	8.67 - 10.01	4.64 - 8.73	4.70 J - 7.16	5.92 J - 6.48	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																							
Mercury - Mean (mg/kg, wet weight)[1]	--	--	0.02506	0.02342	0.02074	0.02048	0.02302	0.009	--	--	--	--	0.00922	0.00622	--	0.00748	0.00772	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	0.02190 - 0.02840	0.01950 - 0.02730	0.01810 - 0.02330	0.01330 - 0.02700	0.02040 - 0.02740	0.008 - 0.009	--	--	--	--	0.00707 J - 0.01200	0.00349 U - 0.00890 J	--	0.00342 U - 0.01390	0.00541 J - 0.00912 J	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	0.28	5.91	7.91	1.16	0.21	--	--	--	--	--	--	22.62	19.11	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	0.30 - 0.52	4.74 - 6.91	6.52 - 9.45	0.27 - 2.34	0.26 - 0.40 U	--	--	--	--	--	--	12.20 - 36.80	14.30 - 26.00 J	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	18	--	--	--	--	--	--	--	--	--	20.25	10.93	9.13	7.06	10.18	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	10.52 - 26.27	--	--	--	--	--	--	--	--	--	14.38 - 25.01	5.91 - 13.70	2.96 - 12.39	2.29 J - 11.68	7.69 - 12.32	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2017-2018																					
	Project		Regional General Permit 54 (Anchor QEA 2018a)																					
	Sample ID		RGP-1-6-092617	RGP-1-7-092617	RGP-1-8-092617	RGP-1-9-092617	RGP-1-10-092717	RGP-1-11-092717	RGP-1-11a-041118	RGP-1-12-092717	RGP-1-13-092817	RGP-1-14-092817	RGP-1-14a-041018	RGP-1-14b-041018	RGP-1-14c-041018	RGP-1-15-092817	RGP-1-16-092817	RGP-1-17-092817	RGP-1-17a-041018	RGP-1-17b-041018	RGP-1-17c-041018	RGP-1-18-092817	RGP-5-1-100617	RGP-5-1a-041118
	Sample Date		09/26/2017	09/26/2017	09/26/2017	09/26/2017	09/27/2017	09/27/2017	4/11/2018	09/27/2017	09/28/2017	09/28/2017	4/10/2018	4/10/2018	4/10/2018	09/28/2017	09/28/2017	09/28/2017	04/10/2018	04/10/2018	04/10/2018	09/28/2017	10/06/2017	4/11/2018
Parameter	**ERL**	**ERM**																						
Metals (mg/kg, dry weight)																								
Mercury	0.15	0.71	**0.268 J**	**0.246 J**	**0.189 J**	**0.193 J**	**0.335 J**	**5.77 J**	**0.646 J**	**0.163 J**	**0.142 J**	**1.58 J**	**0.357 J**	**9.48 J**	**0.526 J**	**0.105 J**	**0.175 J**	**2.78 J**	**2.87 J**	**0.975 J**	**0.153 J**	**0.634 J**	**1.72**	**2.37**
PCBs (µg/kg, dry weight)																								
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	**11.02**	**7.66**	**4.6**	**0.54**	**24.31**	**505.7**	**100 J**	**6.51**	**1.13 J**	**95.35**	--	--	--	**0.62**	**29.87**	**266.1**	--	**26**	**1.8 J**	**94.5**	--	--
Pesticides (µg/kg, dry weight)																								
Total DDx (U = 0)	1.58	46.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Solid Phase Toxicity (% Survival)																								
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																								
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																								
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																								
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																								
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2017-2018					2018															
	Project		Regional General Permit 54 (Anchor QEA 2018a)					Lower Newport Federal Channels (Anchor QEA 2018b)															
	Sample ID		RGP-5-2-100617	RGP-5-3-100617	RGP-5-4-100617	RGP-5-5-100617	RGP-5-5a-041118	TB-COMP-011218	MCN1-COMP-T-011518	MCN2-COMP-T-011618	MCN3-COMP-011918	MCN4-COMP-011918	MCN5-COMP-011818	BIN-COMP-T-011718	BIME-COMP T-011218	BIME-COMP M-011218	BIMW-COMP-T-011018	BIMW-COMP-M-011018	BIS-COMP-011218	EC-COMP-011718	TB-01-011218	TB-02-011218	TB-03-011218	TB-04-011218	TB-05-011218
	Sample Date		10/06/2017	10/06/2017	10/06/2017	10/06/2017	4/11/2018	1/12/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/18/2018	1/17/2018	1/12/2018	1/12/2018	1/10/2018	1/10/2018	1/12/2018	1/18/2018	1/12/2018	1/12/2018	1/12/2018	1/12/2018	1/12/2018
Parameter	**ERL**	**ERM**																					
Metals (mg/kg, dry weight)																							
Mercury	0.15	0.71	**0.783**	**0.15**	**0.183**	**1.57**	**2.15 J**	**3.64**	**1.18**	**1.04**	**0.797**	**0.181**	**0.205**	**0.431**	**0.142**	**0.69**	**0.153**	**0.658**	**0.233**	**0.0125 J**	**2.54**	**2.72**	**5**	**0.776**	**1.4**
PCBs (µg/kg, dry weight)																							
Total PCB Aroclors (U = 0)	22.7	180	**--**	**--**	**--**	**--**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--	--	**195**	**41.7**	**53.4**	**44.1**	**29**	**30.6**	**30.4**	**23.0**	**40.4**	**24.1**	**41**	**22.7**	0.42 U	**239**	**138**	**403**	**106**	**75**
Pesticides (µg/kg, dry weight)																							
Total DDx (U = 0)	1.58	46.1	--	--	--	--	--	**59.8**	**103**	**121**	**103**	**121**	**96.8**	**121 J**	**125 J**	**208**	**165**	**160**	**155 J**	**0.88 J**	**--**	**--**	**--**	**--**	**--**
Solid Phase Toxicity (% Survival)																							
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	99	98	98	99	92	95	95	94		98		83	95	--	--	--	--	--
Neanthes arenaceodentata	--	--	--	--	--	--	--	100	100	100	100	100	100	96	100		100		100	92	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	--	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																							
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	>100 / >100	>100 / >100	>100 / >100	>100 / 73.4	>100 / 77.2	>100 / >100	>100 / >100	>100 / 74.4		>100 / 75.9		>100 / 75.0	>100 />100	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	>100	>100	>100	>100	>100	>100	>100	>100		>100		>100	>100	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	>100	>100	>100	>100	>100	>100	>100	>100		>100		>100	>100	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																							
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--		--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																				--					
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	0.04142	0.01738	0.0166	0.00991	0.00271	0.00452	0.00176	0.00388		0.00173		0.00172	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	0.03620 - 0.04820	0.01110 - 0.02270	0.01200 - 0.02060	0.00713 J - 0.01250	0.00336 U - 0.00469 J	0.00369 J - 0.00542 J	0.00336 U - 0.00371 U	0.00339 U - 0.00850 J		0.00342 U - 0.00352 U		0.00336 U - 0.00359 U	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	9.45	23.71	52.29	45.32	50.74	36.34	50.4	81.09		74.62		43.19	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	5.06 J - 12.30	6.60 - 36.68 J	24.78 J - 85.60	31.73 J - 61.50	41.97 J - 68.60	18.90 - 50.73 J	27.90 - 95.00	54.17 J - 102.00		49.98 J - 100.00		23.20 - 77.10	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	30.9	12.96	14.04	9.82	6.82	6.08	6.57	9.62		7.8		--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	27.99 J - 39.04	9.83 - 17.76 J	10.27 - 19.64	8.71 J - 11.00	5.75 J - 7.50	4.88 - 7.25	4.83 J - 8.58	7.68 - 10.53		4.63 - 9.94		--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																									
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	0.01574	0.01794	0.02248	0.01728	0.00671	0.00881	0.0207	0.00266		0.01404		0.0194	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	0.01240 - 0.01870	0.01180 - 0.03010	0.01480 - 0.02700	0.01340 - 0.02310	0.00339 U - 0.01820	0.00358 J - 0.01820	0.01230 - 0.02730	0.00336 U - 0.00637 J		0.00434 J - 0.02380		0.01250 - 0.02600	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	8.92	14.7	31.54	29.18	28.02	16.84	24.26	47.8		34.54		26.12	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	7.80 - 10.20	10.20 - 17.80 J	24.30 - 35.30	22.30 J - 38.10	24.10 J - 32.40 J	13.20 J - 20.20 J	18.20 - 29.40	42.70 - 52.70		22.30 J - 47.00		16.00 J - 37.90	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	23.66	13.31	12.23	10.85	7.6	7.16	8.58	11.4		8.93		--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	21.00 - 26.15	11.37 - 16.74	10.03 - 14.97	7.84 - 15.30	6.96 - 8.73	5.13 - 8.78	6.30 J - 10.84	10.38 - 12.85		7.80 - 10.62		--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2018																						
	Project		Lower Newport Federal Channels (Anchor QEA 2018b)																						
	Sample ID		TB-06-011218	MCN1-01-T-011518	MCN1-02-T-011518	MCN1-03-T-011518	MCN1-04-T-011518	MCN2-01-T-011518	MCN2-02-T-011518	MCN2-03-T-011518	MCN2-04-T-011618	MCN3-01-011918	MCN3-02-011918	MCN3-03-011918	MCN3-04-011918	MCN4-01-011918	MCN4-02-011818	MCN4-03-011818	MCN4-04-011818	BIME-01-T-M-030518	BIME-02-T-M-030518	BIME-03-T-M-030518	BIME-04-T-M-030518	BIMW-01-T-M-030518	BIMW-02-T-M-030518	BIMW-03-T-M-030518
	Sample Date		1/12/2018	1/15/2018	1/15/2018	1/15/2018	1/15/2018	1/15/2018	1/15/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/19/2018	1/19/2018	1/19/2018	1/18/2018	1/18/2018	1/18/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018
	ERL	ERM																							
Metals (mg/kg, dry weight)																									
Mercury	0.15	0.71	**3.37**	**1.66**	**1.41**	**0.525**	**0.547**	**1.67**	**0.603**	**2.2**	**0.775**	**1.15**	**1.57**	**0.4**	**0.088**	--	--	--	--	--	--	--	--	--	--	--
PCBs (µg/kg, dry weight)																									
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	**187**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg, dry weight)																									
Total DDx (U = 0)	1.58	46.1	--	**70.6 J**	**84.8**	**90.9 J**	**97.6**	**118.3**	**115.1 J**	**48.4 J**	**141**	**115**	**104**	**101 J**	**25.9 J**	**128**	**107.7 J**	**88.1 J**	**121**	**174.7 J**	**131**	**128**	**161**	**206**	**177**	**148**
Solid Phase Toxicity (% Survival)																									
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																									
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																									
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																									
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																									
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Parameter	Year		2018											2019												
	Project		Lower Newport Federal Channels (Anchor QEA 2018b)											Newport Channel (Nautilus 2019; Anchor QEA 2019)												
	Sample ID		BIMW-04-T-M-030518	BIN-01-T-011618	BIN-02-T-011618	BIN-03-T-011618	BIN-04-T-011618	BIN-05-T-011618	BIN-06-T-011718	BIS-01-011118	BIS-02-011118	BIS-03-011118	BIS-04-011118	NC1-01-012319	NC1-02-012319	NC1-03-012319	NC1-04-012319	NC2-01-012419	NC2-02-012419	NC2-03-012419	NC2-04-012219	NC3-01-012219	NC3-02-012219	NC3-03-012219	NC3-04-012319	NC2-COMP	NC3-COMP
	Sample Date		3/5/2018	1/16/2018	1/16/2018	1/16/2018	1/16/2018	1/16/2018	1/17/2018	1/11/2018	1/11/2018	1/11/2018	1/11/2018	1/23/2019	1/23/2019	1/23/2019	1/23/2019	1/24/2019	1/24/2019	1/24/2019	1/22/2019	1/22/2019	1/22/2019	1/22/2019	1/23/2019	3/1/2019	3/1/2019
	ERL	ERM																								
Metals (mg/kg, dry weight)																										
Mercury	0.15	0.71	--	--	--	--	--	--	--	--	--	--	--	2	2.49	0.708	0.81	0.402	1.52	1.26	0.267	0.245	0.19	0.144	0.0905	0.529	0.173
PCBs (µg/kg, dry weight)																										
Total PCB Aroclors (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	41.68	26.84	10.23	3.6	13.5	18.9	8.3	3.55	6.5 J	4.53 J	1.07	1.45 J	22.75	8 J
Pesticides (µg/kg, dry weight)																										
Total DDx (U = 0)	1.58	46.1	261	199	157	43.5 J	161	200	299	150	232	107.8 J	127.9 J	14	8.8	11	18.5	18.3 J	52.5	21.5 J	21.2	18.3	35.4 J	12	6.4 J	21	17.9
Solid Phase Toxicity (% Survival)																										
Eohaustorius estuarius	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ampelisca abdita	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	97	94
Neanthes arenaceodentata	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	96	96
Americamysis bahia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass benthic test (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Suspended Particulate Phase Toxicity (%)																										
Mytilus galloprovincialis (LC_{50}/EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>100/ >100	>100/ >100
Americamysis bahia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>100	>100
Menidia beryllinia (LC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>100	>100
Crassotrea gigas (EC_{50})	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Meets LPC (Yes/No)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sediment-Water Interface (% Normal Alive)																										
Mytilus galloprovincialis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry - *Macoma nasuta*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--[9]	--[9]
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--[9]	--[9]
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCBs - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tissue Chemistry – *Nereis virens* or *Nephtys caecoides*																										
Mercury - Mean (mg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--[9]	--[9]
Mercury - Range (mg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--[9]	--[9]
Total DDx - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total DDx - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Mean (µg/kg, wet weight)[1]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congeners - Range (µg/kg, wet weight)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 1
Summary of Newport Bay Testing Results from 2003 to 2019

Notes:
1. Mean tissue concentrations provided in source document or calculated by Anchor QEA using 1/2 detection limit for non-detect results
2. Station 14 only
3. Station 8, subsection 8-1
4. Station 8, subsection 8-2
5. No replicate data
6. Mercury results from individual stations presented in Newfields 2009 Table 3-3.
7. PCB screening performed on one replicate per composite area; replicate data presented; no mean or range.
8. Feeding study conducted due to low TOC in sediment
9. Tissue chemistry currently in progress

Detected concentration is greater than ERL screening level
Detected concentration is greater than ERM screening level

Italicized: non-detected concentration is above one or more identified screening levels
Bold: detected result
Red : statistically different from reference site
-- : results not tested or not applicable
µg/kg: microgram per kilogram
cm: centimeter
EC_{50}: median effective concentration
ERL: effects range low
ERM: effects range median
J: estimated value
LC_{50}: median lethal concentration
LPC: limiting permissible concentration
MDL: method detection limit
mg/kg: milligram per kilogram
NA: not available
ND: non-detect
PCB: polychlorinated biphenyl
STFATE: Short-Term Fate
TOC: total organic carbon
U: compound analyzed but not detected above detection limit
For totals, zeros were used for non-detect samples for summing. If all samples were non-detect, the highest MDL of all samples was used as the total result. For some projects, zeros were used for total result.
Total DDTs are the sum of: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT
Total PCB Aroclors are the sum of: 1016, 1221, 1232, 1242, 1248, 1254, and 1260.
Total PCB congeners is the sum of all PCB congeners listed in report.

Sources:

Anchor (Anchor Environmental), 2006. *Rhine Channel Sediment Remediation Feasibility Study and Alternatives Evaluation, Newport Bay, California.* January 2006.
Anchor QEA (Anchor QEA, LLC), 2012. *Sampling and Analysis Report 43 Linda Isle Maintenance Dredging.* January 2012.
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Attachment A
Sampling Locations

Tier III and IV Evaluation (Weston 2007)

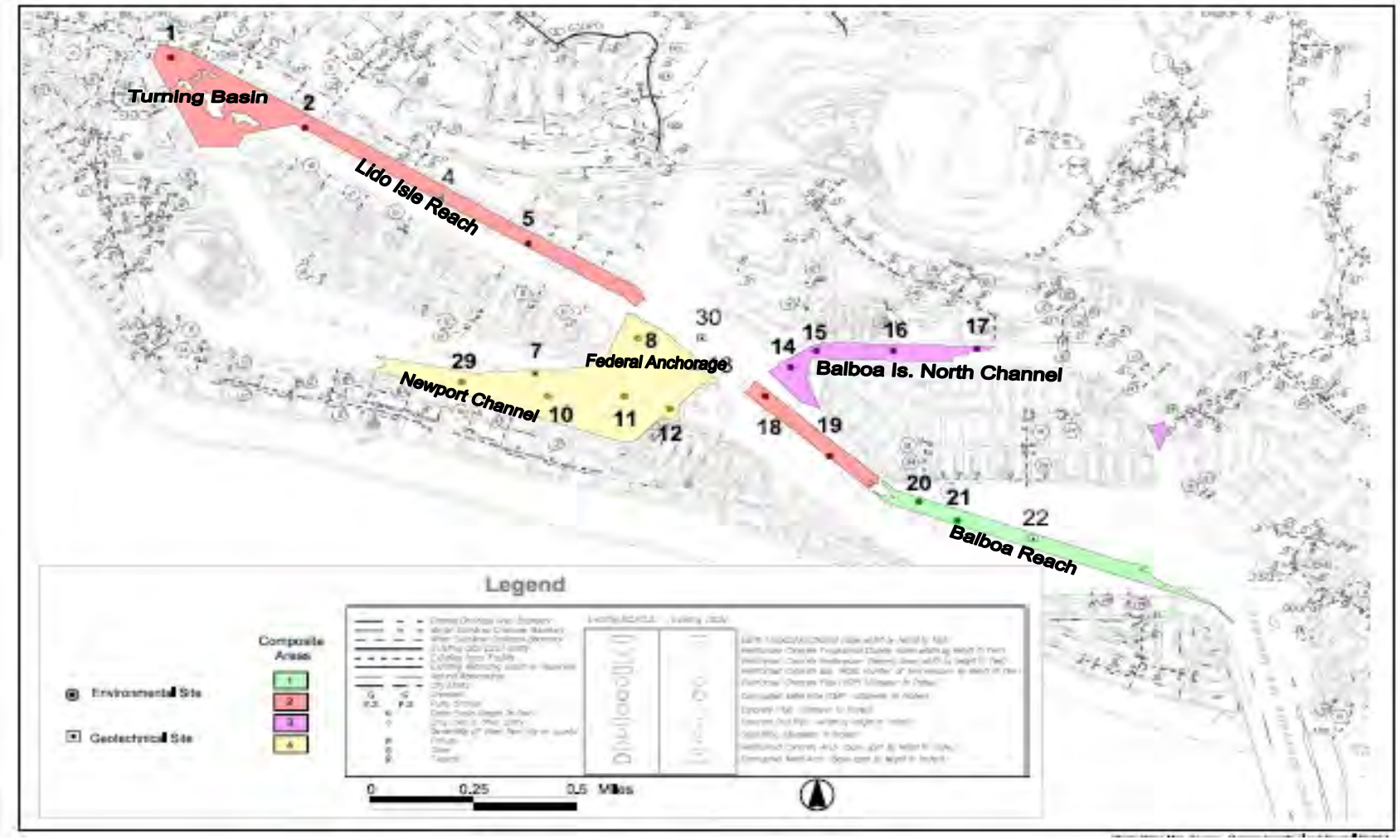


Figure 1-1. Map of Federal Channel dredge area sites.

Rhine Channel Sediment Remediation Feasibility Study (Anchor 2006)

Sta 12 + 00
Sta 13 + 00
Sta 14 + 00
Sta 15 + 00
Sta 16 + 00
Sta 17 + 00
Sta 18 + 00
Sta 19 + 00
Sta 20 + 00
Sta 21 + 00
Sta 22 + 00
Sta 23 + 00
Sta 24 + 00
Sta 25 + 00

21st Street
19th Street

Dry Stack Boat Storage

REACH 1

Project Baseline

A
A'

P4
P3
P2
P1
RS04-08
RS04-09
RS04-10
RS04-11
RS04-12
RS04-13
RS04-14
RS04-15

-15.5
-13.5
-19.5
-12.5
-12.0
-11.5
-11.0
-10.5
-10.0
-9.5
-9.0
-8.5
-8.0

Fig 2B
Fig 2A

Key Map

RS04-01 Sampling station location and designation
P1 Probe to native material location and designation
-11.0 Bathymetric contour in feet MLLW (0.5 ft interval)
Bulkhead/Shoreline
Storm Drain
Inferred Location of Storm Drain Outfall

0 100
Scale in Feet

Apr 22, 2005 1:36pm bdelabar K:\Jobs\040279-RHINE_CHANNEL\04027901\Drawings\04027901-03.dwg Rhine Channel Fig 2A

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 2A
Rhine Channel Sediment Remediation
Site Map - Reach 1

Sta 0 + 00
Sta 1 + 00
Sta 2 + 00
Sta 3 + 00
Sta 4 + 00
Sta 5 + 00
Sta 6 + 00
Sta 7 + 00
Sta 8 + 00
Sta 9 + 00
Sta 10 + 00
Sta 11 + 00
Sta 12 + 00

B
B'

Cannery
LAFAYETTE ROAD
30th Street
29th Street
Villa Way
Newport Blvd
26th Street
LIDO PARK DRIVE
REACH 2
Project Baseline
Dry Stack Boat Storage

RS04-01
RS04-02
RS04-03
RS04-04
RS04-05
RS04-06
RS04-07
RS04-08
RS04-09
RS04-16
P1
P4
P5

-10.0
-10.5
-11.0
-11.5
-12.0
-12.5
-13.0
-14.5
-15.0
-15.5
-9.5
-13.5

Fig 2B
Fig 2A
Key Map

RS04-01 Sampling station location and designation
P1 Probe to native material location and designation
-11.0 Bathymetric contour in feet MLLW (0.5 ft interval)
Bulkhead/Shoreline
Storm Drain
Inferred Location of Storm Drain Outfall

N
0 100
Scale in Feet

Apr 25, 2005 1:58pm bdelabar K:\Jobs\040279-RHINE_CHANNEL\04027901\Drawings\04027901-03.dwg Rhine Channel Fig 2B

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 2B
Rhine Channel Sediment Remediation
Site Map Reach 2

Regional General Permit 54 (Weston 2005)

2.0 Methods

Sampling and analysis methods followed those outlined in OTM/ITM protocols. This section summarizes the methods used during this investigation.

2.1 Station Locations

Samples were collected from 33 stations throughout the six proposed dredging areas in Newport Bay between May 24 and May 31, 2005. Station locations within each area were selected based on the erosional and depositional patterns in Newport Bay, dredging history of the area, the perceived need for future dredging (based on depositional patterns and past dredging), and previous chemistry and/or biological data. Actual station coordinates are provided in the results section.

Area 1: Area 1 included Lido Island, the north shore of Lido Isle Reach, the western portion of the Balboa Peninsula to, but not including Bay Island (Figure 2.1). With the exception of the Rhine Channel, all areas were included in the previous RGP-54 permit. A total of ten stations were sampled in Area 1, focusing on the south shore of Lido Island, but also representing the north shore of Balboa Peninsula and Lido Island.



Figure 2.1. Map Showing Area 1, RGP-54 boundary, and Station Locations.

Area 2: Area 2 included those areas south of the US 101 bridge, but north of the Harbor Island Reach, including all shoreline of Linda Isle and Harbor Island (Figure 2.2). No dredging has occurred in Promontory Bay following its construction in 1980 and while part of the RGP, was not a part of the sampling design or planned dredging events. A total of seven stations were sampled in Area 2 representing both Linda Isle, Harbor Island, and the western shoreline of the Newport River, immediately south of the US 101 bridge.



Figure 2.2. Map Showing Area 2, RGP-54 Boundary, and Station Locations.

Area 3: Area 3 included those portions of Upper Newport Bay, immediately above the US 101 Bridge. Previous investigations found some evidence of biological effects in the composites from this area. Station by station analysis indicated increased levels of DDE and amphipod toxicity in the western portion of the Bayside Village Marina. Because of these previous results Area 3 was been split into two areas, Area 3a and 3b (Figure 2.3). Area 3a (Stations 3-3, 3-4, and 3-5) included the channel and a marina immediately north of Galaxie View Park. Area 3b (Stations 3-1, 3-2, and 3-6) included the Bayside Village Marina. The Dunes Lagoon and bluffs on the western shore of the river were not included in the RGP.



Figure 2.3. Map Showing Area 3, RGP-54 Boundary, and Station Locations

Area 4: Area 4 included Balboa Island, the eastern portion of Balboa Peninsula to the mouth of Newport Bay, and Bay Island (Figure 2.4). Previous investigations have indicated differences in sediment grain size between Balboa Island and the Balboa Peninsula and for this reason these areas were analyzed separately. Area 4a (Stations 4-1 through 4-7) included Balboa Island and Bay Island. Area 4b (Stations 4-8 through 4-10) included the northern shore of Balboa Peninsula and the western entrance. Seven stations were sampled in Area 4a and three stations were sampled in Area 4b.



Figure 2.4. Map Showing Area 4, RGP-54 boundary, and Station Locations.

Balboa Marina (Newfields 2007)



Figure 2-1. Proposed Study Unit Boundaries and Station Locations with The Existing Site Plan.

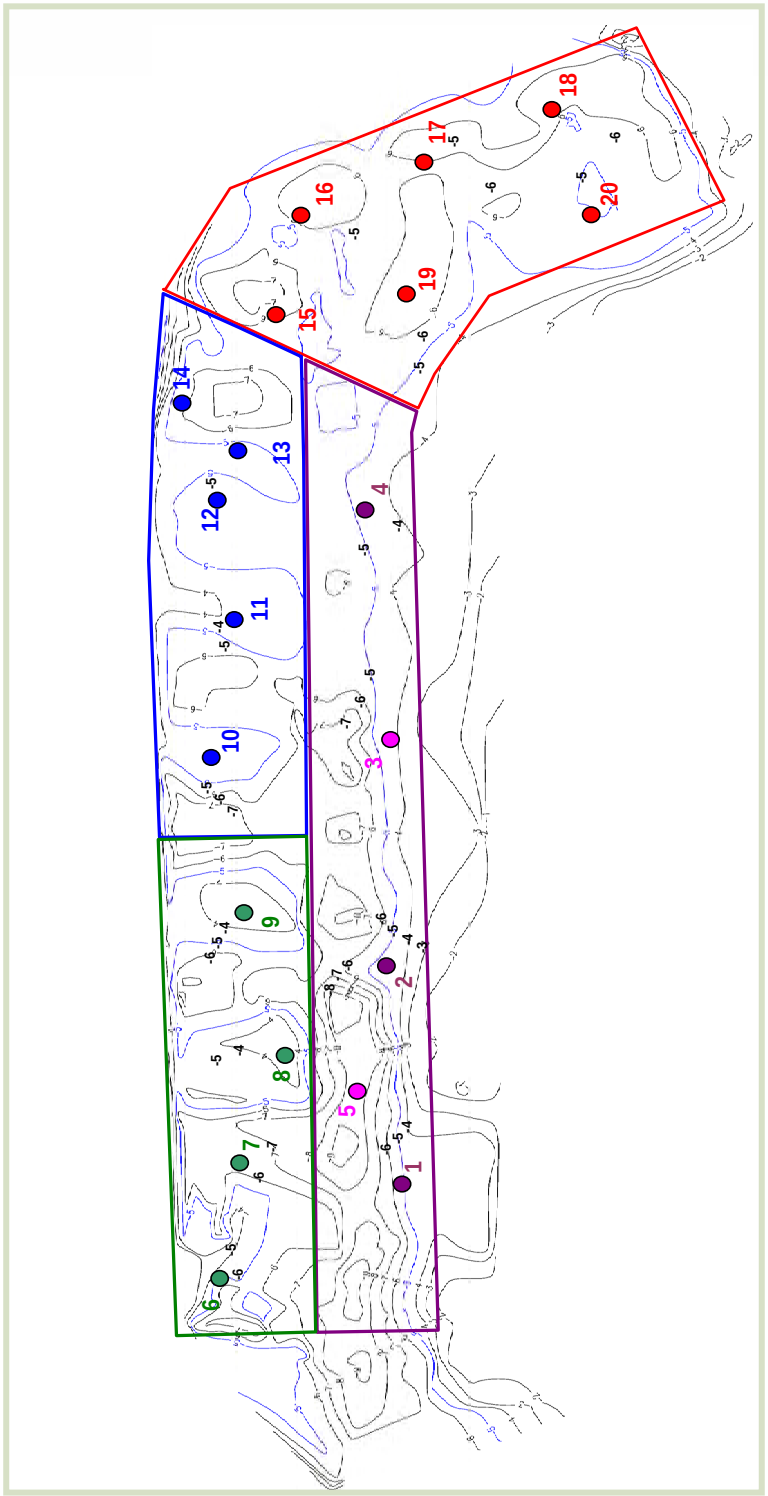


Figure 2-2. Existing Bathymetry with Proposed Sample Areas and Station Locations.

Marina Park Dredged Material Evaluation (Newfields 2009a)

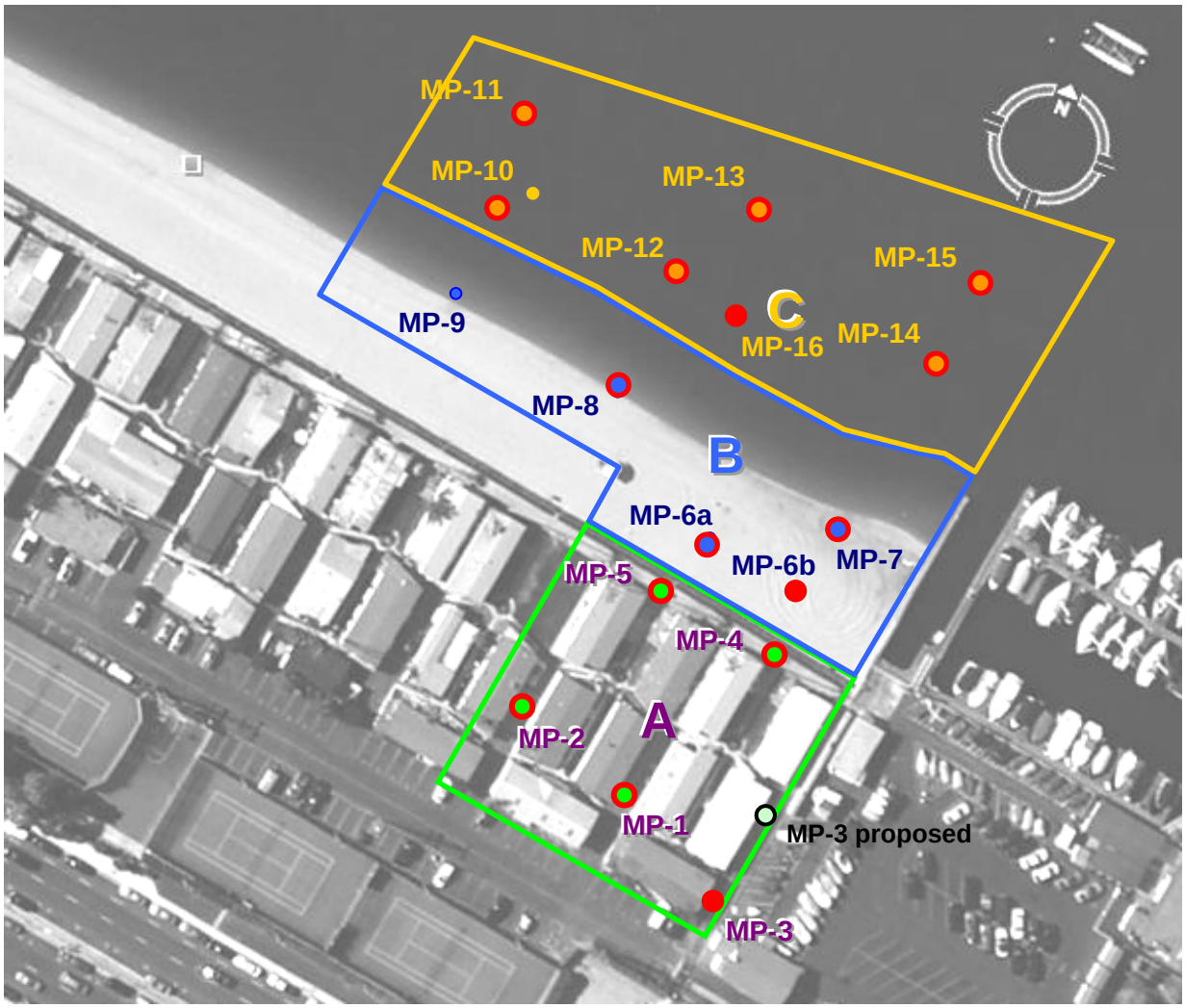


Figure 3. Area and Station Locations. Proposed locations denoted by green, blue and orange symbols. Actual locations denoted by red symbols.

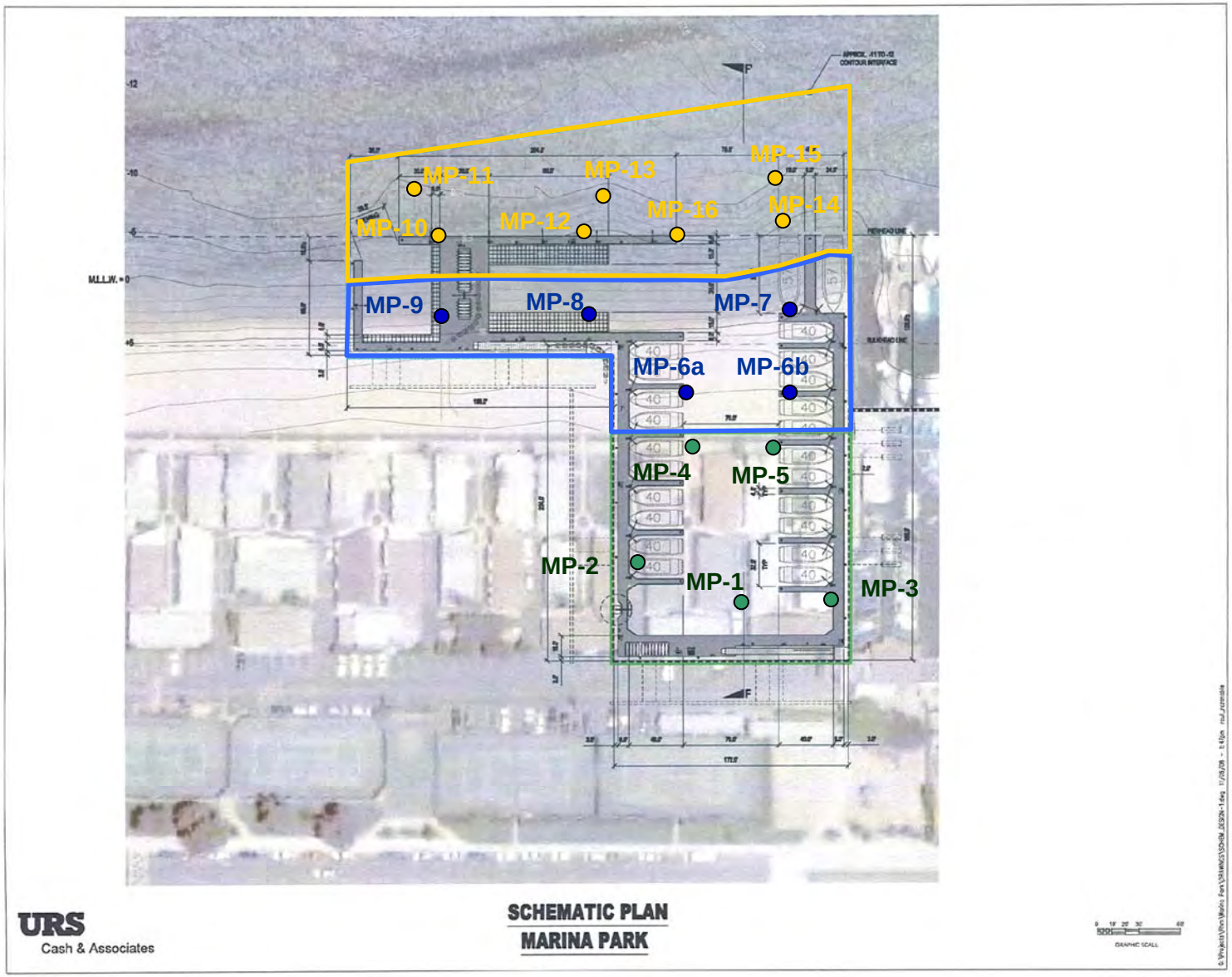


Figure 4. Project Areas and Station Locations with Proposed Project Plan and Current Bathymetry

Lower Newport Bay Dredged Material Evaluation (Newfields 2009b)

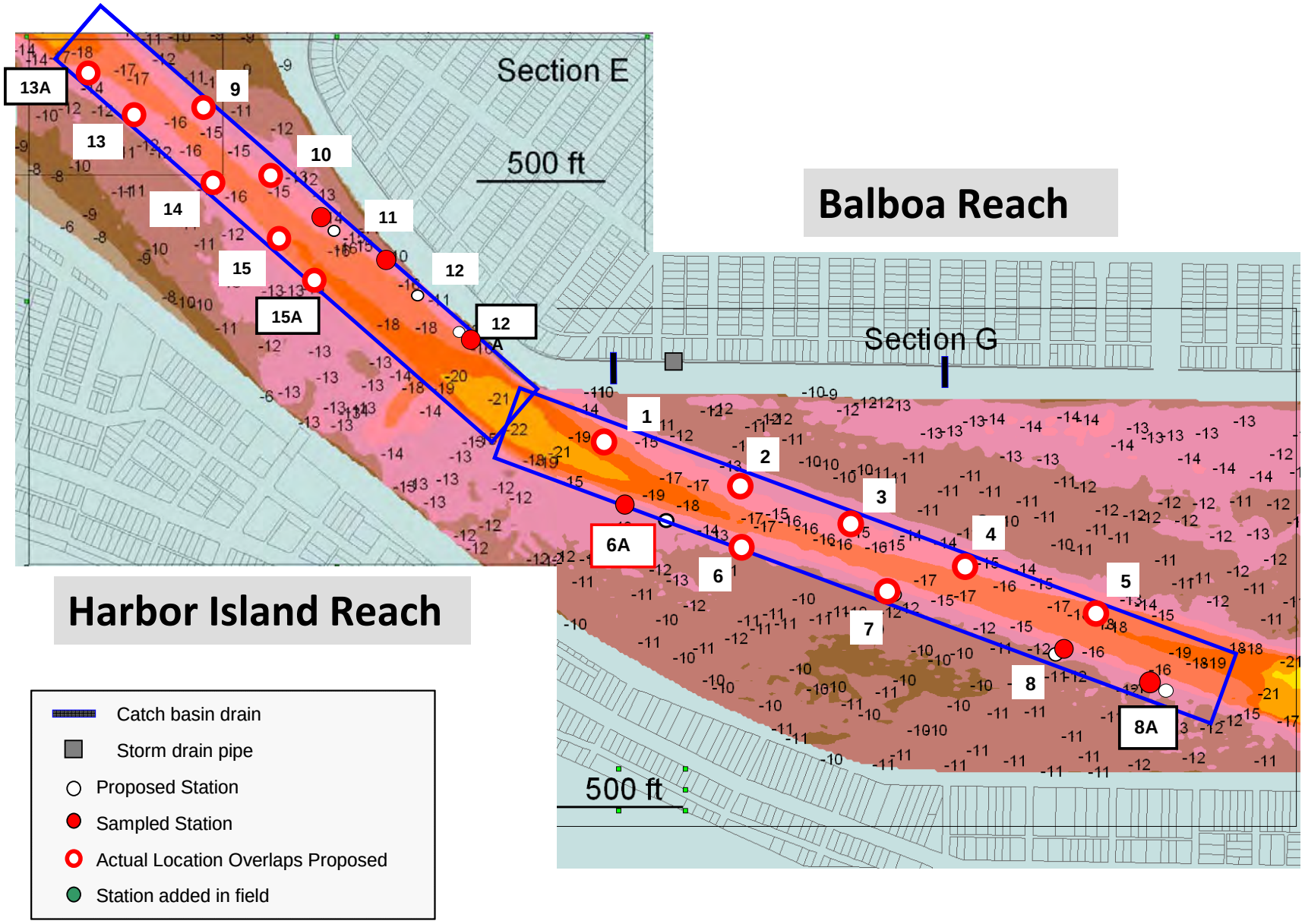


Figure 6-1. Station locations for the Balboa Reach (BR) and Harbor Island Reach (HIR)

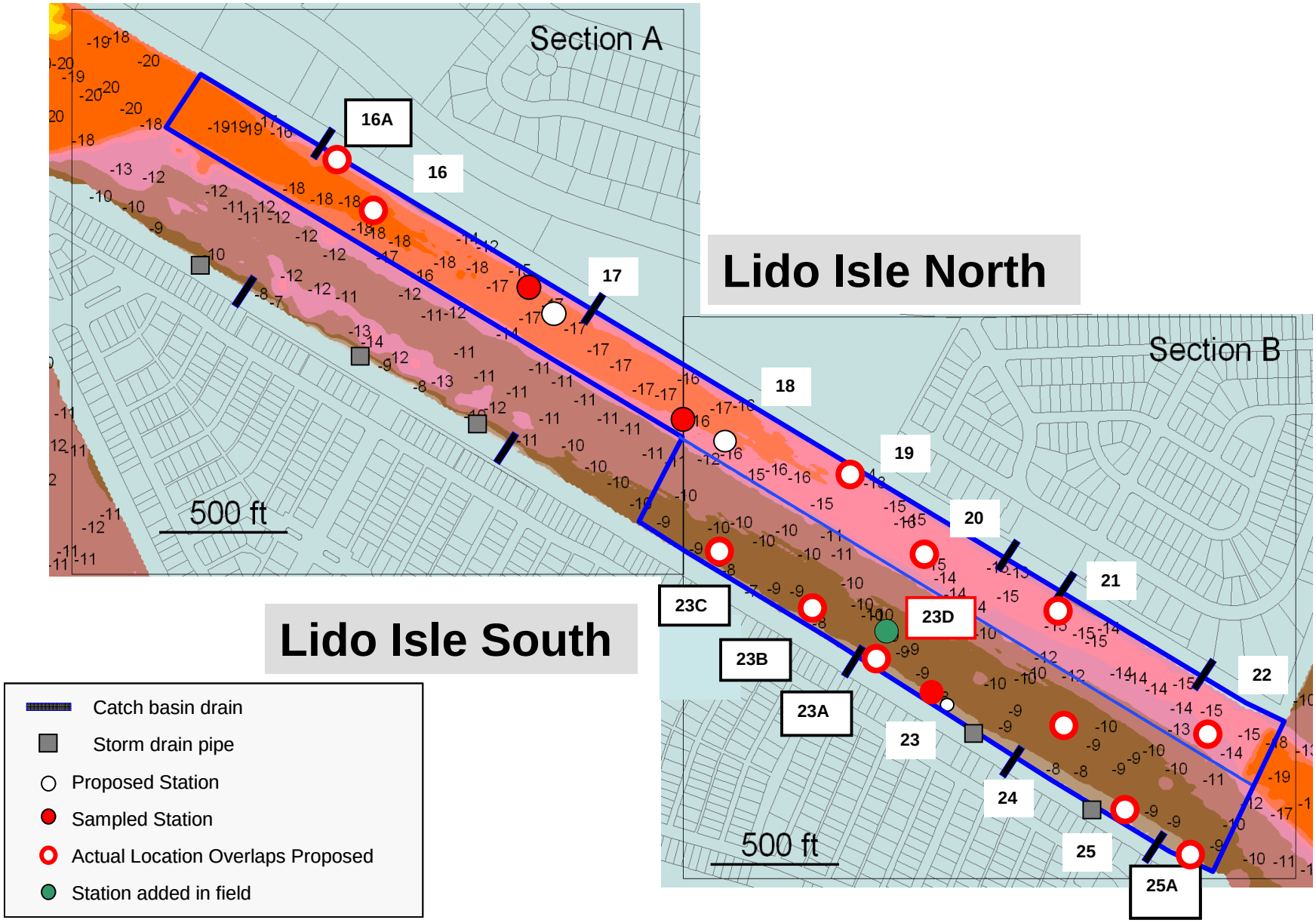


Figure 6-2. Station locations for the Lido Isle Reach –North (LIN) and Lido Isle Reach – South (LIS)

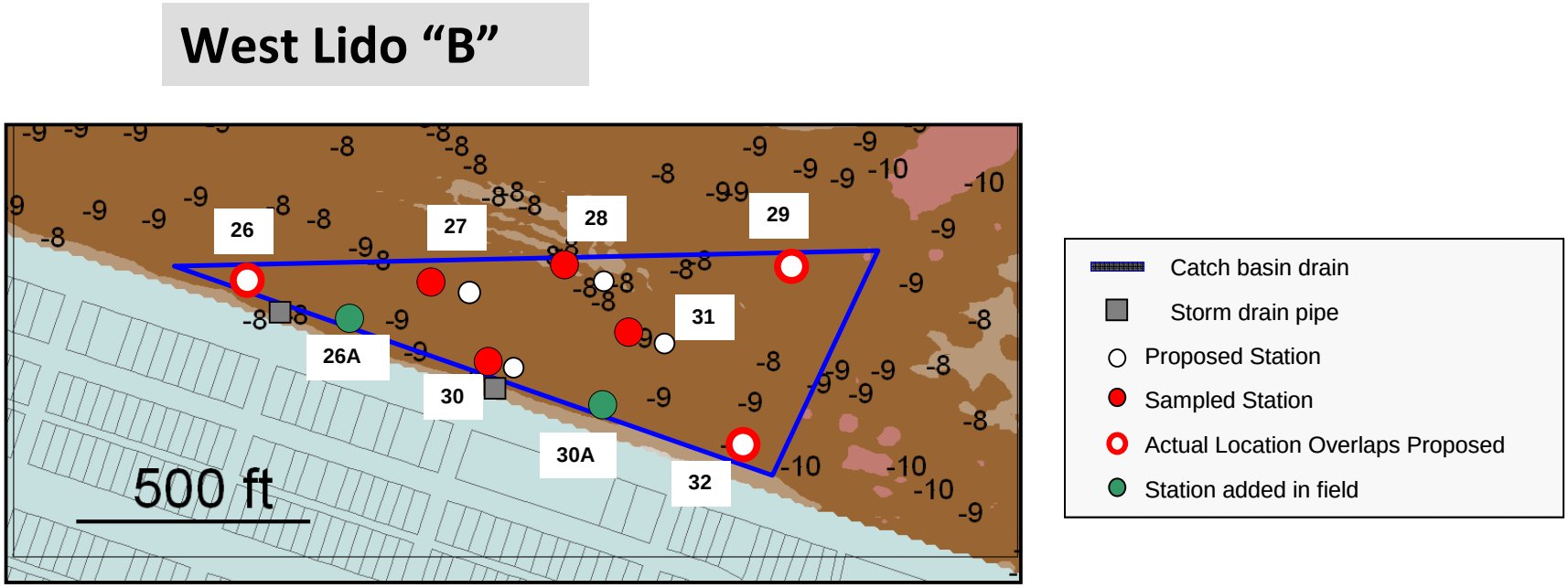


Figure 6-5. Station locations for the West Lido Area "B" (WLB)

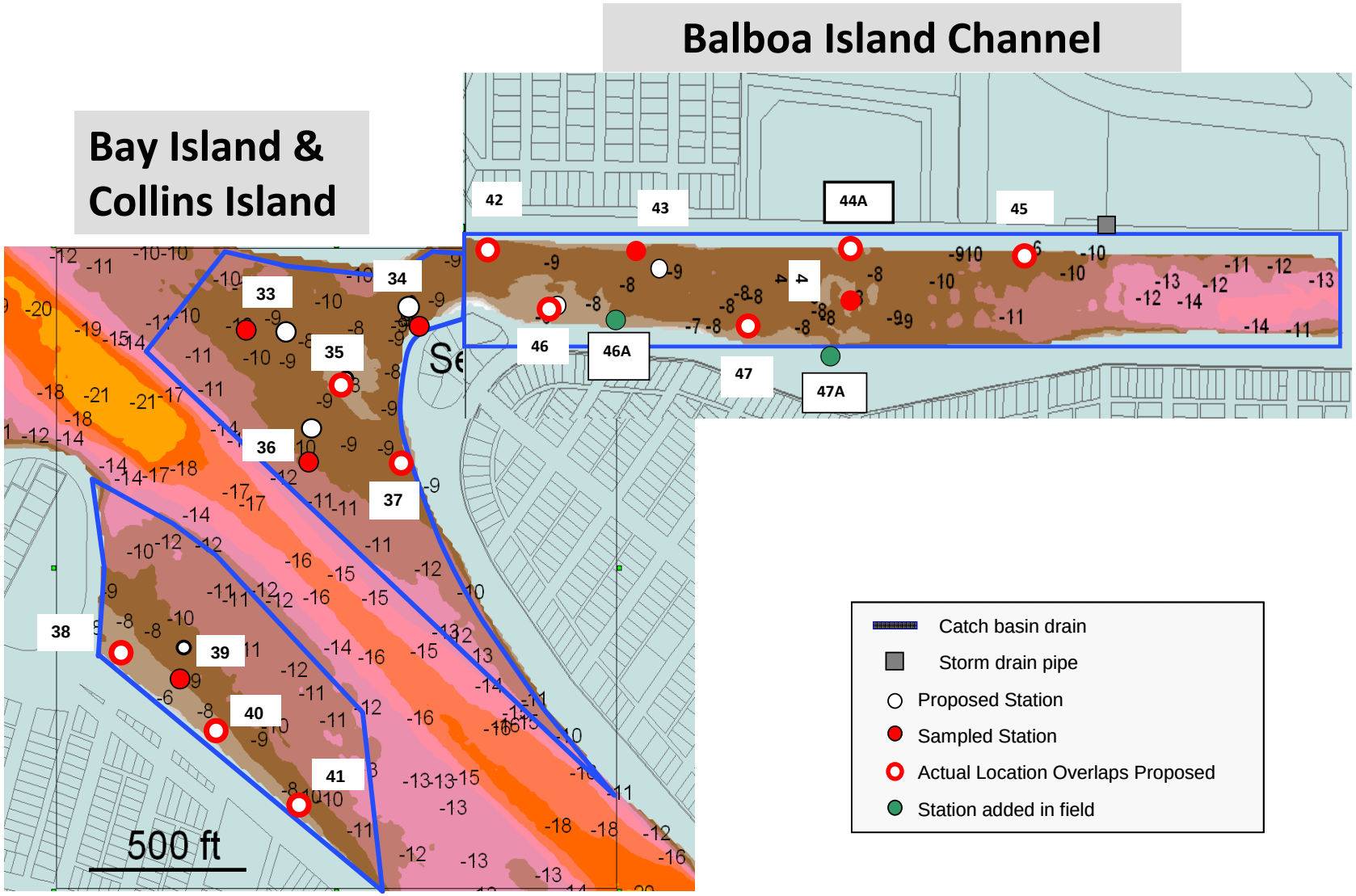


Figure 6-4. Station locations for the Bay Island Anchorage and Collins Island Subarea (BICI) and Balboa Island Channel

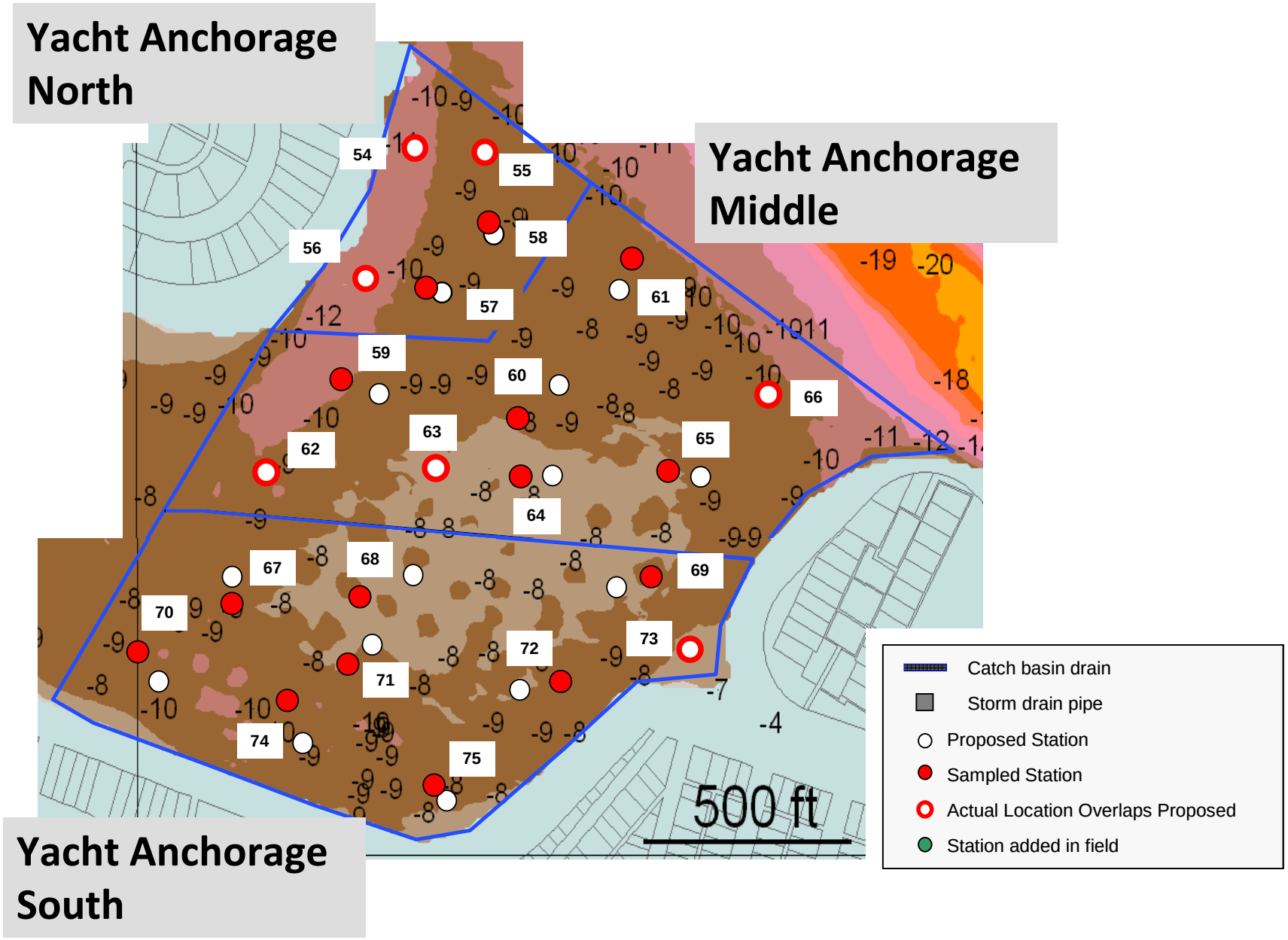


Figure 6-5. Station locations for Yacht Anchroage North (YAN), Middle, (YAM), and South (YAS)

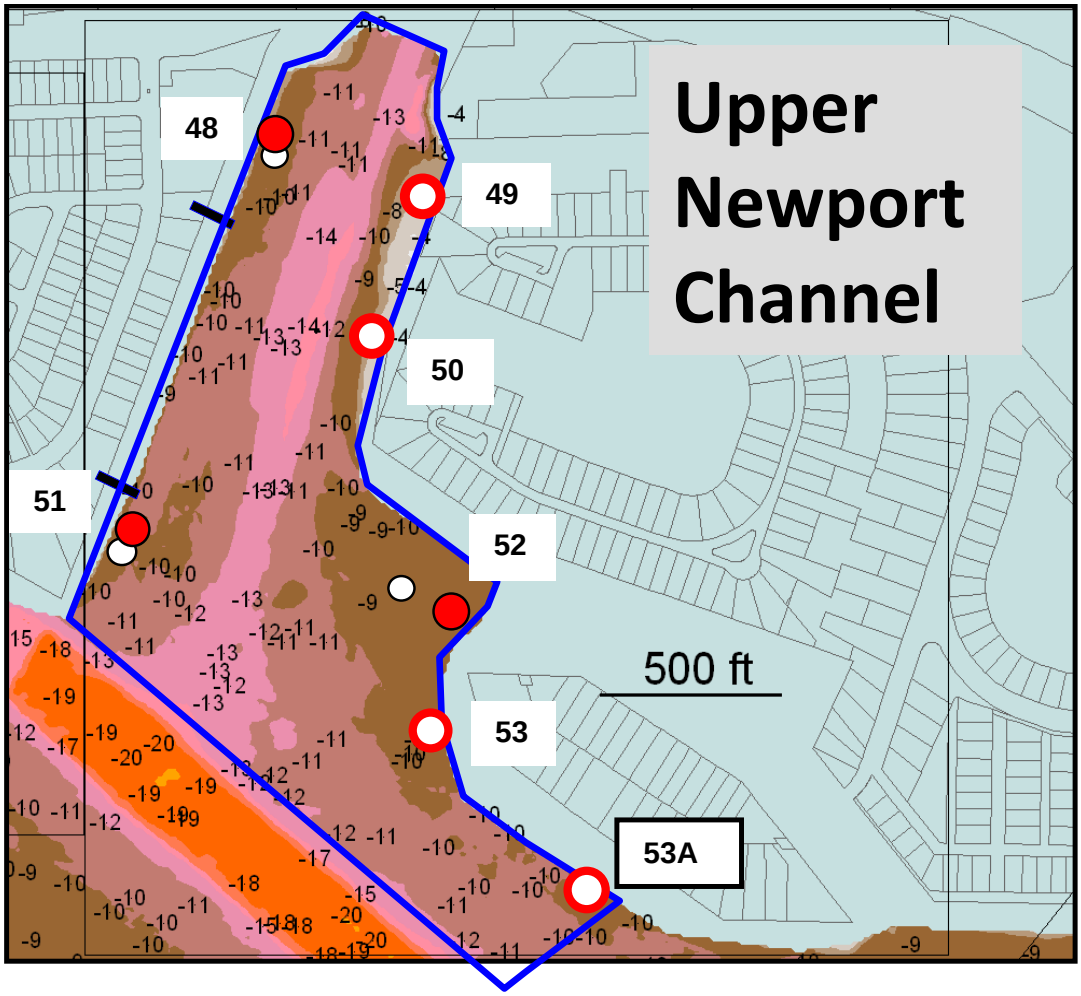


Figure 6-6. Station locations for Upper Newport Channel (UNC)

Harbor Island and Linda Isle Channels (Newfields 2012a)

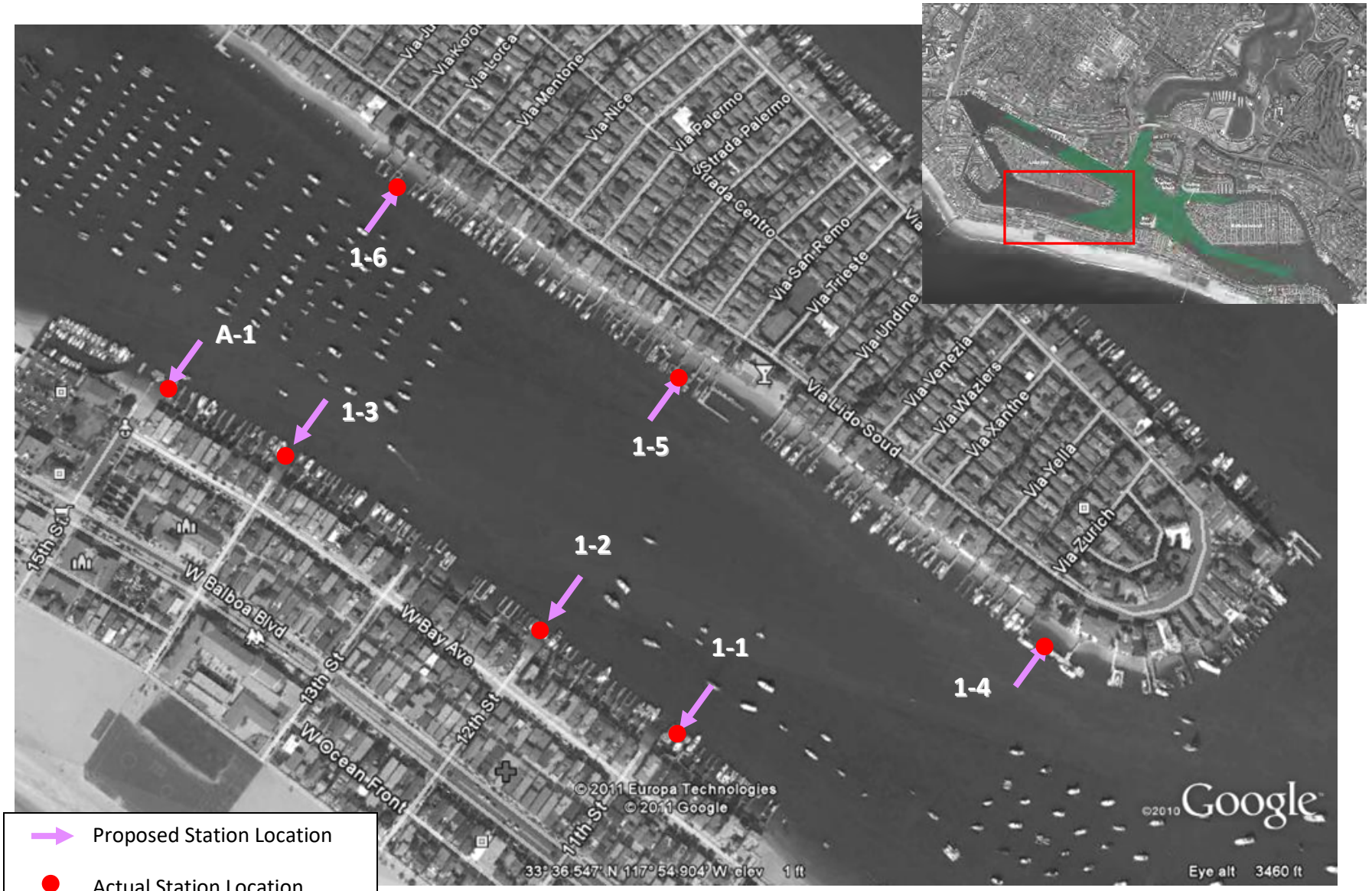


Figure 3-1. Stations Locations within the Harbor Island/Linda Isle Proposed Dredge Area

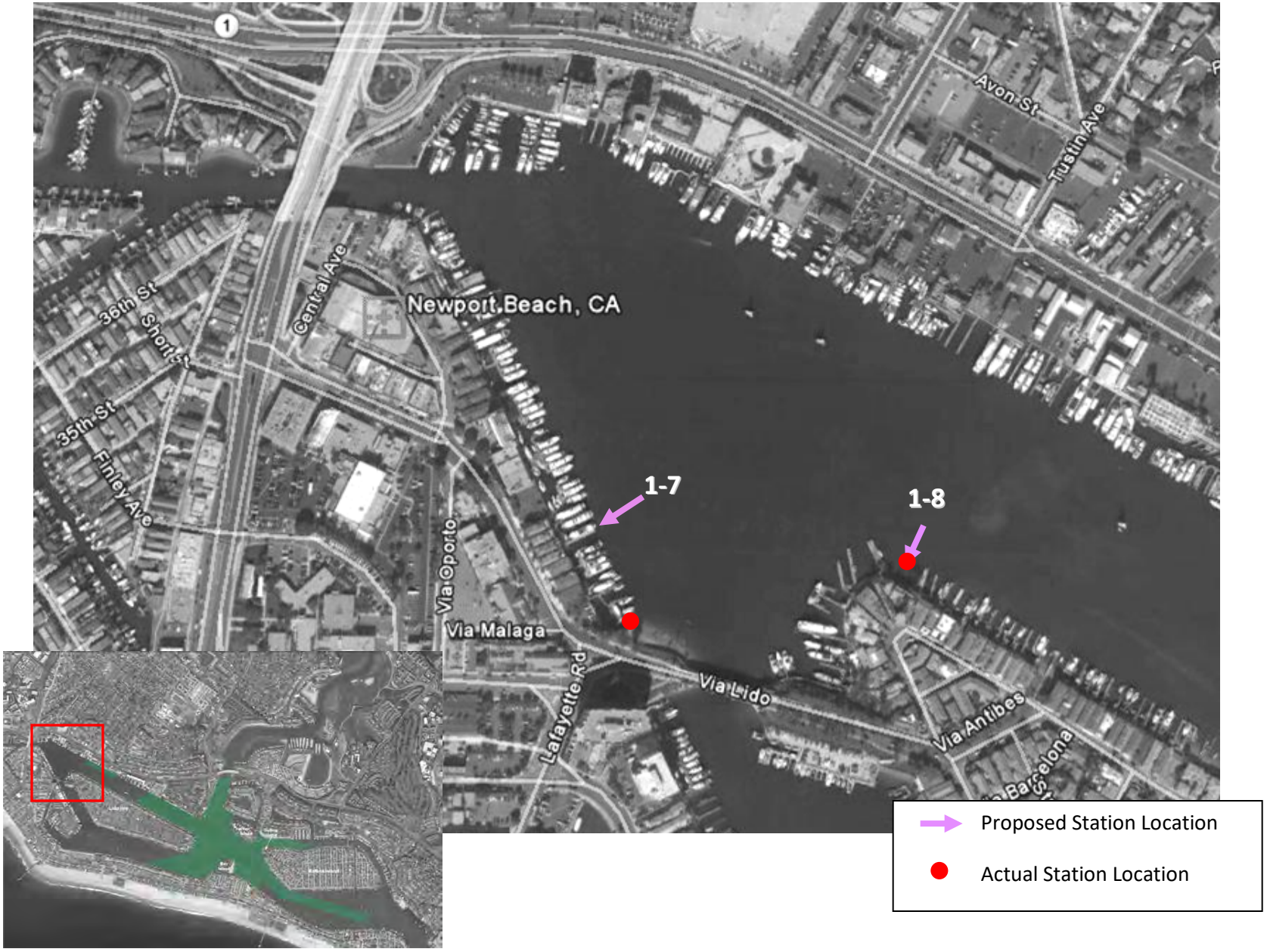
Regional General Permit 54
(Newfields 2012b)



Proposed Study Areas and Station Locations for the Interim RGP-54 Permit Renewal


1-6
A-1
1-3
1-5
1-2
1-1
1-4
Via Lorca
Via Menton
Via Nice
Via Palermo
Strada Palermo
Strada Centro
Via San Remo
Via Trieste
Via Undine
Via Lido Soud
Via Venezia
Via Waziers
Via Xanthe
Via Yella
Via Zurich
15th St
W Balboa Blvd
W Bay Ave
13th St
12th St
11th St
W Ocean Front
© 2011 Europa Technologies
© 2011 Google
©2010 Google
33° 36.547' N 117° 54.904' W elev 1 ft
Eye alt 3460 ft
Proposed Station Location
Actual Station Location

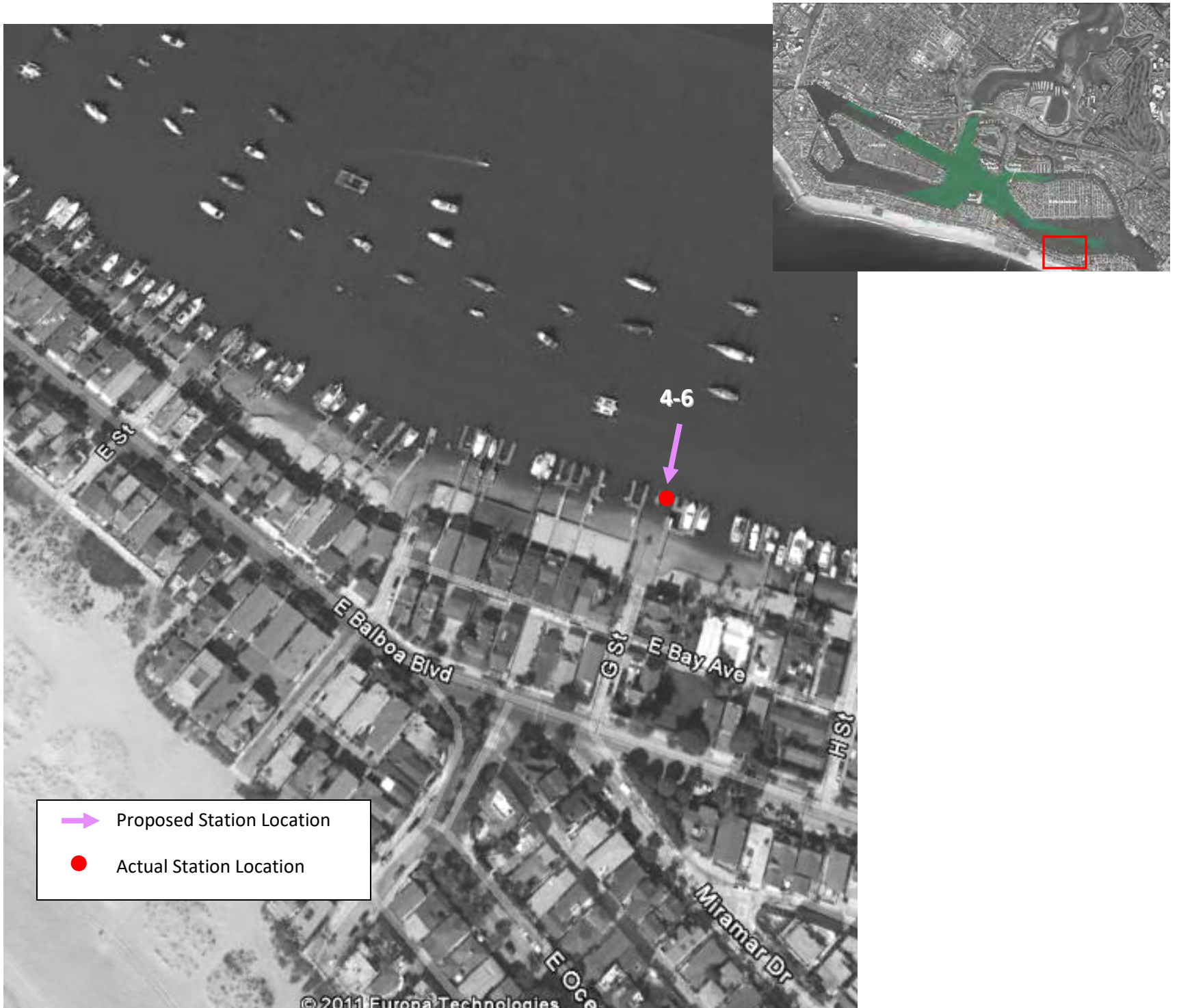

1-8
1-9
1-11
1-10
Via Lido
Lafayette Rd
Lido Park Dr
28th St
Private St
Shipyard Way
Bolivar St
Gabrillo St
Drake St
El Paseo St
Fremont St
Beach St
Anchorage Way
Via Antibes
Via Barcelona
Via Cordova
Via Dijon
Via Eboli
Via Florence
Via Fermo
Via Firenze
Via Genoa
Piazza Lido
Via Havre
Via Ithaca
Via Jucar
Via Loron
Via Lorca
Via Lido Sud
Via Mentone
Strada Centro
Kings Rd
Avon Alley
Cliff Dr
1
© 2011 Europa Technologies
© 2011 Google
33° 36.861' N 117° 55.218' W elev 15 ft
Proposed Station Location
Actual Station Location


1
Avon St
Tustin Ave
Central Ave
36th St
Short St
Newport Beach, CA
35th St
Finley Ave
1-7
1-8
Via Oporto
Via Malaga
Lafayette Rd
Via Lido
Via Antibes
Barcelona
Proposed Station Location
Actual Station Location

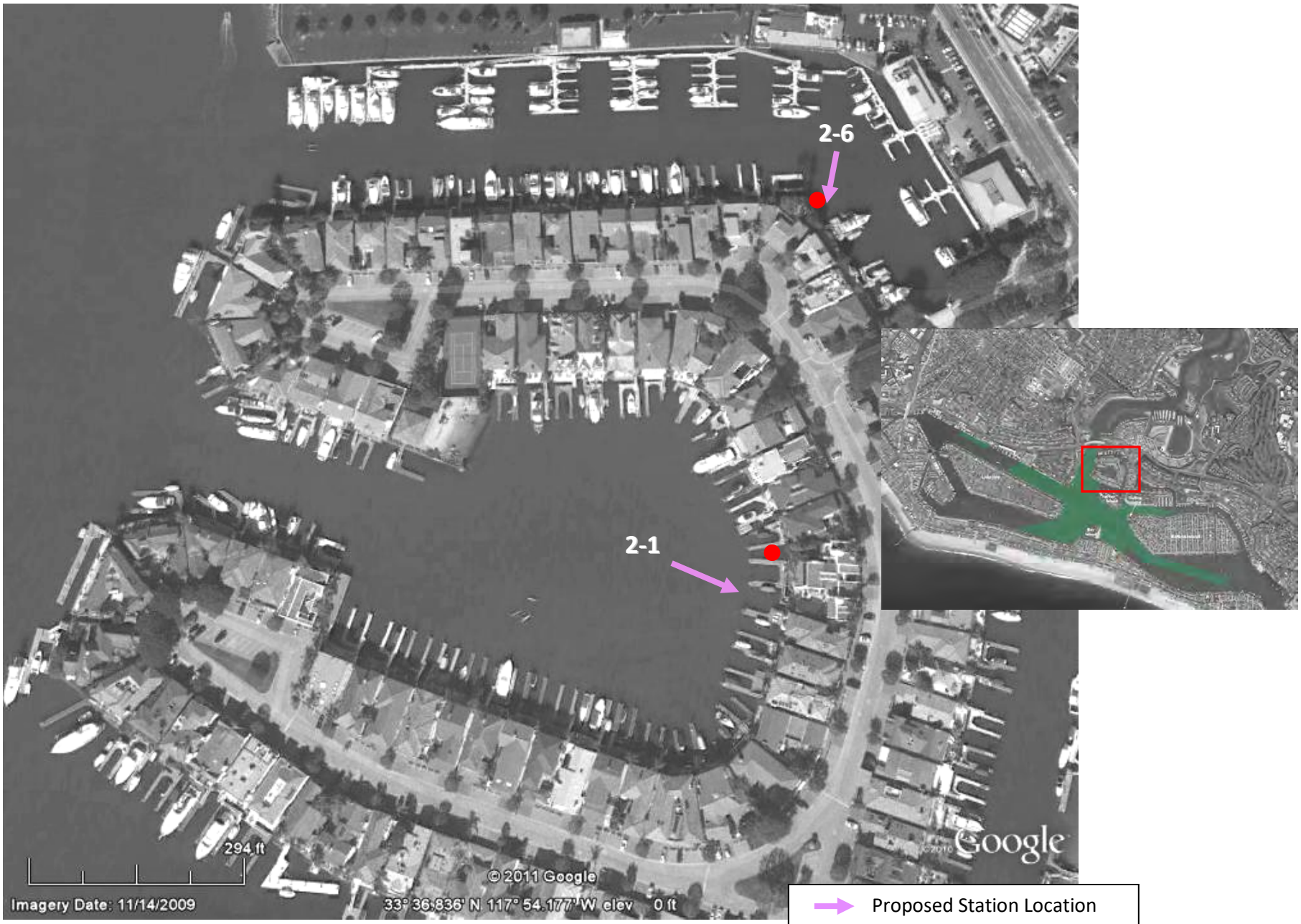


Proposed Station Location

Actual Station Location


4-6
E St
E Balboa Blvd
E Bay Ave
H St
Miramar Dr
Proposed Station Location
Actual Station Location
© 2011 Europa Technologies


S Bay Front
Jade Ave
Bayside Dr
4-4
Proposed Station Location
Actual Station Location
© 2011 Europa Technologies

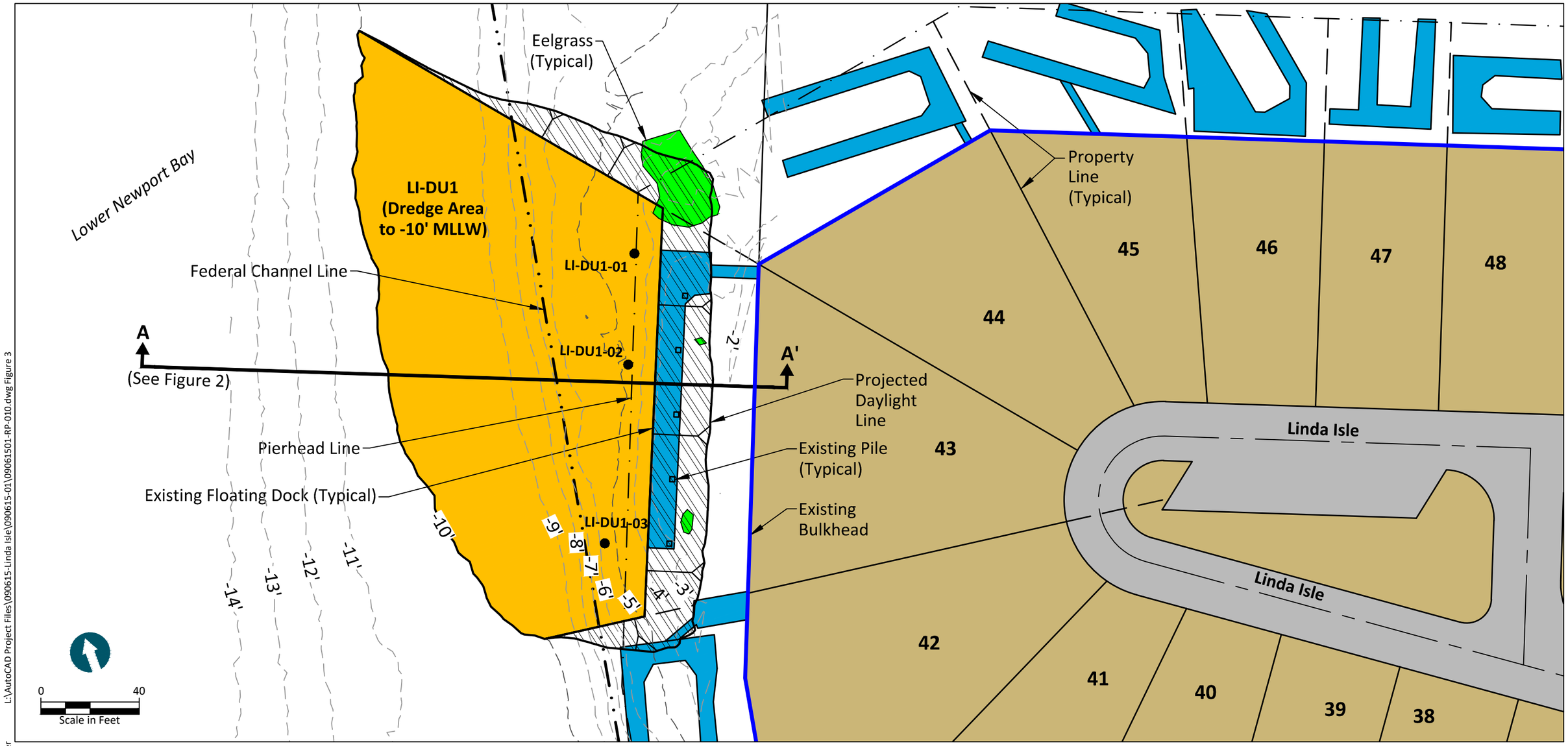

2-6
2-1
294 ft
© 2011 Google
Imagery Date: 11/14/2009
33° 36.836' N 117° 54.177' W elev 0 ft
Google
Proposed Station Location
Actual Station Location


Linda Isle
2-3
2-2
Harbor Island Rd
Harbor Island Dr
Beacon Bay
Cape Cove
© 2011 Europa Technologies
Proposed Station Location
Actual Station Location


2-4
2-5
4-1
Bayside Dr
N Bay Front
Balboa Ave
Yawl Rd
Jamboree Rd
Dolphin Terrace
K Thanga Dr
Santa Cruz
Agate Ave
Opal Ave
Park Ave
Topaz Ave
Turquoise Ave
Collins Ave
Ruby Ave
Diamond Ave
Sapphire Ave
Coral Ave
Apolena Ave
Amethyst Ave
Onyx Ave
Marine Ave
The Grand Canal
Abalone Dr
Abalone Ave
Crystal Ave
E Bay Front
Proposed Station Location
Actual Station Location


A5
A4
A6
A-1
A-1
A3
A2
Proposed Station Location
Actual Station Location

43 Linda Isle (Anchor QEA 2012)



L:\AutoCAD Project Files\090615-Linda Isle\090615-01\09061501-RP-010.dwg Figure 3
Jan 18, 2012 9:12am mpratschner

SOURCE: Drawing prepared from City of Newport Beach base maps and Gahagan & Bryant Associates, Inc.'s October 2010 bathymetry survey.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: mean lower low water (MLLW).

LEGEND:

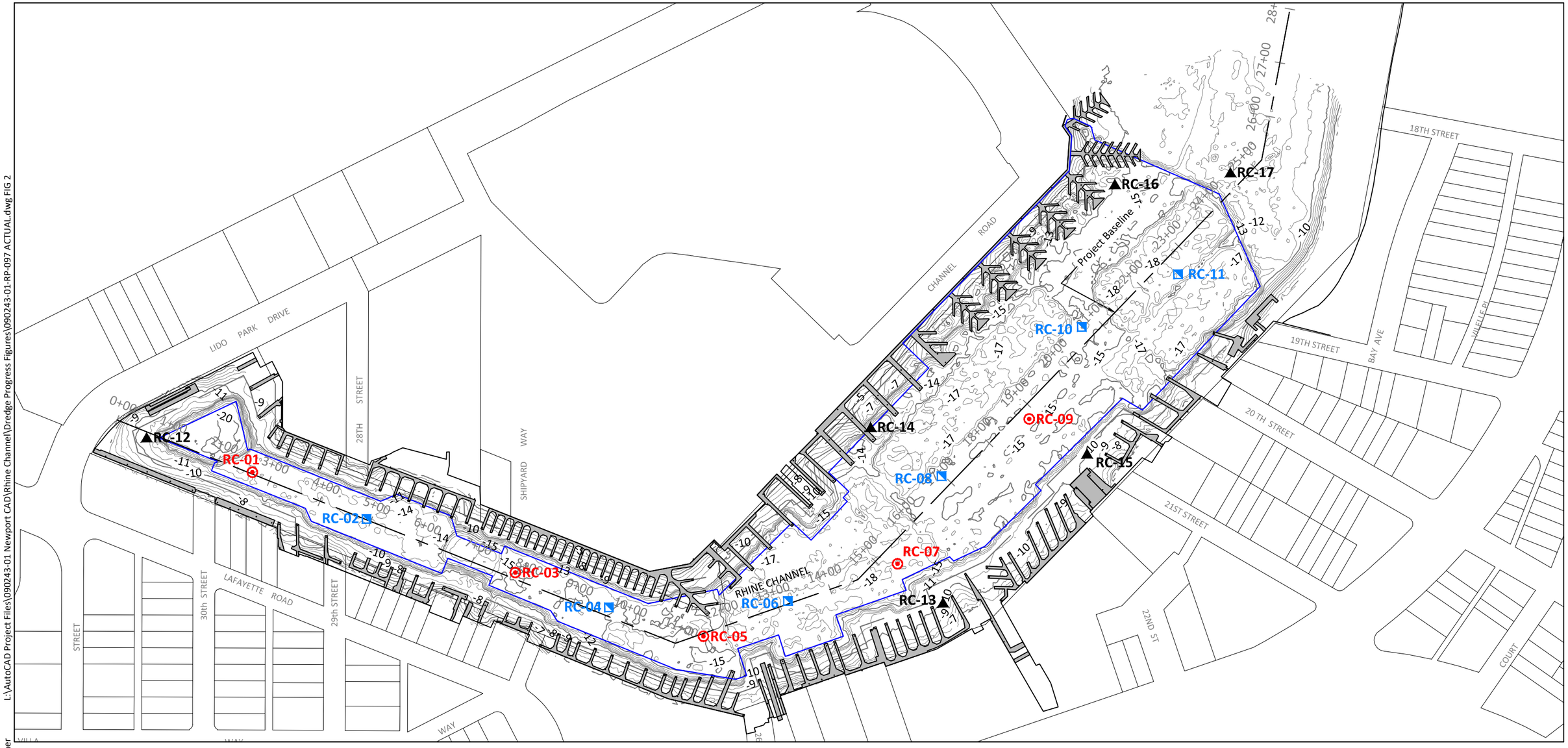
- Eelgrass
- LI-DU1 (Dredge Area to -10' MLLW)
- Projected Side Slope
- Property Line
- Projected Property Line
- Existing Bulkhead
- Existing Floating Dock/Gangway
- Federal Channel Line
- Pierhead Line
- LI-DU1-# Sampling Station

Volume Table	
Estimated Volume to -10' MLLW	2,300 CY
1' Paid Overdepth	800 CY
1' Unpaid Overdepth	800 CY
Total Volume	**3,900 CY**

ANCHOR QEA

Figure 3
Dredge Area and Actual Sampling Locations
43 Linda Isle Maintenance Dredging

Rhine Channel Post-Dredge Confirmatory Sampling (Anchor QEA 2013a)



L:\AutoCAD Project Files\090243-01 Newport CAD\Rhine Channel\Dredge Progress Figures\090243-01-RP-097 ACTUAL.dwg FIG 2

Nov 15, 2013 9:03am mpratschner

SOURCE: Drawing prepared from City of Newport Beach and ESRI basemaps, and all Dutra Surveys performed as of November 1, 2011.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTES:
Contours shown are from post-dredge bathymetric survey conducted by Gahagan & Bryant Associates, Inc., on November 2, 2011.

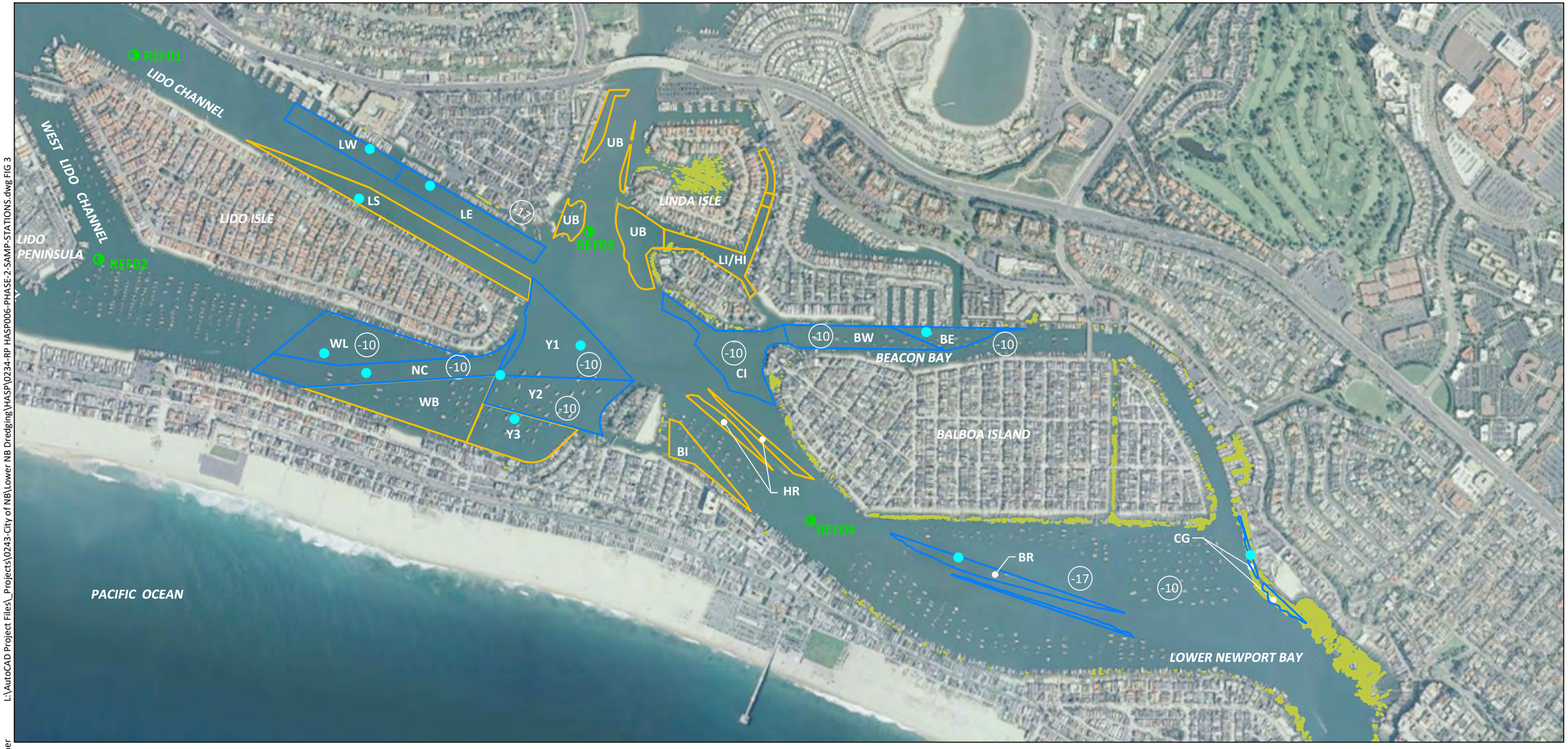
LEGEND:

- ⊙RC-# Actual Sampling Locations for Sediment Coring
- ▲RC-# Actual Sampling Locations for Surface Sediment
- RC-# Actual Sampling Locations for Sediment Coring and Surface Sediment
- -10 Post-Dredge Bathymetry
- Dredge Boundary

ANCHOR QEA

Figure 2
Post-Dredge Bathymetric Data and Actual Sampling Locations
Rhine Channel Contaminated Sediment Cleanup

Lower Newport Federal Channels
Post-Dredge Sampling
(Anchor QEA 2013b)



L:\AutoCAD Project Files_Projects\0243-City of NB\Lower NB Dredging\HASP\0234-RP HASP006-PHASE-2-SAMP-STATIONS.dwg FIG 3

Jul 19, 2013 11:52am mpratschner

SOURCE: Drawing prepared from Bing maps. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Phase I Dredge Unit
- Phase II Dredge Unit
- -10 Dredge Depth
- REF# Reference Site
- Sampling Locations

0 1000
Scale in Feet

ANCHOR QEA

Figure 3
Post-Dredge Sediment Sampling Locations
Lower Newport Bay Federal Dredging

Regional General Permit 54 – Preliminary Testing for Sample Compositing (Anchor QEA 2013c, 2013d)



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations

- Area 1a
- Area 1b
- Area 2
- Area 3
- Area 4a
- Area 4b
- Area 5

0 1500
Scale in Feet

L:\AutoCAD Project Files\090243-01 Newport CAD\Lower Newport Bay\RGP 54\090243-01-RP-0011 RGP 54 AREAS-ACTUAL OVERALL.dwg Fig 3
Oct 14, 2013 1:35pm mpratschner

ANCHOR QEA

Figure 3
Actual Sampling Locations
RGP 54 Sediment Characterization



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations

Area 1a

Area 1b

0 1,300

Scale in Feet

L:\AutoCAD Project Files\090243-01 Newport CAD\Lower Newport Bay\RGP 54\090243-01-RP-0011 RGP 54 AREAS-ACTUAL.dwg FIG 4

Oct 14, 2013 12:50pm mpratschner

ANCHOR QEA

Figure 4
Area 1 Boundary and Actual Sampling Locations
RGP 54 Sediment Characterization



L:\AutoCAD Project Files\090243-01 Newport CAD\Lower Newport Bay\RGP 54\090243-01-RP-0011 RGP 54 AREAS-ACTUAL.dwg FIG 5

Oct 14, 2013 3:13pm mpratschner

SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations

Area 3

0 700

Scale in Feet

ANCHOR QEA

Figure 5
Area 2 Boundary and Actual Sampling Locations
RGP 54 Sediment Characterization



L:\AutoCAD Project Files\090243-01 Newport CAD\Lower Newport Bay\RGP 54\090243-01-RP-0011 RGP 54 AREAS-ACTUAL.dwg FIG 6

Oct 14, 2013 1:04pm mpratschner

SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations

Area 3

0 800

Scale in Feet

ANCHOR QEA

Figure 6
Area 3 Boundary and Actual Sampling Locations
RGP 54 Sediment Characterization



L:\AutoCAD Project Files\090243-01 Newport CAD\Lower Newport Bay\RGP 54\090243-01-RP-0011 RGP 54 AREAS-ACTUAL.dwg FIG 7

Oct 14, 2013 3:15pm mpratschner

SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations

Area 4a

Area 4b

0 1,600

Scale in Feet

ANCHOR QEA

Figure 7
Area 4 Boundary and Actual Sampling Locations
RGP 54 Sediment Characterization



L:\AutoCAD Project Files\090243-01 Newport CAD\Lower Newport Bay\RGP 54\090243-01-RP-0011 RGP 54 AREAS-ACTUAL.dwg FIG 8

Oct 14, 2013 3:16pm mpratschner

SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone VI, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations

Area 5

0 500
Scale in Feet

ANCHOR QEA

Figure 8
Area 5 Boundary and Actual Sampling Locations
RGP 54 Sediment Characterization

Balboa Marina West (Newfields 2014)

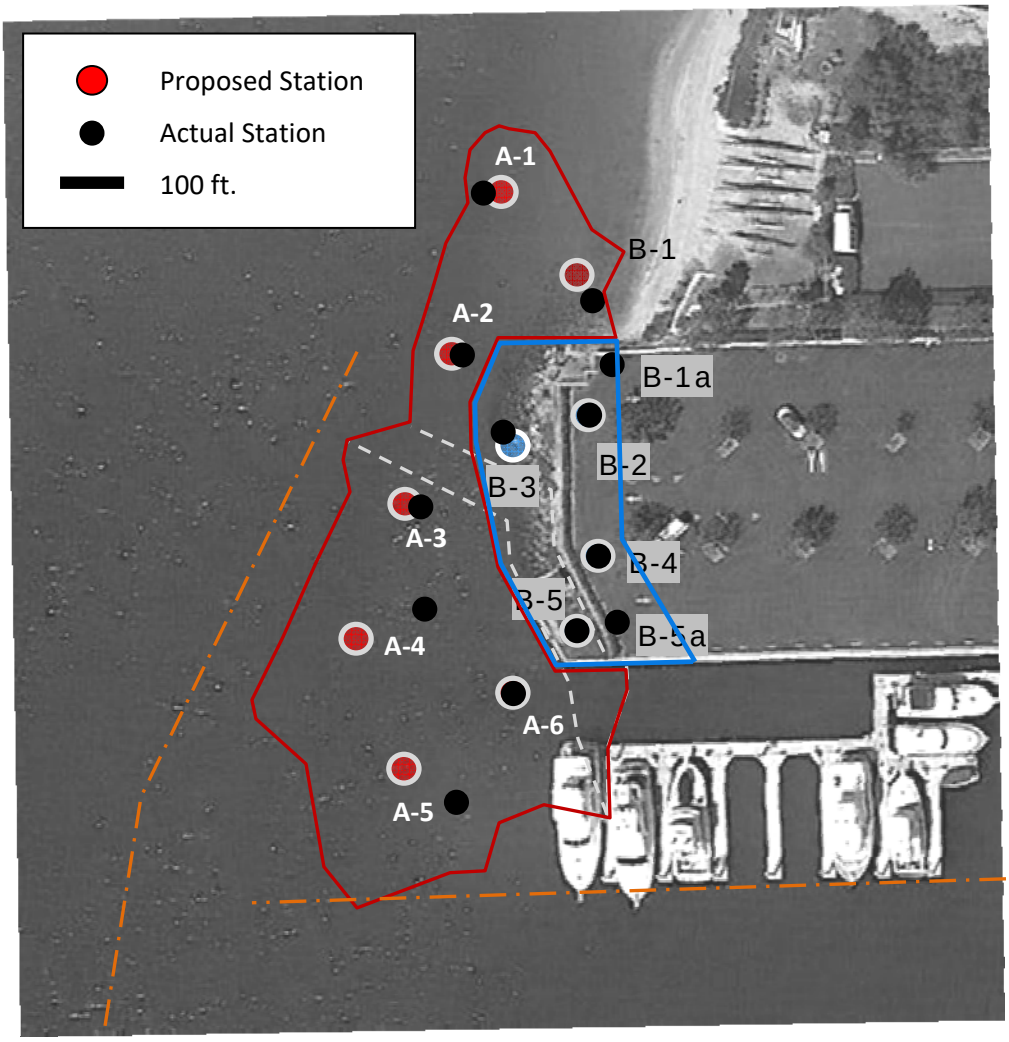
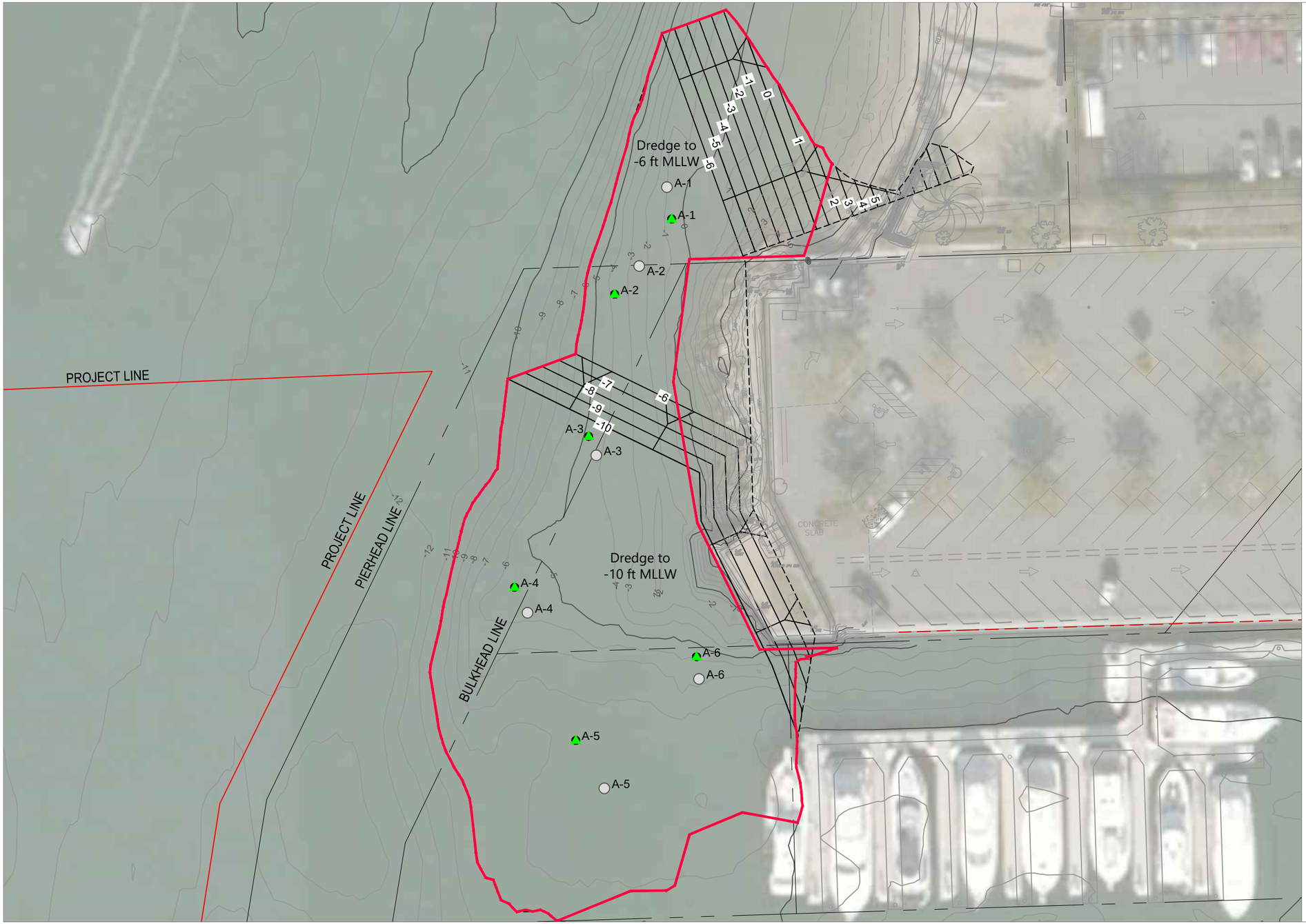


Figure 6. Station Locations for the Balboa Marina West project. The Area A boundary has been modified from the proposed sampling design to reflect the inclusion of Station B-1 in the Area A composite. See Section 3.2 for explanation.

Balboa Marina West (Anchor QEA 2017)



LEGEND:

- Existing Bathymetry Contours (10/14/2016 GBA, 1-ft Intervals)
- Target Sampling Locations
- Actual Sampling Locations
- Area A
- Projected Side Slopes

HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

0 40
Feet

Publish Date: 2017/11/27 3:41 PM | User: mpratschner
Filepath: K:\Projects\0483-Irvine Co\Balboa marina West\0483-RP-006 DREDGE AND SAMPLE.dwg FIG 4

ANCHOR QEA

Figure 4
Dredge Area and Sampling Locations
Balboa Marina West Dredging and Public/Transient Dock Development
City of Newport Beach and Irvine Company

Regional General Permit 54
(Anchor QEA 2018a)



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations (-10 ft + 2 ft Overdepth)

⊙#-# Actual Sampling Locations (-7 ft + 1 ft Overdepth)

Area 1
Area 2
Area 3
Area 4
Area 5

0 1,500
Feet

Publish Date: 2018/06/08 12:25 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\RGP 54\0243-RP-014 RGP 54 ACTUAL.dwg Figure 3

ANCHOR QEA

Figure 3
Project Areas and Actual Sampling Locations
RGP 54 Sediment Characterization



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

#-# Actual Sampling Locations (-10 ft + 2 ft Overdepth) — Area 1

#-# Actual Sampling Locations (-7 ft + 1 ft Overdepth)

0 1000
Feet

Publish Date: 2018/06/08 12:37 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\RGP 54\0243-RP-015 RGP 54 ACTUAL_AREA1.dwg FIG 4

ANCHOR QEA

Figure 4
Project Areas and Actual Sampling Locations - Area 1
RGP 54 Sediment Characterization



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations (-10 ft + 2 ft Overdepth)

Area 2

0 500
Feet

Publish Date: 2018/06/08 12:42 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\RGP 54\0243-RP-016 RGP 54 ACTUAL_AREA2.dwg FIG 5

ANCHOR QEA

Figure 5
Project Areas and Actual Sampling Locations - Area 2
RGP 54 Sediment Characterization



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations (-10 ft + 2 ft Overdepth)

Area 3

0 600
Feet

Publish Date: 2018/06/08 12:47 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\RGP 54\0243-RP-017 RGP 54 ACTUAL_AREA3.dwg FIG 6

ANCHOR QEA

Figure 6
Project Areas and Actual Sampling Locations - Area 3
RGP 54 Sediment Characterization



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations (-10 ft + 2 ft Overdepth)

◔#-# Actual Sampling Locations (-7 ft + 1 ft Overdepth)

Area 4

0 1000
Feet

Publish Date: 2018/06/08 1:17 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\RGP 54\0243-RP-018 RGP 54 ACTUAL_AREA4.dwg FIG 7

ANCHOR QEA

Figure 7
Project Areas and Actual Sampling Locations - Area 4
RGP 54 Sediment Characterization



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

⊙#-# Actual Sampling Locations (-10 ft + 2 ft Overdepth)

Area 5

0 500
Feet

Publish Date: 2018/06/08 1:22 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\RGP 54\0243-RP-019 RGP 54 ACTUAL_AREA5.dwg FIG 8

ANCHOR QEA

Figure 8
Project Areas and Actual Sampling Locations - Area 5
RGP 54 Sediment Characterization



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

●# Additional Sampling Locations from April 2018 (-10 ft MLLW + 2 ft Overdepth)

●# Initial Sampling Locations from September and October 2017

0 1000
Feet

Publish Date: 2018/06/08 1:29 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\RGP 54\0243-RP-020 MERCURY AREA 1.dwg FIG 9

ANCHOR QEA

Figure 9
Additional Sampling Locations - Area 1
RGP 54 Sediment Characterization



SOURCE: Aerial from Bing maps. Lotlines from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

●# Additional Sampling Locations from April 2018 (-10 ft MLLW + 2 ft Overdepth)

●# Initial Sampling Locations from September and October 2017

0 500
Feet

Publish Date: 2018/06/08 1:41 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\RGP 54\0243-RP-021 MERCURY AREA 5.dwg FIG 10

ANCHOR QEA

Figure 10
Additional Sampling Locations - Area 5
RGP 54 Sediment Characterization

Lower Newport Federal Channels Dredging (Anchor QEA 2018b)



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- -20 Design Depth
- Dredge Footprint
- -10 Existing Bathymetry

0 1,400
Feet

Publish Date: 2017/12/04 11:56 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-011 PROPOSED SAMPLING.dwg FIG 4

ANCHOR QEA

Figure 4
Overview of Dredge Units and Bathymetry
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- -20 — Design Depth
- Dredge Footprint
- ⊙-# — Actual Sampling Location
- —10— Existing Bathymetric Contour
- -16.5 — Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 7:40 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015A ACTUAL SAMPLING.dwg FIG 6

ANCHOR QEA

Figure 5
Dredge Unit, Bathymetry, and Actual Sampling Locations - Turning Basin
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- -20 — Design Depth
- Dredge Footprint
- -# — Actual Sampling Location
- -10 — Existing Bathymetric Contour
- -16.5 — Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 9:06 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015B ACTUAL SAMPLING.dwg FIG 7

ANCHOR QEA

Figure 6
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 1
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

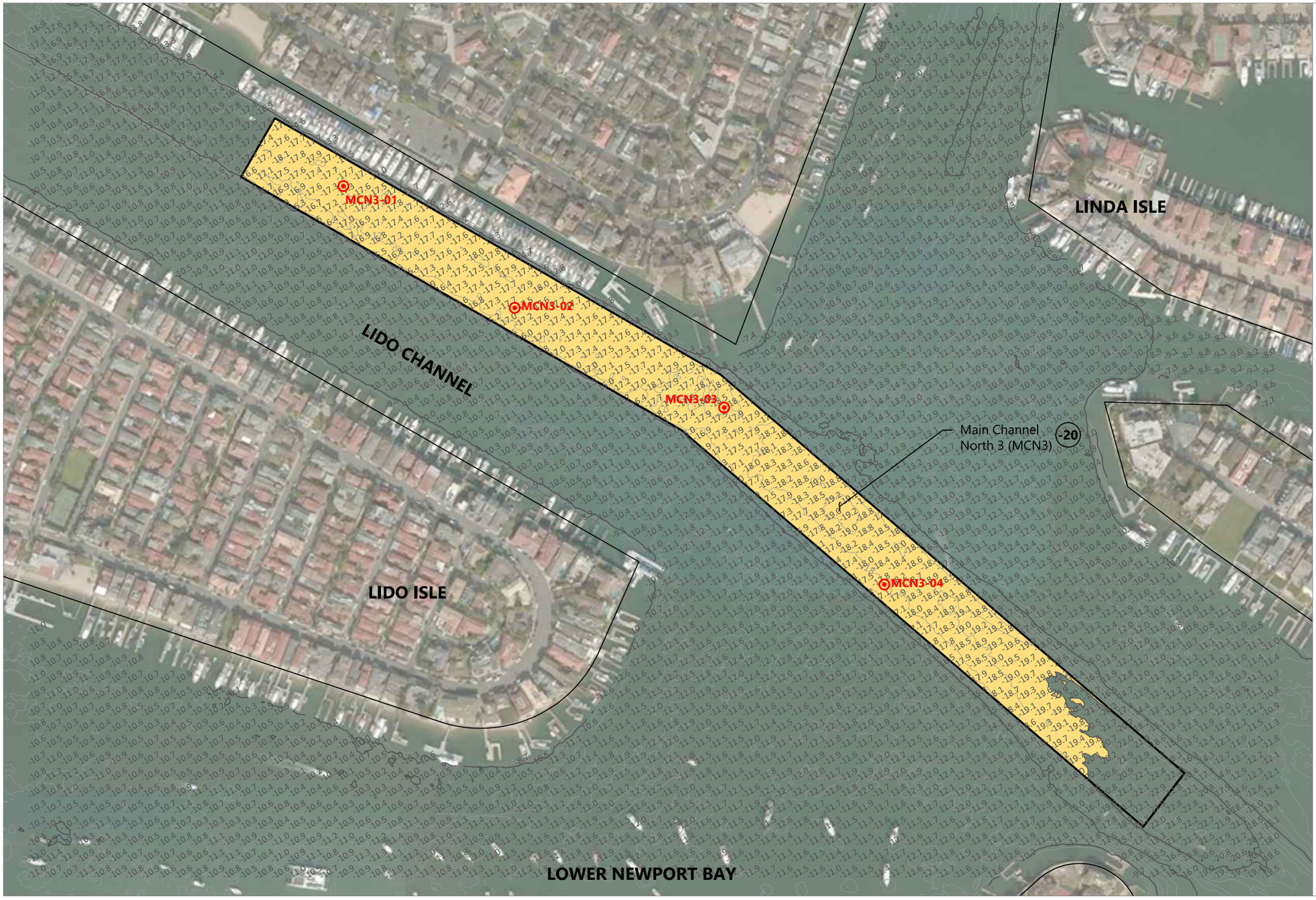
- Dredge Unit Boundary
- -20 — Design Depth
- Dredge Footprint
- -# — Actual Sampling Location
- -10 — Existing Bathymetric Contour
- -16.5 — Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 9:11 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015C ACTUAL SAMPLING.dwg FIG 8

ANCHOR QEA

Figure 7
Dredge Unit, Bathymetry and Actual Sampling Locations - Main Channel North 2
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

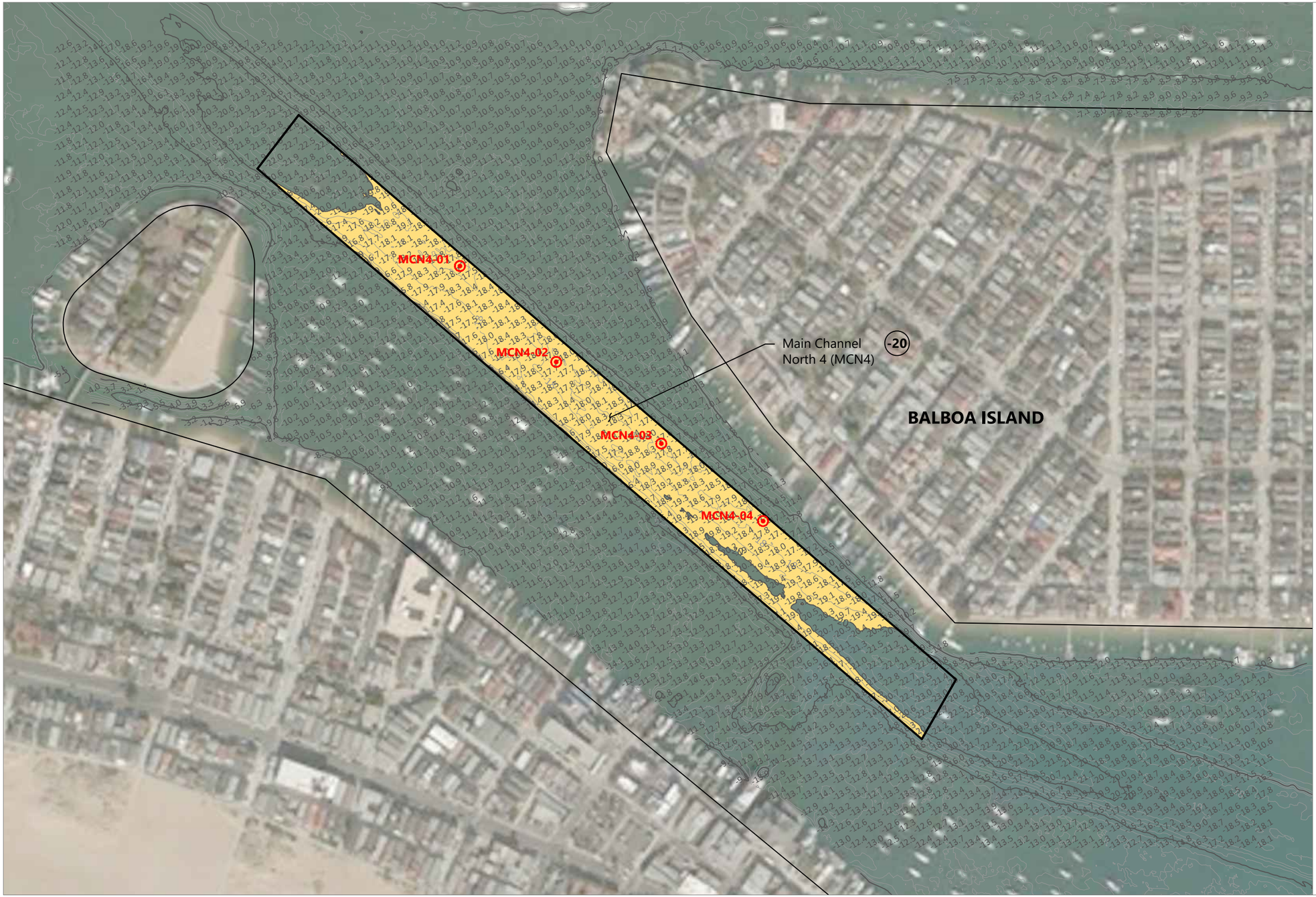
- Dredge Unit Boundary
- (-20) Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 10:36 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015D ACTUAL SAMPLING.dwg FIG 9

ANCHOR QEA

Figure 8
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 3
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

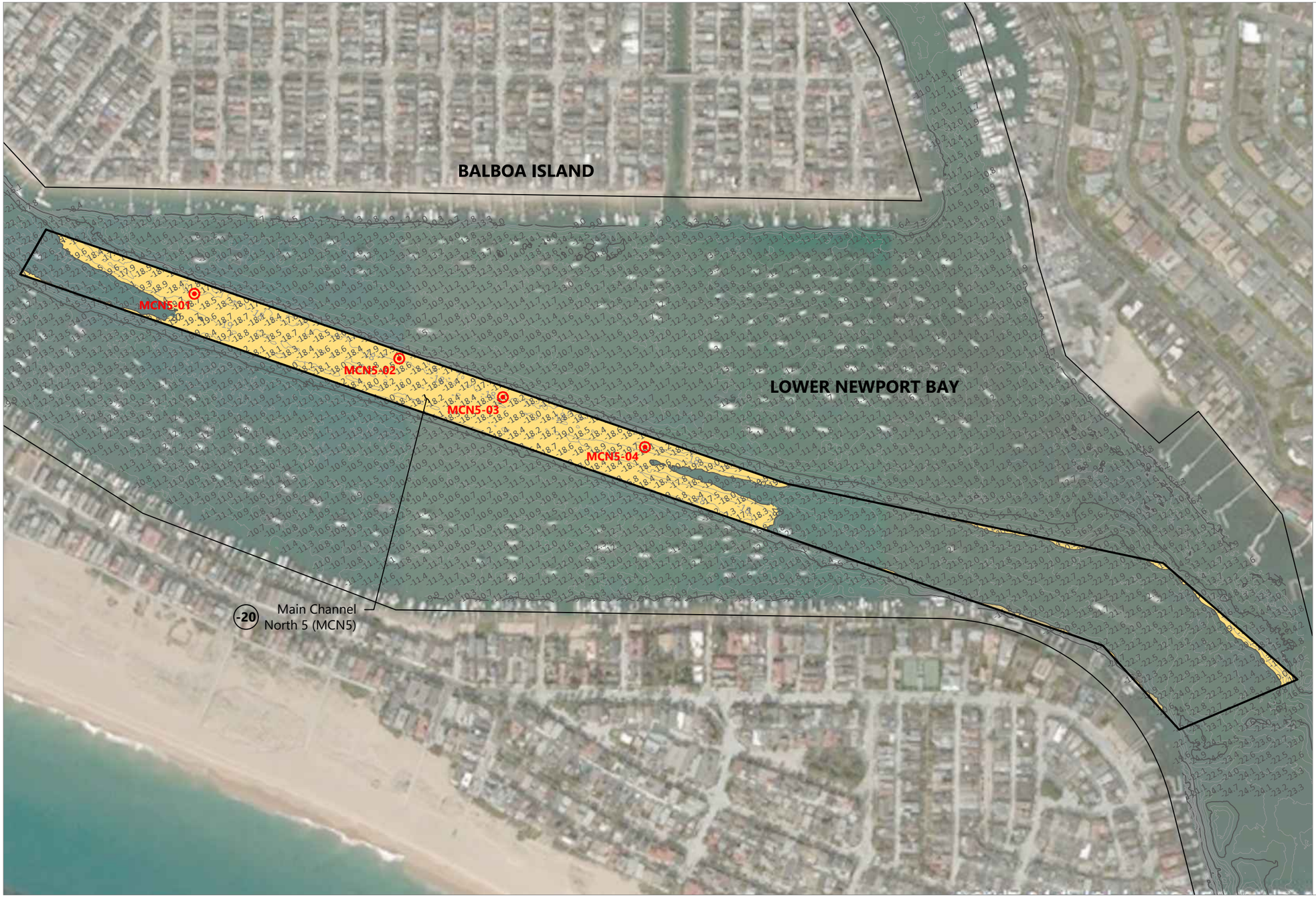
- Dredge Unit Boundary
- -20 Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- -10 Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 12:43 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015I ACTUAL SAMPLING.dwg FIG 14

ANCHOR QEA

Figure 9
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 4
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

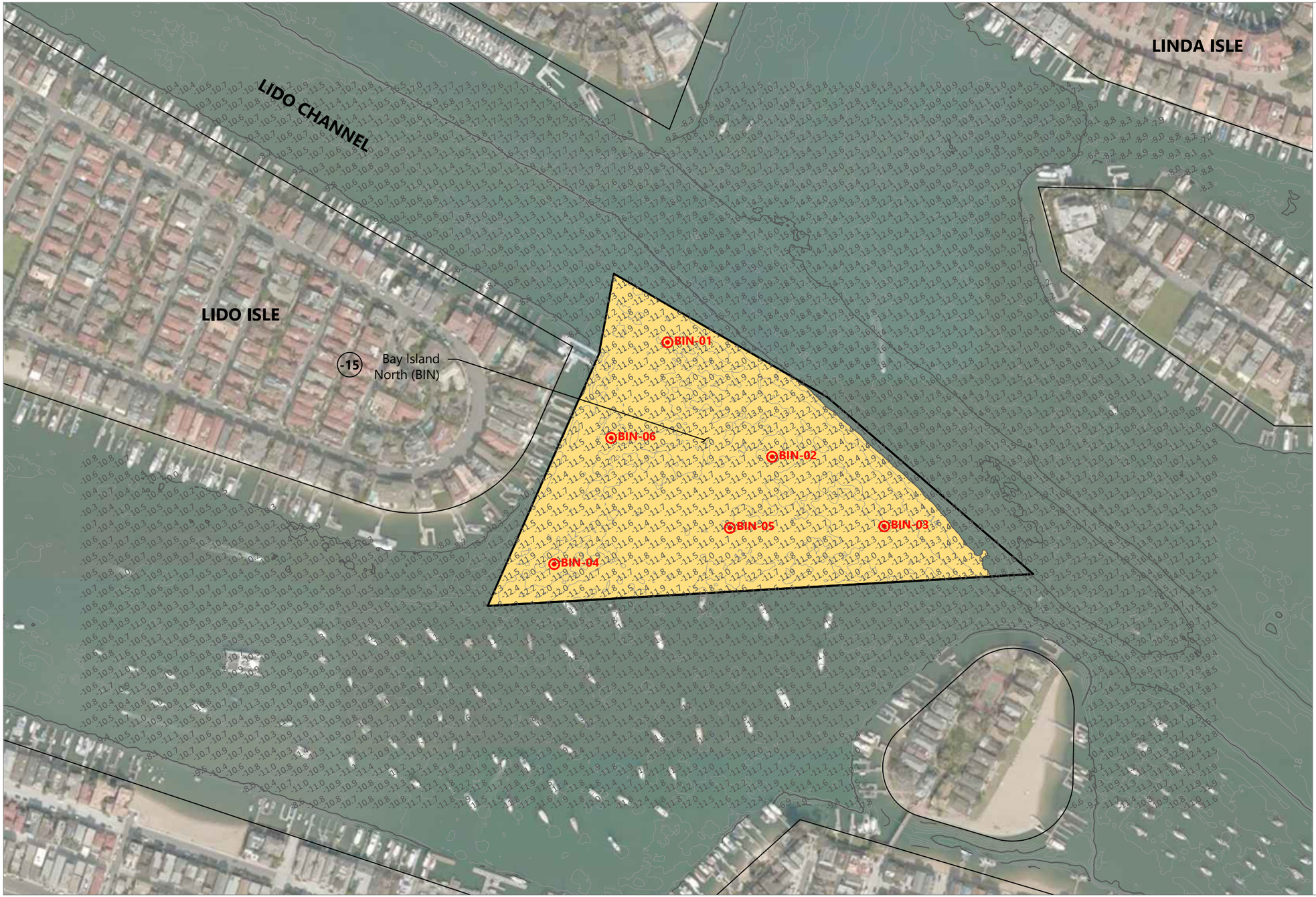
- Dredge Unit Boundary
- (-20) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 400
Feet

Publish Date: 2018/02/09 12:53 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015J ACTUAL SAMPLING.dwg FIG 15

ANCHOR QEA

Figure 10
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 5
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- -15 Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- -10 Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 11:09 AM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015E ACTUAL SAMPLING.dwg FIG 10

ANCHOR QEA

Figure 11
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island North
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (-15) Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 3:35 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015G ACTUAL SAMPLING.dwg FIG 12

ANCHOR QEA

Figure 12
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island Middle East
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (-15) Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- -10 Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 3:57 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015F ACTUAL SAMPLING.dwg FIG 11

ANCHOR QEA

Figure 13
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island Middle West
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (-15) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —-10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 300
Feet

Publish Date: 2018/02/09 12:29 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015H ACTUAL SAMPLING.dwg FIG 13

ANCHOR QEA

Figure 14
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island South
Lower Newport Bay Federal Channels Dredging



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- -20 Design Depth
- Dredge Footprint
- -# Actual Sampling Location
- -10 Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

0 500
Feet

Publish Date: 2018/02/09 1:09 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-015K ACTUAL SAMPLING.dwg FIG 16

ANCHOR QEA

Figure 15
Dredge Unit, Bathymetry, and Actual Sampling Locations - Entrance Channel
Lower Newport Bay Federal Channels Dredging

Newport Channel
(Nautilus 2019; Anchor QEA 2019)



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Dredge Unit Boundary
- (-15) Design Depth
- Dredge Footprint
- -12.8 Existing Bathymetry
- ●NC-# Actual Sampling Location

0 400 Feet

Publish Date: 2019/04/12 12:37 PM | User: mpratschner
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-018 NEWPORT CHANNEL.dwg FIG 1

ANCHOR QEA

Figure 1
Dredge Units, Bathymetry, and Actual Sampling Locations - Newport Channel
Lower Newport Bay Federal Channels Dredging

Attachment B
Mercury Concentrations in Sediment from Individual Stations (Newfields 2009b)

Table 3-3. Mercury Concentrations in Sediment from Individual Stations

Area	Station	Mercury (mg/kg)
BR	1	0.22
	2	0.35
	3	0.17
	4	0.27
	5	0.26
	6	0.17
	6A	0.27
	7	0.16
	8	0.17
	8A	0.15
HIR	9	0.43
	10	0.32
	11	0.13
	12	0.48
	12A	0.29
	13	0.49
	13A	0.58
	14	0.35
	15	0.13
	15A	0.34
LIN	16	1.63
	16A	0.89
	17	1.61
	18	1.09
	19	1.61
	20	0.53
	21	0.28
	22	0.5
LIS	23	0.26
	23A	0.55
	23B	1.38
	23C	0.84
	23D	--
	24	0.37
	25	0.97
	25A	0.26
WLB	26	1.19
	27	0.41
	28	0.31
	29	0.23
	30	0.66
	30 A	0.41
	31	0.38
	32	0.35

Area	Station	Mercury (mg/kg)
BICI	33	0.14
	34	0.17
	35	0.45
	36	0.32
	37	0.29
	38	0.88
	39	0.57
	40	0.57
	41	0.80
BC	42	0.16
	43	0.58
	44	0.60
	44A	3.01
	45	2.60
	46	0.53
	46A	0.42
	47	0.11
UNC	48	0.71
	49	0.13
	50	ND
	51	ND
	52	ND
	53	ND
	53A	0.42
YAN	54	0.48
	55	0.35
	56	0.23
	57	0.15
	58	0.49

Table 3-3 Continued.

Area	Station	Mercury (mg/kg dry)
YAM-U	59	0.28
	60	0.13
	61	0.12
	62	0.15
	63	0.10
	64	0.15
	65	0.13
	66	0.11
YAS-U	67	0.13
	68	0.12
	69	0.14
	70	ND
	71	0.13
	72	ND
	73	0.13

Area	Station	Mercury (mg/kg dry)
YAM-L	59	2.22
	60	0.35
	61	2.25
	62	1.17
	63	0.23
	64	1.28
	65	0.19
	66	0.11
YAS-L	67	0.30
	68	0.58
	69	0.20
	70	ND
	71	0.28
	72	0.12
	73	0.56

ND: No data, archive sample unavailable for analysis.



Figure 3-1. Mercury concentrations (mg/kg) for Individual Stations, Lower Newport Bay 2009.



Figure 3-2. Mercury concentrations (mg/kg) for Individual Stations, Lower Newport Bay 2009.



Figure 3-3. Mercury concentrations (mg/kg) for Individual Stations, Lower Newport Bay 2009.



Figure 3-4. Mercury concentrations (mg/kg) for Individual Stations, Lower Newport Bay 2009; U: upper portion of core; L: lower portion of core.

Appendix I
Mass Loading Calculations

9700 Research Drive
Irvine, California 92618
949.347.2780

Memorandum

April 18, 2019

To: Chris Miller, City of Newport Beach

From: Andrew Martin, Adam Gale, Chris Osuch, and Steve Cappellino, Anchor QEA, LLC

Re: Lower Newport Bay Federal Channels Maintenance Dredging – Mass Loading Calculations

As requested by the U.S. Environmental Protection Agency, Anchor QEA calculated mass loadings of mercury and total polychlorinated biphenyls (PCBs) to support the Lower Newport Bay Federal Channels maintenance dredged material evaluation. Table 1 shows results from these calculations for each dredge unit (DU), as well as a summary of the mass loadings of mercury and total PCBs for the following scenarios:

- The entire project (all DUs)
- All DUs except Turning Basin and Newport Channel 1
- Only Turning Basin and Newport Channel 1 DUs

The calculations show that approximately 50% of the mercury loadings and nearly 40% of the total PCB loadings are attributable to the Turning Basin and Newport Channel 1 DUs.

Please note that this memorandum has been developed for the purpose of presenting an estimate of mass loading for both total PCBs and mercury based strictly on the results of two sediment sampling events conducted in January of 2018 and 2019. The mass estimates were derived through a series of calculations using anticipated dredge volumes (including overdredge estimates of 2 feet), average analytical results for total solids and contaminant concentrations, and reasonable assumptions of the density of solids and porewater in sediment based on similar samples from Newport Harbor. While the mass has been estimated based on these parameters, they should still be considered approximate values that can vary based on a number of variables, including sample location (i.e., site variability), field and laboratory homogenization variability, and laboratory methods. Considering this potential variability in the input parameters, the calculated mass loadings for total PCBs and mercury presented in this memorandum should be used only for making relative comparisons between DUs and for estimating overall magnitude of loading potential, and not for any other purpose.

Approach to Mass Loading Calculation

The following approach was used to calculate mass loading of mercury and total PCBs from dredged material proposed as part of the Lower Newport Bay Federal Channels project.

Known Values

- Total dredged material volume (V_t, in cubic yards [cy]) generated using AutoCAD for known design depths + overdredge depths for specific proposed dredge footprints

- For the purpose of these calculations, units of cubic meters (m^3) are more useful. The conversion factor from cy to m^3 is determined as:

Equation 1

$$1\ \text{cy} \times \frac{(36\ \text{inches})^3}{\text{cy}} \times \frac{(2.54\ \text{cm})^3}{(\text{inches})^3} \times \frac{\text{m}^3}{100\ \text{cm}^3} = 0.76455\ \text{m}^3$$

- Mercury (Hg) concentrations (in milligrams per kilogram [mg/kg]) dry weight were provided by Eurofins Calscience, Inc. (ECI)
- Total PCB concentrations (in micrograms per kilogram [µg/kg]) dry weight were provided by ECI
- Total solids content of dredged material (S in percent of mass [%]) were provided by ECI

Estimated/Assumed Values

- Density of solids in dredged material (ρ_s in grams per cubic centimeter [g/cm^3]) as derived from specific gravity (SG) values
  - SG of solids (unitless value) was estimated from several Newport Bay and other regional sediment or dredged material characterization projects:
    - Newport Bay Regional General Permit 54 (2011)
      - Range 2.67 to 2.69
    - Balboa Marina West (2014)
      - Range 2.66 to 2.69
    - Port of Long Beach Pier T/S (2014)
      - Range 2.67 to 2.74
  - A value of 2.68 was selected based on the above measured values, with emphasis given to Newport Bay-specific values over other regional values measured
  - SG is the ratio of the density of a substance to a standard, typically assumed to be pure water, which has a density of 1.00 g/cm^3
  - The density of solids in dredged material (ρ_s), therefore, is calculated as:

Equation 2

$$2.68 \times 1.00 \frac{\text{g}}{\text{cm}^3} = 2.68 \frac{\text{g}}{\text{cm}^3}$$

  - For the purpose of these calculations, units of kilograms per cubic meter (kg/m^3) are more useful. The conversion factor from g/cm^3 to kg/m^3 is determined as:

Equation 3

$$1.00\frac{\mathrm{g}}{\mathrm{cm}^3} \times 0.001\frac{\mathrm{kg}}{\mathrm{g}} \times 1{,}000{,}000\frac{\mathrm{cm}^3}{\mathrm{m}^3} = 1{,}000\frac{\mathrm{kg}}{\mathrm{m}^3}$$

- As such, a more useful value of density of solids in dredged material (ρ_s) is:

Equation 4

$$2.68\frac{\mathrm{g}}{\mathrm{cm}^3} \times 1{,}000 = 2{,}680\frac{\mathrm{kg}}{\mathrm{m}^3}$$

- Density of porewater in sediment (ρ_w) in kg/m^3 is assumed to be equivalent to the density of saltwater for average temperature and salinity conditions of 18°C and 32 parts per thousand, respectively, which is approximately 1,023 kg/m^3 (Pond and Pickard 1983)

Key Assumption

Because analytical chemistry concentrations are provided in mg/kg dry weight, the mass loading calculation assumes 100% of the contaminant is bound to the solid (particulate) portion of the sample. As such, total dredged material volumes were adjusted based on total solids measurements.

Approach

Using the CAD-generated volumes for each DU, the analytical-laboratory-measured values for total solids, and the assumed values for density of solids and porewater in dredged material, the volume of solids in dredged material (V_s; m^3) was calculated. The V_s was derived by algebraically manipulating the following fundamental equations:

Equation 5

$$\rho_t = \frac{M_t}{V_t}$$

where:

ρ_t	=	Density total
M_t	=	Mass total
V_t	=	Volume total

Equation 6

$$\rho_w = \frac{M_w}{V_w}$$

where:

ρ_w = Density water
M_w = Mass water
V_w = Volume water

Equation 7

$$\rho_s = \frac{M_s}{V_s}$$

where:

ρ_s = Density solids
M_s = Mass solids
V_s = Volume solids

Equation 8

$$M_t = M_s + M_w$$

where:

M_t = Mass total
M_s = Mass solids
M_w = Mass water

Equation 9

$$V_t = V_s + V_w$$

where:

V_t = Volume total
V_s = Volume solids
V_w = Volume water

First, the mass of solids (M_s) needs to be defined relative to the total solids content (S) and mass of water (M_w):

Equation 10

$$M_s = S \times M_t$$

The following may then be derived:

Equation 11

$$M_w = (1 - S) \times M_t$$

Rearranging Equations 10 and 11 and solving for M_t results in:

Equation 12

$$M_t = \frac{M_s}{S} = \frac{M_w}{(1 - S)}$$

Mass of solids can then be defined as:

Equation 13

$$M_s = \frac{M_w \times S}{(1 - S)}$$

Rearranging Equation 7 and solving for M_s results in:

Equation 14

$$M_s = \rho_s \times V_s$$

The M_s from Equations 13 and 14 can then be made equal:

Equation 15

$$\rho_s \times V_s = \frac{M_w \times S}{(1 - S)}$$

Solving for V_s results in:

Equation 16

$$V_s = \frac{M_w \times S}{((1-S) \times \rho_s)}$$

Rearranging Equation 6 and solving for M_w results in:

Equation 17

$$M_w = \rho_w \times V_w$$

Substituting M_w into Equation 16 results in:

Equation 18

$$V_s = \frac{(\rho_w \times V_w \times S)}{((1-S) \times \rho_s)}$$

Rearranging Equation 9 and solving for V_w results in:

Equation 19

$$V_w = V_t - V_s$$

Substituting V_w into Equation 18 results in:

Equation 20

$$V_s = \frac{(\rho_w \times (V_t - V_s) \times S)}{((1-S) \times \rho_s)}$$

Using the distributive property of multiplication over subtraction, Equation 20 is then equal to:

Equation 21

$$V_s = \frac{(\rho_w \times V_t \times S) - (\rho_w \times V_s \times S)}{((1-S) \times \rho_s)}$$

Similarly, Equation 21 is then equal to:

Equation 22

$$V_s = \frac{(\rho_w \times V_t \times S)}{((1-S) \times \rho_s)} - \frac{(\rho_w \times V_s \times S)}{((1-S) \times \rho_s)}$$

Rearranging Equation 22 results in:

Equation 23

$$V_s + \frac{(\rho_w \times V_s \times S)}{((1-S) \times \rho_s)} = \frac{(\rho_w \times V_t \times S)}{((1-S) \times \rho_s)}$$

The V_s term may be multiplied by a value equivalent to 1, using the denominator of both fractions in Equation 23 as both the numerator and denominator:

Equation 24

$$\frac{(V_s \times ((1-S) \times \rho_s))}{((1-S) \times \rho_s)} + \frac{(\rho_w \times V_s \times S)}{((1-S) \times \rho_s)} = \frac{(\rho_w \times V_t \times S)}{((1-S) \times \rho_s)}$$

Multiplying all the terms by $((1-S) \times \rho_s)$, the equation becomes:

Equation 25

$$(V_s \times ((1-S) \times \rho_s)) + (\rho_w \times V_s \times S) = (\rho_w \times V_t \times S)$$

This is equivalent to:

Equation 26

$$V_s \times (((1-S) \times \rho_s) + (\rho_w \times S)) = (\rho_w \times V_t \times S)$$

It may be rearranged to solve for V_s:

Equation 27

$$V_s = \frac{(\rho_w \times V_t \times S)}{(((1-S) \times \rho_s) + (\rho_w \times S))}$$

Now that V_s has been solved, rearranging Equation 7, the M_s in dredged material can be defined by:

Equation 28

$$M_s = \rho_s \times \frac{(\rho_w \times V_t \times S)}{(((1-S) \times \rho_s) + (\rho_w \times S))}$$

Multiplying the M_s in the dredged material by the dry weight concentration of a contaminant in the dredged material results in the mass of the contaminant in the dredged material (in this example, the contaminant is mercury):

Equation 29

$$M_s \times [Hg] = M_{Hg}\ (\text{mg})\ \text{in dredged material}$$

This value may be converted to kg by dividing by 1,000,000:

Equation 30

$$M_{Hg} \times \frac{1\ \text{kg}}{1{,}000{,}000\ \text{mg}} = M_{Hg}\ \text{kg}$$

Example Calculation

The following is an example calculation for determining mercury loads using values from the Main Channel North 1 DU.

- Dredge volume = V_t = 63,180 cy = 48,304 m^3
- Mercury concentration = [Hg] = 1.18 mg/kg
- Total solids = S = 45.5%
- Density of solids = ρ_s = 2,680 kg/m^3
- Density of [pore]water = ρ_w = 1,023 kg/m^3

$$M_s = 2{,}680\ \text{kg/m}^3 \times \frac{\left(1{,}023\frac{\text{kg}}{\text{m}^3} \times\ 48{,}304\ \text{m}^3 \times 0.455\right)}{(((1-0.455) \times\ 2{,}680\ \text{kg/m}^3) +\ (1{,}023\ \text{kg/m}^3 \times 0.455))}$$

$$M_s = 2{,}680\ \text{kg/m}^3 \times \frac{22{,}483{,}821.36\ \text{kg}}{1926.065\ \text{kg/m}^3}$$

$$M_s = 31{,}284{,}843.06\ \text{kg}$$

$$M_{Hg} = 31{,}284{,}843.06\ \text{kg} \times 1.18\frac{\text{mg}}{\text{kg}} \times \frac{1\ \text{kg}}{1{,}000{,}000\ \text{mg}}$$

$$M_{Hg} = 36.9\ \text{kg}$$

Reference

Pond, S., and G.L. Pickard, 1983. *Introductory Dynamical Oceanography, 2nd Edition*. New York: Butterworth-Heinemann.

Table

Table 1
Lower Newport Bay Federal Channels 2019 Maintenance Dredging – Summary of Mercury and Total PCB Mass Loadings

Dredge Unit	Dredge Unit Code	Design Depth (feet MLLW)	Estimated Volume to Design Depth (cy)	1-Foot Payable Overdepth Allowance Volume (cy)	1-Foot Non-Pay Overdepth Allowance Volume (cy)	Total Volume (cy)	Total Volume (m^3) [1 cy = 0.76455 m^3]	Total Solids (%)	Volume of Solids in Dredged Material (m^3)	Mass of Solids in Dredged Material (kg)	Concentration of Mercury (mg/kg)	Mass of Mercury in Dredged Material (solids portion) (kg)	% of Total Mass of Mercury in Dredged Material (all areas combined)	Concentration of Total PCBs (µg/kg)	Mass of Total PCBs in Dredged Material (solids portion) (kg)	% of Total Mass of Total PCBs in Dredged Material (all areas combined)
Turning Basin	TB	-20	23,066	34,370	34,370	91,806	70,190	45.1	16,756	44,905,657	3.64	163.5	31.7	195.0	8.8	33
Main Channel North 1	MCN1	-20	36,584	13,298	13,298	63,180	48,304	45.5	11,674	31,285,017	1.18	36.9	7.2	41.7	1.3	5
Main Channel North 2	MCN2	-20	37,504	11,587	11,587	60,678	46,391	48.8	12,376	33,166,870	1.04	34.5	6.7	53.4	1.8	7
Main Channel North 3	MCN3	-20	44,505	19,374	19,374	83,252	63,650	52.3	18,780	50,329,395	0.797	40.1	7.8	44.1	2.2	8
Main Channel North 4	MCN4	-20	28,294	13,344	13,344	54,982	42,036	54.8	13,299	35,642,037	0.181	6.5	1.3	29.0	1.0	4
Main Channel North 5	MCN5	-20	50,106	19,798	19,798	89,701	68,581	54.7	21,637	57,988,264	0.205	11.9	2.3	30.6	1.8	7
Bay Island North	BIN	-15	77,358	27,546	27,546	132,450	101,265	51.9	29,541	79,169,872	0.431	34.1	6.6	30.4	2.4	9
Bay Island Middle East	BIME	-15	41,219	12,178	12,178	65,576	50,136	49.2	13,532	36,266,281	0.142	5.1	1.0	23.0	0.8	3
Bay Island Middle West	BIMW	-15	41,121	12,396	12,396	65,912	50,393	48.9	13,483	36,133,629	0.153	5.5	1.1	24.1	0.9	3
Bay Island South	BIS	-15	51,136	15,798	15,798	82,731	63,252	47.5	16,237	43,515,718	0.233	10.1	2.0	22.7	1.0	4
Entrance Channel	EC	-20	51,663	9,595	9,595	70,852	54,170	82.4	34,734	93,087,517	0.0125	1.2	0.2	0.2	0.0	0
Newport Channel 1	NC1	-15	28,216	9,339	9,339	46,894	35,853	***55.4***	*11,532*	30,905,234	***3.07***	*94.9*	*18.4*	***46.7***	*1.4*	*5*
Newport Channel 2	NC2	-15	85,798	19,761	19,761	125,319	95,813	65.3	40,054	107,343,402	0.529	56.8	11.0	22.8	2.4	9
Newport Channel 3	NC3	-15	54,155	12,268	12,268	78,690	60,162	73.1	30,632	82,093,806	0.173	14.2	2.8	8.0	0.7	2

Total (All Areas Combined)			650,725	230,649	230,649	1,112,023	850,197		**Average Mercury Concentration (mg/kg)**	0.84	**515**	**Average Total PCBs Concentration (µg/kg)**	40.83	**27**	
Total (Excluding Turning Basin and Newport Channel 1)			599,443	186,940	186,940	973,323	744,154			0.42	**257**		27.50	**16**	
Total (Turning Basin and Newport Channel 1 Only)			51,282	43,709	43,709	138,700	106,043			3.36	**258**		120.85	**10**	

Notes:

Bold italics Values are averages calculated from the individual cores that make up the DU. Composite sample was not analyzed based on individual core chemistry.
Italics Values are based on averages taken from individual cores used for total solids, mercury, and total PCB concentrations.

µg/kg: microgram per kilogram
cy: cubic yard
DU: dredge unit
kg: kilogram
m^3: cubic meter
mg/kg: milligram per kilogram
MLLW: mean lower low water
PCB: polychlorinated biphenyl

Appendix C
Utility Location Report (RES 2012)

R. E. Staite Engineering, Inc.

Lower Newport Bay Maintenance Dredging
Orange County, California
W912PL-12-C-0014
Section 35 20 23 Dredging
Paragraph 3.3- Utility Location Report

Per the requirements of Specification section 35 20 23 part 3.3, the following is a Utility Location Report identifying the coordinates and elevations of all utilities within the dredge footprint.

Information Sources:

Utility locations were obtained from respective utility companies and municipalities. The information provided is reported to be the best available and most up to date. The following names are the contact points for the utilities and municipalities consulted in order to obtain the information in this report.

Submarine Electrical Power Cables
Southern California Edison
Contact: Owen Yano – SCE Planner
Huntington Beach Service Center
7333 Bolsa Ave
Westminster, CA 92683
Cell: 310-387-3691
Office: 714-895-0246

Submarine Communications Cables
AT&T
Contact: Craig Akin
1265 Van Buren Room 180
Anaheim, CA 92807
Ca1818@att.com
Phone- 714-237-6156

Wet Utilities
Harbor Resources
City of Newport Beach
829 Harbor Island Drive
Newport Beach, CA 92663
Contacts: Shannon Levin- Harbor Resources Supervisor- 949-644-3041
Chris Miller- Harbor Resources Manager- 949-644-3043

*Additionally a DigAlert request was made for all utilities within the dredge footprint.

Sources Used:

W912PL-11-B-0006 Contract Drawings and Specification Appendix B

Electrical:

-Appendix B: Location of Submarine Cable in Newport Bay- From Owen Yano
-Appendix B: Proposed 12 kV armored submarine cable plan drawing – 1967

Communications:

-As-built drawings for submarine cables in Newport Bay provided by AT&T- Sheet #s 0049-0060

Water and Sewer:

-Appendix B: DUDEK Newport Beach Bay Crossings Evaluation
-Site visit with City of Newport Beach representative to physically locate water lines

Information on the existing utilities reported herein is considered the best available from the above mentioned agencies. Agencies have provided this information with the disclaimer that the accuracy of the information is not guaranteed. Coordinates, depths, and other information as required in this submittal are unavailable for many of the utilities included in this report. Further, many of the as-builts provided are 40-plus years old with landmarks noted such as residences and stationary vessels which likely no longer exist.

The attached table, in conjunction with the attached color coded utility location map represents the available information regarding the presence and location of utilities in the dredge project vicinity.

Attachments:

Utility Location Map
Utility Description Table

Lower Newport Bay Utilities Crossing Analysis

* Yellow Highlighted Utilities Not Shown on Plans

Electrical 'e' (RED LINES)

Number	Description	Size	Nearest Streets at Crossing	Heading	Burial Depth	Shown on Plans?	Crosses Dredge Footprint?
1	SCE Cable- 1210' long	Unknown	14th + Via Jucar	Unknown	Unknown	NO	NO
2	SCE 12 kV Cable	12 kV	7th + South end of Linda Isle	N 25°21'02" E	7' below Harbor Floor - 20 MLLW to -30 MLLW	YES	YES- Yacht Anchorage
3	SCE Cable- 500' Long	Unknown	Balboa Ave + Bahia Corinthian N end	Unknown	Unknown	NO	NO
4	SCE Cable- 1410' long	Unknown	Channel Rd @ M Street Pier + Bayside Pl	Unknown	Unknown	NO	NO

Communications 'c' (ORANGE LINES)

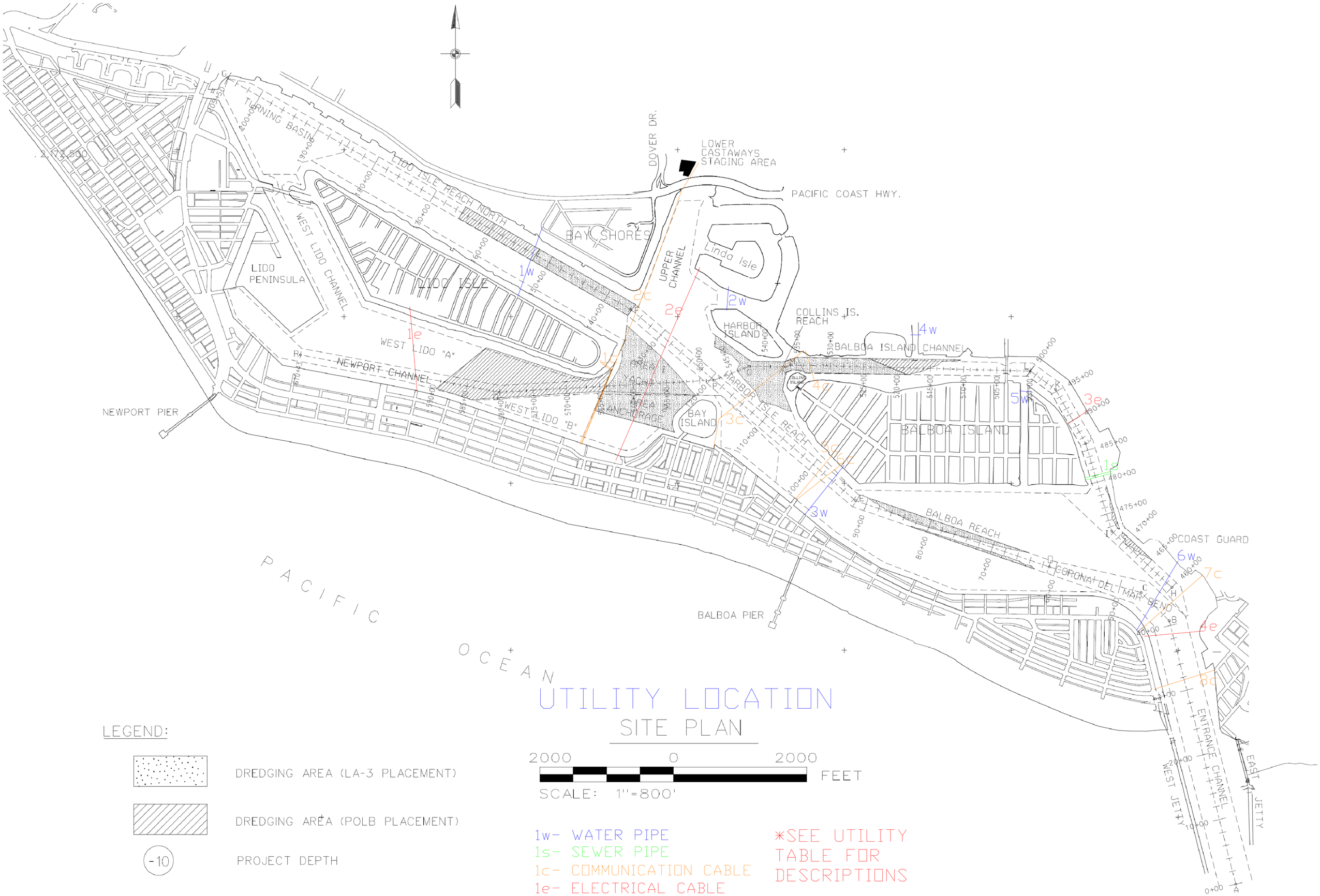
Number	Description	Size	Nearest Streets at Crossing	Heading	Burial Depth	Shown on Plans?	Crosses Dredge Footprint?
1	3-4 ATT Cables	16 GA-22GA	Between 8th and 9th + East end of Lido Isle	S29°W	-16' MLLW to Lido Isle	YES	YES- WEST LIDO B
2	ATT Cable	24 GA	Between 8th and 9th + East end of Lido Isle + Along Bayshore Dr Bulkhead Line	S29°W	-16' MLLW to Lido Isle, -20 MLLW to -30 MLLW in Lido Channel	YES	YES- WEST LIDO B, Yacht Anchorage, Lido Isle Reach
3	ATT Cable	16"	Alvarado Pl + Cape Cove	S54°10'W	-15' MLLW	YES	YES- Collins Is. Reach
4	ATT Cable	24 GA	S. Bay Front/Alley + Cape Cove	N12°W	-15' MLLW To -25' MLLW	NO	YES- Collins Is. Reach
5	2 ATT Cables	24 GA	Palm St + Agate Ave	N42°E	-15' MLLW to -25' MLLW	NO	NO- Harbor Is. Reach
6	3 ATT Cables	26 GA	Palm St + Opal Ave	N49°E	-15' MLLW to -25' MLLW	NO	NO- Harbor Is. Reach
7	4 ATT Cables	24 GA- 26 GA	Channel Rd & M St Pier + Bayside Pl	N86°47'E	Unknown	NO	NO- In Main Channel
8	ATT Cable	22 GA	Dahlia Ave + Channel @ Ocean	N70°E	Unknown	NO	NO- In Main Channel

Water 'w' (BLUE LINES)

Number	Description	Size	Nearest Streets at Crossing	Heading	Burial Depth	Shown on Plans?	Crosses Dredge Footprint?
1	Cast Iron Waterline	8"	Via San Remo + Alley W of Crestview	Crestview (N33°36.866, W117°54.786) San Remo (N33°36.438 W117°54.499)	Unknown	YES	YES- Lido Is. Reach North
2	Ductile Iron Pipe (abandoned)	8"	Harbor Is. + Linda Is.	Unknown	Unknown	NO	NO
3	Cast Iron Waterline	12"	Washington + Opal	Wash. (N33°36.116, W 117°53.584) Opal (N33°26.181, W 117°53.524)	Unknown	YES	NO
4	Ductile Iron Pipe	24"	Harbor Is. Dr + Bayside	Unknown	Unknown	NO	NO
5	HDPE Pipe	10"	Bay Front Alley N + Crystal Ave.	Unknown	Unknown	NO	NO
6	Cast Iron Waterline	14"	Channel Rd N of M St Pier + 2107 Bayside Dr	Unknown	Unknown	YES	NO

Sewer 's' (GREEN LINES)

Number	Description	Size	Nearest Streets at Crossing	Heading	Burial Depth	Shown on Plans?	Crosses Dredge Footprint?
1	2 Cast Iron Sewer pipes	8"	S Bayfront Dr + 1907 Bayside Dr	Unknown	Unknown	NO	NO



P A C I F I C O C E A N

UTILITY LOCATION

SITE PLAN

2000 0 2000 FEET

SCALE: 1"=800'

LEGEND:

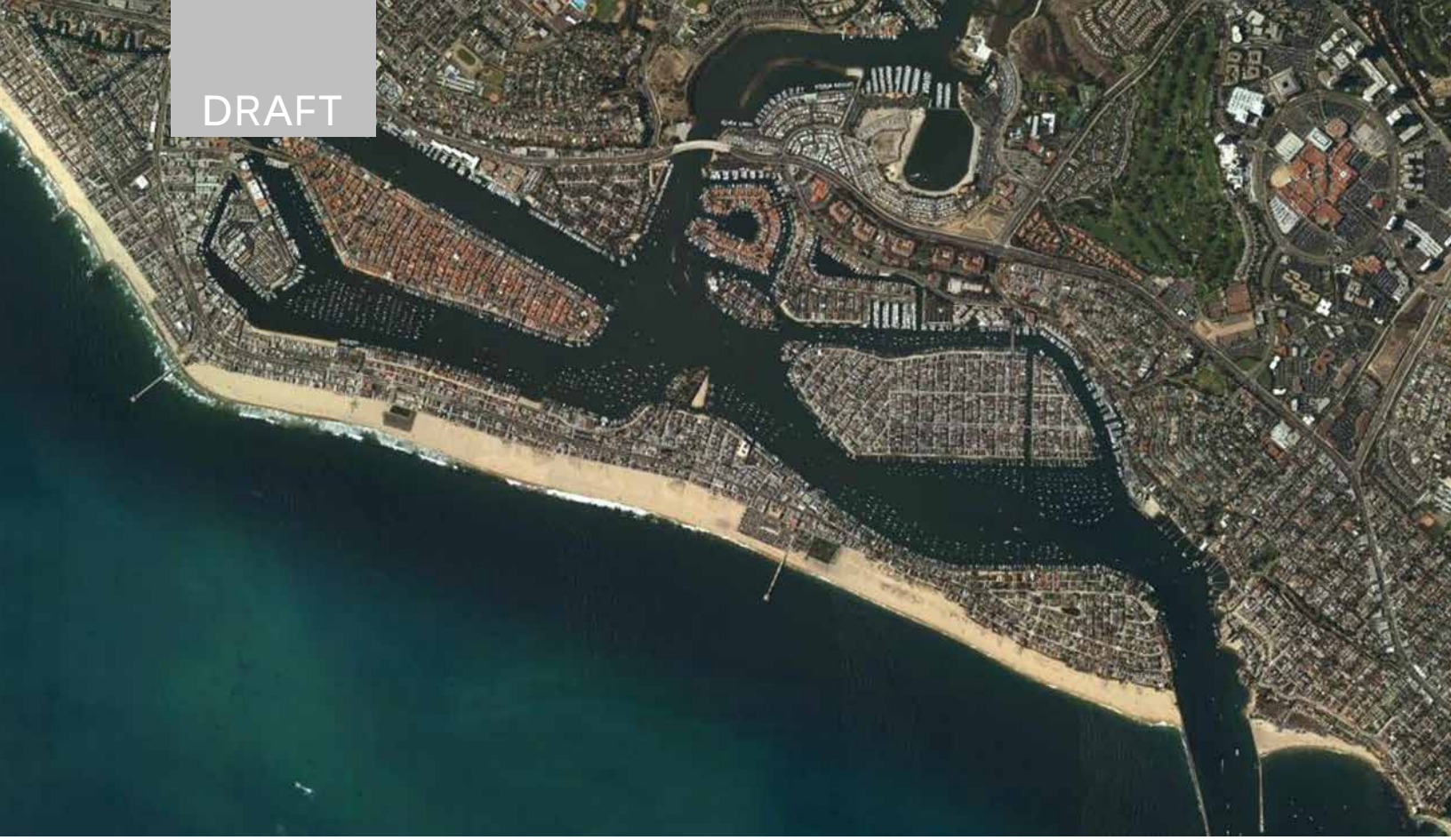
- DREDGING AREA (LA-3 PLACEMENT)
- DREDGING AREA (POLB PLACEMENT)
- -10 PROJECT DEPTH

1w- WATER PIPE
1s- SEWER PIPE
1c- COMMUNICATION CABLE
1e- ELECTRICAL CABLE

*SEE UTILITY TABLE FOR DESCRIPTIONS

Appendix D
Chemical Isolation Cap Analysis

DRAFT



November 24, 2020
Draft Basis of Design Report
Lower Newport Bay Confined Aquatic Disposal

ANCHOR QEA

Appendix D: Chemical Isolation Cap Analysis

Prepared for the City of Newport Beach

DRAFT

November 24, 2020
Draft Basis of Design Report
Lower Newport Bay Confined Aquatic Disposal

Appendix D: Chemical Isolation Cap Analysis

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ABBREVIATIONS

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
BODR	Basis of Design
CAD	confined aquatic disposal
City	City of Newport Beach
cm	centimeter
cm^2/s	square centimeters per second
COPC	contaminant of potential concern
CTR	California Toxics Rule
DDx	comprises DDT, DDE, DDD, including isomers thereof
ERM	effects range median
Federal Channels	Lower Newport Bay Federal Channels
f_{OC}	fraction organic carbon
g/cm^3	grams per cubic centimeter
interim cover	interim cover containment layer
K_d	equilibrium partition coefficient
K_{OC}	organic carbon partition coefficient
K_{OW}	octanol-water partition coefficient
L/kg	liters per kilogram
mg/kg	milligrams per kilogram
mL	milliliter
mL/min	milliliters per minute
MLLW	mean lower low water
ng/L	nanograms per liter
PCB	polychlorinated biphenyl
RGP 54	Regional General Permit 54
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1 Introduction

The City of Newport Beach (City) is in the process of designing a confined aquatic disposal (CAD) facility to support the disposal of dredge material classified as unsuitable for open ocean disposal (referred to hereafter as unsuitable material) that will be generated as part of the upcoming maintenance dredging projects to be conducted in the Lower Newport Bay Federal Channels (Federal Channels) and elsewhere.

The overall intent of the dredging program presented in the Draft Basis of Design Report (BODR) is to dredge the Federal Channels to its current federally authorized design depths. Although a majority of the sediments within the Federal Channels are suitable for open ocean disposal, sediments in Main Channel 1 and 2, the Turning Basin, and Newport Channel 1 (see Figure 1-2 of the Draft BODR) were classified as unsuitable and will therefore require containment in the CAD facility. Contaminants of potential concern (COPCs) in these sediments include total polychlorinated biphenyls (PCBs), total DDx (comprising DDT, DDE, and DDD), and mercury. Additional maintenance dredging is expected to occur outside of the Federal Channels and either permitted or not permitted under the City's Regional General Permit 54 (RGP 54) program. The long-term plan is for those additional materials to also be placed in the CAD facility during a second phase of filling. The CAD facility will be located in the Bay Island Area dredge unit southeast of Lido Isle in Newport Beach, California (see Figure 1-2 of the Draft BODR).

This appendix to the Draft BODR describes numerical modeling evaluations performed to assess the ability of the CAD facility's cap system to chemically isolate dredge material placed into the CAD facility using a two-phase construction approach. Specifically, this modeling is used for the following:

- To evaluate potential transport of dissolved phase contaminants from the dredge materials into the cap and overlying water column
- To design the cap to limit and attenuate such transport so that potentially unacceptable concentrations do not result within the surface of the cap in the future

The primary goal of the modeling documented in this appendix was to simulate the dissolved phase transport of COPCs within the sediment caps overlying the dredge material to assess whether COPC concentrations within the biologically active zone at the cap's surface remain below target levels for at least 100 years following construction of the CAD facility. The analyses included in this report were performed in accordance with the U.S. Environmental Protection Agency's (USEPA's; Palermo et al. 1998) and the Interstate Technology and Regulatory Council's (ITRC) Remedy Selection for Contaminated Sediments guidance (ITRC 2014).

1.1 Confined Aquatic Disposal Design and Sequencing

Dredge material is expected to be placed within the CAD facility in two phases. It is expected that there will be a 2-year gap between the end of the first phase of construction and the beginning of the second phase of construction. The modeling evaluation was performed for each phase of the CAD design. The model domain was based on the CAD design presented in the Draft BODR, and chemical and physical data were drawn from sediment samples collected within the applicable dredge units. Sediment sample results are presented in the *Sampling and Analysis Report Regional General Permit 54 Sediment Characterization* (Anchor QEA 2013) and the *Lower Newport Bay Federal Channels Dredging: Sampling and Analysis Program Report* (Anchor QEA 2019).

The first phase of the CAD facility construction would involve excavation of the CAD facility footprint and backfill with unsuitable dredge materials from the Federal Channels (Newport Channel 1, Turning Basin, select areas within Main Channel North 1, and select areas within Main Channel North 2; see Figure 1-2 of the Draft BODR), as defined in the Draft BODR. Unsuitable material placed in the CAD facility during the first phase would then be covered with an interim cover containment layer (interim cover) using cleaner material excavated from the Newport Channel 3 dredge unit. The second phase of CAD construction would then involve the placement of additional materials on top of the interim cover. These additional unsuitable materials would be excavated from outside of the Federal Channels and either permitted or not permitted under the City's RGP 54 program. A final cap layer will then be placed on top of the dredge material from the second phase; this final cap layer is anticipated to be constructed from clean material excavated from either the Entrance Channel, Newport Channel 3, or Newport Chanel 2 dredge units. Dredge and placement plans for the first phase of CAD construction are presented in the Draft BODR; additional construction activities for the second phase are still under development.

The evaluations presented in this appendix were performed to design the specifications (thickness and sorptive capacity) of the interim cover and final cap layer needed to limit and attenuate chemical transport such that COPC concentrations at the cap surface are within target levels (Section 1.2).

1.2 Target Levels

Target levels used for the interim cover and final cap layer design analysis were based on the effects range median (ERM) values developed by Long et al. (1995). COPCs were identified for modeling based on review of data from dredge area sediment samples and comparison of chemical concentrations to ERM values; chemicals for which sampling data exceeded ERMs were identified as COPCs (as discussed previously, the COPCs consist of total PCBs, total DDx, and mercury). In addition to the ERM values, sediment porewater concentrations calculated in this evaluation were compared to California Toxics Rule (CTR) saltwater chronic criteria for the protection of aquatic life (for total

PCBs and total DDx) and human health criteria (for mercury); these CTR criteria were used in conjunction with the ERM values as target concentrations.

Sediment and porewater target concentrations used in the cap design modeling are listed in Table D-1.

Table D-1
Sediment and Porewater Target Concentrations

COPC	ERM[1] Used for Sediment Target

2 Dissolved Phase Chemical Isolation Analysis

This section describes chemical transport modeling performed to evaluate the long-term performance of the interim cover and final cap layer being designed to chemically isolate unsuitable material placed within the CAD facility. The model described in this appendix simulates the transport of PCBs, total DDx, and mercury within the interim cover and final cap layer for the purpose of designing the cap properties (thickness and sorptive capacity) to maintain COPC concentrations in the biologically active zone below target levels (Table D-1) over the lifetime of the evaluation (100 years). The numerical modeling described in this section was performed in accordance with guidance on cap design set forth by the USEPA, U.S. Army Corps of Engineers (USACE) guidance (Palermo et al. 1998), and ITRC guidance (ITRC 2014).

2.1 Approach

The assessment described in Sections 2.1.1 through 2.1.4 consists of applying a one-dimensional chemical fate and transport model to simulate dissolved phase COPC transport within the interim cover and final cap layer. The assessment is used to support the design of the interim cover and final cap layer to maintain concentrations in its biologically active zone to be less than target levels (Section 1.2).

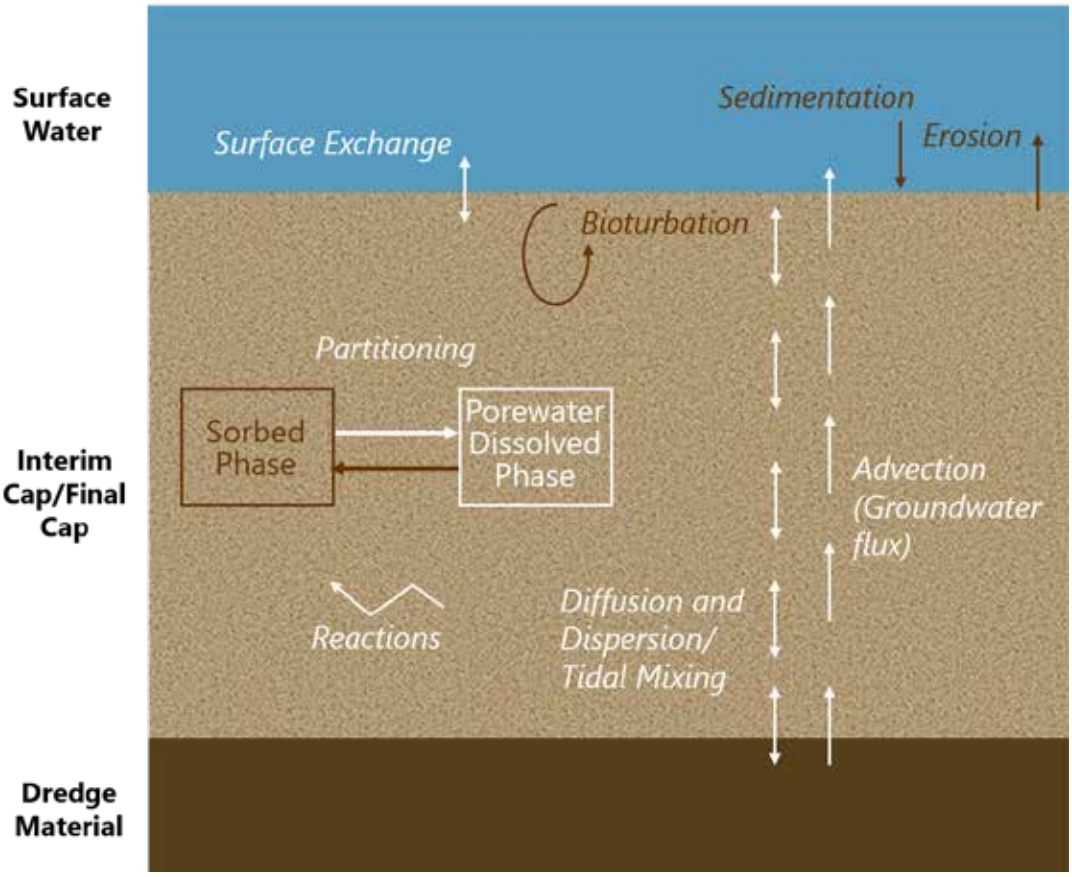
2.1.1 Model Framework

CapSim (Reible 2017, Version 3.5), a one-dimensional model of chemical transport in sediment and cap systems, was used for this evaluation. This model simulates the time-variable fate and transport of chemicals (dissolved and sorbed phases, including partitioning between these phases) under the processes of advection, diffusion and dispersion, biodegradation, bioturbation and bioirrigation, and exchange with the overlying surface water (Go et al. 2009; Lampert and Reible 2009). This model has been used to support the evaluation and design of sediment caps at numerous sites around the United States and internationally, including the development of the Outer Harbor Sediment Placement and Ecosystem Restoration CAD facility in Long Beach, California (Anchor QEA 2016). Details on the model structure and underlying theory and equations are provided in USEPA and USACE capping guidance (Palermo et al. 1998, Appendix B; Go et al. 2009; Lampert and Reible 2009; and Shen et al. 2018).

2.1.2 Simulation Approach

The model was configured to represent the presence of the chemical isolation layer over dredged material placed in the CAD facility for both the interim cover and final cap layer. A schematic of the general cap profile and the fate and transport processes represented in the model are shown in Figure D-1.

Figure D-1
Example Model Domain and Processes



Note:
Sedimentation, erosion, and reactions are not simulated in this evaluation.

2.1.3 Model Layers

The layer configuration represented in the model differed between the two phases of CAD facility construction. The model domain consisted of two layers for the evaluation of the first phase (interim cover), and the model domain consisted of four layers for the evaluation of the second phase (final cap layer). The conceptual design of the second phase is shown in Figure 4-1 of the Draft BODR. The model layers for these two cap simulations are provided in the following list from highest elevation to lowest elevation (i.e., top to bottom):

- First phase (interim cover), listed from top to bottom:
    1. Interim cover (1 foot thick, -31 to -30 feet MLLW): The proposed material would be a silty sand excavated from the Newport Channel 3 dredge unit.
    2. Unsuitable material dredged from within the Federal Channels (15 feet thick, -46 to -31 feet MLLW): The proposed material would be a sandy silt excavated from the

Newport Channel 1, Turning Basin, Main Channel North 1, and Main Channel North 2 dredge units. Volume-weighted average based on sediment data from these areas was calculated for the physical properties and COPC concentrations of this layer based on the volume of unsuitable material in each dredge unit.

- Second phase (final cap layer), listed from top to bottom:
    1. Final clean sediment cap (3 feet thick, -25 to -22 feet MLLW): Cap was simulated separately with material from three potential sources: a) fine to coarse sand excavated from the Entrance Channel dredge unit; b) silty sand excavated from the Newport Channel 2 dredge unit; or c) silty sand excavated from the Newport Channel 3 dredge unit. Based on the propeller wash analysis described in Appendix E of the Draft BODR, up to 3 inches of scour is predicted to potentially occur. Because this potential scour depth is small relative to the total 3-foot cap layer thickness, it was not explicitly considered in this evaluation. The final cap thickness relative to potential future scour will be evaluated as part of future design stages to determine if updated cap modeling is warranted.
    2. Unsuitable material dredged from outside the Federal Channels (15 feet thick, -30 to -25 feet MLLW): The proposed material would be a silty sand excavated from outside of the Federal Channels. Because specific dredge units have not been identified, COPC concentrations were conservatively assumed to be the maximum of all sediment samples collected from outside the Federal Channels.
    3. Interim cover (1 foot thick, -31 to -30 feet MLLW): The proposed material would be a silty sand excavated from the Newport Channel 3 dredge unit.
    4. Unsuitable material dredged from within the Federal Channels (15 feet thick, -46 to -31 feet MLLW): The proposed material would be a sandy silt excavated from the Newport Channel 1, Turning Basin, Main Channel North 1, and Main Channel North 2 dredge units.

2.1.4 Temporal Simulation Approach

Model simulations of both the interim cover and final cap layer were conducted over a 100-year period to evaluate long-term performance. For simplicity, these simulations were conducted independently for the interim cover and final cap layer configurations. It is recognized that there is potential for COPC flux to generate concentrations within the interim cover for the approximate 2 years between its construction and completion of the final cap layer; however, evaluation of the interim cover model results (Section 3) revealed that the predicted concentrations in the interim cover after 2 years were lower than initial concentrations in the interim cover material and lower than those in the phase 2 dredge material, such that the approximation associated with simulating the two periods independently does not affect the model results.

2.2 Model Inputs

The model uses several input parameters that describe chemical-specific properties, physical properties of the unsuitable dredge material and clean sediment cap and cover material, and chemical mass transfer rates. These input parameters were developed based on site-specific data, information from literature, and experience with cap design at other comparable sites. A listing of model input parameters, the values used for this modeling assessment, and the source(s) from which they were derived are provided in Table D-2. A detailed discussion of key model inputs (i.e., those to which the model is most sensitive) is provided in Sections 2.2.1 through 2.2.3.

Table D-2
Input Parameter Values for the Chemical Isolation Cap Model

Model Input Parameter	Value	Data Source
Chemical-Specific Properties		
PCB homolog porewater concentration	See Table D-4	Sediment PCB samples were analyzed for the Southern California Coastal Water Research Project list of 41 congeners used for the Bight '08 Regional Monitoring Program, which is the same list used in Southern California Total Maximum Daily Loads and recommended by USEPA for dredge material evaluations in southern California. Based on this analytical method, individual PCB congeners were summed into homolog groups, which included the tri through nona PCB groups, and modeled separately. Total PCB sums were calculated based on results from model predictions of the individual homologs to facilitate comparisons to the target levels in Table D-1. See Section 2.2.3.
DDx isomer porewater concentrations	See Table D-4	Each individual isomer was modeled separately. Total DDx sums were calculated based on results from model predictions of individual isomers to facilitate comparisons to the target levels in Table D-1. See Section 2.2.3.
Mercury porewater concentration	See Table D-4	See Section 2.2.3.
Organic carbon partition coefficient, log K_{OC} (log L/kg)	See Table D-3	Log K_{OC} values used for PCBs and DDx were calculated based on a relationship with K_{OW} (see Section 2.2.2). K_{OW} values used for PCBs and DDx are from De Bruijn et al. (1989).
Partition coefficient, log K_d for mercury (log L/kg)	See Table D-3	The mean K_d is from Allison and Allison (2005) and is consistent with values reported in USEPA (1997). See Section 2.2.2.
Molecular diffusivity for mercury (cm^2/s)	See Table D-3	The value for mercury was calculated based on average molar volume using the correlation identified by Hayduk and Laudie (1974). The model calculates an effective diffusion coefficient using this chemical-specific input value for the molecular diffusivity and an empirical equation based on the cap material porosity using the approach developed by Boudreau (1997). See Section 2.2.2.
Molecular diffusivity for PCB homologs and DDx isomers (cm^2/s)	See Table D-3	Values were calculated by chemical based on average molecular weight using the correlation identified in Schwarzenbach et al. (1993). The model calculates an effective diffusion coefficient using this chemical-specific input value for the molecular diffusivity and an empirical equation based on the cap material porosity using the approach developed by Boudreau (1997). See Section 2.2.2.
Chemical biodegradation rate (per year)	0	Biodegradation was not simulated in the model.

Model Input Parameter	Value	Data Source
Final Cap Layer Properties		
Thickness (cm)	91	The thickness simulated in the model consisted of 3 feet of material from either the Entrance Channel, Newport Channel 3, or Newport Channel 2 dredge units.
Dry bulk density (g/cm^3)	Entrance Channel: 1.66 Newport Channel 3: 1.27 Newport Channel 2: 1.09	Values were calculated based on typical sediment specific gravity of 2.6 g/cm^3 and site-specific porosity of 0.61 for the Entrance Channel, 0.51 for Newport Channel 3, and 0.58 for Newport Channel 2.
Total porosity	Entrance Channel: 0.36 Newport Channel 3: 0.51 Newport Channel 2: 0.58	Site-specific values were calculated from the percent solids of representative sediment samples from the Entrance Channel, Newport Channel 3, and Newport Channel 2 dredge areas.
Fraction of organic carbon (%)	Entrance Channel: 0.089 Newport Channel 3: 0.44 Newport Channel 2: 1.6	Values were based on representative sediment samples collected from the Entrance Channel, Newport Channel 3, and Newport Channel 2 dredge areas.
Unsuitable Material Dredged from Outside the Federal Channels Layer Properties (Phase 2 Dredging)		
Thickness (cm)	152	The thickness simulated in the model consisted of 5 feet of Phase 2 dredge material from outside the Federal Channels.
Total porosity	0.61	A site-specific value was calculated from the percent solids of representative sediment samples from Phase 2 dredge area.
Dry bulk density (g/cm^3)	1.01	The value was calculated based on typical sediment specific gravity of 2.6 g/cm^3 and site-specific porosity of 0.61.
Fraction of organic carbon (%)	0.42	The value is based on representative sediment samples from Phase 2 dredge areas.
Interim Cover Properties		
Thickness (cm)	30	The thickness simulated in the model consisted of 1 foot of material from the Newport Channel 3 dredge unit.
Total porosity	0.51	A site-specific value was calculated from the percent solids of representative sediment samples from the Newport Channel 3 dredge unit.
Dry bulk density (g/cm^3)	1.27	The value was calculated based on typical sediment specific gravity of 2.6 g/cm^3 and site-specific porosity of 0.49.
Fraction organic carbon (%)	0.44	The value is based on representative sediment samples from the Newport Channel 3 dredge unit.

Model Input Parameter	Value	Data Source
Unsuitable Material Dredged from Inside the Federal Channels Layer Properties (Phase 1 Dredging)		
Thickness (cm)	457	The thickness simulated in the model consisted of 15 feet of dredge material from within the Federal Channels.
Total porosity	0.71	The value was calculated from the percent solids of representative sediment samples from Phase 1 dredge area. Representative samples were averaged based on the volume of material being placed in this layer.
Dry bulk density (g/cm^3)	0.75	The value was calculated based on a typical sediment specific gravity of 2.6 g/cm^3 and site-specific porosity of 0.71.
Fraction organic carbon (%)	0.91	This value was based on representative sediment samples within Phase 1 dredge area. Representative samples were averaged based on the volume of material being placed in this layer.
Mass Transport Properties		
Boundary layer mass transfer coefficient (cm/hour)	0.75	Selected value is a typical value used for cap design (e.g., Reible 2012) and consistent with a range of values measured in other systems (e.g., Thibodeaux et al. 2001).
Groundwater seepage rate (cm/year)	9.1	A conservative groundwater seepage rate was selected based on studies conducted in the area (Todd Engineers 2006). See Section 2.2.1.
Net sedimentation rate (cm/year)	0	Conservatively assumed no net sedimentation in the project area.
Dispersion length (cm)	Final Cap: 73 Interim Cover: 49	Dispersion was set to 10% of model domain length. See Section 2.2.1.
Bioturbation layer thickness (cm)	15	The selected value is consistent with literature values for marine systems (e.g., Clarke et al. 2001; USEPA 2005, 2015).
Porewater biodiffusion coefficient (cm^2/year)	1,000	Parameter represents bioturbation rate applied to the dissolved phase; the selected value is a typical value used for cap design in a marine environment (e.g., Reible 2012).
Particle biodiffusion coefficient (cm^2/year)	10	The parameter represents the bioturbation rate applied to the particulate phase; the selected value is a typical value used for cap design in a marine environment (e.g., Reible 2012).
Consolidation thickness (cm)	152	The value is based on preliminary geotechnical modeling using site-specific data (see Section 6.3.2 of the Draft BODR).
90% consolidation time (year)	0.33	The value is based on preliminary geotechnical modeling using site-specific data (see Section 6.3.2 of the Draft BODR).

2.2.1 Groundwater Darcy Flux and Dispersion

Groundwater seepage rates (i.e., Darcy flux) within the Lower Newport Bay area have been documented to be very low to negligible, as a majority of groundwater from upland flows through steep slopes and banks as seepage above the water table (Weston Solutions 2007). As a result of the low-permeability geological deposits of the Newport Coast area (consolidated sandstone, shales, and volcanic rocks), groundwater flow rates are expected to be very low, but a site-specific study has not been performed. For this design, a conservative estimate of the Darcy flux through the CAD facility was assumed to be 9.1 centimeters (cm) per year (Todd Engineers 2006).

Dispersivity values for flow in porous media over relatively short distances are typically in the range of 1% of the domain length, whereas those for large-scale groundwater plumes are on the order of 10% (Gelhar et al. 1985; Neuman 1990). In addition to net advective flow associated with seepage, groundwater transport within the sediments and within a cap can be influenced by tidal fluctuations. Lower Newport Bay's location along the California coast means that it experiences tidal influence; the typical tidal range in this area is 5.4 feet (NOAA 2003). Tidal action can reduce the groundwater flow rate (or reverse the rate) as the tide rises, and conversely can increase the groundwater flow rate as the tide falls, due to increased or decreased hydrostatic pressure, respectively. Therefore, in the cap model, the hydrodynamic dispersivity was set to a value of 10% of the cap thickness because this modeling is reflecting additional mixing associated with tidal exchange. Representing tidal mixing with a dispersion coefficient is a common approach in groundwater modeling (e.g., La Licata et al. 2011). Because of this approximation (i.e., simulating short-term velocity fluctuations due to tides as a dispersion process in the long term), a sensitivity analysis was conducted to understand how changes in the dispersivity affect the model results.

2.2.2 Partitioning Coefficients and Diffusivity

Partitioning of chemicals between the dissolved and sorbed (i.e., dredge or cap/cover material) phases is described in the model by the chemical-specific equilibrium partition coefficient (K_d). This approach assumes that sorption follows linear isotherms and is instantaneous (not rate-limited) and reversible. For non-polar organic compounds, such as PCBs and DDx, the partition coefficient is calculated in the model based on the customary $K_d = f_{OC} \times K_{OC}$ approach (e.g., Karickhoff 1984), where K_{OC} is the compound's organic carbon partition coefficient and f_{OC} is the organic carbon fraction of the solid phase (i.e., CAD material).

For PCBs, average log K_{OC} values were developed by arithmetically averaging log K_{OW} results from individual congeners within each homolog group based on literature.[1] Average log K_{OC} values were

[1] Log K_{OW} values for PCBs as cited by Hawker and Connell (1988) are widely used, though they were measured by a generator column. Log K_{OW} values measured by the "slow-stirring" method are considered more accurate. Therefore, the Hawker and Connell PCB log K_{OW} values were adjusted based on a correlation with log K_{OW} values measured by De Bruijn et al. (1989) using the "slow-stirring" method (De Bruijn's log K_{OW} values were not used directly because that study only measured 20 PCB congeners).

then calculated from the K_{OW} results by the widely used Di Toro (1985) empirical relationship (log K_{OC} = [log K_{OW} × 0.983] + 0.00028). For DDx, literature-based K_{OW} values were obtained from De Bruijn et al. (1989) for each simulated isomer (i.e., DDD, DDE, and DDT), and it was assumed that isomers (e.g., 2,4'-DDD and 4,4'-DDD) had the same K_{OW} values. Log K_{OC} values were then calculated from the Di Toro (1985) empirical relationship described previously for PCBs. A literature-based K_d value for mercury was used in the model based on the value reported in Allison and Allison (2005). Values of K_{OC} and K_d for each of the COPCs are listed in Table D-3.

Water diffusivities for DDx and PCBs were specified using a literature-based correlation with molecular weight (Schwarzenbach et al. 1993) and are listed in Table D-3. Water diffusivity for mercury was specified using a literature-based correlation with molar volume (Hayduk and Laudie 1974) and is also listed in Table D-3.

Table D-3
Chemical-Specific Properties

Chemical Name[1,2]	Molecular Diffusivity (cm^2/s)	log K_{OC} (log L/kg)	log K_d (log L/kg)
Trichlorobiphenyl	5.2E-06	5.8	--
Tetrachlorobiphenyl	4.9E-06	6.3	--
Pentachlorobiphenyl	4.7E-06	6.7	--
Hexachlorobiphenyl	4.5E-06	7.1	--
Heptachlorobiphenyl	4.3E-06	7.4	--
Octachlorobiphenyl	4.2E-06	7.8	--
Nonachlorobiphenyl	4.0E-06	8.1	--
2,4'-DDT	4.2E-06	6.8	--
4,4'-DDT	4.2E-06	6.8	--
2,4'-DDE	4.5E-06	6.8	--
4,4'-DDE	4.5E-06	6.8	--
2,4'-DDD	4.5E-06	6.1	--
4,4'-DDD	4.5E-06	6.1	--
Mercury	2.8E-05	--	4.9

Notes:

1. PCBs were modeled by homolog group and summed to total PCBs for comparison with the criteria.
2. DDx compounds were modeled separately and summed to total DDx for comparison with the criteria.

--: not applicable

2.2.3 Sediment Porewater Concentrations

The porewater concentration input defines the source term in the cap model and represents the effective concentrations present in each layer of the CAD facility at the beginning of the simulation. Porewater concentrations for the dredge material and interim cover layer and final cap layer were calculated based on the measured COPC concentrations of sediment samples collected in the areas where those materials will be obtained and the layer-specific f_{OC} values presented in Table D-2 and the COPC-specific K_{OC} values presented in Table D-3. Measured concentrations of COPCs in sediment core samples collected from the Main Channel 1, Main Channel 2, Turning Basin, and Newport Channel 1 dredge units in January 2018 were composited per area; the results from these tests were used to represent sediment concentrations of the Phase 1 dredge material layer (Anchor QEA 2019). A volume-weighted average sediment concentration was calculated using the volume contributed from each dredge unit.

Because the specific source(s) of the Phase 2 dredge material outside of the Federal Channels has not yet been identified, the maximum sediment concentration for each of the COPCs measured in composite samples collected from these areas in 2013 and 2017 was used as a conservative assumption. Core samples from the Newport Channel 3 dredge unit were used to represent the interim cover. Core samples from Newport Channel 3 and Newport Channel 2 were collected in January 2019 and used in this model. Core samples from the Entrance Channel were collected in January 2018; results from a composite of these samples were used in this model.

The equilibrium porewater concentration of total DDx in the Newport Channel 3 dredge material exceeds the total DDx porewater target level (Table D-1). However, because the sorbed-phase concentrations in this material are below target levels (and was classified as suitable for open ocean disposal, as described in the Draft BODR), this material was retained for consideration as the interim cover material and potential final cap material. As a result, DDx concentrations predicted by the cap modeling for Newport Channel 3 dredge material described herein were compared to the sediment-based target level rather than to the porewater-based value for the interim cover simulations.

The starting PCB, DDx, and mercury porewater concentrations used in the model evaluations are listed in Table D-4.

Table D-4
Sediment Porewater Concentrations

Chemical Name	COPC Porewater Concentration (ng/L)					
	Final Cap Layer			Phase 2 Dredge Material Layer	Interim Cover Layer	Phase 1 Dredge Material Layer
	Entrance Channel	Newport Channel 3	Newport Channel 2			
Trichlorobiphenyl	0	0	1.89×10^{-4}	1.24×10^{-3}	0	1.87×10^{-3}
Tetrachlorobiphenyl	0	3.93×10^{-5}	1.66×10^{-4}	2.60×10^{-3}	3.93×10^{-5}	1.84×10^{-2}
Pentachlorobiphenyl	0	2.65×10^{-5}	7.95×10^{-5}	1.36×10^{-3}	2.65×10^{-5}	7.45×10^{-3}
Hexachlorobiphenyl	0	3.97×10^{-5}	3.07×10^{-5}	6.42×10^{-4}	3.97×10^{-5}	3.33×10^{-3}
Heptachlorobiphenyl	0	3.91×10^{-5}	8.22×10^{-6}	1.69×10^{-4}	3.91×10^{-5}	8.28×10^{-4}
Octachlorobiphenyl	0	0	4.25×10^{-7}	1.22×10^{-5}	0	3.00×10^{-6}
Nonachlorobiphenyl	0	0	0	4.00×10^{-7}	0	1.80×10^{-6}
Total PCB[1]	0	3.93×10^{-5}	4.74×10^{-4}	4.78×10^{-3}	3.93×10^{-5}	1.88×10^{-2}
2,4'-DDT	0	0	0	5.74×10^{-5}	0	7.25×10^{-4}
4,4'-DDT	0	0	0	3.50×10^{-4}	0	3.89×10^{-3}
2,4'-DDE	0	1.98×10^{-5}	0	3.17×10^{-4}	1.98×10^{-5}	4.88×10^{-3}
4,4'-DDE	1.44×10^{-5}	4.16×10^{-4}	1.27×10^{-4}	2.75×10^{-3}	4.16×10^{-4}	7.48×10^{-2}
2,4'-DDD	0	0	0	7.32×10^{-4}	0	1.58×10^{-2}
4,4'-DDD	0	8.48×10^{-4}	3.38×10^{-4}	4.01×10^{-3}	8.48×10^{-4}	9.29×10^{-2}
Total DDx[2]	1.44×10^{-5}	1.28×10^{-3}	4.65×10^{-4}	1.30×10^{-2}	1.28×10^{-3}	2.25×10^{-1}
Mercury	1.57×10^{-5}	2.11×10^{-3}	6.66×10^{-3}	2.71×10^{-1}	2.11×10^{-3}	3.31×10^{-2}

Notes:
Zero values are non-detects reported as U = 0.

1. Total PCB is included for reference; each individual homolog is modeled, and results are summed to calculate total PCB for comparison to target levels.
2. Total DDx is included for reference; each individual isomer is modeled, and results are summed to calculate total DDx for comparison to target levels.

3 Model Results

Chemical isolation modeling was conducted to simulate the transport of mercury, DDx isomers, and PCB homologs for both the interim cover and final cap layer configurations (Section 2). Model simulations were conducted to assess the performance of the cover and final cap over a 100-year period. Performance was evaluated by comparing vertically averaged, model-predicted dry weight and porewater COPC concentrations from the top 15 cm of the interim cover or final cap to target levels. Model-predicted COPC concentrations for the interim cover and final cap layer are predicted to remain below the target levels provided in Section 1.2 (both sorbed-phase ERMs and CTR porewater criteria) for more than 100 years, as discussed in Sections 3.1 through 3.3.

3.1 Phase 1 Interim Cover Model Results

Figures D-2 through D-4 show the model results for the first phase of CAD construction, which evaluated the performance of a 1 foot layer of clean dredge material (i.e., interim cover) overlying 15 feet of unsuitable Phase 1 dredge material removed from within the Federal Channels. Although the interim cover is only expected to be exposed for 2 years before it will be covered with additional material, final post-construction concentrations for all COPCs are predicted to remain below target levels for more than 100 years. Concentrations within the interim cover start at the specified initial concentration (Section 2.2.3 and Table D-4) and are predicted to decrease as the chemical mass depletes from this layer into the surface water at a rate faster than mass from the Phase 1 dredge material enters the interim cover from below. Concentrations of all COPCs are predicted to decrease throughout the 100-year model simulation, indicating little to no influence on the surface of the interim cover from the dredge material layer beneath. Model results in the top 15 cm of the interim cover after 2 years are as follows:

- Total PCB sorbed-phase concentrations are predicted to be 3.3 , which is less than the ERM of 180 µg/kg. Porewater concentrations are predicted to be 0.11 nanograms per liter (ng/L), which is less than the CTR criteria of 30 ng/L (Figure D-2).
- Total DDx sorbed-phase concentrations are predicted to be 17 , which is less than the ERM of 46.1 µg/kg. Porewater concentrations are predicted to be 1.2 ng/L (Figure D-3). As described in Section 2.2.3, porewater concentrations are not compared with CTR criteria for DDx in the interim cover.
- Mercury sorbed-phase concentrations are predicted to be 170 , which is less than the ERM of 710 µg/kg. Porewater concentrations are predicted to be less than 2.1 ng/L, which is below the CTR criteria of 50 ng/L (Figure D-4).

Figure D-2
Temporal Profile of Vertically Averaged Total PCB Concentrations in the Bioturbation Zone – First Phase

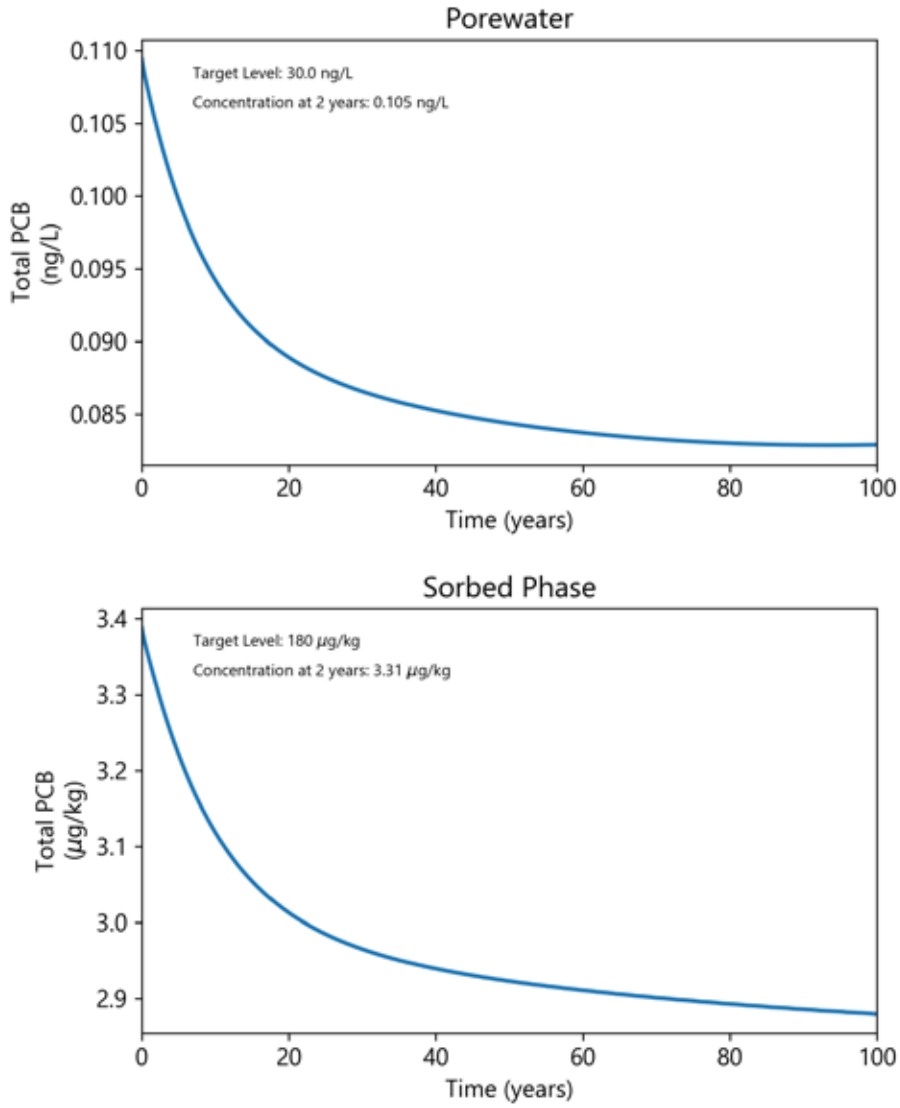


Figure D-3
Temporal Profile of Vertically Averaged Total DDx Concentrations in the Bioturbation Zone – First Phase

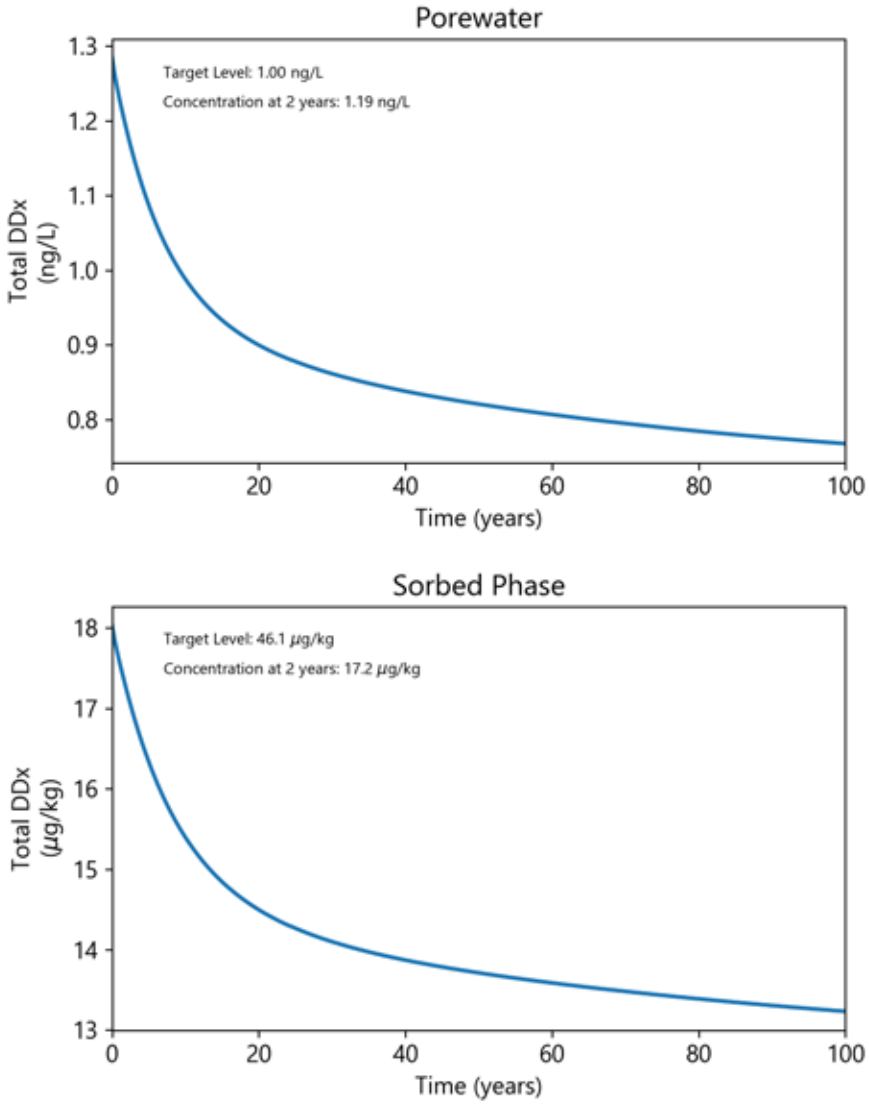
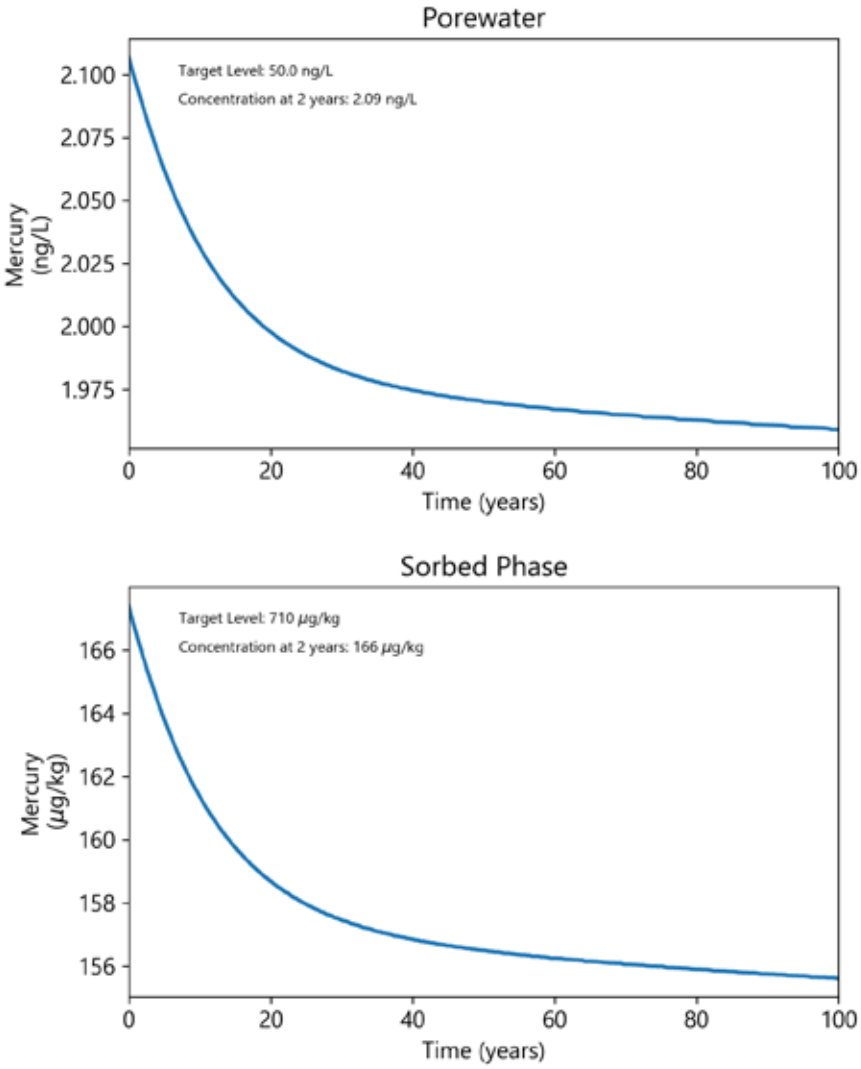


Figure D-4
Temporal Profile of Vertically Averaged Mercury Concentrations in the Bioturbation Zone – First Phase



3.2 Phase 2 Final Cap Model Results

Figures D-5 through D-12 show the model results for the second phase of CAD facility construction. Because the source of the final cap material has not been identified, model simulations were conducted separately for three different material types for the final cap: Entrance Channel dredge material (Figures D-5 through D-7), Newport Channel 3 dredge material (Figures D-8 through D-10), and Newport Channel 2 dredge material (Figures D-11 through D-13). As described in Section 2.1.1, Phase 2 construction will include the placement of a 3 foot layer of clean dredge material (i.e., final

cap) on top of 5 feet of unsuitable Phase 2 dredge material from outside of the Federal Channels, which in turn will be placed on top of the interim cover (i.e., following the first phase of construction).

Vertically averaged concentrations in the top 15 cm of the Phase 2 final cap are predicted to remain below sorbed-phase and porewater target levels for all three cap materials (i.e., Entrance Channel, Newport Channel 3, and Newport Channel 2) for at least 100 years. With the exception of total PCBs in the Entrance Channel material, concentrations within the final cap layer start at the specified initial concentration (Section 2.2.3 and Table D-4) and are predicted to decrease for all chemical and cap material combinations, as the chemical mass depletes from this layer into the surface water at a rate faster than mass from the Phase 2 dredge material enters the final cap layer from below. Total PCB concentrations in the Entrance Channel material begin at zero, and influence from the Phase 2 dredge material is not predicted to occur in the surface of the final cap layer until approximately year 80. After year 80, concentrations of total PCBs increase through year 100 although predicted concentrations remain much lower than target levels. Model results in the top 15 cm of the final cap layer after 100 years are summarized for the three potential final cap materials as follows:

- Entrance Channel

  Total PCB sorbed-phase concentrations are predicted to be less than 10^{-8} , which is less than the ERM of 180 µg/kg. Porewater concentrations are predicted to be less than 10^{-8} ng/L, which is below the CTR criteria of 30 ng/L (Figure D-5).

  Total DDx sorbed-phase concentrations are predicted to be 0.52 than the ERM of 46.1 µg/kg. Porewater concentrations are predicted to be 0.08 ng/L, which is below the CTR criteria of 1.0 ng/L (Figure D-6).

  Mercury sorbed-phase and porewater concentrations are predicted to be 11.9 which is less than the ERM of 710 µg/kg. Porewater concentrations are predicted to be less than 0.15 ng/L, which is below the CTR criteria of 50 ng/L (Figure D-7).

- Newport Channel 3

  Total PCB sorbed-phase concentrations are predicted to be 2.9 the ERM of 180 µg/kg. Porewater concentrations are predicted to be less than 0.083 ng/L, which is below the CTR criteria of 30 ng/L (Figure D-8).

  Total DDx sorbed-phase concentrations are predicted to be 13.4 than the ERM of 46.1 µg/kg. Porewater concentrations are predicted to be 0.78 ng/L (Figure D-9). As described in Section 2.2.3, porewater concentrations are not compared with CTR criteria.

  Mercury sorbed-phase and porewater concentrations are predicted to be 157 which is less than the ERM of 710 µg/kg. Porewater concentrations are predicted to be 1.97 ng/L, which is below the CTR criteria of 50 ng/L (Figure D-10).

- Newport Channel 2

  Total PCB sorbed-phase concentrations are predicted to be 20.3 than the ERM of 180 µg/kg. Porewater concentrations are predicted to be 0.36 ng/L, which is below the CTR criteria of 30 ng/L (Figure D-11).

  Total DDx sorbed-phase concentrations are predicted to be 18.4 than the ERM of 46.1 µg/kg. Porewater concentrations are predicted to be 0.37 ng/L, which is below the CTR criteria of 1.0 ng/L (Figure D-12).

  Mercury sorbed-phase and porewater concentrations are predicted to be 488 which is less than the ERM of 710 µg/kg. Porewater concentrations are predicted to be 6.0 ng/L, which is below the CTR criteria of 50 ng/L (Figure D-13).

Figure D-5
Temporal Profile of Vertically Averaged Total PCB Concentrations in the Bioturbation Zone – Phase 2 Entrance Channel

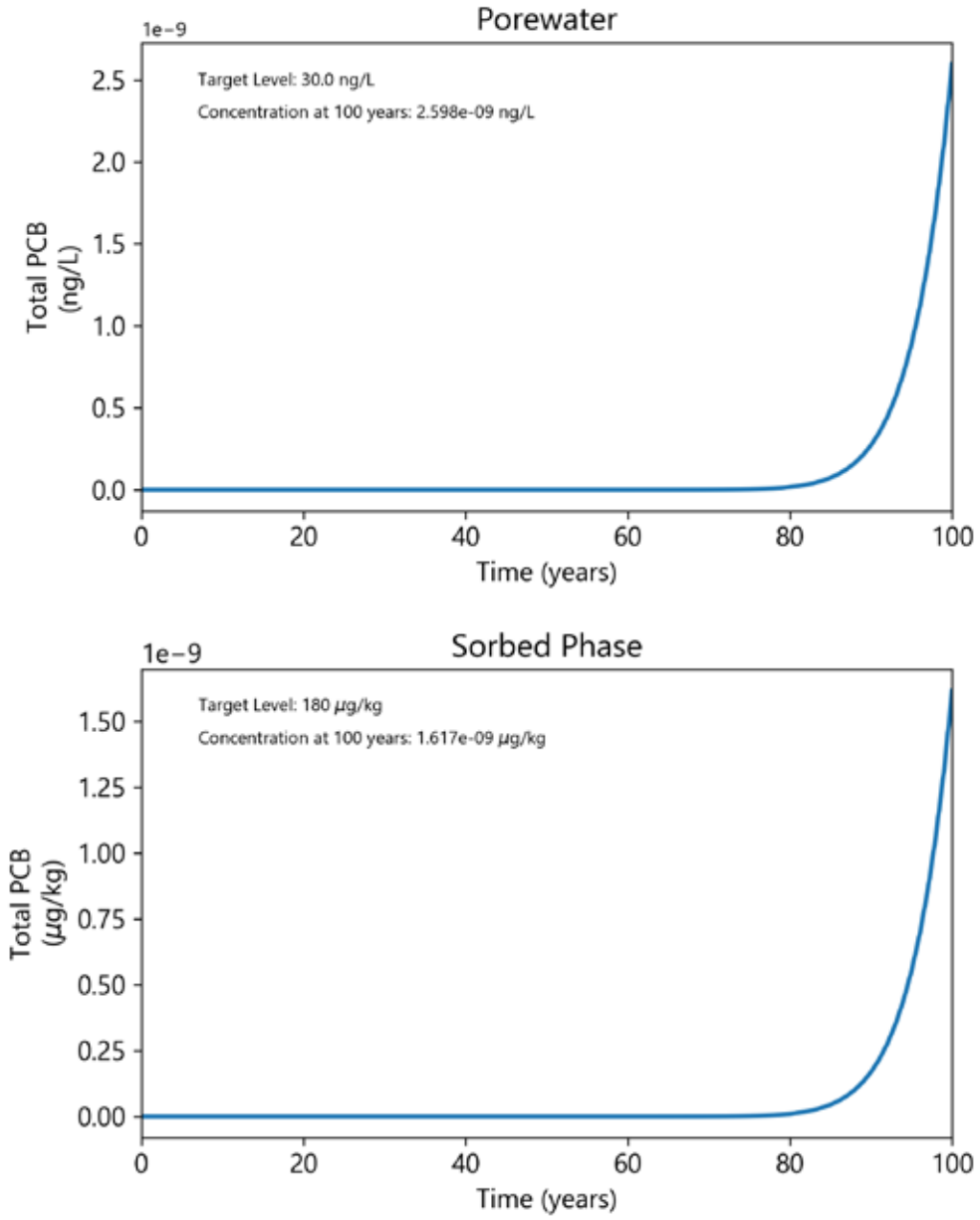


Figure D-6
Temporal Profile of Vertically Averaged Total DDx Concentrations in the Bioturbation Zone – Phase 2 Entrance Channel

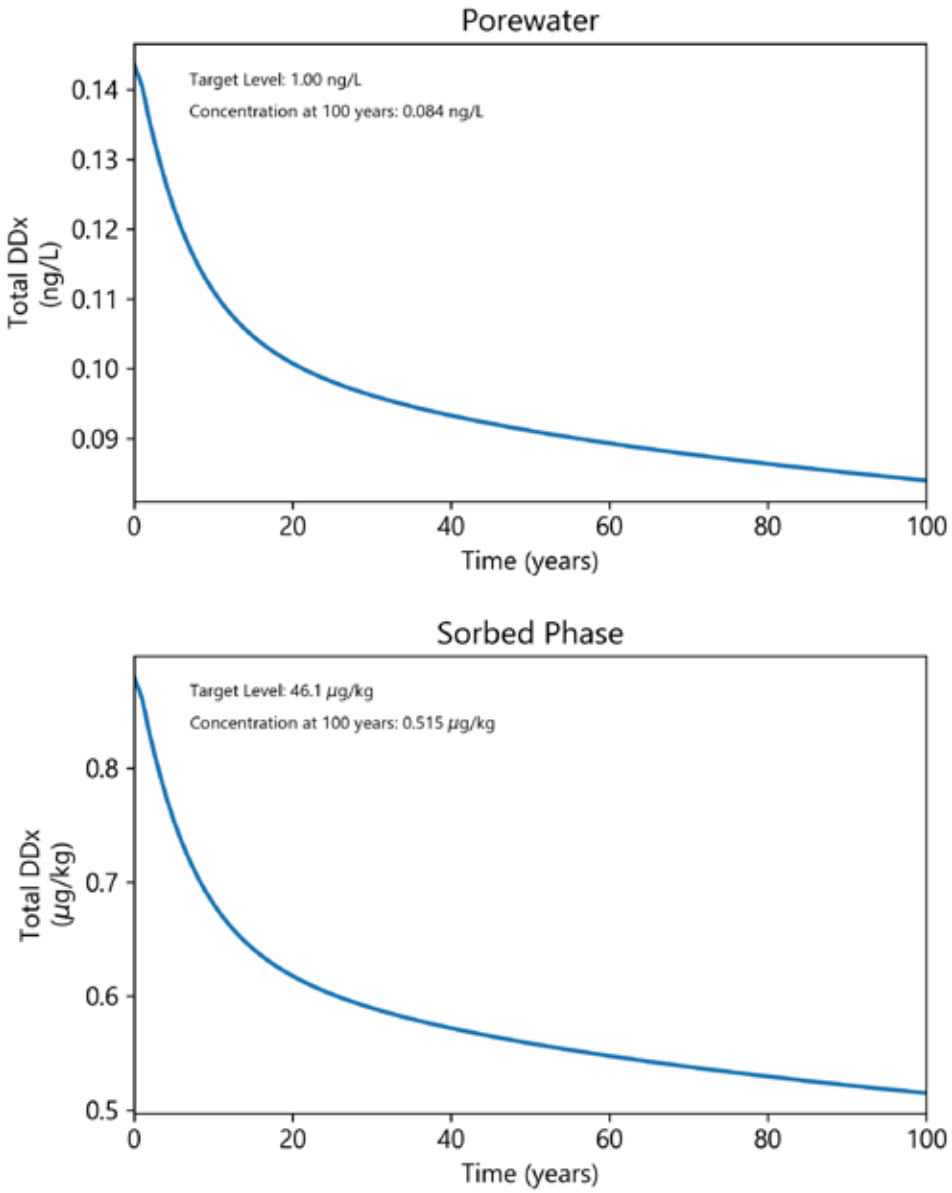


Figure D-7
Temporal Profile of Vertically Averaged Mercury Concentrations in the Bioturbation Zone – Phase 2 Entrance Channel

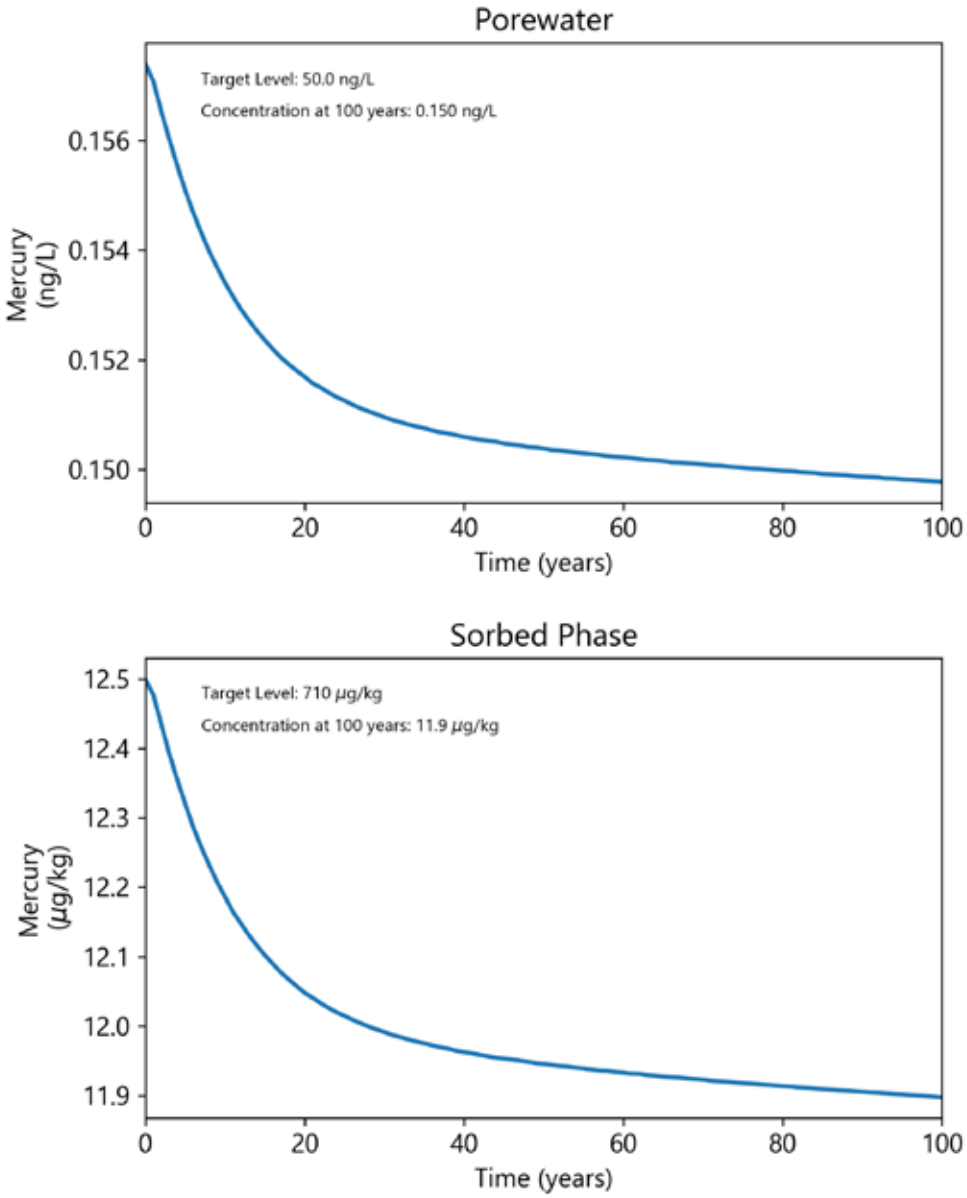


Figure D-8
Temporal Profile of Vertically Averaged Total PCB Concentrations in the Bioturbation Zone – Phase 2 Newport Channel 3

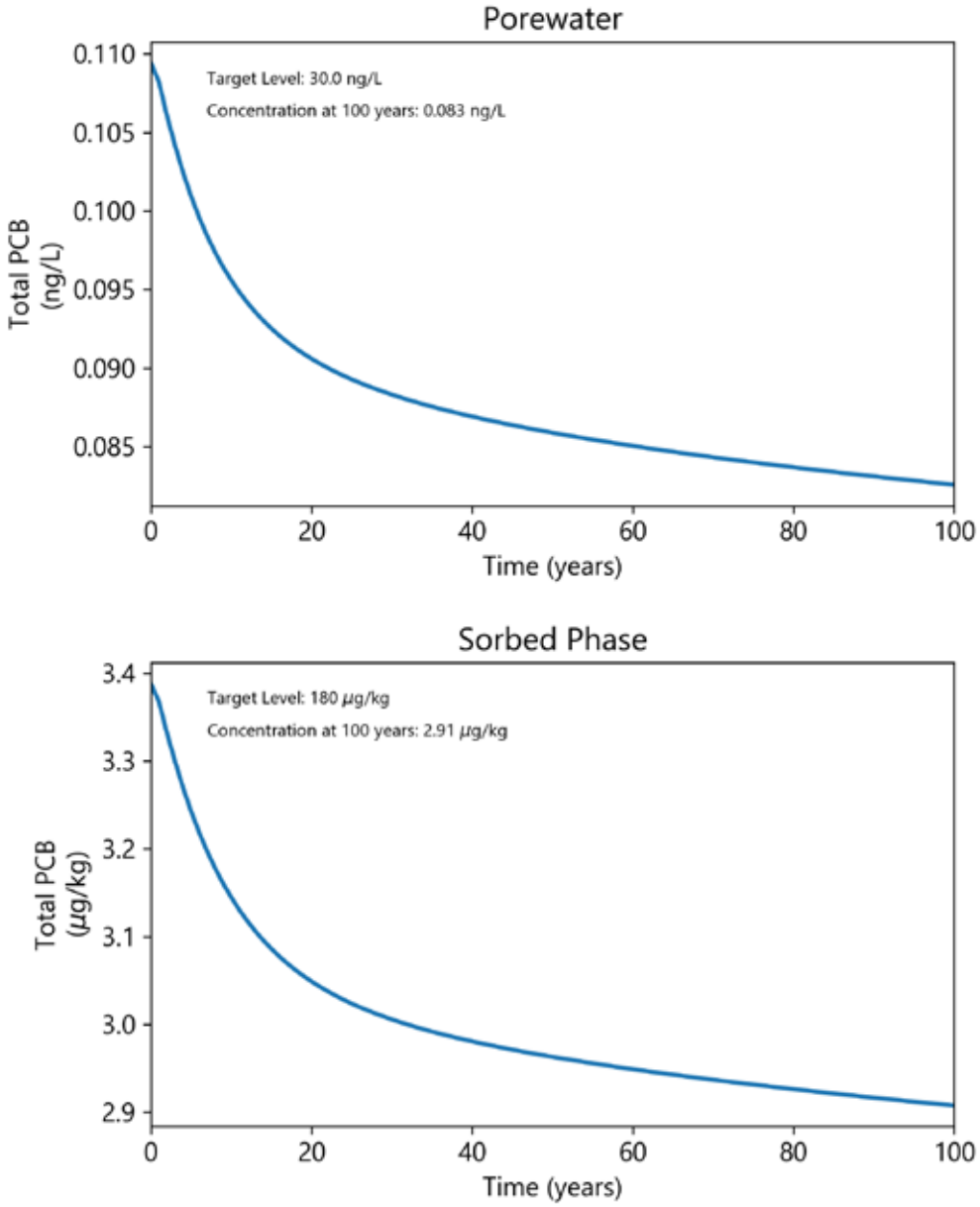


Figure D-9
Temporal Profile of Vertically Averaged Total DDx Concentrations in the Bioturbation Zone – Phase 2 Newport Channel 3

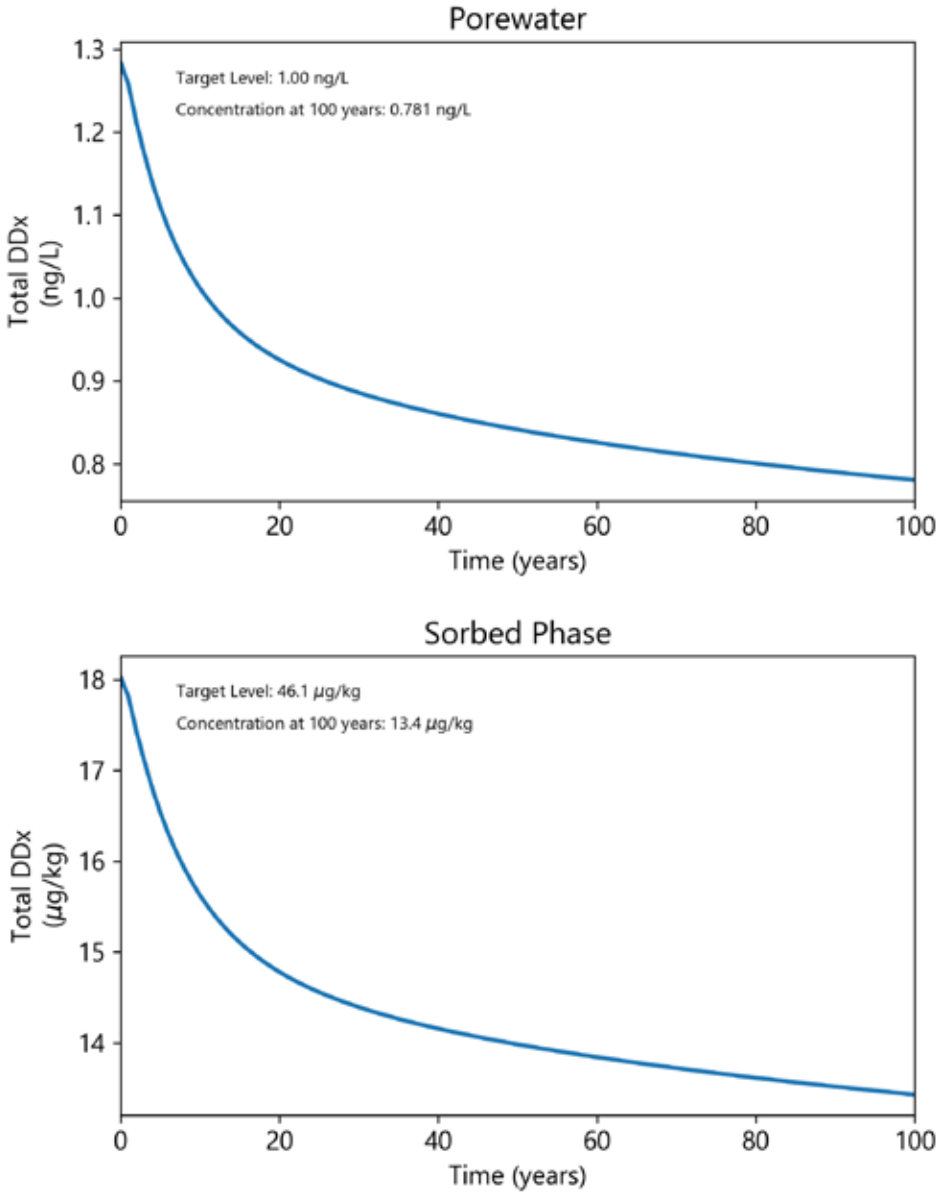


Figure D-10
Temporal Profile of Vertically Averaged Mercury Concentrations in the Bioturbation Zone – Phase 2 Newport Channel 3

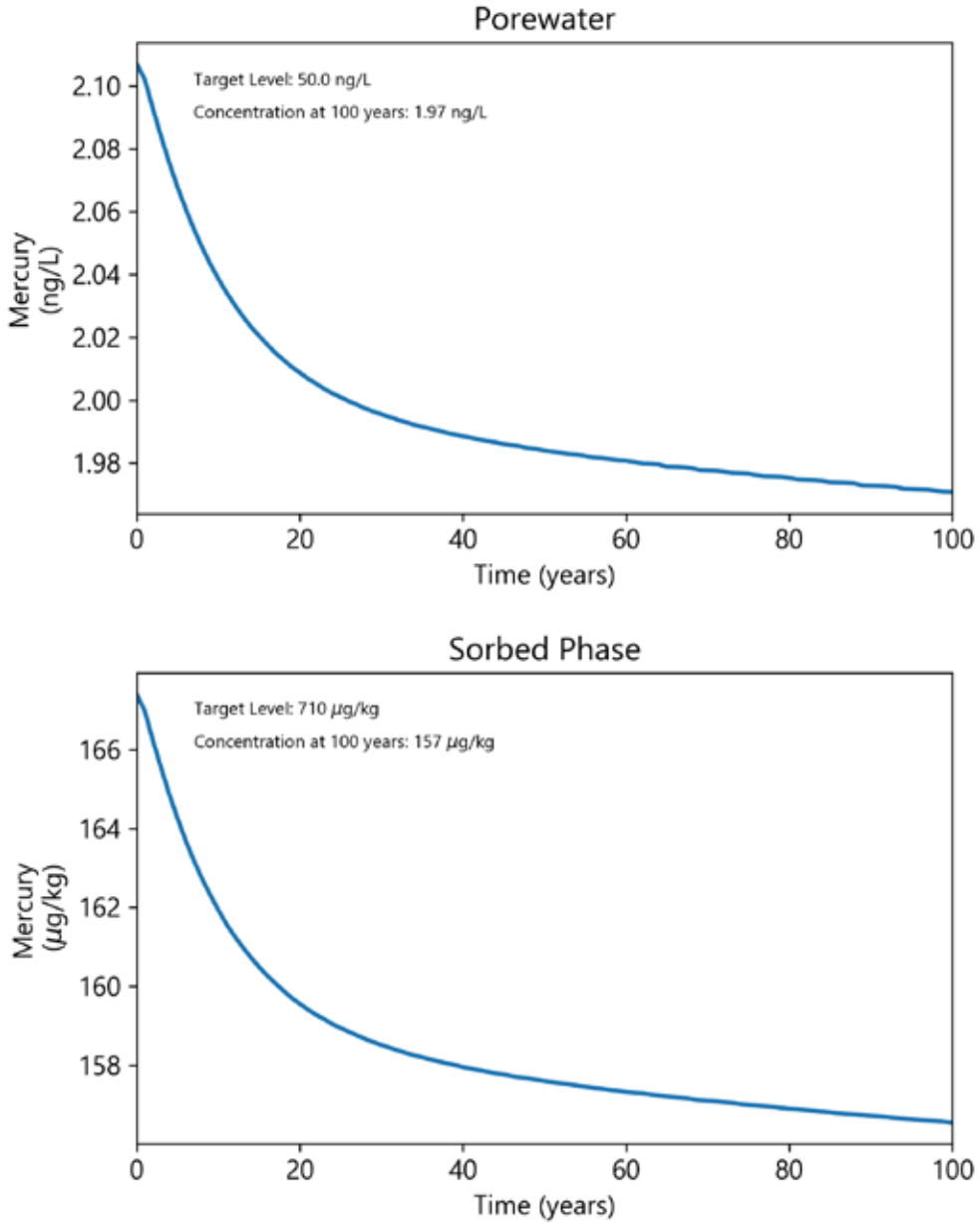


Figure D-11
Temporal Profile of Vertically Averaged Total PCB Concentrations in the Bioturbation Zone – Phase 2 Newport Channel 2

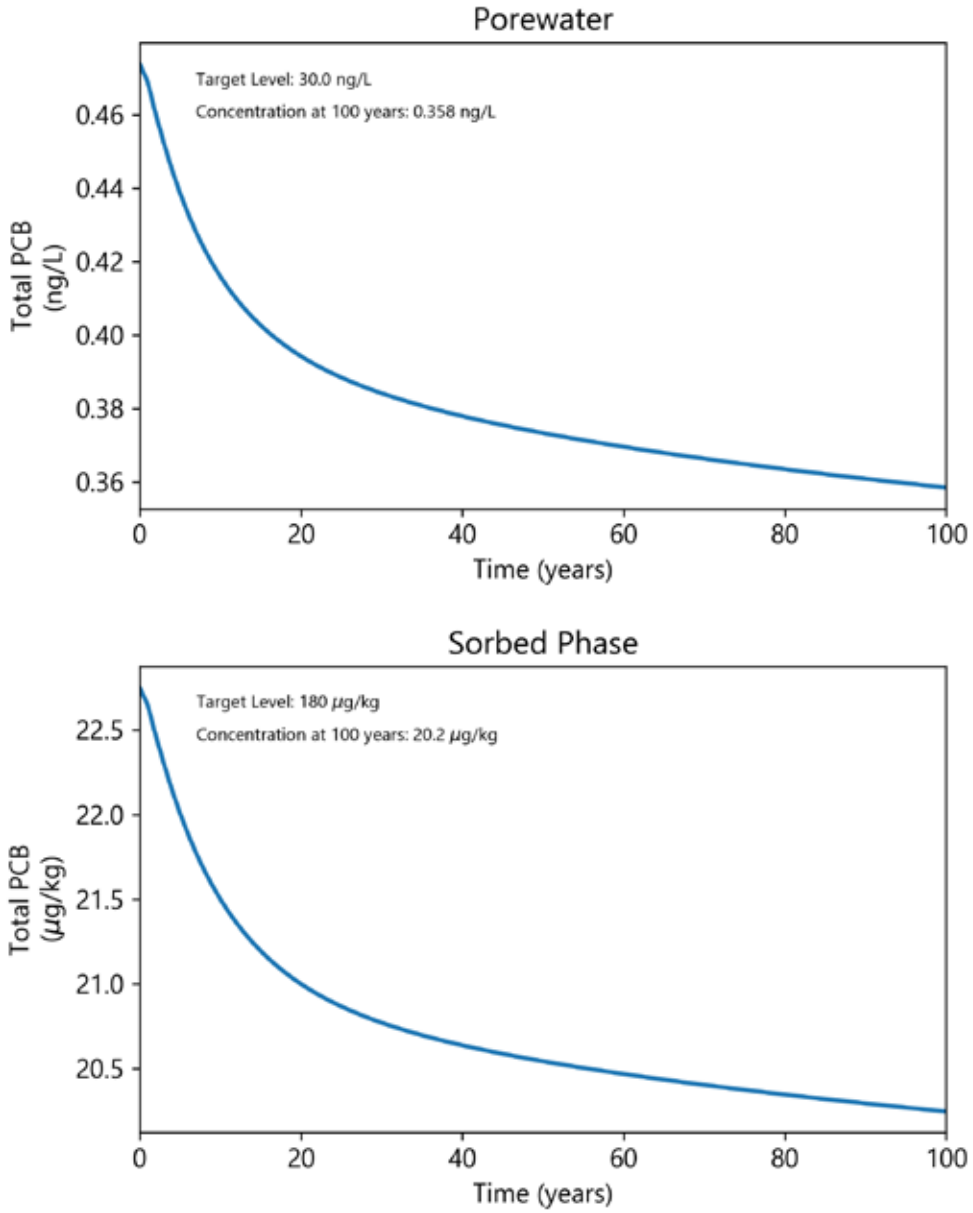


Figure D-12
Temporal Profile of Vertically Averaged Total DDx Concentrations in the Bioturbation Zone – Phase 2 Newport Channel 2

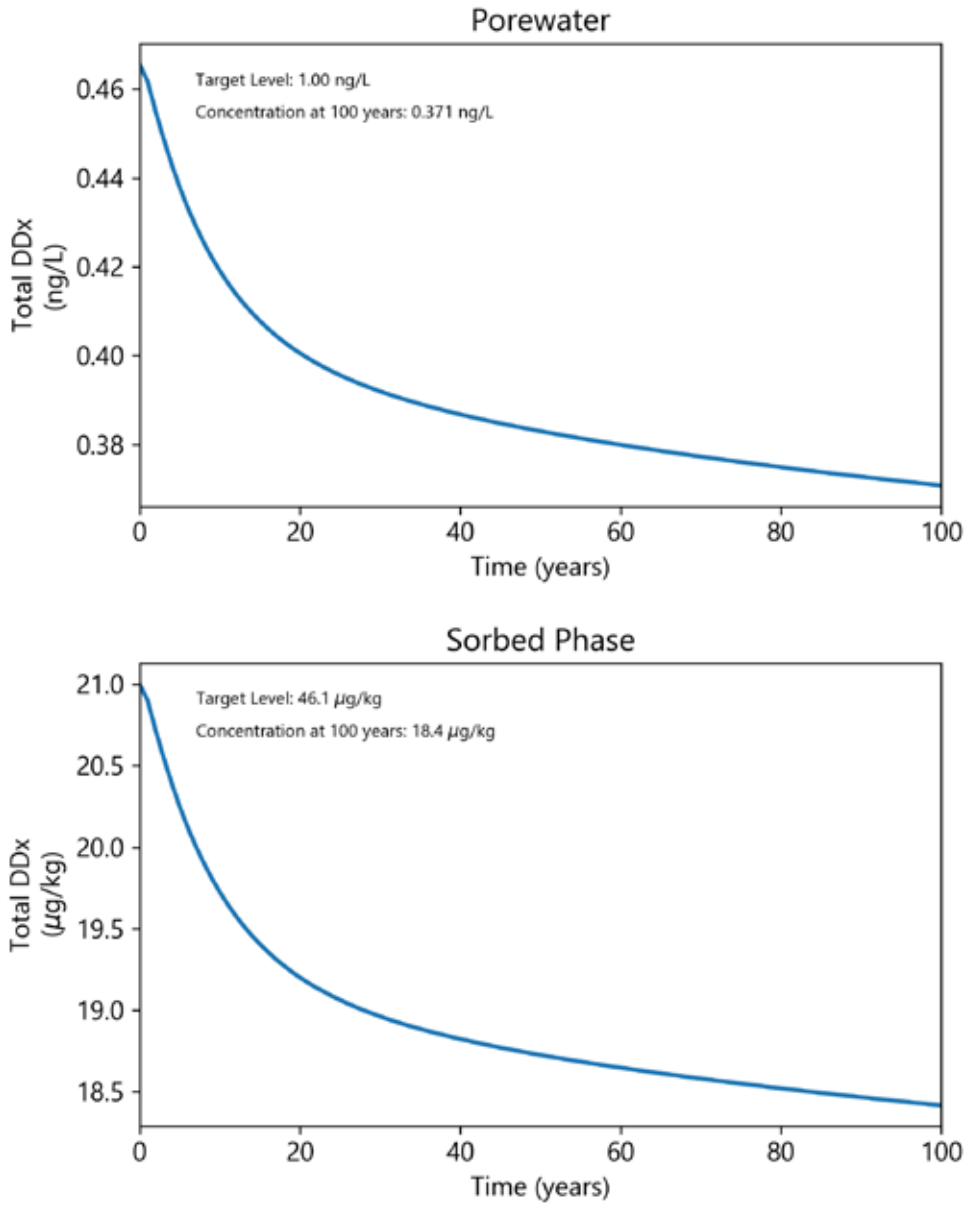
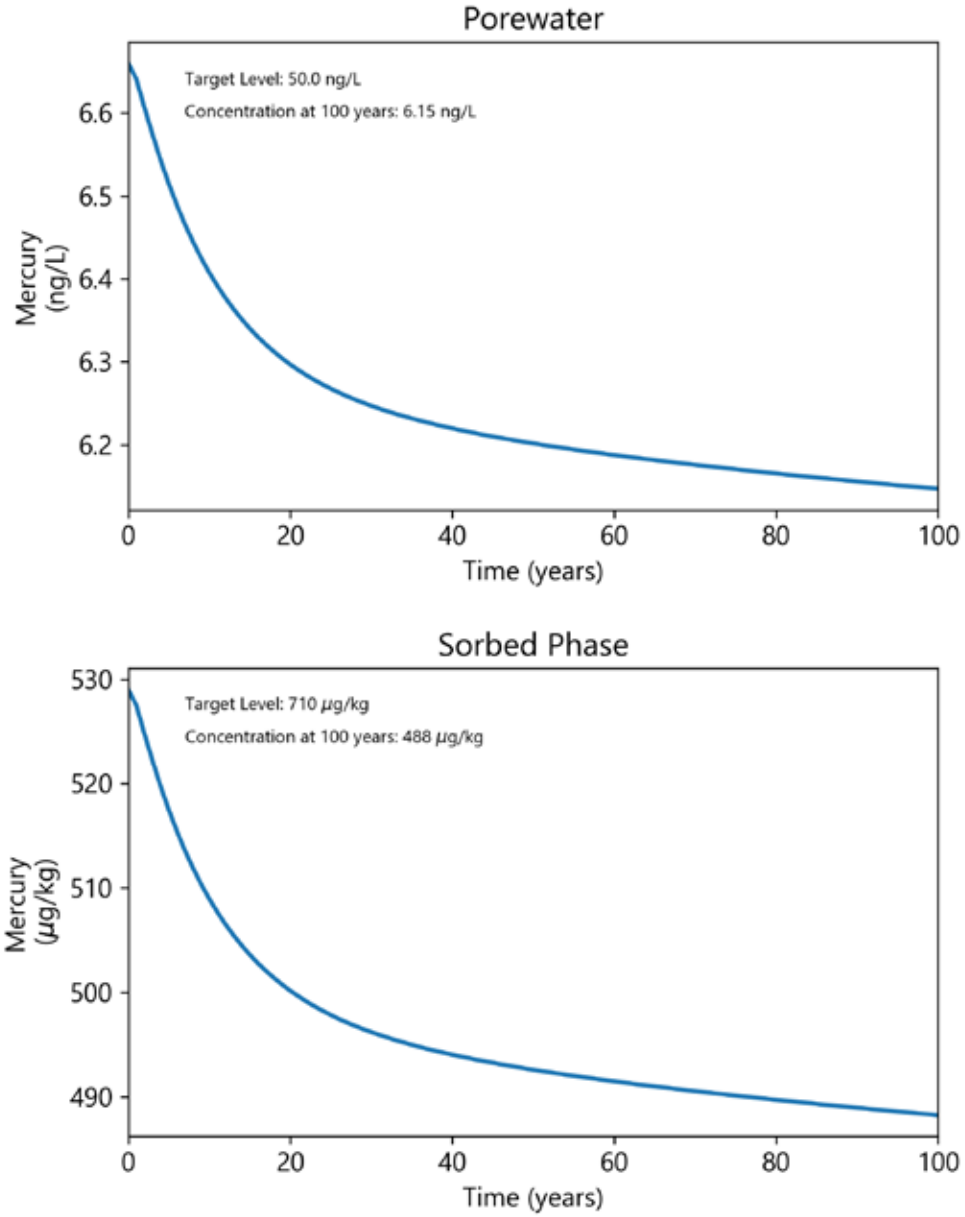


Figure D-13
Temporal Profile of Vertically Averaged Mercury Concentrations in the Bioturbation Zone – Phase 2 Newport Channel 2



3.3 Sensitivity Analysis

As discussed in Section 2.2.1, a sensitivity analysis was conducted to evaluate how uncertainty in the dispersion length affects model results. The sensitivity analysis was run for only the simulation of the Phase 1 interim cover, because that scenario produced higher concentration results for all COPCs than did the simulation of the Phase 2 final cap.

The dispersion length was set to 10% of the model domain length to account for increased dispersion due to tidal mixing. For the sensitivity analysis, alternate values for the dispersion length of 1% and 20% of the domain length were evaluated—this range covers the bounds of realistic values. A dispersion length of 1% of the domain length is typical for flow in porous media over relatively short distances, with no influence from tidal mixing, and a dispersion length of 20% of domain length is at the upper end of the range for a system with tidal mixing (Gelhar et al. 1985; Neuman 1990; La Licata et al. 2011). The resulting porewater concentrations averaged over the interim cover bioturbation zone are presented in Table D-5. The small range of model-predicted porewater and sorbed-phase concentrations for COPCs (Table D-5) indicate that the model is relatively insensitive to changes in the dispersion term. The model predicts that increasing the dispersivity term generally increases model-predicted concentrations, whereas decreasing the dispersity term generally decreases the model-predicted concentrations. Results of the sensitivity analysis indicate that model-predicted concentrations remain below target levels for each scenario evaluated.

Table D-5
Sensitivity Analysis Model Results

Chemical Name	Average Surface Porewater Concentration at 100 Years (			CTR Porewater	Average Surface Sorbed-Phase Concentration at 100 Years (			ERM
	10% of Domain Length	1% of Domain Length	20% of Domain Length		10% of Domain Length	1% of Domain Length	20% of Domain Length	
Total DDx	0.0011	0.00088	0.0019	--	15.6	14.1	20.0	46.1
Total PCBs	0.00012	0.000087	0.00027	0.030	3.20	2.95	4.03	180
Mercury	0.0020	0.0020	0.0020	0.051	160	159	160	710

Note:
--: As described in Section 2.2.3, model-predicted DDx porewater concentrations for Newport Channel 3 dredge material are not compared with the aqueous CTR criteria for interim cover.

4 Summary and Next Steps

Chemical transport modeling was conducted to evaluate the protectiveness of the interim cover and final cap layer for the CAD facility being designed to support the disposal of dredge material classified as unsuitable for open ocean disposal. The material will be generated as part of upcoming maintenance dredging projects to be conducted in the Lower Newport Bay Federal Channels and elsewhere. The analysis incorporated site-specific data, including COPC concentrations in unsuitable dredge material as well as clean sediment for capping, conservative estimates of Darcy groundwater seepage flux based on regional hydraulic data, information from literature, and experience from capping design at other sites. Modeling indicates the interim cover and final cap layer (including sediments from Newport Channel 2, Newport Channel 3, and the Entrance Channel) as currently designed are predicted to meet the target levels for more than 100 years.

These design variables include the following:

- The scour analysis has identified that up to 3 inches of scour from vessels traversing the CAD facility is possible.
- The specific source of the Phase 2 dredge material outside of the Federal Channels has not been identified. Therefore, the maximum sediment concentration for each COPC measured in composite samples collected from potential areas was used as a conservative assumption.
- Any changes to the presumed interim and final cap variables may require updates to the chemical isolation cap model.

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Appendix E
Vessel Scour Analysis

DRAFT

November 24, 2020
Draft Basis of Design Report
Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

Appendix E: Vessel Scour Analysis

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1 Introduction

Vessels traveling over the proposed confined aquatic disposal (CAD) facility produce propeller-generated currents (i.e., propeller wash) that may scour the CAD's surface. The CAD facility will be constructed in phases with an initial layer from the Lower Newport Bay and Federal Channels maintenance dredging program, an interim cover containment layer. After placement of the interim cover containment layer, the public and City of Newport (City) will have a predetermined amount of time to continue placing material from outside the Federal Channels that is determined unsuitable for open ocean disposal. Finally, a clean sediment cap (final cap) will be placed over this material. Due to the extensive time gaps, potential scour effects of propeller wash were evaluated for the following three surface layers: interim cover containment layer, material outside the Federal Channels, and final cap.

This document summarizes the vessel scour analysis, evaluating the CAD surface's physical stability and thickness from exposure to propeller wash. Design elements for the proposed CAD facility are described in Section 2. The propeller-generated currents in Section 3 and propeller-induced scouring in Section 4 were evaluated in Section 5 for the following CAD facility surface elevations, sediment material, tide conditions, and vessel characteristics:

- CAD facility surface elevations (from bottom to top)
  - Final cap surface (-22 feet mean lower low water [MLLW])
  - Surface elevation after the public and City placement period for material outside of the Federal Channels (-25 feet MLLW)
  - Interim cover containment layer surface (-30 feet MLLW)
- Sediment materials
  - Physical properties of clean material within the Federal Channels (assumed to be used to construct the interim cover containment layer) (Anchor QEA 2019)
  - Physical properties of samples collected during 2013 and 2017 for the Regional General Permit (RGP) 54 program (Anchor QEA 2013 and 2018); assumed to be the layer from material outside the Federal Channel that will result from public and City dredging projects
  - Physical properties of the final cap material (assumed to be from the Entrance Channel or Newport Channel 3) (Anchor QEA 2019)
- Tide conditions and water depths
  - Mean higher high water (MHHW)
  - MLLW
  - Lowest observed water (LOW)
- Vessel characteristics
  - 25% maximum power
  - 50% maximum power

2 Design Elements for the Proposed CAD Facility

The proposed CAD facility will be constructed in a layered approach extending from a bottom elevation of -46 feet MLLW (including 1-foot overdredge) to the top final design elevation of -22 feet MLLW. The CAD facility will be initially constructed from dredge material from the Lower Newport Bay and Federal Channels maintenance dredging program. Material unsuitable for open ocean disposal will be placed at the bottom of the CAD facility to an elevation of -31 feet MLLW. This material will then be covered with an interim cover containment layer of clean material with a thickness of 1 foot and surface elevation of -30 feet MLLW. Over a predetermined time frame, material suitable and unsuitable for open ocean disposal from the public and City dredging projects, including material permittable and not permittable under the City's RGP 54 program, will be periodically placed in the CAD facility. This layer will be 5 feet thick to an elevation of -25 feet MLLW. A 3-foot final cap of clean material would complete the CAD facility to a surface elevation of -22 feet MLLW.

The propeller wash scour analysis evaluated potential scour conditions of the CAD surface at three elevations as follows: interim cover containment layer, material outside the Federal Channels, and final cap (Table E-1). Details of the sediment material, tide conditions, and vessel characteristics used to evaluate each layer are provided in Sections 2.1 to 2.3.

Table E-1
CAD Facility Elements

Element	Elevation (feet MLLW)	Sediment Material	Thickness (feet)
Final Cap	-22	Entrance Channel, Newport Channel 3, or RGP 54 clean material	3
Material Outside the Federal Channels	-25	Material within Lower Newport Bay but outside the Federal Channels permittable and not permittable under the City's RGP 54 program	5
Interim Cover Containment Layer	-30	Lower Newport Bay and Federal Channels maintenance dredging clean material	1

2.1 Sediment Material

Sediment grain size compositions were defined for the interim cover containment layer, material outside the Federal Channels, and final cap, as illustrated in Figure E-1. These grain size distributions were determined based on sediment data of the respective source material. Since the source material will have a range in sediment composition, the average sediment compositions were used (Table E-2).

Sediments dredged from Newport Channel 3 (NC3), as part of the Lower Newport Bay and Federal Channels maintenance dredging program, will likely be used for the interim cover containment layer. The sediment composition was determined from four sediment samples taken in NC3 (Anchor QEA 2019). The average sediment composition was used to define the interim cover containment layer sediment properties.

Sediments for material outside the Federal Channels were characterized with data from two previous RGP 54 sediment suitability determinations. These comprehensive bay-wide sediment investigations included grain size analyses of composite samples throughout the RGP 54 area in 2013 (Anchor QEA 2013) and 2017 (Anchor QEA 2018). Composite samples from each sediment investigation were collected for the following five areas: 1) Lido Isle; 2) Linda Isle/Harbor Island; 3) Upper Newport Bay, 4) Balboa Island; and 5) Newport Island Channels. In general, grain sizes in Lower Newport Bay (Areas 1, 4, and 5) are similar with mostly sands. Grain sizes from Area 2 to Area 3 transition to mostly fines (silt and clay). Sediment properties for this layer were defined based on the average sediment composition of data from the 2013 and 2017 RGP 54 sediment investigations.

The final cap material will depend on the availability of sediment material when the final cap is constructed. Potential sources of clean material include the Lower Newport Bay and Federal Channels maintenance dredging or RGP 54 programs. For this vessel scour analysis, the final cap sediment composition was based on sediment from the Entrance Channel (EC-COMP), which is mostly sands, and NC3 (Anchor QEA 2019).

Table E-2
CAD Material Sediment Compositions and Properties

Sediment Class	Diameter (millimeters)	Newport Channel 3	Material Outside Federal Channels	Entrance Channel
Gravel	>2.0	0.56	0.00	0.00
Very Coarse Sand	1.0 to 2.0	6.41	0.96	0.27
Coarse Sand	0.5 to 1.0	19.57	12.43	3.94
Medium Sand	0.25 to 0.5	33.06	22.37	28.92
Fine Sand	0.125 to 0.25	15.55	16.62	56.93
Very Fine Sand	0.0625 to 0.125	2.39	7.25	8.06
Silt	0.00391 to 0.0625	15.68	28.32	1.32
Clay	<0.00391	6.79	11.95	0.55
D_{85}		0.752 mm	0.476 mm	0.386 mm
D_{50}		0.306 mm	0.138 mm	0.204 mm
D_{15}		0.017 mm	0.005 mm	0.133 mm

Notes:
Units in percent unless otherwise indicated
Newport Channel 3 for interim cover containment layer (Anchor QEA 2019)

2.2 Tide Conditions and Water Depths

Water levels at the proposed CAD facility are influenced primarily by astronomical tides. Other factors that affect water levels include temperature variations (e.g., during El Niño Southern Oscillation), barometric pressure changes, wind setup (i.e., storm surge), and wave setup. These factors are secondary in magnitude and episodic in nature, hence their effects on the water levels are not considered in the analysis presented herein. The long-term representation of water levels at the project location is calculated based on astronomical tides alone.

The National Oceanic and Atmospheric Administration monitors water levels around the United States and establishes tidal datums used to reference water levels. Tidal datums for Newport Harbor are summarized in Table E-3 based on the latest tidal epoch from 1983 to 2001.

Table E-3
Tides at the Harbor

Tidal Datum	Water Level (feet MLLW)
Highest observed water (January 28, 1983)	7.67
Mean higher high water (MHHW)	5.41
Mean high water (MHW)	4.68
Mean tide level (MTL)	2.80
Mean sea level (MSL)	2.78
Mean low water (MLW)	0.92
Mean lower low water (MLLW)	0.00
Lowest observed water (January 28, 1988)	-2.35

Note:
Source: NOAA 2003

Water depths were calculated as the difference between the tide water level and CAD surface elevation. This analysis used three water levels for determining the propeller wash velocities. The three water levels selected were two representative tide conditions (i.e., MHHW and MLLW) and one extreme condition (i.e., lowest observed water).

2.3 Vessel Characteristics

Propeller-generated currents were evaluated for the types of vessels traveling over the proposed CAD facility. City personnel provided vessel information and operation characteristics of vessels

expected to transverse the proposed CAD facility, including sailboats, tugboats, charter boats (e.g., Hornblower), and powerboats. Properties of representative vessels operating in Newport Harbor are listed in Table E-4. To adhere to speed limits within the harbor (no wake zone and maximum speed limit of 5 miles per hour), maximum power would not be used under operating conditions. Thus, propeller wash currents were determined assuming 25% and 50% of the vessel maximum power.

Table E-4
Newport Harbor Vessel Characteristics

Vessel Type	Vessel Draft (feet)	Number of Propellers	Propeller Diameter (feet)	Maximum Power (horsepower)
50-foot Sailboat	6	1	1.67	100
70-foot Sailboat	12	1	1.67	100
Tugboat	7	2	4.50	2,200
Charter boat	8	2	3.33	2,500
90-foot Powerboat	9	2	2.67	1,800
135-foot Powerboat	10	2	3.33	2,500

3 Propeller-Generated Currents

The propeller wash exposure on the proposed CAD facility surface depends on the vessel characteristics and water depths. Propeller-generated currents were estimated with a propeller wash model (Anchor 2002) for a range of hydrodynamic conditions and vessel types. The model uses equations developed by Blaauw and van de Kaa (1978), Blaauw et al. (1984), and Verhey (1983). It predicts the velocity field behind a propeller jet based on the momentum theory and assumes the propeller thrust equals the change of the fluid momentum caused by the propeller. It also predicts the laws of free jet turbulence for submerged jets by assuming that flow is steady, uniform, and frictionless. In the zone of established flow, the velocity of the propeller jet at a distance, x, from the propeller and a radial distance, r, from the propeller axis was calculated based on engine operating power, propeller diameter, number of propellers, vessel draft, and water depth (Equation 1). For a non-ducted propeller, the velocity of the propeller jet can be written as shown in Equation 1.

Equation 1

$$V_{x,r} = 9.72 * \left(\frac{P_d}{{D_p}^2}\right)^{1/3} * \left(1.964 * \frac{D_p}{x}\right)^{1.1} * exp\left(-15.43 * \frac{r^2}{x^2}\right)$$

where:

Vx,r	=	water velocity at a given longitudinal distance, x, and radial distance, r, (feet/second)
x	=	distance behind propeller (feet)
r	=	radial distance from propeller axis (feet)
Pd	=	applied engine or propeller power (horsepower)
Dp	=	propeller diameter (feet)

Propeller wash velocities were determined for various combinations of CAD surface elevations, water levels, and vessel operations. Analyses were conducted for the following three surface elevations: interim containment cover layer at -30 feet MLLW; material outside the Federal Channels at -25 feet MLLW; and final cap at -22 feet MLLW. The CAD surface elevations were combined for the following three water levels: MHHW, MLLW, and lowest observed water (LOW). Vessel operations were based on 25% and 50% of maximum power.

3.1 Interim Cover Containment Layer

Propeller wash velocities at the interim cover containment layer surface (-30 feet MLLW) for 25% vessel power are shown in Figure E-2. In the figure, bottom velocities at the three water levels are shown in individual panels for the six vessels. For the 135-foot powerboat, the maximum propeller wash velocities range from 0.9 to 1.3 feet per second, occurring at 140 and 100 feet behind the vessel, respectively. The maximum bottom velocities correspond to the highest vessel power and shallowest water depth (Table E-5).

Table E-5
Maximum Propeller Wash Velocities at Interim Cover Containment Layer Surface for 25% Vessel Power

Vessel Type	Maximum Bottom Velocity (feet per second)		
	MHHW	MLLW	LOW
50-foot Sailboat	0.16	0.20	0.22
70-foot Sailboat	0.21	0.27	0.31
Tugboat	0.86	1.07	1.19

Vessel Type	Maximum Bottom Velocity (feet per second)		
	MHHW	MLLW	LOW
Charter boat	0.84	1.05	1.18
90-foot Powerboat	0.72	0.91	1.03
135-foot Powerboat	0.91	1.16	1.32

Note:
Interim cover containment layer surface elevation at -30 feet MLLW

Figure E-3 illustrates the propeller wash bottom velocities at the interim cover containment layer surface (-30 feet MLLW) for 50% vessel power. For the 135-foot powerboat, the range in maximum propeller wash velocities increased to 1.1 and 1.7 feet per second. The maximum propeller wash velocities for 50% vessel power occurring at the interim cover containment layer surface are provided in Table E-6.

Table E-6
Maximum Propeller Wash Velocities at Interim Cover Containment Layer Surface for 50% Vessel Power

Vessel Type	Maximum Bottom Velocity (feet per second)		
	MHHW	MLLW	LOW
50-foot Sailboat	0.20	0.25	0.28
70-foot Sailboat	0.26	0.34	0.40
Tugboat	1.09	1.35	1.50
Charter boat	1.06	1.32	1.49
90-foot Powerboat	0.91	1.15	1.30
135-foot Powerboat	1.14	1.46	1.66

Note:
Interim cover containment layer surface elevation at -30 feet MLLW

3.2 Material Outside the Federal Channels

Material outside the Federal Channels unsuitable for open ocean disposal from public and City projects determined unsuitable for open ocean disposal could be placed in the proposed CAD facility over a predetermined time frame, increasing the surface elevation over time. For the propeller wash analysis, the top surface elevation of this layer at -25 feet MLLW was used because this produces in the highest bottom velocities expected to occur for the layer. Propeller wash velocities at the layer's surface (-25 feet MLLW) are shown in Figure E-4 for 25% vessel power and Figure E-5 for 50% vessel power. Compared to the interim cover containment layer surface, the propeller-generated velocities

are higher on this layer's surface due to the higher surface elevation (i.e., shallower water depths). The 135-foot powerboat (50% power) would generate the greatest bottom velocities from 1.4 to 2.3 feet per second, corresponding to distances of 120 and 80 feet behind the vessel, respectively. Tables E-7 and E-8 summarize the maximum propeller wash velocities at this layer surface for 25% and 50% vessel power, respectively. Bottom velocities would be lower for elevations lower than this layer surface.

Table E-7
Maximum Propeller Wash Velocities at Material Outside the Federal Channels Surface for 25% Vessel Power

Vessel Type	Maximum Bottom Velocity (feet per second)		
	MHHW	MLLW	LOW
50-foot Sailboat	0.20	0.26	0.29
70-foot Sailboat	0.27	0.38	0.47
Tugboat	1.05	1.36	1.56
Charter boat	1.03	1.37	1.58
90-foot Powerboat	0.89	1.21	1.42
135-foot Powerboat	1.14	1.55	1.82

Note:
Material outside the Federal Channels surface elevation at -25 feet MLLW

Table E-8
Maximum Propeller Wash Velocities at Material Outside the Federal Channels Surface for 50% Vessel Power

Vessel Type	Maximum Bottom Velocity (feet per second)		
	MHHW	MLLW	LOW
50-foot Sailboat	0.25	0.32	0.37
70-foot Sailboat	0.33	0.48	0.59
Tugboat	1.32	1.72	1.96
Charter boat	1.30	1.72	1.99
90-foot Powerboat	1.13	1.52	1.78
135-foot Powerboat	1.43	1.95	2.30

Note:
Material outside the Federal Channels surface elevation at -25 feet MLLW

3.3 Final Cap

Propeller wash velocities at the final cap surface (-22 feet MLLW) are shown in Figures E-6 and E-7 for 25% and 50% vessel power, respectively. Overall, the highest propeller-generated velocities occur at the final cap surface due to the shallower water depths. The 135-foot powerboat (50% power) would generate bottom velocities from 1.7 feet per second at 100 feet behind the vessel to 3.0 feet per second at 80 feet behind the vessel. Tables E-9 and E-10 summarize the maximum propeller wash velocities at the CAD final cap elevation for 25% and 50% vessel power, respectively.

Table E-9
Maximum Propeller Wash Velocities at Final Cap Surface for 25% Vessel Power

Vessel Type	Maximum Bottom Velocity (feet/second)		
	MHHW	MLLW	LOW
50-foot Sailboat	0.23	0.31	0.36
70-foot Sailboat	0.32	0.50	0.65
Tugboat	1.20	1.63	1.91
Charter boat	1.20	1.65	1.98
90-foot Powerboat	1.04	1.48	1.80
135-foot Powerboat	1.33	1.92	2.37

Note:
Final cap surface elevation at -22 feet MLLW

Table E-10
Maximum Propeller Wash Velocities at Final Cap Surface for 50% Vessel Power

Vessel Type	Maximum Bottom Velocity (feet/second)		
	MHHW	MLLW	LOW
50-foot Sailboat	0.29	0.39	0.46
70-foot Sailboat	0.40	0.63	0.81
Tugboat	1.52	2.05	2.41
Charter boat	1.51	2.08	2.50
90-foot Powerboat	1.31	1.87	2.27
135-foot Powerboat	1.68	2.42	2.99

Note:
Final cap surface elevation at -22 feet MLLW

4 Propeller Wash Induced Scouring

The propeller wash velocities may induce scouring of the CAD surface, depending on the sediment composition. Dücker and Miller (1996) developed an empirical method to estimate the fully formed scour depth as a function of jet load intensity (Equation 2). In this method, the scour depth is related to the grain size of the material and propeller jet load, which is a function of the maximum propeller wash velocity and sediment properties. For the vessel maneuvering coefficient, a value of 0.3 was found to be appropriate for this method (Schokking 2002).

Equation 2

$$\frac{d_{hole}}{D_{85}} = C_m * 0.1\left(\frac{B}{B_{crit}}\right)^{13} \quad \text{for} \quad 1.0 < \left(\frac{B}{B_{crit}}\right) < 1.4$$

$$\frac{d_{hole}}{D_{85}} = C_m * 4.6\left(\frac{B}{B_{crit}}\right)^{2.25} \quad \text{for} \quad 1.4 < \left(\frac{B}{B_{crit}}\right)$$

where:

d_{hole}	=	bed scour depth (meter)
D_{85}	=	particle diameter for which 85% of the soil particles are finer by weight (meter)
C_m	=	vessel maneuvering coefficient, 0.3 for maneuvering condition and 1.0 for stationary condition (dimensionless)
B	=	propeller jet load intensity, $\frac{U_{max,bot}}{\sqrt{D_{85} * g * \frac{\rho s - \rho}{\rho}}}$ (dimensionless)
B_{crit}	=	stability coefficient of bed material, 1.25 (dimensionless)

Propeller-induced scour depths were estimated for vessel types and operating conditions expected to scour the CAD surface. Analyses were conducted using the maximum propeller wash velocities (Section 3.1) and corresponding sediment compositions (Section 2.1).

For each CAD surface evaluated, scour depths were determined for vessel types with propeller wash velocities high enough to cause scour. Figure E-8 shows the Hjulstrom curve, which is commonly used to determine the critical current speed that would cause incipient particle motion of material of a given grain size. In each panel of Figure E-8, the propeller wash velocities by vessel type are compared to the mean particle size. For the final cap, the Hjulstrom curve (black line) indicates the threshold for scour is 0.6 foot per second for a median grain size of 0.204 millimeters (mm; red dashed line). Propeller wash velocities (solid colored lines) are shown for 50% vessel power at LOW. Propeller wash velocities from the 50-foot sailboat are lower than the threshold for scour, while other

vessel propeller wash velocities are higher and may cause scouring of the final cap surface. For the layer of material outside the Federal Channels and interim cover containment layer, scour depths were evaluated for vessels larger than a tugboat.

4.1 Interim Cover Containment Layer

Scour depths of the interim cover containment layer were determined for the tugboat, charter boat, 90-foot powerboat, and 135-foot powerboat. These vessels could produce velocities high enough to erode the interim cover containment layer at -30 feet MLLW. Table E-11 summarizes the estimated interim cover containment layer scour depths for vessel operation at 25% and 50% power and three water levels. Scour depths less than 0.1 foot were considered negligible. All scour depths for the interim cover containment layer were negligible.

Table E-11
Scour Depths at Interim Cover Containment Layer Surface

Vessel Type	Scour Depth (feet) at 25% Power			Scour Depth (feet) at 50% Power		
	MHHW	MLLW	LOW	MHHW	MLLW	LOW
Tugboat	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Charter Boat	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
90-foot Powerboat	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
135-foot Powerboat	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Note:
Scour depths based on propeller wash velocities at -30 feet MLLW and sediment with D_{85} of 0.752 mm

4.2 Material Outside the Federal Channels

Scour depths of the layer for material outside the Federal Channel were determined for the tugboat, charter boat, 90-foot powerboat, and 135-foot powerboat, which could produce velocities high enough to erode the surface at -25 feet MLLW. Estimated scour depths of this layer surface for vessel operation at 25% and 50% power and three water levels are provided in Table E-12. At 25% power, scour depths were negligible. A scour depth of 0.1 foot was estimated for the 135-foot powerboat at 50% power and MLLW. At LOW, scour depths of 0.1 foot were estimated for the tugboat, charter boat, and 135-foot powerboat.

Table E-12
Scour Depths at Material Outside the Federal Channels Surface

Vessel Type	Scour Depth (feet) at 25% Power			Scour Depth (feet) at 50% Power		
	MHHW	MLLW	LOW	MHHW	MLLW	LOW
Tugboat	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Charter Boat	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
90-foot Powerboat	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
135-foot Powerboat	<0.1	<0.1	<0.1	<0.1	0.1	0.1

Note:
Scour depths propeller wash velocities at -25 feet MLLW and sediment with based on D_{85} of 0.476 mm

4.3 Final Cap

Scour depths at the final cap surface with material from the Entrance Channel, as shown in Table E-13, were determined for vessel types that could produce velocities high enough to erode the surface at -22 feet MLLW. Vessel types include the 70-foot sailboat, tugboat, charter boat, 90-foot powerboat, and 135-foot powerboat. Scour depths for the 70-foot sailboat were negligible. Scour depths ranged from 0.1 to 0.2 foot for the tugboat (50% power at MLLW and LOW) and charter boat (25% power at LOW and 50% power at MLLW and LOW). For the 90-foot powerboat, a scour depth of 0.1 foot was estimated at 50% power at LOW. The 135-foot powerboat scour depths range from 0.1 to 0.3 foot, which occurs for vessel operations at 25% and 50% and water levels at MLLW and LOW.

Table E-13
Scour Depths at Final Cap Surface with Material from Entrance Channel

Vessel Type	Scour Depth (feet) at 25% Power			Scour Depth (feet) at 50% Power		
	MHHW	MLLW	LOW	MHHW	MLLW	LOW
70-foot Sailboat	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tugboat	<0.1	<0.1	<0.1	<0.1	0.1	0.2
Charter Boat	<0.1	<0.1	0.1	<0.1	0.1	0.2
90-foot Powerboat	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
135-foot Powerboat	<0.1	0.1	0.2	<0.1	0.2	0.3

Note:
Scour depths based on propeller wash velocities at -22 feet MLLW and sediment with D_{85} of 0.386 mm

Table E-14 summarizes scour depths at the final cap surface with material from NC3 and elevation at -22 feet MLLW. Scour depths for the NC3 material were the same as the Entrance Channel material for all the vessel types except the 135-foot powerboat, which was slightly lower. The 135-foot powerboat scour depths range from 0.1 to 0.2 foot, which occurs for vessel operations at 25% and 50% and water levels at MLLW and LOW.

Table E-14
Scour Depths at Final Cap Surface with Material from Newport Channel 3

Vessel Type	Scour Depth (feet) at 25% Power			Scour Depth (feet) at 50% Power		
	MHHW	MLLW	LOW	MHHW	MLLW	LOW
70-foot Sailboat	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tugboat	<0.1	<0.1	<0.1	<0.1	0.1	0.2
Charter Boat	<0.1	<0.1	0.1	<0.1	0.1	0.2
90-foot Powerboat	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
135-foot Powerboat	<0.1	0.1	0.1	<0.1	0.2	0.2

Note:
Scour depths based on propeller wash velocities at -22 feet MLLW and sediment with D_{85} of 0.752 mm

5 Evaluation

Vessels traveling over the proposed CAD facility produce propeller wash velocities that may scour the CAD surface depending on vessel characteristics and water depths. Vessels with larger operating power and propeller size in combination with shallower water depths would result in the greatest propeller wash velocities at the CAD surface (as discussed in Section 3). Exposure to propeller wash velocities may impact the CAD surface's physical stability by scouring of the sediment material. (These propeller-induced scour depths are discussed in Section 4.) Based on the range of vessel types analyzed, the 135-foot powerboat would result in the greatest scour depths. Estimated scour depths of the CAD surface at three elevations for the 135-foot powerboat are summarized in Table E-15. For the final cap, scour depths are based on the material from the Entrance Channel.

Table E-15
Scour Depths for 135-Foot Powerboat

Element	Scour Depth (feet) at 25% Power			Scour Depth (feet) at 50% Power		
	MHHW	MLLW	LOW	MHHW	MLLW	LOW
Interim Cover Containment Layer	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Material Outside the Federal Channels	<0.1	<0.1	<0.1	<0.1	0.1	0.1
Final Cap	<0.1	0.1	0.2	<0.1	0.2	0.3

5.1 Propeller Wash

The interim cover containment layer of clean material will be used to cover material unsuitable for open ocean disposal from the Lower Newport Bay and Federal Channels maintenance dredging. The interim cover containment layer will be constructed with a 1-foot thickness and surface elevation of -30 feet MLLW. Impacts from vessels traveling over the interim cover containment layer are

expected to be negligible. Water depths are deep enough that propeller wash velocities result in negligible scour depths, thus maintaining the physical stability of the interim cover containment layer.

Over a predetermined time frame, material outside the Federal Channels from public and City dredging projects that have material suitable or unsuitable for open ocean disposal will be periodically placed on top of the interim cover containment layer. This layer will be 5 feet thick to an elevation of -25 feet MLLW. At the surface, propeller-induced scour depths will be negligible for vessel operations at 25% power. At 50% power, the scour depth is estimated to be 0.1 foot during low tide conditions when water levels are less than MLLW. Over the duration of the material placements, impacts from vessel traffic over the proposed CAD facility are expected to be minimal. Initially, placements for the layer will have negligible impacts from propeller wash due to the deeper water depths and would likely remain negligible for most of the time. Propeller-induced scour depths of about 0.1 foot could start occurring when this layer is near completion. Upon completion, the CAD surface will be stable given the relatively small scour depths. Impacts to the layer from vessel traffic may be minimized by limiting the time between completion of this layer and placement of the final cap.

A 3-foot final cap of clean material would complete the proposed CAD facility to a surface elevation of -22 feet MLLW. Maximum scour depths of the final cap are estimated to range from 0.1 to 0.3 foot, which occur at water levels less than MLLW. Vessels that may impact the final cap include tugboat, charter boat, 90-foot powerboat, and 135-foot powerboat. However, since these scour depths are substantially less than the final cap thickness of 3 feet, the final CAD surface is expected to be physical stable from exposure to propeller wash.

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Figures

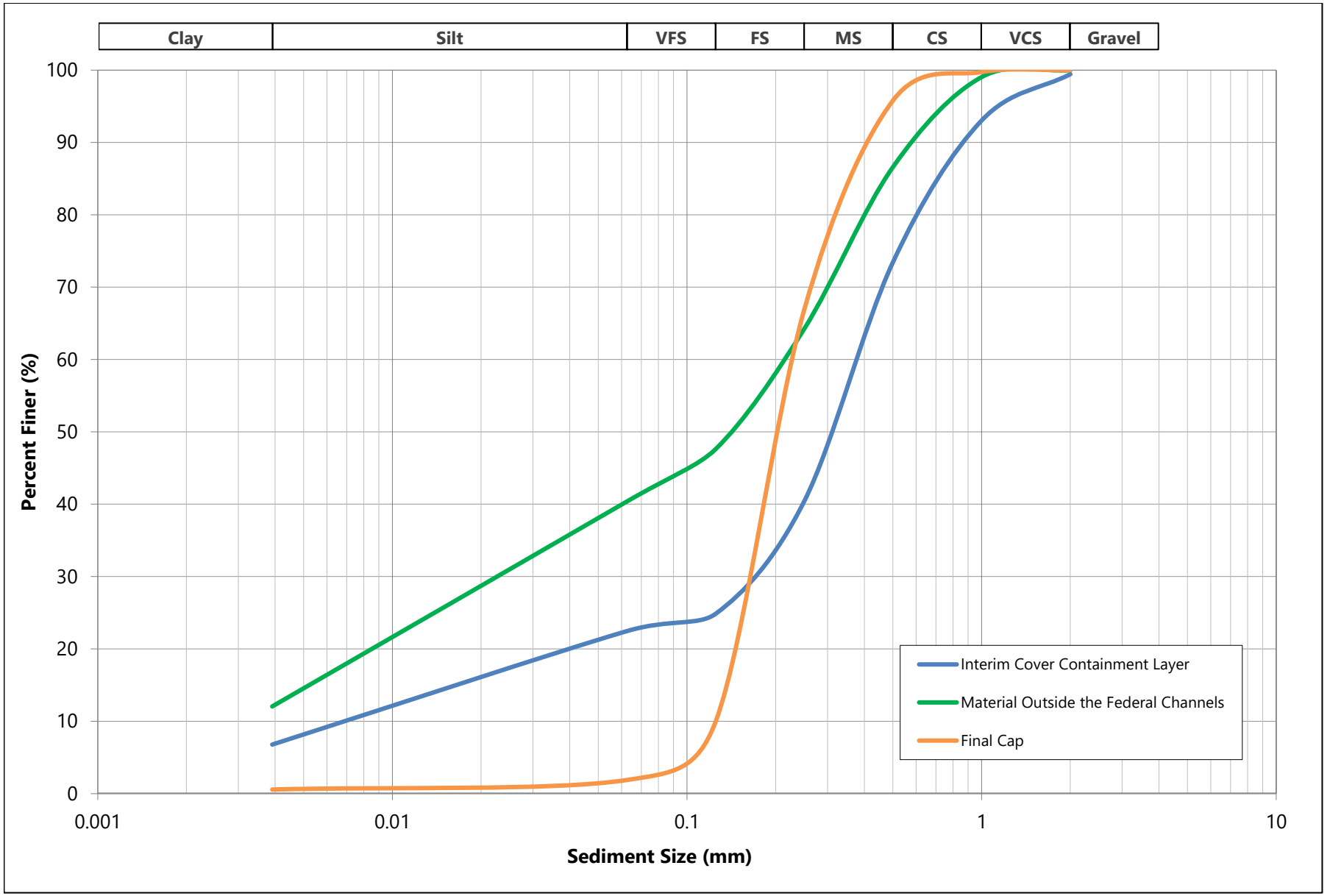
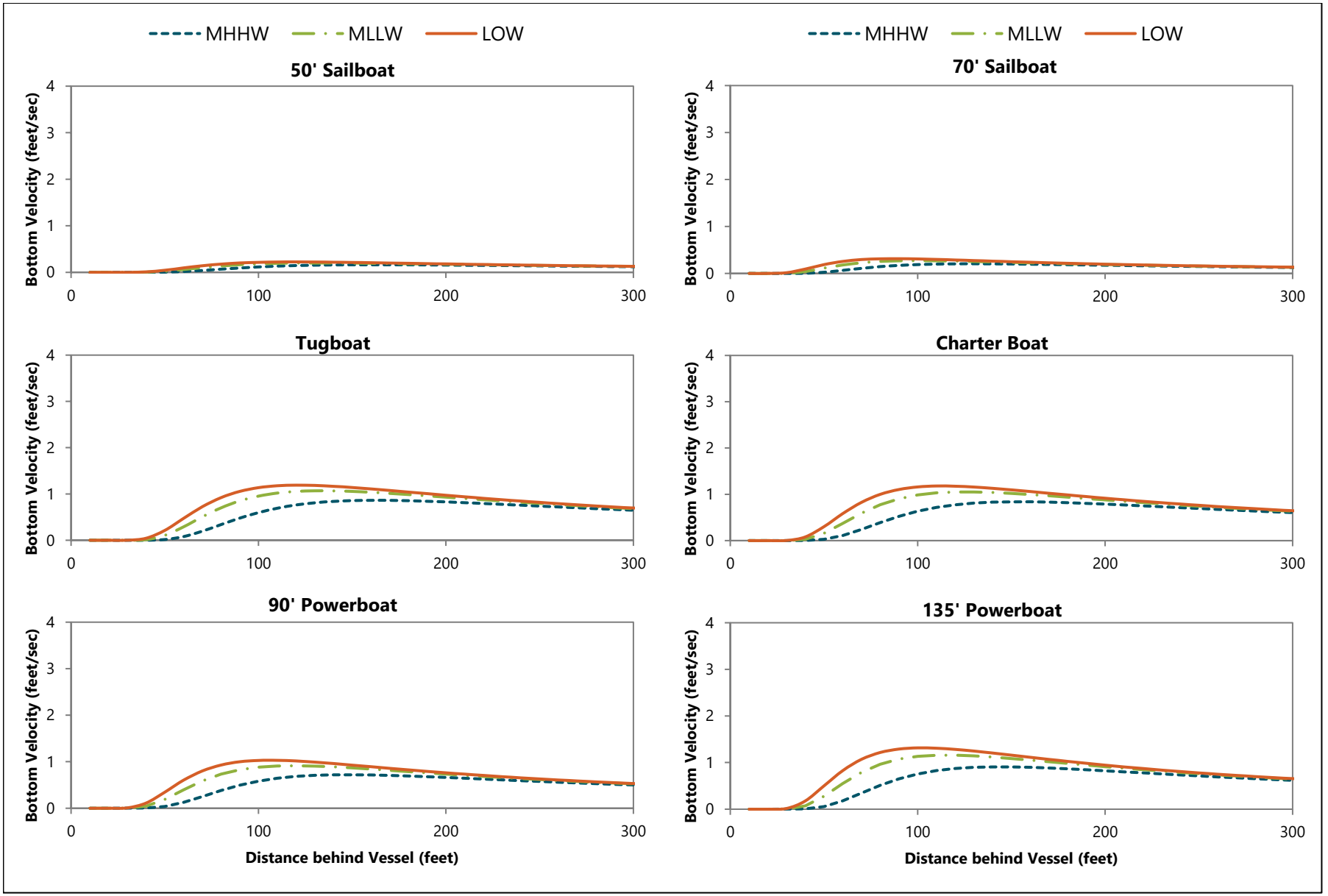


Figure E-1
CAD Facility Material Sediment Composition
Appendix E Vessel Scour Analysis
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay



NOTE: Elevation at -30 feet MLLW

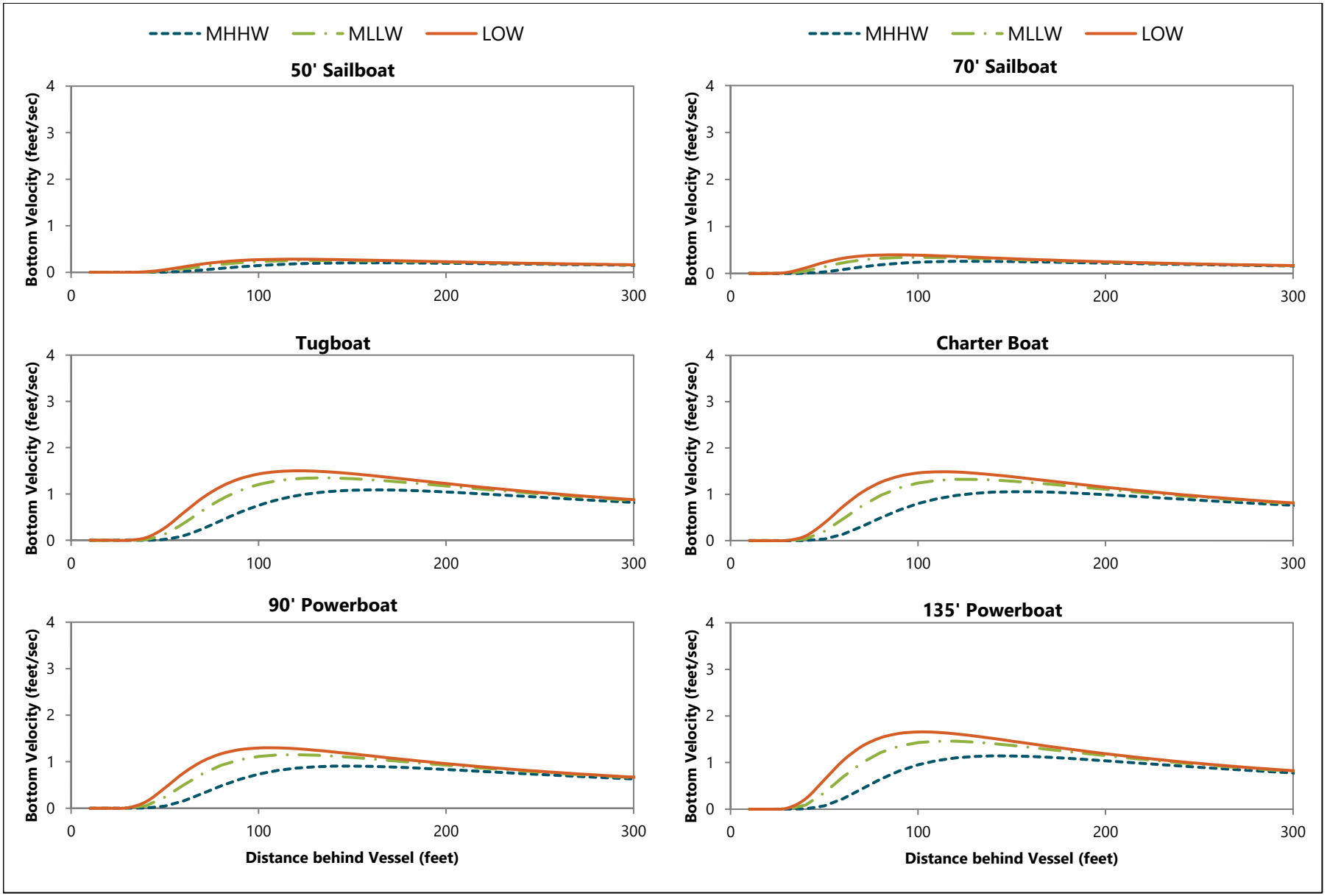
ANCHOR QEA

Figure E-2

Propeller Wash Velocities at Interim Cover Containment Layer Surface for 25% Vessel Power

Appendix E Vessel Scour Analysis

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay



NOTE: Elevation at -30 feet MLLW

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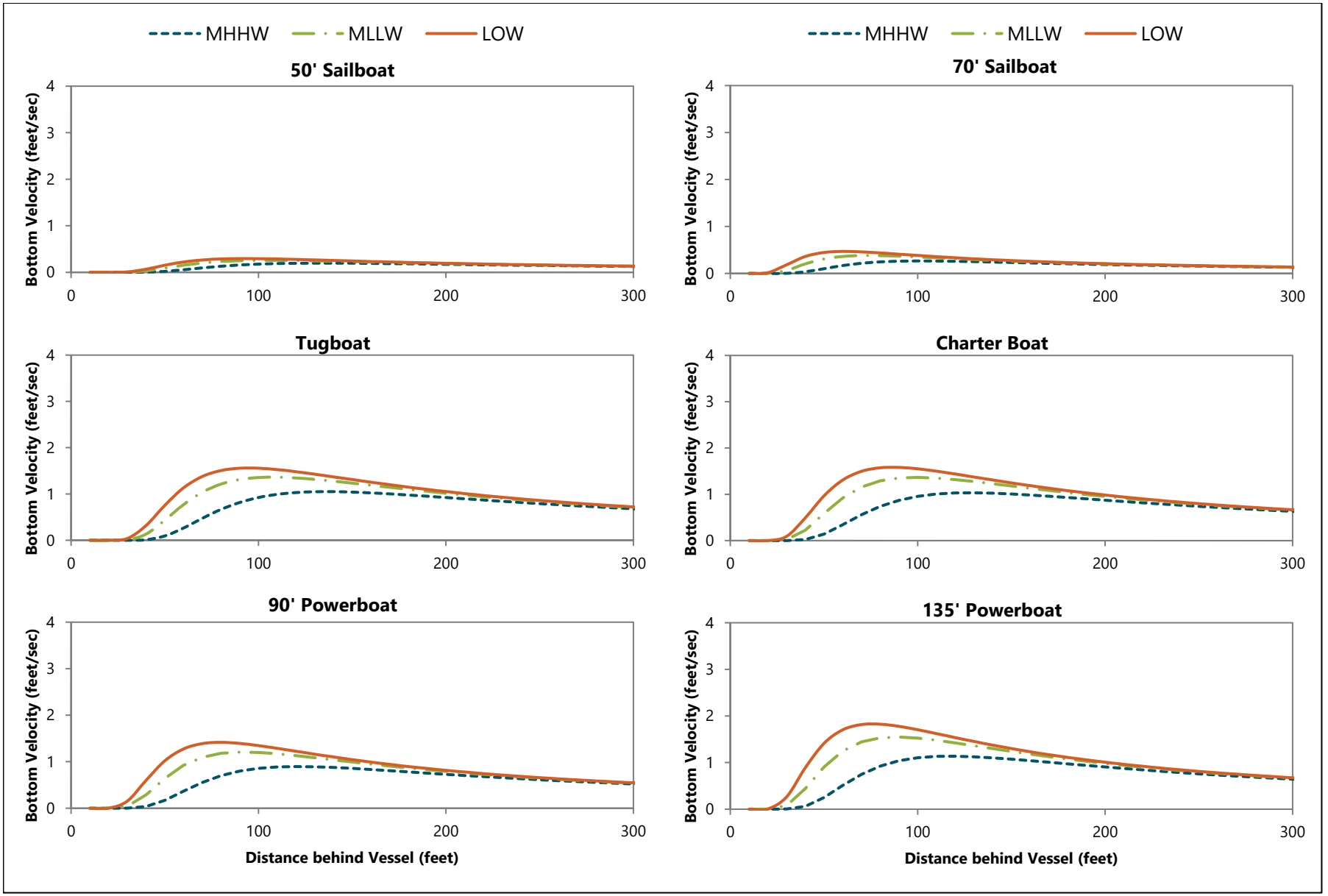
Figure E-3

Propeller Wash Velocities at Interim Cover Containment Layer Surface for 50% Vessel Power

Appendix E Vessel Scour Analysis

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

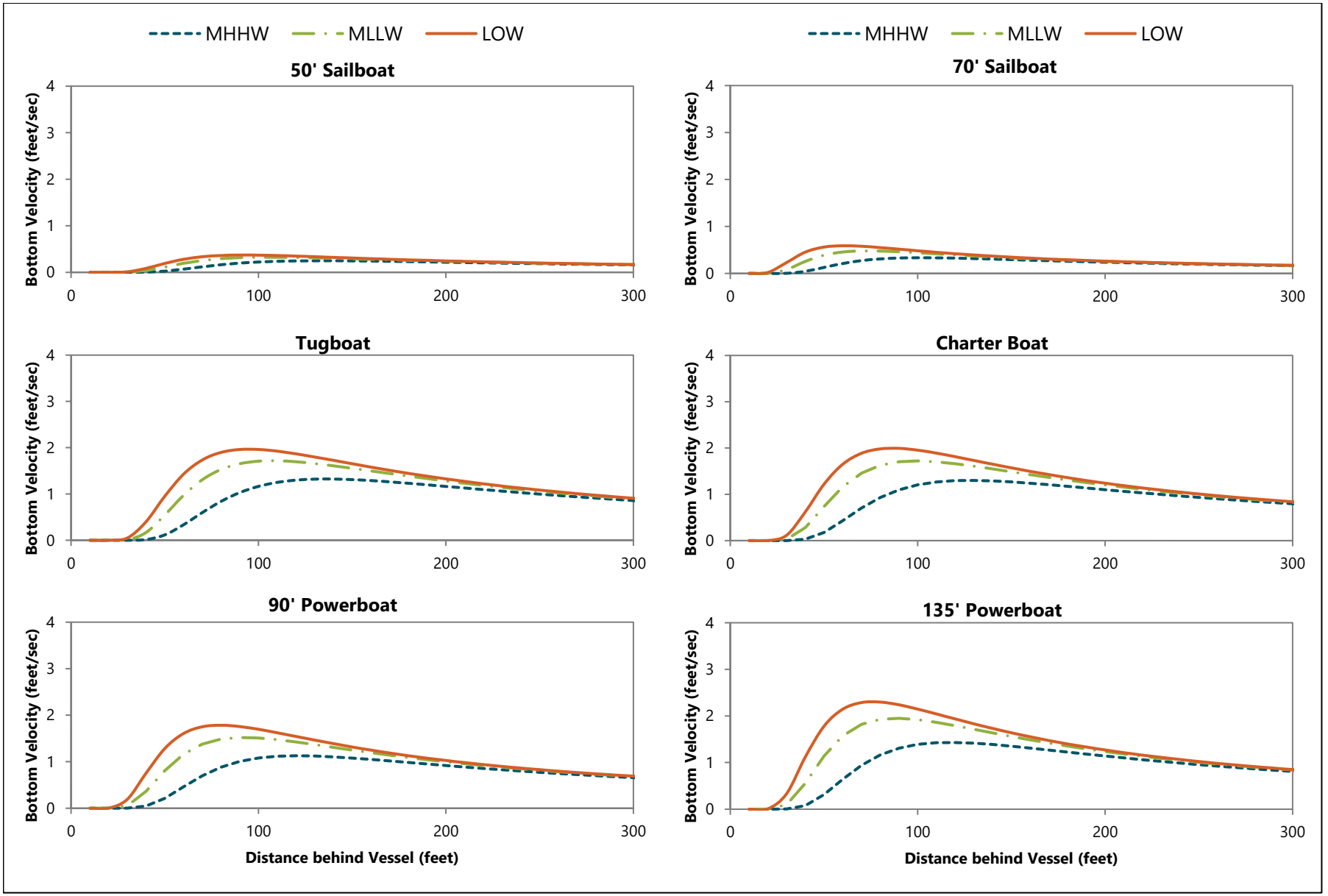


NOTE: Elevation at -25 feet MLLW

ANCHOR QEA

Figure E-4

Propeller Wash Velocities at Material Outside the Federal Channels Surface for 25% Vessel Power



NOTE: Elevation at -25 feet MLLW

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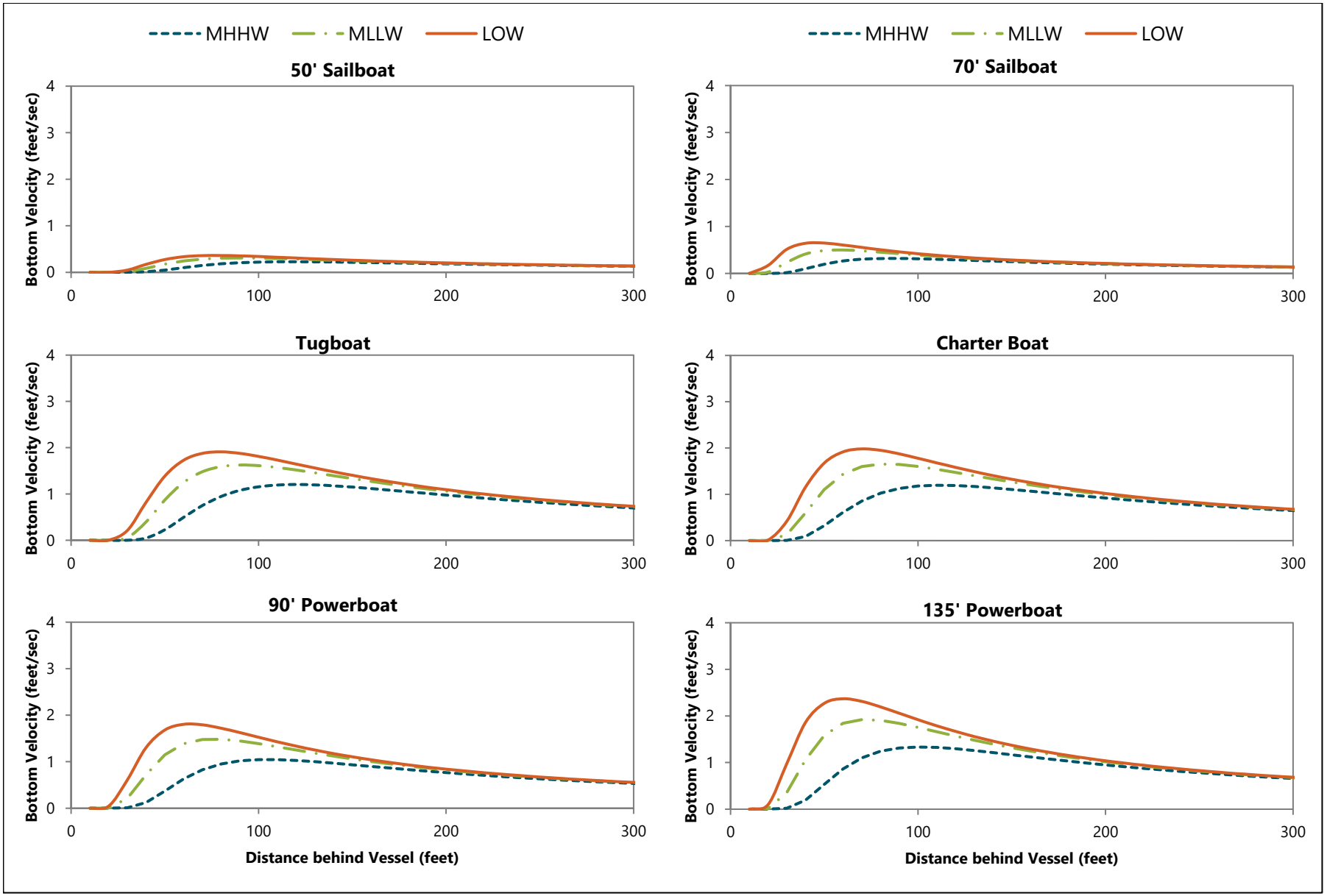
Figure E-5

Propeller Wash Velocities at Material Outside the Federal Channels Surface for 50% Vessel Power

Appendix E Vessel Scour Analysis

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay



NOTE: Elevation at -22 feet MLLW

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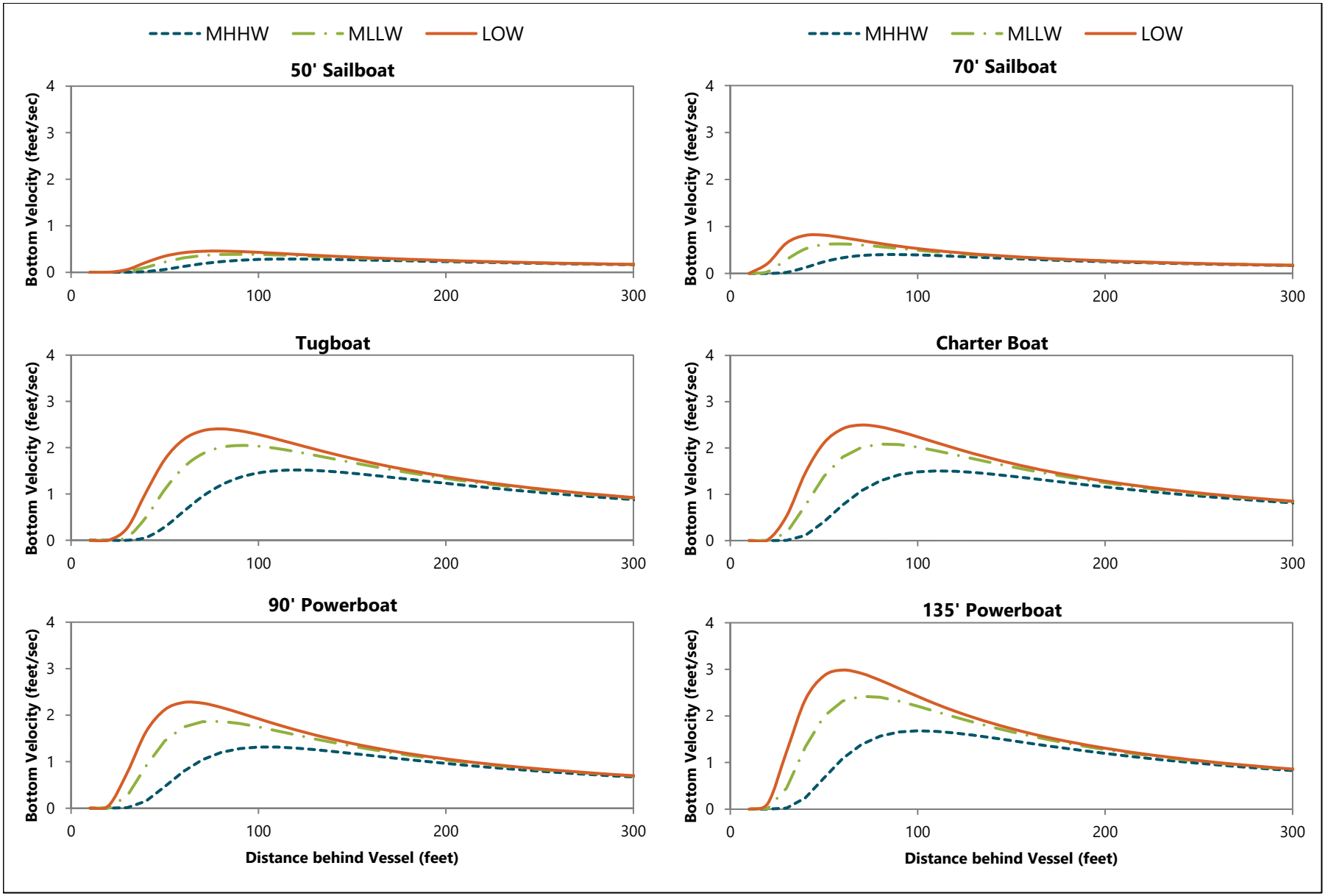
Figure E-6

Propeller Wash Velocities at Final Cap Surface for 25% Vessel Power

Appendix E Vessel Scour Analysis

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay



NOTE: Elevation at -22 feet MLLW

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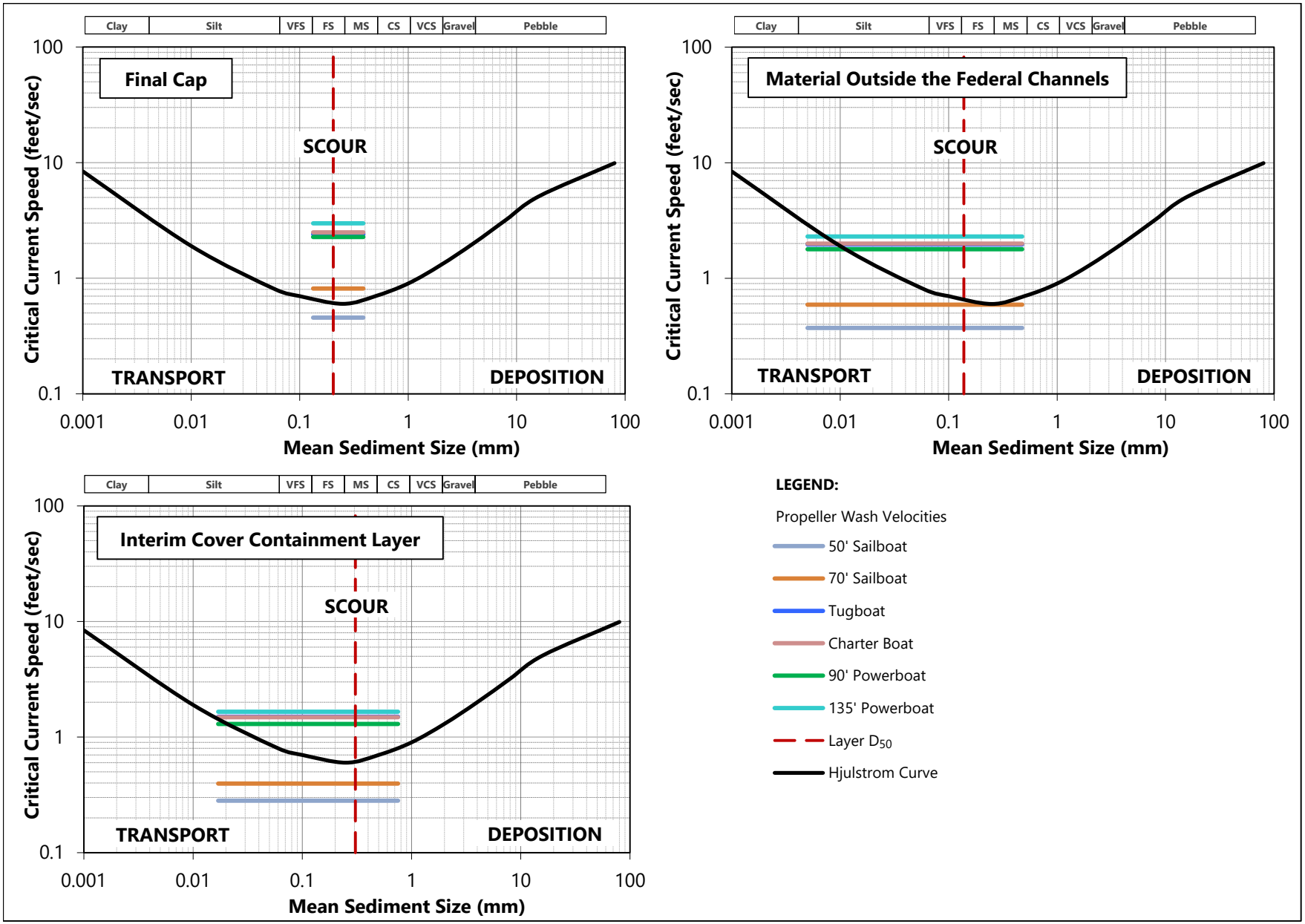
Figure E-7

Propeller Wash Velocities at Final Cap Surface for 50% Vessel Power

Appendix E Vessel Scour Analysis

Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay



NOTE: Propeller wash velocities shown for 50% vessel power at LOW

ANCHOR QEA

Figure E-8
Hjulstrom Curve for Proposed CAD Facility Layers
Appendix E Vessel Scour Analysis
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

Appendix F
Geotechnical Investigations

Appendix F
Geotechnical Investigations

Attachment F-1
Geotechnical Investigation by Diaz Yourman & Associates

A Report Prepared for:

Bay Island Club, Inc.
C/O Moffatt & Nichol
3780 Kilroy Airport Way, Suite 600
Long Beach, CA 90806

GEOTECHNICAL INVESTIGATION
BAY ISLAND SEA WALL AND BRIDGE
NEWPORT BEACH, CALIFORNIA

Project No. 2005-041

by

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January 15, 2007

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1.0 INTRODUCTION

This report presents the results of the geotechnical investigation performed by Diaz•Yourman & Associates (DYA) for the proposed Bay Island Sea Wall and Bridge rehabilitation project in Newport Beach, California. Moffat & Nichol Engineers authorized this work on September 20, 2005. Our findings, conclusions, and recommendations were presented and discussed as they were developed. A draft report was submitted January 17, 2006; final comments were received in January 2007.

1.1 PROJECT DESCRIPTION

Bay Island is located at the Balboa peninsula in Newport Beach, California, as shown on the Vicinity Map, Figure 1. An Aerial view of the island is shown on the Site Plan, Figure 2.

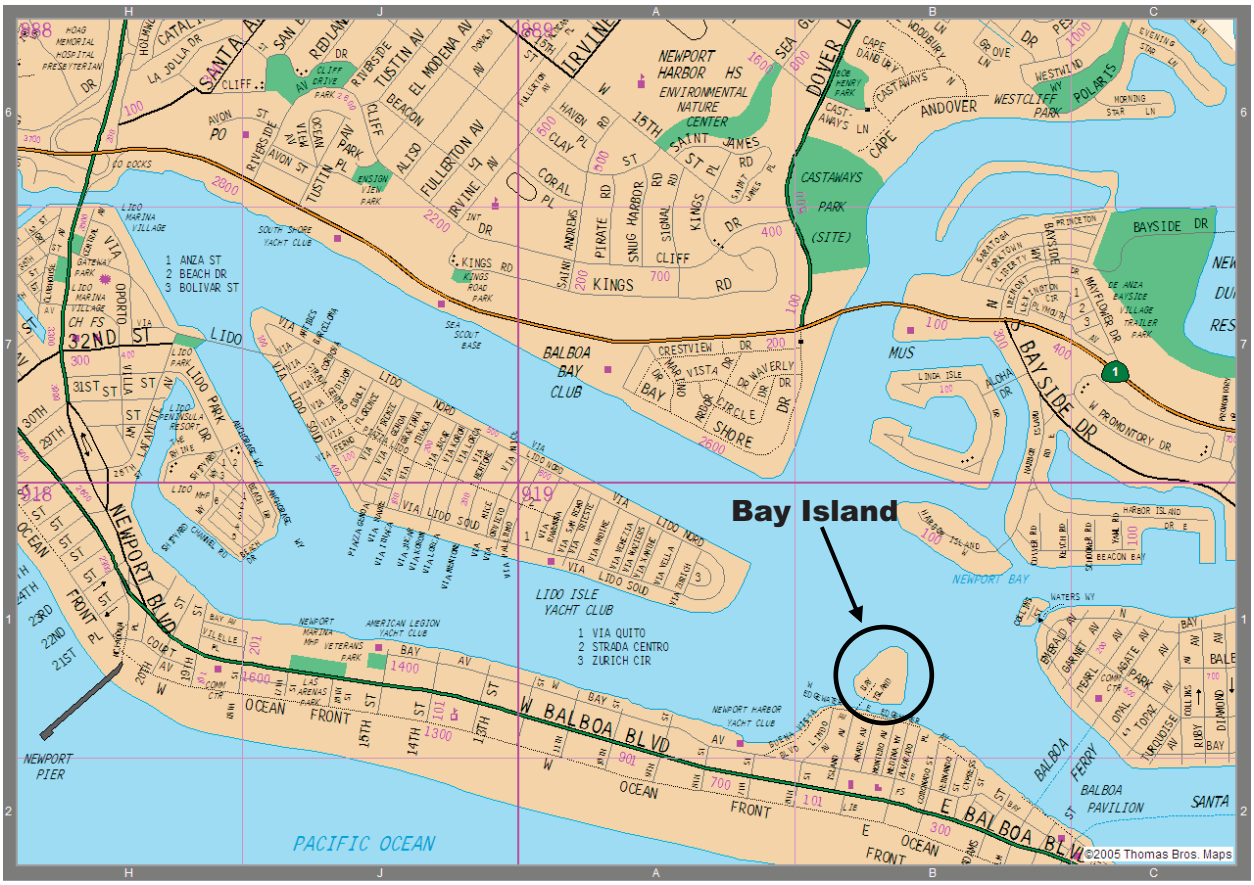

Figure 1 - VICINITY MAP



Figure 2 - SITE PLAN

The island is surrounded by concrete and steel sheet pile bulkheads, except where sand beaches are present on the east and west sides. Access is provided by a 140-foot-long reinforced concrete pedestrian bridge. The bridge has multiple pre-cast concrete deck panels simply supported on driven precast concrete piles with cast in place pile caps. An initial condition assessment was conducted by Cash & Associates in June 2004 for the existing infrastructure including utility line, bridge, and sea wall. Based on the findings of that report, additional studies are being undertaken. We understand that the proposed project will probably consist of the following features.

- Replacing the existing pedestrian bridge to increase service load and capability (to allow emergency and maintenance vehicle access) and meet current seismic standards.
- Improving, renovating, and/or replacing approximately 1,500 feet of existing sheet pile bulkhead seawall, because of corrosion and, in one area, significant rotation toward water side.

The proposed grades will be near existing grades.

1.2 PURPOSE AND SCOPE

The purpose of DYA's investigation was to provide geotechnical input for the design of the proposed project. The scope of our services consisted of the following tasks:

- Reviewing data.
- Conducting a field investigation.
- Performing laboratory tests on selected samples.
- Performing engineering analyses to develop conclusions and recommendations regarding the following:
  - Site conditions
  - Geologic and seismic hazards
  - Bridge foundation type and design criteria
  - Lateral earth pressures (active and passive) for seawall bulkhead design
  - Resistance to lateral loads
  - Soil corrosion potential
- Preparing this report.

2.0 DATA REVIEW, FIELD INVESTIGATION, AND LABORATORY TESTING

Geotechnical data from the project vicinity presented in previous reports were reviewed to supplement site data collected during this investigation. A list of the documents reviewed is presented in the bibliography (Section 7.0).

The field investigation, conducted from November 8 to November 10, 2005, and November 21, 2005, consisted of drilling five soil borings at the locations shown on Figure 2. The originally proposed scope of the field investigation had to be modified. DYA initially proposed three borings using rotary wash drilling techniques using a truck-mounted drill rig on the peninsula, and a limited access drill rig on the island. In addition, four cone penetration tests (CPTs) with a limited access rig were proposed on the island; however, CPT tests were not performed due to concerns regarding the load capacity of bridge. DYA and Moffat & Nichol judged that the CPT rig weight and engine vibration could possibly cause damage to the existing bridge and utility line. Therefore, the revised boring locations (shown on Figure 2), using a limited access drill rig, were chosen to provide areal coverage of the project site within the budget. The boring depths, ranging from approximately 8 to 80 feet, were selected to extend to the depth of significant influence of the proposed loads and to investigate liquefaction potential. Details of the field investigation, including sampling procedures and boring logs, are presented in Appendix A.

Soil samples collected from the borings were re-examined in the laboratory to substantiate field classifications. Selected soil samples were tested for moisture content, dry density, grain-size distribution, percent passing the No. 200 sieve, shear strength, and corrosion potential (pH, electrical resistivity, soluble chlorides, and soluble sulfates). The soil samples tested are identified on the boring logs. Laboratory test data are summarized on the boring logs in Appendix A and presented on individual test reports in Appendix B.

3.0 SITE CONDITIONS

Our interpretation of the surface and subsurface conditions is based on our current investigation and a brief review of historical information.

3.1 SURFACE CONDITIONS

Bay Island was a natural sand island prior to development. Figure 3, an overlay of the topography from approximately 1875 on a recent topographic map, shows how the original island has been expanded. Local history notes that occasional flooding occurred during the time the first house was present near the turn of the 20th century. Over the years, the island was filled and shaped to its current configuration using sand dredged from the adjacent channels, and the use of waterfront bulkhead/seawalls. As shown on Figure 2, the island is partially surrounded by steel and concrete sheet pile walls; it is connected to the mainland (Balboa Peninsula) with a pedestrian bridge approximately 10 feet wide and 140 feet long. The existing ground surface elevation ranges from approximately 6 to 8 feet above mean lower low water level (MLLW). The existing perimeter sea walls consist of steel sheet piles with tiebacks at the northwest, south, and southeast sides, and concrete soldier piles and concrete panels with tiebacks on the west side of the island. Severe corrosion and significant rotation toward the water side was observed in the steel sheet pile walls on the southeast side of the island.

3.2 SUBSURFACE CONDITIONS

The subsurface soils generally consist of fill overlying natural and alluvial sandy soil. The fill thickness is unknown at this time because of the absence of maps of original and existing topography and pre-fill bathymetric surveys. However, based on soil conditions encountered in the borings, we expect the fill thickness to range from 15 to 20 feet. Because of difficulty in distinguishing between the fill and natural soil, no distinction between fill and natural soils was made on the boring logs and cross sections.

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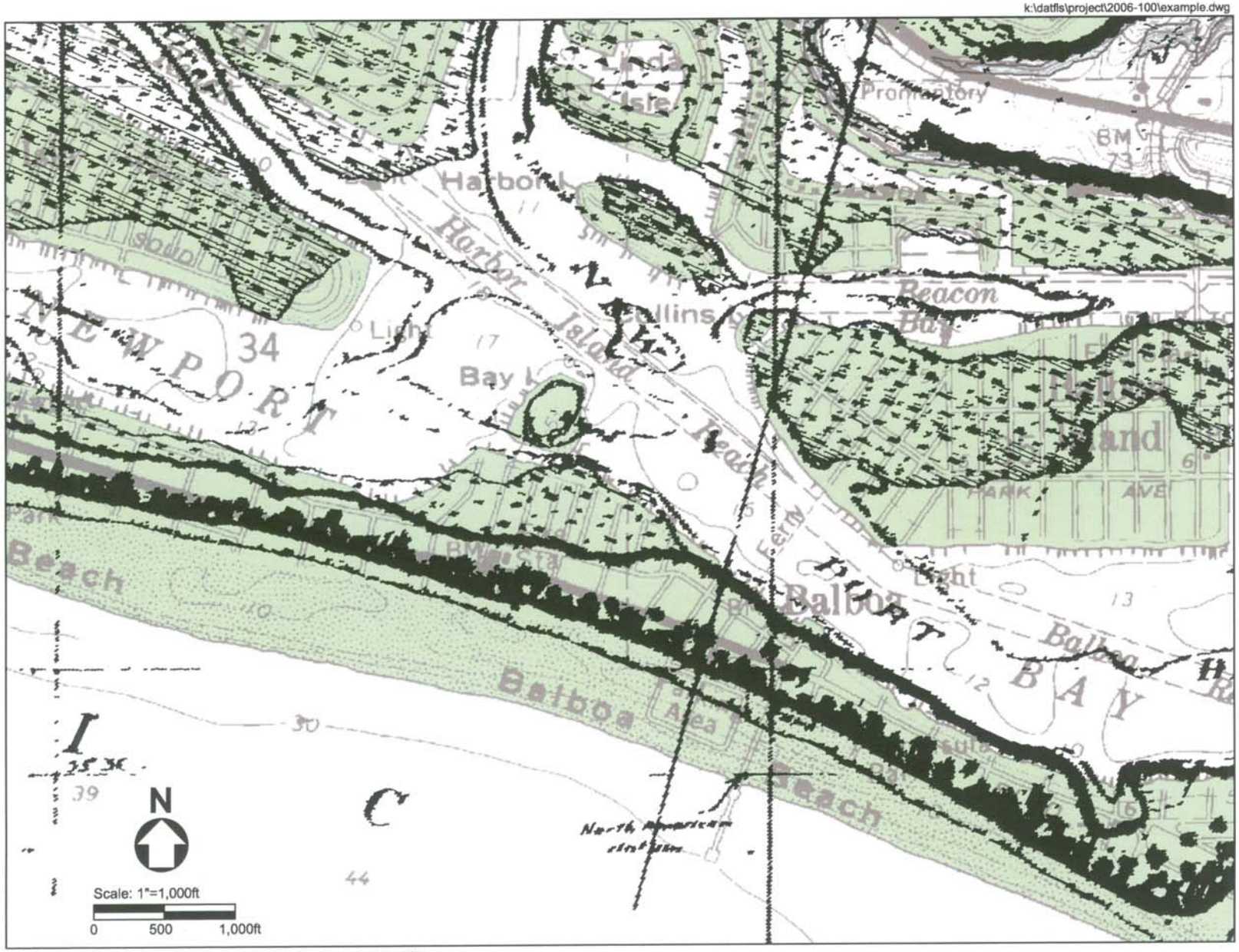


Reference: The first hydrographic survey map of the Bay, approximately 1875, The picture history of balboa island, 1906-1981

Figure 3 - HISTORIC CONDITIONS

The idealized soil profiles based on laboratory test data and field investigation are presented on Figure 4, Figure 5, and Table 1 and consisted of four design layers (DL-1 through DL-4). The data generally indicates improvement with depth, with strength gain in layer DL-2 and very high strength in layer DL-4. Boring B-4, performed in the beach area, was terminated at approximately 8 feet below the ground surface (bgs) due to loss of drilling mud circulation. The soil type and standard penetration test (SPT) blow counts in Boring B-4 were similar to that encountered at other borings. The loss of mud circulation was not attributed to significant voids or very loose soils at this boring location. The absence of vegetation or topsoil at this location resulted in the recirculation of drill mud back up to the surface rather than into the mud pan. Groundwater could not be measured or correctly measured during drilling operations due to the drilling technique, but it is assumed to be near sea level, approximately 5 feet bgs. The groundwater will be tidally influenced.

Table 1 - SUMMARY OF GEOTECHNICAL CHARACTERISTICS

SOIL LAYER	APPROXIMATE ELEVATION (feet MLLW)		AVERAGE UNCORRECTED SPT BLOW COUNT[1] (bpf)	TOTAL UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	EFFECTIVE FRICTION ANGLE (deg)
	Top of Layer	Bottom of Layer				
DL1 - Sandy Soils	7.5	-1.5	7	115	13	30
DL2 - Sandy Soils	-1.5	-10.5	23	122	22	32
DL3 - Sandy Soils	-10.5	-20.5	38	123	20	35
DL4 - Sandy Soils	-20.5	-72.5	67	121	23	38

Notes:

1. Includes equivalent SPT blow counts converted from modified California sampler. Value does not include SPT blow counts where refusal was met.

- Assumed design groundwater level, Elevation + 5 feet MLLW.
- SPT = standard penetration test.
- bpf = blows per foot.
- pcf = pounds per cubic foot.

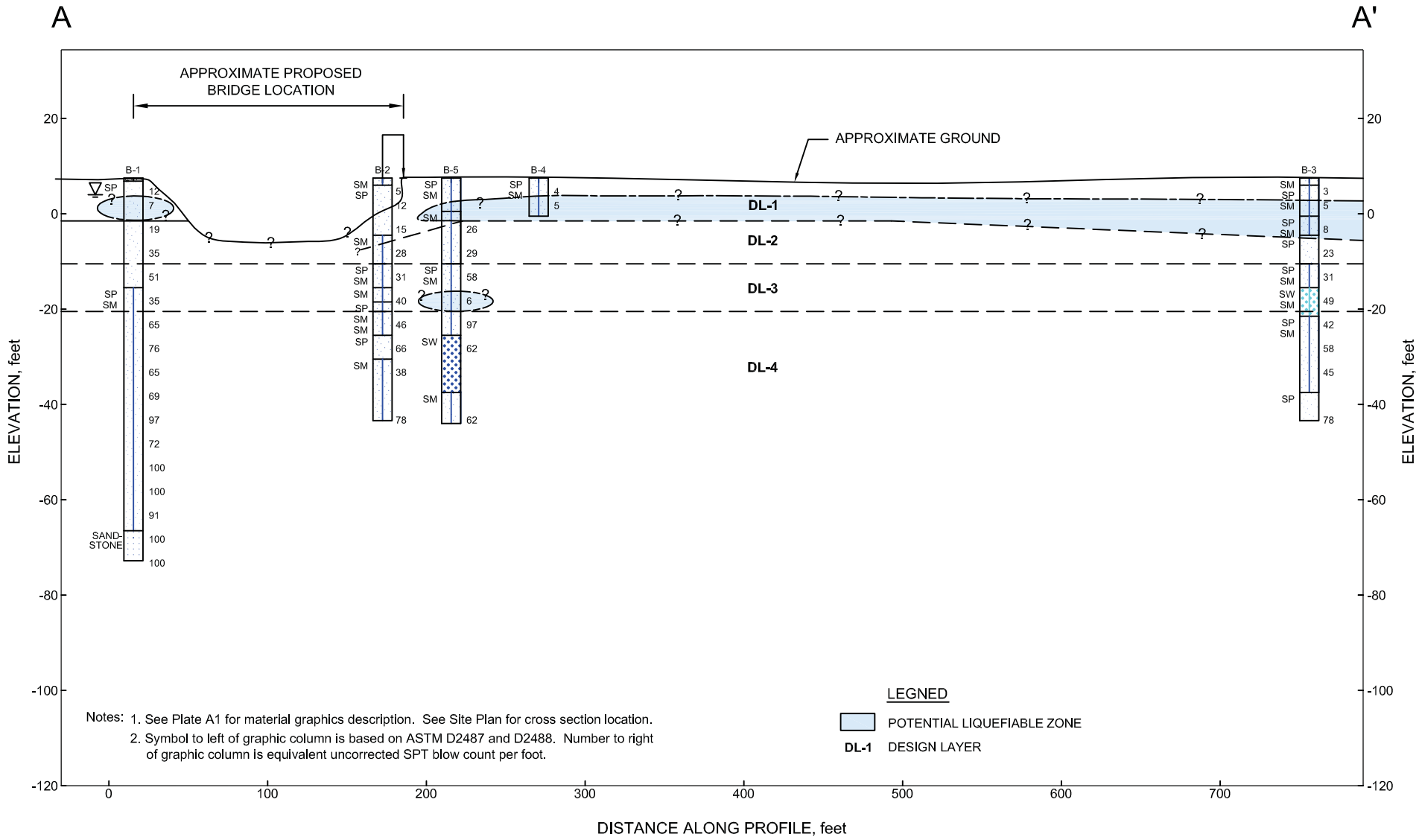


Figure 4 - CROSS SECTION A-A'

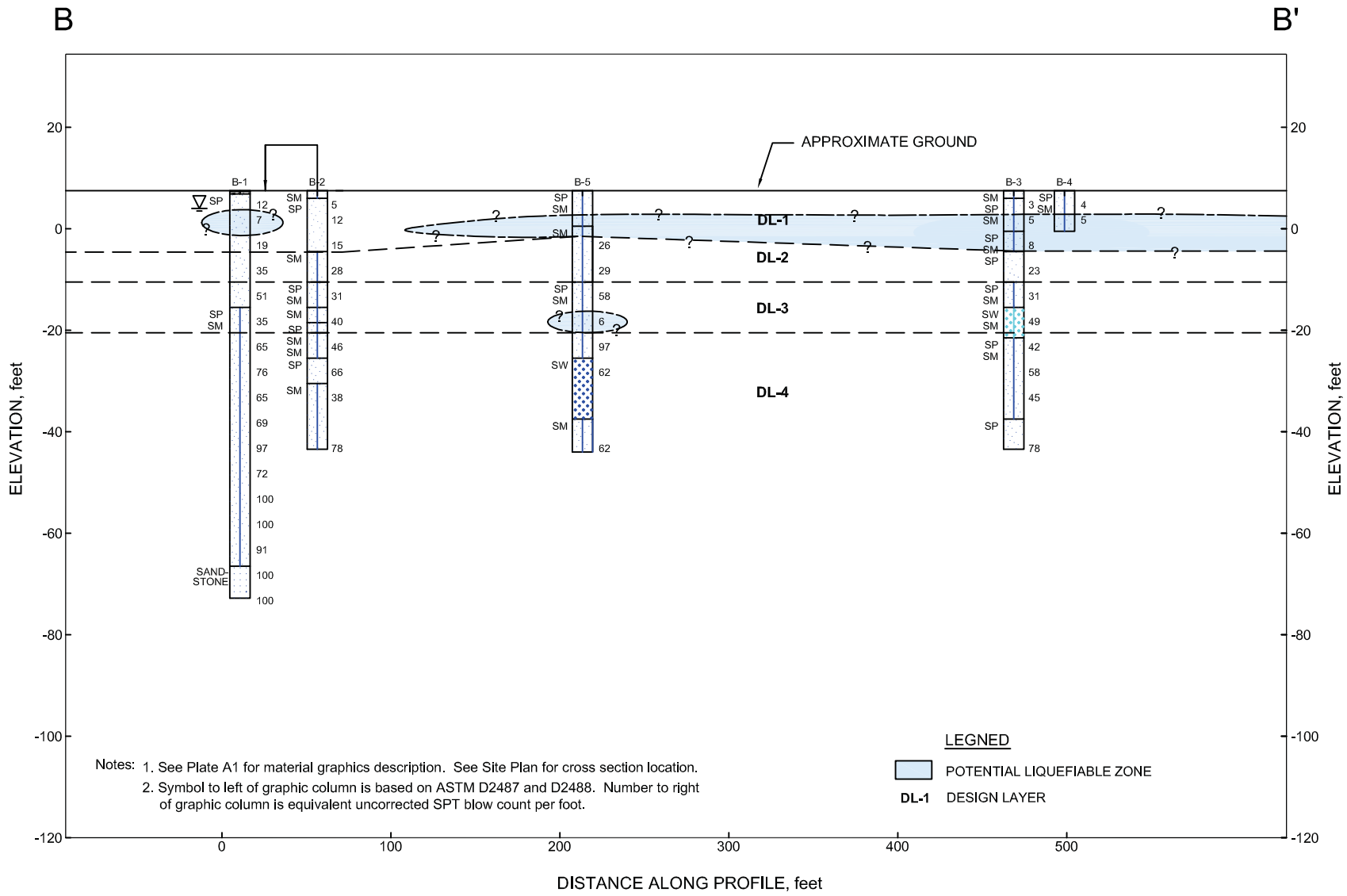


Figure 5 - CROSS SECTION B-B'

4.0 CONCLUSIONS AND RECOMMENDATIONS

The primary geotechnical considerations for the proposed project are the earth pressures for the sheet pile wall and pile capacities for the bridge foundation and seismic loading. Geotechnical recommendations are provided below.

4.1 SEISMIC/GEOLOGIC HAZARDS

The site, like most of Southern California, will be subject to strong ground shaking during major earthquakes. Seismic design can be performed in accordance with the criteria listed in Table 2.

Table 2 - SEISMIC DESIGN CRITERIA

CHARACTERISTIC	CRITERIA
Alquist-Priolo Special Study Zone Act	Site outside special study zones
California Building Code (CBC) Seismic Zone Factor (z)	0.4
CBC Soil Profile	S_F [1]
CBC Seismic Source Type / Distance (km)	B / 2 km
CBC Near Source Factors, Na and Nv	1.3 and 1.6
California Seismic Hazards Mapping Act, Liquefaction Zone	Site within liquefaction zone
California Seismic Hazards Mapping Act, Landslide Zone	Site outside landslide zone
CGS Peak Ground Acceleration,[2] g	0.39

Notes:
1. The site was classified as S_F but can be assumed to be S_D to estimate the design acceleration response spectra.
2. California Geological Survey, 10 percent probability of exceedance in 50 years, alluvial site.

Liquefaction analyses were based on the following:

- Subsurface data from this investigation and an assumed groundwater depth of 5 feet bgs.
- R. B. Seed, et al. (2003) guidelines (see Appendix C).
- A peak ground acceleration of 0.39g.
- An earthquake moment magnitude of 6.6.

We judge that limited zones of the subsurface soils are subject to liquefaction, as shown on Figure 4, Figure 5, and Table 3. Liquefaction-induced settlement was estimated to be approximately 1 to 3 inches based on Tokimatsu and Seed (1987).

The liquefaction evaluation and seismic settlement calculations are presented in Appendix C.



Table 3 - SUMMARY OF LIQUEFACTION INDUCED SETTLEMENT

IDENTIFICATION	DEPTH OF POTENTIALLY LIQUEFIABLE LAYERS (feet)	CALCULATED LIQUEFATION INDUCED SETTLEMENT (inches)
B-1	5 to 8	1
B-2	--	--
B-3	5 to 12	2.5
B-5	23 to 28[1]	2

Notes:
1. In Boring B-5, liquefaction is likely to occur from 5 to 8 feet based on soil conditions encountered in adjacent borings. Additional settlement of approximately 1 inch is therefore likely.
- Peak ground acceleration = 0.39g.

4.2 EARTHWORK

4.2.1 Site Preparation and Grading

Some grading will be required at the bridge approaches and behind the new bulkheads. Prior to the start of construction, the following should be performed:

- All utilities should be located in the field and either rerouted, removed, abandoned, or protected.
- Areas to be graded should be stripped of vegetation and debris, and the material removed from the site.
- Topsoil materials should be stockpiled for later use in landscaped areas.
- Pavement and concrete should be separated for recycling.
- Areas to receive fill should be compacted to 90 percent relative compaction[1].

Where the soils at the bottom of the excavation preclude compaction, they should be excavated to a sufficient depth such that a firm and unyielding surface is achieved at the planned bottom of excavation or the base of fill. Generally, an overexcavation depth of 1 to 2 feet is sufficient.

Fill and backfill should be compacted by:

- Placing in loose layers less than 8 inches thick.
- Moisture conditioning to above-optimum moisture content.

[1] Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by the American Society for Testing Materials (ASTM) D1557-91 test method. Optimum moisture content is the moisture content corresponding to the maximum dry density, as determined by the ASTM D1557-91 test method.



- Compacting to at least 90 percent relative compaction.

Import materials for fill and select backfill should meet the criteria in Table 4. Select backfill is material placed within a horizontal distance of 5 feet or one-half of the wall height, whichever is greater, behind retaining walls.

Table 4 - IMPORT FILL AND SELECT BACKFILL CRITERIA

CRITERIA	IMPORT FILL	SELECT BACKFILL
Maximum particle size (inches)	4	1
Maximum liquid limit (%)	10	5
Maximum plasticity index (%)	5	0
Maximum percentage passing the No. 200 sieve (%)	40	30
Minimum sand equivalent	20	20

The soils encountered in the borings are expected to meet the above criteria for select backfill.

Site grading may be accomplished with conventional heavy-duty construction equipment. The fill should be compacted using soil compactors or vibratory drum roller, as defined by the Caterpillar Performance Handbook (1998), or equivalent. However, to avoid overstressing walls, backfill should be compacted using lightweight compaction equipment behind the walls.

4.2.2 Excavations and Temporary and Permanent Slopes

The stability of temporary excavations is a function of several factors, including the total time the excavation is exposed, moisture condition, soil type and consistency, and contractor's operations. The contractor is responsible for excavation safety. As a guideline, temporary construction excavations greater than 3 feet but less than 10 feet deep should be planned with slopes no steeper than 1.5H:1V (horizontal to vertical). For steeper temporary construction slopes or deeper excavations, shoring should be provided for stability and protection.

Because of the shallow groundwater levels and proximity of the ocean, significant dewatering may be required. The construction method must consider construction dewatering and excavation stability. The effectiveness of shoring and dewatering are largely dependent on the construction method. Therefore they should be designed by the contractor. Construction methods should, therefore, attempt to reduce the amount of construction dewatering. Conventional construction methods consist of driving sheetpile walls to considerable depth below the proposed bottom of excavation to provide an effective cut-off wall. Generally, dewatering within the shored excavation

can be achieved using well points within confined cut-off perimeter walls. Dewatering should commence prior to the excavation reaching the groundwater level and the ground water must be monitored and maintained well below the bottom of the excavation sufficient to maintain a stable bottom.

For preliminary design purposes, a dewatering system using well points at close spacing along the inside perimeter of the excavation can be considered. It should be noted that if the dewatering system is not properly designed and operated in concert with the shoring system, installation and excavation, an unstable "quick" bottom condition might occur during excavation. Deep dewatering could cause settlement of this site and adjacent sites due to an increase of the effective weight of soil. Accordingly, the depth and lateral influence of the dewatering scheme must be planned to reduce the influence of dewatering beneath nearby improvements. The contractor should strictly adhere to grading requirements of city and applicable health and safety regulations, including the Occupational Safety and Health Administration (OSHA).

Permanent compacted fill slopes should be planned no steeper than 2H:1V. The slopes should be covered with vegetation or paved to reduce surface erosion.

4.3 BRIDGE FOUNDATION DESIGN

Shallow foundations were not considered feasible for bridge support because of the presence of the existing channel and potential liquefaction at shallow depths (excessive settlement and differential settlement during seismic loading). Pile foundations should extend to a uniform, competent soil layer below potentially liquefiable layers. We understand that the top of the pile elevation will be at an approximate elevation of -2 feet MLLW. Potentially liquefiable layers were not present beneath the proposed pile top elevation in borings adjacent to the proposed bridge. However, since a potentially liquefiable layer was encountered in another boring within the design layer DL-3, we recommend that the piles extend and tip within the design layer DL-4. Driven piles (steel piles or prestressed, precast concrete piles) that develop their capacity from a combination of friction and end-bearing are suitable for the project.

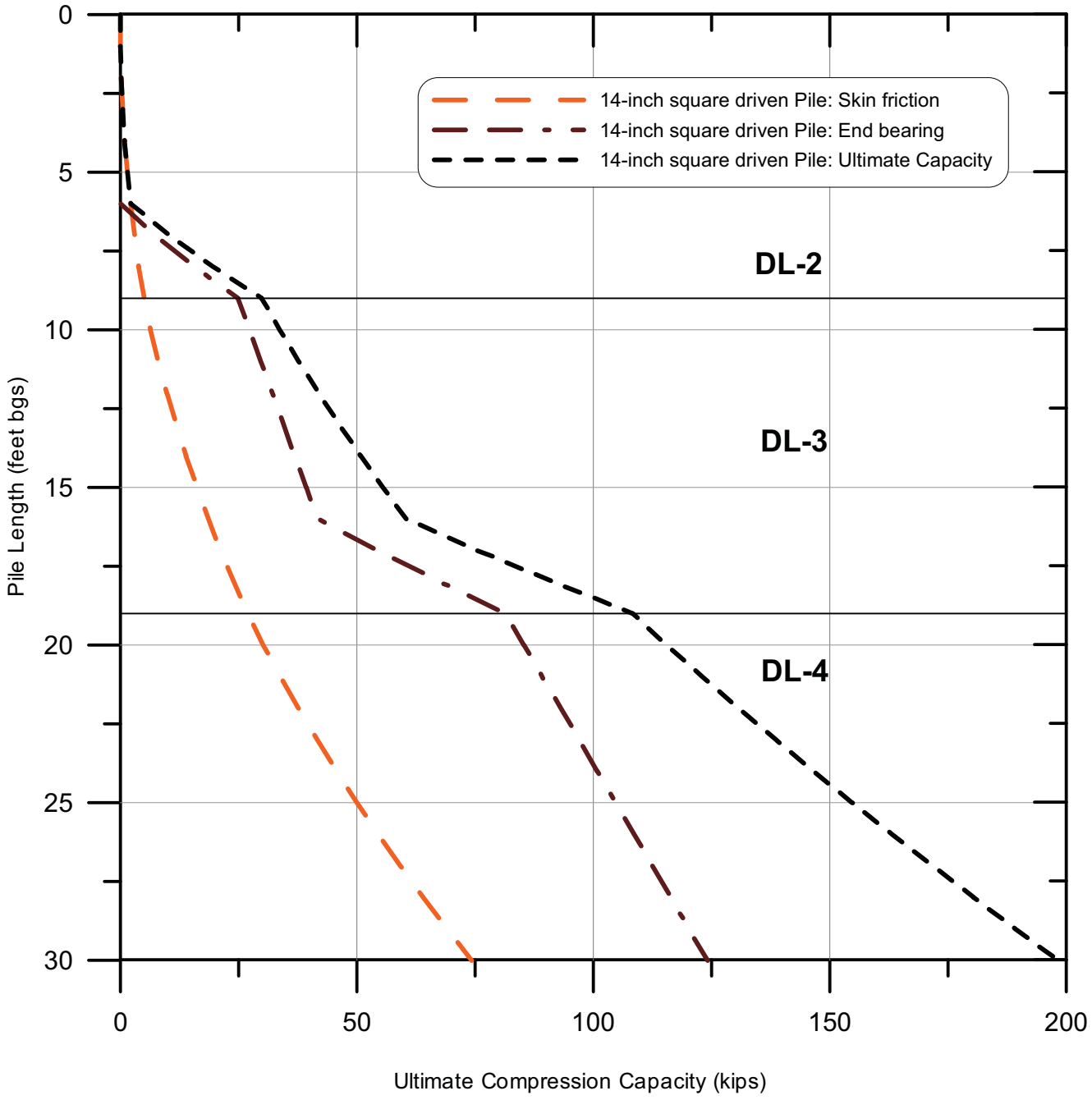
4.3.1 Pile Foundations

Pile axial and lateral capacities were evaluated for 14-inch square precast concrete piles. Pile axial capacities were evaluated using the computer program APILE^{Plus}4.0 for Windows. This computer



program has the capability to estimate the vertical pile performance using four different approaches: the American Petroleum Institute (API) recommended practice 2A (RP2A), the U.S. Federal Highway Administration (FHWA), the U.S. Army Corps of Engineers (USACE), and the Lambda method. The axial pile capacity results are summarized on Figure 6. Settlement calculations were also performed using the computer program APILE^{Plus}4.0 for Windows. The pile head downward movement for applied axial load (40kips) with a factor of safety of 2 or more was estimated to be less than ½ inch.

2005-041\Calcs\A Pile\plle abutment-bay island.grf



Note:
1. Ultimate compression capacity based on skin friction and end bearing capacity.
2. A minimum factor of safety (FS) of 2 and 3 should be applied to ultimate skin capacity and end bearing capacity respectively to estimate allowable static compression.
3. A minimum FS of 1.5 should be applied to ultimate skin and end bearing compression to estimate allowable seismic compression.
4. The ultimate tension capacity may be assumed to be equivalent to 60% of ultimate skin friction.
5. A minimum FS of 2 should be applied to the ultimate tension capacity to estimate allowable static tension.
6. A minimum FS of 1.2 should be applied to the ultimate tension to estimate allowable seismic tension.
7. Calculation assumed sloping dredge line (5H:1V).
8. Based on soil conditions from boring adjacent to the bridge location, liquefaction and liquefaction induced downdrag etc. were considered negligible below mudline.

Figure 6 - AXIAL PILE CAPACITY - PILE TOP AT MUDLINE

The minimum center-to-center spacing between the piles should be no less than three pile diameters. For piles spaced at three pile diameters or greater, group efficiency reduction factors need not be applied for axial pile capacity calculation.

Analyses for lateral capacity of vertical piles were performed using the computer program LPILE^{PLUS}5.0 for Windows (Ensoft, 2004), using non-linear p-y (lateral load deflection) curves and a finite-difference solution. Lateral pile capacity results are summarized in Table 5 and are also presented in Appendix D.

Table 5 - SUMMARY OF PILE LATERAL LOAD ANALYSES

PILE TYPE	BOUNDARY CONDITION	AXIAL LOAD (kips)	LATERAL LOAD (kips)	APPLIED MOMENT (kips-inches)	PILE HEAD DEFECTION (inches)	MAXIMUM MOMENT (kips-feet)/ Depth (feet)	MAXIMUM SHEAR (kips)/ Depth (feet)
14-in. square Driven pile	Free Head	40	6.7	0	0.5	31.1/7.4	6.7/0
	Free Head	40	10.8	0	1	55.8/7.8	10.8/0
	Fixed Head	40	17.3	0	0.5	87.8/0	17.3/0
	Fixed Head	40	28.4	0	1	156.9/0	28.4/0

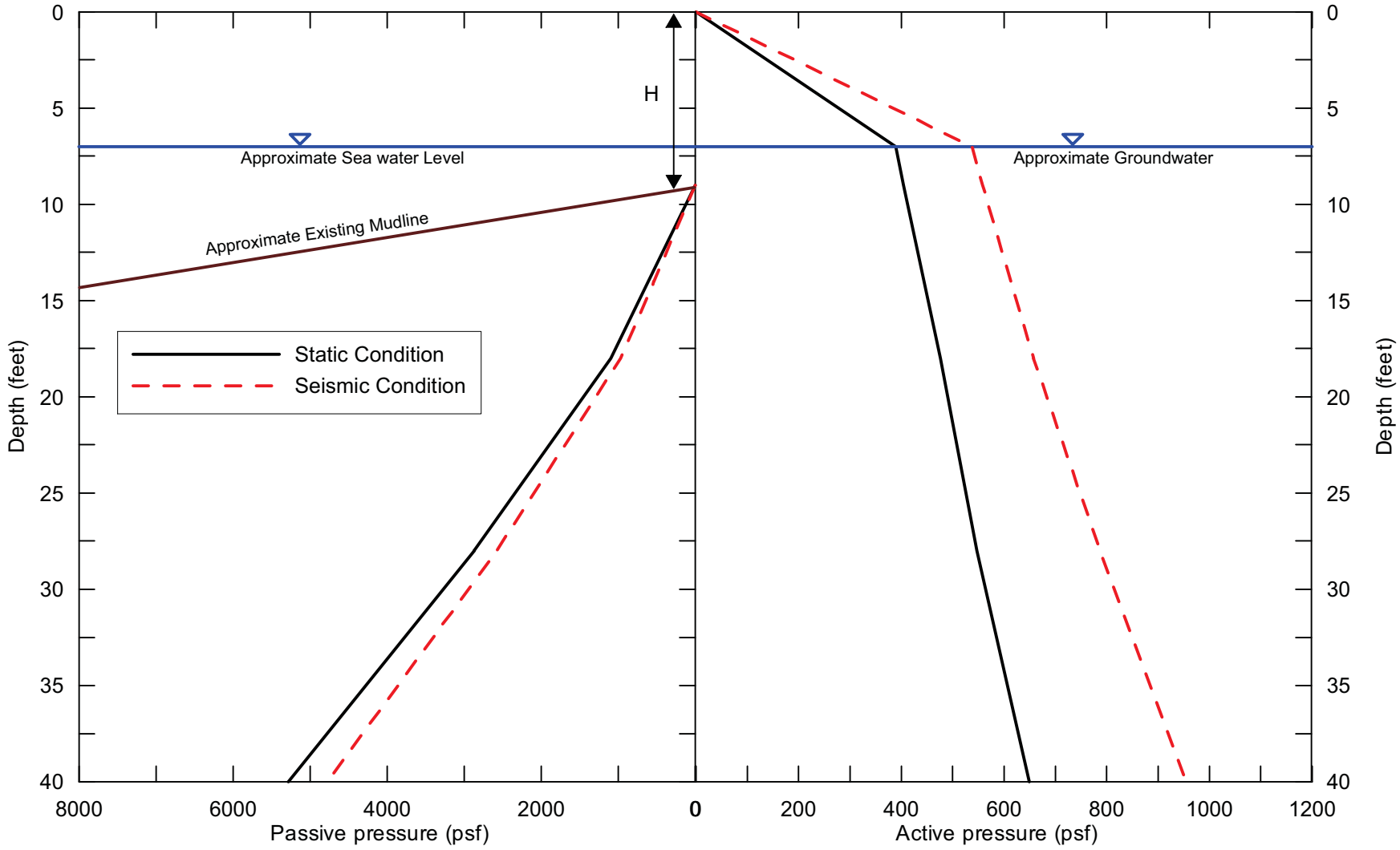
Note:
- Assumed pile top at mudline.
- Lateral capacity of batter piles would be equal to the horizontal component of axial capacity.

4.4 LATERAL EARTH PRESSURES

Lateral earth pressures for sheet pile wall design are presented on Figure 7 and are based on existing material noted in Table 1. These lateral pressures are based on water level at the retained side and the water side to be at the same elevation. The groundwater level on the retained side may, however, have the potential to be at a slightly higher level than the water side because of tidal variation and slower drainage. Analyses should be performed considering this potential imbalance of water pressure as noted on Figure 7.

4.5 RESISTANCE TO LATERAL LOADS

At the bridge foundation locations, the lateral loads can be resisted by pile foundations as discussed in Section 4.3.1. For the sheet pile walls, the lateral loads can be resisted by an allowable passive soil pressure and tieback forces as outlined on Figure 7 and Figure 8, respectively.



Note: 1. Calculations based on flexible wall with sloping dredge line (5H:1V).
2. Passive pressures consider existing slope. FS of overturning and sliding for static loading condition is 1.5. FS of overturing and sliding for seismic loading condition is 1.
3. If upslope above the wall is present within a horizontal distance equal or less than the height of the wall(H) the active lateral pressures should be increased. For 2H:1V slopes above the wall, increase active pressures by 50 percent; for 1.5H:1V slope, increase the active pressures by 100 percent.
4. A seismic coefficient of 0.2g (50 percent of peak ground acceleration [PGA]) was used to calculate pressure during seismic condition.
5. Surcharge was not considered in calculation. If surcharge (q) present, use additional surcharge pressure, P_q=0.45q on active pressure.
6. To analyze potential imbalance of hydrostatic pressures on the sheet ple wall consider the case during which the groundwater level could be 5 feet higher on the retained side. The net water pressure can be cacluated using a fluid weight of 64 pcf.
7. For seismic conditions additional pressures could be applied on the wall becuase of liquefaction. For liquefiable layers present above the mudline assume additional pressures of 40psf/unit length.

Figure 7 - LATERAL EARTH PRESURE ON SHEET PILE WALL

4.6 TIEBACK ANCHORS

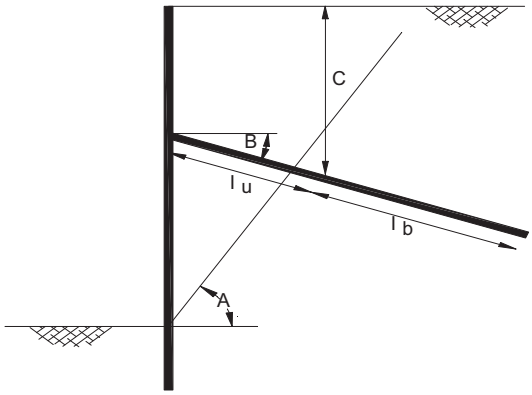
4.6.1 Design

Tieback anchors can be installed for both temporary and permanent conditions. For temporary conditions, corrosion protection of the steel tieback anchors is not critical if corrosion is small or minor compared to the total amount of steel present. However, for permanent installation, corrosion protection is critical. For permanent installations, at a minimum, dual corrosion protection is required. This dual corrosion usually consists of an epoxy coated tieback anchor completely enclosed in grout or a concrete sheath. Corrosion protection can also consist of active catholic protection. Section 4.7 provides details on the tieback anchor corrosion protection.

For permanent tieback anchors, provisions should be made to install instrumentation to check on the loads of the anchors after construction has been completed. This instrumentation can consist of strain gauges, load cells, and other types of equipment to check that the tieback anchors are carrying the full design load. Also, permanent access to the tieback anchors for periodic retention, if necessary, should be provided. The retaining walls should also include survey monuments such that both the vertical and lateral positions can be checked using conventional surveying instruments.

Tieback anchors can be designed based on the recommendations provided by the Post-Tensioning Institute (PTI, 1996) for prestressed soil anchors as outlined on Figure 8. All anchors should be tested as described below.





A = 60° B = 10° to 40° C = 4 feet (minimum) l_u = Unbonded length (5-foot minimum) (not to be used for tieback capacity)	f_{all} = Allowable tieback friction/square foot surface area = 40C psf (1,000 PSF maximum) single stage grout = 80C psf (2,000 PSF maximum) secondary or post grouting l_b = Bonded length (allowable tieback length for capacity)

Note:
- In case of anchored tieback, lateral capacity of anchored pile should be verified.

Figure 8 - TIEBACK ANCHORS

The tieback anchor capacities presented on Figure 8 were developed for conventionally single-stage grouted tieback anchors. Recently, secondary or post grouted anchors have been used in Southern California. These post-grouted tieback anchors can develop more capacity than conventional single grout anchors as noted on Figure 8. However, the capacity of the post-grouted anchors can vary significantly depending on the method used for grouting, the pressure of the grouting, type of grout, and other factors. Therefore, if post-grouting tieback anchors are selected by the contractor, the capacities should be reviewed prior to installation. Also, the testing program described in Section 4.6.2 should be increased to check on the effectiveness of the grouting program.

4.6.2 Testing

Tieback anchors should be tested in general accordance with the recommendations and procedures described by the Post-Tensioning Institute (1996) and at the frequency, test loads, and criteria outlined in Table 6, whichever is more restrictive. The allowable design capacities of all tiebacks should be verified by a program of proof test and performance tests. Selected representative tieback(s) at each wall should be selected by the geotechnical engineer and tested to 200 percent of the design load for a 24-hour period to check the estimated design capacity. In addition to the above test, a minimum of 5 percent of all tiebacks shall be proof tested to 200 percent of design load for 30 minutes and all remaining anchors should be proof tested to

150 percent of design load for 15 minutes as outlined in Table 6. Where satisfactory, tests are not achieved on the initial anchors, the anchor diameter, length, and/or grouting program should be increased until satisfactory test results are obtained. Alternatively, the design load could be decreased and the number of anchors increased.

Table 6 - TIEBACK ANCHOR TESTING

Testing Load (percent of working load)	200	200	150
Test Type	Performance	Performance	Proof
Test Duration after Load Application	24 hours	30 minutes	15 minutes
Maximum Deflection after Load Application, inches	0.5	0.25	0.10
Early termination after load application	<0.1@4	--	--
Movement (inches) @ Time (hours)	<0.5@12	--	--
Number of Tests	Selected representative tiebacks	5% of all tiebacks	All remaining anchors

After a satisfactory test, each anchor should be locked-off at no less than 110 percent of rated design load. The locked-off load should be verified by rechecking the load in the anchor. If the lift-off load varies by more than 10 percent from required lock-off (110 percent of design load), the anchorage should be reset and the lift-off measurement repeated until a satisfactory reading is obtained.

The testing equipment and set up should be provided by the contractor and reviewed by DYA. The installation of the anchors and the testing of the completed anchors should be observed by DYA personnel.

4.7 SOIL CORROSION POTENTIAL

Analytical chemical test results from three tests performed during this investigation indicated 21-42 parts per million (ppm) soluble sulfate concentrations in the near-surface soils. These test results indicate that Type II cement can be used with a maximum water/cement materials ratio in accordance with CBC standard 1904.3.1.

Table 7 - CORROSION POTENTIAL

	CALTRANS CRITERIA FOR CORROSIVE MATERIALS	RANGE OF VALUES
pH	<5.5	8.2 - 9.1
Soluble sulfate content (ppm)	>2,000	21 -42
Soluble chloride content (ppm)	>500	139 - 1,940
Electrical resistivity (ohm-cm)	<1,000	300 - 4,200

We suggest that permanent tieback anchors follow the recommendations provided by the Post-Tensioning Institute for Class 1, encapsulated tendons. Table 8 and Figure 9 summarize these recommendations.

Table 8 - ANCHOR CORROSION PROTECTION

PROTECTION REQUIREMENTS CLASS I ENCAPSULATED TENDON		
Anchorage	**Unbonded Length**	**Tendon Bond Length**
Trumpet Cover if Exposed	Grease-filled sheath, or Grout-filled sheath, or Epoxy for fully bonded anchors	Grout-filled encapsulation, or Epoxy

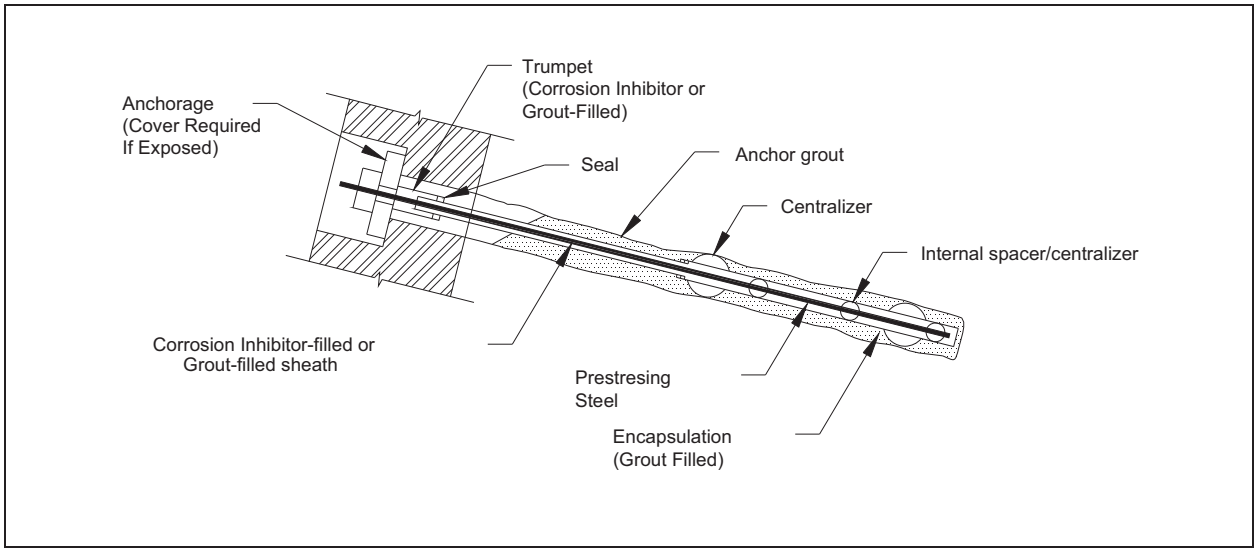


Figure 9 - ENCAPSULATED TENDON RECOMMENDATION

5.0 PLAN REVIEW, CONSTRUCTION OBSERVATION, AND TESTING

DYA should be retained to review the finished grading earthwork and foundation plans and specifications for conformance with the intent of our recommendations. The review will enable DYA to modify the recommendations if final design conditions are different than presently understood.

During construction, DYA should provide field observation and testing to check that the site preparation, excavation, foundation installation, and finished grading conform to the intent of these recommendations, project plans, and specifications. This would allow DYA to develop supplemental recommendations as appropriate for the actual soil conditions encountered and the specific construction techniques used by the contractor.

As needed during construction, DYA should be retained to consult on geotechnical questions, construction problems, and unanticipated site conditions.



6.0 LIMITATIONS

This report has been prepared for this project in accordance with generally accepted geotechnical engineering practices common to the local area. No other warranty, expressed or implied, is made.

The analyses and recommendations contained in this report are based on the literature review, field investigation, and laboratory testing conducted in the area. The results of the field investigation indicate subsurface conditions only at the specific locations and times, and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between such locations. Although subsurface conditions have been explored as part of the investigation, we have not conducted chemical laboratory testing on samples obtained or evaluated the site with respect to the presence or potential presence of contaminated soil or groundwater conditions.

The validity of our recommendations is based in part on assumptions about the stratigraphy. Observations during construction can help confirm such assumptions. If subsurface conditions different from those described are noted during construction, recommendations in this report must be reevaluated. DYA should be retained to observe earthwork construction in order to help confirm that our assumptions and recommendations are valid or to modify them accordingly. In accordance with UBC Appendix Chapter 33 Section 3317, DYA cannot assume responsibility or liability for the adequacy of recommendations if we do not observe construction.

This report is intended for use only for the project described. In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by DYA. We are not responsible for any claims, damages, or liability associated with the interpretation of subsurface data or reuse of the subsurface data or engineering analyses without our express written authorization.

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APPENDIX A
FIELD INVESTIGATION

APPENDIX A - FIELD INVESTIGATION

The field investigation for the proposed project consisted of drilling five borings (B-1 through B-5) to depths ranging from approximately 8 to 80 feet. The approximate boring locations are shown on Figure 2.

Four borings on Bay Island were drilled by Pacific Drilling, Inc. on November 8 through 10, 2005, with a limited access drill rig using rotary wash drilling techniques. One boring on the mainland for the bridge abutment location was drilled by C & L, Inc. on November 21, 2005, with a truck-mounted mobile drill rig using rotary wash drilling techniques. Our field engineer observed the drilling operations and collected drive samples for visual examination and subsequent laboratory testing. Drive samples were collected with a 2.4-inch-inside-diameter (3.0-inch-outside-diameter) modified California split-barrel sample lined with brass tubes and a standard split-spoon penetrometer with dimensions in accordance with ASTM 3550 and 1586, respectively. Both samplers were driven with a 140-pound hammer falling 30 inches. A cathead with 2.5 loops hammer was used to lift the hammer. The blows required to drive the modified California sampler were converted to equivalent standard penetration test (SPT) N-values by multiplying by 0.65 (N = 0.65 x modified California blows per foot).

The cone penetration tests (CPTs) with a limited access rig was proposed but not performed due to limited accessibility on the bridge.

Soils encountered in the borings were classified in general accordance with the ASTM Soil Classification System (ASTM D2487 and 2488), which is summarized on Plate A1. Boring logs presented on Plates A2 through A11 were prepared from visual examination of the samples, cuttings obtained during drilling operations, and results of laboratory tests.

Groundwater could not be measured or correctly measured during the field investigation due to the drilling technique; however, we expect the groundwater at approximately a depth of 5 below the ground surface. Borings were backfilled with cement and bentonite chip.

Boring locations were identified in the field by measuring from known locations using a measuring wheel or using a hand-held differential Global Positioning System (GPS) unit with a 6-foot horizontal accuracy.

SOIL CLASSIFICATION SYSTEM-ASTM D2487

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE-GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

"Push" Sampler

Split Barrel "Drive" Sampler With Liner

Standard Penetration Test (SPT) Sampler

Bag Sample

Concrete/Rock Core

Groundwater Surface

NP = Nonplastic
EI = Expansion Index Test
SG = Specific Gravity
SE = Sand Equivalent
UC = Unconfined Comp.
CD = Consol. Drained Comp.
CU = Consol. Undrained Comp.
UU = Undrained, Unconsol. Comp.
RV = R-Value
CA = Chemical Analysis
DS = Direct Shear
CN = Consolidation
SA = Grain size; HD = Hydrometer
MD = Compaction Test
[PID] Reading in ppm above background

SPT "N" = Uncorrected equivalent blow count for last foot of driving (set to 100 for driving refusal)
= 0.65 x modified California blows per foot

KEY TO LOG OF BORINGS

Bay Island Sea Wall
Project No. 2005-041

PLATE
A1

Template: DYLG1; Prj ID: 2005-041.GPJ

BORING LOCATION:	See Figure 2	**ELEVATION AND DATUM (feet):**	8 MLLW
LATITUDE:	33° 36' 21.6" N	**LONGITUDE:**	117° 54' 20.8" W
DRILLING EQUIPMENT:	Mayhew 1000	**DRILLING METHOD:**	Rotary Wash
BORING DIAMETER (inches):	5	**BORING DEPTH (feet):**	80
DATE STARTED:	11/21/05	**DATE COMPLETED:**	11/21/05
SPT HAMMER DROP:	30 inches **WT:** 140 lbs	**DRIVE HAMMER DROP:**	30 inches **WT:** 140 lbs
LOGGED BY:	QL **CHECKED BY:** JL	**DRIVE SAMPLER DIAMETER (inches)**	**ID:** 2.4 **OD:** 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
							ASPHALT CONCRETE - 2 inches						
							SILTY GRAVEL with SAND (GM); brown, moist, medium dense, fine to coarse gravel, fine-grained sand; BASE - 6 inches						
5				4 8 11	12		POORLY GRADED SAND (SP); olive brown, moist, loose, fine-grained sand, trace seashell fragments wet						
	5			5 5 6	7			99	24			2	DS
0							medium dense, fine- to coarse-grained sand						
	10			8 15 15	19			109	17			1	SA CA
-5													
	15			9 15 20	35		dense, no seashell fragments						
-10													
	20			18 35 44	51		trace fine gravel	104	21				DS
-15													
							POORLY GRADED SAND with SILT (SP-SM); dark greenish gray, wet, dense, fine-grained sand						
	25			12 16 19	35							6	
-20													

LOG OF BORING B-1

Page 1 of 3
Bay Island Sea Wall
Project No. 2005-041

PLATE
A2

Template: DYLG1; Prj ID: 2005-041.GPJ

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
				23 50/6 "	65		olive brown, dense to very dense, fine- to coarse-grained sand	107	19				
-25													
	35			15 32 44	76		very dense, fine- to medium-grained sand						
-30													
	40			26 50/6 "	65		fine-grained sand, trace seashell fragments					5	
-35													
	45			40 30 39	69		dark greenish gray, no seashell fragments						
-40													
	50			30 50/4 "	97			100	25				
-45													
	55			19 32 40	72								
-50													
	60			35 50/3 "	100								
-55													
	65			36 50/6 "	100								
-60													

LOG OF BORING B-1

Page 2 of 3
Bay Island Sea Wall
Project No. 2005-041

PLATE

A3

Template: DYLG1; Prj ID: 2005-041.GPJ

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
				15 40 50/3 "	91								
-65													
	75			50/3 "	100		SANDSTONE (BEDROCK)?; very dark gray, wet, very dense, fine-grained sand					20	
-70													
	80			50/4 "	100		Bottom of boring at 80.3 feet. Groundwater encountered at 3.5 feet during drilling. Boring backfilled with cement/bentonite grout. Surface patched with cold patch asphalt.						
-75													
	85												
-80													
	90												
-85													
	95												
-90													
	100												
-95													
	105												
-100													

LOG OF BORING B-1

Page 3 of 3
Bay Island Sea Wall
Project No. 2005-041

PLATE

A4

Template: DYLG1; Prj ID: 2005-041.GPJ

BORING LOCATION:	See Figure 2	**ELEVATION AND DATUM (feet):**	8 MLLW
LATITUDE:	33° 36' 23.2" N	**LONGITUDE:**	117° 54' 19.9" W
DRILLING EQUIPMENT:	Mini Mole	**DRILLING METHOD:**	Rotary Wash
BORING DIAMETER (inches):	6	**BORING DEPTH (feet):**	51
DATE STARTED:	11/9/05	**DATE COMPLETED:**	11/9/05
SPT HAMMER DROP:	30 inches **WT:** 140 lbs	**DRIVE HAMMER DROP:**	30 inches **WT:** 140 lbs
LOGGED BY:	JL **CHECKED BY:** QL	**DRIVE SAMPLER DIAMETER (inches)**	**ID:** 2.4 **OD:** 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
							SILTY SAND (SM); brown, moist, loose, fine-grained sand, trace roots						
5				3 3 4	5		POORLY GRADED SAND (SP); olive brown, moist, very loose, fine-grained sand, trace seashell fragments	121	5			2	DS
	5			6 7 5	12		medium dense, trace cemented sand, trace fine gravel						CA
0							wet, fine- to coarse-grained sand						
	10			4 7 8	15							3	SA
-5							SILTY SAND (SM); olive brown, wet, medium dense, fine-grained sand						
	15			12 20 23	28			97	25				
-10							POORLY GRADED SAND with SILT (SP-SM); olive brown, wet, dense, fine-grained sand						
	20			12 14 17	31								
-15							SILTY SAND (SM); dark greenish gray, wet, dense, fine-grained sand						
	25			12 30 32	40			91	30				DS
-20							POORLY GRADED SAND with SILT (SP-SM); brown, wet, dense, fine-grained sand						
							SILTY SAND (SM); olive brown, wet, dense, fine-grained sand						

LOG OF BORING B-2

Bay Island Sea Wall

Project No. 2005-041

PLATE

A5

Template: DYLG1; Prj ID: 2005-041.GPJ

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
				20 21 25	46								
-25							POORLY GRADED SAND (SP); brown, wet, very dense, fine- to medium-grained sand, trace seashell fragments						
	35			30 51/6 "	66								
-30							SILTY SAND (SM); greenish gray, wet, dense, fine-grained sand, trace seashell fragments						
	40			12 19 19	38								
-35													
	45												
-40													
	50			30 50/5 "	78		very dense, no seashell	98	24				
							Bottom of boring at 51 feet. Groundwater not measured during drilling. Boring backfilled with cement/bentonite grout.						
-45													
	55												
-50													
	60												
-55													
	65												
-60													

LOG OF BORING B-2

Page 2 of 2
Bay Island Sea Wall
Project No. 2005-041

PLATE

A6

Template: DYLG1; Prj ID: 2005-041.GPJ

BORING LOCATION: See Figure 2	**ELEVATION AND DATUM (feet):** 8 MLLW
LATITUDE: 33° 36' 27.2" N	**LONGITUDE:** 117° 54' 15.0" W
DRILLING EQUIPMENT: Mini Mole	**DRILLING METHOD:** Rotary Wash
BORING DIAMETER (inches): 6	**BORING DEPTH (feet):** 51
DATE STARTED: 11/8/05	**DATE COMPLETED:** 11/8/05
SPT HAMMER DROP: 30 inches **WT:** 140 lbs	**DRIVE HAMMER DROP:** 30 inches **WT:** 140 lbs
LOGGED BY: JL **CHECKED BY:** QL	**DRIVE SAMPLER DIAMETER (inches)** **ID:** 2.4 **OD:** 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
5				2 2 2	3		SILTY SAND (SM); dark brown, moist, loose, fine-grained sand, trace roots POORLY GRADED SAND with SILT (SP-SM); yellowish brown, moist, very loose, fine-grained sand						
0	5			5 3 5	5		dark greenish gray, trace seashell fragments					8	
-5	10			4 4 4	8		POORLY GRADED SAND with SILT (SP-SM); dark gray, wet, loose, fine-grained sand, trace seashell fragments						CA
-10	15			8 18 18	23		POORLY GRADED SAND (SP); dark gray, wet, medium dense, fine- to medium-grained sand, trace seashell fragments	100	23			2	
-15	20			11 17 14	31		POORLY GRADED SAND with SILT (SP-SM); dark gray, wet, dense, fine- to medium-grained sand, few seashell fragments						
-20	25			17 30 45	49		WELL-GRADED SAND (SW); yellowish brown, wet, dense, fine- to coarse-grained sand, trace seashell fragments	107	15			1	
							POORLY GRADED SAND with SILT (SP-SM); olive brown,						

LOG OF BORING B-3

Bay Island Sea Wall

Project No. 2005-041

PLATE

A7

Template: DYLG1; Prj ID: 2005-041.GPJ

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
-25				15 17 25	42		wet, dense, fine-grained sand						
	35			17 30 50/5 "	58			99	24				
-30													
	40			14 17 28	45		fine- to coarse-grained sand						
-35													
	45						POORLY GRADED SAND (SP); brown, wet, very dense, coarse-grained sand, few fine gravel, little seashell fragments						
-40													
	50			21 50/5 "	78		Bottom of boring at 51 feet. Groundwater not measured during drilling. Boring backfilled with cement/bentonite grout.						
-45													
	55												
-50													
	60												
-55													
	65												
-60													

LOG OF BORING B-3

Page 2 of 2
Bay Island Sea Wall
Project No. 2005-041

PLATE

A8

Template: DYLG1; Prj ID: 2005-041.GPJ

BORING LOCATION:	See Figure 2	**ELEVATION AND DATUM (feet):**	8 MLLW
LATITUDE:	33° 36' 22.6" N	**LONGITUDE:**	117° 54' 16.6" W
DRILLING EQUIPMENT:	Mini Mole	**DRILLING METHOD:**	Rotary Wash
BORING DIAMETER (inches):	6	**BORING DEPTH (feet):**	8
DATE STARTED:	11/10/05	**DATE COMPLETED:**	11/10/05
SPT HAMMER DROP:	30 inches **WT:** 140 lbs	**DRIVE HAMMER DROP:**	30 inches **WT:** 140 lbs
LOGGED BY:	JL **CHECKED BY:** QL	**DRIVE SAMPLER DIAMETER (inches)**	**ID:** 2.4 **OD:** 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
5				3 3 3	4		POORLY GRADED SAND with SILT (SP-SM); brown, moist, very loose, fine-grained sand	90	11				
	5			2 3 5	5		very loose to loose, wet						
0							Boring terminated at 8 feet due to loss of circulation. Groundwater not measured during drilling. Boring backfilled with cement/bentonite grout.						
	10												
-5													
	15												
-10													
	20												
-15													
	25												
-20													

LOG OF BORING B-4

Page 1 of 1
Bay Island Sea Wall
Project No. 2005-041

PLATE

A9

Template: DYLG1; Prj ID: 2005-041.GPJ

BORING LOCATION: See Figure 2	**ELEVATION AND DATUM (feet):** 8 MLLW
LATITUDE: 33° 36' 22.9" N	**LONGITUDE:** 117° 54' 18.7" W
DRILLING EQUIPMENT: Mini Mole	**DRILLING METHOD:** Rotary Wash
BORING DIAMETER (inches): 6	**BORING DEPTH (feet):** 52
DATE STARTED: 11/10/05	**DATE COMPLETED:** 11/10/05
SPT HAMMER DROP: 30 inches **WT:** 140 lbs	**DRIVE HAMMER DROP:** 30 inches **WT:** 140 lbs
LOGGED BY: JL **CHECKED BY:** QL	**DRIVE SAMPLER DIAMETER (inches)** **ID:** 2.4 **OD:** 3

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
5							POORLY GRADED SAND with SILT (SP-SM); brown, moist, very loose, fine-grained sand						
	5												
0							SILTY SAND (SM); olive brown, wet, medium dense, fine-grained sand						
	10			14 16 24	26			98	24				CA
-5													
	15			10 14 15	29		trace seashell fragments						
-10							POORLY GRADED SAND with SILT (SP-SM); olive brown, wet, dense, fine- to medium-grained sand						
	20			21 40 50	58			111	15				DS
-15													
	25			1 2 4	6		loose					6	SA
-20													

LOG OF BORING B-5

Bay Island Sea Wall

Project No. 2005-041

PLATE

A10

Template: DYLG1; Prj ID: 2005-041.GPJ

Elevation (feet)	Depth (feet)	Sampler	Symbol	Blows per 6 Inches	Equiv. SPT N Blows per Foot	Field Unc. Comp. Str. (tsf)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve	Other Tests [PID]
				30 50/4 "	97		very dense						
-25							WELL GRADED SAND with SILT (SW-SM); olive brown, wet, very dense, fine- to coarse-grained sand						
	35			25 30 32	62		trace seashell fragments					6	
-30													
	40												
-35													
	45						SILTY SAND (SM); greenish brown, wet, very dense, fine-grained sand						
-40													
	50			17 28 34	62								
-45							Bottom of boring at 51.5 feet. Groundwater not measured during drilling. Boring backfilled with cement/bentonite grout.						
	55												
-50													
	60												
-55													
	65												
-60													

LOG OF BORING B-5

Page 2 of 2
Bay Island Sea Wall
Project No. 2005-041

PLATE
A11

APPENDIX B
LABORATORY TESTING

APPENDIX B - LABORATORY TESTING

Diaz•Yourman & Associates (DYA) selected soil samples to be tested and the tests to be performed on the selected samples. Laboratory testing was performed by AP Engineering and Testing, Inc. Laboratory data are summarized on the boring logs in Appendix A and presented on Plates B1 through B7. We have reviewed and concur with the test results and accept full responsibility for their use in our analysis. A summary of the geotechnical laboratory testing is presented in Table B1.

Table B1 - LABORATORY TESTING SUMMARY

TEST NAME	PROCEDURE	PURPOSE	LOCATION
Percent Passing the No. 200 Sieve	ASTM D1140-92	Classification, index properties	Boring Logs
Moisture Content, Dry Density	ASTM D2216-92	Classification, index properties	Boring Logs
Grain-Size Distribution	ASTM D422-63	Classification, index properties	Plates B1 and B2
Direct Shear	ASTM D3080-90	Shear strength	Plates B3 to B7
pH	CTM 532	Corrosion potential	Table B2
Resistivity	CTM 532	Corrosion potential	Table B2
Soluble Sulfates	CTM 417-B	Corrosion potential	Table B2
Soluble Chlorides	CTM 422	Corrosion potential	Table B2

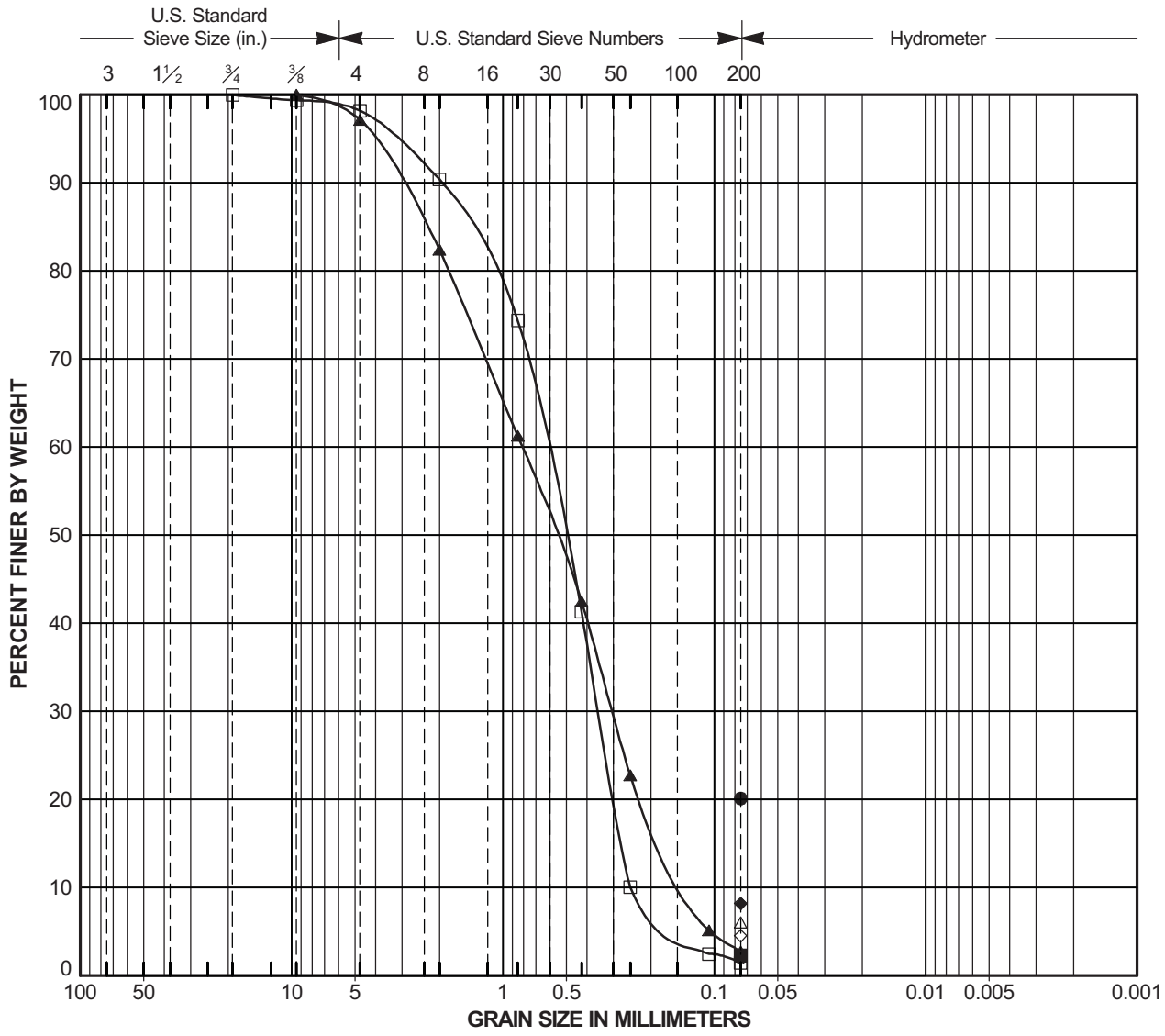
Notes:
- ASTM = American Society for Testing and Materials
- CTM = Caltrans Test Method

Table B2 - CORROSION POTENTIAL TEST RESULTS

Boring No.	B-1	B-2	B-3 & B-5
Depth (feet)	10 to 21[1]	0 to 10[1]	10 to 20[1]
pH	8.23	9.08	8.31
Water Soluble Sulfate Content (ppm)	42	21	38
Water Soluble Chloride Content (ppm)	1940	139	1238
Minimum Resistivity/Moisture Content (ohms-cm)	300	4200	500

Note:
1. Composite sample

Template: DY_SIEVE_WIN



COBBLES	GRAVEL		SAND			SILT or CLAY
	Coarse	Fine	Coarse	Medium	Fine	

Laboratory Testing by: AP Engineering and Testing, Inc.

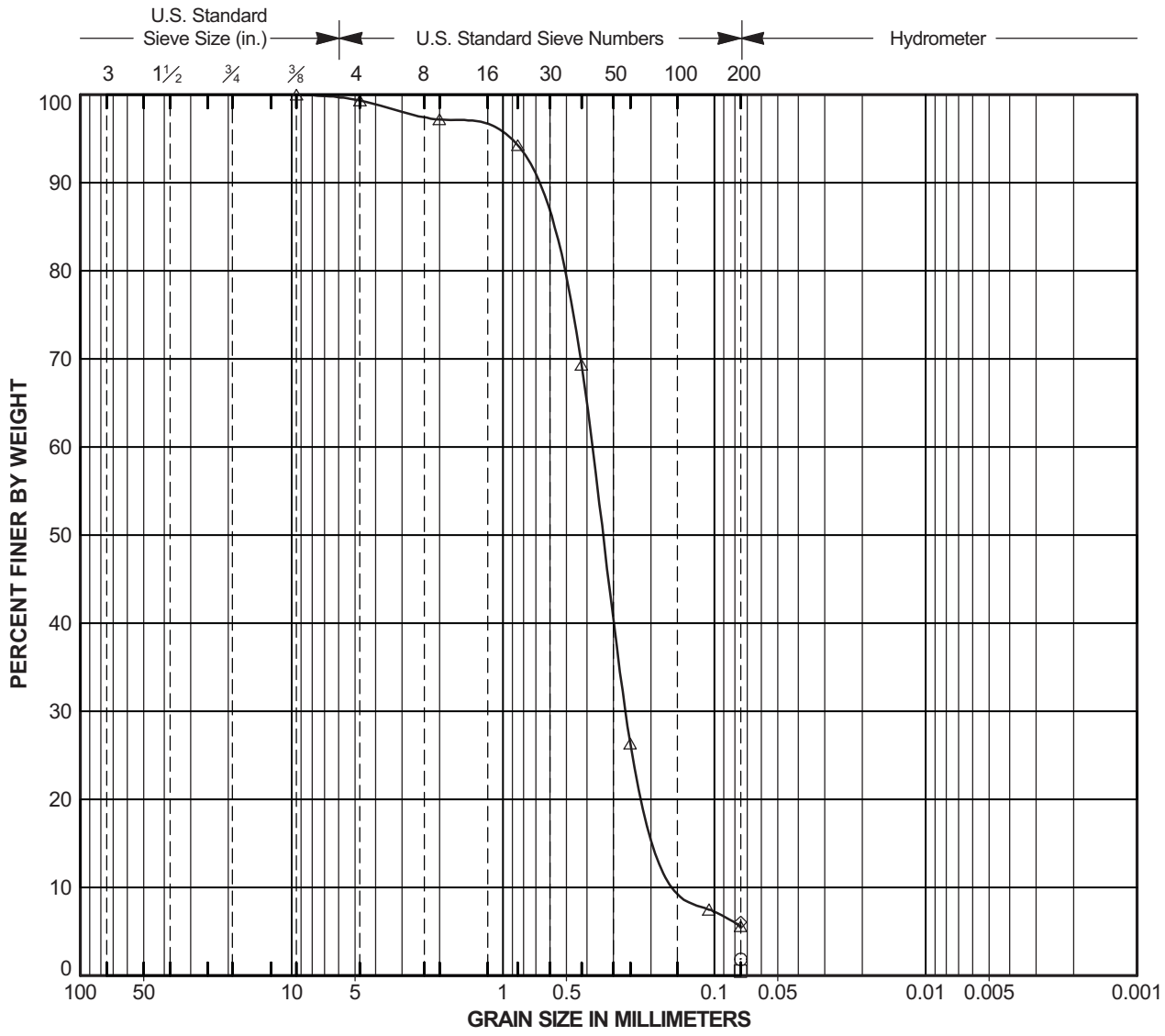
Symbol	Source	Depth (feet)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
⊙	B-1	5.0	POORLY GRADED SAND (SP)	24			2
□	B-1	10.0	POORLY GRADED SAND (SP)	17			1
△	B-1	25.0	POORLY GRADED SAND with SILT (SP-SM)				6
◇	B-1	40.0	POORLY GRADED SAND with SILT (SP-SM)				5
●	B-1	75.0	SANDSTONE(BEDROCK)				20
■	B-2	2.0	POORLY GRADED SAND (SP)	5			2
▲	B-2	10.0	POORLY GRADED SAND (SP)				3
◆	B-3	5.0	POORLY GRADED SAND with SILT (SP-SM)				8

PARTICLE SIZE ANALYSIS

Bay Island Sea Wall
Project No. 2005-041

PLATE
B1

Template: DY_SIEVE_WIN



COBBLES	Coarse	Fine	Coarse	Medium	Fine	SILT or CLAY
	GRAVEL		SAND			

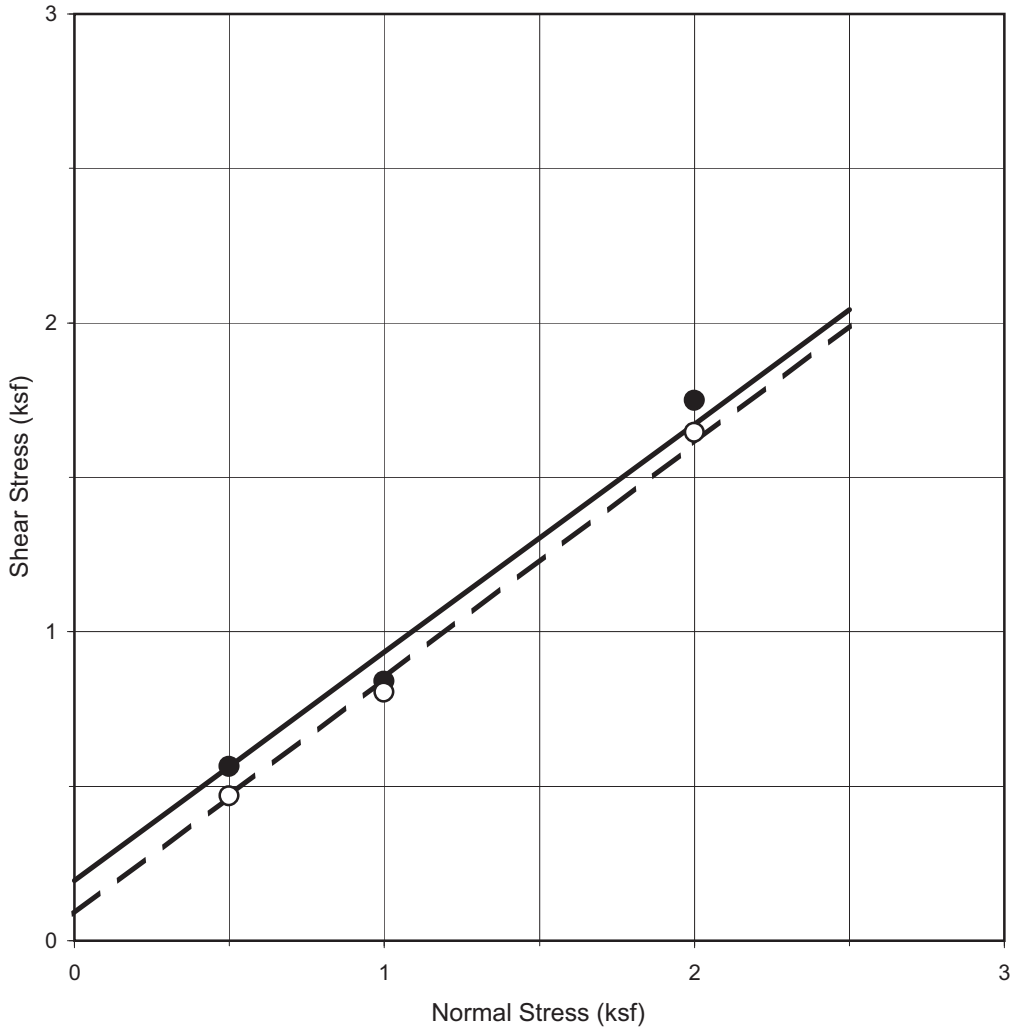
Laboratory Testing by: AP Engineering and Testing, Inc.

Symbol	Source	Depth (feet)	Classification	Natural M. C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
⊙	B-3	15.0	POORLY GRADED SAND (SP)	23			2
□	B-3	25.0	WELL-GRADED SAND (SW-SM)	15			1
△	B-5	25.0	POORLY GRADED SAND with SILT (SP-SM)				6
◇	B-5	35.0	WELL-GRADED SAND with SILT (SW-SM)				6

PARTICLE SIZE ANALYSIS

Bay Island Sea Wall
Project No. 2005-041

PLATE
B2



Project Name:	:	Bay Island Sea Wall
Project No.	:	2005-041
Boring No.	:	B-1
Sample No.	:	2
Depth (ft)	:	5
Sample Type	:	Undisturbed
Soil Type	:	Yellowish Brown Poorly-Graded Sand w/shell
Test Condition	:	Saturated
Initial Dry Density	:	99.46 pcf
Moisture Content (before)	:	23.99 %
Moisture Content (after)	:	24.58 %

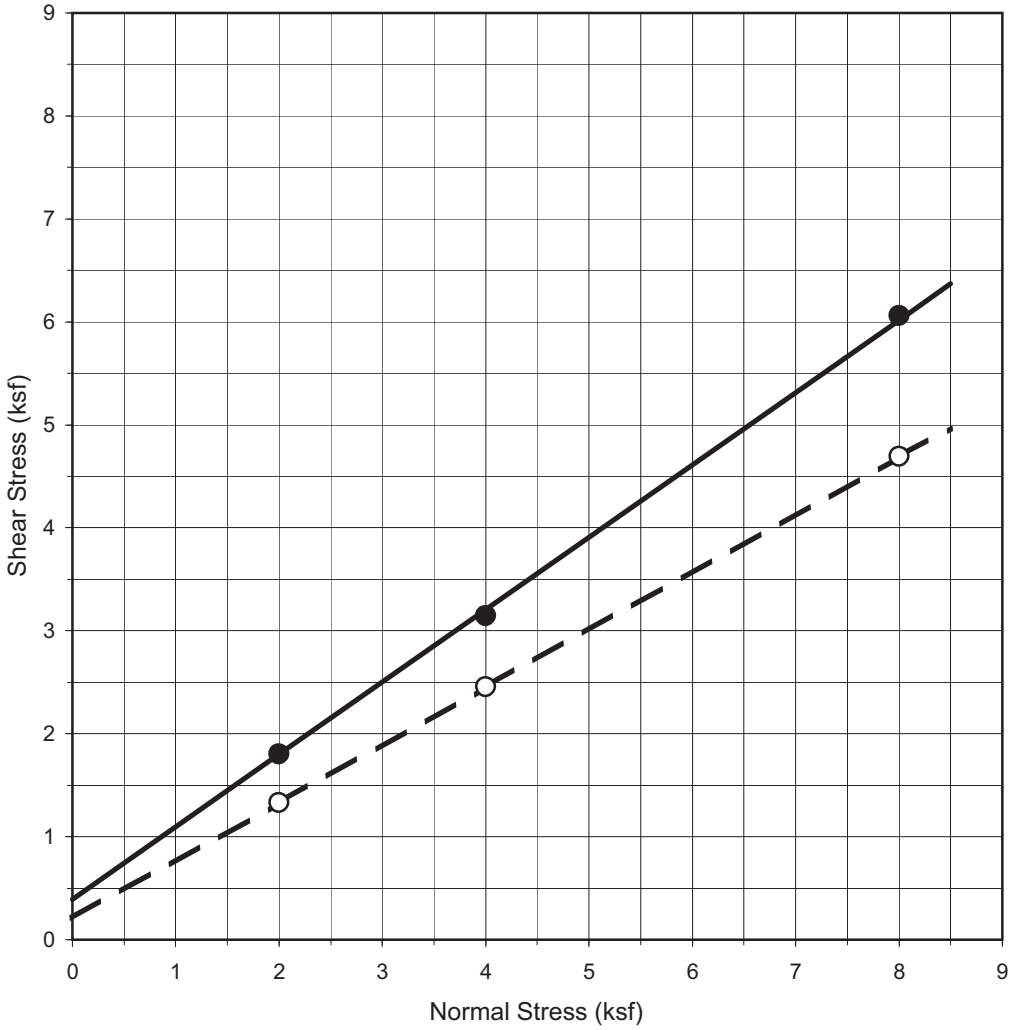
INTERPRETED STRENGTH DATA

	Peak	Ultimate
COHESION (PSF) :	200	100
FRICTION ANGLE :	36 °	37 °

AP ENGINEERING AND TESTING, INC.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Dec-05 Figure No.



Project Name:	:	Bay Island Sea Wall
Project No.	:	2005-041
Boring No.	:	B-1
Sample No.	:	5A
Depth (ft)	:	20
Sample Type	:	Undisturbed
Soil Type	:	Yellowish Brown Poorly-Graded Sand
Test Condition	:	Saturated
Initial Dry Density	:	103.74 pcf
Moisture Content (before)	:	21.11 %
Moisture Content (after)	:	24.26 %

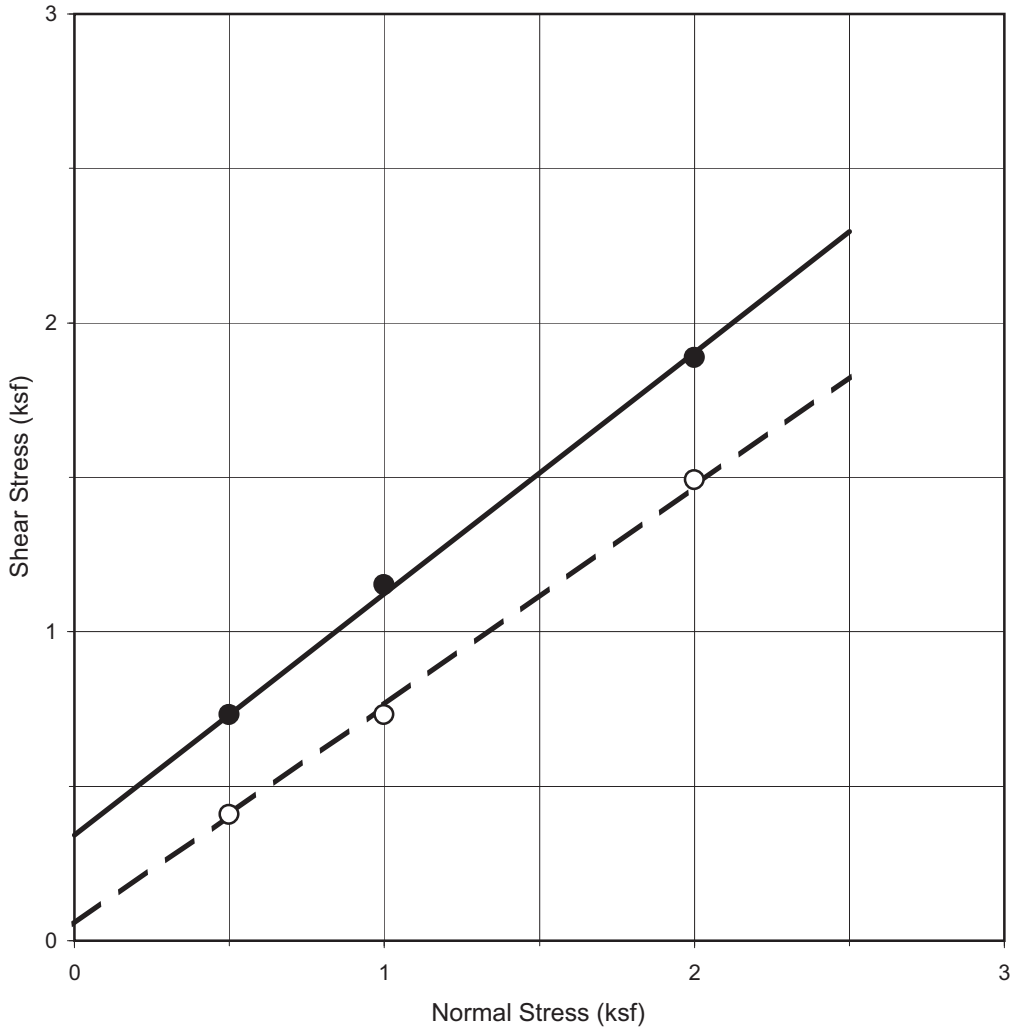
INTERPRETED STRENGTH DATA

	Peak	Ultimate
COHESION (PSF) :	400	200
FRICTION ANGLE :	35 °	29 °

AP ENGINEERING AND TESTING, INC.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Dec-05 Figure No.



Project Name:	:	Bay Island Sea Wall
Project No.	:	2005-041
Boring No.	:	B-2
Sample No.	:	1A
Depth (ft)	:	2
Sample Type	:	Undisturbed
Soil Type	:	Yellowish Brown Well-Graded Sand w/shell
Test Condition	:	Saturated
Initial Dry Density	:	120.88 pcf
Moisture Content (before)	:	4.85 %
Moisture Content (after)	:	15.24 %

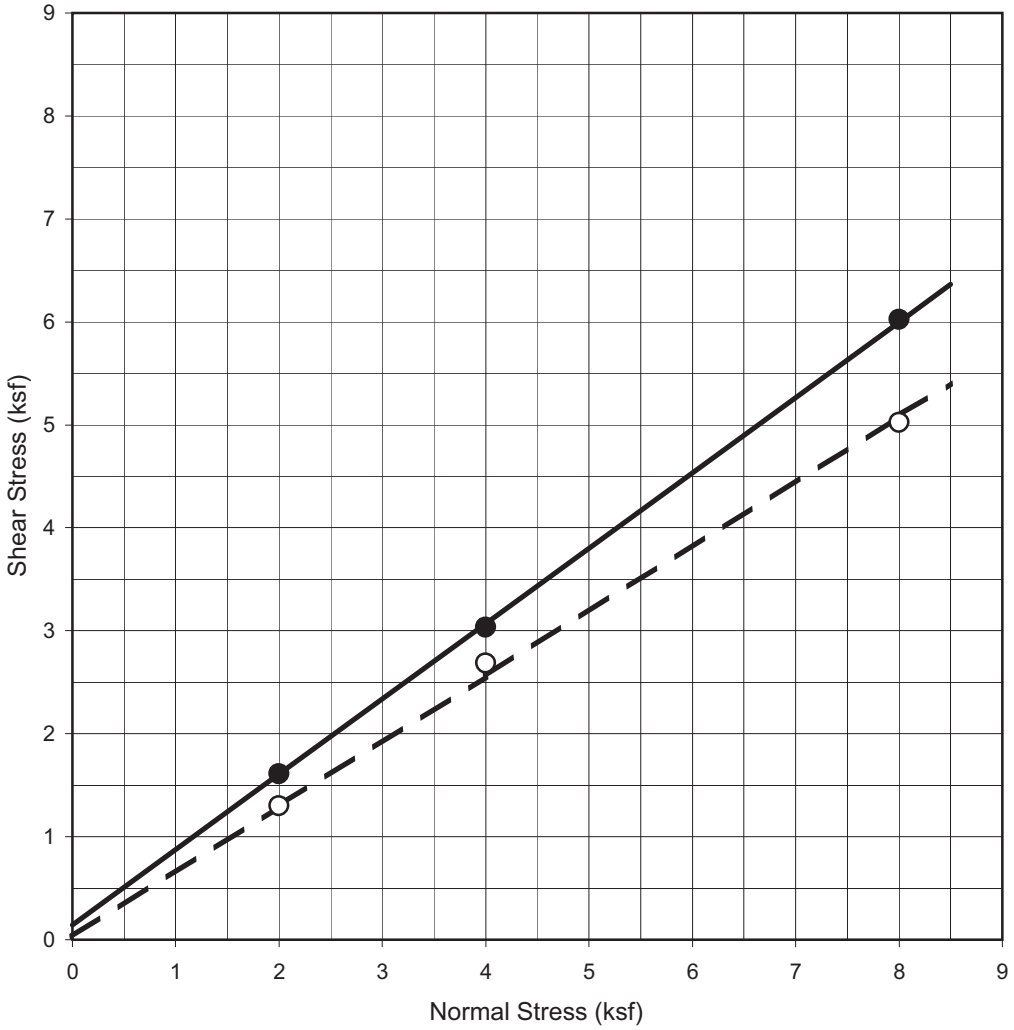
INTERPRETED STRENGTH DATA

	Peak	Ultimate
COHESION (PSF) :	350	50
FRICTION ANGLE :	38 °	35 °

AP ENGINEERING AND TESTING, INC.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Nov-05 Figure No.



Project Name:	:	Bay Island Sea Wall
Project No.	:	2005-041
Boring No.	:	B-2
Sample No.	:	6A
Depth (ft)	:	25
Sample Type	:	Undisturbed
Soil Type	:	Olive Gray Silty Sand
Test Condition	:	Saturated
Initial Dry Density	:	90.9 pcf
Moisture Content (before)	:	30.2 %
Moisture Content (after)	:	32.1 %

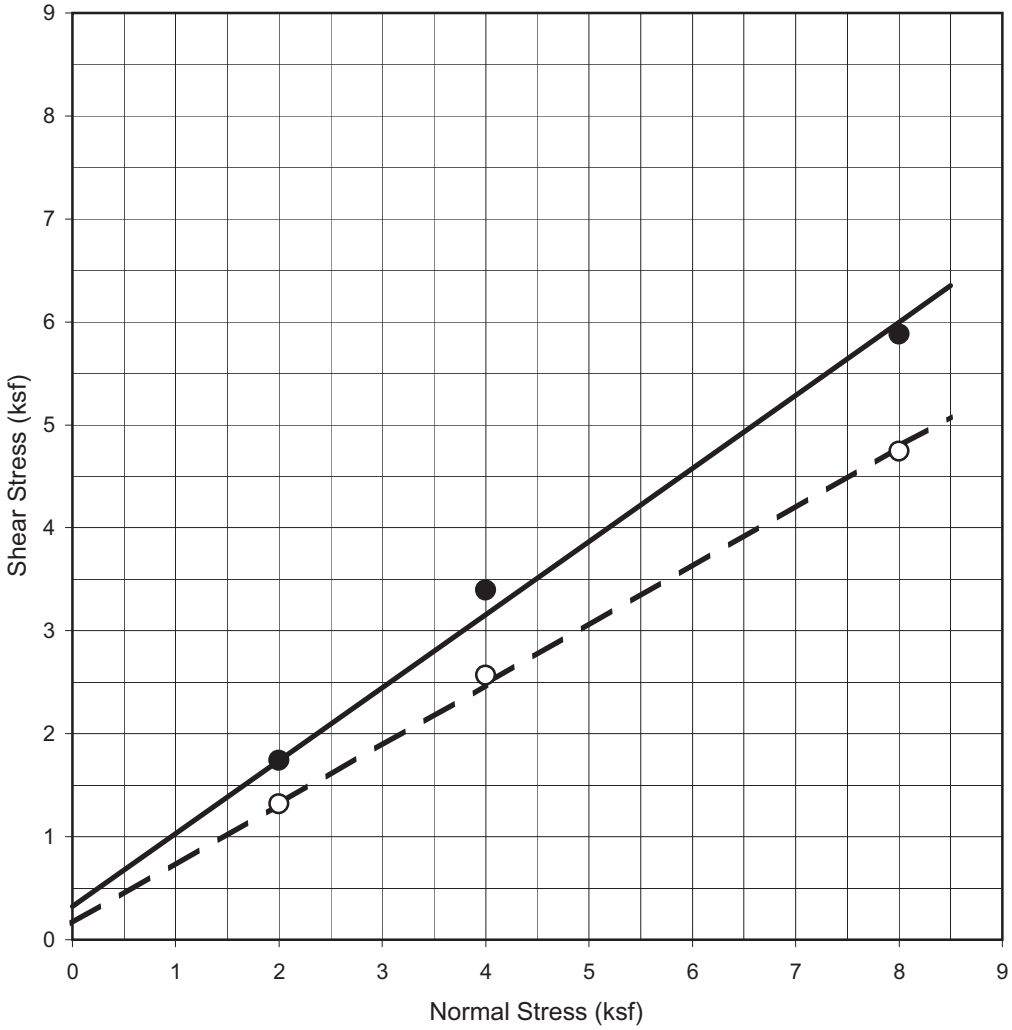
INTERPRETED STRENGTH DATA

	Peak	Ultimate
COHESION (PSF) :	150	50
FRICTION ANGLE :	36 °	32 °

AP ENGINEERING AND TESTING, INC.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Nov-05 Figure No.



Project Name:	:	Bay Island Sea Wall
Project No.	:	2005-041
Boring No.	:	B-3
Sample No.	:	4
Depth (ft)	:	15
Sample Type	:	Undisturbed
Soil Type	:	Dark Grayish Brown Sand /w shell
Test Condition	:	Saturated
Initial Dry Density	:	99.9 pcf
Moisture Content (before)	:	22.9 %
Moisture Content (after)	:	24.2 %

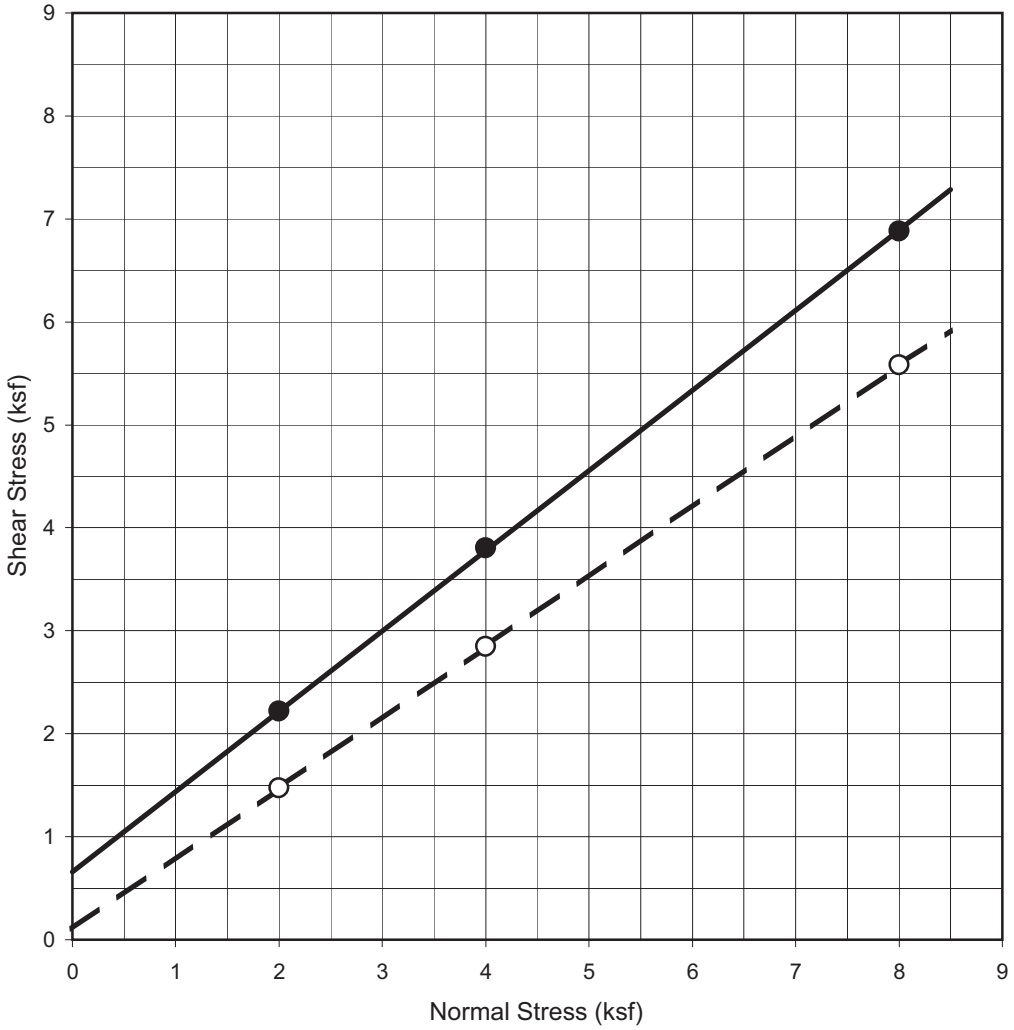
INTERPRETED STRENGTH DATA

	Peak	Ultimate
COHESION (PSF) :	300	150
FRICTION ANGLE :	35 °	30 °

AP ENGINEERING AND TESTING, INC.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Nov-05 Figure No.



Project Name:	:	Bay Island Sea Wall
Project No.	:	2005-041
Boring No.	:	B-5
Sample No.	:	3
Depth (ft)	:	20
Sample Type	:	Undisturbed
Soil Type	:	Yellowish Brown Well-Graded Sand w/shell
Test Condition	:	Saturated
Initial Dry Density	:	111.0 pcf
Moisture Content (before)	:	14.8 %
Moisture Content (after)	:	20.1 %

INTERPRETED STRENGTH DATA

	Peak	Ultimate
COHESION (PSF) :	650	100
FRICTION ANGLE :	38 °	34 °

AP ENGINEERING AND TESTING, INC.

DIRECT SHEAR
TEST RESULTS
(ASTM D 3080)

Nov-05 Figure No.

APPENDIX C

LIQUEFACTION AND SEISMIC SETTLEMENT ANALYSES

APPENDIX C - LIQUEFACTION AND SEISMIC SETTLEMENT ANALYSES

LIQUEFACTION POTENTIAL EVALUATION

The liquefaction potential evaluation was based on the approaches recommended by R. B. Seed, et al. (2003) under a unified and consistent framework for soil liquefaction engineering. The comprehensive efforts by R. B. Seed, et al. (2003) summarized recent advances in the liquefaction engineering topics based on a recent database. This approach meets the requirements in the California Division of Mines and Geology (now California Geological Survey) Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California* (1997) and provides a more rigorous evaluation than the procedures outlined in the Southern California Earthquake Center's (SCEC) *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California* (1999). The simplified liquefaction evaluation procedure involves the following basic steps:

1. An estimate is made of the cyclic stress ratio (CSR) caused by given earthquake ground motions at different depths using a simplified approach. The intensity of ground shaking, the duration of shaking, and the variations of induced shear stresses with depth are incorporated into the evaluation.
2. An estimate is then made of cyclic resistance ratio (CRR), indicative of the liquefaction resistance of the site subsurface soils. Recommendations were provided to estimate CRR either from standard penetration test (SPT) blow counts or direct cone penetration test (CPT) results.

The procedure can provide a deterministic index, namely a factor of safety (FS), comparing of the CRR and CSR to evaluate the potential zone of liquefaction in the soil deposit. The FS against liquefaction is defined as FS = CRR/CSR. Potential zones of liquefaction correspond to soil layers where FS is less than 1. In addition to the FS, the procedure can provide the probabilistic evaluation for liquefaction potential.

SIMPLIFIED PROCEDURES BASED ON SPT BLOW COUNT

The use of standard penetration test (SPT) blow counts in a liquefaction potential evaluation is considered to be appropriate because many factors affecting the liquefaction potential of sandy soils affect the SPT blow count in a similar way. Among several SPT-based approaches, the

procedure proposed by R. B. Seed, et al. (2003) was adopted in this analysis because it was developed more recently and based on a larger database which consisted of modern field records.

Initially, the subsurface soils consisting of fine-grained materials (silts and clays) were evaluated to screen out the nonliquefiable fine-grained soils. The silts and clays (including the soils containing more than 20 percent fines with plasticity index [PI] higher than 12 percent or soils consisting of fines more than 35 percent fines with PI less than 12 percent) were categorized into three groups based on the following criteria:

- Zone A: soils with PI less than 12 percent and liquid limit (LL) less than 37 percent were considered potentially susceptible to cyclically induced liquefaction if the insitu moisture content was more than 80 percent of the LL.
- Zone B: soils with PI less than 20 percent and LL less than 47 percent may be liquefiable if the insitu moisture content was more than 85 percent of the LL.
- Zone C: soils outside zones A and B were generally not considered susceptible to classic cyclic liquefaction, but should be checked for potential loss of strength with remolding or monotonic accumulation of shear deformation.

The liquefaction potential of the soils classified as Zones A or B was then estimated based on the following procedures recommended for the sandy soils. The soils classified as Zone C were not included in this liquefaction analysis. However, other evaluations were performed on those clays/silts, which may be vulnerable to strength loss during shaking.

The CSR, generally based on the earthquake magnitude, shaking intensity (maximum ground acceleration), and overall soil conditions (average shear wave velocity at depths within 40 feet below the ground surface), was then adjusted by a duration weighting factor (DWF_M), which was correlated to the design earthquake magnitude, and a effective overburden stress factor (K_σ) to a fully normalized value at a magnitude of 7.5 and effective overburden stress of 1 atmosphere (atm, approximately 1 ton per square foot [tsf]).

Either the CRR or probability of liquefaction potential can be evaluated using the SPT blow count data of potentially liquefiable sandy soils (including the fine-grained material classified as Zones A and B). Normalized clean sand SPT blow counts, $N_{1,60cs}$, were obtained by modifying the field SPT blow counts. The modifications included normalizing to an overburden pressure of 1 atm and corrections for hammer energy, borehole diameter, rod length, the lining (or lack of lining) of SPT



samplers, and fines content (percent passing No. 200 sieve). An expression was presented in the procedure for CRR for a given earthquake magnitude and probability, as a function of $(N_1)_{60cs}$ and effective overburden stress. For the deterministic approach, the threshold was set at a probability of 15 percent in this analysis. The FS can be obtained using the pairs of CRR and CSR. In addition to CRR, probabilities at a given earthquake magnitude can be calculated directly as a function of $(N_1)_{60cs}$, CSR, and effective overburden stress.

ANALYSES

The liquefaction potential of the subsurface soils was evaluated using the above recommended procedures using the SPT results. Sample calculations of the spreadsheets used for liquefaction potential evaluations for design basis earthquake (DBE) with both SPT methods are attached. Graphical results for the borings are presented on Plates C1 through C4.

SEISMIC SETTLEMENT

Settlement of level ground because of the design event with a peak ground acceleration o f 0.39g and corresponding moment magnitude of 6.6. Liquefaction was estimated based on procedures presented by Tokimatsu and Seed (1987) for SPT methods. The results are summarized in Table C1.

Table C1 - SUMMARY OF LIQUEFACTION INDUCED SETTLEMENT

IDENTIFICATION	POTENTIAL LIQUEFIABLE LAYERS IN DEPTH (feet)	CALCULATED LIQUEFATION INDUCED SETTLEMENT (inches)
B-1	5 to 8	1
B-2	--	--
B-3	5 to 12	2.5
B-5	23 to 28	2

Note:
- Peak ground acceleration = 0.39g

APPENDIX D

PILE CAPACITY ANALYSES

APPENDIX D - PILE CAPACITY ANALYSES

AXIAL PILE CAPACITY

Axial pile capacities were evaluated using the computer program APILE^{Plus}4.0 for Windows. This computer program has the capability to estimate the vertical pile performance using four different approaches including American Petroleum Institute (API) recommended practice 2A (RP2A), the U.S. Federal Highway Administration (FHWA), the U.S. Army Corps of Engineers (USACE), and the Lambda method. Regardless of which method was used, the ultimate axial capacity can generally be obtained by summing the components from incremental side friction and end-bearing.

For the proposed foundation type, the RP2A method recommended by API was used in the analyses. For the RP2A method, the ultimate axial pile capacity can be expressed as:

$$Pu = \int\int (\alpha x cx + Kpx \tan \delta x)\, dA\, dL + Ap\,(9c + poNq)$$

where

- Pu = ultimate axial pile capacity,
- αx = coefficient depending on effective overburden pressure and undrained shear strength at depth x for cohesive soil (ignored for cohesionless soil),
- cx = undrained soil shear strength at depth x,
- K = coefficient of lateral earth pressure for cohesionless soil (0.8 for open-ended pipe piles, ignored for cohesive soil),
- px = effective overburden pressure at depth x,
- δx = angle of friction between pile wall and soil at depth x,
- As = side surface area of pile,
- L = penetration of pile below the ground surface,
- Ap = cross-sectional area of the pile tip,
- c = undrained soil shear strength at pile tip, taken as the average over a distance of 2 diameters below the tip of the pile (ignored for cohesionless soil),
- po = effective overburden pressure at pile tip, and
- Nq = bearing capacity factor for cohesionless soil (ignored for cohesive soil).

Settlement of axially loaded piles was evaluated using elastic settlement analyses and load-transfer function analyses. The load-transfer functions considered the shaft-load transfer function (t-z

curves) and the base-load transfer function (q-u curves). The built-in load-transfer function curves within the APILE program were used in the analyses.

The lateral coefficients, bearing capacity factor, and external friction angles were obtained based on site specific data gathered for this investigation and on correlations/recommendations provided in the APILE^{Plus}4.0 manual. Limiting side friction and end-bearing pressures were also assigned according to the manual recommendations and local experience.

Pile downdrag may be caused by settlement of the soils under static and dynamic loading conditions. Downdrag may occur under static condition if adjacent additional fill is placed after the piles are in place. During dynamic loading, downdrag may be caused by settlement of a liquefied layer and nonliquefied layer overlying a liquefied layer. Downdrag by nonliquefied layer overlying the liquefied layer may be estimated using 50 percent to 100 percent of the corresponding side friction. Downdrag by the liquefied layer may be estimated using the residual/cyclic strength of the liquefied material. The effect of reduced capacity and additional downdrag due to the seismic loading is to increase settlement. However, oversized predrilling will be specified within the upper dense layers and within the potentially liquefiable sands, and accordingly, downdrag within the predrilled depth was ignored in the analyses.

Axial pile capacities of 14-inch square driven concrete pile including ultimate compression capacity were estimated in Figure 6.

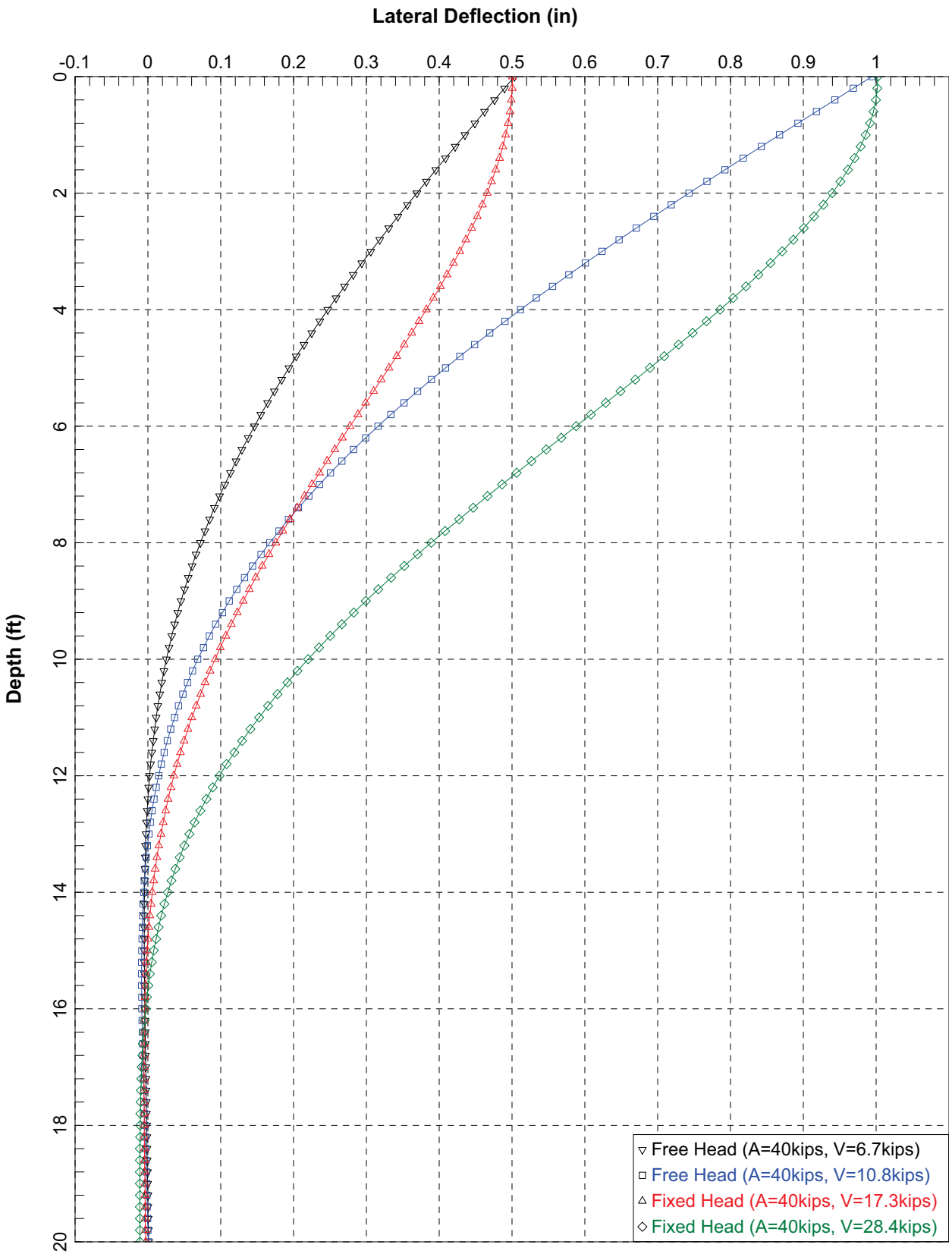
PILE LATERAL CAPACITY

Lateral pile analyses were performed using the computer program LPILE^{PLUS}5.0 for Windows (Ensoft, 2004). The program uses nonlinear p-y (lateral load deflection) data and a finite-difference solution. These p-y curves can be either input or generated by the program.

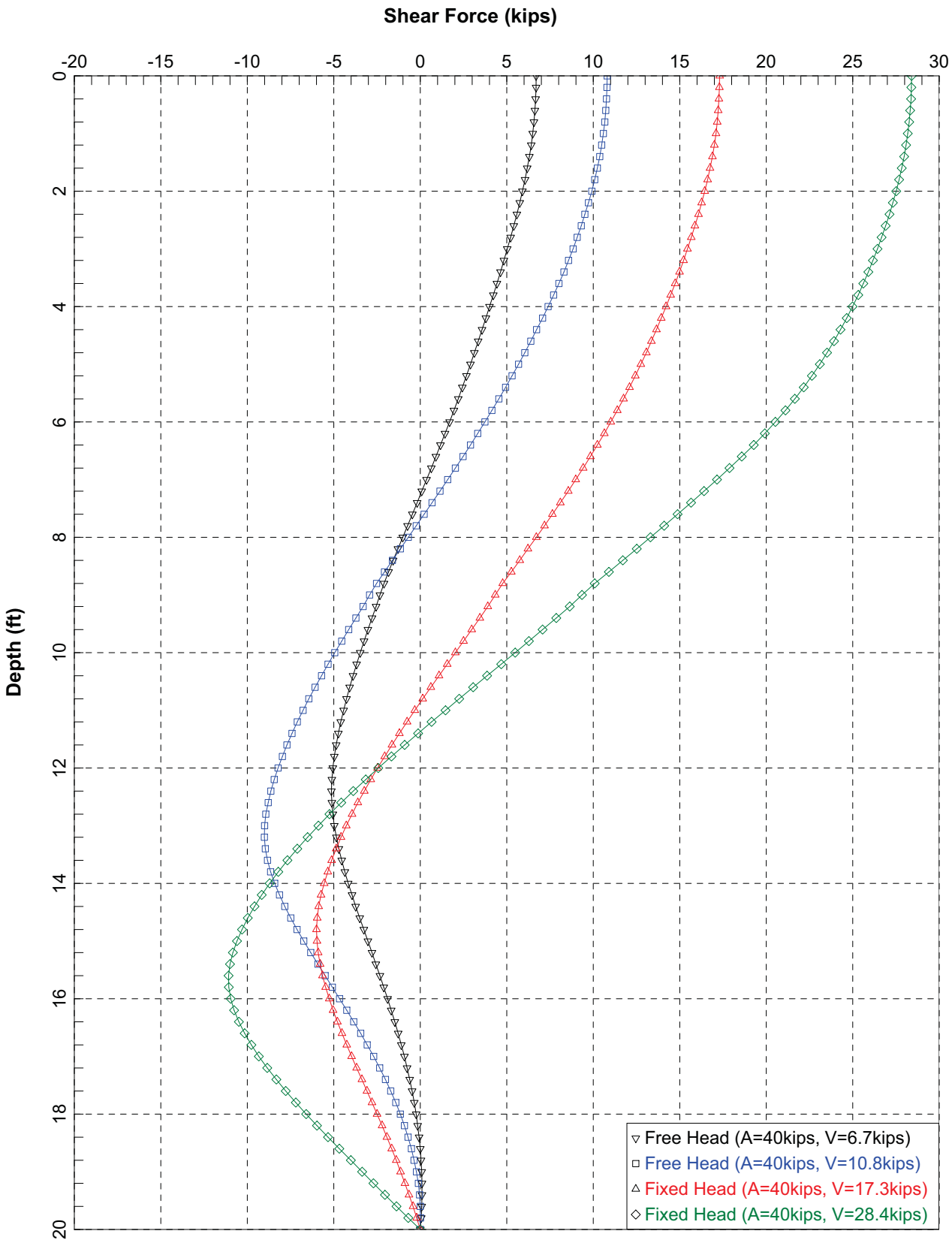
Input parameters for the program include applied moments, lateral forces, axial load, head condition (free or fixed), pile geometry and stiffness, initial soil movement along the pile, and soil geometry and strength parameters. The soil parameters include soil type for internal p-y curve generation, unit weight, friction angle, shear strength, initial stiffness, and soil strain at 50 percent of maximum strength.

For the lateral load capacity evaluation, 14-inch square driven concrete piles were considered. Pile loads were assumed to be at the pile top. Since design loads were not provided at the time of our analyses, for preliminary design, nonlinear static analyses were performed.

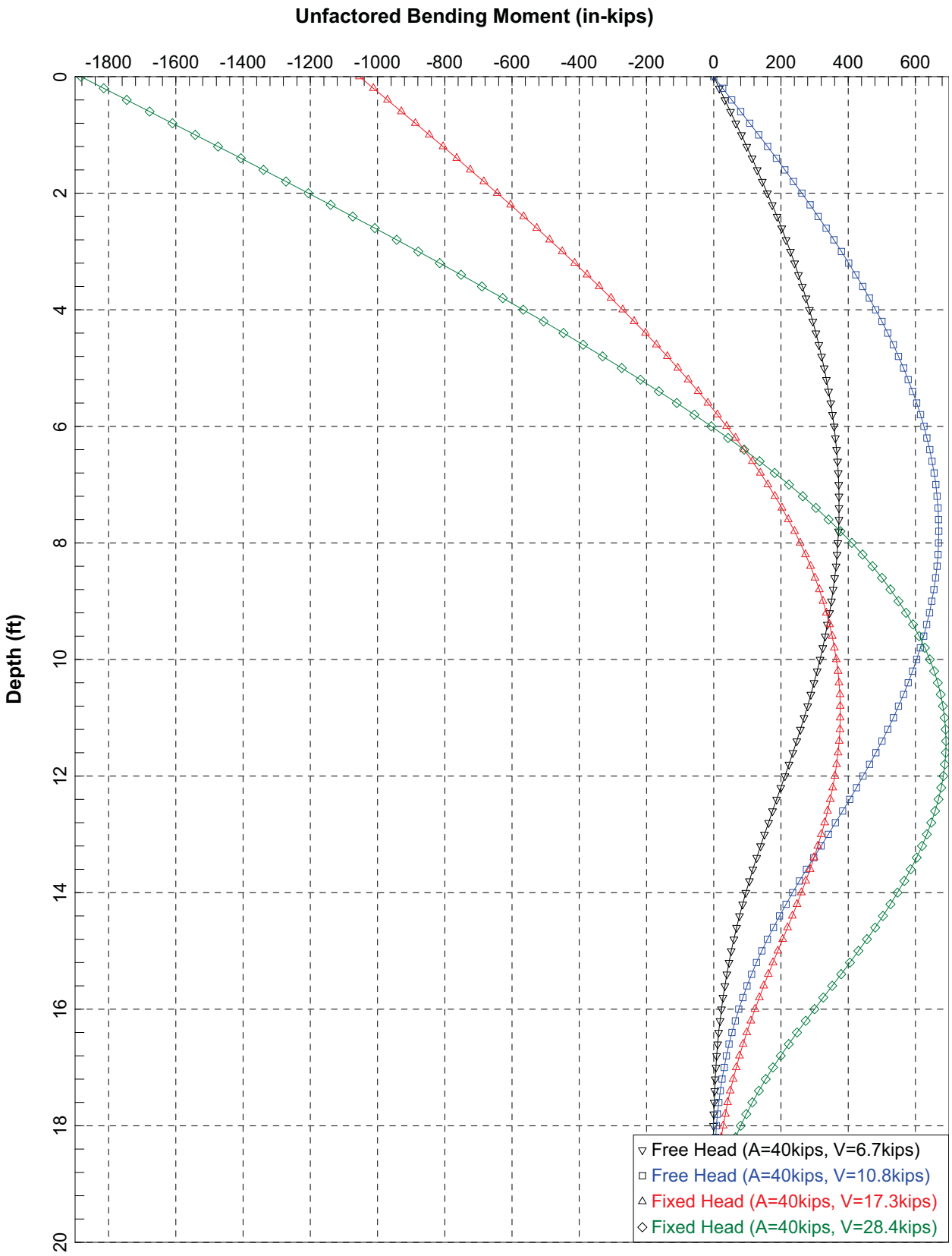
Lateral pile capacities of 14-inch square driven concrete pile including bending moment, shear force, and lateral deflection were estimated for bridge abutment location on static and seismic condition; see Plates D1 through D3.



14-in square driven concrete pile (assume pile top at mudline)



14-in square driven concrete pile(assume pile top at bottom of mudline)



14-in square driven concrete pile (assume pile top at bottom of mudline)

DISTRIBUTION

2 copies: Mr. James Crumpley
Moffatt & Nichol
3780 Kilroy Airport Way, Suite 600
Long Beach, Ca 90806

QUALITY CONTROL REVIEWER

V.R. Nadeswaran., P.E., G.E.
Principal

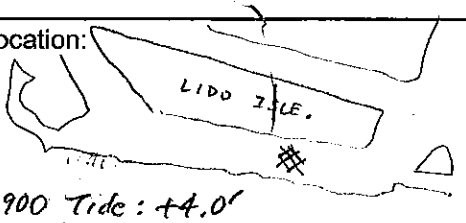
JL/GMD:cfp

Attachment F-2
Excerpts from 2009 CAD Feasibility Study in Lower Newport Bay

Soil Boring Processing Log

ANCHOR QEA

Boring Location:



Time: 0900 Tide: +4.0'
Leadline Depth = 15 ft
Elevation: -11 ft MLLW Datum: MLLW
Obs. Well Install. Yes No

Boring CNB-CAD-1 Date 5-6-09 Sheet 1 of 3
Job Newport Harbor CAD Job No.
Logged By Whelan + Stofferahn Weather Nice
Drilled By Gregg Drilling
Drill Type/ Method Mud Rotary
Sampling Method Split Spoon
Bottom of Boring ATD Water Level Depth
33°36.5057' N - 117°54.9050' W 1679889.43 N 6587525.41 E

SIZE (%) G Max.	S Range	F Att. Limits	Time	DEPTH From	To	SAMPLE Type	Number	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist., color, minor, MAJOR CONSTITUENT, NON-SOIL SUBSTANCES: Odor, staining, sheen, scrag, slag, etc.	REMARKS: Drill action, drill and sample procedures, water conditions, heave, etc.	SUMMARY LOG (Water & Date)
		Tide						0		Elev -11		
		+4'	0915	0.5'	1.5'	ARCH	S-1A	1	WOR	Grey CLAY/SILT (very soft)	Sampler sinks into mud 1 foot.	
				1.5	2'	ARCH.	S-1B	2	WOR	Grey, silty fine-med SAND with shells.		
			0925	2.5'	4'	ARCH	S-2	3	2	Loose, grey, sl silty SAND with frequent small shell fragments.	Poor recovery	
								4	2	-15		
								5	5			
		+3.7'	0935	5	6.5'	↑ S-3 ↓ 4	S-3	6	4	Med. dense, grey, fine SAND with a layer of shell hash.	Poor recovery	
								7	5			
								8	6	med dense, greyish brown, med-fine sand w/ few shell fragments		
				7.5	9'	CHEM + G.S.	S-4	9	7		half recovery	
								10	7			
								11	10	-20		
				10	11.5	ARCH.	S-5	12	5	Med. dense, grey, SAND with occasional shell fragments		
								13	7			
								14	10	-25		
								15		-26		
				15	16.5'	Chem only	S-6	16	10	Med. dense, grey, coarse-med SAND with trace shell frags	Enough recovery to fill chemistry jar, but that's all.	
								17	13			
								18	14			
								19		-30		
								20				

5·8·10
5·6·9

Soil Boring Processing Log

ANCHOR QEA

Boring Location:

Elevation: Datum:

Obs. Well Install. Yes No

Boring CNB-CAD-1 Date ___ Sheet 2 of 3
Job Newport Harbor CAD Job No. ___
Logged By ___ Weather ___
Drilled By ___
Drill Type/ Method ___
Sampling Method
Bottom of Boring ___ ATD Water Level Depth

SIZE (%) G Max.	S Range	F Att. Limits	Time	DEPTH From	To	SAMPLE Type	Number	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist., color, minor, MAJOR CONSTITUENT, NON-SOIL SUBSTANCES: Odor, staining, sheen, scrag, slag, etc.	REMARKS: Drill action, drill and sample procedures, water conditions, heave, etc.	SUMMARY LOG (Water & Date)
		TIDE						20		.32 very dense? Light brown, medium SAND. Trace shell frags. (See plate of mica?)	Overfilled sampler? Copper collars are dented - blow counts may be artificially high.	
		+3.1'	1025	20	21.5'	S.S. +ARCH	S-7	(85) 21	22 39 46			
								22				
								23		-35		
								24				
								25	17	very dense, light brown, fine-med SAND.		
		+2.75'	1100	25	26.5	ARCH.	S-8	(80) 26	34 46		Blow count appears accurate.	
								27				
								28		-38		
								29				
								30	50	very dense, light brown medium SAND layer over fine SAND layer		
		+2'	1120	30	31.5'	CHEM + G.S.	S-9	(0/5) 31	50/5"			
								32				
								33		-43		
								34				
								35	25	very dense, brown fine SAND.		
							S-10	(0/6") 36	50/6"			
								37				
								38		-48		
								39				
								40				

30'

1'

15' rod
20' rod
20' rod
+ 3' sampler = 53' rod.

53 - 7 = 46' below mudline
Water depth = 15' - 7' tide change = 13'
46' - 13' = 33'

Tide.

Soil Boring Processing Log

ANCHOR QEA

Boring Location:

Elevation: Datum:

Obs. Well Install. Yes No

Boring CNB-CAD-1 Date ___ Sheet 3 of 3

Job Newport Harbor CAD Job No. ___

Logged By ___ Weather ___

Drilled By ___

Drill Type/ Method ___

Sampling Method

Bottom of Boring ___ ATD Water Level Depth

SIZE (%) G Max.	S Range	F Att. Limits	Time	DEPTH From	To	SAMPLE Type	Number	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist., color, minor, MAJOR CONSTITUENT, NON-SOIL SUBSTANCES: Odor, staining, sheen, scrag, slag, etc.	REMARKS: Drill action, drill and sample procedures, water conditions, heave, etc.	SUMMARY LOG (Water & Date)
		+1.5'	1230	45	46.5'	CHEM + G.S.	S-11	(50/5)	30 65 66	very dense, brown, fine SAND.		
										-53		
										-58 Advance 15' more feet		
				60	61.5'	G.S.	S-12	(58)	17 23 35	very dense, grey, fine silty SAND.		
										+ 3' sampler		
										25' + 25' 10' + 15 + 5 rods 83' long	END OF BORING -61.5'	
										8' shelf		
										75' below deck -12' deep water		
										-63' elevation		

40 41 42 43 44 45 46 47 48 59 60 61 62 63 64 5 6 7 8 9 0

Calscience Environmental Laboratories, Inc.

May 20, 2009

Tracy Stofferahn
Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Subject: **Calscience Work Order No.: 09-05-0488**
Client Reference: Newport Harbor

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 5/6/2009 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Systems Manual, applicable standard operating procedures, and other related documentation. The original report of subcontracted analysis, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Sincerely,

Calscience Environmental
Laboratories, Inc.
Danielle Gonsman
Project Manager

Calscience Environmental Laboratories, Inc.

CASE NARRATIVE

Calscience Work Order No.: 09-05-0488

Provided below is a narrative of our analytical effort, including any unique features or anomalies encountered as part of the analysis of the sediment samples.

Sample Condition on Receipt

Six (6) sediment samples in glass jars were received for this project on May 6, 2009. The samples were transferred to the laboratory in an ice-chest with wet ice, following strict chain-of-custody (COC) procedures. The temperature of the samples upon receipt at the laboratory ranged was 3.8°C. The samples were logged into the Laboratory Information Management System (LIMS), given laboratory identification numbers, and stored in refrigeration units pending analysis.

Tests Performed

Testing was performed in accordance with the chain-of-custody instructions and the project work plan. The following testing was performed as requested:

Trace Metals by EPA 6020
Mercury by EPA 7471A
PAHs by EPA 8270C SIM
Organochlorine Pesticides by EPA 8081A
PCB Aroclors by EPA 8082
Organotins by Krone, et al.
TOC by EPA 9060A
Total Solids by SM 2540 B
Total Sulfide by EPA 376.2M
Dissolved Sulfide by EPA 376.2M
Ammonia by SM 4500-NH3 B/C (M)

Testing for grain size was subcontracted to PTS Laboratories in Santa Fe Springs, California. This data is included and follows the chemistry data.

Data Summary

Holding times

All holding time requirements were met.

Calibration

Frequency and control criteria for initial and continuing calibration verifications were met.

Blanks

Concentrations of target analytes in the method blank were found to be below reporting limits for all testing.

Laboratory Control Samples

A Laboratory Control Sample (LCS) analysis was performed for each test. All parameters were within control limits.

Matrix Spikes

Matrix spike analyses were performed at required frequencies. One of the project samples (Calscience Work Order 09-05-0616) was spiked for each applicable method. Each parameter was within control limits for each method with the following exceptions.

For the metals by EPA 6020, the matrix spike recovery for antimony fell just below the established control limit for this metal. However, the corresponding LCS/LCSD recoveries for antimony were in control, suggesting a possible matrix interference effect, and the data is released with no further qualifications.

For the organotins, the MSD recovery for TBT fell above the established control limit. However, TBT was not found in any of the samples at the indicated reporting limit, and thus the elevated MSD recovery is moot. Also, the corresponding LCS/LCSD recoveries for TBT were in control, and the data is thus released without further action.

Surrogates

The surrogate recoveries for each applicable test, and all samples, were within acceptable control limits, with the exception of the PCBs. For sample CNB-CAD-1-S9, the surrogate 2,4,5,6-Tetrachloro-m-xylene fell above the established control limit for this compound. However, the PCBs were undetected in the sample, so the elevated recovery has no effect on the data.

Acronyms

MS/MSD:	Matrix Spike/Matrix Spike Duplicate
LCS/LCSD:	Laboratory Control Sample/Laboratory Control Sample Duplicate
RPD:	Relative Percent Difference

Calscience Environmental Laboratories, Inc.

Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488
Preparation: EPA 3050B / EPA 7471A Total
Method: EPA 6020 / EPA 7471A
Units: mg/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S3/4	**09-05-0488-1-A**	**05/06/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 22:16**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:29:05 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.605	1		Mercury	ND	0.101	1	
Arsenic	2.10	0.121	1		Nickel	1.64	0.121	1	
Beryllium	ND	0.121	1		Selenium	0.164	0.121	1	
Cadmium	ND	0.121	1		Silver	ND	0.121	1	
Chromium	2.79	0.121	1		Thallium	ND	0.121	1	
Copper	8.76	0.121	1		Zinc	8.76	1.21	1	
Lead	0.467	0.121	1						

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S6	**09-05-0488-2-A**	**05/06/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 22:22**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:31:22 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.600	1		Mercury	ND	0.100	1	
Arsenic	2.54	0.120	1		Nickel	1.25	0.120	1	
Beryllium	ND	0.120	1		Selenium	0.154	0.120	1	
Cadmium	ND	0.120	1		Silver	ND	0.120	1	
Chromium	1.99	0.120	1		Thallium	ND	0.120	1	
Copper	5.36	0.120	1		Zinc	5.82	1.20	1	
Lead	0.411	0.120	1						

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S9	**09-05-0488-4-A**	**05/06/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 22:27**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:33:36 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.599	1		Mercury	ND	0.100	1	
Arsenic	2.15	0.120	1		Nickel	1.99	0.120	1	
Beryllium	ND	0.120	1		Selenium	0.162	0.120	1	
Cadmium	ND	0.120	1		Silver	ND	0.120	1	
Chromium	4.20	0.120	1		Thallium	ND	0.120	1	
Copper	26.9	0.120	1		Zinc	17.3	1.20	1	
Lead	0.589	0.120	1						

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA	Date Received: 05/06/09
28202 Cabot Road, Suite 425	Work Order No: 09-05-0488
Laguna Niguel, CA 92677-1271	Preparation: EPA 3050B / EPA 7471A Total
	Method: EPA 6020 / EPA 7471A
	Units: mg/kg
Project: Newport Harbor	Page 2 of 2

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S11	**09-05-0488-5-A**	**05/06/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 22:33**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:35:46 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.611	1		Mercury	ND	0.102	1	
Arsenic	1.44	0.122	1		Nickel	1.45	0.122	1	
Beryllium	ND	0.122	1		Selenium	0.136	0.122	1	
Cadmium	ND	0.122	1		Silver	ND	0.122	1	
Chromium	3.22	0.122	1		Thallium	ND	0.122	1	
Copper	13.0	0.122	1		Zinc	9.63	1.22	1	
Lead	0.605	0.122	1						

Method Blank	096-10-002-1,503	N/A	Solid	ICP/MS 03	05/08/09	05/14/09 10:18	090508L07

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.500	1		Lead	ND	0.100	1	
Arsenic	ND	0.100	1		Nickel	ND	0.100	1	
Beryllium	ND	0.100	1		Selenium	ND	0.100	1	
Cadmium	ND	0.100	1		Silver	ND	0.100	1	
Chromium	ND	0.100	1		Thallium	ND	0.100	1	
Copper	ND	0.100	1		Zinc	ND	1.00	1	

Method Blank	099-04-007-6,279	N/A	Solid	Mercury	05/08/09	05/08/09 14:57	090508L02

Parameter	Result	RL	DF	Qual
Mercury	ND	0.0835	1	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	Organotins by Krone et al.
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S3/4	**09-05-0488-1-B**	**05/06/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 18:48**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.6	1		Tetrabutyltin	ND	3.6	1	
Monobutyltin	ND	3.6	1		Tributyltin	ND	3.6	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	114	50-130							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S6	**09-05-0488-2-B**	**05/06/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 19:20**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.6	1		Tetrabutyltin	ND	3.6	1	
Monobutyltin	ND	3.6	1		Tributyltin	ND	3.6	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	104	50-130							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S9	**09-05-0488-4-A**	**05/06/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 19:52**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.6	1		Tetrabutyltin	ND	3.6	1	
Monobutyltin	ND	3.6	1		Tributyltin	ND	3.6	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	110	50-130							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S11	**09-05-0488-5-A**	**05/06/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 20:24**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.7	1		Tetrabutyltin	ND	3.7	1	
Monobutyltin	ND	3.7	1		Tributyltin	ND	3.7	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	114	50-130							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	Organotins by Krone et al.
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-07-016-653**	**N/A**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 11:17**	**090514L12**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.0	1		Tetrabutyltin	ND	3.0	1	
Monobutyltin	ND	3.0	1		Tributyltin	ND	3.0	1	

Surrogates:	REC (%)	Control Limits	Qual
Tripentyltin	79	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PAHs
		Units:	ug/kg
Project: Newport Harbor			Page 1 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S3/4	**09-05-0488-1-B**	**05/06/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 12:47**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	24	1		Benzo (b) Fluoranthene	ND	24	1	
2-Methylnaphthalene	ND	24	1		Benzo (a) Pyrene	ND	24	1	
Acenaphthylene	ND	24	1		Benzo (g,h,i) Perylene	ND	24	1	
Acenaphthene	ND	24	1		Indeno (1,2,3-c,d) Pyrene	ND	24	1	
Fluorene	ND	24	1		Dibenz (a,h) Anthracene	ND	24	1	
Phenanthrene	ND	24	1		1-Methylnaphthalene	ND	24	1	
Anthracene	ND	24	1		Benzo (e) Pyrene	ND	24	1	
Fluoranthene	ND	24	1		Perylene	ND	24	1	
Pyrene	ND	24	1		Biphenyl	ND	24	1	
Benzo (a) Anthracene	ND	24	1		1-Methylphenanthrene	ND	24	1	
Chrysene	ND	24	1		2,6-Dimethylnaphthalene	ND	24	1	
Benzo (k) Fluoranthene	ND	24	1		1,6,7-Trimethylnaphthalene	ND	24	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	115	18-162			2-Fluorobiphenyl	96	14-146		
p-Terphenyl-d14	103	34-148							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S6	**09-05-0488-2-B**	**05/06/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 13:33**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	24	1		Benzo (b) Fluoranthene	ND	24	1	
2-Methylnaphthalene	ND	24	1		Benzo (a) Pyrene	ND	24	1	
Acenaphthylene	ND	24	1		Benzo (g,h,i) Perylene	ND	24	1	
Acenaphthene	ND	24	1		Indeno (1,2,3-c,d) Pyrene	ND	24	1	
Fluorene	ND	24	1		Dibenz (a,h) Anthracene	ND	24	1	
Phenanthrene	ND	24	1		1-Methylnaphthalene	ND	24	1	
Anthracene	ND	24	1		Benzo (e) Pyrene	ND	24	1	
Fluoranthene	ND	24	1		Perylene	ND	24	1	
Pyrene	ND	24	1		Biphenyl	ND	24	1	
Benzo (a) Anthracene	ND	24	1		1-Methylphenanthrene	ND	24	1	
Chrysene	ND	24	1		2,6-Dimethylnaphthalene	ND	24	1	
Benzo (k) Fluoranthene	ND	24	1		1,6,7-Trimethylnaphthalene	ND	24	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	116	18-162			2-Fluorobiphenyl	92	14-146		
p-Terphenyl-d14	78	34-148							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PAHs
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S9	**09-05-0488-4-A**	**05/06/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 14:19**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	24	1		Benzo (b) Fluoranthene	ND	24	1	
2-Methylnaphthalene	ND	24	1		Benzo (a) Pyrene	ND	24	1	
Acenaphthylene	ND	24	1		Benzo (g,h,i) Perylene	ND	24	1	
Acenaphthene	ND	24	1		Indeno (1,2,3-c,d) Pyrene	ND	24	1	
Fluorene	ND	24	1		Dibenz (a,h) Anthracene	ND	24	1	
Phenanthrene	ND	24	1		1-Methylnaphthalene	ND	24	1	
Anthracene	ND	24	1		Benzo (e) Pyrene	ND	24	1	
Fluoranthene	ND	24	1		Perylene	ND	24	1	
Pyrene	ND	24	1		Biphenyl	ND	24	1	
Benzo (a) Anthracene	ND	24	1		1-Methylphenanthrene	ND	24	1	
Chrysene	ND	24	1		2,6-Dimethylnaphthalene	ND	24	1	
Benzo (k) Fluoranthene	ND	24	1		1,6,7-Trimethylnaphthalene	ND	24	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	117	18-162			2-Fluorobiphenyl	91	14-146		
p-Terphenyl-d14	68	34-148							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S11	**09-05-0488-5-A**	**05/06/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 15:04**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	24	1		Benzo (b) Fluoranthene	ND	24	1	
2-Methylnaphthalene	ND	24	1		Benzo (a) Pyrene	ND	24	1	
Acenaphthylene	ND	24	1		Benzo (g,h,i) Perylene	ND	24	1	
Acenaphthene	ND	24	1		Indeno (1,2,3-c,d) Pyrene	ND	24	1	
Fluorene	ND	24	1		Dibenz (a,h) Anthracene	ND	24	1	
Phenanthrene	ND	24	1		1-Methylnaphthalene	ND	24	1	
Anthracene	ND	24	1		Benzo (e) Pyrene	ND	24	1	
Fluoranthene	ND	24	1		Perylene	ND	24	1	
Pyrene	ND	24	1		Biphenyl	ND	24	1	
Benzo (a) Anthracene	ND	24	1		1-Methylphenanthrene	ND	24	1	
Chrysene	ND	24	1		2,6-Dimethylnaphthalene	ND	24	1	
Benzo (k) Fluoranthene	ND	24	1		1,6,7-Trimethylnaphthalene	ND	24	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	120	18-162			2-Fluorobiphenyl	95	14-146		
p-Terphenyl-d14	71	34-148							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PAHs
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-471-23**	**N/A**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 12:00**	**090511L01**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	20	1		Benzo (b) Fluoranthene	ND	20	1	
2-Methylnaphthalene	ND	20	1		Benzo (a) Pyrene	ND	20	1	
Acenaphthylene	ND	20	1		Benzo (g,h,i) Perylene	ND	20	1	
Acenaphthene	ND	20	1		Indeno (1,2,3-c,d) Pyrene	ND	20	1	
Fluorene	ND	20	1		Dibenz (a,h) Anthracene	ND	20	1	
Phenanthrene	ND	20	1		1-Methylnaphthalene	ND	20	1	
Anthracene	ND	20	1		Benzo (e) Pyrene	ND	20	1	
Fluoranthene	ND	20	1		Perylene	ND	20	1	
Pyrene	ND	20	1		Biphenyl	ND	20	1	
Benzo (a) Anthracene	ND	20	1		1-Methylphenanthrene	ND	20	1	
Chrysene	ND	20	1		2,6-Dimethylnaphthalene	ND	20	1	
Benzo (k) Fluoranthene	ND	20	1		1,6,7-Trimethylnaphthalene	ND	20	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	76	18-162			2-Fluorobiphenyl	56	14-146		
p-Terphenyl-d14	49	34-148							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8082
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S3/4	**09-05-0488-1-B**	**05/06/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 12:20**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	12	1		Aroclor-1248	ND	12	1	
Aroclor-1221	ND	12	1		Aroclor-1254	ND	12	1	
Aroclor-1232	ND	12	1		Aroclor-1260	ND	12	1	
Aroclor-1242	ND	12	1		Aroclor-1262	ND	12	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	122	50-130			Decachlorobiphenyl	104	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S6	**09-05-0488-2-B**	**05/06/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 12:39**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	12	1		Aroclor-1248	ND	12	1	
Aroclor-1221	ND	12	1		Aroclor-1254	ND	12	1	
Aroclor-1232	ND	12	1		Aroclor-1260	ND	12	1	
Aroclor-1242	ND	12	1		Aroclor-1262	ND	12	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	97	50-130			Decachlorobiphenyl	87	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S9	**09-05-0488-4-A**	**05/06/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 12:58**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	12	1		Aroclor-1248	ND	12	1	
Aroclor-1221	ND	12	1		Aroclor-1254	ND	12	1	
Aroclor-1232	ND	12	1		Aroclor-1260	ND	12	1	
Aroclor-1242	ND	12	1		Aroclor-1262	ND	12	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	135	50-130		2	Decachlorobiphenyl	115	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8082
		Units:	ug/kg
Project: Newport Harbor			Page 2 of 2

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S11	**09-05-0488-5-A**	**05/06/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 13:17**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	12	1		Aroclor-1248	ND	12	1	
Aroclor-1221	ND	12	1		Aroclor-1254	ND	12	1	
Aroclor-1232	ND	12	1		Aroclor-1260	ND	12	1	
Aroclor-1242	ND	12	1		Aroclor-1262	ND	12	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	129	50-130			Decachlorobiphenyl	124	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-565-106**	**N/A**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 11:41**	**090511L06**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	10	1		Aroclor-1248	ND	10	1	
Aroclor-1221	ND	10	1		Aroclor-1254	ND	10	1	
Aroclor-1232	ND	10	1		Aroclor-1260	ND	10	1	
Aroclor-1242	ND	10	1		Aroclor-1262	ND	10	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	107	50-130			Decachlorobiphenyl	88	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg
Project: Newport Harbor			Page 1 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S3/4	**09-05-0488-1-B**	**05/06/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 14:10**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.2	1		4,4'-DDT	ND	1.2	1	
Alpha-BHC	ND	1.2	1		Endosulfan I	ND	1.2	1	
Beta-BHC	ND	1.2	1		Endosulfan II	ND	1.2	1	
Delta-BHC	ND	1.2	1		Endosulfan Sulfate	ND	1.2	1	
Gamma-BHC	ND	1.2	1		Endrin	ND	1.2	1	
Chlordane	ND	12	1		Endrin Aldehyde	ND	1.2	1	
Dieldrin	ND	1.2	1		Endrin Ketone	ND	1.2	1	
Trans-nonachlor	ND	1.2	1		Heptachlor	ND	1.2	1	
2,4'-DDD	ND	1.2	1		Heptachlor Epoxide	ND	1.2	1	
Cis-nonachlor	ND	1.2	1		Methoxychlor	ND	1.2	1	
2,4'-DDE	ND	1.2	1		Toxaphene	ND	24	1	
2,4'-DDT	ND	1.2	1		Alpha Chlordane	ND	1.2	1	
4,4'-DDD	ND	1.2	1		Gamma Chlordane	ND	1.2	1	
4,4'-DDE	ND	1.2	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	103	50-130		Decachlorobiphenyl	76	50-130	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S6	**09-05-0488-2-B**	**05/06/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 14:37**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.2	1		4,4'-DDT	ND	1.2	1	
Alpha-BHC	ND	1.2	1		Endosulfan I	ND	1.2	1	
Beta-BHC	ND	1.2	1		Endosulfan II	ND	1.2	1	
Delta-BHC	ND	1.2	1		Endosulfan Sulfate	ND	1.2	1	
Gamma-BHC	ND	1.2	1		Endrin	ND	1.2	1	
Chlordane	ND	12	1		Endrin Aldehyde	ND	1.2	1	
Dieldrin	ND	1.2	1		Endrin Ketone	ND	1.2	1	
Trans-nonachlor	ND	1.2	1		Heptachlor	ND	1.2	1	
Cis-nonachlor	ND	1.2	1		Heptachlor Epoxide	ND	1.2	1	
2,4'-DDD	ND	1.2	1		Methoxychlor	ND	1.2	1	
2,4'-DDE	ND	1.2	1		Toxaphene	ND	24	1	
2,4'-DDT	ND	1.2	1		Alpha Chlordane	ND	1.2	1	
4,4'-DDD	ND	1.2	1		Gamma Chlordane	ND	1.2	1	
4,4'-DDE	ND	1.2	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	81	50-130		Decachlorobiphenyl	65	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S9	**09-05-0488-4-A**	**05/06/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 15:04**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.2	1		4,4'-DDT	ND	1.2	1	
Alpha-BHC	ND	1.2	1		Endosulfan I	ND	1.2	1	
Beta-BHC	ND	1.2	1		Endosulfan II	ND	1.2	1	
Delta-BHC	ND	1.2	1		Endosulfan Sulfate	ND	1.2	1	
Gamma-BHC	ND	1.2	1		Endrin	ND	1.2	1	
Chlordane	ND	12	1		Endrin Aldehyde	ND	1.2	1	
Dieldrin	ND	1.2	1		Endrin Ketone	ND	1.2	1	
2,4'-DDD	ND	1.2	1		Heptachlor	ND	1.2	1	
Trans-nonachlor	ND	1.2	1		Heptachlor Epoxide	ND	1.2	1	
Cis-nonachlor	ND	1.2	1		Methoxychlor	ND	1.2	1	
2,4'-DDE	ND	1.2	1		Toxaphene	ND	24	1	
2,4'-DDT	ND	1.2	1		Alpha Chlordane	ND	1.2	1	
4,4'-DDD	ND	1.2	1		Gamma Chlordane	ND	1.2	1	
4,4'-DDE	ND	1.2	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	111	50-130		Decachlorobiphenyl	79	50-130	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-1-S11	**09-05-0488-5-A**	**05/06/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 15:32**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.2	1		4,4'-DDT	ND	1.2	1	
Alpha-BHC	ND	1.2	1		Endosulfan I	ND	1.2	1	
Beta-BHC	ND	1.2	1		Endosulfan II	ND	1.2	1	
Delta-BHC	ND	1.2	1		Endosulfan Sulfate	ND	1.2	1	
Gamma-BHC	ND	1.2	1		Endrin	ND	1.2	1	
Chlordane	ND	12	1		Endrin Aldehyde	ND	1.2	1	
Dieldrin	ND	1.2	1		Endrin Ketone	ND	1.2	1	
Trans-nonachlor	ND	1.2	1		Heptachlor	ND	1.2	1	
2,4'-DDD	ND	1.2	1		Heptachlor Epoxide	ND	1.2	1	
Cis-nonachlor	ND	1.2	1		Methoxychlor	ND	1.2	1	
2,4'-DDE	ND	1.2	1		Toxaphene	ND	24	1	
2,4'-DDT	ND	1.2	1		Alpha Chlordane	ND	1.2	1	
4,4'-DDD	ND	1.2	1		Gamma Chlordane	ND	1.2	1	
4,4'-DDE	ND	1.2	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	93	50-130		Decachlorobiphenyl	74	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg
Project: Newport Harbor			Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-858-29**	**N/A**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 12:21**	**090511L05**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.0	1		4,4'-DDT	ND	1.0	1	
Alpha-BHC	ND	1.0	1		Endosulfan I	ND	1.0	1	
Beta-BHC	ND	1.0	1		Endosulfan II	ND	1.0	1	
Delta-BHC	ND	1.0	1		Endosulfan Sulfate	ND	1.0	1	
Gamma-BHC	ND	1.0	1		Endrin	ND	1.0	1	
Chlordane	ND	10	1		Endrin Aldehyde	ND	1.0	1	
Dieldrin	ND	1.0	1		Endrin Ketone	ND	1.0	1	
Trans-nonachlor	ND	1.0	1		Heptachlor	ND	1.0	1	
2,4'-DDD	ND	1.0	1		Heptachlor Epoxide	ND	1.0	1	
Cis-nonachlor	ND	1.0	1		Methoxychlor	ND	1.0	1	
2,4'-DDE	ND	1.0	1		Toxaphene	ND	20	1	
2,4'-DDT	ND	1.0	1		Alpha Chlordane	ND	1.0	1	
4,4'-DDD	ND	1.0	1		Gamma Chlordane	ND	1.0	1	
4,4'-DDE	ND	1.0	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	104	50-130		Decachlorobiphenyl	101	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date Collected	Matrix
CNB-CAD-1-S3/4	**09-05-0488-1**	**05/06/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	ND	0.12	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.12	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	730	600	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	82.7	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	ND	0.24	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

Client Sample Number	Lab Sample Number	Date Collected	Matrix
CNB-CAD-1-S6	**09-05-0488-2**	**05/06/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	ND	0.12	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.12	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	720	600	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	83.4	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	0.67	0.24	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

Client Sample Number	Lab Sample Number	Date Collected	Matrix
CNB-CAD-1-S9	**09-05-0488-4**	**05/06/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	0.24	0.12	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.12	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	2000	600	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	83.5	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	0.50	0.24	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA	Date Received:	05/06/09
28202 Cabot Road, Suite 425	Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date Collected	Matrix
CNB-CAD-1-S11	**09-05-0488-5**	**05/06/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	0.12	0.12	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.12	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	730	610	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	81.8	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	0.68	0.24	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

Method Blank	**N/A**	**Solid**

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total	ND	0.10	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved	ND	0.10	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic	ND	500	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	ND	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N)	ND	0.20	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488
Preparation: EPA 3050B
Method: EPA 6020

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-05-0616-3	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09**	**090508S07**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Antimony	79	83	80-120	5	0-20	3
Arsenic	101	108	80-120	6	0-20	
Beryllium	109	113	80-120	3	0-20	
Cadmium	102	105	80-120	3	0-20	
Chromium	100	101	80-120	1	0-20	
Copper	111	105	80-120	4	0-20	
Lead	99	101	80-120	2	0-20	
Nickel	103	105	80-120	2	0-20	
Selenium	101	103	80-120	2	0-20	
Silver	99	102	80-120	3	0-20	
Thallium	97	101	80-120	4	0-20	
Zinc	106	106	80-120	0	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - PDS / PDSD

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488
Preparation: EPA 3050B
Method: EPA 6020

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
09-05-0616-3	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09**	**090508S07**

Parameter	PDS %REC	PDSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Antimony	104	103	75-125	1	0-20	
Arsenic	106	110	75-125	4	0-20	
Beryllium	113	109	75-125	4	0-20	
Cadmium	105	103	75-125	1	0-20	
Chromium	96	94	75-125	2	0-20	
Copper	106	102	75-125	3	0-20	
Lead	100	101	75-125	1	0-20	
Nickel	103	101	75-125	2	0-20	
Selenium	104	101	75-125	3	0-20	
Silver	104	100	75-125	4	0-20	
Thallium	101	102	75-125	1	0-20	
Zinc	104	101	75-125	3	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488
Preparation: EPA 7471A Total
Method: EPA 7471A

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-05-0616-3	**Solid**	**Mercury**	**05/08/09**	**05/08/09**	**090508S02**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	112	112	71-137	0	0-14	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - PDS / PDSD

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA		Date Received	05/06/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 7471A Total
		Method:	EPA 7471A

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
09-05-0616-3	**Solid**	**Mercury**	**05/08/09**	**05/08/09**	**090508S02**

Parameter	PDS %REC	PDSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	107	110	75-125	3	0-14	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488
Preparation: EPA 3545
Method: Organotins by Krone et al.

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-05-0616-3	**Solid**	**GC/MS Y**	**05/14/09**	**05/15/09**	**090514S12**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	112	126	50-130	11	0-20	
Tributyltin	120	145	50-130	19	0-20	3

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488
Preparation: EPA 3545
Method: EPA 8270C SIM PAHs

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-05-0616-3	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09**	**090511S01**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Naphthalene	138	138	40-160	0	0-20	
2-Methylnaphthalene	141	142	40-160	0	0-20	
Acenaphthylene	132	131	40-160	0	0-20	
Acenaphthene	137	138	40-160	0	0-20	
Fluorene	139	139	40-160	0	0-20	
Phenanthrene	141	138	40-160	2	0-20	
Anthracene	117	122	40-160	4	0-20	
Fluoranthene	116	126	40-160	8	0-20	
Pyrene	122	120	40-160	2	0-46	
Benzo (a) Anthracene	131	132	40-160	1	0-20	
Chrysene	129	125	40-160	3	0-20	
Benzo (k) Fluoranthene	147	146	40-160	1	0-20	
Benzo (b) Fluoranthene	150	154	40-160	3	0-20	
Benzo (a) Pyrene	143	143	40-160	0	0-20	
Benzo (g,h,i) Perylene	135	133	40-160	2	0-20	
Indeno (1,2,3-c,d) Pyrene	158	149	40-160	6	0-20	
Dibenz (a,h) Anthracene	138	136	40-160	2	0-20	
1-Methylnaphthalene	141	141	40-160	0	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488
Preparation: EPA 3545
Method: EPA 8082

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-05-0616-3	**Solid**	**GC 31**	**05/11/09**	**05/18/09**	**090511S06**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aroclor-1016	120	126	50-135	5	0-25	
Aroclor-1260	90	96	50-135	6	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/06/09
Work Order No: 09-05-0488
Preparation: EPA 3545
Method: EPA 8081A

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-05-0616-3	**Solid**	**GC 51**	**05/11/09**	**05/19/09**	**090511S05**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aldrin	96	94	50-135	2	0-25	
Alpha-BHC	89	88	50-135	1	0-25	
Beta-BHC	99	97	50-135	2	0-25	
Delta-BHC	106	103	50-135	2	0-25	
Gamma-BHC	93	92	50-135	2	0-25	
Dieldrin	87	85	50-135	2	0-25	
4,4'-DDD	94	89	50-135	5	0-25	
4,4'-DDE	99	97	50-135	2	0-25	
4,4'-DDT	91	88	50-135	3	0-25	
Endosulfan I	88	86	50-135	2	0-25	
Endosulfan II	87	84	50-135	4	0-25	
Endosulfan Sulfate	84	80	50-135	4	0-25	
Endrin	99	96	50-135	3	0-25	
Endrin Aldehyde	66	73	50-135	10	0-25	
Endrin Ketone	83	75	50-135	9	0-25	
Heptachlor	100	98	50-135	2	0-25	
Heptachlor Epoxide	88	87	50-135	1	0-25	
Methoxychlor	91	88	50-135	3	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0488

Project: Newport Harbor

Matrix: Solid

Parameter	Method	Quality Control Sample ID	Date Analyzed	Date Extracted	MS% REC	MSD % REC	%REC CL	RPD	RPD CL	Qualifiers
Carbon, Total Organic	EPA 9060A	09-05-0616-3	05/07/09	N/A	94	93	75-125	1	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0488

Project: Newport Harbor

Matrix: Solid

Parameter	Method	QC Sample ID	Date Analyzed	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Sulfide, Total	EPA 376.2M	09-05-0616-3	05/12/09	0.27	0.27	0	0-25	
Sulfide, Dissolved	EPA 376.2M	09-05-0616-3	05/11/09	ND	ND	NA	0-25	
Ammonia (as N)	SM 4500-NH3 B/C (M)	09-05-0616-3	05/15/09	0.76	0.76	0	0-25	
Solids, Total	SM 2540 B	09-05-0616-3	05/12/09	73.8	72.7	2	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0488
Preparation: EPA 3050B
Method: EPA 6020

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
096-10-002-1,503	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09**	**090508L07**

Parameter	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Antimony	92	92	80-120	73-127	1	0-20	
Arsenic	90	83	80-120	73-127	8	0-20	
Beryllium	108	111	80-120	73-127	2	0-20	
Cadmium	100	98	80-120	73-127	1	0-20	
Chromium	91	92	80-120	73-127	0	0-20	
Copper	103	102	80-120	73-127	1	0-20	
Lead	96	96	80-120	73-127	0	0-20	
Nickel	98	99	80-120	73-127	1	0-20	
Selenium	96	94	80-120	73-127	2	0-20	
Silver	99	99	80-120	73-127	0	0-20	
Thallium	99	96	80-120	73-127	2	0-20	
Zinc	100	99	80-120	73-127	1	0-20	

Total number of LCS compounds : 12
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0488
Preparation: EPA 7471A Total
Method: EPA 7471A

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-04-007-6,279	**Solid**	**Mercury**	**05/08/09**	**05/08/09**	**090508L02**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	102	101	85-121	1	0-10	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0488
Preparation: EPA 3545
Method: Organotins by Krone et al.

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-07-016-653	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09**	**090514L12**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	94	90	50-130	4	0-20	
Tributyltin	91	104	50-130	13	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0488
Preparation: EPA 3545
Method: EPA 8270C SIM PAHs

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-471-23	**Solid**	**GC/MS MM**	**05/11/09**	**05/16/09**	**090511L01**

Parameter	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Naphthalene	77	77	40-160	20-180	0	0-20	
2-Methylnaphthalene	78	78	40-160	20-180	1	0-20	
Acenaphthylene	73	74	40-160	20-180	1	0-20	
Acenaphthene	79	79	48-108	38-118	0	0-11	
Fluorene	77	77	40-160	20-180	1	0-20	
Phenanthrene	80	80	40-160	20-180	0	0-20	
Anthracene	59	59	40-160	20-180	1	0-20	
Fluoranthene	74	75	40-160	20-180	1	0-20	
Pyrene	79	77	40-160	20-180	2	0-16	
Benzo (a) Anthracene	76	77	40-160	20-180	0	0-20	
Chrysene	73	73	40-160	20-180	1	0-20	
Benzo (k) Fluoranthene	77	80	40-160	20-180	3	0-20	
Benzo (b) Fluoranthene	84	85	40-160	20-180	2	0-20	
Benzo (a) Pyrene	78	79	40-160	20-180	1	0-20	
Benzo (g,h,i) Perylene	77	74	40-160	20-180	3	0-20	
Indeno (1,2,3-c,d) Pyrene	82	82	40-160	20-180	0	0-20	
Dibenz (a,h) Anthracene	66	65	40-160	20-180	1	0-20	
1-Methylnaphthalene	77	78	40-160	20-180	2	0-20	

Total number of LCS compounds : 18
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA		Date Received:	N/A
28202 Cabot Road, Suite 425		Work Order No:	09-05-0488
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8082

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-565-106	**Solid**	**GC 31**	**05/11/09**	**05/18/09**	**090511L06**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aroclor-1016	118	99	50-135	17	0-25	
Aroclor-1260	107	94	50-135	12	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0488
Preparation: EPA 3545
Method: EPA 8081A

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-858-29	**Solid**	**GC 51**	**05/11/09**	**05/19/09**	**090511L05**

Parameter	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Aldrin	99	91	50-135	36-149	8	0-25	
Alpha-BHC	100	92	50-135	36-149	8	0-25	
Beta-BHC	100	93	50-135	36-149	7	0-25	
Delta-BHC	106	97	50-135	36-149	9	0-25	
Gamma-BHC	101	93	50-135	36-149	8	0-25	
Dieldrin	98	91	50-135	36-149	7	0-25	
4,4'-DDD	100	93	50-135	36-149	6	0-25	
4,4'-DDE	95	92	50-135	36-149	3	0-25	
4,4'-DDT	99	92	50-135	36-149	7	0-25	
Endosulfan I	94	90	50-135	36-149	4	0-25	
Endosulfan II	95	89	50-135	36-149	6	0-25	
Endosulfan Sulfate	96	90	50-135	36-149	7	0-25	
Endrin	103	95	50-135	36-149	8	0-25	
Endrin Aldehyde	98	90	50-135	36-149	8	0-25	
Endrin Ketone	91	86	50-135	36-149	6	0-25	
Heptachlor	102	94	50-135	36-149	8	0-25	
Heptachlor Epoxide	93	91	50-135	36-149	3	0-25	
Methoxychlor	96	90	50-135	36-149	7	0-25	

Total number of LCS compounds : 18
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Laboratory Control Sample

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0488

Project: Newport Harbor

Matrix : Solid

Parameter	Method	Quality Control Sample ID	Date Analyzed	Date Extracted	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	Qualifiers
Carbon, Total Organic	EPA 9060A	099-06-013-380	05/07/09	N/A	6000	5440	91	80-120	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 09-05-0488

Qualifier	Definition
*	See applicable analysis comment.
1	Surrogate compound recovery was out of control due to a required sample dilution, therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported with no further corrective action required.
A	Result is the average of all dilutions, as defined by the method.
B	Analyte was present in the associated method blank.
C	Analyte presence was not confirmed on primary column.
E	Concentration exceeds the calibration range.
H	Sample received and/or analyzed past the recommended holding time.
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
ME	LCS Recovery Percentage is within LCS ME Control Limit range.
N	Nontarget Analyte.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
U	Undetected at the laboratory method detection limit.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture.

Chain of Custody Record & Laboratory Analysis Request

Page 1 of 1

Turnaround Requested: standard

Anchor Contact: Tracy Stofferahn

0488

ANCHOR ENVIRONMENTAL CA, L.P.
28202 Cabot Road, Suite 620
Laguna Niguel, CA 92677
Ph: (949) 347-2780 Fax: (949) 347-2781

Lab Contact:	Proj. Name:
Danielle Gonsman	Newport Harbor
Lab:	Proj. Number:
Calscience	090243-01
Address:	Sampler:
7440 Lincoln Way	MPW / TLS
Garden Grove, CA 92841	
Phone:	Shipping Method:
714-895-5494	CEL Pick-up
Fax:	AirBill:
714-894-7501	

	Sample ID	Sample Date	Sample Time	Sample Martix	# Containers	EPA 6020/7471 Priority Pollutant Metals / Mercury	EPA 8082 PCBs	EPA 8081A OC Pesticides	ASTM D4464 Grain Size	EPA 8270 OC SIMS PAHs	EPA 9060 A TOC	SM 2540 B Total Solids	Krone, et al. Organotins	SM 4500-NH3 Ammonia	EPA 376.2 M Sulfide (Total + Dissolved)
1	CNB-CAD-1-S3/4	5-6-09		SED	3	X	X	X	X	X	X	X	X	X	X
2	CNB-CAD-1-S6				2	X	X	X		X	X	X	X	X	X
3	CNB-CAD-1-S7				1				X						
4	CNB-CAD-1-S9				3	X	X	X	X	X	X	X	X	X	X
5	CNB-CAD-1-S11				3	X	X	X	X	X	X	X	X	X	X
6	CNB-CAD-1-S12				1				X						

Analyses Requested

Notes/ Comments:

Relinquished: (Signature)	Relinquished: (Signature)	Relinquished: (Signature)	Special Instructions/Notes
Printed Name: Tracy Stofferahn	Printed Name: PHUONG LE	Printed Name:	
Company: Anchor QEA	Company: CEL	Company:	
Date/Time: 5/6/09 4:04 PM	Date/Time: 5/6/09 1700	Date/Time:	
Received By:	Received By:	Received By:	
Printed Name: PHUONG LE	Printed Name: J. PATEL	Printed Name:	
Company: CEL	Company: CEL	Company:	# of Coolers: / Cooler Temp(s):
Date/Time: 5/6/09 1604	Date/Time: 5/6/09 1700	Date/Time:	COC Seals Intact? / Bottles Intact?

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 09-05-0846

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: ANCHOR DATE: 5/6/09

TEMPERATURE: (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 4.0 °C - 0.2 °C (CF) = 3.8 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter ☐ Metals Only ☐ PCBs Only Initial: pl

CUSTODY SEALS INTACT:

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A Initial: pl

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Initial: VA

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ COC not relinquished. ☐ No date relinquished. ☐ No time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Correct containers and volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☑8ozCGJ ☑16ozCGJ ☐Sleeve ☐EnCores® ☐TerraCores® ☐_____

Water: ☐VOA ☐VOA**h** ☐VOA**na_2** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na_2** ☐1AGB**s** ☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐500PB ☐500PB**na** ☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PB ☐100PB**na_2** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Summa® ☐_____ **Other:** ☐_____ Checked/Labeled by: VA

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar (Wide-mouth) **B:** Bottle (Narrow-mouth) Reviewed by: AM

Preservative: **h:** HCL **n:** HNO3 **na_2:**$Na_2S_2O_3$ **Na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **znna:** $ZnAc_2$+NaOH **f:** Field-filtered Scanned by: RM

PTS Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

May 20, 2009

Danielle Gonsman
Calscience
7440 Lincoln Way
Garden Grove, CA 92841-1427

Re: PTS File No: 39393
09-05-0488

Dear Ms. Gonsman:

Please find enclosed report for Physical Properties analyses conducted upon samples received from your 09-05-0488 project. All analyses were performed by applicable ASTM, EPA, or API methodologies. An electronic version of the report has previously been sent to your attention via the internet. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please give me a call at (562) 347-2504.

Sincerely,
PTS Laboratories

Rachel Spitz
Project Manager

Encl.

PTS Laboratories

Project Name: N/A
Project Number: 09-05-0488

PTS File No: 39393
Client: Calscience

TEST PROGRAM

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis ASTM D4464M						Notes
		Plugs:	Grab						
Rcvd. 5/8/09									
CNB-CAD-1-S3/4	N/A	N/A	X						
CNB-CAD-1-S7	N/A	N/A	X						
CNB-CAD-1-S9	N/A	N/A	X						
CNB-CAD-1-S11	N/A	N/A	X						
CNB-CAD-1-S12	N/A	N/A	X						
TOTALS:	5 Jars		5						

Laboratory Test Program Notes

PTS Laboratories, Inc.

Calscience
PTS File No: 39393

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: N/A
PROJECT NO: 09-05-0488

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
CNB-CAD-1-S3/4	N/A	Medium sand	0.529	0.00	0.00	64.42	33.69	1.44	0.45	1.89
CNB-CAD-1-S7	N/A	Medium sand	0.906	0.00	0.00	92.35	6.07	1.25	0.34	1.58
CNB-CAD-1-S9	N/A	Medium sand	0.567	0.00	0.00	65.66	30.42	3.18	0.74	3.92
CNB-CAD-1-S11	N/A	Fine sand	0.303	0.00	0.00	19.66	74.27	4.63	1.44	6.07
CNB-CAD-1-S12	N/A	Fine sand	0.086	0.00	0.00	0.00	61.80	33.84	4.37	38.20

(1) Based on Mean from Trask

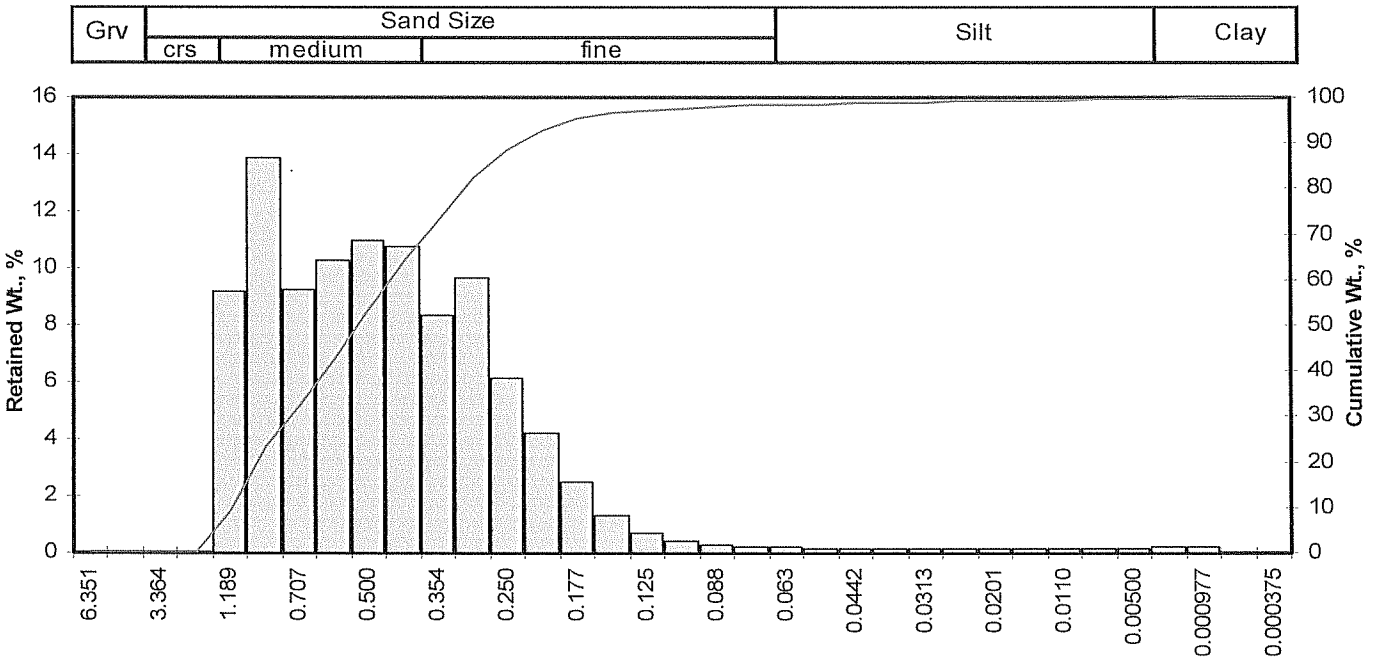
*Particles >2 mm screened off due to equipment restrictions.

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: Calscience
Project: N/A
Project No: 09-05-0488

PTS File No: 39393
Sample ID: CNB-CAD-1-S3/4
Depth, ft: N/A



Particle Size, mm

Opening		Phi of	U.S.	Sample	Increment	Cumulative
Inches	Millimeters	Screen	No.	Weight, grams	Weight, percent	Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	9.20	9.19	9.19
0.0331	0.841	0.25	20	13.90	13.89	23.08
0.0278	0.707	0.50	25	9.27	9.26	32.35
0.0234	0.595	0.75	30	10.30	10.29	42.64
0.0197	0.500	1.00	35	11.00	10.99	53.63
0.0166	0.420	1.25	40	10.80	10.79	64.42
0.0139	0.354	1.50	45	8.33	8.32	72.75
0.0117	0.297	1.75	50	9.63	9.62	82.37
0.0098	0.250	2.00	60	6.15	6.15	88.52
0.0083	0.210	2.25	70	4.19	4.19	92.70
0.0070	0.177	2.50	80	2.49	2.49	95.19
0.0059	0.149	2.75	100	1.30	1.30	96.49
0.0049	0.125	3.00	120	0.70	0.70	97.19
0.0041	0.105	3.25	140	0.42	0.42	97.61
0.0035	0.088	3.50	170	0.28	0.28	97.89
0.0029	0.074	3.75	200	0.22	0.22	98.11
0.0025	0.063	4.00	230	0.19	0.19	98.30
0.0021	0.053	4.25	270	0.16	0.16	98.46
0.00174	0.0442	4.50	325	0.13	0.13	98.59
0.00146	0.0372	4.75	400	0.12	0.12	98.71
0.00123	0.0313	5.00	450	0.11	0.11	98.82
0.000986	0.0250	5.32	500	0.13	0.13	98.95
0.000790	0.0201	5.64	635	0.11	0.11	99.06
0.000615	0.0156	6.00		0.11	0.11	99.17
0.000435	0.0110	6.50		0.13	0.13	99.30
0.000308	0.00781	7.00		0.12	0.12	99.42
0.000197	0.00500	7.65		0.13	0.13	99.55
0.000077	0.00195	9.00		0.21	0.21	99.76
0.000038	0.000977	10.00		0.22	0.22	99.98
0.000019	0.000488	11.00		0.02	0.02	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-0.59	0.0593	1.507
10	-0.22	0.0459	1.166
16	0.00	0.0395	1.003
25	0.30	0.0319	0.811
40	0.69	0.0245	0.622
50	0.92	0.0208	0.529
60	1.15	0.0178	0.451
75	1.56	0.0134	0.340
84	1.82	0.0112	0.284
90	2.09	0.0093	0.235
95	2.48	0.0071	0.179

Measure	Trask	Inman	Folk-Ward
Median, phi	0.92	0.92	0.92
Median, in.	0.0208	0.0208	0.0208
Median, mm	0.529	0.529	0.529
Mean, phi	0.80	0.91	0.91
Mean, in.	0.0227	0.0210	0.0210
Mean, mm	0.575	0.534	0.532
Sorting	1.546	0.911	0.921
Skewness	0.991	-0.013	0.002
Kurtosis	0.254	0.687	1.002

Grain Size Description (ASTM-USCS Scale)	Medium sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	64.42
Fine Sand	200	33.69
Silt	>0.005 mm	1.44
Clay	<0.005 mm	0.45
	Total	**100**

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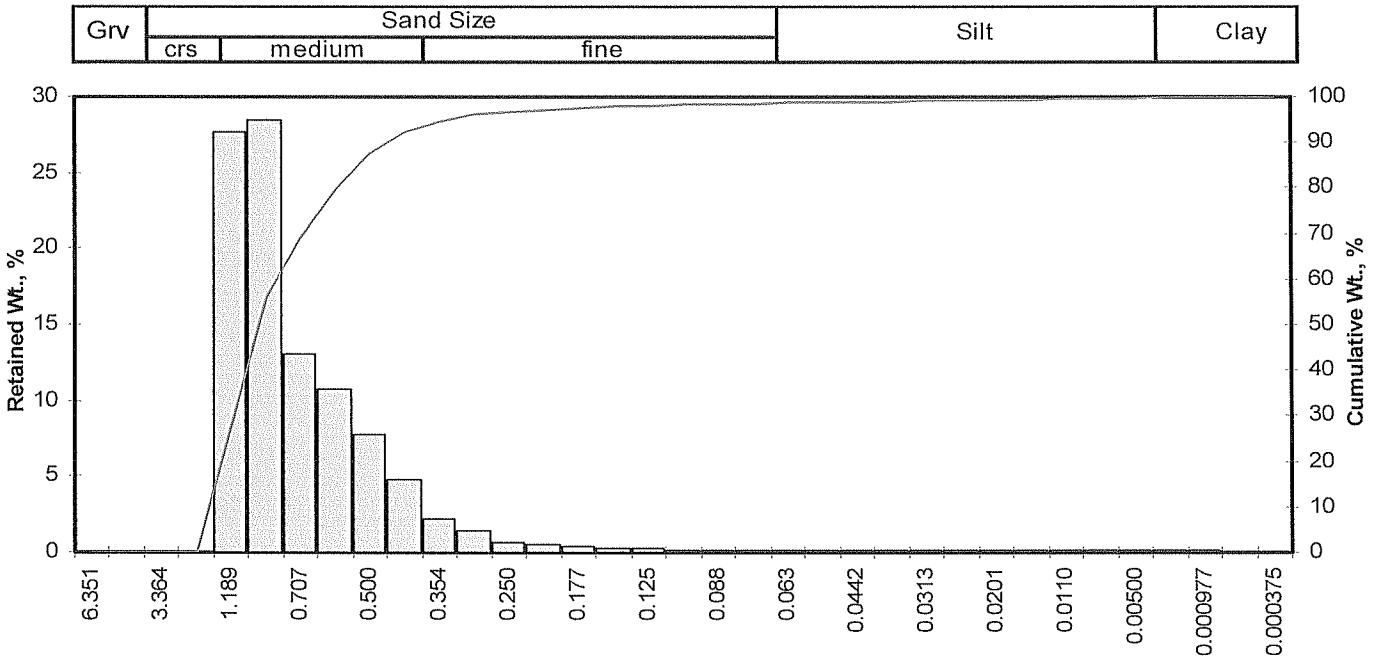
Phone: (562) 907-3607
Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: Calscience
Project: N/A
Project No: 09-05-0488

PTS File No: 39393
Sample ID: CNB-CAD-1-S7
Depth, ft: N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	27.70	27.73	27.73
0.0331	0.841	0.25	20	28.40	28.43	56.16
0.0278	0.707	0.50	25	13.00	13.01	69.17
0.0234	0.595	0.75	30	10.70	10.71	79.88
0.0197	0.500	1.00	35	7.74	7.75	87.63
0.0166	0.420	1.25	40	4.72	4.72	92.35
0.0139	0.354	1.50	45	2.16	2.16	94.51
0.0117	0.297	1.75	50	1.45	1.45	95.96
0.0098	0.250	2.00	60	0.67	0.67	96.63
0.0083	0.210	2.25	70	0.48	0.48	97.12
0.0070	0.177	2.50	80	0.36	0.36	97.48
0.0059	0.149	2.75	100	0.26	0.26	97.74
0.0049	0.125	3.00	120	0.21	0.21	97.95
0.0041	0.105	3.25	140	0.18	0.18	98.13
0.0035	0.088	3.50	170	0.16	0.16	98.29
0.0029	0.074	3.75	200	0.13	0.13	98.42
0.0025	0.063	4.00	230	0.13	0.13	98.55
0.0021	0.053	4.25	270	0.13	0.13	98.68
0.00174	0.0442	4.50	325	0.11	0.11	98.79
0.00146	0.0372	4.75	400	0.10	0.10	98.89
0.00123	0.0313	5.00	450	0.10	0.10	98.98
0.000986	0.0250	5.32	500	0.12	0.12	99.10
0.000790	0.0201	5.64	635	0.11	0.11	99.21
0.000615	0.0156	6.00		0.10	0.10	99.31
0.000435	0.0110	6.50		0.12	0.12	99.43
0.000308	0.00781	7.00		0.11	0.11	99.54
0.000197	0.00500	7.65		0.12	0.12	99.66
0.000077	0.00195	9.00		0.17	0.17	99.83
0.000038	0.000977	10.00		0.15	0.15	99.98
0.000019	0.000488	11.00		0.02	0.02	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-0.86	0.0717	1.821
10	-0.73	0.0653	1.658
16	-0.57	0.0583	1.482
25	-0.32	0.0493	1.252
40	-0.03	0.0403	1.024
50	0.14	0.0357	0.906
60	0.32	0.0315	0.799
75	0.64	0.0253	0.643
84	0.88	0.0213	0.542
90	1.13	0.0180	0.458
95	1.58	0.0131	0.334

Measure	Trask	Inman	Folk-Ward
Median, phi	0.14	0.14	0.14
Median, in.	0.0357	0.0357	0.0357
Median, mm	0.906	0.906	0.906
Mean, phi	0.08	0.16	0.15
Mean, in.	0.0373	0.0353	0.0354
Mean, mm	0.948	0.896	0.900
Sorting	1.395	0.725	0.734
Skewness	0.990	0.022	0.100
Kurtosis	0.253	0.689	1.045
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	92.35
Fine Sand	200	6.07
Silt	>0.005 mm	1.25
Clay	<0.005 mm	0.34
	Total	**100**

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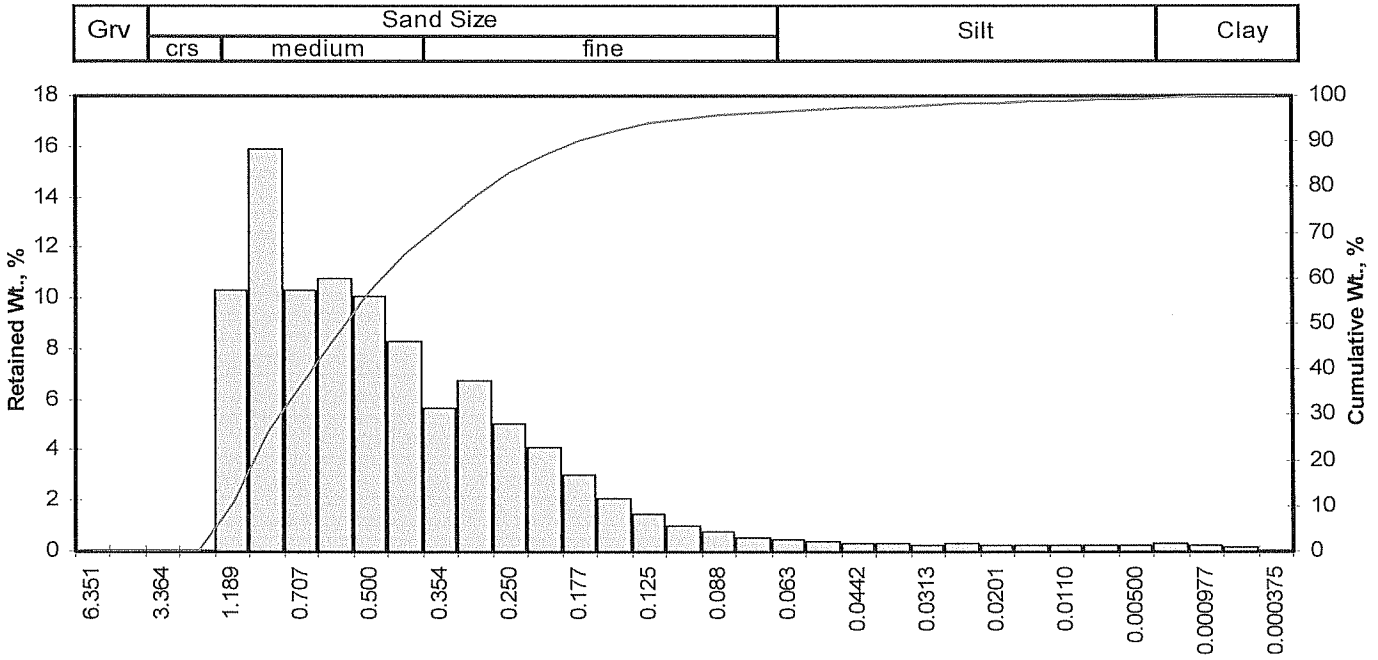
Phone: (562) 907-3607
Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Calscience	**PTS File No:**	39393
Project:	N/A	**Sample ID:**	CNB-CAD-1-S9
Project No:	09-05-0488	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	10.30	10.29	10.29
0.0331	0.841	0.25	20	15.90	15.88	26.17
0.0278	0.707	0.50	25	10.30	10.29	36.46
0.0234	0.595	0.75	30	10.80	10.79	47.25
0.0197	0.500	1.00	35	10.10	10.09	57.34
0.0166	0.420	1.25	40	8.33	8.32	65.66
0.0139	0.354	1.50	45	5.69	5.68	71.35
0.0117	0.297	1.75	50	6.72	6.71	78.06
0.0098	0.250	2.00	60	5.03	5.02	83.09
0.0083	0.210	2.25	70	4.10	4.10	87.18
0.0070	0.177	2.50	80	3.01	3.01	90.19
0.0059	0.149	2.75	100	2.10	2.10	92.29
0.0049	0.125	3.00	120	1.47	1.47	93.76
0.0041	0.105	3.25	140	1.03	1.03	94.79
0.0035	0.088	3.50	170	0.74	0.74	95.52
0.0029	0.074	3.75	200	0.56	0.56	96.08
0.0025	0.063	4.00	230	0.44	0.44	96.52
0.0021	0.053	4.25	270	0.38	0.38	96.90
0.00174	0.0442	4.50	325	0.33	0.33	97.23
0.00146	0.0372	4.75	400	0.29	0.29	97.52
0.00123	0.0313	5.00	450	0.26	0.26	97.78
0.000986	0.0250	5.32	500	0.29	0.29	98.07
0.000790	0.0201	5.64	635	0.25	0.25	98.32
0.000615	0.0156	6.00		0.23	0.23	98.55
0.000435	0.0110	6.50		0.26	0.26	98.81
0.000308	0.00781	7.00		0.22	0.22	99.03
0.000197	0.00500	7.65		0.23	0.23	99.26
0.000077	0.00195	9.00		0.34	0.34	99.60
0.000038	0.000977	10.00		0.26	0.26	99.86
0.000019	0.000488	11.00		0.14	0.14	100.00
0.000015	0.000375	11.38		0.00	0.00	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-0.64	0.0612	1.554
10	-0.27	0.0475	1.207
16	-0.07	0.0413	1.050
25	0.21	0.0340	0.863
40	0.58	0.0263	0.668
50	0.82	0.0223	0.567
60	1.08	0.0186	0.473
75	1.64	0.0127	0.322
84	2.06	0.0095	0.241
90	2.48	0.0070	0.179
95	3.32	0.0039	0.100

Measure	Trask	Inman	Folk-Ward
Median, phi	0.82	0.82	0.82
Median, in.	0.0223	0.0223	0.0223
Median, mm	0.567	0.567	0.567
Mean, phi	0.76	0.99	0.93
Mean, in.	0.0233	0.0198	0.0206
Mean, mm	0.592	0.503	0.523
Sorting	1.637	1.063	1.131
Skewness	0.929	0.164	0.215
Kurtosis	0.263	0.862	1.140
Grain Size Description (ASTM-USCS Scale)		Medium sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	65.66
Fine Sand	200	30.42
Silt	>0.005 mm	3.18
Clay	<0.005 mm	0.74
	Total	**100**

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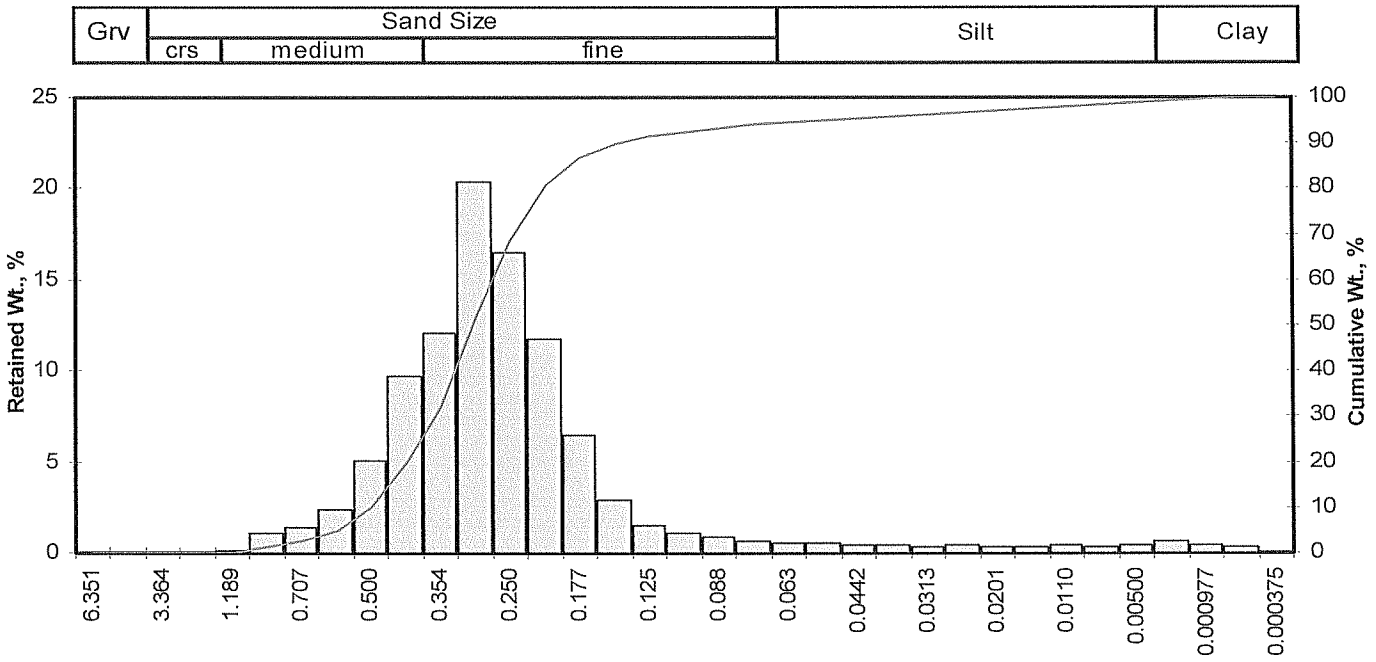
Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: Calscience
Project: N/A
Project No: 09-05-0488

PTS File No: 39393
Sample ID: CNB-CAD-1-S11
Depth, ft: N/A



Particle Size, mm

Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.10	0.10	0.10
0.0331	0.841	0.25	20	1.13	1.13	1.23
0.0278	0.707	0.50	25	1.35	1.35	2.58
0.0234	0.595	0.75	30	2.34	2.34	4.92
0.0197	0.500	1.00	35	5.07	5.07	9.98
0.0166	0.420	1.25	40	9.69	9.68	19.66
0.0139	0.354	1.50	45	12.10	12.09	31.75
0.0117	0.297	1.75	50	20.40	20.38	52.13
0.0098	0.250	2.00	60	16.50	16.48	68.62
0.0083	0.210	2.25	70	11.80	11.79	80.41
0.0070	0.177	2.50	80	6.45	6.44	86.85
0.0059	0.149	2.75	100	2.91	2.91	89.76
0.0049	0.125	3.00	120	1.55	1.55	91.31
0.0041	0.105	3.25	140	1.09	1.09	92.39
0.0035	0.088	3.50	170	0.86	0.86	93.25
0.0029	0.074	3.75	200	0.68	0.68	93.93
0.0025	0.063	4.00	230	0.57	0.57	94.50
0.0021	0.053	4.25	270	0.50	0.50	95.00
0.00174	0.0442	4.50	325	0.45	0.45	95.45
0.00146	0.0372	4.75	400	0.40	0.40	95.85
0.00123	0.0313	5.00	450	0.36	0.36	96.21
0.000986	0.0250	5.32	500	0.41	0.41	96.62
0.000790	0.0201	5.64	635	0.37	0.37	96.99
0.000615	0.0156	6.00		0.36	0.36	97.35
0.000435	0.0110	6.50		0.42	0.42	97.77
0.000308	0.00781	7.00		0.37	0.37	98.14
0.000197	0.00500	7.65		0.42	0.42	98.56
0.000077	0.00195	9.00		0.68	0.68	99.24
0.000038	0.000977	10.00		0.43	0.43	99.67
0.000019	0.000488	11.00		0.30	0.30	99.97
0.000015	0.000375	11.38		0.03	0.03	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.75	0.0233	0.593
10	1.00	0.0197	0.500
16	1.16	0.0177	0.449
25	1.36	0.0153	0.389
40	1.60	0.0130	0.330
50	1.72	0.0119	0.303
60	1.87	0.0108	0.274
75	2.14	0.0090	0.228
84	2.39	0.0075	0.191
90	2.79	0.0057	0.145
95	4.25	0.0021	0.053

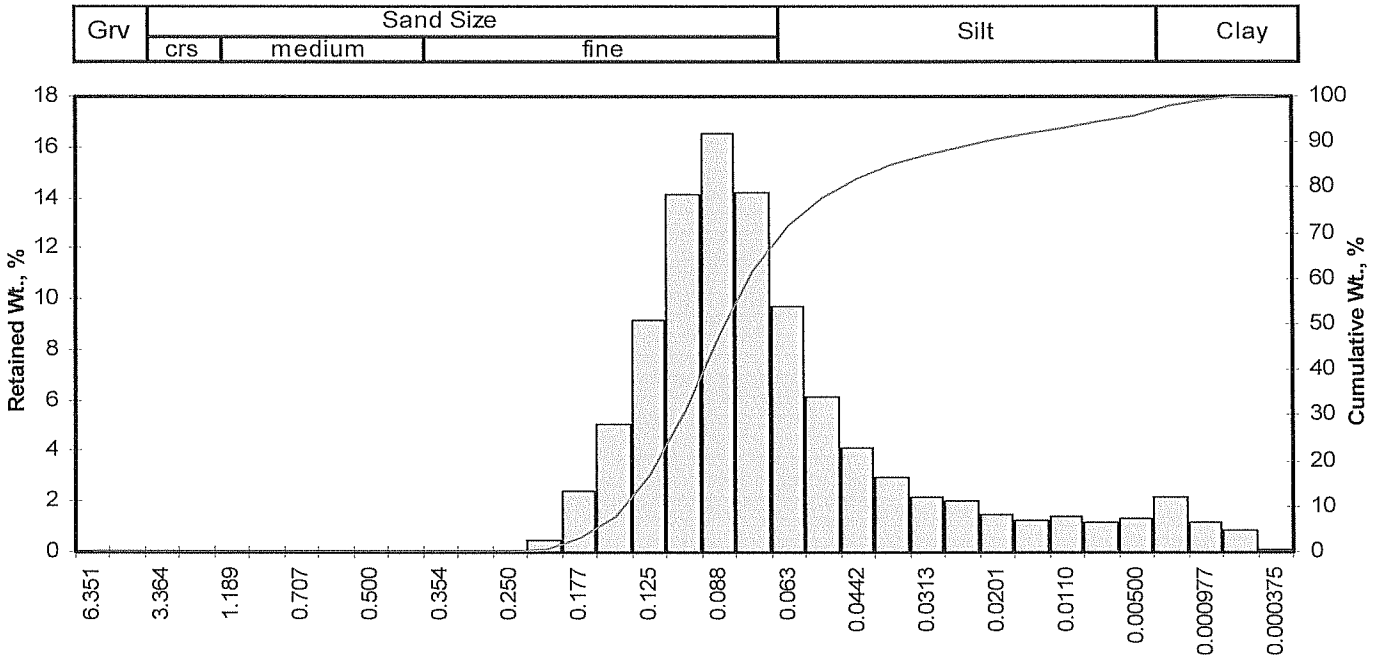
Measure	Trask	Inman	Folk-Ward
Median, phi	1.72	1.72	1.72
Median, in.	0.0119	0.0119	0.0119
Median, mm	0.303	0.303	0.303
Mean, phi	1.70	1.77	1.76
Mean, in.	0.0121	0.0115	0.0117
Mean, mm	0.309	0.293	0.296
Sorting	1.308	0.617	0.838
Skewness	0.983	0.079	0.262
Kurtosis	0.228	1.832	1.848
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	19.66
Fine Sand	200	74.27
Silt	>0.005 mm	4.63
Clay	<0.005 mm	1.44
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Calscience	**PTS File No:**	39393
Project:	N/A	**Sample ID:**	CNB-CAD-1-S12
Project No:	09-05-0488	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.01	0.01	0.01
0.0083	0.210	2.25	70	0.46	0.46	0.47
0.0070	0.177	2.50	80	2.38	2.38	2.85
0.0059	0.149	2.75	100	5.04	5.04	7.88
0.0049	0.125	3.00	120	9.13	9.13	17.01
0.0041	0.105	3.25	140	14.10	14.10	31.11
0.0035	0.088	3.50	170	16.50	16.49	47.60
0.0029	0.074	3.75	200	14.20	14.20	61.80
0.0025	0.063	4.00	230	9.74	9.74	71.53
0.0021	0.053	4.25	270	6.16	6.16	77.69
0.00174	0.0442	4.50	325	4.12	4.12	81.81
0.00146	0.0372	4.75	400	2.96	2.96	84.77
0.00123	0.0313	5.00	450	2.17	2.17	86.94
0.000986	0.0250	5.32	500	2.02	2.02	88.96
0.000790	0.0201	5.64	635	1.50	1.50	90.46
0.000615	0.0156	6.00		1.27	1.27	91.73
0.000435	0.0110	6.50		1.37	1.37	93.10
0.000308	0.00781	7.00		1.20	1.20	94.29
0.000197	0.00500	7.65		1.34	1.34	95.63
0.000077	0.00195	9.00		2.21	2.21	97.84
0.000038	0.000977	10.00		1.19	1.19	99.03
0.000019	0.000488	11.00		0.87	0.87	99.90
0.000015	0.000375	11.38		0.10	0.10	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.61	0.0065	0.164
10	2.81	0.0056	0.143
16	2.97	0.0050	0.127
25	3.14	0.0045	0.113
40	3.38	0.0038	0.096
50	3.54	0.0034	0.086
60	3.72	0.0030	0.076
75	4.14	0.0022	0.057
84	4.69	0.0015	0.039
90	5.54	0.0008	0.021
95	7.34	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	3.54	3.54	3.54
Median, in.	0.0034	0.0034	0.0034
Median, mm	0.086	0.086	0.086
Mean, phi	3.56	3.83	3.73
Mean, in.	0.0033	0.0028	0.0030
Mean, mm	0.085	0.070	0.075
Sorting	1.414	0.856	1.145
Skewness	0.934	0.334	0.470
Kurtosis	0.233	1.763	1.941
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	61.80
Silt	>0.005 mm	33.84
Clay	<0.005 mm	4.37
	Total	**100**

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Phone: (562) 907-3607 Fax: (562) 907-3610

Calscience Environmental Laboratories, Inc.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1427
TEL: (714) 895-5494 . FAX: (714) 894-7501

TO: PTS Laboratories

CHAIN OF CUSTODY RECORD

DATE: 05/07/09

PAGE: 1 OF 1

LABORATORY CLIENT: Calscience Environmental Laboratories, Inc.		CLIENT PROJECT NAME / NUMBER: 09-05-0488	P.O. NO.: 09-05-0488
ADDRESS: 7440 Lincoln Way		PROJECT CONTACT: Danielle Gonsman	QUOTE NO.:
CITY: Garden Grove, CA 92841-1427		SAMPLER(S): (PRINT)	LAB USE ONLY: 39393
TEL: (714) 895-5494	E-MAIL: dgonsman@calscience.com		

TURNAROUND TIME: ___SAME DAY ___24 HR ___48HR ___72 HR ___5 DAYS _X_NORMAL

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)

☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

REQUESTED ANALYSIS

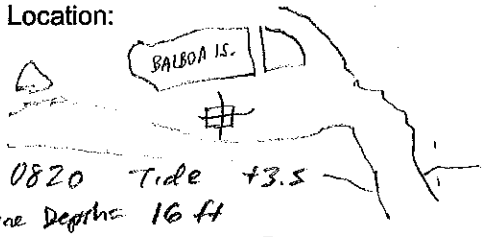
LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	Matrix	#Cont	GRAIN SIZE, ASTM D4464
	CNB-CAD-1-S3/4	05/06/09		SED	1	X
	CNB-CAD-1-S7	05/06/09		SED	1	X
	CNB-CAD-1-S9	~~05/06/09~~		SED	1	X
	CNB-CAD-1-S11	05/06/09		SED	1	X
	CNB-CAD-1-S12	05/06/09		SED	1	X

Relinquished by: (Signature) (CALSCIENCE)	Received by / Affiliation: (Signature) Daniel Nranek PTS Labs	Date: 5/8/09 ~~05/07/09~~	Time: 1245
Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:

Soil Boring Processing Log

ANCHOR QEA

Boring Location:



Time: 0820 Tide +3.5
Leadline Depths: 16 ft
Elevation: ~12.5 ft MLLW. Datum: MLLW

Boring CNB-CAD-3 Date 5-7-09 Sheet 1 of 3
Job Newport Harbor CAD Job No.
Logged By Wulz/Stafford Weather
Drilled By Gregg Drilling
Drill Type/ Method
Sampling Method
Bottom of Boring ATD Water Level Depth
Obs. Well Install. Yes No
33°36.0914' N 117°53.5559' W. 1677382.82 N 6594375.39 E

SIZE (%) G Max.	SIZE (%) S Range	SIZE (%) F Att. Limits	Time	DEPTH From	DEPTH To	SAMPLE Type	SAMPLE Number	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist., color, minor, MAJOR CONSTITUENT, NON-SOIL SUBSTANCES: Odor, staining, sheen, scrag, slag, etc.	REMARKS: Drill action, drill and sample procedures, water conditions, heave, etc.	SUMMARY LOG (Water & Date)
				0.5'	2'	ARCH 2 jars	S-1A S-1B		WOR	Very soft Dark grey Clayey SILT (8") over Dark grey silty SAND (4")	S-1A/1B	
			0835	3' 3.5'	6.5' 4.5'	ARCH.	S-2	9	2 4 5	Dark grey, sl. silty medium SAND with some shell fragments	S-2	
				5.5'	7'	ARCH.	S-3 + S-4 FOR CHEM. COMBINE S-3 + S-4 FOR CHEM.	14	4 6 8	Med dense, brown, c-m SAND w/shell frags. ↓ (same)	S-3 + S-4	
				7.5'	9'	ARCH.	S-4	10	3 4 6			
											START COMPOSITE SAMPLE	
				12.5	14	ARCH.	S-5	55 14	14 25 30	Dense to very dense, brown, med-coarse SAND with trace gravel & shell fragments.		
				17.5	19'	ARCH.	S-6	70	22 31 39	Very dense, brownish-grey, sl. silty fine SAND.		

20 37 40

4 6 8

28 - 6 22 16 d = 6'

4-5' 16 20

15 20 3 38' 18 15

Soil Boring Processing Log

ANCHOR QEA

Boring Location:

Elevation: Datum:

Obs. Well Install. Yes No

Boring CNB-CAD-3 Date 5-7-09 Sheet 2 of 3

Job Job No.

Logged By Weather

Drilled By

Drill Type/ Method

Sampling Method

Bottom of Boring ATD Water Level Depth

SIZE (%) G Max.	SIZE (%) S Range	SIZE (%) F Att. Limits	Time	DEPTH From	DEPTH To	SAMPLE Type	SAMPLE Number	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist., color, minor, MAJOR CONSTITUENT, NON-SOIL SUBSTANCES: Odor, staining, sheen, scrag, slag, etc.	REMARKS: Drill action, drill and sample procedures, water conditions, heave, etc.	SUMMARY LOG (Water & Date)
								20				
								21				
								22				
				22.5	24	CHEM	S-7	23 (77) 24	20 37 40	very dense, greyish brown, sl. silty fine SAND		
								25				
								26				
								27				
			0935	27.5	29	ARCH	S-8	28 (81) 29	16 40 41	same, with thin lens of shell hash.		
								30				
								31				
								32				
				32.5	34	ARCH.	S-9	33	13 38 54	very dense, greyish brown fine SAND.		
								34				
								35				
								36				
								37				
				37.5	39	ARCH.	S-10	38 (5/5") 39	26 64 65	very dense, grey, fine SAND.		
								40				

3' 20 20 10 } 53

5' sticking 16' depth 21'

32

23/58/72

16/46/41 26/64/65

Soil Boring Processing Log

ANCHOR QEA

Boring Location:

Elevation: Datum:

Obs. Well Install. Yes No

Boring CNB-CAD-3 Date 5-7-09 Sheet 3 of 3

Job Job No.

Logged By Weather

Drilled By

Drill Type/ Method

Sampling Method

Bottom of Boring ATD Water Level Depth

SIZE (%) G Max.	S Range	F Att. Limits	Time	DEPTH From	To	SAMPLE Type	Number	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist., color, minor, MAJOR CONSTITUENT, NON-SOIL SUBSTANCES: Odor, staining, sheen, scrag, slag, etc.	REMARKS: Drill action, drill and sample procedures, water conditions, heave, etc.	SUMMARY LOG (Water & Date)
		TIDE						40				
								41				
								42				
		+3.5'	1015	42.5	44	CHEM	S-11	43 (50/4)	29 72 82	V. dense grey fine SAND. Trace shell frags		
								44				
								45				
								46				
								47				
				47.5	49	ARCH	S-12	48 (72)	16 33 39	V. dense grey fine SAND	Grading finer & silter with depth	
								49				
								50				
								51				Rod check 25 25 20 3 73
								52				5 deck 16 21
		+3.3'	1040	52.5	54	ARCH	S-13	53 (67)	15 31 36	V. dense, grey, Sl. silty fine SAND Trace shell frags		73-21 = 52 ✓
								54				
								55				
								56			END COMPOSITE SAMPLE.	
								57				
				57.5	59	ARCH	S-14	58 (59)	10 23 36	V. dense grey silty fine SAND		
								59		END.		
								60				

Calscience Environmental Laboratories, Inc.

May 22, 2009

Tracy Stofferahn
Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Subject: **Calscience Work Order No.: 09-05-0616**
Client Reference: Newport Harbor

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 5/7/2009 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Systems Manual, applicable standard operating procedures, and other related documentation. The original report of subcontracted analysis, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Sincerely,

Calscience Environmental
Laboratories, Inc.
Danielle Gonsman
Project Manager

CASE NARRATIVE

Calscience Work Order No.: 09-05-0616

Provided below is a narrative of our analytical effort, including any unique features or anomalies encountered as part of the analysis of the sediment samples.

Sample Condition on Receipt

Four (4) sediment samples in glass jars were received for this project on May 7, 2009. The samples were transferred to the laboratory in an ice-chest with wet ice, following strict chain-of-custody (COC) procedures. The temperature of the samples upon receipt at the laboratory ranged was 4.2°C. The samples were logged into the Laboratory Information Management System (LIMS), given laboratory identification numbers, and stored in refrigeration units pending analysis.

Tests Performed

Testing was performed in accordance with the chain-of-custody instructions and the project work plan. The following testing was performed as requested:

Trace Metals by EPA 6020
Mercury by EPA 7471A
PAHs by EPA 8270C SIM
Organochlorine Pesticides by EPA 8081A
PCB Aroclors by EPA 8082
Organotins by Krone, et al.
TOC by EPA 9060A
Total Solids by SM 2540 B
Total Sulfide by EPA 376.2M
Dissolved Sulfide by EPA 376.2M
Ammonia by SM 4500-NH3 B/C (M)

Testing for grain size was subcontracted to PTS Laboratories in Santa Fe Springs, California. This data is included and follows the chemistry data.

Data Summary

A laboratory duplicate result is included for sample CNB-CAD-3-S11.

Holding times

All holding time requirements were met.

Calibration

Frequency and control criteria for initial and continuing calibration verifications were met.

Blanks

Concentrations of target analytes in the method blank were found to be below reporting limits for all testing.

Laboratory Control Samples

A Laboratory Control Sample (LCS) analysis was performed for each test. All parameters were within control limits.

Matrix Spikes

Matrix spike analyses were performed at required frequencies. One of the project samples, CNB-CAD-3-S11, was spiked for each applicable method. Each parameter was within control limits for each method with the following exceptions.

For the metals by EPA 6020, the matrix spike recovery for antimony fell just below the established control limit for this metal. However, the corresponding LCS/LCSD recoveries for antimony were in control, suggesting a possible matrix interference effect, and the data is released with no further qualifications.

For the organotins, the MSD recovery for TBT fell above the established control limit. However, TBT was not found in any of the samples at the indicated reporting limit, and thus the elevated MSD recovery is moot. Also, the corresponding LCS/LCSD recoveries for TBT were in control, and the data is thus released without further action.

Surrogates

The surrogate recoveries for each applicable test, and all samples, were within acceptable control limits, with the exception of the PCBs. For samples CNB-CAD-3-S3/4 and CNB-CAD-3-COMP (Lab Duplicate), the surrogate 2,4,5,6-Tetrachloro-m-xylene fell above the established control limit for this compound. However, the PCBs were undetected in the sample, so the elevated recovery has no effect on the data.

Acronyms

MS/MSD:	Matrix Spike/Matrix Spike Duplicate
LCS/LCSD:	Laboratory Control Sample/Laboratory Control Sample Duplicate
RPD:	Relative Percent Difference

Calscience Environmental Laboratories, Inc.

Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616
Preparation: EPA 3050B / EPA 7471A Total
Method: EPA 6020 / EPA 7471A
Units: mg/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S3/4	**09-05-0616-1-A**	**05/07/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 21:37**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:13:17 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.624	1		Mercury	ND	0.104	1	
Arsenic	1.56	0.125	1		Nickel	1.41	0.125	1	
Beryllium	ND	0.125	1		Selenium	0.164	0.125	1	
Cadmium	ND	0.125	1		Silver	ND	0.125	1	
Chromium	1.91	0.125	1		Thallium	ND	0.125	1	
Copper	6.28	0.125	1		Zinc	8.14	1.25	1	
Lead	0.637	0.125	1						

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S7	**09-05-0616-2-A**	**05/07/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 21:43**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:15:32 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.656	1		Mercury	ND	0.110	1	
Arsenic	2.61	0.131	1		Nickel	5.16	0.131	1	
Beryllium	ND	0.131	1		Selenium	0.221	0.131	1	
Cadmium	ND	0.131	1		Silver	ND	0.131	1	
Chromium	8.20	0.131	1		Thallium	ND	0.131	1	
Copper	7.75	0.131	1		Zinc	23.5	1.31	1	
Lead	1.08	0.131	1						

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S11	**09-05-0616-3-A**	**05/07/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 21:32**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:17:47 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.678	1		Mercury	ND	0.113	1	
Arsenic	2.00	0.136	1		Nickel	2.09	0.136	1	
Beryllium	ND	0.136	1		Selenium	0.222	0.136	1	
Cadmium	ND	0.136	1		Silver	ND	0.136	1	
Chromium	4.08	0.136	1		Thallium	ND	0.136	1	
Copper	14.3	0.136	1		Zinc	12.5	1.36	1	
Lead	0.751	0.136	1						

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3050B / EPA 7471A Total
		Method:	EPA 6020 / EPA 7471A
		Units:	mg/kg
Project: Newport Harbor			Page 2 of 2

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-COMP	**09-05-0616-4-A**	**05/07/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 21:48**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:24:32 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.618	1		Mercury	ND	0.103	1	
Arsenic	2.20	0.124	1		Nickel	3.46	0.124	1	
Beryllium	ND	0.124	1		Selenium	0.125	0.124	1	
Cadmium	ND	0.124	1		Silver	ND	0.124	1	
Chromium	5.73	0.124	1		Thallium	ND	0.124	1	
Copper	11.7	0.124	1		Zinc	19.5	1.24	1	
Lead	0.865	0.124	1						

CNB-CAD-3-COMP (LAB DUPLICATE)	**09-05-0616-5-A**	**05/07/09 00:00**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09 22:11**	**090508L07**

Comment(s): -Mercury was analyzed on 5/8/2009 3:26:48 PM with batch 090508L02
-Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.635	1		Mercury	ND	0.106	1	
Arsenic	2.60	0.127	1		Nickel	3.51	0.127	1	
Beryllium	ND	0.127	1		Selenium	0.238	0.127	1	
Cadmium	ND	0.127	1		Silver	ND	0.127	1	
Chromium	5.75	0.127	1		Thallium	ND	0.127	1	
Copper	12.7	0.127	1		Zinc	18.2	1.27	1	
Lead	0.914	0.127	1						

Method Blank	**096-10-002-1,503**	**N/A**	**Solid**	**ICP/MS 03**	**05/08/09**	**05/14/09 10:18**	**090508L07**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.500	1		Lead	ND	0.100	1	
Arsenic	ND	0.100	1		Nickel	ND	0.100	1	
Beryllium	ND	0.100	1		Selenium	ND	0.100	1	
Cadmium	ND	0.100	1		Silver	ND	0.100	1	
Chromium	ND	0.100	1		Thallium	ND	0.100	1	
Copper	ND	0.100	1		Zinc	ND	1.00	1	

Method Blank	**099-04-007-6,279**	**N/A**	**Solid**	**Mercury**	**05/08/09**	**05/08/09 14:57**	**090508L02**

Parameter	Result	RL	DF	Qual
Mercury	ND	0.0835	1	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	Organotins by Krone et al.
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S3/4	**09-05-0616-1-A**	**05/07/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 12:22**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.7	1		Tetrabutyltin	ND	3.7	1	
Monobutyltin	ND	3.7	1		Tributyltin	ND	3.7	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	113	50-130							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S7	**09-05-0616-2-A**	**05/07/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 12:53**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.9	1		Tetrabutyltin	ND	3.9	1	
Monobutyltin	ND	3.9	1		Tributyltin	ND	3.9	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	111	50-130							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S11	**09-05-0616-3-A**	**05/07/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 13:26**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	4.1	1		Tetrabutyltin	ND	4.1	1	
Monobutyltin	ND	4.1	1		Tributyltin	ND	4.1	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	112	50-130							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-COMP	**09-05-0616-4-A**	**05/07/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 13:58**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.7	1		Tetrabutyltin	ND	3.7	1	
Monobutyltin	ND	3.7	1		Tributyltin	ND	3.7	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	121	50-130							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	Organotins by Krone et al.
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-COMP (LAB DUPLICATE)	**09-05-0616-5-A**	**05/07/09 00:00**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 14:30**	**090514L12**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.8	1		Tetrabutyltin	ND	3.8	1	
Monobutyltin	ND	3.8	1		Tributyltin	ND	3.8	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	123	50-130							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-07-016-653**	**N/A**	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09 11:17**	**090514L12**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Dibutyltin	ND	3.0	1		Tetrabutyltin	ND	3.0	1	
Monobutyltin	ND	3.0	1		Tributyltin	ND	3.0	1	
Surrogates:	REC (%)	Control Limits		Qual					
Tripentyltin	79	50-130							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: EPA 8270C SIM PAHs
Units: ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S3/4	**09-05-0616-1-A**	**05/07/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 15:50**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	25	1		Benzo (b) Fluoranthene	ND	25	1	
2-Methylnaphthalene	ND	25	1		Benzo (a) Pyrene	ND	25	1	
Acenaphthylene	ND	25	1		Benzo (g,h,i) Perylene	ND	25	1	
Acenaphthene	ND	25	1		Indeno (1,2,3-c,d) Pyrene	ND	25	1	
Fluorene	ND	25	1		Dibenz (a,h) Anthracene	ND	25	1	
Phenanthrene	ND	25	1		1-Methylnaphthalene	ND	25	1	
Anthracene	ND	25	1		Benzo (e) Pyrene	ND	25	1	
Fluoranthene	ND	25	1		Perylene	ND	25	1	
Pyrene	ND	25	1		Biphenyl	ND	25	1	
Benzo (a) Anthracene	ND	25	1		1-Methylphenanthrene	ND	25	1	
Chrysene	ND	25	1		2,6-Dimethylnaphthalene	ND	25	1	
Benzo (k) Fluoranthene	ND	25	1		1,6,7-Trimethylnaphthalene	ND	25	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
Nitrobenzene-d5	111	18-162		2-Fluorobiphenyl	87	14-146	
p-Terphenyl-d14	69	34-148					

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S7	**09-05-0616-2-A**	**05/07/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 16:35**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	26	1		Benzo (b) Fluoranthene	ND	26	1	
2-Methylnaphthalene	ND	26	1		Benzo (a) Pyrene	ND	26	1	
Acenaphthylene	ND	26	1		Benzo (g,h,i) Perylene	ND	26	1	
Acenaphthene	ND	26	1		Indeno (1,2,3-c,d) Pyrene	ND	26	1	
Fluorene	ND	26	1		Dibenz (a,h) Anthracene	ND	26	1	
Phenanthrene	ND	26	1		1-Methylnaphthalene	ND	26	1	
Anthracene	ND	26	1		Benzo (e) Pyrene	ND	26	1	
Fluoranthene	ND	26	1		Perylene	ND	26	1	
Pyrene	ND	26	1		Biphenyl	ND	26	1	
Benzo (a) Anthracene	ND	26	1		1-Methylphenanthrene	ND	26	1	
Chrysene	ND	26	1		2,6-Dimethylnaphthalene	ND	26	1	
Benzo (k) Fluoranthene	ND	26	1		1,6,7-Trimethylnaphthalene	ND	26	1	

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
Nitrobenzene-d5	124	18-162		2-Fluorobiphenyl	91	14-146	
p-Terphenyl-d14	73	34-148					

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PAHs
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S11	**09-05-0616-3-A**	**05/07/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 17:20**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	27	1		Benzo (b) Fluoranthene	ND	27	1	
2-Methylnaphthalene	ND	27	1		Benzo (a) Pyrene	ND	27	1	
Acenaphthylene	ND	27	1		Benzo (g,h,i) Perylene	ND	27	1	
Acenaphthene	ND	27	1		Indeno (1,2,3-c,d) Pyrene	ND	27	1	
Fluorene	ND	27	1		Dibenz (a,h) Anthracene	ND	27	1	
Phenanthrene	ND	27	1		1-Methylnaphthalene	ND	27	1	
Anthracene	ND	27	1		Benzo (e) Pyrene	ND	27	1	
Fluoranthene	ND	27	1		Perylene	ND	27	1	
Pyrene	ND	27	1		Biphenyl	ND	27	1	
Benzo (a) Anthracene	ND	27	1		1-Methylphenanthrene	ND	27	1	
Chrysene	ND	27	1		2,6-Dimethylnaphthalene	ND	27	1	
Benzo (k) Fluoranthene	ND	27	1		1,6,7-Trimethylnaphthalene	ND	27	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	129	18-162			2-Fluorobiphenyl	101	14-146		
p-Terphenyl-d14	83	34-148							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-COMP	**09-05-0616-4-A**	**05/07/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 18:06**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	25	1		Benzo (b) Fluoranthene	ND	25	1	
2-Methylnaphthalene	ND	25	1		Benzo (a) Pyrene	ND	25	1	
Acenaphthylene	ND	25	1		Benzo (g,h,i) Perylene	ND	25	1	
Acenaphthene	ND	25	1		Indeno (1,2,3-c,d) Pyrene	ND	25	1	
Fluorene	ND	25	1		Dibenz (a,h) Anthracene	ND	25	1	
Phenanthrene	ND	25	1		1-Methylnaphthalene	ND	25	1	
Anthracene	ND	25	1		Benzo (e) Pyrene	ND	25	1	
Fluoranthene	ND	25	1		Perylene	ND	25	1	
Pyrene	ND	25	1		Biphenyl	ND	25	1	
Benzo (a) Anthracene	ND	25	1		1-Methylphenanthrene	ND	25	1	
Chrysene	ND	25	1		2,6-Dimethylnaphthalene	ND	25	1	
Benzo (k) Fluoranthene	ND	25	1		1,6,7-Trimethylnaphthalene	ND	25	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	122	18-162			2-Fluorobiphenyl	95	14-146		
p-Terphenyl-d14	77	34-148							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8270C SIM PAHs
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-COMP (LAB DUPLICATE)	**09-05-0616-5-A**	**05/07/09 00:00**	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09 18:51**	**090511L01**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	25	1		Benzo (b) Fluoranthene	ND	25	1	
2-Methylnaphthalene	ND	25	1		Benzo (a) Pyrene	ND	25	1	
Acenaphthylene	ND	25	1		Benzo (g,h,i) Perylene	ND	25	1	
Acenaphthene	ND	25	1		Indeno (1,2,3-c,d) Pyrene	ND	25	1	
Fluorene	ND	25	1		Dibenz (a,h) Anthracene	ND	25	1	
Phenanthrene	ND	25	1		1-Methylnaphthalene	ND	25	1	
Anthracene	ND	25	1		Benzo (e) Pyrene	ND	25	1	
Fluoranthene	ND	25	1		Perylene	ND	25	1	
Pyrene	ND	25	1		Biphenyl	ND	25	1	
Benzo (a) Anthracene	ND	25	1		1-Methylphenanthrene	ND	25	1	
Chrysene	ND	25	1		2,6-Dimethylnaphthalene	ND	25	1	
Benzo (k) Fluoranthene	ND	25	1		1,6,7-Trimethylnaphthalene	ND	25	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	69	18-162			2-Fluorobiphenyl	55	14-146		
p-Terphenyl-d14	43	34-148							

Method Blank	099-12-471-23	N/A	Solid	GC/MS MM	05/11/09	05/15/09 12:00	090511L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Naphthalene	ND	20	1		Benzo (b) Fluoranthene	ND	20	1	
2-Methylnaphthalene	ND	20	1		Benzo (a) Pyrene	ND	20	1	
Acenaphthylene	ND	20	1		Benzo (g,h,i) Perylene	ND	20	1	
Acenaphthene	ND	20	1		Indeno (1,2,3-c,d) Pyrene	ND	20	1	
Fluorene	ND	20	1		Dibenz (a,h) Anthracene	ND	20	1	
Phenanthrene	ND	20	1		1-Methylnaphthalene	ND	20	1	
Anthracene	ND	20	1		Benzo (e) Pyrene	ND	20	1	
Fluoranthene	ND	20	1		Perylene	ND	20	1	
Pyrene	ND	20	1		Biphenyl	ND	20	1	
Benzo (a) Anthracene	ND	20	1		1-Methylphenanthrene	ND	20	1	
Chrysene	ND	20	1		2,6-Dimethylnaphthalene	ND	20	1	
Benzo (k) Fluoranthene	ND	20	1		1,6,7-Trimethylnaphthalene	ND	20	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
Nitrobenzene-d5	76	18-162			2-Fluorobiphenyl	56	14-146		
p-Terphenyl-d14	49	34-148							

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8082
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S3/4	**09-05-0616-1-A**	**05/07/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 15:45**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	12	1		Aroclor-1248	ND	12	1	
Aroclor-1221	ND	12	1		Aroclor-1254	ND	12	1	
Aroclor-1232	ND	12	1		Aroclor-1260	ND	12	1	
Aroclor-1242	ND	12	1		Aroclor-1262	ND	12	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	142	50-130		2	Decachlorobiphenyl	123	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S7	**09-05-0616-2-A**	**05/07/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 16:04**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	13	1		Aroclor-1248	ND	13	1	
Aroclor-1221	ND	13	1		Aroclor-1254	ND	13	1	
Aroclor-1232	ND	13	1		Aroclor-1260	ND	13	1	
Aroclor-1242	ND	13	1		Aroclor-1262	ND	13	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	128	50-130			Decachlorobiphenyl	115	50-130		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S11	**09-05-0616-3-A**	**05/07/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 13:36**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	14	1		Aroclor-1248	ND	14	1	
Aroclor-1221	ND	14	1		Aroclor-1254	ND	14	1	
Aroclor-1232	ND	14	1		Aroclor-1260	ND	14	1	
Aroclor-1242	ND	14	1		Aroclor-1262	ND	14	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	127	50-130			Decachlorobiphenyl	110	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8082
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-COMP	**09-05-0616-4-A**	**05/07/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 17:38**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	12	1		Aroclor-1248	ND	12	1	
Aroclor-1221	ND	12	1		Aroclor-1254	ND	12	1	
Aroclor-1232	ND	12	1		Aroclor-1260	ND	12	1	
Aroclor-1242	ND	12	1		Aroclor-1262	ND	12	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	111	50-130			Decachlorobiphenyl	99	50-130		

CNB-CAD-3-COMP (LAB DUPLICATE)	**09-05-0616-5-A**	**05/07/09 00:00**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 17:19**	**090511L06**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	13	1		Aroclor-1248	ND	13	1	
Aroclor-1221	ND	13	1		Aroclor-1254	ND	13	1	
Aroclor-1232	ND	13	1		Aroclor-1260	ND	13	1	
Aroclor-1242	ND	13	1		Aroclor-1262	ND	13	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	136	50-130		2	Decachlorobiphenyl	116	50-130		

Method Blank	**099-12-565-106**	**N/A**	**Solid**	**GC 31**	**05/11/09**	**05/18/09 11:41**	**090511L06**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aroclor-1016	ND	10	1		Aroclor-1248	ND	10	1	
Aroclor-1221	ND	10	1		Aroclor-1254	ND	10	1	
Aroclor-1232	ND	10	1		Aroclor-1260	ND	10	1	
Aroclor-1242	ND	10	1		Aroclor-1262	ND	10	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
2,4,5,6-Tetrachloro-m-Xylene	107	50-130			Decachlorobiphenyl	88	50-130		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA	Date Received:	05/07/09
28202 Cabot Road, Suite 425	Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271	Preparation:	EPA 3545
	Method:	EPA 8081A
	Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S3/4	**09-05-0616-1-A**	**05/07/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 16:26**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.2	1		4,4'-DDT	ND	1.2	1	
Alpha-BHC	ND	1.2	1		Endosulfan I	ND	1.2	1	
Beta-BHC	ND	1.2	1		Endosulfan II	ND	1.2	1	
Delta-BHC	ND	1.2	1		Endosulfan Sulfate	ND	1.2	1	
Gamma-BHC	ND	1.2	1		Endrin	ND	1.2	1	
Chlordane	ND	12	1		Endrin Aldehyde	ND	1.2	1	
Dieldrin	ND	1.2	1		Endrin Ketone	ND	1.2	1	
Trans-nonachlor	ND	1.2	1		Heptachlor	ND	1.2	1	
2,4'-DDD	ND	1.2	1		Heptachlor Epoxide	ND	1.2	1	
Cis-nonachlor	ND	1.2	1		Methoxychlor	ND	1.2	1	
2,4'-DDE	ND	1.2	1		Toxaphene	ND	25	1	
2,4'-DDT	ND	1.2	1		Alpha Chlordane	ND	1.2	1	
4,4'-DDD	ND	1.2	1		Gamma Chlordane	ND	1.2	1	
4,4'-DDE	ND	1.2	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	104	50-130		Decachlorobiphenyl	81	50-130	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S7	**09-05-0616-2-A**	**05/07/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 16:53**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.3	1		4,4'-DDT	ND	1.3	1	
Alpha-BHC	ND	1.3	1		Endosulfan I	ND	1.3	1	
Beta-BHC	ND	1.3	1		Endosulfan II	ND	1.3	1	
Delta-BHC	ND	1.3	1		Endosulfan Sulfate	ND	1.3	1	
Gamma-BHC	ND	1.3	1		Endrin	ND	1.3	1	
Chlordane	ND	13	1		Endrin Aldehyde	ND	1.3	1	
Dieldrin	ND	1.3	1		Endrin Ketone	ND	1.3	1	
Trans-nonachlor	ND	1.3	1		Heptachlor	ND	1.3	1	
Cis-nonachlor	ND	1.3	1		Heptachlor Epoxide	ND	1.3	1	
2,4'-DDD	ND	1.3	1		Methoxychlor	ND	1.3	1	
2,4'-DDE	ND	1.3	1		Toxaphene	ND	26	1	
2,4'-DDT	ND	1.3	1		Alpha Chlordane	ND	1.3	1	
4,4'-DDD	ND	1.3	1		Gamma Chlordane	ND	1.3	1	
4,4'-DDE	ND	1.3	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	102	50-130		Decachlorobiphenyl	79	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-S11	**09-05-0616-3-A**	**05/07/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 15:59**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.4	1		4,4'-DDT	ND	1.4	1	
Alpha-BHC	ND	1.4	1		Endosulfan I	ND	1.4	1	
Beta-BHC	ND	1.4	1		Endosulfan II	ND	1.4	1	
Delta-BHC	ND	1.4	1		Endosulfan Sulfate	ND	1.4	1	
Gamma-BHC	ND	1.4	1		Endrin	ND	1.4	1	
Chlordane	ND	14	1		Endrin Aldehyde	ND	1.4	1	
Dieldrin	ND	1.4	1		Endrin Ketone	ND	1.4	1	
2,4'-DDD	ND	1.4	1		Heptachlor	ND	1.4	1	
Trans-nonachlor	ND	1.4	1		Heptachlor Epoxide	ND	1.4	1	
Cis-nonachlor	ND	1.4	1		Methoxychlor	ND	1.4	1	
2,4'-DDE	ND	1.4	1		Toxaphene	ND	27	1	
2,4'-DDT	ND	1.4	1		Alpha Chlordane	ND	1.4	1	
4,4'-DDD	ND	1.4	1		Gamma Chlordane	ND	1.4	1	
4,4'-DDE	ND	1.4	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	106	50-130		Decachlorobiphenyl	80	50-130	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-COMP	**09-05-0616-4-A**	**05/07/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 17:20**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.2	1		4,4'-DDT	ND	1.2	1	
Alpha-BHC	ND	1.2	1		Endosulfan I	ND	1.2	1	
Beta-BHC	ND	1.2	1		Endosulfan II	ND	1.2	1	
Delta-BHC	ND	1.2	1		Endosulfan Sulfate	ND	1.2	1	
Gamma-BHC	ND	1.2	1		Endrin	ND	1.2	1	
Chlordane	ND	12	1		Endrin Aldehyde	ND	1.2	1	
Dieldrin	ND	1.2	1		Endrin Ketone	ND	1.2	1	
Trans-nonachlor	ND	1.2	1		Heptachlor	ND	1.2	1	
Cis-nonachlor	ND	1.2	1		Heptachlor Epoxide	ND	1.2	1	
2,4'-DDD	ND	1.2	1		Methoxychlor	ND	1.2	1	
2,4'-DDE	ND	1.2	1		Toxaphene	ND	25	1	
2,4'-DDT	ND	1.2	1		Alpha Chlordane	ND	1.2	1	
4,4'-DDD	ND	1.2	1		Gamma Chlordane	ND	1.2	1	
4,4'-DDE	ND	1.2	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	95	50-130		Decachlorobiphenyl	76	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3545
		Method:	EPA 8081A
		Units:	ug/kg
Project: Newport Harbor			Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
CNB-CAD-3-COMP (LAB DUPLICATE)	**09-05-0616-5-A**	**05/07/09 00:00**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 17:48**	**090511L05**

Comment(s): -Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.3	1		4,4'-DDT	ND	1.3	1	
Alpha-BHC	ND	1.3	1		Endosulfan I	ND	1.3	1	
Beta-BHC	ND	1.3	1		Endosulfan II	ND	1.3	1	
Delta-BHC	ND	1.3	1		Endosulfan Sulfate	ND	1.3	1	
Gamma-BHC	ND	1.3	1		Endrin	ND	1.3	1	
Chlordane	ND	13	1		Endrin Aldehyde	ND	1.3	1	
Dieldrin	ND	1.3	1		Endrin Ketone	ND	1.3	1	
Trans-nonachlor	ND	1.3	1		Heptachlor	ND	1.3	1	
2,4'-DDD	ND	1.3	1		Heptachlor Epoxide	ND	1.3	1	
Cis-nonachlor	ND	1.3	1		Methoxychlor	ND	1.3	1	
2,4'-DDE	ND	1.3	1		Toxaphene	ND	25	1	
2,4'-DDT	ND	1.3	1		Alpha Chlordane	ND	1.3	1	
4,4'-DDD	ND	1.3	1		Gamma Chlordane	ND	1.3	1	
4,4'-DDE	ND	1.3	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	112	50-130		Decachlorobiphenyl	86	50-130	

Method Blank	**099-12-858-29**	**N/A**	**Solid**	**GC 51**	**05/11/09**	**05/19/09 12:21**	**090511L05**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Aldrin	ND	1.0	1		4,4'-DDT	ND	1.0	1	
Alpha-BHC	ND	1.0	1		Endosulfan I	ND	1.0	1	
Beta-BHC	ND	1.0	1		Endosulfan II	ND	1.0	1	
Delta-BHC	ND	1.0	1		Endosulfan Sulfate	ND	1.0	1	
Gamma-BHC	ND	1.0	1		Endrin	ND	1.0	1	
Chlordane	ND	10	1		Endrin Aldehyde	ND	1.0	1	
Dieldrin	ND	1.0	1		Endrin Ketone	ND	1.0	1	
Trans-nonachlor	ND	1.0	1		Heptachlor	ND	1.0	1	
2,4'-DDD	ND	1.0	1		Heptachlor Epoxide	ND	1.0	1	
Cis-nonachlor	ND	1.0	1		Methoxychlor	ND	1.0	1	
2,4'-DDE	ND	1.0	1		Toxaphene	ND	20	1	
2,4'-DDT	ND	1.0	1		Alpha Chlordane	ND	1.0	1	
4,4'-DDD	ND	1.0	1		Gamma Chlordane	ND	1.0	1	
4,4'-DDE	ND	1.0	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
2,4,5,6-Tetrachloro-m-Xylene	104	50-130		Decachlorobiphenyl	101	50-130	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date Collected	Matrix
CNB-CAD-3-S3/4	**09-05-0616-1**	**05/07/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	0.37	0.12	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.12	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	1200	620	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	80.1	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	0.35	0.25	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

Client Sample Number	Lab Sample Number	Date Collected	Matrix
CNB-CAD-3-S7	**09-05-0616-2**	**05/07/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	0.66	0.13	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.13	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	1000	660	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	76.2	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	0.37	0.26	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

Client Sample Number	Lab Sample Number	Date Collected	Matrix
CNB-CAD-3-S11	**09-05-0616-3**	**05/07/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	0.27	0.14	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.14	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	810	680	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	73.8	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	0.76	0.27	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616

Project: Newport Harbor

Client Sample Number	Lab Sample Number	Date Collected	Matrix
CNB-CAD-3-COMP	**09-05-0616-4**	**05/07/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	1.2	0.12	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.12	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	740	620	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	80.9	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	0.69	0.25	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

CNB-CAD-3-COMP (LAB DUPLICATE)	**09-05-0616-5**	**05/07/09**	**Solid**

Comment(s): (9) Results are reported on a dry weight basis.

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total (9)	1.3	0.13	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved (9)	ND	0.13	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic (9)	1000	640	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	78.7	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N) (9)	0.71	0.25	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

Method Blank	**N/A**	**Solid**

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Sulfide, Total	ND	0.10	0.2		mg/kg	05/12/09	05/12/09	EPA 376.2M
Sulfide, Dissolved	ND	0.10	0.2		mg/kg	05/11/09	05/11/09	EPA 376.2M
Carbon, Total Organic	ND	500	1		mg/kg	N/A	05/07/09	EPA 9060A
Solids, Total	ND	0.100	1		%	05/12/09	05/12/09	SM 2540 B
Ammonia (as N)	ND	0.20	1		mg/kg	05/15/09	05/15/09	SM 4500-NH3 B/C (M)

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616
Preparation: EPA 3050B
Method: EPA 6020

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CNB-CAD-3-S11	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09**	**090508S07**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Antimony	79	83	80-120	5	0-20	3
Arsenic	101	108	80-120	6	0-20	
Beryllium	109	113	80-120	3	0-20	
Cadmium	102	105	80-120	3	0-20	
Chromium	100	101	80-120	1	0-20	
Copper	111	105	80-120	4	0-20	
Lead	99	101	80-120	2	0-20	
Nickel	103	105	80-120	2	0-20	
Selenium	101	103	80-120	2	0-20	
Silver	99	102	80-120	3	0-20	
Thallium	97	101	80-120	4	0-20	
Zinc	106	106	80-120	0	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - PDS / PDSD

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA		Date Received	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 3050B
		Method:	EPA 6020

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
CNB-CAD-3-S11	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09**	**090508S07**

Parameter	PDS %REC	PDSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Antimony	104	103	75-125	1	0-20	
Arsenic	106	110	75-125	4	0-20	
Beryllium	113	109	75-125	4	0-20	
Cadmium	105	103	75-125	1	0-20	
Chromium	96	94	75-125	2	0-20	
Copper	106	102	75-125	3	0-20	
Lead	100	101	75-125	1	0-20	
Nickel	103	101	75-125	2	0-20	
Selenium	104	101	75-125	3	0-20	
Silver	104	100	75-125	4	0-20	
Thallium	101	102	75-125	1	0-20	
Zinc	104	101	75-125	3	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA		Date Received:	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 7471A Total
		Method:	EPA 7471A

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CNB-CAD-3-S11	**Solid**	**Mercury**	**05/08/09**	**05/08/09**	**090508S02**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	112	112	71-137	0	0-14	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - PDS / PDSD

ACCREDITED IN ACCORDANCE WITH nelac

Anchor QEA		Date Received	05/07/09
28202 Cabot Road, Suite 425		Work Order No:	09-05-0616
Laguna Niguel, CA 92677-1271		Preparation:	EPA 7471A Total
		Method:	EPA 7471A

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
CNB-CAD-3-S11	**Solid**	**Mercury**	**05/08/09**	**05/08/09**	**090508S02**

Parameter	PDS %REC	PDSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	107	110	75-125	3	0-14	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: Organotins by Krone et al.

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CNB-CAD-3-S11	**Solid**	**GC/MS Y**	**05/14/09**	**05/15/09**	**090514S12**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	112	126	50-130	11	0-20	
Tributyltin	120	145	50-130	19	0-20	3

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: EPA 8270C SIM PAHs

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CNB-CAD-3-S11	**Solid**	**GC/MS MM**	**05/11/09**	**05/15/09**	**090511S01**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Naphthalene	138	138	40-160	0	0-20	
2-Methylnaphthalene	141	142	40-160	0	0-20	
Acenaphthylene	132	131	40-160	0	0-20	
Acenaphthene	137	138	40-160	0	0-20	
Fluorene	139	139	40-160	0	0-20	
Phenanthrene	141	138	40-160	2	0-20	
Anthracene	117	122	40-160	4	0-20	
Fluoranthene	116	126	40-160	8	0-20	
Pyrene	122	120	40-160	2	0-46	
Benzo (a) Anthracene	131	132	40-160	1	0-20	
Chrysene	129	125	40-160	3	0-20	
Benzo (k) Fluoranthene	147	146	40-160	1	0-20	
Benzo (b) Fluoranthene	150	154	40-160	3	0-20	
Benzo (a) Pyrene	143	143	40-160	0	0-20	
Benzo (g,h,i) Perylene	135	133	40-160	2	0-20	
Indeno (1,2,3-c,d) Pyrene	158	149	40-160	6	0-20	
Dibenz (a,h) Anthracene	138	136	40-160	2	0-20	
1-Methylnaphthalene	141	141	40-160	0	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: EPA 8082

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CNB-CAD-3-S11	**Solid**	**GC 31**	**05/11/09**	**05/18/09**	**090511S06**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aroclor-1016	120	126	50-135	5	0-25	
Aroclor-1260	90	96	50-135	6	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: 05/07/09
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: EPA 8081A

Project Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CNB-CAD-3-S11	**Solid**	**GC 51**	**05/11/09**	**05/19/09**	**090511S05**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aldrin	96	94	50-135	2	0-25	
Alpha-BHC	89	88	50-135	1	0-25	
Beta-BHC	99	97	50-135	2	0-25	
Delta-BHC	106	103	50-135	2	0-25	
Gamma-BHC	93	92	50-135	2	0-25	
Dieldrin	87	85	50-135	2	0-25	
4,4'-DDD	94	89	50-135	5	0-25	
4,4'-DDE	99	97	50-135	2	0-25	
4,4'-DDT	91	88	50-135	3	0-25	
Endosulfan I	88	86	50-135	2	0-25	
Endosulfan II	87	84	50-135	4	0-25	
Endosulfan Sulfate	84	80	50-135	4	0-25	
Endrin	99	96	50-135	3	0-25	
Endrin Aldehyde	66	73	50-135	10	0-25	
Endrin Ketone	83	75	50-135	9	0-25	
Heptachlor	100	98	50-135	2	0-25	
Heptachlor Epoxide	88	87	50-135	1	0-25	
Methoxychlor	91	88	50-135	3	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616

Project: Newport Harbor

Matrix: Solid

Parameter	Method	Quality Control Sample ID	Date Analyzed	Date Extracted	MS% REC	MSD % REC	%REC CL	RPD	RPD CL	Qualifiers
Carbon, Total Organic	EPA 9060A	CNB-CAD-3-S11	05/07/09	N/A	94	93	75-125	1	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616

Project: Newport Harbor

Matrix: Solid

Parameter	Method	QC Sample ID	Date Analyzed	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Sulfide, Total	EPA 376.2M	CNB-CAD-3-S11	05/12/09	0.27	0.27	0	0-25	
Sulfide, Dissolved	EPA 376.2M	CNB-CAD-3-S11	05/11/09	ND	ND	NA	0-25	
Ammonia (as N)	SM 4500-NH3 B/C (M)	CNB-CAD-3-S11	05/15/09	0.76	0.76	0	0-25	
Solids, Total	SM 2540 B	CNB-CAD-3-S11	05/12/09	73.8	72.7	2	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616
Preparation: EPA 3050B
Method: EPA 6020

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
096-10-002-1,503	**Solid**	**ICP/MS 03**	**05/08/09**	**05/11/09**	**090508L07**

Parameter	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Antimony	92	92	80-120	73-127	1	0-20	
Arsenic	90	83	80-120	73-127	8	0-20	
Beryllium	108	111	80-120	73-127	2	0-20	
Cadmium	100	98	80-120	73-127	1	0-20	
Chromium	91	92	80-120	73-127	0	0-20	
Copper	103	102	80-120	73-127	1	0-20	
Lead	96	96	80-120	73-127	0	0-20	
Nickel	98	99	80-120	73-127	1	0-20	
Selenium	96	94	80-120	73-127	2	0-20	
Silver	99	99	80-120	73-127	0	0-20	
Thallium	99	96	80-120	73-127	2	0-20	
Zinc	100	99	80-120	73-127	1	0-20	

Total number of LCS compounds : 12
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616
Preparation: EPA 7471A Total
Method: EPA 7471A

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-04-007-6,279	**Solid**	**Mercury**	**05/08/09**	**05/08/09**	**090508L02**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	102	101	85-121	1	0-10	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: Organotins by Krone et al.

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-07-016-653	**Solid**	**GC/MS Y**	**05/14/09**	**05/17/09**	**090514L12**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Tetrabutyltin	94	90	50-130	4	0-20	
Tributyltin	91	104	50-130	13	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: EPA 8270C SIM PAHs

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-471-23	**Solid**	**GC/MS MM**	**05/11/09**	**05/16/09**	**090511L01**

Parameter	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Naphthalene	77	77	40-160	20-180	0	0-20	
2-Methylnaphthalene	78	78	40-160	20-180	1	0-20	
Acenaphthylene	73	74	40-160	20-180	1	0-20	
Acenaphthene	79	79	48-108	38-118	0	0-11	
Fluorene	77	77	40-160	20-180	1	0-20	
Phenanthrene	80	80	40-160	20-180	0	0-20	
Anthracene	59	59	40-160	20-180	1	0-20	
Fluoranthene	74	75	40-160	20-180	1	0-20	
Pyrene	79	77	40-160	20-180	2	0-16	
Benzo (a) Anthracene	76	77	40-160	20-180	0	0-20	
Chrysene	73	73	40-160	20-180	1	0-20	
Benzo (k) Fluoranthene	77	80	40-160	20-180	3	0-20	
Benzo (b) Fluoranthene	84	85	40-160	20-180	2	0-20	
Benzo (a) Pyrene	78	79	40-160	20-180	1	0-20	
Benzo (g,h,i) Perylene	77	74	40-160	20-180	3	0-20	
Indeno (1,2,3-c,d) Pyrene	82	82	40-160	20-180	0	0-20	
Dibenz (a,h) Anthracene	66	65	40-160	20-180	1	0-20	
1-Methylnaphthalene	77	78	40-160	20-180	2	0-20	

Total number of LCS compounds : 18
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: EPA 8082

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-565-106	**Solid**	**GC 31**	**05/11/09**	**05/18/09**	**090511L06**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Aroclor-1016	118	99	50-135	17	0-25	
Aroclor-1260	107	94	50-135	12	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616
Preparation: EPA 3545
Method: EPA 8081A

Project: Newport Harbor

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-858-29	**Solid**	**GC 51**	**05/11/09**	**05/19/09**	**090511L05**

Parameter	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Aldrin	99	91	50-135	36-149	8	0-25	
Alpha-BHC	100	92	50-135	36-149	8	0-25	
Beta-BHC	100	93	50-135	36-149	7	0-25	
Delta-BHC	106	97	50-135	36-149	9	0-25	
Gamma-BHC	101	93	50-135	36-149	8	0-25	
Dieldrin	98	91	50-135	36-149	7	0-25	
4,4'-DDD	100	93	50-135	36-149	6	0-25	
4,4'-DDE	95	92	50-135	36-149	3	0-25	
4,4'-DDT	99	92	50-135	36-149	7	0-25	
Endosulfan I	94	90	50-135	36-149	4	0-25	
Endosulfan II	95	89	50-135	36-149	6	0-25	
Endosulfan Sulfate	96	90	50-135	36-149	7	0-25	
Endrin	103	95	50-135	36-149	8	0-25	
Endrin Aldehyde	98	90	50-135	36-149	8	0-25	
Endrin Ketone	91	86	50-135	36-149	6	0-25	
Heptachlor	102	94	50-135	36-149	8	0-25	
Heptachlor Epoxide	93	91	50-135	36-149	3	0-25	
Methoxychlor	96	90	50-135	36-149	7	0-25	

Total number of LCS compounds : 18
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Laboratory Control Sample

Anchor QEA
28202 Cabot Road, Suite 425
Laguna Niguel, CA 92677-1271

Date Received: N/A
Work Order No: 09-05-0616

Project: Newport Harbor

Matrix : Solid

Parameter	Method	Quality Control Sample ID	Date Analyzed	Date Extracted	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	Qualifiers
Carbon, Total Organic	EPA 9060A	099-06-013-380	05/07/09	N/A	6000	5440	91	80-120	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 09-05-0616

Qualifier	Definition
*	See applicable analysis comment.
1	Surrogate compound recovery was out of control due to a required sample dilution, therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported with no further corrective action required.
A	Result is the average of all dilutions, as defined by the method.
B	Analyte was present in the associated method blank.
C	Analyte presence was not confirmed on primary column.
E	Concentration exceeds the calibration range.
H	Sample received and/or analyzed past the recommended holding time.
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
ME	LCS Recovery Percentage is within LCS ME Control Limit range.
N	Nontarget Analyte.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
U	Undetected at the laboratory method detection limit.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture.

Chain of Custody Record & Laboratory Analysis Request

Page 1 of 1 Turnaround Requested: standard

Anchor Contact: Tracy Stoffrahn

0616

ANCHOR ENVIRONMENTAL CA, L.P.
28202 Cabot Road, Suite ~~620~~ 425
Laguna Niguel, CA 92677
Ph: (949) 347-2780 Fax: (949) 347-2781

Lab Contact:	Proj. Name:	Analyses Requested										Notes/ Comments:
Danielle Gonsman	Newport Harbor											
Lab: Calscience	Proj. Number: 090843-01											
Address: 7440 Lincoln Way	Sampler: MPW / TLS											
Garden Grove, CA 92841												
Phone: 714-895-5494	Shipping Method: CEL Pick-up											
Fax: 714-894-7501	AirBill:											

Sample ID	Sample Date	Sample Time	Sample Martix	# Containers	EPA 6020 / 7471 Priority Pollutant Metals / Mercury	EPA 8082 PCBs	EPA 8081A oc Pesticides	ASTM D4464 Grain Size	EPA 8270 oc SIMS PAHs	EPA 9060A TOC	SM 2540 B Total Solids	Kuenc et al. Organotins	SM 4500-NH3 Ammonia	EPA 376.2 M Sulfide (Total + Dissolved)	
CNB-CAD-3-S314	5-7-09		SED	2	X	X	X		X	X	X	X	X	X	
CNB-CAD-3-S7	↓		↓	3	X	X	X	X	X	X	X	X	X	X	
CNB-CAD-3-S11				4	X	X	X	X	X	X	X	X	X	X	extra-matrix spike
CNB-CAD-3-COMP	↓		↓	5	X	X	X	X	X	X	X	X	X	X	extra-dup

Relinquished: (Signature)	Relinquished: (Signature)	Relinquished: (Signature)	Special Instructions/Notes
Printed Name: MARK REEMTS	Printed Name: PHUONG CE	Printed Name:	
Company: Anchor QEA	Company: CEL	Company:	
Date/Time: 5/7/09 2:30pm	Date/Time: 5/7/09 1605	Date/Time:	
Received By:	Received By:	Received By:	
Printed Name: PHUONG CE	Printed Name: J. PATEL	Printed Name:	
Company: CEL	Company: CEL	Company:	# of Coolers: / Cooler Temp(s):
Date/Time: 5/7/09 1630	Date/Time: 5/7/09 1605	Date/Time:	COC Seals Intact? / Bottles Intact?

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 09-05- 0 8 1 6

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: ANCHOR DATE: 5/7/09

TEMPERATURE: (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 4.4 °C - 0.2 °C (CF) = 4.2 °C ☑ **Blank** ☐ **Sample**

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter ☐ Metals Only ☐ PCBs Only **Initial:** pl

CUSTODY SEALS INTACT:

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A **Initial:** pl

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present **Initial:**

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ COC not relinquished. ☐ No date relinquished. ☐ No time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Correct containers and volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☐
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☑8ozCGJ ☑16ozCGJ ☐Sleeve ☐EnCores® ☐TerraCores® ☐_____

Water: ☐VOA ☐VOA**h** ☐VOA**na_2** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na_2** ☐1AGB**s** ☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐500PB ☐500PB**na** ☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PB ☐100PB**na_2** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Summa® ☐_____ **Other:** ☐_____ **Checked/Labeled by:**

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar (Wide-mouth) **B:** Bottle (Narrow-mouth) **Reviewed by:**

Preservative: **h:** HCL **n:** HNO3 **na_2:**$Na_2S_2O_3$ **Na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **znna:** $ZnAc_2$+NaOH **f:** Field-filtered **Scanned by:**

PTS Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

May 22, 2009

Danielle Gonsman
Calscience
7440 Lincoln Way
Garden Grove, CA 92841-1427

Re: PTS File No: 39401
09-05-0616

Dear Ms. Gonsman:

Please find enclosed report for Physical Properties analyses conducted upon samples received from your 09-05-0616 project. All analyses were performed by applicable ASTM, EPA, or API methodologies. An electronic version of the report has previously been sent to your attention via the internet. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please give me a call at (562) 347-2504.

Sincerely,
PTS Laboratories

Rachel Spitz
Project Manager

Encl.

PTS Laboratories

Project Name: N/A
Project Number: 09-05-0616

PTS File No: 39401
Client: Calscience

TEST PROGRAM

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis ASTM D4464M						Notes
		Plugs:	Grab						
Rcvd. 5/11/09									
CNB-CAD-3-COMP	N/A	N/A	X						
CNB-CAD-3-S7	N/A	N/A	X						
CNB-CAD-3-S11	N/A	N/A	X						
TOTALS:	3 Jars		3						

Laboratory Test Program Notes

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: N/A
PROJECT NO: 09-05-0616

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
CNB-CAD-3-COMP	N/A	Fine sand	0.233	0.00	0.00	18.10	72.05	8.14	1.71	9.85
CNB-CAD-3-S7	N/A	Fine sand	0.157	0.00	0.00	12.27	72.17	13.43	2.14	15.56
CNB-CAD-3-S11	N/A	Fine sand	0.260	0.00	0.00	18.91	73.46	6.29	1.33	7.63

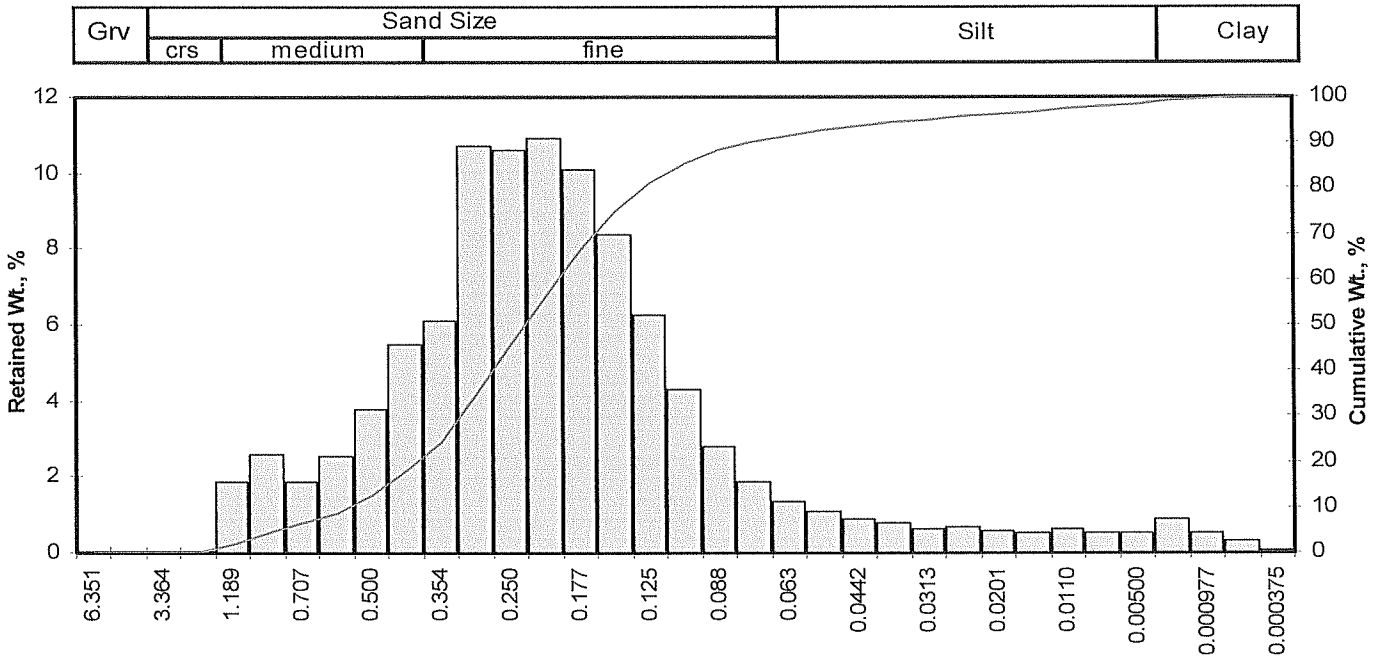
(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: Calscience
Project: N/A
Project No: 09-05-0616

PTS File No: 39401
Sample ID: CNB-CAD-3-COMP
Depth, ft: N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.87	1.87	1.87
0.0331	0.841	0.25	20	2.56	2.56	4.43
0.0278	0.707	0.50	25	1.85	1.85	6.29
0.0234	0.595	0.75	30	2.54	2.54	8.83
0.0197	0.500	1.00	35	3.78	3.78	12.61
0.0166	0.420	1.25	40	5.48	5.49	18.10
0.0139	0.354	1.50	45	6.09	6.10	24.19
0.0117	0.297	1.75	50	10.70	10.71	34.90
0.0098	0.250	2.00	60	10.60	10.61	45.52
0.0083	0.210	2.25	70	10.90	10.91	56.43
0.0070	0.177	2.50	80	10.10	10.11	66.54
0.0059	0.149	2.75	100	8.36	8.37	74.90
0.0049	0.125	3.00	120	6.25	6.26	81.16
0.0041	0.105	3.25	140	4.29	4.29	85.46
0.0035	0.088	3.50	170	2.81	2.81	88.27
0.0029	0.074	3.75	200	1.88	1.88	90.15
0.0025	0.063	4.00	230	1.36	1.36	91.51
0.0021	0.053	4.25	270	1.07	1.07	92.58
0.00174	0.0442	4.50	325	0.89	0.89	93.47
0.00146	0.0372	4.75	400	0.75	0.75	94.22
0.00123	0.0313	5.00	450	0.64	0.64	94.86
0.000986	0.0250	5.32	500	0.68	0.68	95.55
0.000790	0.0201	5.64	635	0.57	0.57	96.12
0.000615	0.0156	6.00		0.53	0.53	96.65
0.000435	0.0110	6.50		0.61	0.61	97.26
0.000308	0.00781	7.00		0.50	0.50	97.76
0.000197	0.00500	7.65		0.53	0.53	98.29
0.000077	0.00195	9.00		0.87	0.87	99.16
0.000038	0.000977	10.00		0.51	0.51	99.67
0.000019	0.000488	11.00		0.30	0.30	99.97
0.000015	0.000375	11.38		0.03	0.03	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.33	0.0314	0.798
10	0.83	0.0222	0.564
16	1.15	0.0177	0.449
25	1.52	0.0137	0.349
40	1.87	0.0108	0.274
50	2.10	0.0092	0.233
60	2.34	0.0078	0.198
75	2.75	0.0058	0.148
84	3.17	0.0044	0.111
90	3.73	0.0030	0.075
95	5.06	0.0012	0.030

Measure	Trask	Inman	Folk-Ward
Median, phi	2.10	2.10	2.10
Median, in.	0.0092	0.0092	0.0092
Median, mm	0.233	0.233	0.233
Mean, phi	2.01	2.16	2.14
Mean, in.	0.0098	0.0088	0.0089
Mean, mm	0.249	0.224	0.227
Sorting	1.534	1.005	1.220
Skewness	0.977	0.057	0.153
Kurtosis	0.206	1.356	1.572

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	18.10
Fine Sand	200	72.05
Silt	>0.005 mm	8.14
Clay	<0.005 mm	1.71
	Total	**100**

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Fax: (562) 907-3610

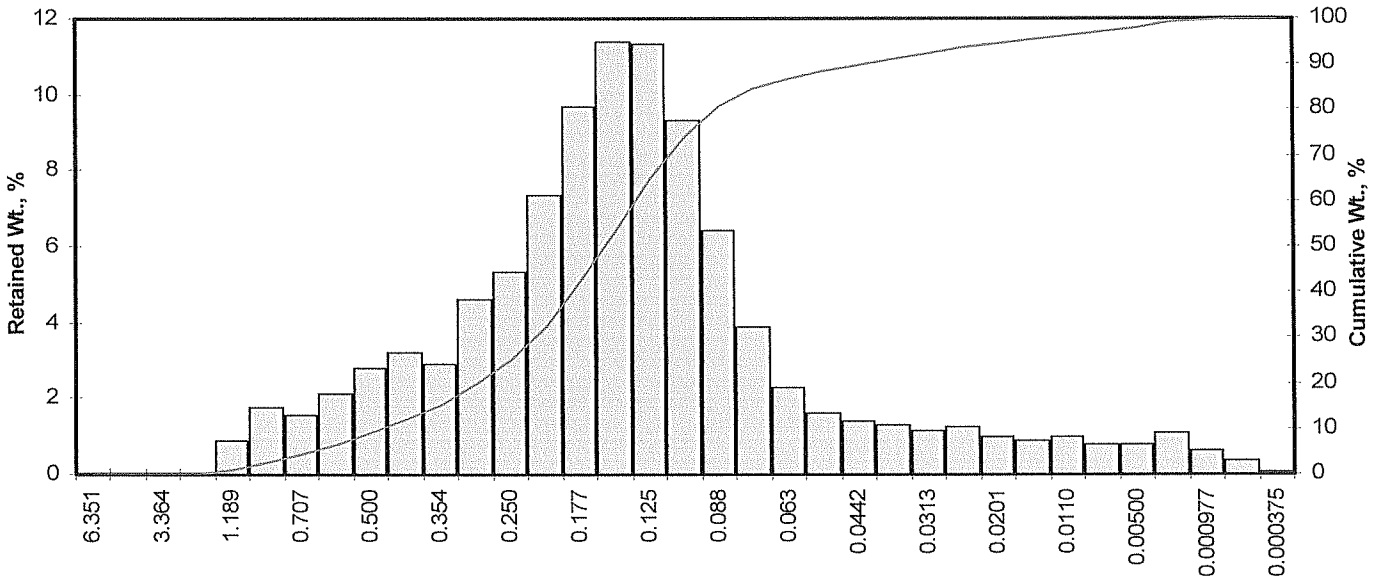
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: Calscience
Project: N/A
Project No: 09-05-0616

PTS File No: 39401
Sample ID: CNB-CAD-3-S7
Depth, ft: N/A

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Particle Size, mm

Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.88	0.88	0.88
0.0331	0.841	0.25	20	1.76	1.76	2.64
0.0278	0.707	0.50	25	1.53	1.53	4.17
0.0234	0.595	0.75	30	2.13	2.13	6.30
0.0197	0.500	1.00	35	2.78	2.78	9.08
0.0166	0.420	1.25	40	3.18	3.18	12.27
0.0139	0.354	1.50	45	2.87	2.87	15.14
0.0117	0.297	1.75	50	4.61	4.61	19.75
0.0098	0.250	2.00	60	5.30	5.30	25.05
0.0083	0.210	2.25	70	7.36	7.36	32.41
0.0070	0.177	2.50	80	9.68	9.68	42.10
0.0059	0.149	2.75	100	11.40	11.40	53.50
0.0049	0.125	3.00	120	11.30	11.30	64.81
0.0041	0.105	3.25	140	9.32	9.32	74.13
0.0035	0.088	3.50	170	6.43	6.43	80.56
0.0029	0.074	3.75	200	3.87	3.87	84.44
0.0025	0.063	4.00	230	2.30	2.30	86.74
0.0021	0.053	4.25	270	1.62	1.62	88.36
0.00174	0.0442	4.50	325	1.41	1.41	89.77
0.00146	0.0372	4.75	400	1.29	1.29	91.06
0.00123	0.0313	5.00	450	1.14	1.14	92.20
0.000986	0.0250	5.32	500	1.22	1.22	93.42
0.000790	0.0201	5.64	635	0.99	0.99	94.41
0.000615	0.0156	6.00		0.90	0.90	95.31
0.000435	0.0110	6.50		1.00	1.00	96.31
0.000308	0.00781	7.00		0.78	0.78	97.09
0.000197	0.00500	7.65		0.77	0.77	97.86
0.000077	0.00195	9.00		1.11	1.11	98.97
0.000038	0.000977	10.00		0.62	0.62	99.59
0.000019	0.000488	11.00		0.37	0.37	99.96
0.000015	0.000375	11.38		0.04	0.04	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.60	0.0260	0.661
10	1.07	0.0187	0.476
16	1.55	0.0135	0.342
25	2.00	0.0099	0.250
40	2.45	0.0072	0.184
50	2.67	0.0062	0.157
60	2.89	0.0053	0.135
75	3.28	0.0040	0.103
84	3.72	0.0030	0.076
90	4.55	0.0017	0.043
95	5.88	0.0007	0.017

Measure	Trask	Inman	Folk-Ward
Median, phi	2.67	2.67	2.67
Median, in.	0.0062	0.0062	0.0062
Median, mm	0.157	0.157	0.157
Mean, phi	2.50	2.63	2.65
Mean, in.	0.0070	0.0063	0.0063
Mean, mm	0.177	0.161	0.160
Sorting	1.562	1.088	1.344
Skewness	1.023	-0.036	0.089
Kurtosis	0.171	1.427	1.682
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	12.27
Fine Sand	200	72.17
Silt	>0.005 mm	13.43
Clay	<0.005 mm	2.14
	Total	**100**

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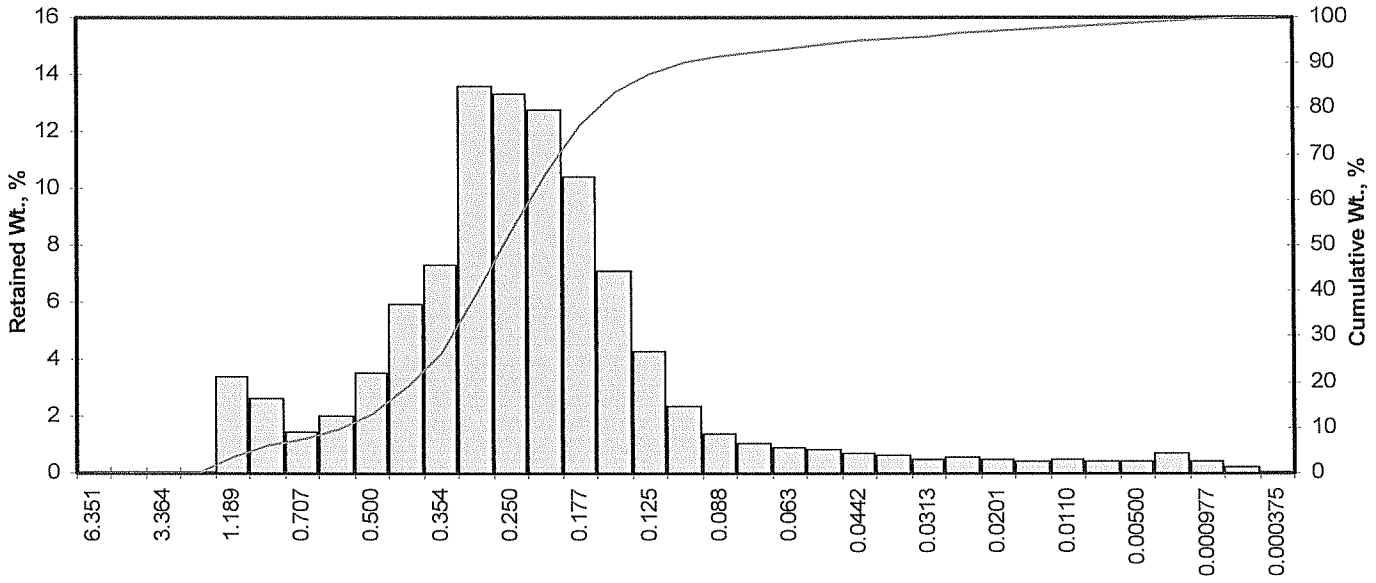
Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	Calscience	**PTS File No:**	39401
Project:	N/A	**Sample ID:**	CNB-CAD-3-S11
Project No:	09-05-0616	**Depth, ft:**	N/A

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Particle Size, mm

Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	3.40	3.40	3.40
0.0331	0.841	0.25	20	2.62	2.62	6.01
0.0278	0.707	0.50	25	1.43	1.43	7.44
0.0234	0.595	0.75	30	2.01	2.01	9.45
0.0197	0.500	1.00	35	3.50	3.50	12.95
0.0166	0.420	1.25	40	5.97	5.96	18.91
0.0139	0.354	1.50	45	7.35	7.34	26.26
0.0117	0.297	1.75	50	13.60	13.59	39.84
0.0098	0.250	2.00	60	13.30	13.29	53.13
0.0083	0.210	2.25	70	12.80	12.79	65.92
0.0070	0.177	2.50	80	10.40	10.39	76.31
0.0059	0.149	2.75	100	7.14	7.13	83.44
0.0049	0.125	3.00	120	4.25	4.25	87.69
0.0041	0.105	3.25	140	2.32	2.32	90.01
0.0035	0.088	3.50	170	1.36	1.36	91.36
0.0029	0.074	3.75	200	1.01	1.01	92.37
0.0025	0.063	4.00	230	0.90	0.90	93.27
0.0021	0.053	4.25	270	0.82	0.82	94.09
0.00174	0.0442	4.50	325	0.71	0.71	94.80
0.00146	0.0372	4.75	400	0.59	0.59	95.39
0.00123	0.0313	5.00	450	0.50	0.50	95.89
0.000986	0.0250	5.32	500	0.55	0.55	96.44
0.000790	0.0201	5.64	635	0.47	0.47	96.91
0.000615	0.0156	6.00		0.44	0.44	97.35
0.000435	0.0110	6.50		0.50	0.50	97.85
0.000308	0.00781	7.00		0.40	0.40	98.25
0.000197	0.00500	7.65		0.42	0.42	98.67
0.000077	0.00195	9.00		0.68	0.68	99.35
0.000038	0.000977	10.00		0.40	0.40	99.75
0.000019	0.000488	11.00		0.23	0.23	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**100.10**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.06	0.0379	0.962
10	0.79	0.0228	0.579
16	1.13	0.0180	0.458
25	1.46	0.0143	0.364
40	1.75	0.0117	0.297
50	1.94	0.0103	0.260
60	2.13	0.0090	0.228
75	2.47	0.0071	0.181
84	2.78	0.0057	0.145
90	3.25	0.0041	0.105
95	4.58	0.0016	0.042

Measure	Trask	Inman	Folk-Ward
Median, phi	1.94	1.94	1.94
Median, in.	0.0103	0.0103	0.0103
Median, mm	0.260	0.260	0.260
Mean, phi	1.88	1.96	1.95
Mean, in.	0.0107	0.0102	0.0102
Mean, mm	0.272	0.258	0.259
Sorting	1.420	0.827	1.100
Skewness	0.985	0.017	0.092
Kurtosis	0.194	1.736	1.835

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	18.91
Fine Sand	200	73.46
Silt	>0.005 mm	6.29
Clay	<0.005 mm	1.33
	Total	**100**

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Phone: (562) 907-3607 Fax: (562) 907-3610

Calscience Environmental Laboratories, Inc.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1427
TEL: (714) 895-5494 . FAX: (714) 894-7501

TO: PTS LABORATORIES

CHAIN OF CUSTODY RECORD

DATE: 05/07/09

PAGE: 1 OF 1

LABORATORY CLIENT: Calscience Environmental Laboratories, Inc.	CLIENT PROJECT NAME / NUMBER: 09-05-0616	P.O. NO.: 09-05-0616
ADDRESS: 7440 Lincoln Way	PROJECT CONTACT: Danielle Gonsman	QUOTE NO.:
CITY: Garden Grove, CA 92841-1427	SAMPLER(S): (PRINT)	LAB USE ONLY: 39407
TEL: (714) 895-5494 / E-MAIL: dgonsman@calscience.com		

TURNAROUND TIME: ___SAME DAY ___24 HR ____48HR ____72 HR ____5 DAYS __X_NORMAL

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)

☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

~~** Porosity: Total, Effective, Water filled, Air filled~~ DG

REQUESTED ANALYSIS

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	Matrix	#Cont	GRAIN SIZE - ASTM D4464
	CNB-CAD-3-COMP	05/07/09		SED	1	X
	CNB-CAD-3-S7	05/07/09		SED	1	X
	CNB-CAD-3-S11	05/07/09		SED	1	X

Relinquished by: (Signature) (CALSCIENCE)	Received by / Affiliation: (Signature) PTS Labs INC	Date: 5/11/09 ~~05/07/09~~	Time: 10:25 29°F
Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:

Attachment F-3
Excerpts from 2018 and 2019 Sediment Sampling in Lower Newport Bay

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport	Date	1/16/18 Time 1304
Station ID	BIN-03	Latitude	33°36.522' Longitude 117°54.352'
Type of Core	Vibracore	Water Depth (ft)	12.8 Tide (ft) 0.9
Mudline Elevation (ft MLLW)	-11.9	Target Core Length (ft)	10.1
Project Depth+Overdepth (ft MLLW)	-17+5=-22	Penetration Length (ft)	7.8 Core Recovery (ft) 6.8

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1	BIN-03-T	Gray soft wet SILT
0.4		med.vn stiff moist
2		~~f-c~~ SAFL; slightly clayey SILT
3		
4		sandy SILT w/ trace shells
5		very dense damp f-SAND
5.1	BIN-03-Z	
5.6		
6	BIN-03-B	
6.8		
7		
8		Refusal @ 7.8'
9		

4 No. Photos Taken

Recorded By: C. Osuch

Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport	Date	1/16/18 Time 1350
Station ID	BIN-03	Latitude	33°36.522' Longitude 117°54.352'
Type of Core	vibracore	Water Depth (ft)	11.9 Tide (ft) 0.0
Mudline Elevation (ft MLLW)	-11.9	Target Core Length (ft)	5.1
Project Depth+Overdepth (ft MLLW)	-17+5=-22	Penetration Length (ft)	6.5 Core Recovery (ft) 5.1

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1	BIN-03-T	Gray soft wet SILT
2		medium stiff moist
3		stiff
4		4.2 sandy SILT
5	5.1	very dense damp f-SAND w/ trace shells
6		
7		
8		Refusal @ 6.5
9		

___ No. Photos Taken

Recorded By: C. Osuch

Attempt No. 2 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport	Date	1/16/18 Time 1600
Station ID	BIN-05	Latitude	33°36.520' Longitude 117°54.442'
Type of Core	Vibracore	Water Depth (ft)	11.2 Tide (ft) -0.6
Mudline Elevation (ft MLLW)	-11.8	Target Core Length (ft)	10.2
Project Depth+Overdepth (ft MLLW)	-17+5=-22	Penetration Length (ft)	9.2 Core Recovery (ft) 7.3

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1	BIN-05-T	gray soft wet SILT
2		0.4 medium stiff moist
3		stiff
4		slightly clayey SILT
5	5.2 BIN-05-Z 5.7	
6	BIN-05-B	
7	7.3	7.1 dense damp f-SAND
8		
9		refusal @ 9.2'.

4 No. Photos Taken

Recorded By: C. Osuch

Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport	Date	1/16/18 Time 1620
Station ID	BIN-05	Latitude	33°36.520' Longitude 117°54.442'
Type of Core	Vibracore	Water Depth (ft)	11.4 Tide (ft) -0.4
Mudline Elevation (ft MLLW)	-11.8	Target Core Length (ft)	5.2
Project Depth+Overdepth (ft MLLW)	-17	Penetration Length (ft)	7.6 Core Recovery (ft) 6.7

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1	BIN-05-T	Gray, medium stiff, wet, SILT
2		stiff
3		
4		slightly clayey SILT
5	5.2	
6	Discard	w/f-sand @ 6.4
	6.7	
7		
8		
9		

___ No. Photos Taken

Recorded By: C. Osuch

Attempt No. 2 of 2

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Analytical Report

ANCHOR QEA, LLC
27201 Puerta Real, Suite 350
Mission Viejo, CA 92691-8306

Date Received: 01/17/18
Work Order: 18-01-1208
Preparation: N/A
Method: ASTM D4464 (M)
Units: %

Project: City of Newport Beach - Federal Channels

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BIN-COMP-T-011718	**18-01-1208-1-C**	**01/17/18 17:40**	**Sediment**	**LPSA 1**	**N/A**	**01/18/18 09:47**	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	19.98	
Silt (0.00391 to 0.0625mm)	53.67	
Total Silt and Clay (0 to 0.0625mm)	73.62	
Very Fine Sand (0.0625 to 0.125mm)	8.91	
Fine Sand (0.125 to 0.25mm)	13.35	
Medium Sand (0.25 to 0.5mm)	4.14	
Coarse Sand (0.5 to 1mm)	ND	
Very Coarse Sand (1 to 2mm)	ND	
Gravel (greater than 2mm)	ND	

Return to Contents

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

ANCHOR QEA, LLC
27201 Puerta Real, Suite 350
Mission Viejo, CA 92691-8306

Date Received: 01/17/18
Work Order: 18-01-1209
Preparation: N/A
Method: ASTM D4464 (M)
Units: %

Project: City of Newport Beach Exploratory

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
BIN-COMP-B-011718	**18-01-1209-1-B**	**01/17/18 17:45**	**Sediment**	**LPSA 1**	**N/A**	**01/18/18 09:57**	

Parameter	Result	Qualifiers
Clay (less than 0.00391mm)	6.67	
Silt (0.00391 to 0.0625mm)	17.42	
Total Silt and Clay (0 to 0.0625mm)	24.10	
Very Fine Sand (0.0625 to 0.125mm)	8.25	
Fine Sand (0.125 to 0.25mm)	32.71	
Medium Sand (0.25 to 0.5mm)	27.02	
Coarse Sand (0.5 to 1mm)	7.48	
Very Coarse Sand (1 to 2mm)	0.45	
Gravel (greater than 2mm)	ND	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

Appendix G
Analysis of Short-Term Water Quality Impacts During Construction

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Appendix G: Analysis of Short-Term Water Quality Impacts During Construction

Introduction

Short-Term Fate (STFATE) model scenarios were developed, executed, and evaluated to estimate the potential for sediment drift and loss of material during fill operations at the proposed confined aquatic disposal (CAD) facility within the Lower Newport Bay Federal Channels (Federal Channels). Hydrodynamic data generated from the Newport Bay Model[1] (developed by Everest International Consultants, Inc. [2005]) and physical characteristics of sediments within Lower Newport Bay that have recently been evaluated as part of the Federal Channels maintenance dredging program were used to inform the STFATE model. Results from the model scenarios were used to estimate sediment dispersion patterns associated with disposal operations within the proposed CAD facility boundaries as well as to predict compliance with applicable water quality criteria.

STFATE Model

The STFATE model is a module of the Automated Dredging and Disposal Alternatives Management System developed by the U.S. Army Corps of Engineers (USACE). STFATE predicts the transport of a single barge-load of dredged material through the water column and subsequently the area and thickness of deposits on the seabed through three phases of movement: convective descent (material settling through water column under the influence of gravity), dynamic collapse (neutral buoyancy and horizontal spreading), and passive transport-dispersion (dominated by ambient currents and turbulence). The model assumes material is not resuspended because of erosion or bedload transport once deposited on the seabed. The model may also be used to predict contaminant concentrations relative to applicable water quality criteria at multiple locations and time steps during the scenario simulation. Additional information regarding the model's capabilities and assumptions may be found in the Inland Testing Manual (USEPA/USACE 1998).

Input parameters to the model fall under four primary categories consisting of site description, velocity data, material description, and disposal operation. Model and site-specific input parameters for each of these categories are discussed in the following sections.

It should be noted that, wherever possible, similar input parameters to the STFATE model—as used for recent work at the North Energy Island Borrow Pit CAD pilot project, the Port Hueneme CAD Site,

[1] The Newport Bay Model was developed for hydrodynamic and water quality studies in Newport Bay. Applications have included circulation improvement, storm diversion, and pollutant transport studies.

and the Long Beach Outer Harbor Sediment Placement Ecological Restoration project sites—were used to maintain consistency in the approach to this project.

STFATE Model Setup

The following scenarios were developed and evaluated to address a range of environmental conditions anticipated to be encountered:

- **Tidal Stage**. Distinct scenarios were developed to simulate ebb and flood tide conditions.[2]
- **Material Type**. Three different material types were evaluated, representing the average grain size, maximum fine-grained, and maximum coarse-grained conditions. Furthermore, for each of these material types, scenarios were evaluated assuming the material did and did not experience clumping during disposal.
- **Placement Location**. Due to dynamic hydrodynamic conditions observed across the project area, two placement locations per tide stage were evaluated except during neap ebb tide, which only considered one placement location.

For each scenario, placement of dredged material was assumed to be from a split-hull barge.

Site Description

The model grid for the proposed CAD facility initially consisted of 23 cells in the east-west (left to right) and 16 cells in the north-south (top to bottom) directions (Table G-1; Figure G-1).[3] The dimensions of each cell were 75 feet by 75 feet. The constant water depth was determined by first defining a water depth that correlated to the center point of each grid cell outside the boundaries of the proposed CAD facility and then calculating an average of those values.[4] Water depths were taken from a recent USACE bathymetric survey conducted in June 2018. Water density profiles were developed from recent water quality measurements in support of the Federal Channels maintenance dredging program (Anchor QEA 2013a).

[2] Initially, the maximum predicted spring ebb tide and spring flood tide velocities were used in the model with the assumption that these conditions represented the worst case scenario for material transport away from, and material deposits outside, the proposed CAD facility. The initial model scenarios did not run to completion because fine-grained material (i.e., silts and clays) was remaining in suspension at the limits of the STFATE model grid due to a combination of model grid size and tidal velocities. Based on the STFATE model execution process, the total amount of material remaining in suspension could not be evaluated; therefore, various other tidal stage current velocities were evaluated. See Velocity Data for detailed information on current velocities used in the assessment.

[3] The STFATE model grid was expanded to 49 cells in the east-west (left to right) and 73 cells in the north-south (top to bottom) directions to enable the model to run to completion. The key metric in evaluating the model results with the larger grid size was amount of material deposited within the proposed CAD facility versus amount of material lost outside the proposed CAD facility. STFATE deposition results for material lost outside the proposed CAD facility should be interpreted with considerations of the hydrodynamics and geography of the Lower Newport Bay.

[4] This depth is representative of existing conditions for areas that will not be deepened during construction of the proposed CAD facility. The water depth used within the proposed CAD facility, presented in a subsequent section, "Disposal Operations" (Table G-3), conforms to the STFATE setup for disposal over a depression, where the depression is the depth of the proposed CAD facility.

Table G-1
STFATE Model Setup and Input Parameters for Placement of Material at the Lower Newport Bay CAD Facility – Site Description

Parameter (units)	Value	Source/Notes
Number of Grid Points (Left to Right)	73	Site-specific; best professional judgment
Number of Grid Points (Top to Bottom)	49	Site-specific; best professional judgment
Grid Spacing (Left to Right; feet)	75	Site-specific; best professional judgment
Grid Spacing (Top to Bottom; feet)	75	Site-specific; best professional judgment
Constant Water Depth (feet)	-13.5	Average depth outside boundary proposed CAD facility; based on USACE Bathymetric Survey, June 2018
Water Density Profile	At 3 feet: 1.024 g/cm^3 At 6 feet: 1.024 g/cm^3 At 12 feet: 1.024 g/cm^3	Anchor QEA 2013a

Note:
g/cm^3: grams per cubic centimeter

Velocity Data

Current velocity data were generated for typical spring tide conditions from the Newport Bay Model. The model consists of a model grid of varying cell dimensions that overlays Newport Bay (Figure G-1). It uses National Oceanic and Atmospheric Administration tide data and water quality data collected throughout Newport Bay to predict the hydrodynamics of the system (Everest International Consultants, Inc., 2005). Current vectors (u [+east/-west]; and v [+north/-south]) were provided for each of the model grid cells in the vicinity of the proposed CAD facility. The alignment of the model grid cells relative to the proposed CAD facility and STFATE model grid are shown in Figures G-1 and G-2. Current vector data were evaluated to determine the average non-peak spring ebb and flood current velocities (Figure G-2). Non-peak currents were defined as the plus or minus 2 hours from high or low tide (Figure G-3). Because the Newport Bay Model uses depth-averaged current data, a two-point vertical velocity field using the same velocities at each depth was used in STFATE, and the current vectors were transformed 48 degrees to align with the STFATE model grid. The transformed current vectors for each placement point are listed in Table G-2. The average non-peak spring ebb current velocities were applied to two disposal points on the western portion of the proposed CAD facility, and the average non-peak spring flood current velocities were applied to two disposal points on the eastern portion of the proposed CAD facility.

Table G-2
STFATE Model Setup and Input Parameters for Placement of Material at the Lower Newport Bay CAD Facility – Velocity Data

Parameter (units)	Surface Value	Source/Notes
Profile Type	Single Point Velocity Field for Constant Depth Grid	Site specific; best professional judgment
Ebb Tide Current Velocity (x-vector[1]; ft/s)	Disposal Point A: 0.298 Disposal Point B: 0.298	Newport Bay Model
Ebb Tide Current Velocity (z-vector[1]; ft/s)	Disposal Point A: 0.021 Disposal Point B: 0.021	Newport Bay Model
Flood Tide Current Velocity (x-vector[1]; ft/s)	Disposal Point X: -0.300 Disposal Point Y: -0.300	Newport Bay Model
Flood Tide Current Velocity (z-vector[1]; ft/s)	Disposal Point X: -0.079 Disposal Point Y: -0.079	Newport Bay Model

Notes:
1. The local coordinate system within STFATE assumes x-direction vectors are positive down (moving top to bottom) and z-direction vectors are positive right (moving left to right).

ft/s: feet per second

Disposal Operation

Two placement points (generally representing the western areas) during ebb tide and two placement points (generally representing the eastern areas) during flood tide were selected across the proposed CAD facility (Table G-3). Vessel characteristics were similar to those used in previous work supporting dredging operations within Lower Newport Bay. Due to constraints within the STFATE model capabilities, the proposed CAD facility was assumed to be a rectangular-shaped depression bounded by an area of constant water depth. To best fit a rectangular depression within the proposed CAD facility, the STFATE grid was rotated 48 degrees to align the STFATE-specified coordinate system with the proposed CAD facility. The water depth within the proposed CAD facility was determined using suitable area and volume of dredged material to be managed within the facility.

Table G-3
STFATE Model Setup and Input Parameters for Placement of Material at the Lower Newport Bay CAD Facility – Disposal Operation

Parameter (units)	Value	Source/Notes
Disposal Point (from top of grid; feet)	Disposal Point A: 525 Disposal Point B: 525 Disposal Point X: 5025 Disposal Point Y: 5025	Site-specific; best professional judgment. Points A and B represent placement locations during ebb tide conditions; Points X and Y represent placement locations during flood tide conditions
Disposal Point (from left of grid; feet)	Disposal Point A: 1725 Disposal Point B: 1575 Disposal Point X: 1800 Disposal Point Y: 1650	Site-specific; best professional judgment. Points A and B represent placement locations during ebb tide conditions; Points X and Y represent placement locations during flood tide conditions
Length of Vessel (feet)	200	Consistent with Lower Newport Bay dredging projects
Width of Vessel (feet)	50	Consistent with Lower Newport Bay dredging projects
Pre-Disposal Draft (feet)	12	Consistent with Lower Newport Bay dredging projects
Post-Disposal Draft (feet)	3	Consistent with Lower Newport Bay dredging projects
Time to Empty Vessel (seconds)	30	Professional knowledge from previous projects
Length of Depression (feet)	450	Based from proposed design drawings
Width of Depression (feet)	450	Based from proposed design drawings
Average Depth (feet)	-45	Based from proposed design drawings

Material Description

It was assumed that split-hull barges with the capacity to carry 2,000 cubic yards (cy) of material would be used during fill operations (Table G-4). STFATE default values were used for the settling characteristics of the various material types (sand, silt, clay, and clumps). In order to best represent a range of sediment characteristics anticipated to be placed at the proposed CAD facility, recent maintenance dredged material evaluation projects conducted for the Federal Channels and Regional General Permit programs were evaluated, and an average grain size and total solids condition was determined for five distinct scenarios.

The first scenario represents the layer of material consisting of sediment from dredge units determined unsuitable for open ocean disposal within the Federal Channels. The second scenario represents the layer of material consisting of sediment from dredge units identified for use as either an interim cover containment layer or final cap layer from the Federal Channels program. The third scenario represents the layer of material consisting of sediment from dredge units found unsuitable for open ocean disposal within the boundaries of the Regional General Permit for Newport Bay (RGP 54). The fourth scenario represents sediment from the dredge unit identified as an alternative source for an interim cover containment layer or final cap layer (sediments associated with the Entrance Channel dredge unit). The fifth scenario represents material consisting of sediment from the dredge unit found unsuitable for open ocean disposal and containing the greatest amount of fine-grained materials (project sample MCN1-COMP-T-011518 from the Lower Newport Bay Main Channel [Anchor QEA 2019]). Volumetric fractions for each of these project samples are presented in Table G-5.

STFATE has the capability of modeling clumping (typical of cohesive sediments) and non-clumping (typical of non-cohesive sediments) scenarios. Scenarios 1, 3, and 5 consist predominantly of fine-grained, cohesive materials, and therefore were modeled with an assumption that 50% of the material clumps prior to disposal. Scenarios 2 and 4 consist predominantly of coarse-grained, non-cohesive materials, and therefore were modeled without clumps during disposal.

Table G-4
STFATE Model Setup and Input Parameters for Placement of Material at the Lower Newport Bay CAD Facility – Material Description

Parameter (units)	Value	Source/Notes
Number of Layers	1	Best professional judgment based on predictive models and post-placement monitoring at similar CAD facilities in southern California
Total Volume (cy)	2,000	Professional knowledge from previous projects
Barge Velocity Ebb Tide (x-vector; ft/s)	-0.82	Best professional judgment based on historical dredging operations with Lower Newport Bay
Barge Velocity Ebb Tide (z-vector; ft/s)	0.0	Best professional judgment based on historical dredging operations with Lower Newport Bay
Barge Velocity Flood Tide (x-vector; ft/s)	0.82	Best professional judgment based on historical dredging operations with Lower Newport Bay
Barge Velocity Flood Tide (z-vector; ft/s)	0.0	Best professional judgment based on historical dredging operations with Lower Newport Bay
Specific Gravity	Use STFATE default value	Best professional judgment based on predictive models and post-placement monitoring at similar CAD facilities in southern California
Fall Velocity (ft/s)	Use STFATE default value	Best professional judgment based on predictive models and post-placement monitoring at similar CAD facilities in southern California
Void Ratio	Use STFATE default value	Best professional judgment based on predictive models and post-placement monitoring at similar CAD facilities in southern California
Critical Shear Stress (lb/ft^2)	Use STFATE default value	Best professional judgment based on predictive models and post-placement monitoring at similar CAD facilities in southern California
Cohesive (Y/N)	Use STFATE default value	Best professional judgment based on predictive models and post-placement monitoring at similar CAD facilities in southern California
Stripped During Descent (Y/N)	Use STFATE default value	Best professional judgment based on predictive models and post-placement monitoring at similar CAD facilities in southern California
Volumetric Fraction	See Table G-5[1]	Federal Channels maintenance dredging program and Regional General Permit programs (2013 and 2017)

Notes:

1. Project samples from the Federal Channels maintenance dredging program (Anchor QEA 2019) and Regional General Permit programs (Anchor QEA 2013b; Anchor QEA 2018) were evaluated to determine the material type volumetric fraction for five distinct material types. Scenario 1 used the average grain size and total solids concentrations from all project areas within the boundaries of the Federal Channels program found not suitable for open ocean disposal. Scenario 2 used the average grain size and total solids concentrations from all project areas identified as suitable for use as an interim cover containment layer or final cap layer. Scenario 3 used the average grain size and total solids concentrations from all project areas within the boundaries of the City's RGP 54 program found not suitable for open ocean disposal. Scenario 4 used the average grain size and total solids concentrations from the Lower Newport Bay Entrance Channel, which was identified as an alternate source suitable for use as an interim cover containment layer or final cap layer. Scenario 5 used the grain size representing a maximum fine-grained material and total solids concentrations from all project areas found not suitable for open ocean disposal.

lb/ft^2: pounds per square foot

Table G-5
STFATE Scenarios Sediment Characteristics

Scenario No.	Scenario Description	Material Property	Measured Value1 (%)	STFATE Volumetric Fraction2 (unitless)
1	Average Grain Size Condition; Federal Channels; Unsuitable; with Clumping	Sand	14.1	0.0764
		Silt	24.7	0.1340
		Clay	11.2	0.0607
		Clumps	50	0.2711
		Total Solids	54.2	--
2	Average Grain Size Condition; Federal Channels; Interim Cover Containment Layer or Final Cap Layer	Sand	77.5	0.5557
		Silt	15.7	0.1124
		Clay	6.8	0.0486
		Clumps	--	--
		Total Solids	71.7	--
3	Average Grain Size Condition; RGP 54; Unsuitable; with Clumping	Sand	29.9	0.1965
		Silt	14.2	0.0932
		Clay	6.0	0.0393
		Clumps	50	0.3290
		Total Solids	65.8	--
4	Average Grain Size Condition; Entrance Channel; Alternative Material Source for Interim Cover Containment Layer or Final Cap Layer	Sand	98.1	0.8085
		Silt	1.3	0.0109
		Clay	0.6	0.0045
		Clumps	--	--
		Total Solids	82.4	--
5	Maximum Fine-Grained Material; Federal Channels; Unsuitable; with Clumping	Sand	4.1	0.0185
		Silt	33.0	0.1499
		Clay	13.0	0.0590
		Clumps	50	0.2275
		Total Solids	45.5	--

Notes:

1. For scenarios that include clumping (Scenarios 1, 3, and 5), clumping was not measured. Rather, it was assumed 50% of material clumped, which is consistent with similar modeling conducted during construction of other regional CAD facilities (e.g., Port Hueneme, North Energy Island Borrow Pit, and Long Beach's Outer Harbor Sediment Placement and Ecosystem Restoration site).
2. STFATE Volumetric Fraction (unitless) was calculated by multiplying the measured grain size value (or assumed clumping rate) by the measured total solids value.

--: not applicable

Water Quality Analysis

STFATE was used to evaluate the copper, dissolved mercury, total polychlorinated biphenyls (PCBs), and total DDx contaminant concentrations within the boundary of the model grid for each of the scenarios listed above. The California Toxics Rule (CTR) Saltwater Criterion Continuous Concentration (CCC; i.e., chronic water quality standard) for dissolved copper (3.1 micrograms per liter [µg/L]), dissolved mercury (0.94 ug/L), total PCBs (0.03 ug/L), and total DDx (0.001 µg/L) were used in the model as the water quality standard; however, the predicted results were compared to both the CTR CCC and the CTR Criterion Maximum Concentration (CMC; i.e., acute water quality standard).

The background water concentration for dissolved copper was calculated as the average concentration measured in Lower Newport Bay as part of the Lower Newport Bay Federal Dredging Project (Anchor QEA 2013a) and Newport Bay Copper Study (Anchor QEA 2016). The background water concentrations for dissolved mercury, total PCBs, and total DDx were calculated as the average concentrations measured in Lower Newport Bay as part of the Lower Newport Bay Federal Dredging Project (Anchor QEA 2013a). Average concentrations are shown in Table G-6.

Similar to determining the appropriate physical properties described in the Material Description section above, the average sediment contaminant concentration was calculated from samples associated with each scenario (Table G-6; except Scenario 5 which used the sample-specific concentrations). The predicted initial concentration in the fluid fraction was then calculated by dividing the bulk sediment copper concentration by a representative solid-water partitioning coefficient (K_d). Assuming equilibrium is met, the initial concentration for metals in the fluid fraction was calculated using Equation 1.

Equation 1

$$K_d = \frac{C_s}{C_w}$$

where:

K_d	=	Solid-water distribution coefficient (liters per kilogram)
C_s	=	Metal concentration in sediment at equilibrium (milligrams per kilogram)
C_w	=	Metal concentration in water at equilibrium (milligrams per liter)

The initial concentration for organics (e.g., total PCBs or total DDx) in the fluid fraction was calculated using Equation 2.

Equation 2

$$K_{oc} * F_{oc} = \frac{C_s}{C_w}$$

where:

K_{oc}	=	where K_{oc} is the organic carbon-water partition coefficient
F_{oc}	=	F_{oc} is fractional organic carbon
C_s	=	Metal concentration in sediment at equilibrium (milligrams per kilogram)
C_w	=	Metal concentration in water at equilibrium (milligrams per liter)

An organic carbon partition coefficient (log K_{OC}) for total DDx and for total PCBs was estimated based on analytical data collected from each sediment layer. For each layer, sediment concentrations from several representative samples were averaged for each of the six DDx isomers and each of the 40 PCB congeners analyzed, with non-detects set to one-half of the detection limit. A weighted harmonic mean was then calculated based on the fractional distribution of these average concentrations, a compilation of octanol-water partition coefficients (K_{OW}) associated with each individual DDx isomer and PCB congener,[5] and a commonly used correlation between log K_{OW} and log K_{OC}[6]. Results from each layer were relatively consistent, yielding a total DDx log K_{OC} between 6.4 and 6.6 L/kg, and a total PCB log K_{OC} between 6.5 and 6.7 L/kg.

[5] For DDx compounds, log K_{ow} values for para,para isomers (e.g., 4,4'-DDT) are provided in de Bruijn et al. (1989) with log K_{ow} values for the ortho, par isomers (e.g., 2, 4'-DDT) assumed the same. For PCB congeners, log K_{OW} values as cited by Hawker and Connell (1988) are widely used, though they were measured by a generator column. Log K_{OW} values measured by the "slow-stirring" method are considered more accurate. Therefore, the Hawker and Connell (1988) PCB log K_{OW} values were adjusted based on a correlation with log K_{OW} values measured by de Bruijn et al. (1989) using the "slow-stirring" method (de Bruijn et al.'s (1989) log K_{OW} values were not used directly because that study only measured 20 PCB congeners).

[6] Log K_{OC} values were estimated from log K_{OW} using Di Toro's (1985) well known empirical relationship (log K_{OC} = [log K_{OW} x 0.983] + 0.00028).

Table G-6
Water Quality Analysis Input Parameters

Scenario No.	Contaminant of Concern	Background Concentration (mg/L)	Bulk Sediment Concentration[1] (mg/kg)	Solid-Water Partitioning Coefficient[1,2] (K_d)	Organic Carbon Partitioning Coefficient (K_{oc}) [1]	Fraction Organic Carbon[1] (F_{oc})	Predicted Initial Concentration in Fluid Fraction (mg/L)
1	Copper	0.00258	84.0	104.1	NA	NA	0.00667
	Mercury	0.0000161[3]	1.70	104.9	NA	NA	0.0000214
	Total PCBs	0.00000650[3]	0.0532	NA	106.5	0.00770	0.00000218
	Total DDx[4]	0.0000013[5]	0.000945	NA	106.5	0.00770	0.00000168
2	Copper	0.00258	14.5	104.1	NA	NA	0.00115
	Mercury	0.0000161[3]	0.167	104.9	NA	NA	0.00000210
	Total PCBs	0.00000650[3]	0.00107	NA	106.7	0.0034	0.0000000628
	Total DDx[4]	0.0000013[5]	0.00076	NA	106.5	0.0034	0.0000000312
3	Copper	0.00258	42.8	104.1	NA	NA	0.00340
	Mercury	0.0000161[3]	20.7	104.9	NA	NA	0.000261
	Total PCBs	0.00000650[3]	0.044	NA	106.6	0.00423	0.00000261
	Total DDx[4]	0.0000013[5]	0.0313	NA	106.5	0.00423	0.00000234
4	Copper	0.00258	3.22	104.1	NA	NA	0.000256
	Mercury	0.0000161[3]	0.0125	104.9	NA	NA	0.000000157
	Total PCBs	0.00000650[3]	0.00042	NA	106.6	0.00089	0.000000119
	Total DDx[4]	0.0000013[5]	0.00088	NA	106.6	0.00089	0.000000124
5	Copper	0.00258	83.7	104.1	NA	NA	0.00665
	Mercury	0.0000161[3]	1.18	104.9	NA	NA	0.0000149
	Total PCBs	0.00000650[3]	0.042	NA	106.6	0.00019	0.0000555
	Total DDx[4]	0.0000013[5]	0.1026	NA	106.4	0.00019	0.000215

Notes:

1. The bulk sediment concentration and partitioning coefficients are not directly used by STFATE. These parameters were used to calculate the predicted initial concentration in the fluid fraction, which is used by STFATE.
2. K_d values are from Allison and Allison (2005).
3. All sample concentrations were reported as not detected; therefore, the highest method detection limit was used.
4. Due to limitations in STFATE, input parameters were multiplied by 10^6 when entered into STFATE, and the result was divided by 10^6. For example, for Scenario 1, the water quality standard was entered as 1.0 mg/L, the background concentration was entered as 1.3 mg/L, and the predicted initial fluid concentration was entered as 1.68 mg/L. The STFATE result was 0.139E+01 mg/L, which was converted back to 0.139E-05 mg/L (then converted again to 0.139E-02 µg/L in the results Table G-9 below).
5. The average was calculated using one-half the method detection limit for samples with non-detects and actual values for samples with detected concentrations.

mg/kg: milligram per kilogram
mg/L: milligram per liter

Model Execution and Evaluation

The STFATE model was executed in 1,200-second (20-minute) time steps for a duration of 14,400 seconds (4 hours). Results for the total volume (cy) and total thickness (feet) of material placed within each grid cell were evaluated at the conclusion of the 4 hours model simulation.

STFATE estimates the total volume and total thickness of material in each model grid cell. For model cells that receive a very small fraction of material, the STFATE defines the total volume into categories such as "less than 0.1 cubic foot (ft^3)" or "less than 0.001 ft^3." Each category was reduced in value by two orders of magnitude from the previous category. As a conservative approach, (i.e., worst case scenario), this modeling effort assumed a cell receiving "less than 0.1 ft^3" actually received exactly 0.001 ft^3 (the value of the next lowest category) and so on. Therefore, this approach overestimates the amount of material lost outside the model grid. As a point of comparison, STFATE generally predicted that 0.1 ft^3 of accumulated material on the bottom would have a total thickness of less than 1/10,000th of a foot (0.03 millimeters).

For each scenario, the placement of fill material was evaluated, and various metrics were calculated as follows:

- **Volume of material within proposed CAD facility**
  - The total volume of material accumulated within and deposited outside the proposed CAD facility was determined, and the proportion of material deposited outside the CAD facility was calculated. This metric evaluates the appropriateness of the CAD facility location and target placement locations.
- **Deposit thicknesses**
  - The maximum predicted deposit thickness after a single placement event was determined.
- **Water quality analysis**
  - Water quality analysis was conducted for each scenario during a disposal event occurring on an ebb tide at one of the two disposal locations. The maximum predicted

contaminant concentrations at any point (surface or mid-depth) and at any time was compared to the water quality criteria to determine if a potential for water quality exceedances existed.

Results and Discussion

A summary of the relative spatial distribution of fill material is provided in Table G-7. A summary of the single placement event deposit thicknesses is provided in Table G-8. A summary of the water quality analysis is provided in Table G-9. Additional detailed results (STFATE model output) per scenario are provided in Attachment G-1. Figures illustrating the volume, thickness of deposited material for each scenario, and thickness of deposited material greater than 0.17 foot (2 inches) are provided in Attachment G-2. Key findings from an evaluation of the modeling results are as follows:

- **Volume of material within proposed CAD facility**
  - Two disposal locations were evaluated for each tidal stage. Results shown in Table G-7 are representative of the disposal location that had the greatest amount of material deposited outside the proposed CAD facility boundaries. It should be noted, though, for placement events occurring during ebbing tides, the difference between the two disposal locations ranged from 1% to 3%; whereas, for placement events occurring during flooding tides, the difference between the two disposal locations ranged from 0% to 1%.
  - For placement events occurring during ebbing tides of material determined to be unsuitable for ocean disposal (Scenarios 1, 3, and 5), 88% to 90% of material is predicted to be deposited within the proposed CAD facility boundaries (i.e., 10% to 12% of material released from the scow would be deposited outside the boundary of the proposed CAD facility). Most of the material lost outside the proposed CAD facility would deposit within 75 feet (one model grid cell; see discussion below regarding deposit thicknesses).
  - For placement events occurring during ebbing tides of material suitable for use as an interim cover containment layer or final cap layer (Scenarios 2 and 4), 79% to 81% of material is predicted to be deposited within the proposed CAD facility boundaries (i.e., 19% to 21% of material released from the scow would be deposited outside the boundary of the propose CAD facility. Because this material would be sequenced after placement of unsuitable material, then any material from Scenarios 2 and 4 deposited beyond the boundaries of the proposed CAD facility would act as thin layer cover over any unsuitable material that may have been "lost" from the proposed CAD facility.
  - For placement events occurring during flooding tides, 91% to 94% of material is predicted to be deposited within the proposed CAD facility boundaries (i.e., 6% to 9%

of material released from the scow would be deposited outside the boundary of the proposed CAD facility).

- The chosen dump locations were appropriate for containing the placed material within the proposed Lower Newport Bay CAD facility; however, best management practices (BMPs) should be implemented to increase the proportion of material that is deposited within the proposed CAD facility, including the following:
  - Placement events during neap and non-peak tides (i.e., plus or minus 2 hours from slack tide; Figure G-3) would limit the horizontal distribution of fill material due to reduced current speeds.
  - The greater the fine content, the more dispersive the placement event; therefore, any sediment management strategy that reduces percent fines in any single barge-load dredged would reduce loss outside proposed CAD facility boundaries.
  - Implementation of BMPs to restrict placement locations within 150 feet from a site boundary would minimize loss outside the proposed Lower Newport Beach CAD facility site boundaries.

- **Deposit thicknesses**
  - For a single placement event from a split-hull barge, the maximum observed deposit thickness within the proposed CAD facility ranged from 1.3 to 2.3 feet for placement events occurring during ebbing tides and 1.4 to 2.3 feet for placement events occurring during flooding tides. It should be noted the deposit thicknesses typically decreased by an order of magnitude within 75 feet (one model grid cell). The average deposit thickness within approximately 190 feet (inclusive of all model grid cells within 150 feet (two model grid cells) and including the maximum deposit grid cell) was 0.4 foot. Deposit thicknesses decreased by an order of magnitude beyond this boundary and were less than 0.1 foot within 225 feet (three model grid cells).
  - For placement events during ebbing tides for each modeled scenario, some deposits greater than 0.17 foot (about 2 inches) were predicted in two to four model grid cells outside the proposed CAD facility boundary. These deposits were within 75 feet of the proposed CAD facility (i.e., one model grid cell).
    - BMPs are recommended to minimize or eliminate any deposition of material outside the proposed CAD facility.
    - Post-construction surveys and/or surface sediment sampling may be conducted to confirm presence of recently deposited material and characterize chemical concentrations in those deposits if present.
- **Water quality analysis**
  - Because of the short-term, intermittent impacts to water quality, predicted water quality concentrations after an initial mixing period of 4 hours were compared to the CMC (i.e.,

acute water quality standard).[7] If acute water quality standards were not established for a contaminant of concern, then predicted water quality concentrations were compared to the CCC (i.e., chronic water quality standard).[8] Predicted water quality concentrations were also compared to existing background water quality concentrations to determine if placement activities result in an increase in contaminant concentrations relative to background after the initial mixing period.

- For each modeled scenario, copper concentrations predicted in the water column were below the CMC of 4.8 µg/L. The maximum predicted copper concentration after 4 hours was 2.59 µg/L for material from the DUs determined to be unsuitable for ocean disposal from the Federal Channels Program (Scenario 1) and the maximum fine-grained material from the Lower Newport Bay Federal Channels program (Scenario 5). Predicted water quality concentrations after 4 hours of material placement from Scenarios 2, 3, and 4 were equal to the existing background water quality concentration (2.58 µg/L). Predicted water quality concentrations after 4 hours of material placement from Scenarios 1 and 5 were only 0.01 µg/L greater than background.
- For each modeled scenario, mercury concentrations predicted in the water column were below the CCC of 0.94 µg/L (a CMC has not been established for mercury). The maximum predicted mercury concentration after 4 hours was 0.0162 µg/L for the average grain size from the RGP 54 program (Scenario 3). Predicted water quality concentrations after 4 hours of material placement from Scenarios 1, 2, 4, and 5 were equal to the existing background water quality concentration (0.0161 µg/L). Predicted water quality concentrations after 4 hours of material placement from Scenarios 1 and 5 were only 0.0001 µg/L greater than background.
- For each modeled scenario, total PCB concentrations predicted in the water column were below the CCC of 0.03 µg/L (a CMC has not been established for total PCBs). The maximum predicted total PCB concentration was 0.00658 µg/L for the maximum fine-grained material from the Federal Channels program (Scenario 5). Predicted water quality concentrations after 4 hours of material placement from Scenarios 1, 2, 3, and 4 were equal to the existing background water quality concentration (0.00650 µg/L). The predicted water quality concentration after 4 hours of material placement from Scenario 5 was only 0.00008 µg/L greater than background.
    - Predicted water column concentrations for total PCBs do not exceed the Lower Newport Bay organochlorine compounds Total Maximum Daily Load (TMDL)

[7] The CMC (i.e., acute water quality standard) is defined in the CTR as the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects.

[8] The CCC (i.e., chronic water quality standard) is defined in the CTR as the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects.

chronic water quality targets (acute water quality targets were not established in the TMDL).

- For each modeled scenario, total DDx concentrations predicted in the water column after 4 hours were below the CMC of 0.13 µg/L. The maximum predicted total DDx concentration was 0.00160 µg/L for the maximum fine-grained material from the Lower Newport Bay Federal Channels program (Scenario 5). Predicted water quality concentrations after 4 hours of material placement from Scenarios 1, 2, 3, and 4 were equal to the existing background water quality concentration (0.00130 µg/L). Predicted water quality concentrations after 4 hours of material placement from Scenario 5 were only 0.0003 µg/L greater than background.
    - Predicted water column concentrations for total DDx do not exceed the Lower Newport Bay organochlorine compounds TMDL acute water quality targets; however, they do exceed the TMDL's chronic water quality targets. Water column targets for the TMDL for organochlorine compounds for Lower Newport Bay are equivalent to the CMC and CCC. As previously mentioned, comparing predicted water column concentrations to acute criterion is appropriate considering the short-term and intermittent nature of material placement activities. Furthermore, the removal, placement, and containment of DDx-contaminated Lower Newport Bay sediments at the proposed CAD facility provides a greater benefit than any short-term water quality impacts. Background water quality concentrations of total DDx are slightly higher than the TMDL chronic water quality targets. Scenario 5 results in a slight increase in total DDx concentrations relative to background after 4 hours. Water quality monitoring may be conducted to confirm model predictions and determine persistence of increased total DDx concentrations relative to background.
    - Although water quality monitoring may be conducted to confirm model predictions, consideration of analytical laboratory capabilities to detect concentrations near the water quality standard is required. Analytical laboratory method detection limits for DDx isomers are typically greater than the water quality standard; therefore, monitoring and associated analytical results may only provide non-detect results at method detection limits similar to the predicted DDx concentrations.
    - Material from MCN-1 is finer grained in content and therefore more susceptible for off-site transport during disposal. To minimize or eliminate potential increases of total DDx relative to existing background water quality concentrations, additional BMPs may be required to minimize the potential for impacts.

Table G-7
Summary of STFATE Model Results – Relative Spatial Distribution of Fill Material

Tide	Scenario No.	Scenario Description	Percent of Material Deposited within Proposed CAD Facility	Percent of Material Lost Outside Proposed CAD Facility
Ebb	1	Average Grain Size; Federal Channels; Unsuitable; with Clumping	88	12
	2	Average Grain Size Condition; Federal Channels; Interim Cover Containment Layer or Final Cap Layer	79	21
	3	Average Grain Size Condition; RGP 54; Unsuitable; with Clumping	90	10
	4	Average Grain Size Condition; Entrance Channel; Alternative Material Source for Interim Cover Containment Layer or Final Cap Layer	81	19
	5	Maximum Fine-Grained Material; Federal Channels; Unsuitable; with Clumping	88	12
Flood	1	Average Grain Size; Federal Channels; Unsuitable; with Clumping	92	8
	2	Average Grain Size Condition; Federal Channels; Interim Cover Containment Layer	93	7
	3	Average Grain Size Condition; RGP 54; Unsuitable; with Clumping	94	6
	4	Average Grain Size Condition; Entrance Channel; Alternative Material Source for Interim Cover Containment Layer or Final Cap Layer	94	6
	5	Maximum Fine-Grained Material; Federal Channels; Unsuitable; with Clumping	91	9

Table G-8
Summary of STFATE Model Results – Relative Vertical Distribution of Fill Material

Tide	Scenario No.	Scenario Description	Maximum Deposit Thickness within proposed CAD Facility (ft)
Ebb	1	Average Grain Size; Federal Channels; Unsuitable; with Clumping	2.3
	2	Average Grain Size Condition; Federal Channels; Interim Cover Containment Layer or Final Cap Layer	1.9
	3	Average Grain Size Condition; RGP 54; Unsuitable; with Clumping	2.3
	4	Average Grain Size Condition; Entrance Channel; Alternative Material Source for Interim Cover Containment Layer or Final Cap Layer	1.3
	5	Maximum Fine-Grained Material; Federal Channels; Unsuitable; with Clumping	2.3
Flood	1	Average Grain Size; Federal Channels; Unsuitable; with Clumping	2.3
	2	Average Grain Size Condition; Federal Channels; Interim Cover Containment Layer or Final Cap Layer	1.9
	3	Average Grain Size Condition; RGP 54; Unsuitable; with Clumping	2.3
	4	Average Grain Size Condition; Entrance Channel; Alternative Material Source for Interim Cover Containment Layer or Final Cap Layer	1.4
	5	Maximum Fine-Grained Material; Federal Channels; Unsuitable; with Clumping	2.3

Table G-9
Summary of STFATE Model Results – Water Quality Analysis

Scenario No.	Scenario Description	Copper Concentration Predicted on Model Grid after 4 hours (µg/L)	Mercury Concentration Predicted on Model Grid after 4 hours (µg/L)	Total PCBs Concentration Predicted on Model Grid after 4 hours (µg/L)	Total DDx Concentration Predicted on Model Grid after 4 hours (µg/L)
1	Average Grain Size; Federal Channels; Unsuitable; with Clumping	2.59	0.0161	0.00650	0.00130
2	Average Grain Size Condition; Federal Channels; Interim Cover Containment Layer	2.58	0.0161	0.00650	0.00130
3	Average Grain Size Condition; RGP 54; Unsuitable; with Clumping	2.58	0.0162	0.00650	0.00130
4	Average Grain Size Condition; Entrance Channel; Final Cap Layer	2.58	0.0161	0.00650	0.00130
5	Maximum Fine-Grained Material; Federal Channels; Unsuitable; with Clumping	2.59	0.0161	0.00658	0.00160
	Acute (CMC) Water Quality Standard (µg/L)	4.8	--	--	0.13
	Chronic (CCC) Water Quality Standard (µg/L)	3.1	0.94	0.03	0.001
	Background Water Quality Concentration (µg/L)	2.58	0.0161	0.00650	0.00130
	Water Quality Standard Exceeded?	No	No	No	**No**
	Background Water Quality Concentration Exceeds Water Quality Standard?	No	No	No	**Yes**

Note:
Bold: Predicted exceedance of water quality standard
--: Criteria not established

Conclusions

STFATE model scenarios were developed, executed, and evaluated in order to estimate the potential for sediment drift and loss of material during fill operations at the proposed CAD facility in Lower Newport Bay. Results from the model scenarios were used to estimate depositional patterns within the CAD facility during various tidal currents. Key findings from these model simulations are as follows:

- There are no restrictions of placement events during neap tides (i.e., first and third quarters of the moon).
- During spring tides, BMPs should be implemented to limit placement events during non-peak tidal current velocities (i.e., plus or minus 2 hours from slack tide; Figure G-3) to limit the horizontal distribution of fill material.
  - Disposal events of unsuitable material (Scenarios 1, 3, and 5) occurring during non-peak ebbing tides result in 10% to 12% of material deposited outside the proposed CAD facility.
    - Most of these deposits occur within 75 feet of the proposed CAD facility.
  - Disposal events of interim cover containment layer or final cap layer material (Scenarios 2 and 4) occurring during non-peak ebbing tides result in 19% to 21% of material deposited outside the proposed CAD facility.
    - Most of these deposits occur within 75 feet of the proposed CAD facility and will act as a thin layer cover over any unsuitable material lost outside the CAD facility.
  - Disposal events occurring during non-peak flooding tides result in 6% to 9% of material to be deposited outside the proposed CAD facility.
- The maximum observed thicknesses of deposited material ranged from 1.3 to 2.3 feet within the model grid cell directly associated with the placement location. Deposit thicknesses rapidly decreased in adjacent model grid cells (within 75 feet).
  - Deposit thicknesses greater than 0.17 foot (2 inches) outside the proposed CAD facility are limited in area and do not extend more than 75 feet from the boundary of the facility.
- Acute condition water quality standards and TMDL water quality targets (where established) for dissolved copper, dissolved mercury, total PCBs, and total DDX were not violated. Although the dredging operation is anticipated to be short term and intermittent, it is noted that the chronic condition water quality standard for total DDx was exceeded during disposal events of all material types. However, the existing background water quality is also greater than this standard, and predicted total DDx concentrations are expected to be at or near background concentrations within 4 hours of dredging. Water quality monitoring may have limited practicality because predicted total DDx concentrations (during disposal events with materials in Scenarios 1 through 4, listed previously) are similar to typical method detection

limits currently achieved by regional analytical laboratories. Strategies to minimize the volume of material from Scenario 5, such as mixing with material from other dredge units, sequencing material from Scenario 5 first, use of silt curtains, or other BMPs, should be used to minimize water quality impairments.

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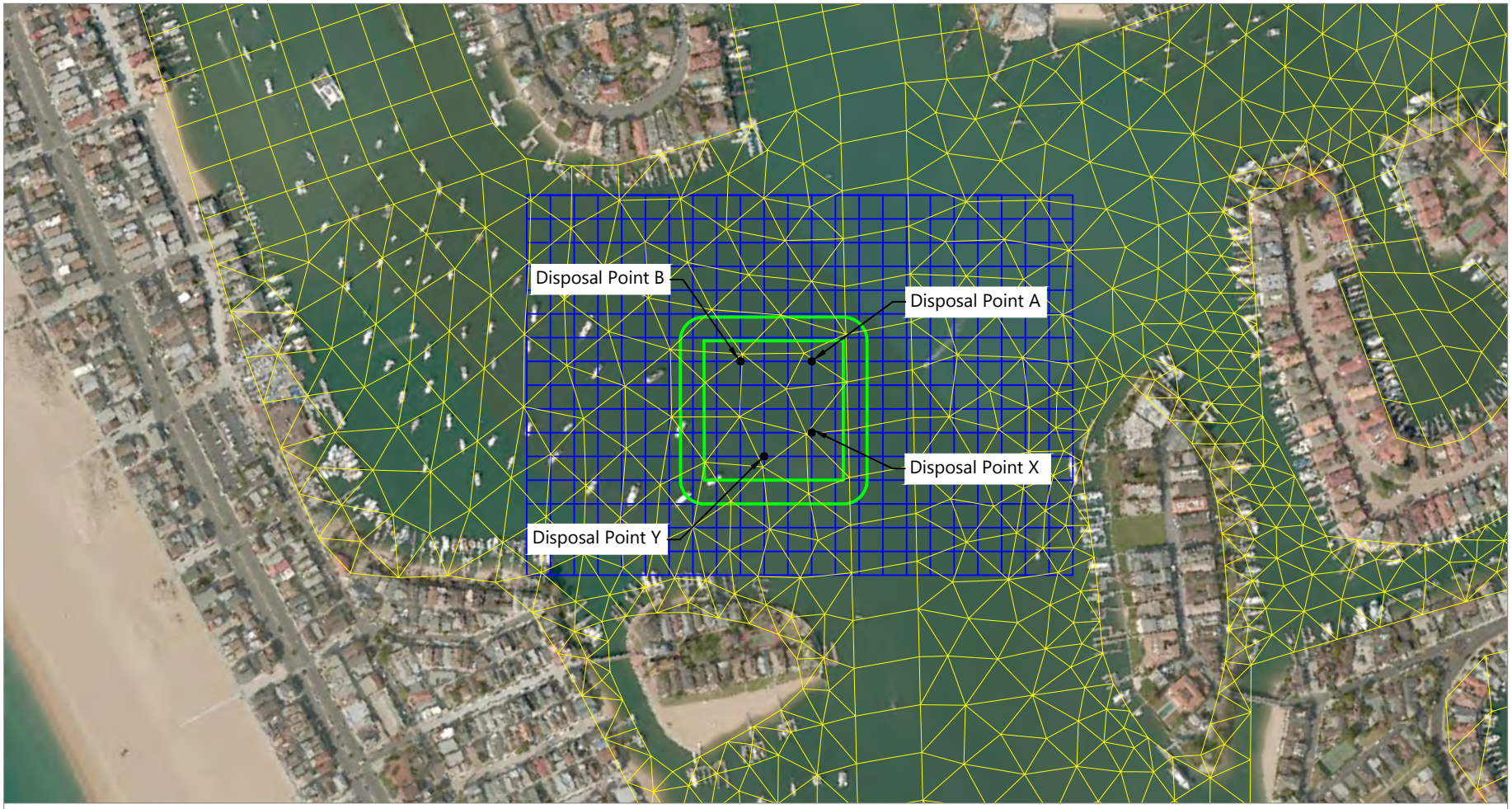
Figures



SOURCE: Image from Bing Maps.
HORIZONTAL DATUM: California State Plane, Zone VI, North American Datum of 1983 (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

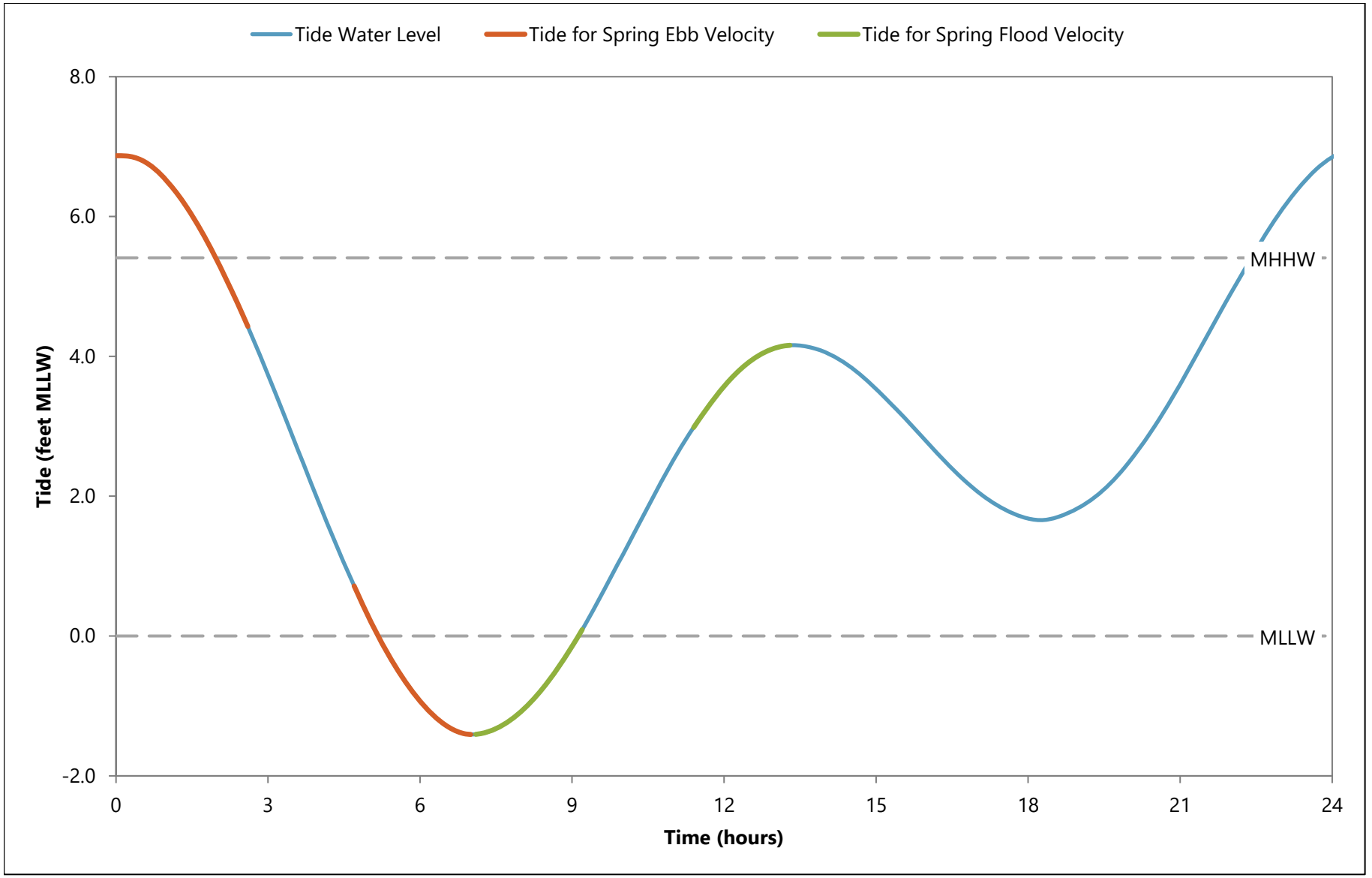
- Proposed CAD Facility
- STFATE Model Grid
- Newport Bay Model

0 500
Feet

Publish Date: 2020/04/07 9:29 AM | User: bueoka
Filepath: S:\PROJECTS\City_of_Newport_Beach\C-6111_On-call_2015-2017(150243-01)\NH Sediment Management\LNB Design Documents\CAD Design\STFATE Modeling\STFATE_Grid.dwg Figure 1

ANCHOR QEA

Figure G-1
Project Location of Proposed CAD Facility with Overlays of Newport Bay Model and STFATE Model Grids
Appendix G: STFATE Model Scenarios for CAD Site Development at the Proposed Lower Newport Bay Federal Channels Site
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay



Notes: MHHW: mean higher high water, MLLW: mean lower low water

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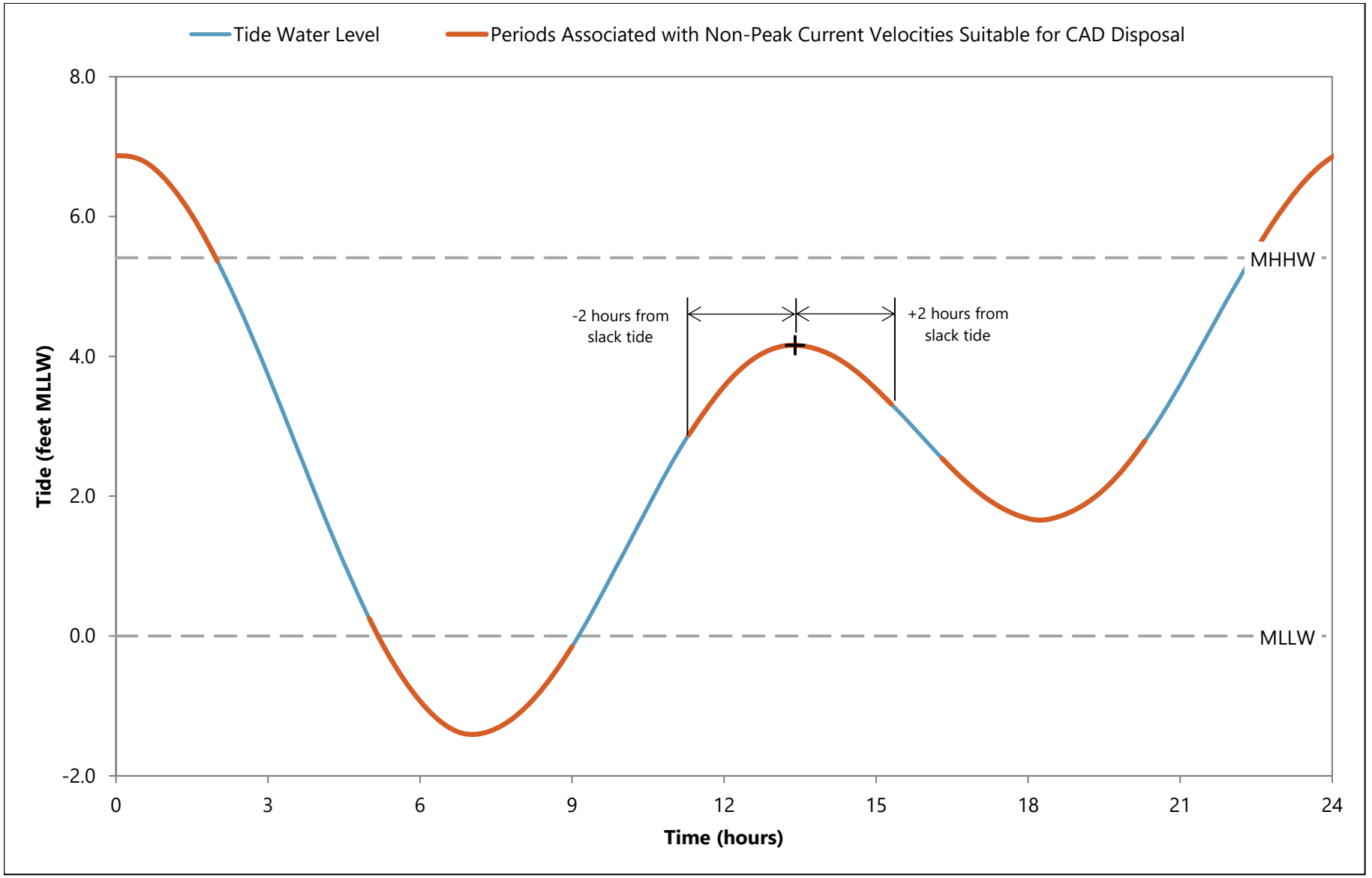
Figure G-2
Tide Conditions Used for Estimating Non-Peak Spring Tide Velocities
Appendix G: STFATE Model Scenarios for CAD Site Development at the Proposed Lower Newport Bay Federal Channels Site
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay



Notes: MHHW: mean higher high water, MLLW: mean lower low water

ANCHOR QEA

Figure G-3
Periods Associated with Non-Peak Current Velocities Suitable for CAD Disposal
Appendix G: STFATE Model Scenarios for CAD Site Development at the Proposed Lower Newport Bay Federal Channels Site
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

Attachment G-1
Detailed Results Per Scenario

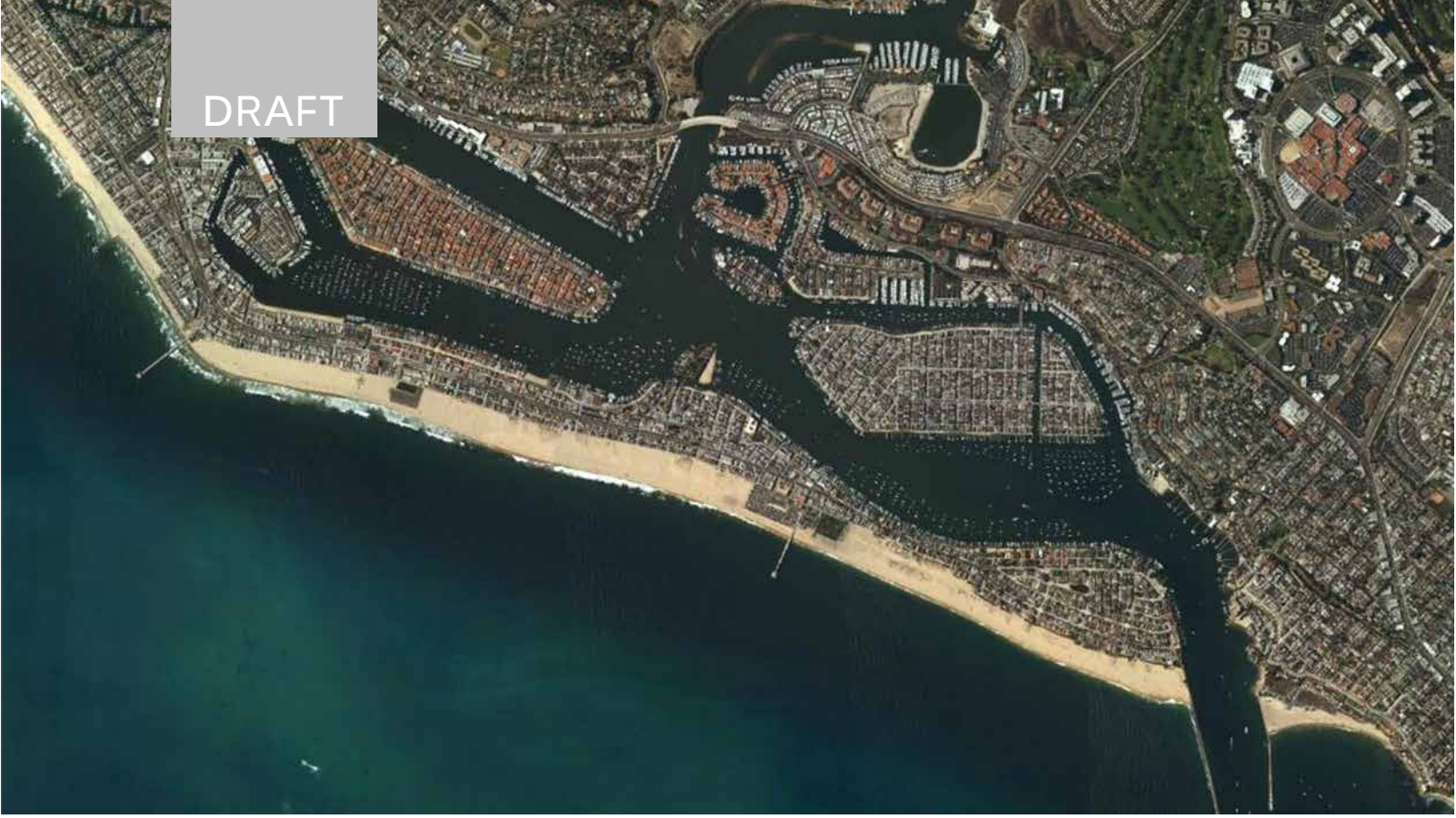
Electronic copy available at www.newportbeachca.gov/ceqa.

Attachment G-2
Results Figures Per Scenario

Electronic copy available at www.newportbeachca.gov/ceqa.

Appendix H
Operations, Management, and Monitoring Plan

DRAFT



November 24, 2020
Draft Basis of Design Report
Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

ANCHOR QEA

Appendix H: Operations, Management, and Monitoring Plan

Prepared for City of Newport Beach

DRAFT

November 24, 2020
Draft Basis of Design Report
Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

Appendix H: Operations, Management, and Monitoring Plan

Prepared for
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100 Civic Center Drive
Newport Beach, California 92660

Prepared by
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Project Number: 180243-02.01

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ABBREVIATIONS

BODR	Basis of Design Report
BMP	best management practice
CAD	confined aquatic disposal
CCC	California Coastal Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
City	City of Newport Beach
CWA	Clean Water Act
cy	cubic yard
DGPS	differential global positioning system
DMMT	Dredged Material Management Team
EFH	Essential Fish Habitat
ESA	Endangered Species Act
GPS	global positioning system
NEPA	National Environmental Policy Act
NOAA	National Oceanic Atmospheric Administration
OMMP	Operations, Management, and Monitoring Plan
PCB	polychlorinated biphenyl
RGP 54	Regional General Permit 54
RWQCB	California Regional Water Quality Control Board
T&D	Transportation and Disposal
TBT	tributyltin
TSS	total suspended solid
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WDR	Waste Discharge Requirement

1 Project Overview

The City of Newport (City) and the U.S. Army Corps of Engineers (USACE) are responsible for maintaining authorized navigation depths in different parts of Lower Newport Bay Federal Channels (herein referred to as Federal Channels). Combined, approximately 106,900 cubic yards (cy) of material unsuitable for open ocean disposal requires dredging from the Federal Channels by the City and USACE. Working closely with the agencies and the USACE, the City has elected to design a confined aquatic disposal (CAD) facility within the Federal Channels (between Lido Isle and Bay Island) to chemically isolate this material (Figure H-1). This Operations, Management, and Monitoring Plan (OMMP) has been developed to present the City's planned approach for managing the site as a disposal facility for use by the City and USACE during a phased dredging project. Included in this document are the following elements:

- Overview of the OMMP objectives and establishment and proposed CAD project
- Discussion of associated regulatory permits needed for creation and operation of the disposal facility
- Planned operation and communication process for site use
- Presentation of an environmental monitoring program
- Proposed annual reporting details
- Discussion of contingency plans to address unexpected construction issues or long-term stability should they become a concern

2 OMMP Objectives

The primary objective of the City's CAD facility OMMP is to describe the plan for managing the CAD facility as a disposal site for sediments unsuitable for open ocean disposal during a phased, multi-user project conducted by the City and USACE. This document discusses the administrative steps and physical process of placing the material into the CAD facility, covering (or capping) it with clean material to prevent the release of contaminants, and the details of an ongoing and long-term monitoring program to monitor for potential environmental impacts associated with the project.

The purpose of the OMMP is to provide the construction and monitoring framework through which the City and USACE will conduct the disposal of their dredged material. The OMMP describes the conditions for use of the CAD facility; for example, the OMMP requires that specific, identified best management practices (BMPs) are employed during disposal and capping activities (see Sections 6.3 and 6.4), and that the City employ short- and long-term monitoring activities (see Section 7).

The CAD facility would be managed by the City, under the terms and conditions of the OMMP and would be permitted by the regulatory and resource agencies as an approved disposal location for a phased, multi-user project. In this way, the disposal site would be permitted for use, the conditions for use would be known in advance of dredging, and the City would be responsible for ensuring that the framework established by this OMMP is followed. Documentation of the regulatory agency decision-making process and environmental analyses that leads to approval of the CAD facility as an acceptable disposal alternative is currently under way. Results from the City's Environmental Impact Report, currently being conducted in compliance with the California Environmental Quality Act (CEQA), and agency permits and special conditions will augment this OMMP as appropriate.

3 Establishment of the OMMP

3.1 Legal Authority and Responsible Party

The City is financially responsible for constructing the CAD facility. Following completion, the City will assume responsibility for the long-term management of the CAD facility, which includes the following components:

- Pre- and post-disposal monitoring of the CAD facility
- On-site monitoring of all disposal and capping operations within the CAD facility including the disposal and capping operations for sediments within Lower Newport Bay but outside the Federal Channels that are not suitable for open ocean disposal under the City's Regional General Permit 54 (RGP 54) program
- Design of the final isolation cap placed on the surface of the CAD facility at the conclusion of all disposal operations
- Preparation of monitoring reports for the regulatory agencies that document compliance with this OMMP

Specific staff and departments responsible for these management operations include the following:

- Dave Webb, Public Works Director, City of Newport Beach
- Chris Miller, Public Works Manager, City of Newport Beach
- Adam Gale, Managing Planner, Anchor QEA, LLC
- Steve Cappellino, Principal Scientist, Anchor QEA, LLC
- Michael Whelan, Principal Engineer, Anchor QEA, LLC

3.2 Modifications of the OMMP

This OMMP has been developed as a "working document" and may require modification during the operation and monitoring phases of the CAD facility development. Final modification of the plan is at the discretion of the City, in consultation and consensus with the USACE, U.S. Environmental Protection Agency (USEPA), California Coastal Commission (CCC), and California Regional Water Quality Control Board (RWQCB).

If modifications to the OMMP are required, addenda sheets will be issued to each party that is involved. The addenda sheets will clearly identify the addendum number, date of the revision, and where the addenda sheet is to be placed in the OMMP. Additionally, the plan identification number for each plan holder will be shown. These sheets can be inserted into the plan (via a 3-ring binder) in the appropriate section. A list of the names of all of plan holders and their plan identification numbers will be compiled and maintained. This list will be used to ensure that all addenda are distributed to every plan holder. All addenda will be distributed with return receipt requests to ensure that all plan holders receive all addenda.

4 CAD Facility Description

The proposed project entails creation of a CAD facility within the Federal Channels (Figure H-1) as a solution for sediments dredged from within and outside the Federal Channels that are unsuitable for open ocean disposal. Specifically, the project involves excavating a CAD facility between Lido Isle and Bay Island to accommodate the total volume of sediment previously determined to be unsuitable for open ocean disposal under the Federal Channels maintenance dredging program as well as additional capacity for sediments outside the Federal Channels that are not permitted under the City's RGP 54 permit.

Bay deposits excavated to create the CAD facility will be dredged and disposed with a bottom-dump barge at an open ocean disposal site (e.g., LA-3). Clean sand that is dredged to create the CAD facility would be disposed of with bottom-dump barges at a predefined nearshore placement area in Newport Beach, located immediately north of the Entrance Channel. Subsequently, sediments unsuitable for open ocean disposal from the Federal Channels (Main Channel 1, Main Channel 2, Turning Basin, and Newport Channel 1) would be dredged using mechanical equipment and placed within the CAD facility using a bottom-dump barge.

These sediments would then be covered with an interim cover containment layer of clean sediments dredged from the Federal Channels that is suitable for open ocean disposal (e.g., Newport Channel 3), as part of USACE's maintenance dredging program. The clean interim cover containment layer will be 1 foot thick. The City will provide public and private entities opportunities prior to and after the placement of the interim cover containment layer to place additional sediments from outside the Federal Channels. The CAD facility has been designed to accommodate an additional 50,000 cy of capacity for this material. If the final elevation for this layer is achieved prior the completion of the negotiated time period of disposal, the City will close the CAD facility for disposal and place a 3-foot-thick, clean final cap to chemically isolate the underlying sediments from burrowing organisms and biota residing in the overlying water column under long-term scenarios. If 50,000 cy of material from public and private participants is not achievable within the negotiated time period of disposal, the City will close the CAD facility for disposal and place a 3-foot-thick, clean final cap, thus leaving the final elevation of the CAD facility lower than originally designed.

Since the final cap will be placed after completion of the Federal Channels maintenance dredging program, sourcing of this layer will need to be finalized by the City. For modelling purposes, the Entrance Channel, Newport Channel 2, Newport Channel 3 was used due to its low chemical properties and higher sand content, making it ideal candidates for the final cap for the CAD facility. Also, shoaling is most prevalent within the Entrance Channel, which makes it good candidate for additional maintenance dredging in the future. If the City elects to source the final cap from another location, the City should meet or exceed the material properties of the Entrance Channel, Newport

Channel 2, and Newport Channel 3 to closely match the chemical isolation results described in Appendix D of the Draft Basis and Design Report (Draft BODR).

Since the CAD facility is located within the Federal Channels, the top of slope for the CAD will range between -15 to -17 feet mean lower low water (MLLW) depending on whether the selected contractor elects to dredge the full allowable overdredge. Regardless, the CAD facility has been designed to accommodate the possibility of dredging the Bay Island area deeper in the future to match the authorized depth in the adjacent Main Channel 3 (-20 feet MLLW). Thus, the final elevation of the final cap is designed to a -22 feet MLLW elevation to accommodate for future deepening to -20 feet MLLW and 2 feet of allowable overdredge. The bottom of the CAD is designed to -45 feet MLLW plus 1 foot of allowable overdredge. Further details on dimensions and estimated volumes are included in the Draft BODR. It is anticipated that most of this material will be suitable for nearshore placement, whereas the top 2 feet of material may require disposal at an open ocean disposal site (e.g., LA-3). Testing of the sediments during dredging may be required to determine suitability.

Geotechnical investigations near the proposed CAD facility location (see Appendix F of the Draft BODR) were used to conduct geotechnical analysis on the CAD facility. Additional sediment cores conducted within the CAD facility (see Appendix F of the Draft BODR) provided additional evidence on the extent of bay deposits within the location of the CAD facility. Subsurface materials in the CAD location largely consist of soft clayey silt underlain by poorly graded to fine dense sand. Figure H-2 shows a typical cross section through the CAD facility.

5 Permitting Requirements

This section discusses applicable state and federal permits required for construction, operation, and management of the Lower Newport Bay CAD facility. The anticipated regulatory framework for disposal of dredged material in the CAD facility includes multiple permits obtained by the City to authorize construction and operation of the CAD facility.

5.1 Activities Requiring Permits for Disposal

Regulations governing dredging and discharge of marine sediments, and subsequent capping include the following:

- National Environmental Policy Act (NEPA)
- CEQA
- Clean Water Act (CWA) Section 404 and Rivers and Harbors Act Section 10 under the jurisdiction of the USACE
- Coastal Development Permit under the jurisdiction of the CCC
- CWA Section 401 and Porter-Cologne Waste Discharge Requirements (WDRs) under the jurisdiction of the RWQCB
- Endangered Species Act (ESA) consultations for federally listed species under the authority of the U.S. Fish and Wildlife Service (USFWS) and National Oceanic Atmospheric Administration (NOAA) Fisheries
- Magnuson-Stevens Fishery Conservation and Management Act consultations for Essential Fish Habitat (EFH) under the jurisdiction of NOAA Fisheries
- Surface Lease Agreement under the jurisdiction of the State Lands Commission

The City anticipates obtaining all necessary regulatory permits to construct and operate the CAD facility as a multi-user, multiphase project disposal facility for sediments unsuitable for open ocean disposal from within and outside the Federal Channels in Lower Newport Bay. Expected authorizations include WDRs from the RWQCB and a Federal Consistency Determination from the CCC. The City will also request a standard individual permit from the USACE Regulatory program for discharges of dredged material into the CAD facility and nearshore placement in Newport Beach, California, and work in navigable waters. The City will prepare permit applications to the USACE, RWQCB, and CCC to obtain permission to dredge the material and to use the CAD facility as a disposal site. The Federal Channels maintenance dredging program would prepare analogous environmental documents for their maintenance dredging and disposal within the CAD facility.

5.2 Permit Application Process

As described above, the City will obtain all necessary permits to construct and operate the CAD facility. The City will also obtain all permits to dredge and transport material unsuitable for open

ocean disposal within the Federal Channels to the CAD facility. Individual permits will be required during the second phase of the project for dredged material outside the Federal Channels.

The proposed dredging, CAD facility construction, and site management activities must demonstrate compliance with the requirements of NEPA, CEQA, ESA, and CWA Section 404. The USACE and other permitting agencies will require the results of the physical and chemical testing of the dredged material as well as the most recent bathymetric survey of the CAD facility.

The regulatory and permitting agencies will likely require the City to employ designated BMPs and operational controls and conduct short-term monitoring during placement within the CAD facility of sediments unsuitable for open ocean disposal (within the Federal Channels and outside the Federal Channels) and during capping operations. Therefore, the City will likely be required to comply with one or more operational and/or institutional controls (e.g., BMPs) to minimize water quality impacts to Lower Newport Bay.

6 OMMP Communications Plan and Operating Requirements

This section addresses the operational conditions set forth for disposal and capping procedures at the CAD facility. The CAD facility will be designed with enough capacity for the unsuitable material dredged within the Federal Channels, 50,000 cy of material dredged within Lower Newport Bay but outside the Federal Channels, a 1-foot-thick interim cover containment layer, and a 3-foot-thick final cap (see Draft BODR for additional details). Furthermore, CAD facility construction and placement of material within the CAD facility will be restricted by an evaluation of whether the activities constitute the Least Environmentally Damaging Practicable Alternative according to the USEPA 404(b)(1) guidelines.

6.1 Communication Plan

6.1.1 Pre-Disposal Planning

The two parties proposing to use the CAD facility (City and USACE) have conducted detailed coordination throughout the project development phase and developed the technical requirements for all pre- and post-construction activities at the site. Bulk physical and sediment chemistry analyses in accordance with state and USACE permit requirements have been performed by the City on candidate material within the Federal Channels. Based on these detailed analyses, a determination of sediment suitability with the Dredged Material Management Team (DMMT) in August 2019 has concluded material in Main Channel 1, Main Channel 2, Turning Basin, and Newport Channel 1 is not suitable for open ocean disposal and therefore suitable for placement in the CAD facility (Figure H-3). Engineering design for the CAD facility including disposal and capping elements are at approximately 30% complete at this time and are thus sufficiently developed for the agency permit application process.

A pre-project planning meeting will be held at least 1 week prior to initiation of construction and disposal operations to discuss the schedule and logistics of the planned activities. Specific topics of discussion for the pre-project planning meeting include the following:

- Identify points of contact for all parties involved in the project including emergency contact numbers for the City, USACE, and City Representatives
- Review the construction specifications and anticipated project schedule
- Review the environmental monitoring requirements for the project, if applicable, and contact numbers for field sampling staff
- Review health and safety requirements and communication between field contractors
- Discuss reporting requirements for the project

6.2 Disposal and Capping Operations

6.2.1 Schedule

A conceptual schedule for CAD facility construction, dredged material placement and subsequent capping operations for the facility has been developed (Figure H-4).

6.2.2 Navigation and Safety Requirements

The users of the CAD facility must exercise every precaution to prevent accidents and injury to themselves or others when operating within the boundaries of the facility. This requirement extends to all persons entering and working around the CAD facility including, but not limited to, tugboat operators and crew, dredging vessel crew, sampling and surveying crew, and USACE and City field staff.

Vessels transporting material for discharge, including cap material, shall utilize global positioning system (GPS) and automated disposal barge tracking system. The City and USACE will be required to adhere to applicable provisions of the following regulations with regard to navigation, navigational/maritime safety, and worker occupational health and safety:

- U.S. Coast Guard (USCG) requirements, consistent with the office of the Captain of Lower Newport Bay
- 33 United States Code – Navigation and Navigable Waters, including Chapter 34, "Inland Navigation Rules"
- 33 Code of Federal Regulations (CFR) – Navigation and Navigable Waters
- 46 CFR – Shipping
- 29 CFR 1926 – Safety and Health Regulations for Construction
- Other applicable federal, state, and/or local regulations

6.3 Disposal Operations

The City will ensure that dredging contractors maintain contact with the City throughout disposal operations via telephone, radio, and face-to-face conversations. During specific disposal events, environmental monitoring will be performed to identify the levels of total suspended solids (TSS) and chemical contaminants in the water surrounding the CAD facility. Based on the results of environmental monitoring, the City may amend this document to require modification of the disposal operations. Pre- and post-construction monitoring requirements are described in Section 7.

Differential Global Positioning Systems (DGPS) will be employed by all contractors who have authorization to dispose of dredged materials in the CAD facility. If floating debris are expected, the contractors must provide a boat capable of collecting and transporting debris. The City and USACE are responsible for either removing debris from dredged material at dredge sites in their areas of

responsibility or collecting all floating debris after disposal to ensure floating debris are not observed in or around the CAD facility location. If floating debris are observed following disposal, it must be collected and disposed of by the contractors immediately following the disposal event.

A Transportation and Disposal (T&D) Log will be a fundamental component of recordkeeping for permit and disposal activities. The T&D Log will be used to identify basic disposal information and status including owner; equipment and permit information; tug and barge information; loading, transit, and weather information; and specific information about disposal and post-disposal operations. The T&D Log will be completed by the inspector, and a copy will be forwarded to the engineer via email within 24 hours of each day of disposal activities. This will be a component of both phases of the project, including the initial unsuitable material disposal from the Federal Channels and the subsequent disposal activities for material outside the Federal Channels that are not suitable for open ocean disposal under the City's existing RGP 54 program.

6.4 Capping Operations

Cap placement within the CAD facility shall occur via dump barge. Care must be taken to ensure that the material is released in a controlled manner and that the cap is placed as evenly as possible over the site.[1] Contractors barge tracking requirements and progress surveys will be required during the placement of sediments at the CAD facility.

[1] This BMP is recommended to allow for increased bearing capacity of the contaminant surface layer and to minimize the potential for mixing at the interface layer

7 Construction Monitoring and Post-Disposal Requirements

Monitoring of CAD facility's (Port of Hueneme, California and Long Beach, California) have demonstrated that sediments unsuitable for open ocean disposal could be placed into a CAD facility and capped with clean sediments without causing significant environmental impacts to the overlying water column or surrounding sediments. The methods and results of the recently completed 10-year monitoring conducted for the CAD facility at Port Hueneme are being finalized and should be available upon request prior to construction of the Lower Newport Bay CAD facility. Included in that study were field investigations conducted during disposal, immediately after capping, and consecutively for 10 years after construction. The construction monitoring and post-disposal requirements proposed for the Lower Newport Bay CAD facility have been informed by the lessons learned during the Port Hueneme CAD facility study.

7.1 Construction Monitoring

Using the results of the extensive field monitoring conducted at Port Hueneme as a general example of successful disposal and capping operations, construction monitoring for sediments unsuitable for open ocean disposal at the CAD facility will focus on the following two main objectives: 1) ensure that significant quantities of sediments are not deposited outside of the designated CAD facility; and 2) ensure that chemicals in the sediment remain fully isolated and do not affect resident aquatic organisms.

To achieve these objectives, the following field and laboratory parameters will be monitored during and immediately after construction:

- Field operations will be monitored and documented to ensure proper equipment placement prior to disposal and volumes/depths for all material placed into the CAD facility.
- Water column turbidity monitoring shall be conducted on a routine basis at reference and downcurrent locations to assess sediment transport during disposal operations.
- Water column samples will be collected periodically and analyzed for dissolved and particulate metals to monitor for chemical release and transport during disposal operations.
- During dredging, silt curtains may be required to reduce turbidity by isolating the active dredging site from the rest of Lower Newport Bay.
- A bathymetric survey of the CAD facility will be conducted prior to initiation of disposal operations to ensure that it has been constructed to meet the design specifications.
- A bathymetric survey of the CAD facility will be conducted after the sediments unsuitable for open ocean disposal have been placed within the CAD facility to ensure that the material has been placed evenly within the CAD facility.

- A bathymetric survey of the CAD facility will be conducted after the interim cover containment layer is constructed to ensure that the material has been placed evenly and at the proper depth within the CAD facility.
- Bathymetric surveys will be conducted periodically during the disposal operations for sediments unsuitable for open ocean disposal under the City's existing RGP 54 program to ensure that the material has been placed evenly within the CAD facility.
- A bathymetric survey of the CAD facility will be conducted after the final cap is constructed to ensure that the material has been placed evenly and at the proper depth within the CAD facility. If not, the contractor will be required to repair any irregularities.

7.1.1 Water Quality Monitoring

Water column monitoring will occur at set distances directly downcurrent of the disposal operations. The proposed downstream sampling distances for each operation will include at a minimum 150, 200, and 250 feet, and the nearest sample will be collected within 15 minutes of the disposal event.

At each station, continuous depth profiles will be collected a minimum of three times per week for light transmission, dissolved oxygen, and conventional field sampling measurements (i.e., salinity, temperature, and pH). Three sample depths (3 feet below the water surface, 1 foot above the bottom, and midway between these two points) will be monitored for TSS three times per week. Samples will be processed by the laboratory for a 7-day turnaround. Water column monitoring for dissolved metals, polychlorinated biphenyls (PCBs), DDT, and tributyltin (TBT) concurrent with the TSS samples will be conducted three times per week for the first 2 weeks of disposal operations, then weekly, thereafter, if no water quality exceedances are observed. Reference or upcurrent stations within Lower Newport Bay will also be sampled at similar depths and frequency for comparison. Figure H-5 depicts the conceptual locations for monitoring of the water column.

Water column monitoring at the dredging operations will be conducted at similar distances, depths and frequencies and be tested for the same chemical parameters. If no elevated chemicals are observed during the first 2 weeks of monitoring, sample frequency will be reduced to once per week.

7.1.2 Construction Operations Monitoring

Proposed monitoring procedures to meet the objectives related to cap design include the following:

- Recording tonnage/volume of sediment dredged and placed within the CAD facility
- Tracking location of sediment placement within the CAD facility
- Recording tonnage/volume of capping sediment dredged and placed within the CAD facility
- Completing progress bathymetric surveys to verify sediment placement location
- Tracking operational information such as dredge production rates, downtime, and barge discharge time

- Completing a bathymetric survey of the CAD facility after the interim cover containment layer and final cap have been placed over the CAD facility to ensure that the cap material has been placed evenly over the entire facility

7.2 Immediate Post-Construction Monitoring Description

Monitoring immediately after construction is completed is required to ensure that placement of the sediment is successful, which, in this case, is measured by achieving the desired minimum cap thickness over the entire CAD facility while minimizing the incidence of off-site transport of sediment outside of the CAD facility. These parameters will be measured using during- and post-construction bathymetry surveys and post-construction sediment coring of the cap layer. Each parameter is described in greater detail below.

7.2.1 Bathymetric Surveys

Bathymetric surveys will be conducted prior to initiation of disposal activities to establish the baseline conditions for the CAD facility and routinely during disposal operations to monitor successful placement of sediments into the CAD facility. A post-construction cap bathymetric survey is also required to quantify the final configuration and elevations of the capped site. This bathymetric survey will be conducted after the placement of the interim cover containment layer and after placement of the final cap. This information will help determine whether design criteria are met and provide a baseline for comparison to long-term bathymetric surveys of the CAD facility.

7.2.2 Cap Coring

Post-construction coring is required after the placement of the final clean sediment cap to provide information both on the physical characteristics of the final cap and the underlying sediment (i.e., final cap thickness, horizontal coverage, and extent of mixing between layers) and the chemical characteristics of the final cap once it has been placed. Core chemistry data will be collected to establish a baseline profile of chemicals in various layers of the final cap and in the underlying sediment. Final cap core chemistry information will also help to quantify the extent of mixing between the final cap and underlying sediment that occurred during placement.

This baseline chemistry profile will be compared to long-term monitoring core chemistry data to determine whether any chemicals are migrating from the underlying sediment into the final cap sediment. Because diffusion of chemicals through sediment is a time-dependent process, migration from underlying sediments will be observable first in the deepest layers of the final cap. If long-term monitoring reveals increases in chemicals only in surface layers of the final cap, it would be indicative of chemicals from sources outside the CAD facility being deposited on the final cap surface (rather than migration of chemicals from beneath the cap).

7.3 Long-Term Post-Construction Monitoring

Long-term monitoring after construction of the final clean sediment cap is completed is required to verify that the CAD facility has maintained its physical integrity and that the cap is maintaining its ability to sequester underlying contaminants. These parameters will be measured using periodic post-construction bathymetric surveys and sediment coring of the cap layer. Each parameter is described in greater detail below. The key elements addressed by the monitoring program included the following:

- Determining if the CAD facility cap has maintained its physical integrity
- Confirming that chemicals remain isolated below the cap surface

7.3.1 Bathymetric Surveys

Bathymetric surveys will be conducted 3, 6, and 12 months after completion of final cap construction to quantify the configuration and elevations of the capped site. Then, bathymetric surveys will be taken periodically and reported to the responsible state and federal regulatory agencies (CCC, RWCQB, USEPA, and USACE). If there is consensus among the regulatory agencies that the final cap is performing as predicted after 10 years of monitoring, the applicants may apply to the Executive Director of the CCC to narrow the focus or modify this aspect of the long-term monitoring program. This information will help determine whether design criteria continue to be met and quantify rates of erosion or deposition at the CAD facility.

7.3.2 Cap Coring

Twelve months after completion of final cap construction, sediment coring will be conducted to provide information on the physical characteristics of the final cap and underlying sediment (i.e., final cap thickness, horizontal coverage, and extent of mixing between layers) and the chemical characteristics of the final cap for comparison to baseline data collected immediately after final cap construction. Core chemistry data will be collected at a minimum of five locations distributed across the CAD facility to establish a profile of chemicals in various layers of the final cap and in the underlying sediment.

This chemistry data will be compared to the baseline chemistry data to determine whether any chemicals are migrating from the underlying sediment into the final cap sediment. Because diffusion of chemicals through sediment is a time-dependent process, migration from underlying sediments will be observable first in the deepest layers of the cap. As such, bulk chemistry and porewater samples will be taken within 1 foot of the interface between the underlying material and the final cap material to determine if there has been significant movement of contaminants. At least five samples will be taken 12 months after completion of the final cap and then every 5 years thereafter. A report will be submitted to the responsible state and federal regulatory agencies. If there is consensus among the regulatory agencies (CCC, RWCQB, USEPA, and USACE) that the final cap is performing as

predicted after the third round of samples, the applicants may apply to the Executive Director of the CCC to narrow the focus or modify this aspect of the long-term monitoring program. If long-term monitoring reveals increases in chemicals only in surface layers of the cap, it would be indicative of chemicals from sources outside the CAD facility being deposited on the final cap surface (rather than migration of chemicals from beneath the final cap).

7.3.3 Adaptive Management

After the first year of post-construction monitoring has been completed, an adaptive management plan will be developed based on an analysis of the data collected during the year. The long-term management plan will be developed based on the existing conditions of the site and current technological developments and will be designed to ensure long-term cap stability and isolation of contaminants. Monitoring requirements, such as timing of the events, will be determined at that time. At a minimum, however, long-term monitoring will include the following:

- Completing bathymetric surveys to rates of erosion and deposition
- Coring for chemistry in bulk sediments and porewater

The exact scope and frequency of the long-term monitoring program will be evaluated and developed after the first year of post-construction monitoring data are available and have been reviewed.

7.3.4 Environmental Monitoring Reports

The City will prepare and submit to the regulatory agencies an annual environmental monitoring report to document and discuss the results of all CAD facility monitoring activities conducted during the previous year. Sampling will be based on the calendar year, and reports will be completed by January 31 of the following year and will include a discussion of current and past monitoring data for the site, as well as proposed future monitoring planned for the site. Table H-1 includes a summary of the construction and post-construction monitoring requirements.

Table H-1
Summary of Construction and Post-Construction Monitoring

Matrix	Target Analytes	Frequency	Collection Technique
Surface Water – During Dredging (Outside Silt Curtain) and at Disposal Location	TSS, metals, PCBs, DDT, and TBT	Three times per week for first 2 weeks, then weekly if no elevated concentrations are observed	Grab samples
Bathymetry – During Disposal	—	As needed and at milestones during disposal of Main Channel 1, Main Channel 2, Turning Basin, and Newport Channel 1 sediments	Multi-beam sonar

Matrix	Target Analytes	Frequency	Collection Technique
Bathymetry – Immediate Post Construction	—	Immediately following construction (including both the layer of material unsuitable for open ocean disposal and the interim cover containment layer)	Multi-beam sonar
Bathymetry – During Disposal	—	As needed, and at milestones for sediments outside the Federal Channels (permittable and not permittable under the City's RGP 54 program)	Multi-beam sonar
Sediment Cores – Immediate Post Construction of the Final Cap	Metals, PCBs, DDT, and TBT	Immediately following construction of the final cap	Core samples
Bathymetry – Immediate Post Construction of the Final Cap	—	Immediately following construction of the final cap	Multi-beam sonar
Porewater – Long-Term Monitoring	Metals and PCBs	1 year post construction, then every 5 years	In situ sediment probes
Sediment Cores – Long-Term Monitoring	Metals, PCBs, DDT, and TBT	1 year post construction, then every 5 years	Core samples
Bathymetry Surveys – Long-Term Monitoring	—	3, 6, and 12 months post construction and then every 5 years	Multi-beam sonar

8 Contingency Plans

Environmental and maritime safety is of primary importance in the operation and management of the Lower Newport Bay CAD facility. This OMMP has been developed with these factors in mind. However, it is recognized that unforeseen events can occur. Sound plans of action are required to assure consistent and appropriate actions are taken to address such events.

8.1 Emergency Notification Procedures

The contractor's field safety plan shall include specific points of contact in the event of emergencies. During the pre-construction meeting, the contractor will be given 24-hour emergency numbers for the City, USACE, USEPA, USCG, and the Harbor Police Department.

8.2 Incidents and Unusual Occurrences

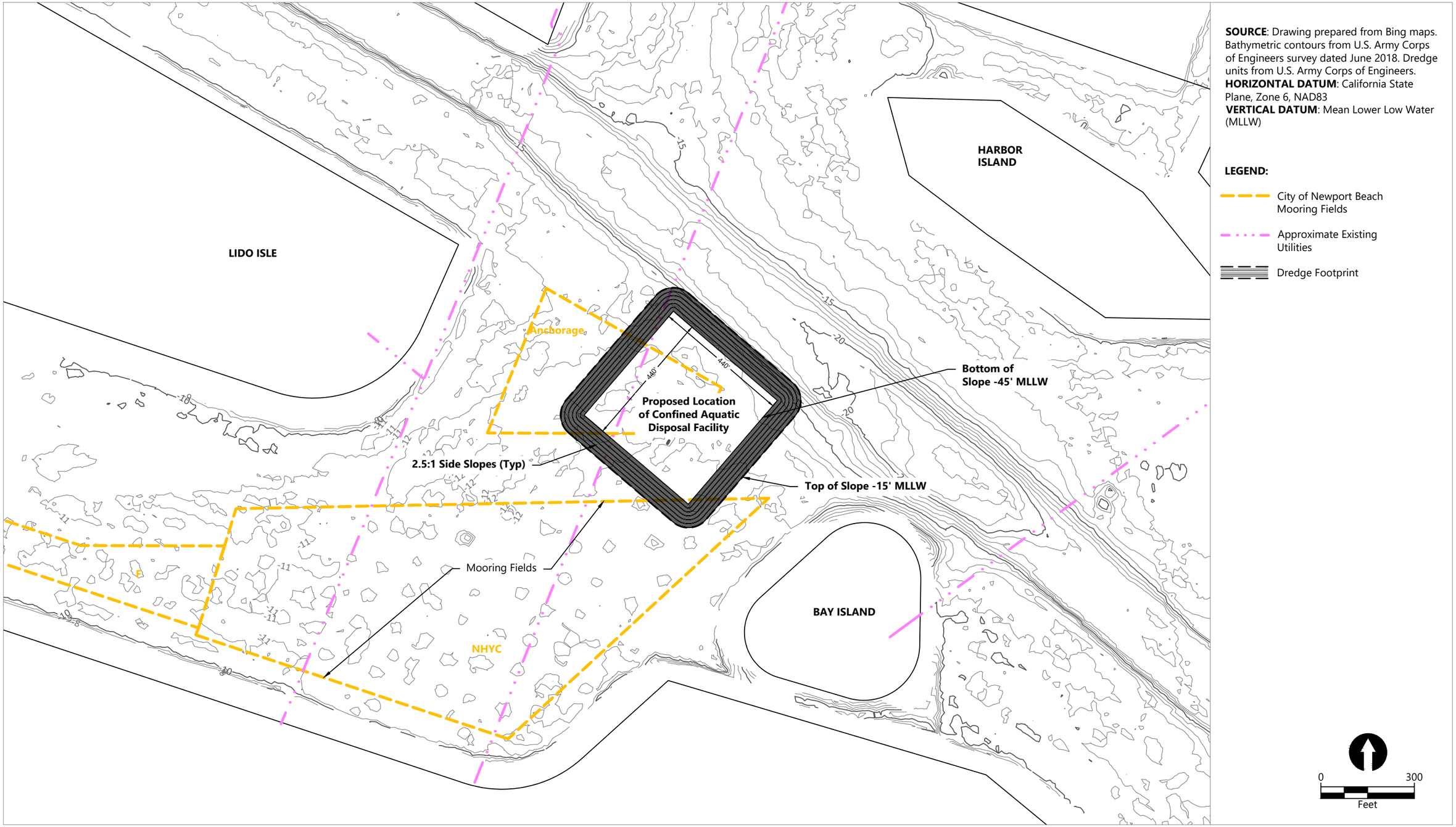
The City, which is responsible for the operation and management of the CAD facility, will work with the USACE and contractors to establish safe working conditions within and around the CAD facility. At the pre-construction meeting and in the agreements to be executed between the City and USACE addressing construction and operation of the CAD facility, it will be emphasized that the contractors, tugboat captain, and USACE-certified inspector are the first line of defense for assuring safety and compliance at the site. It will be emphasized that no activities should be started if the potential for problems appears possible and that any ongoing disposal activities should be ceased once the potential for problems arises. It is anticipated that most remedies will be precautionary (e.g., wait for better weather, repair dredging and disposal equipment, alter dredging and disposal equipment, alter dredging and disposal methods, coordinate conflicting activities among separate users of the Harbor).

If incidents or unusual occurrences do occur, the contractor will immediately cease the specific dredging and disposal activity and assess the situation. Remedies will be identified and provided to the City and, if necessary, the USACE and USCG for their concurrence. The contractor will be required to provide details on how the incident occurred and what immediate steps were taken to limit the extent of the impact. The contractor will be required to report on immediate actions and notifications made. The City will assess this information and evaluate the proposed remedy of the occurrence.

The engineer will perform environmental monitoring during all specified disposal activities. The results of this monitoring will be reported to the City and USACE. The City and USACE will evaluate these results and work together to determine whether operations are environmentally sound. The results of environmental monitoring may require operational methods to be modified to help meet the determined goals.

Any change in dredged material disposal techniques, methods, or equipment must receive prior approval from the City and USACE. Modifications to environmental permits may be required. If it becomes impractical to meet the criteria, considering the environmental and physical conditions within the site and equipment and methods available to the contractor, then engineering solutions may be considered and proposed. Modifications to the proposed actions and notifications described above will be made as lessons are learned in the operation and management of the site.

Figures



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2018. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- City of Newport Beach Mooring Fields
- Approximate Existing Utilities
- Dredge Footprint

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Figure H-1
Plan View and Location of Proposed CAD Facility

Appendix H Operations, Management, and Monitoring Plan
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

SOURCE: Ariel from Bing Maps, 2018.
HORIZONTAL DATUM: California State Plane, Zone 6, North American Datum of 1983 (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Required Dredge Elevation
- Allowable Overdepth Elevation
- Existing Mudline

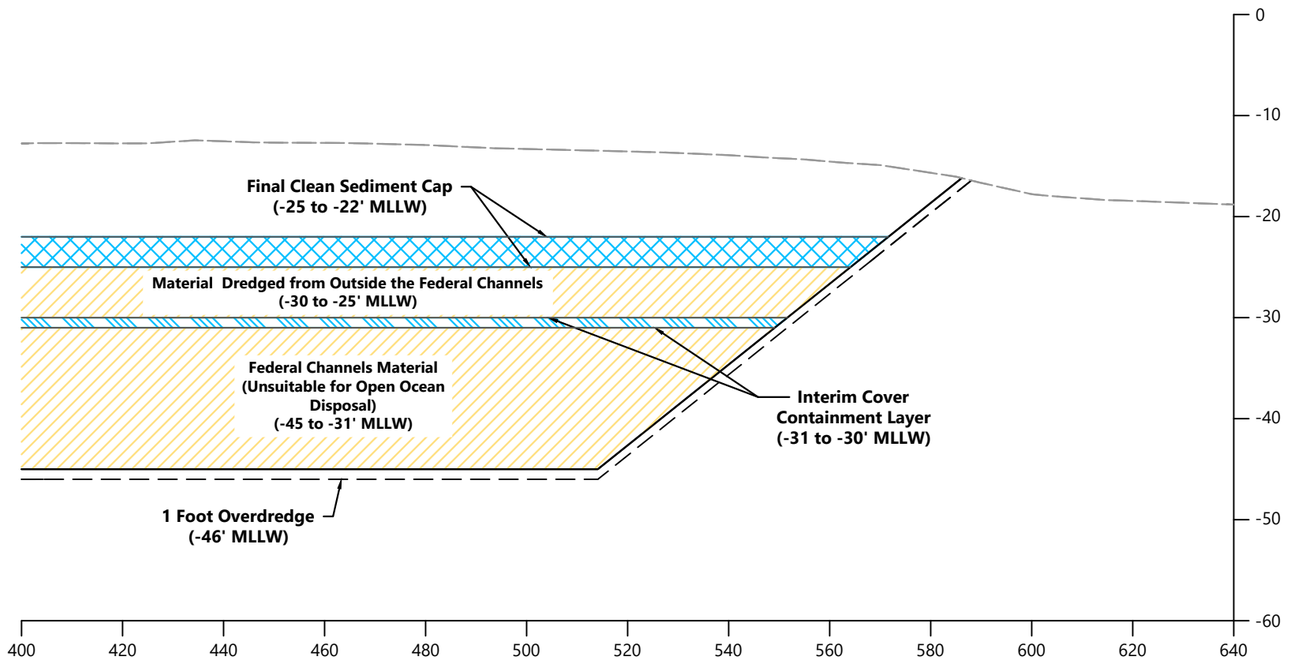

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Figure H-2
Cross Section of CAD Facility

Appendix H Operations, Management, and Monitoring Plan
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay



SOURCE: Drawing prepared from Bing maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2017. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Authorized Federal Channel Limits and Dredge Unit Boundaries
- (-20) Authorized Depth
- —-10— Existing Bathymetry
- Dredged Material Not Suitable for Open Ocean or Nearshore Disposal
- Dredged Material Suitable for Open Ocean or Nearshore Disposal
- Proposed Confined Aquatic Disposal Facility
- Nearshore Placement Area

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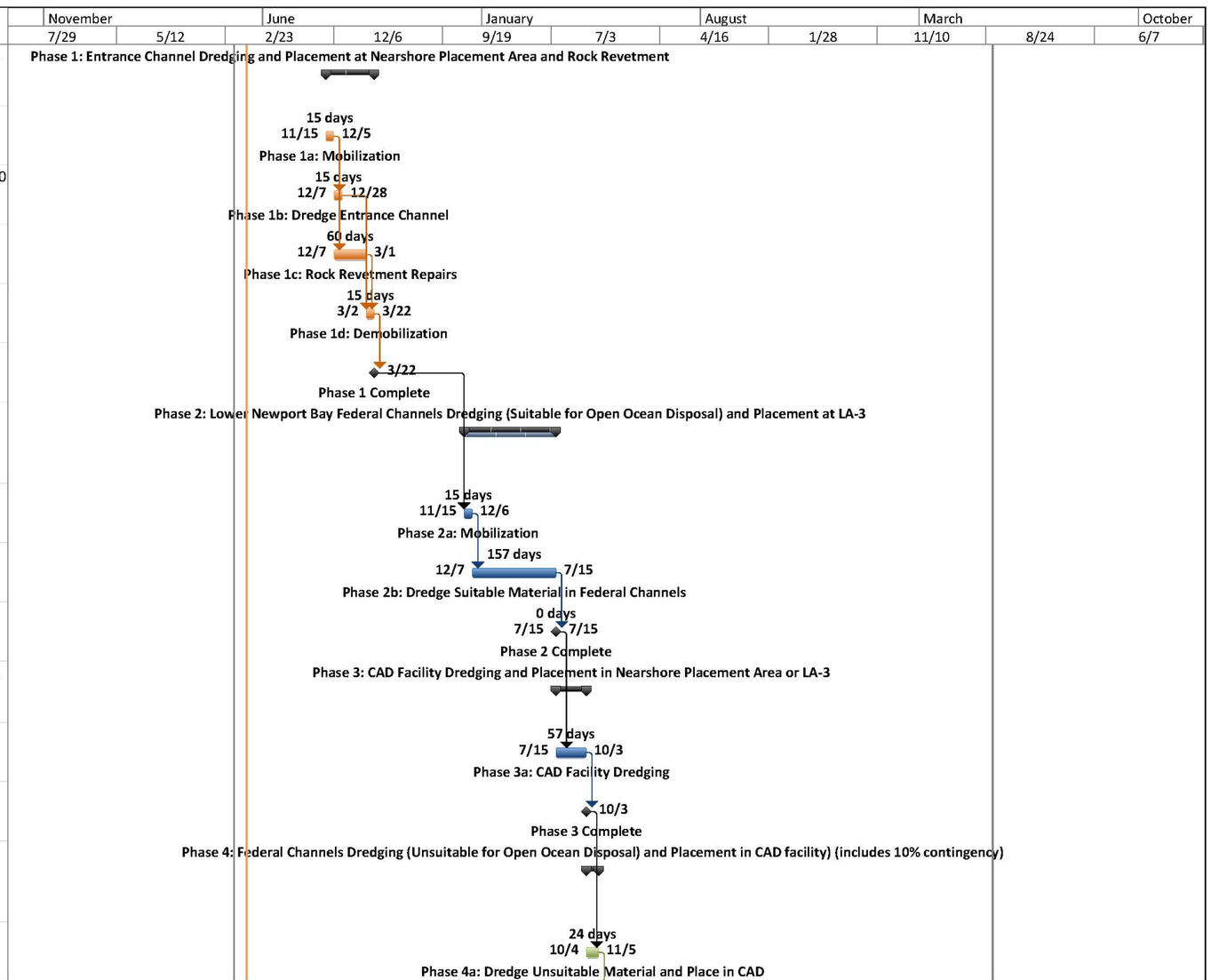
Figure H-3
Federal Channels Maintenance Dredging Sediment Suitability Map

Appendix H Operations, Management, and Monitoring Plan
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

ID	Task Name	Duration	Start	Finish
1	**Phase 1: Entrance Channel Dredging and Placement at Nearshore Placement Area and Rock Revetment**	**89.2 days**	**Sun 11/15/20**	**Mon 3/22/21**
2	Phase 1a: Mobilization	15 days	Sun 11/15/20	Sat 12/5/20
3	Phase 1b: Dredge Entrance Channel	15 days	Mon 12/7/20	Mon 12/28/20
4	Phase 1c: Rock Revetment Repairs	60 days	Mon 12/7/20	Mon 3/1/21
5	Phase 1d: Demobilization	15 days	Tue 3/2/21	Mon 3/22/21
6	Phase 1 Complete	0 days	Mon 3/22/21	Mon 3/22/21
7	**Phase 2: Lower Newport Bay Federal Channels Dredging (Suitable for Open Ocean Disposal) and Placement at LA-3**	**171.8 days**	**Mon 11/15/21**	**Fri 7/15/22**
8	Phase 2a: Mobilization	15 days	Mon 11/15/21	Mon 12/6/21
9	Phase 2b: Dredge Suitable Material in Federal Channels	157 days	Tue 12/7/21	Fri 7/15/22
10	Phase 2 Complete	0 days	Fri 7/15/22	Fri 7/15/22
11	**Phase 3: CAD Facility Dredging and Placement in Nearshore Placement Area or LA-3**	**57 days**	**Fri 7/15/22**	**Mon 10/3/22**
12	Phase 3a: CAD Facility Dredging	57 days	Fri 7/15/22	Mon 10/3/22
13	Phase 3 Complete	0 days	Mon 10/3/22	Mon 10/3/22
14	**Phase 4: Federal Channels Dredging (Unsuitable for Open Ocean Disposal) and Placement in CAD facility) (includes 10% contingency)**	**24 days**	**Tue 10/4/22**	**Sat 11/5/22**
15	Phase 4a: Dredge Unsuitable Material and Place in CAD	24 days	Tue 10/4/22	Sat 11/5/22



Project: LNB - Construction Sched
Date: Mon 4/20/20

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

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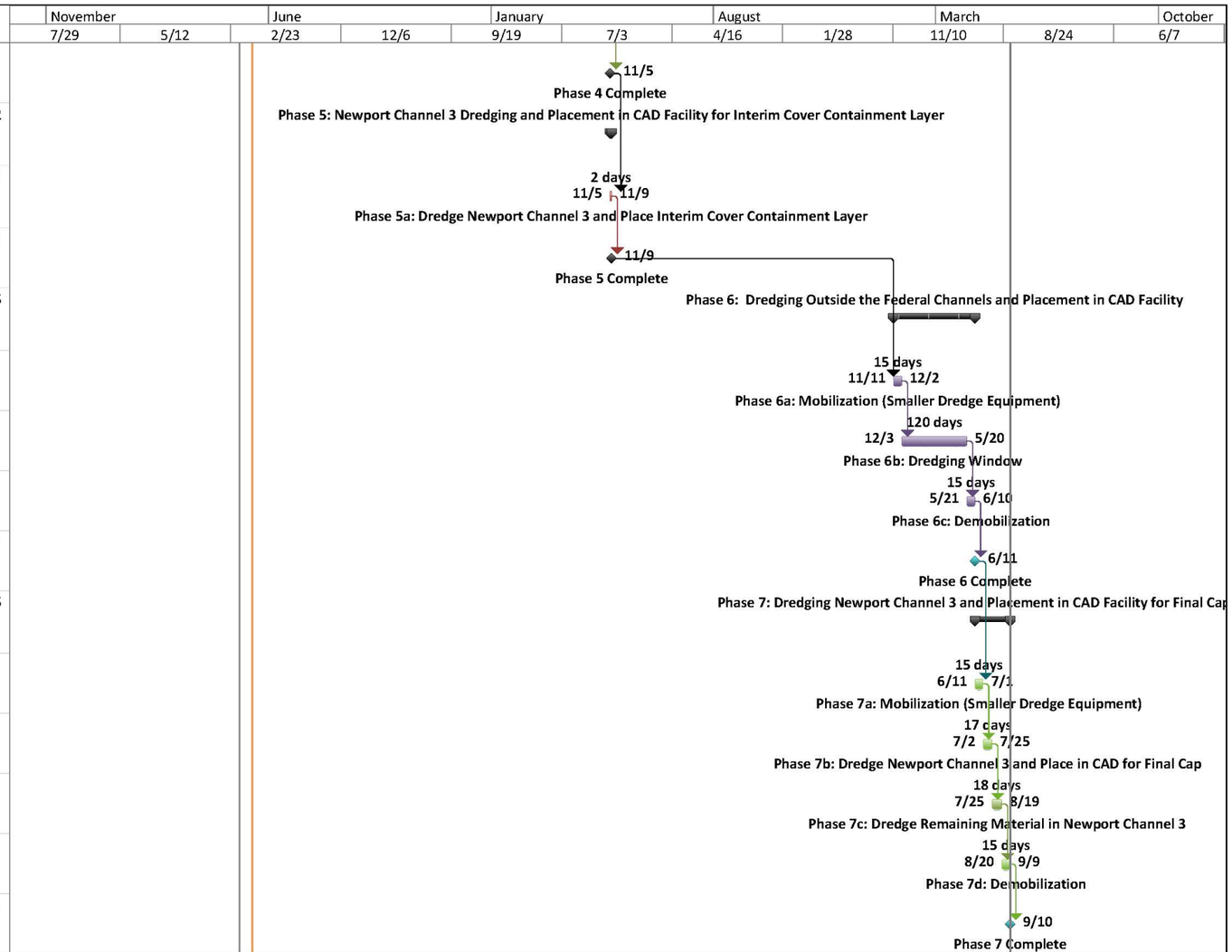
Figure H-4
Construction Schedule
Appendix H Operations, Management, and Monitoring Plan
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

ID	Task Name	Duration	Start	Finish
16	Phase 4 Complete	0 days	Sat 11/5/22	Sat 11/5/22
17	**Phase 5: Newport Channel 3 Dredging and Placement in CAD Facility for Interim Cover Containment Layer**	**2 days**	**Sat 11/5/22**	**Wed 11/9/22**
18	Phase 5a: Dredge Newport Channel 3 and Place Interim Cover Containment Layer	2 days	Sat 11/5/22	Wed 11/9/22
19	Phase 5 Complete	0 days	Wed 11/9/22	Wed 11/9/22
20	**Phase 6: Dredging Outside the Federal Channels and Placement in CAD Facility**	**150 days**	**Mon 11/11/24**	**Wed 6/11/25**
21	Phase 6a: Mobilization (Smaller Dredge Equipment)	15 days	Mon 11/11/24	Mon 12/2/24
22	Phase 6b: Dredging Window	120 days	Tue 12/3/24	Tue 5/20/25
23	Phase 6c: Demobilization	15 days	Wed 5/21/25	Tue 6/10/25
24	Phase 6 Complete	0 days	Wed 6/11/25	Wed 6/11/25
25	**Phase 7: Dredging Newport Channel 3 and Placement in CAD Facility for Final Cap Layer**	**65 days**	**Wed 6/11/25**	**Wed 9/10/25**
26	Phase 7a: Mobilization (Smaller Dredge Equipment)	15 days	Wed 6/11/25	Tue 7/1/25
27	Phase 7b: Dredge Newport Channel 3 and Place in CAD for Final Cap	17 days	Wed 7/2/25	Fri 7/25/25
28	Phase 7c: Dredge Remaining Material in Newport Channel 3	18 days	Fri 7/25/25	Tue 8/19/25
29	Phase 7d: Demobilization	15 days	Wed 8/20/25	Tue 9/9/25
30	Phase 7 Complete	0 days	Wed 9/10/25	Wed 9/10/25



Project: LNB - Construction Sched
Date: Mon 4/20/20

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

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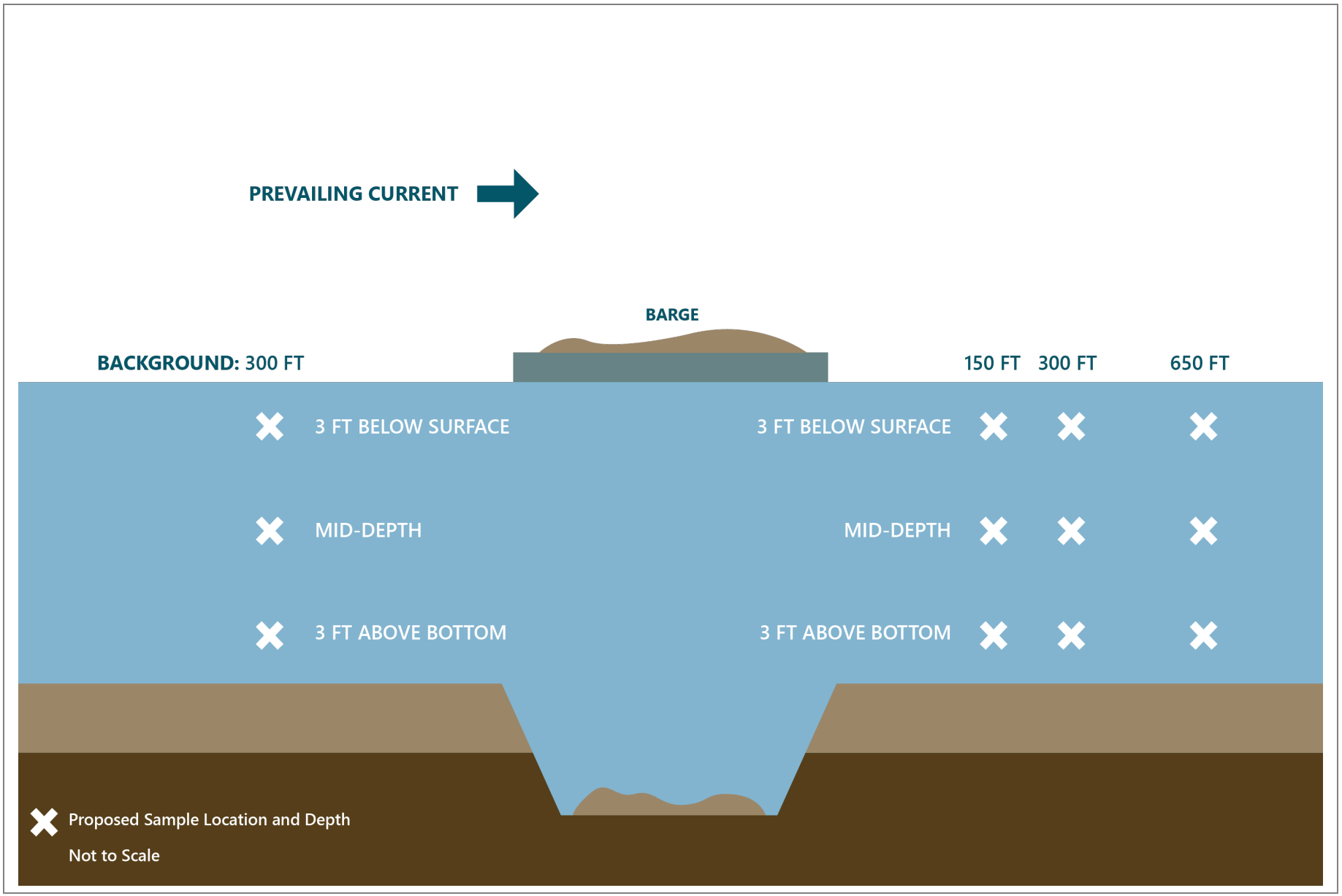

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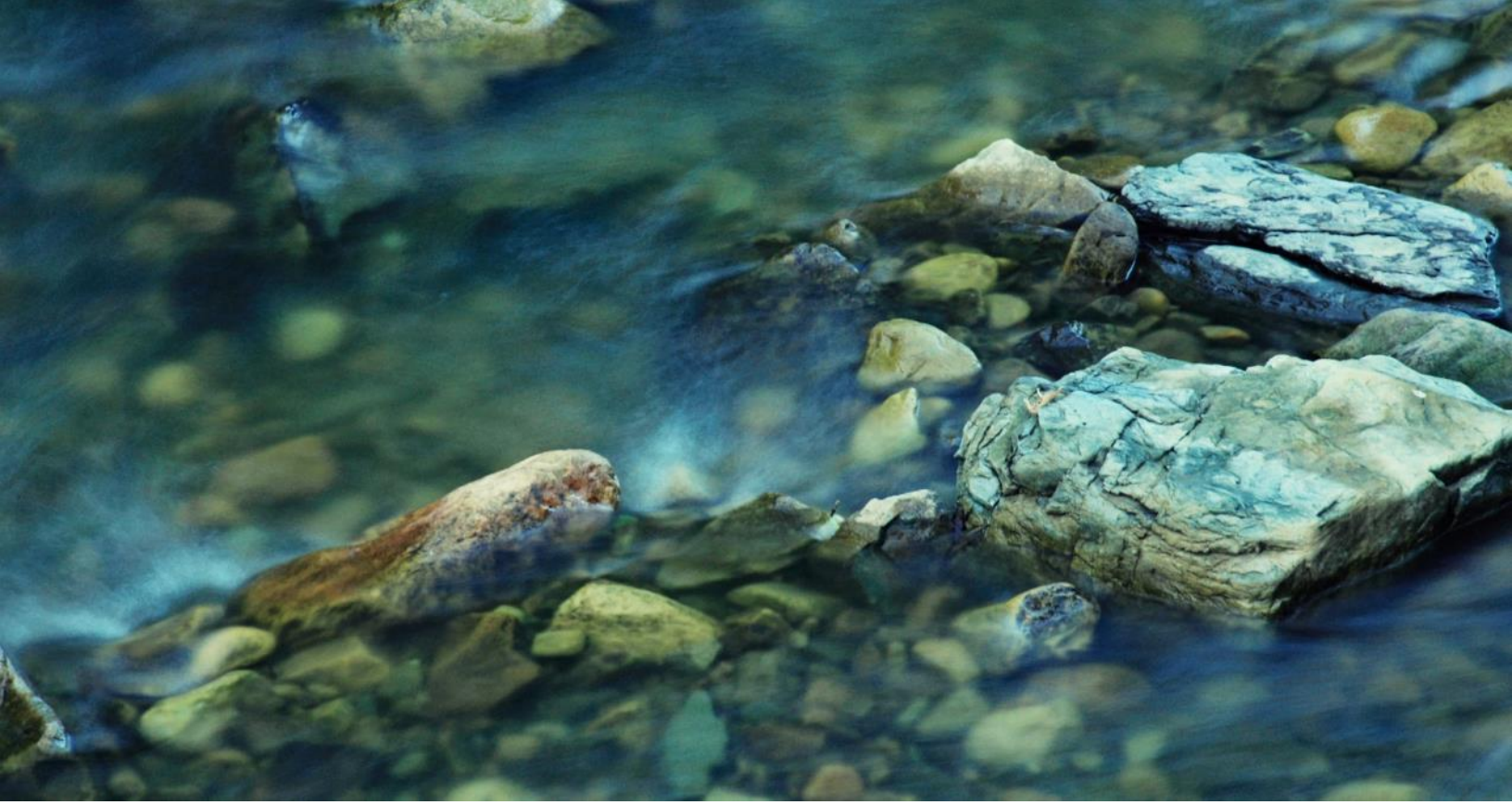
Figure H-5
Water Quality Monitoring Locations During Disposal
Appendix H Operations, Management, and Monitoring Plan
Draft Basis of Design Report Sediment Dredging and Confined Aquatic Disposal, Lower Newport Bay

Appendix D
Sediment Management Plan



November 24, 2020
Lower Newport Bay

ANCHOR QEA

Sediment Management Plan

Prepared for the City of Newport Beach

November 24, 2020
Lower Newport Bay

Sediment Management Plan

Prepared for
City of Newport Beach
100 Civic Center Drive
Newport Beach, California 92660

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Project Number: 180243-02.01

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APPENDICES

Appendix A Contaminant Maps for Lower Newport Bay
Appendix B Contaminant Maps for RGP 54
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ABBREVIATIONS

BMP	best management practice
BODR	Basis of Design Report
CAD	Confined Aquatic Disposal
CCC	California Coastal Commission
CCR	California Code of Regulations
CDF	confined disposal facility
CEQA	California Environmental Quality Act
City	City of Newport Beach
CSTF	Contaminated Sediments Task Force
CWA	Clean Water Act
cy	cubic yard
DMMP	dredge material management plan
DMMT	Southern California Dredged Material Management Team
EET	effluent elutriate test
ERM	effects range median
ESA	Endangered Species Act
FDA	U.S. Food and Drug Administration
LTMS	Long-Term Management Strategy
mg/kg	milligrams per kilogram
MLLW	mean lower low water
MPRSA	Marine Protection, Research, and Sanctuaries Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Services
ODMDS	ocean dredged material disposal site
OMMP	Operations, Management, and Monitoring Plan
OTM	*Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual*
PCB	polychlorinated biphenyl
POLB	Port of Long Beach
RGP 54	Regional General Permit 54
RWQCB	Regional Water Quality Control Board
SCOUP	Sand Compatibility Opportunistic Use Program
SMP	Sediment Management Plan
SP	solid phase
SPP	suspended particulate phase
STLC	soluble threshold limit concentration

SWAC	surface-weighted average concentration
TCLP	toxicity characteristic leaching procedure
TMDL	Total Maximum Daily Load
Toxics TMDL	*Total Maximum Daily Loads for Toxic Pollutants in San Diego Creek and Newport Bay, California*
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
WDR	Waste Discharge Requirements
WET	Waste Extraction Test

1 Introduction

The U.S. Army Corps of Engineers (USACE), in partnership with the City of Newport Beach (City), is planning to conduct maintenance dredging within the Federal Channels in Lower Newport Bay, California, to maintain the federally authorized depths. Based on the pre-dredge sediment investigation, portions of the Federal Channels, including the Turning Basin and portions of Main Channel and Newport Channel, were determined to be unsuitable for unconfined open-water disposal because of elevated mercury and/or polychlorinated biphenyls (PCBs; Anchor QEA 2019). Although all samples passed bioassay and bioaccumulation testing, the U.S. Environmental Protection Agency (USEPA) expressed concerns regarding the degradation of the offshore disposal site because of mass loading of mercury and the potential for adverse effects caused by methylmercury. Following negotiations with USEPA and the Southern California Dredged Material Management Team (DMMT) in August 2019, sediments with mercury up to 1.5 milligrams per kilogram (mg/kg) were approved for ocean disposal if the City met the following conditions:

1. Develop a long-term Sediment Management Plan (SMP) to address dredged material determined to be unsuitable for open ocean disposal
2. Contribute partial funding towards USEPA monitoring at the LA-3 Ocean Dredged Material Disposal Site (ODMDS) with respect to potential bioaccumulation effects resulting from mercury disposal

This SMP was developed to meet the first of these conditions, as specified by USEPA and the DMMT, in support of the Federal Channels dredging program. This SMP summarizes existing sediment quality conditions and evaluates management alternatives for sediments that are suitable and unsuitable for open ocean disposal. Further, this document is intended as a pathway to sediment management within Newport Harbor. It will be updated, as warranted, to reflect changes in policy, availability of new technology to treat contaminated sediment, new disposal options, or changes in conditions.

1.1 Overview and Need for Sediment Management Plan

As previously described, USACE, in partnership with the City, is planning to conduct maintenance dredging in the Federal Channels in Lower Newport Bay to maintain authorized depths. Based on the pre-dredge sediment investigation, portions of the Federal Channels, including the Turning Basin and portions of Main Channel and Newport Channel, were determined to be unsuitable for unconfined open-water disposal because of elevated mercury and/or PCBs. Approximately 106,900 cubic yards (cy) of impacted material will require management. During the previous Federal Channels program in 2012 and 2013, approximately 120,000 cy of impacted material were placed at the Port of Long Beach's (POLB's) Middle Harbor Fill Site. Currently, there are no regional fill projects accepting material that would be available for the current Federal Channels program.

In addition to the Federal Channels, impacted sediments in other portions of Newport Bay have been determined unsuitable for open ocean disposal and thus require management. Since the mid-1970s, the City has maintained a Regional General Permit (RGP) 54 that provides a relatively streamlined process for permitting small dredging and dock maintenance projects between the bulkhead and pierhead lines in Newport Harbor. The City maintains and renews the sediment suitability for RGP 54 every 5 years. The most recent sediment investigation indicated that some areas required additional confirmatory sampling for mercury, DDTs, and/or PCBs prior to unconfined open-water disposal. Areas exceeding the confirmatory thresholds would be excluded from RGP 54. In addition, other areas of Lower Newport Bay are excluded from RGP 54 due to the presence of elevated chemical concentrations, including Promontory Bay, Balboa Yacht Basin, and Rhine Channel. In 2011, approximately 80,000 cy of impacted sediment were removed from Rhine Channel and placed at the POLB's Middle Harbor Fill Site. While that project was successful at removing a large amount of impacted sediments, some residual material remains on the surface, which may also require additional management.

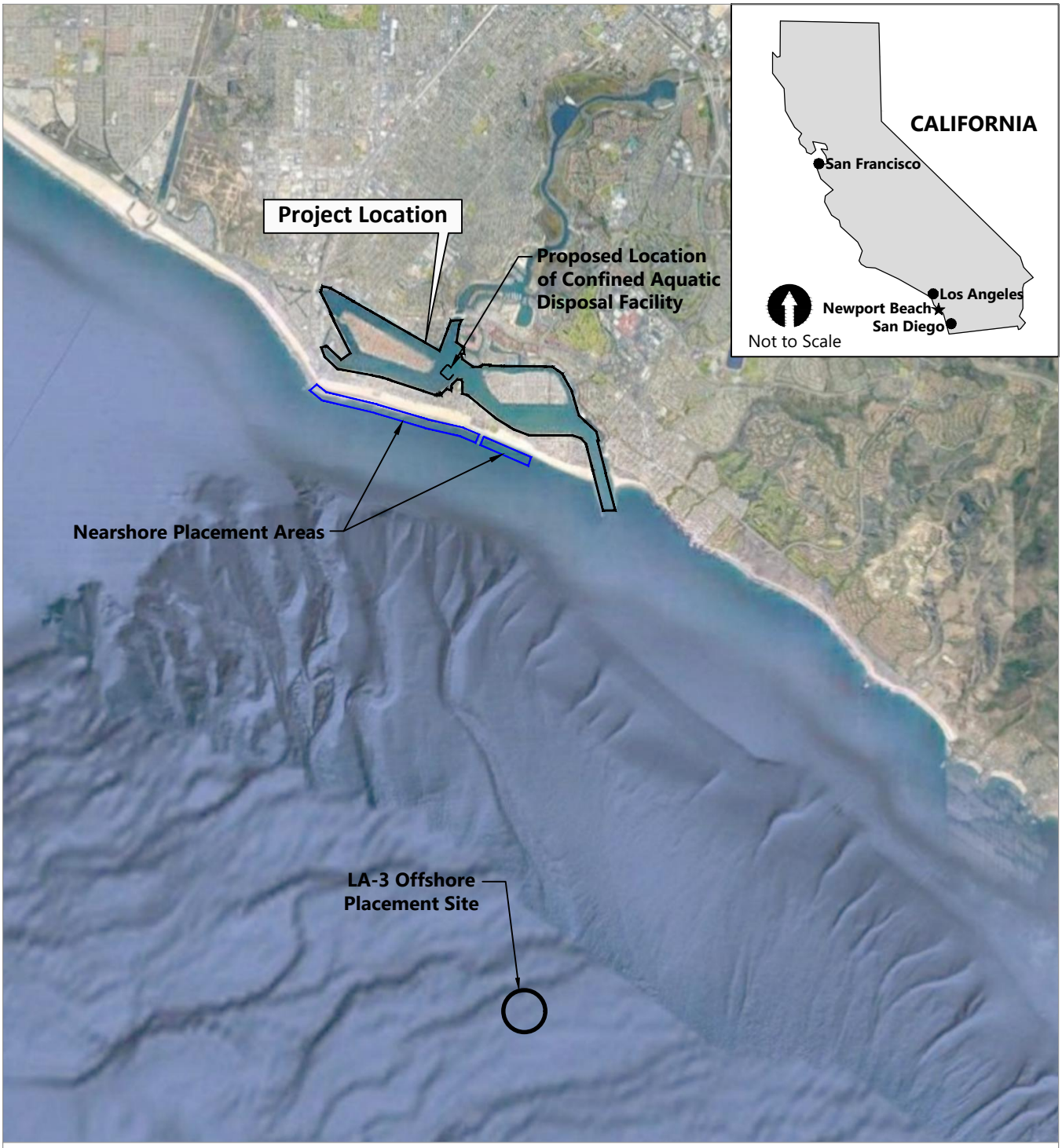
Currently, there are limited sediment management alternatives for sediments unsuitable for open ocean disposal in Newport Bay. Transporting and disposing of this material to an upland landfill is expensive and would cause impacts to air quality, traffic, noise, and other aspects associated with hauling the material via trucks on the local roads and highways. The City previously had the ability to manage impacted material at the POLB's Middle Harbor Fill Site, but this site is closed and no longer an option for future sediment management needs. Port fill sites are rare opportunities, and when they do arise, they are only able to receive sediment for a relatively short amount of time and usually from local sources within close proximity. The City is currently pursuing development of a Confined Aquatic Disposal (CAD) facility within Newport Harbor. The use of CAD sites to manage impacted sediments has been proven successful both nationally and internationally, with many examples across the United States. Locally, the North Energy Island Borrow Pit was developed in Long Beach approximately 20 years ago, and the Port Hueneme CAD site was developed approximately 10 years ago. There are currently two additional CAD sites in development within the POLB for their internal sediment management needs. Developing a CAD cell dedicated to Newport Harbor's material would provide a cost-effective and environmentally protected alternative for sediment management.

1.2 Setting: Newport Bay

The Newport Bay/San Diego Creek watershed is located in Central Orange County in the southwest corner of the Santa Ana River Basin, about 35 miles southeast of Los Angeles and 70 miles north of San Diego (Figure 1). The watershed encompasses 154 square miles and includes portions of the cities of Newport Beach, Irvine, Laguna Hills, Lake Forest, Tustin, Orange, Santa Ana, and Costa Mesa. Mountains on three sides encircle the watershed; runoff from these mountains drains across the Tustin Plain and enters Upper Newport Bay via San Diego Creek. Newport Bay is a combination of

two distinct waterbodies, Upper and Lower Newport Bay, which are generally divided by the Pacific Coast Highway Bridge. The majority of commerce and recreational boating exists in Lower Newport Bay, which is highly developed. Upper Newport Bay contains both a diverse mix of development in the lower reach and an undeveloped ecological reserve in the upper reach.

The rich history of agricultural and industrial activities in the watershed has resulted in a legacy of sediment contamination in Newport Bay. This contamination is specifically a result of historical releases from industrial sources and storm drains adjacent to the bay as well as ongoing runoff from the surrounding watershed. Contaminants of concern include metals, pesticides, and PCBs.



SOURCE: Image from Bing Maps.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

Approximate Project Location:
33° 36.540', 117° 54.230'

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Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-025 SMP VIC.dwg Figure 1

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Figure 1
Vicinity Map

Sediment Management Plan
Lower Newport Bay

1.3 Regional Sediment Management Regulatory Process

Dredging, disposal, and the long-term management of contaminated sediments in Orange County, Los Angeles County, and Ventura County are overseen by the DMMT. The DMMT includes representatives from USACE, USEPA, the National Marine Fisheries Services (NMFS), the California Coastal Commission (CCC), the Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife. This group is responsible for reviewing sampling plans, analyzing results, and making suitability determinations for Southern California dredging projects using guidance developed by the Contaminated Sediments Task Force (CSTF). The CSTF was formed in 1998 and includes the same regulatory and resource agencies as well as members of the POLB, Port of Los Angeles, City of Long Beach, Los Angeles County Beaches and Harbors, Heal the Bay, and other interested parties. The objective of the CSTF was to develop a Long-Term Management Strategy (LTMS) for the characterization, management, and beneficial reuse of contaminated sediments (CSTF 2005).

A similar process was initiated by USACE to develop a regional dredge material management plan (DMMP) that focused on materials within Federal Channels and included both clean and contaminated material management options (Everest and Anchor 2009). The sediment management strategies presented in this SMP are consistent with the regional policies, goals, strategies, and recommendations outlined in both the LTMS (CSTF 2005) and DMMP (Everest and Anchor 2009).

1.4 Regional General Permit 54

For approximately 40 years, the City has maintained RGP 54, which provides a relatively streamlined process for permitting small dredging and dock maintenance projects between the bulkhead and pierhead lines in Newport Harbor. The permit authorizes small-scale maintenance dredging for public and residential docks and commercial marinas within the harbor and outside of the federal government's responsibility. The permit includes approvals from USACE, RWQCB, and CCC. While the individual permits and approvals from each respective agency have different expiration dates, the City maintains and renews the sediment suitability every 5 years. The renewal includes a comprehensive bay-wide sediment investigation to evaluate suitability of proposed dredged material for beach nourishment or ocean disposal.

Under the existing RGP 54, the City and residential/commercial property owners are authorized to dredge to a maximum depth of -10 feet mean lower low water (MLLW), plus 2 feet of overdredge allowance. Individual projects are limited to no more than 8,000 cy, with a harbor-wide annual maximum volume of 75,000 cy for all projects. There are three disposal options currently approved by all agencies, including open ocean disposal, in-harbor beach nourishment, and upland disposal. The City is proposing two new alternatives in the latest permit renewal (nearshore ocean placement and disposal within a CAD site).

1.5 Toxics Total Maximum Daily Load for Newport Bay

As part of California's 1996 and 1998 Section 303(d) lists, RWQCB identified Newport Bay and San Diego Creek as water quality limited due to several toxic pollutants and designated the watershed as a high priority for Total Maximum Daily Load (TMDL) development. In 2002, USEPA established *Total Maximum Daily Loads for Toxic Pollutants in San Diego Creek and Newport Bay, California* (Toxics TMDL; USEPA 2002). A summary of toxic pollutants per waterbody is presented in Table 1. Sediment TMDLs specific to Lower Newport Bay and Rhine Channel included copper, chromium, lead, mercury, selenium, zinc, chlordane, dieldrin, DDTs, and PCBs (Table 1). As a result of the sediment TMDLs, some areas of Newport Harbor have been determined by the RWQCB to be above compliance thresholds and thus would be candidates for management (which could include removal and management), further supporting the benefits of an in-harbor CAD cell.

Table 1
Summary of Toxic Pollutants per Waterbody Listed in the Harbor Toxics TMDL (USEPA 2002)

Waterbody	Metals	Organic Compounds
San Diego Creek (freshwater)	Cadmium, copper, lead, selenium, and zinc	Chlorpyrifos, diazinon, chlordane, dieldrin, DDTs, PCBs, and toxaphene
Upper Newport Bay	Cadmium, copper, lead, selenium, and zinc	Chlorpyrifos, chlordane, DDTs, and PCBs
Lower Newport Bay	Copper, lead, selenium, and zinc	Chlordane, dieldrin, DDTs, and PCBs
Rhine Channel	Copper, chromium, lead, mercury, selenium, and zinc	Chlordane, dieldrin, DDTs, and PCBs

2 Existing Sediment Quality Conditions

This section summarizes existing sediment quality conditions for Newport Bay based on the most recent sediment investigations conducted for the Federal Channels dredging program (Anchor QEA 2019) and RGP 54 (Anchor QEA 2018). In addition, existing sediment quality conditions are presented for other areas of Lower Newport Bay that are excluded from RGP 54, including Balboa Yacht Basin and Promontory Bay (Anchor QEA 2013a, 2013b, 2013c) and Rhine Channel (Anchor QEA 2013d).

2.1 Lower Newport Federal Channels

The City and USACE are proposing to conduct dredging within the Federal Channels in Lower Newport Bay (Figure 2). Dredging is needed in areas of increased shoaling to improve navigation and maintain federal authorized design depths. The Federal Channels were most recently dredged between May 2012 and January 2013, at which time dredging to depths of -10 to -17 feet MLLW was performed throughout large areas of Lower Newport Bay. Contaminated material was placed at the POLB's Middle Harbor Fill Site and clean material was placed at the USEPA-designated LA-3 offshore disposal site (Figure 1). During this time, the Federal Channels were only partially dredged and not to the full authorized design depth. This was in part due to funding availability and capacity at the POLB's Middle Harbor Fill Site.

Based on the 2018 USACE harbor-wide bathymetric surveys, sedimentation has occurred in many areas of Lower Newport Bay such that dredging is needed within the Federal Channels to maintain safe navigation. The City is pursuing this program, in partnership with USACE, to dredge the Federal Channels to the currently authorized design depths, ranging from -10 to -20 feet MLLW. Areas that require the most dredging include the Entrance Channel, Main Channel North, Bay Island, Turning Basin, and Newport Channel (Figure 2). Dredging each of these areas is estimated to result in the sediment volumes summarized in Table 2, which includes 2 feet of overdredge allowance.

In December 2017, the City, as the local sponsor, initiated a sediment characterization study to determine the suitability of proposed dredged material from the Federal Channels for ocean disposal at the LA-3 offshore disposal site (Figure 1; Anchor QEA 2019). Sediment from the Entrance Channel was also evaluated to determine compatibility for nearshore placement. Sediment core sampling was conducted within the Turning Basin, Main Channel North, Bay Island, and the Entrance Channel in January 2018. Sediment cores were collected at 48 stations within 11 dredge units and composite samples were submitted for physical and chemical analysis and biological testing. Newport Channel was not initially included as part of the sediment characterization because of historical contamination but was added following exploratory sampling within the area that indicated sediments may be suitable for unconfined open-water disposal. Additional sampling was conducted at 12 stations in Newport Channel in January 2019. Based on individual core chemistry and coordination with USEPA, two composite samples were submitted for physical and chemical analysis and biological testing. The

western portion of Newport Channel (Newport Channel 1; Figure 2) was eliminated from the investigation because of elevated mercury.

Benthic and water column bioassay testing indicated that sediments were not acutely toxic to aquatic life. Bioaccumulation testing indicated low bioaccumulation potential, with all concentrations less than U.S. Food and Drug Administration (FDA) action levels and those that have been shown to cause toxicity to marine invertebrates. Based on composite sample results, archives from individual cores were analyzed for mercury, PCBs, and/or DDTs to further delineate the extent of contamination. Mercury, total DDT, and total PCB concentrations for individual core samples are presented in Appendix A.

Based on sediment chemistry results and effects-based testing (i.e., toxicity and bioaccumulation), sediments from Main Channel 3, 4, and 5, Bay Island, Newport Channel 3, and the Entrance Channel were determined suitable for open ocean disposal. In addition, based on the grain size compatibility assessment, the Entrance Channel was also determined to be suitable for nearshore placement. The total volume of material suitable for ocean disposal or nearshore placement is approximately 933,700 cy (Table 2). Because of elevated concentrations of mercury and/or PCBs, the Turning Basin and portions of Main Channel North 1 and 2 and Newport Channel 1 were deemed unsuitable for open ocean disposal, as shown in Figure 3. These sediments will require an alternative disposal option. The total volume of material unsuitable for unconfined open-water disposal is approximately 106,900 cy (Table 2).

Table 2
Federal Channels Maintenance Dredging Estimated Volumes and Suitability for Ocean or Nearshore Placement

Federal Channels	Design Depth (feet MLLW)	Estimated Volume to Design Depth (cy)	2-Foot Overdredge Allowance Volume (cy)	Total Volume (cy)	Suitable for Open Ocean Disposal (cy)	Not Suitable for Open Ocean Disposal or Nearshore Placement (cy)
Entrance Channel	-20	51,700	19,200	70,900	70,900[1]	0
Main Channel 1	-20	36,600	26,600	63,200	43,200	20,000
Main Channel 2	-20	37,600	23,200	60,800	40,400	20,400
Main Channel 3	-20	44,600	38,800	83,400	83,400	0
Main Channel 4	-20	28,300	26,700	55,000	55,000	0
Main Channel 5	-20	50,200	39,600	89,800	89,800	0
Turning Basin	-19[2]	5,200	14,300	19,500	0	19,500
Bay Island Area	-15	210,900	135,900	346,800	346,800	0
Newport Channel 1	-15	28,300	18,700	47,000	0	47,000
Newport Channel 2	-15	85,800	39,600	125,400	125,400	0
Newport Channel 3	-15	54,200	24,600	78,800	78,800	0
Total		**633,400**	**407,200**	**1,040,600**	**933,700**	**106,900**

Notes:
All volumes include 3H:1V perimeter side slopes.
Volumes are based on the June 2018 conditional survey conducted by USACE for the City.

1. Suitable for nearshore placement and open ocean disposal
2. Because most of the Turning Basin is already at design depth of -20 feet MLLW, only the shoaled spots around the periphery of the Turning Basin are proposed for dredging. Therefore, a reduced design depth of -19 feet MLLW, plus 2 feet of overdredge allowance, is applied to the Turning Basin.



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Figure 2
Overview of Authorized Design Depths, Dredge Units, and Bathymetry for Federal Channels Maintenance Dredging

Sediment Management Plan
Lower Newport Bay



SOURCE: Drawing prepared from Bing Maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2018. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Authorized Federal Channel Limits and Dredge Unit Boundaries
- (-20) Authorized Depth
- —-10— Existing Bathymetry
- Dredged Material Not Suitable for Open Ocean or Nearshore Disposal
- Dredged Material Suitable for Open Ocean or Nearshore Disposal
- Nearshore Placement Area

0 1,800
Feet

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Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-018 SMP SUITABILITY.dwg Figure 3

ANCHOR QEA

Figure 3
Federal Channels Maintenance Dredging Sediment Suitability Map

Sediment Management Plan
Lower Newport Bay

2.2 Regional General Permit 54 Managed Areas

As previously described, the City maintains and renews the RGP 54 sediment suitability every 5 years. The most recent bay-wide sediment investigation for suitability renewal was conducted from 2017 to 2018 (Anchor QEA 2018). During this investigation, proposed dredged material was evaluated for beach nourishment, nearshore placement, or ocean disposal at the USEPA-designated LA-3 offshore disposal site (Figure 1). Although nearshore placement was not included as part of the existing RGP 54, the City wanted flexibility in the next permit reauthorization to allow for placement at nearshore ocean beaches.

In September and October 2017, sediment core sampling was conducted at 54 stations within five areas and composite samples were submitted for physical and chemical analysis and biological testing. Benthic and water column bioassay testing indicated that sediments were not acutely toxic to aquatic life. Bioaccumulation testing indicated low bioaccumulation potential, with all concentrations less than FDA action levels and those that have been shown to cause toxicity to marine invertebrates. Based on the results of composite sediment chemistry, individual core samples from Area 1 were analyzed for mercury and PCBs, and individual core samples from Area 5 were analyzed for mercury, as requested by USEPA. Based on these results, additional sediment cores were collected in April 2018 to further delineate the horizontal extent of mercury and/or PCBs. Mercury and/or total PCB concentrations for individual stations within Areas 1 and 5 are presented in Appendix B.

Based on results of chemical and biological analyses and negotiations with the DMMT, the RGP 54 boundaries for the sediment suitability renewal are presented in Figure 4. Much of the material was determined to be suitable for unconfined aquatic disposal; however, certain areas of the harbor require additional confirmatory sampling for both the dredge cut and/or predicted Z layer[1] prior to beneficial reuse or open-water disposal. If confirmatory testing exceeds thresholds, sediments will require alternative disposal or management options and would not qualify under RGP 54. Promontory Bay, Balboa Yacht Basin, and Rhine Channel were not tested as part of this investigation due to historical contamination and are excluded from RGP 54 (Sections 2.3 and 2.4).

[1] The new surface following dredging to authorized depth and overdepth.



LEGEND:

- Suitable to -10 feet MLLW plus 2 feet of overdepth for unrestricted disposal at the LA-3 ODMDS. Grain size required prior to beach replenishment or nearshore placement to demonstrate suitability.
- Suitable to -7 feet MLLW plus 1 foot of overdepth for unrestricted disposal at the LA-3 ODMDS. Z-layer testing to confirm post-dredge surface contains mercury less than 1 ppm prior to dredging to demonstrate newly exposed surface is clean. Grain size required prior to beach replenishment or nearshore placement to demonstrate suitability.
- Area not included under RGP 54.
- Material proposed for disposal at LA-3 ODMDS must have chemical testing for mercury with agency concurrence to verify suitability prior to disposal. Z-layer testing is required to confirm post-dredge surface contains mercury less than 1 ppm prior to dredging to demonstrate newly exposed surface is clean. Material proposed for beach replenishment or nearshore placement must also have grain size verification prior to placement.
- Material proposed for disposal at LA-3 ODMDS must have chemical testing for mercury and PCBs with agency concurrence to verify suitability prior to disposal. Z-layer testing is required to confirm post-dredge surface contains mercury less than 1 ppm and PCBs less than 100 ppb prior to dredging to demonstrate newly exposed surface is clean. Material proposed for beach replenishment or nearshore placement must also have grain size verification prior to placement.
- Suitable to -10 feet MLLW plus 2 feet of overdepth for unrestricted disposal at the LA-3 ODMDS. Material proposed for beach replenishment or nearshore placement must have grain size verification and chemical testing for DDTs with agency concurrence to verify suitability prior to placement. Z-layer testing is required to confirm post-dredge surface contains DDT concentrations less than 18.0 ppb*.

SOURCE: Aerial from Bing Maps. Coastline extents from City of Newport Beach.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTE:
Areas included in RGP 54 are generally between the bulkhead and pierhead lines with the shoreline/boundary demarcated by the various colors/hatched lines. The colored lines, whether solid or dashed, always follow the shoreline rather than following individual fingers or docks. ODMDS (Ocean Dredged Material Disposal Site) and ppm (parts per million).

* Represents the 95% Upper Confidence Limit for surface sediment concentrations within the RGP permit area.

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Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-019 SUITABLE.dwg Figure 4

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Figure 4
RGP 54 Boundaries
Sediment Management Plan
Lower Newport Bay

2.3 Areas Excluded from Regional General Permit 54

2.3.1 Balboa Yacht Basin and Promontory Bay

Historically, Balboa Yacht Basin and Promontory Bay were not included in RGP 54 (Figure 4). In 2013, as part of the RGP 54 bay-wide sediment investigation, sampling and testing was performed in these areas to provide a means for conducting maintenance dredging (Anchor QEA 2013a, 2013b). Phase I of the sediment investigation consisted of preliminary metals analysis on selected stations that potentially contained elevated levels of contaminants to determine whether they should be included within the larger composite areas or eliminated from further testing. Balboa Yacht Basin and Promontory Bay were new to the RGP 54 program; therefore, it was unknown whether concentrations of contaminants were elevated. Based on this preliminary analysis, sediment from Balboa Yacht Basin (Station 4-14) and Promontory Bay (Stations 4-15 and 4-16) were found to be unsuitable for ocean disposal based on elevated metals concentrations. Within Balboa Yacht Basin, mercury (1.91 mg/kg) was greater than the USEPA recommended threshold of 1.0 mg/kg and zinc (521 mg/kg) was greater than the effects range median (ERM)[2] value. Within Promontory Bay, mercury (1.39 mg/kg) was greater than the USEPA recommended threshold and zinc (580 mg/kg) and copper (411 mg/kg) were greater than the ERM value at one station (Station 4-16). Balboa Yacht Basin and Promontory Bay were not sampled as part of the subsequent RGP 54 renewal in 2018 and remain excluded from the existing RGP 54.

Based on the elevated metals concentrations within Promontory Bay, additional exploratory samples were collected following completion of RGP 54 sampling to further evaluate the extent of contamination (Anchor QEA 2013c). Three sediment grab samples (Stations 4-17-SG through 4-19-SG) and two sediment cores (Stations 4-20 and 4-21) were collected and submitted for metals analysis. Within these samples, mercury (1.05 mg/kg and 1.51 mg/kg) was greater than the USEPA recommended threshold at two stations (Stations 4-20 and 4-21), copper (293 mg/kg and 365 mg/kg) was greater than the ERM at two stations (Stations 4-18-SG and 4-19-SG), and zinc (520 mg/kg) was greater than the ERM at one station (Station 4-19-SG).

Existing bathymetry and sampling locations within Promontory Bay and Balboa Yacht Basin are presented in Figure 5. Mercury, copper, and zinc concentrations within Promontory Bay and Balboa Yacht Basin are presented in Appendix C. Based on these data, material expected to be unsuitable for open ocean disposal due to ERM or USEPA recommended threshold exceedances is presented in Figure 6. Based on existing data within Promontory Bay and Balboa Yacht Basin, the total volume of material expected to be suitable for ocean disposal is approximately 19,000 cy, pending a full Tier III evaluation (Table 3). The total volume of material expected to be unsuitable for unconfined open-

[2] While not designed as a regulatory limit for remediation, ERM values are typically used as guidance values for areas that likely would require separate management and would not be suitable for open ocean disposal at a USEPA-managed site. For panning purposes, this document uses ERM values as a screening tool for estimating potential sediment management volumes.

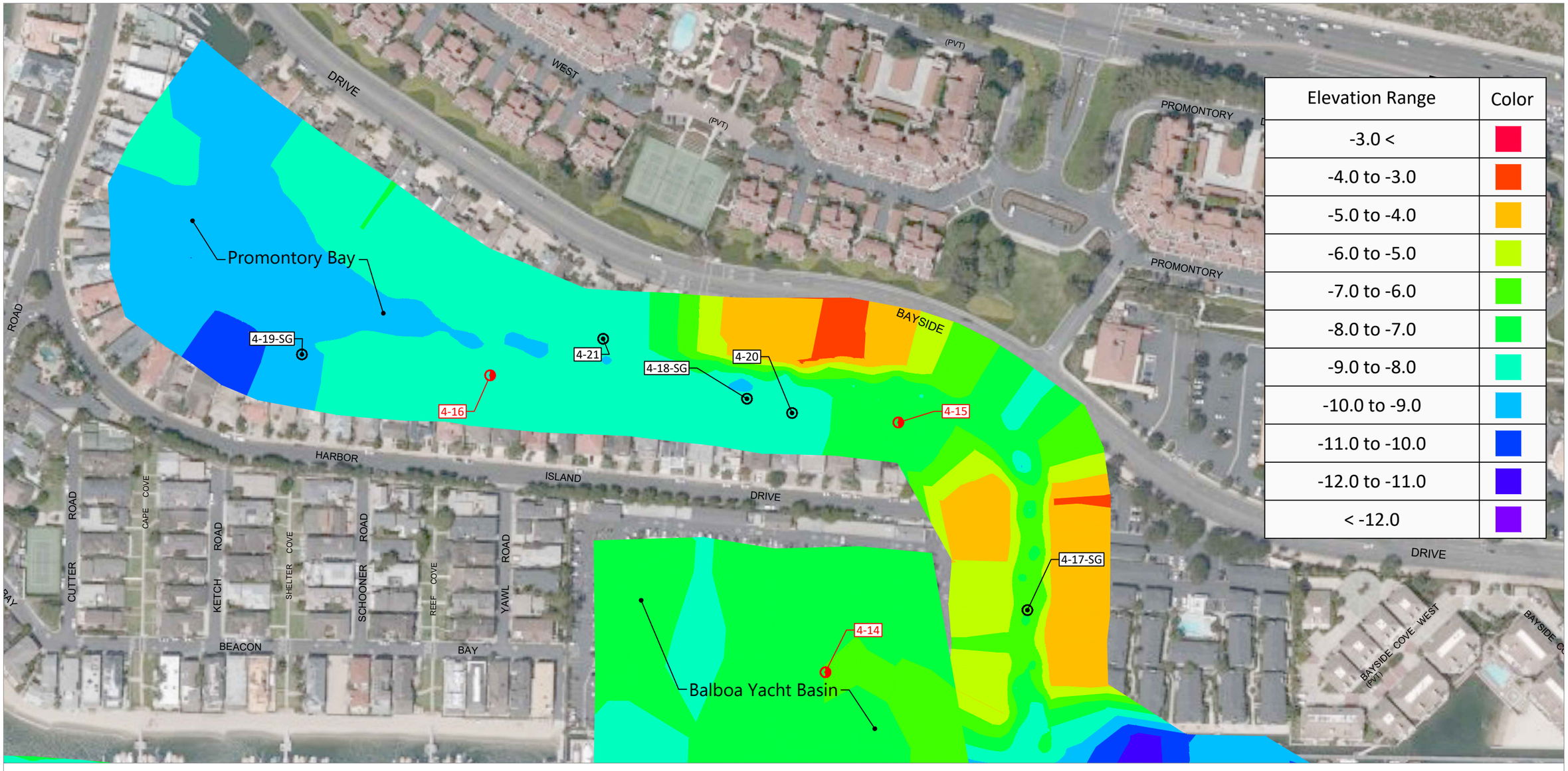
water disposal is approximately 50,000 cy. However, as shown in Figure 5, dredging is only required within the entrance of Promontory Bay to maintain adequate navigational depths. Within this area, depths range from -4 to -7 feet MLLW. Based on existing data, sediment from the entrance of Promontory Bay is expected to be suitable for open ocean disposal (Figure 6); therefore, only a small amount of material from within Promontory Bay would require an alternative disposal location at this time. Data within these areas are limited; therefore, additional sampling and analysis and updated bathymetric surveys would be required within Promontory Bay and Balboa Yacht Basin to fully delineate the extent of metals contamination and better define the volume of material that would require an alternative disposal location.

Table 3
Balboa Yacht Basin and Promontory Bay Estimated Volumes and Expected Suitability for Ocean Disposal

Area	Design Depth (feet MLLW)	Estimated Volume to Design Depth (cy)	1-Foot Overdredge Allowance Volume (cy)	Total Volume (cy)	Expected Suitable for Open Ocean Disposal (cy)	Expected Not Suitable for Open Ocean Disposal (cy)
Promontory Bay	-10	28,000	16,000	44,000	19,000	25,000[1]
Balboa Yacht Basin	-10	18,000	7,000	25,000	0	25,000
	Total	**46,000**	**23,000**	**69,000**	**19,000**	**50,000**

Note:

1. Based on existing bathymetry, only a small portion of this material requires dredging.



Elevation Range	Color
-3.0 <	
-4.0 to -3.0	
-5.0 to -4.0	
-6.0 to -5.0	
-7.0 to -6.0	
-8.0 to -7.0	
-9.0 to -8.0	
-10.0 to -9.0	
-11.0 to -10.0	
-12.0 to -11.0	
< -12.0	

SOURCE: Promontory Bay survey from USACE, July 16 - August 5, 2019. Balboa leadline survey from September 15, 2019. Aerial provided by Bing Maps.

HORIZONTAL DATUM: California State Plane ,Zone VI North American Datum of 1983 (NAD83), U.S. Survey Feet

VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Exploratory Sampling Locations (2013)
- RGP 54 Sampling Locations (2013)

0 180
Feet

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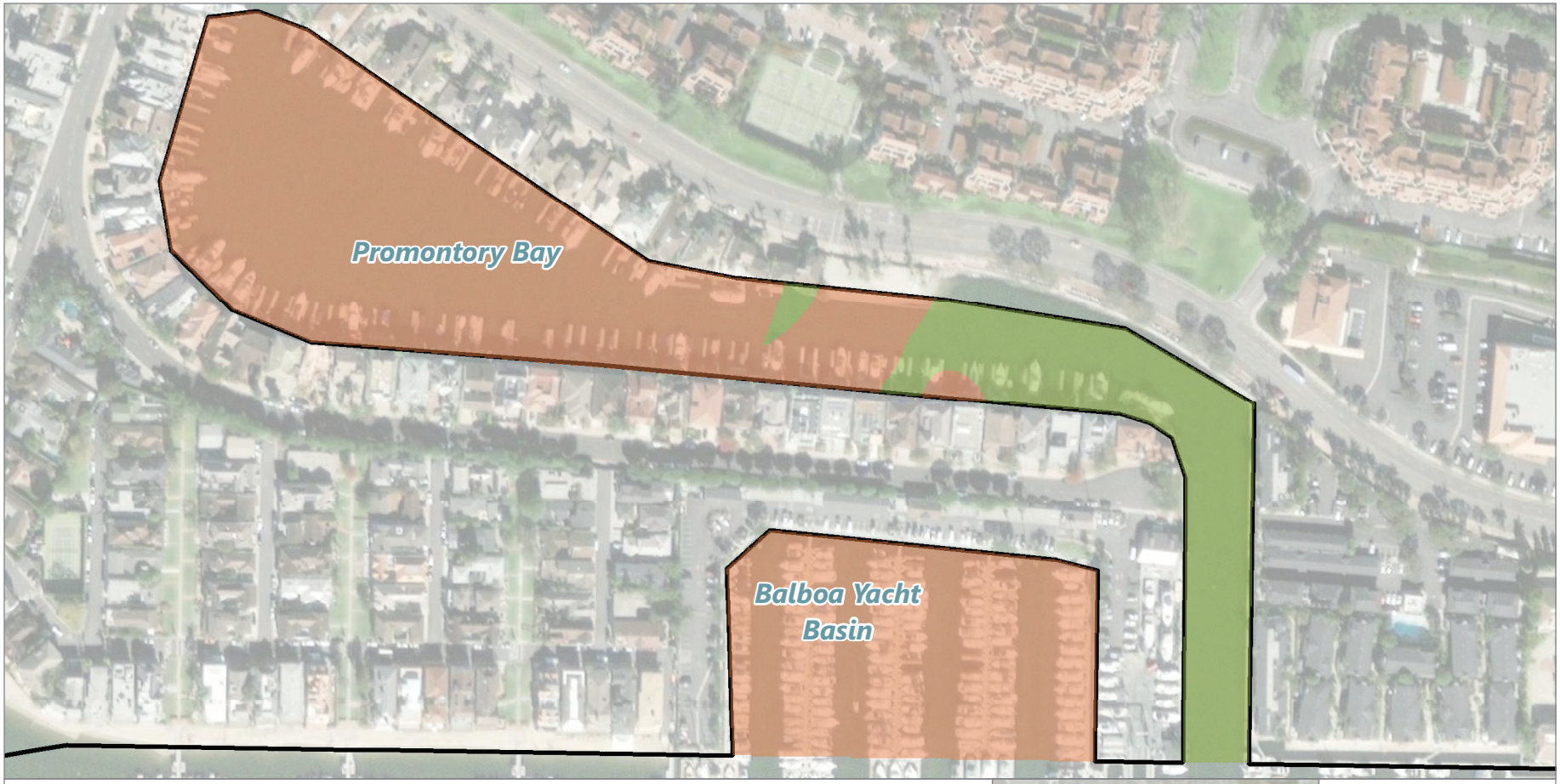
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-027 RGP 54 Promontory Bay.dwg Figure 5

ANCHOR QEA

Figure 5
Existing Bathymetry and Sampling Locations within Promontory Bay and Balboa Yacht Basin

Sediment Management Plan
Lower Newport Bay



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Filepath: \\orcas\GIS\Jobs\City_of_Newport_Beach_0243\PromontoryBay_BalboaYachtBasin\Maps\AQ_Figure03_ExpectedSedimentSuitability.mxd

ANCHOR QEA

Figure 6
Expected Sediment Suitability within Promontory Bay and Balboa Yacht Basin
Sediment Management Plan
Lower Newport Bay

2.3.2 Rhine Channel

During the past 80 years, the Rhine Channel has served as the primary industrial area in Lower Newport Bay with current and past businesses including boatyards, metal plating facilities, and a seafood cannery (Anchor 2006). While some small boatyards and retail boat suppliers are still located along the Rhine Channel, the area is currently in transition from an industrial area to a residential and recreational area. Prior to 2011, the channel had not been dredged since its construction in circa 1920, and sediments were known to contain elevated concentrations of metals, polycyclic aromatic hydrocarbons, pesticides, and PCBs from decades of industrial discharges and stormwater runoff. As described in Section 1.5, USEPA released the Toxics TMDL in 2002, which contained TMDLs for several chemicals in Rhine Channel, including copper, chromium, lead, mercury, selenium, zinc, chlordane, dieldrin, DDTs, and PCBs (Table 1).

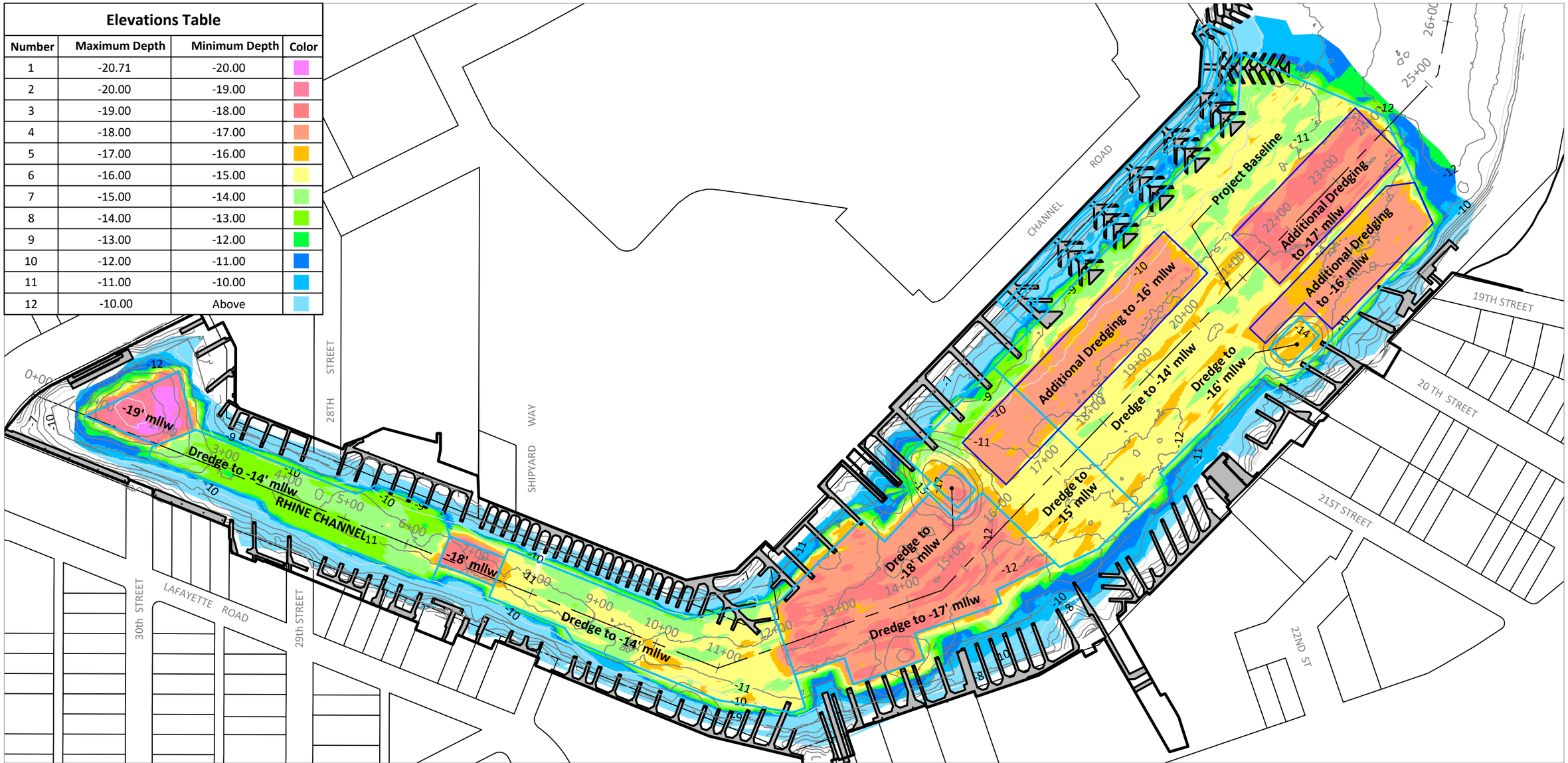
In 2006, a Feasibility Study was conducted to develop and evaluate remediation alternatives with the goal of restoring beneficial uses to Rhine Channel (Anchor 2006). Based on this evaluation, "Dredging with Upland Landfill Disposal" was selected as the preferred alternative. In May 2010, the POLB began accepting material for its Middle Harbor Fill Site, which presented an opportunity for beneficial use of contaminated sediment from the region. In 2011, approximately 80,000 cy of impacted sediment were removed from Rhine Channel and beneficially reused at the POLB's fill site. With the exception of one property located along the southeast end of Lido Isle, dredging was not performed along bulkhead structures in order to maintain geotechnical and structural stability adjacent to private, landside structures; therefore, some impacted sediments were left in place along the perimeter of Rhine Channel. A summary of dredge depths and final elevations is presented in Figure 7.

In compliance with RWQCB requirements, post-dredge sediment sampling and analysis was performed to verify removal of chemically impacted sediment and to determine final surface sediment chemical concentrations (Anchor QEA 2013d). This post-dredge investigation represents existing sediment quality conditions within the Rhine Channel. Sediment cores were collected at 11 stations within the dredge footprint of Rhine Channel to verify successful removal of chemically impacted sediments, and sediment grab samples were collected at 12 stations, as requested by RWQCB, to evaluate the new surface layer from a TMDL perspective.

Within the dredge area (excluding the perimeter of Rhine Channel), a comparison of surface-weighted average concentrations (SWACs) to pre-dredge weighted average concentrations indicated an 8% to 84% reduction in concentrations for all contaminants of concern. Although the SWAC of copper, mercury, and PCBs exceeded the TMDL numeric target from 0 to 0.5 foot, concentrations were all reduced when compared to pre-dredge concentrations.

As previously described, dredging was not performed along bulkhead structures in order to maintain geotechnical and structural stability adjacent to private, landside structures, resulting in approximately 26,000 cy of impacted material that was left in place along the perimeter of Rhine Channel. Based on post-dredge confirmatory sampling, some elevated dredge residuals remain in limited areas of the Rhine Channel. These residuals were found as thin layers of fine-grained material that resuspended during dredging and settled back onto the newly dredged surface. In some areas, it appears that material from the perimeter of the Rhine Channel had sloughed into the previously dredged area and created a thickened residual layer. Residuals are common in dredging projects where sediments are very fine grained. In general, surface sediment concentrations have improved, but a thin veneer of impacted residuals remains over the dredge footprint. Because the previous work included a bulk removal of sediment from the Rhine Channel, any potential future management actions would likely be limited to one or more alternate management techniques such as thin-layer capping or in situ treatment. As such, material from the Rhine Channel is not expected to be placed into the CAD cell.

Elevations Table			
Number	Maximum Depth	Minimum Depth	Color
1	-20.71	-20.00	
2	-20.00	-19.00	
3	-19.00	-18.00	
4	-18.00	-17.00	
5	-17.00	-16.00	
6	-16.00	-15.00	
7	-15.00	-14.00	
8	-14.00	-13.00	
9	-13.00	-12.00	
10	-12.00	-11.00	
11	-11.00	-10.00	
12	-10.00	Above	



SOURCE: Drawing prepared from City of Newport Beach and ESRI basemaps, and all Dutra surveys performed as of November 1, 2011.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTES:
Contours shown are from pre-dredge bathymetric survey conducted by Gahagan & Bryant Associates, Inc., on July 1, 2011.

LEGEND:

- Dredge Footprint
- Additional Dredging
- Limits of Work (Top of Slope)
- Existing Docks

0 150
Feet

Publish Date: 2020/05/29 2:50 PM | User: bhurry
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-028 Composite Elev Banding.dwg Figure 7

ANCHOR QEA

Figure 7
Dredge Depths and Final Elevations within Rhine Channel

Sediment Management Plan
Lower Newport Bay

2.4 Summary of Existing Conditions

Sediment quality within Newport Harbor was assessed based on the most recent sediment investigations conducted for the Federal Channels dredging program (Anchor QEA 2019) and RGP 54 (Anchor QEA 2018), exploratory and previous RGP 54 sampling at Balboa Yacht Basin and Promontory Bay (Anchor QEA 2013a, 2013b, 2013c), and post-dredge confirmatory sampling at Rhine Channel (Anchor QEA 2013d). These investigations revealed large areas of the harbor that are suitable for unconfined open-water disposal and smaller portions of the harbor that are unsuitable for unconfined open-water disposal, primarily due to elevated mercury and PCB concentrations. DDTs were also elevated within portions of the harbor at concentrations that may require post-dredge residuals management to meet TMDL compliance; however, no material was excluded for open-water disposal based solely on DDT concentrations.

As previously stated, within the Federal Channels, approximately 933,700 cy of sediment were suitable for ocean disposal or nearshore placement, and 106,900 cy of sediment were unsuitable for open-water disposal due to elevated mercury and/or PCB concentrations (Table 2). Areas unsuitable for open-water disposal include the Turning Basin and portions of Main Channel and Newport Channel, as shown in Figure 3.

RGP 54 boundaries are presented in Figure 4. Much of the RGP 54 Plan Area was determined to be suitable for unconfined aquatic disposal; however, within West Newport and around Lido Isle, confirmatory sampling is required to verify mercury and/or PCB concentrations prior to open-water disposal or beneficial reuse (beach replenishment). If confirmatory testing exceeds the RGP-specified thresholds, an alternative disposal location will be required. Other areas requiring only z-layer testing for DDTs include Linda Isle, Bayshore, Harbor Island, and north of Pacific Coast Highway Bridge. These areas are suitable for open-water disposal, but post-dredge residuals management may be required.

Promontory Bay and Balboa Yacht Basin were found unsuitable for open-water disposal based on elevated mercury, as well as copper and zinc, measured in 2013 (Anchor QEA 2013a, 2013b). Based on existing data, areas expected to be suitable and unsuitable for open-water disposal are shown in Figure 6. Areas expected to be unsuitable include the Entrance Channel to Promontory Bay and Balboa Yacht Basin. Based on existing data, the total volume of material expected to be suitable and unsuitable for ocean disposal is approximately 19,000 cy and 50,000 cy, respectively. As previously described, sediment chemistry data within Balboa Yacht Basin and Promontory Bay are limited; therefore, additional sampling and analysis and updated bathymetric surveys would be required to fully delineate the extent of metals contamination and better define the volume of material that would require an alternative disposal location.

3 Overview of Viable Sediment Management Alternatives

Sediment management alternatives in Southern California have been studied thoroughly and documented in two key regional documents: the LTMS (CSTF 2005) and DMMP (Everest and Anchor 2009). The LTMS recommends the following alternatives in order of priority for managing sediments determined to be suitable for unconfined aquatic disposal: beach replenishment, beneficial use in a port fill, in-water or upland storage for later reuse, beneficial reuse as cover material (upland or for a CAD facility), and ocean disposal. The LTMS recommends the following alternatives in order of priority for managing sediments determined to be unsuitable for unconfined open-water disposal: beneficial reuse in a port fill, treatment and other beneficial reuses, disposal in a CAD facility, and landfill disposal. Treatment of sediments for subsequent beneficial reuse is expensive and requires a large area for sediment stockpiling and construction of a treatment facility, which is not readily available or viable in Newport Bay.

Within Newport Bay, past dredging efforts included a combination of ocean disposal, beach or nearshore nourishment, or reuse of unsuitable sediment at the POLB's Middle Harbor Fill Site. Unfortunately, this fill site is no longer an option for management of unsuitable sediment; therefore, other options need to be considered. An overview of viable disposal and beneficial reuse options for Newport Harbor are presented in the following subsections.

3.1 Sediments Suitable for Unconfined Open-Water Placement

An overview of disposal and beneficial reuse options for clean sediment from Newport Harbor are presented in the following subsections.

3.1.1 Beach/Nearshore Nourishment

Beach or nearshore nourishment is a practical reuse option for Lower Newport Bay sediments that are free of chemical contaminants and have comparable grain size and aesthetic characteristics to that of the beach under consideration. Sandy sediments with appropriate characteristics can be placed on eroding beaches or in nearshore areas to widen, build-out, and/or protect the beach areas.

For RGP 54, beach nourishment is the preferred placement alternative. Individual applicants regularly reuse sandy sediments within the harbor. The City is currently proposing to add nearshore placement as part of the RGP 54 renewal to replenish nearshore ocean beaches. The proposed nearshore placement area spans from just south of the Balboa Pier to Newport Pier to the north (Figure 1). Based on the sediment characterization for the Federal Channels maintenance dredging, sandy sediment from the Entrance Channel has chemical and physical characteristics deemed as suitable for nearshore nourishment.

3.1.2 Clean Capping or Cover Material for a Confined Aquatic Disposal Facility or Capping Project

As recommended in the LTMS, sediments suitable for open-water placement may be beneficially reused as capping or cover material for a CAD facility or capping project. Capping involves the placement of clean sediment over contaminated material to chemically isolate underlying sediments. For a CAD facility, contaminated sediment is placed within a submerged depression and subsequently capped. Alternatively, contaminated sediment may be capped in place. Placement of a thin-layer sand cover is also commonly used for residuals management (USACE 2008a, 2008b). The thin-layer cover is placed to dilute surface sediment concentrations and promote natural recovery.

3.1.3 Open Ocean Disposal

For clean sediment that is not compatible with the receiver beach or nearshore area, sediment may be placed at a designated ODMDS. Prior to disposal, sediment must be tested in accordance with the *Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual* (OTM; USEPA/USACE 1991). Open ocean disposal is a cost-effective alternative that is widely used for maintenance dredging projects in Southern California. Because ocean-disposed dredged sediment does not require a re-handling step, sediment can be dredged and placed directly into a bottom-dump barge, hauled to one of several USEPA-managed open ocean disposal sites, and discharged. The closest open ocean disposal location to Newport Harbor, located approximately 5.4 miles to the south of the Entrance Channel, is the LA-3 ODMDS (Figure 1).

Based on the federal channel sediment characterization described in Section 2.1, select sediment from Main Channel 1 and Main Channel 2 and all sediment from the Entrance Channel, Main Channel 3, Main Channel 4, Main Channel 5, Bay Island Area, Newport Channel 2, and Newport Channel 3 are suitable for open ocean disposal (Table 2; Figure 3; Anchor QEA 2019). Based on the most recent bay-wide sediment investigation for RGP 54, much of the material outside the federal government's responsibility between the bulkhead and pierhead lines are suitable for open ocean disposal (Figure 4; Anchor QEA 2018).

3.2 Sediments Not Suitable for Unconfined Open-Water Placement

An overview of sediment management options for unsuitable sediment from Newport Harbor are presented in the following subsections.

3.2.1 Port Fill

For sediment that is unsuitable for ocean disposal, the preferred management alternative, as outlined in the LTMS and DMMP, is beneficial reuse in a fill project (nearshore confined disposal facility [CDF]). Nearshore CDFs are typically created by constructing a containment dike, placing contaminated dredged sediment and structural fill material (i.e., clean sand) behind a dike, using

weirs to dewater the material, and covering the material with asphalt and/or concrete. The resulting CDF can then be used to support port operations or other future uses.

The City previously had the ability to manage contaminated material at the POLB's Middle Harbor Fill Site, but as of 2018, this site is closed and no longer an option for future sediment management needs. Port fill sites are rare opportunities, and when they do arise, they are only able to receive sediment for a relatively short amount of time, and preference is usually reserved for material requiring management from within the overall port property as a first priority. Currently, there are no regional fill projects accepting material.

3.2.2 Confined Aquatic Disposal

Development of a CAD facility has been shown to be an effective long-term management solution for chemically impacted sediment under the right set of conditions. A CAD facility is constructed underwater by excavating a depression into the existing seabed, into which sediment can be placed, and then capped with a sufficient type and thickness of clean material (e.g., imported sand or dredged sediment) to keep the underlying sediments permanently isolated from the environment (Illustration 1).

The CAD facility concept has been used successfully both internationally and nationally (in northwestern and northeastern states such as Washington and Massachusetts), including the following projects in Southern California over the last 20 years:

1. Port Hueneme, which was jointly developed by the U.S. Navy, USACE, and the Oxnard Harbor District
2. North Energy Island Borrow Pit, located in the City of Long Beach

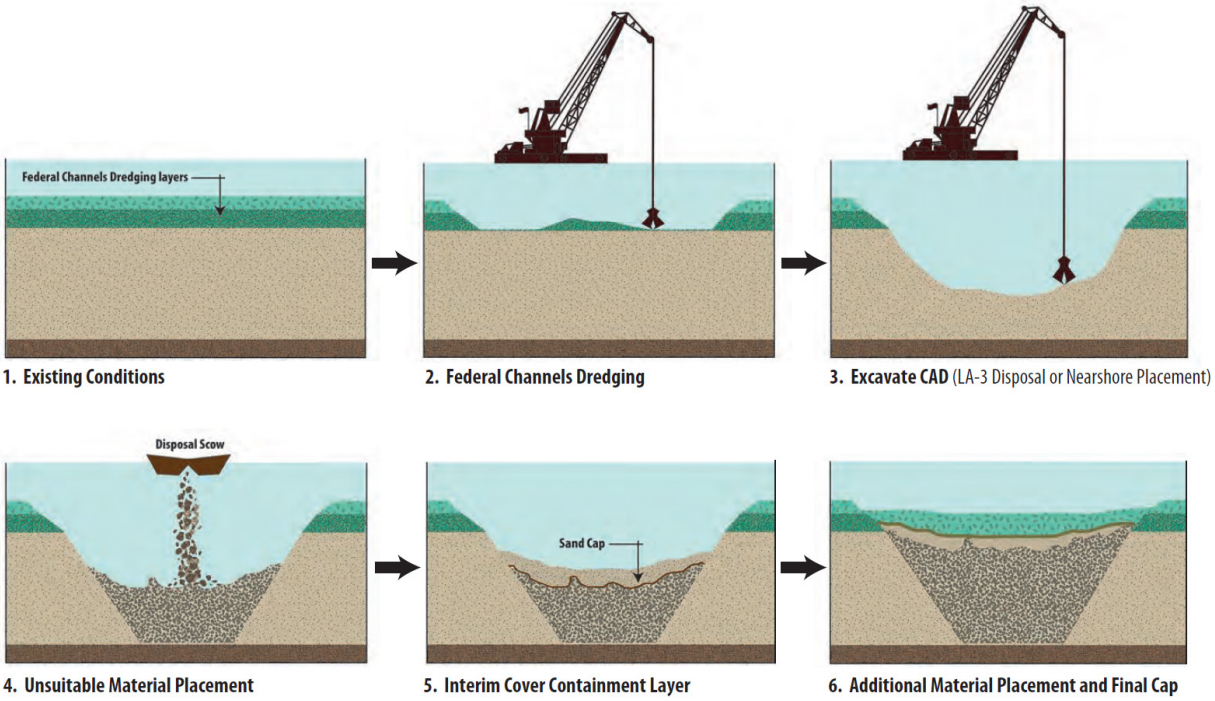
In 2009, the City performed a Feasibility Study for dredged sediment and determined that constructing a CAD facility in Lower Newport Bay was the most cost-effective alternative for managing the City's contaminated sediment (Anchor QEA 2009). Development of the CAD facility was suspended when Rhine Channel sediment was accepted into the POLB's Middle Harbor Fill Site. The CAD facility option was viewed favorably by regulatory agencies as the least environmentally damaging practical alternative. Lower Newport Bay offers a unique opportunity to develop a CAD facility in large part for the following reasons:

1. Newport Harbor is large enough to accommodate such an approach.
2. The sediment that would be removed to create the CAD depression appears to be a good match for nearby beaches—which are in need of nourishment—and would provide a low-cost disposal alternative for suitable sands dredged from within the CAD facility.

This alternative also has the advantage of requiring no re-handling because unsuitable dredged sediments can be placed directly into a bottom-dump haul barge, moved above the CAD facility, and

dropped into the depression which is similar to the process that would be used for open ocean disposal (and with a much shorter transportation distance).

Illustration 1
CAD Construction Overview



3.2.3 Upland Landfill Disposal

For sediments that do not qualify for open ocean disposal, beneficial reuse, or beach nourishment, more costly disposal scenarios must be considered. One commonly used alternative is to haul the sediment to an upland permitted landfill facility. Two factors to consider in determining the suitability of a specific permitted landfill for disposal of dredged sediment are the concentration of contaminants in the sediment and the total quantity of sediment to be disposed. In addition, dredged sediment disposed at a landfill must typically pass the "paint filter" test, which requires that the sediment must be sufficiently dewatered after dredging to prevent drainage during transport and to minimize excess infiltration during disposal.

The concentration of contaminants in dredged sediment determines its waste type and therefore the class of landfill that can accept the material. In California, landfills are identified as Class I, II, or III, as follows:

1. Class I landfills can accept materials that are classified by the State of California as hazardous wastes under Title 22 of the California Code of Requirements (CCR).

2. Class II landfills are similar in design to Class I landfills, but they accept only designated waste that has been determined to be below hazardous waste criteria concentrations.
3. Class III landfills can accept sediment with relatively lower concentrations of contaminants depending on the individual landfill design and location. Each Class III site operator must maintain a certification with the California State Integrated Waste Management Board specifying the facility's waste acceptance criteria and testing requirements in accordance with applicable state and federal discharge regulations.

Landfill disposal of marine sediments is not approved for all landfills within Southern California due to concerns related to salt leaching from the sediments and potential to impact groundwater resources. Los Angeles County has typically not allowed disposal of marine sediments, while in Orange County it is left up to the landfill to make the determination if the material meets the requirements of their waste acceptance permits. Marine sediments are commonly placed in landfills in San Diego County, and several recent examples from the Port of San Diego highlight this practice.

Upland landfill disposal is very expensive for several reasons. First, the sediment must be dewatered prior to transport in order to meet the paint filter test. The dewatering can be accomplished either actively using a mechanical dewatering device (e.g., belt presses, centrifugation, hydrocyclones, or via additives) or passively by constructing a large containment area to hold the sediment until the water evaporates or drains. Both processes require a significant landside staging area adjacent to the harbor. Next, the sediment must be trucked or shipped via railcar to the landfill. Lastly, the sediment would be subject to a tipping fee similar to any other waste product that the landfill receives.

Costs, while high, are not the only perceived disadvantage of upland landfill disposal. A potentially more significant factor on the greater public is the effect of numerous truck hauling trips carrying chemically impacted sediments over City streets and roads for an extended period of time. This activity will pose impacts on noise, emissions, traffic, public street use, and increased wear and tear on road surfacing. Furthermore, several acres of shoreline space will need to be set aside for the project duration to allow for transfer of sediments onto land, their stockpiling, dewatering and drying, water treatment, and placement into the trucks. The Lower Newport Bay area does not currently have any areas well suited for this purpose. Because of the reasons described above, upland landfill disposal is only viable for small volumes of sediment unsuitable for open-water placement.

4 Decision Tree for Sediment Management Alternatives

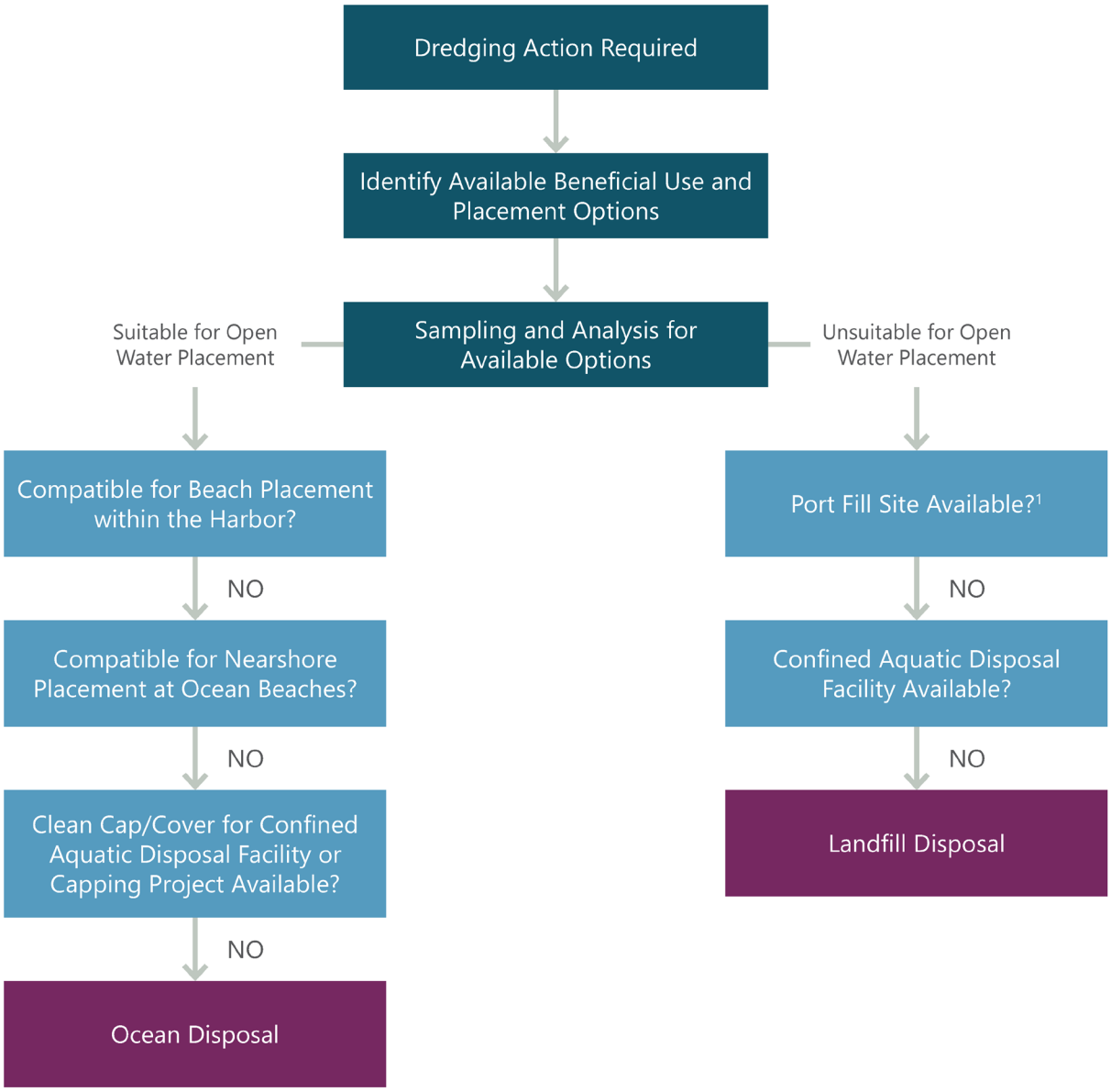
Using the LTMS (CSTF 2005) and DMMP (Everest and Anchor 2009) as a basis, the City's preferred sediment management alternative for sediments that are suitable for open-water placement is beneficial reuse as beach or nearshore nourishment or reuse as clean capping or cover material for a CAD facility or capping project. Sediment that is clean but not compatible with the receiver beach or nearshore area, and for which no other beneficial reuses are available, may be placed at a USEPA-designated ODMDS. The City's preferred sediment management alternative for sediments that are unsuitable for open-water placement is beneficial reuse in a port fill site, placement in a CAD facility, or upland landfill disposal.

Selecting appropriate sediment management alternatives for material suitable and unsuitable for open-water placement should be conducted in accordance with the decision tree shown in Figure 8. Upon determining a required dredging action, a preliminary evaluation of available beneficial reuse options and other regional placement options for material suitable and unsuitable for open-water placement should be conducted. The decision tree indicates the hierarchy of options, presenting two hierarchical pathways for evaluating preferred sediment management alternatives for material suitable and unsuitable for open-water placement. This sequence is appropriate and in compliance with the requirements of the Clean Water Act (CWA) and Marine Protection, Research, and Sanctuaries Act (MPRSA) and with the goals of the LTMS, which include maximizing beneficial reuse of dredged material and minimizing unconfined discharges of dredged material to the ocean or upland landfill disposal.

As shown in Figure 8, preferred sediment management alternatives for material suitable and unsuitable for open-water placement can be evaluated by using one of the two following hierarchical pathways:

1. If sampling and analysis indicates the material is clean, beneficial reuse as beach nourishment within Newport Bay should be considered first. If sediment is not compatible with the receiver beach, material should be evaluated for nearshore placement at ocean beaches. Source material may still be compatible for nearshore beaches despite a slightly lower sand content. If sediment is not compatible for nearshore placement, material should be evaluated for clean capping material if there is a CAD facility or capping project available. Unconfined ocean disposal should be the last alternative to be evaluated and only used for situations in which no other short- or long-term options are practical for clean sediment.
2. If sampling and analysis indicates that the material is contaminated at levels that suggest certain biological impacts, then beneficial reuse as port construction fill should initially be considered. If no immediate port construction fill project is available, then material should be evaluated for placement in a submerged CAD facility if available. If no immediate CAD facility is available or possible in the foreseeable future, then upland landfill disposal should be the last option evaluated and only used if other options are unavailable or not viable.

Figure 8
Decision Tree for Sediment Management Alternatives Assessment



Notes:
Decision tree modified from LTMS (CSTF 2005)
1. Assumes coordination of dredge and fill schedules.

5 Implementation Considerations for Each Sediment Management Alternative

Implementation considerations for each sediment management alternative are provided in the following subsections.

5.1 Sediments Suitable for Unconfined Open-Water Placement

5.1.1 Beach/Nearshore Nourishment

Beach or nearshore nourishment is a practical and cost-effective reuse option for sediments from Lower Newport Bay, with numerous beaches in need of replenishment. For RGP 54, beach nourishment is the preferred placement alternative. Individual applicants regularly reuse sandy sediments within the harbor. The City is currently proposing to add nearshore placement as part of the RGP 54 renewal to replenish nearshore ocean beaches. Factors that affect the cost of beach or nearshore nourishment include transport distance and quantity of material.

Sediments must be free of chemical contaminants and have comparable grain size and aesthetic characteristics to that of the beach under consideration. To determine compatibility with the receiver beach, sediments should be evaluated following guidance provided in the Sand Compatibility Opportunistic Use Program (SCOUP; Moffatt & Nichol 2006) and USACE (1989). Samples should be collected from the project site and receiver beach and analyzed for grain size to determine compatibility. For dredged material under RGP 54 to be suitable for beach nourishment, sediment must comprise at least 80% sand or be within 10% of the receiver beach.

For nearshore placement, grain size results from the project site should be compared to the grain size envelope for the receiver beach. The coarsest and finest gradation curves from the receiver beach should be plotted to create the grain size envelope. Source material samples should be plotted against the grain size envelope to determine compatibility. Based on guidance provided in the SCOUP (Moffatt & Nichol 2006) and USACE (1989), the source material curves should fall within the limits of the grain size envelope, with the following exceptions:

1. The coarse-grained portion of the source material curve may fall outside the envelope and still be considered compatible.
2. The fine-grained portion of the source material curve may also fall outside the envelope; however, the percent fines (less than 0.074 millimeter) shall not exceed that of the finest beach sample by more than 10%.

Other considerations associated with this beneficial reuse alternative include aesthetic impacts and requirements for sensitive and listed species and habitats per the Endangered Species Act (ESA) and

Magnuson-Stevens Fishery Management Act. Additional monitoring may be required during placement to ensure no biological impacts (e.g., grunion monitoring).

5.1.2 Clean Capping or Cover Material for a Confined Aquatic Disposal Facility or Capping Project

Beneficially reusing sediment as clean capping or cover material is a cost-effective regionally accepted management alternative. As previously described, regional examples include the cap for the Port Hueneme CAD facility and the North Energy Island Borrow Pit. Factors affecting the cost of this alternative include the area that requires capping, types of contaminants of underlying sediments, proximity of the capping site to source material, and thickness of capping material required. For clean capping or cover material, the sediment component of the cap should be clean as demonstrated by a Tier III evaluation in accordance with *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Inland Testing Manual* (USEPA/USACE 1998) guidelines. As with any capping project, a long-term monitoring program must be designed as part of this management alternative to evaluate long-term cap stability, containment/isolation of the underlying sediments, and/or biological re-colonization of the cap surface. Best management practices (BMPs) associated with placement of the cap include operational controls, such as reducing the rate of discharge or barge movement during discharge, or site containment such as use of a silt curtain or Gunderboom. Additional implementation considerations for a CAD facility are discussed in Section 5.2.2.

5.1.3 Open Ocean Disposal

Ocean disposal is a cost-effective management strategy commonly used for sediments from Newport Harbor. It is also one of the disposal options currently approved by all agencies under RGP 54; however, it is not the preferred management alternative because it is not considered a beneficial reuse. Factors that affect the cost of ocean disposal include transport distance and quantity of material. As previously described, the closest open ocean disposal location to Newport Harbor is LA-3 ODMDS, located approximately 5.4 miles to the south of the Entrance Channel (Figure 1).

To determine suitability for dredged material for placement at the LA-3 ODMDS, a Tier III evaluation should be conducted in accordance with OTM (USEPA/USACE 1991) guidelines. Testing includes physical and chemical analyses and biological testing. Biological testing includes solid phase (SP) and suspended particulate phase (SPP) toxicity testing and bioaccumulation potential testing. SP tests are conducted to evaluate the potential adverse toxicological impacts of dredged material on the benthic community after placement. SPP tests are conducted to evaluate the potential adverse toxicological impacts of dredged material on organisms that live in the water column during placement. Bioaccumulation tests are designed to evaluate the potential of benthic organisms to accumulate contaminants from sediment.

Transportation and disposal of dredged material at authorized ocean disposal sites are regulated pursuant to Section 103 of the MPRSA. USEPA has final jurisdictional authority over approval of dredged material proposed to be placed at ocean disposal sites, whereas USACE retains the final authority at "inland sites," typically defined as inside the baseline of the territorial seas.

BMPs to reduce water quality impacts associated with transport and placement at an ocean disposal site may include the following: eliminate barge overflow, avoid adverse weather, and seal flat deck barges/scows.

5.2 Sediments Not Suitable for Unconfined Open-Water Placement

5.2.1 Port Fill

The City previously had the ability to manage contaminated material at the POLB's Middle Harbor Fill Site; however, this site is closed and no longer an option for future sediment management needs. Port fill sites provide a rare and cost-effective opportunity to beneficially reuse sediment that is unsuitable for open-water placement. Factors that affect cost include transport distance and quantity of material. For the Middle Harbor Fill Site, the POLB worked closely with third parties and the CSTF to accept fill material from regional partners. The decision to accept material was based on schedule, fill composition, documentation (i.e., permits, insurance, licenses), and geographic source of the material.

A primary concern associated with creating a nearshore CDF is the effect of effluent discharge during and after filling the CDF (Everest and Anchor 2009). Testing to determine suitability for placement at a port fill site includes physical and chemical analyses of bulk sediment and elutriate testing using the effluent elutriate test (EET) in accordance with the *Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, and Upland Confined Disposal Facilities – Testing Manual* (USACE 2003). The EET is used to assess effluent discharged from the CDF (i.e., over the weir structure) after placement. This is consistent with testing that was conducted for placement at the POLB's Middle Harbor Fill Site. Heavily contaminated sediments, including hazardous waste, would not be suitable for placement within a port fill. There may also be restrictions on physical material types for constructability. Medium- and coarse-grained sands provide optimum fill material, and fine sands are also suitable structural material. Some fine-grained material can also be accommodated, but that amount is typically limited.

Regulations governing reuse in a port fill include the following:

1. National Environmental Policy Act (NEPA)
2. California Environmental Quality Act (CEQA)
3. CWA Section 404 and Rivers and Harbors Act Section 10 under the jurisdiction of USACE
4. California Coastal Act under the jurisdiction of CCC

5. CWA Section 401 and Porter-Cologne Waste Discharge Requirements (WDRs) under the jurisdiction of RWQCB

BMPs to minimize loss of sediment during transport and placement may include the following: reduce rate of discharge, reduce barge movement during discharge, place material further away from dike/weir, eliminate barge overflow, and use a silt curtain or Gunderboom.

5.2.2 Confined Aquatic Disposal Site

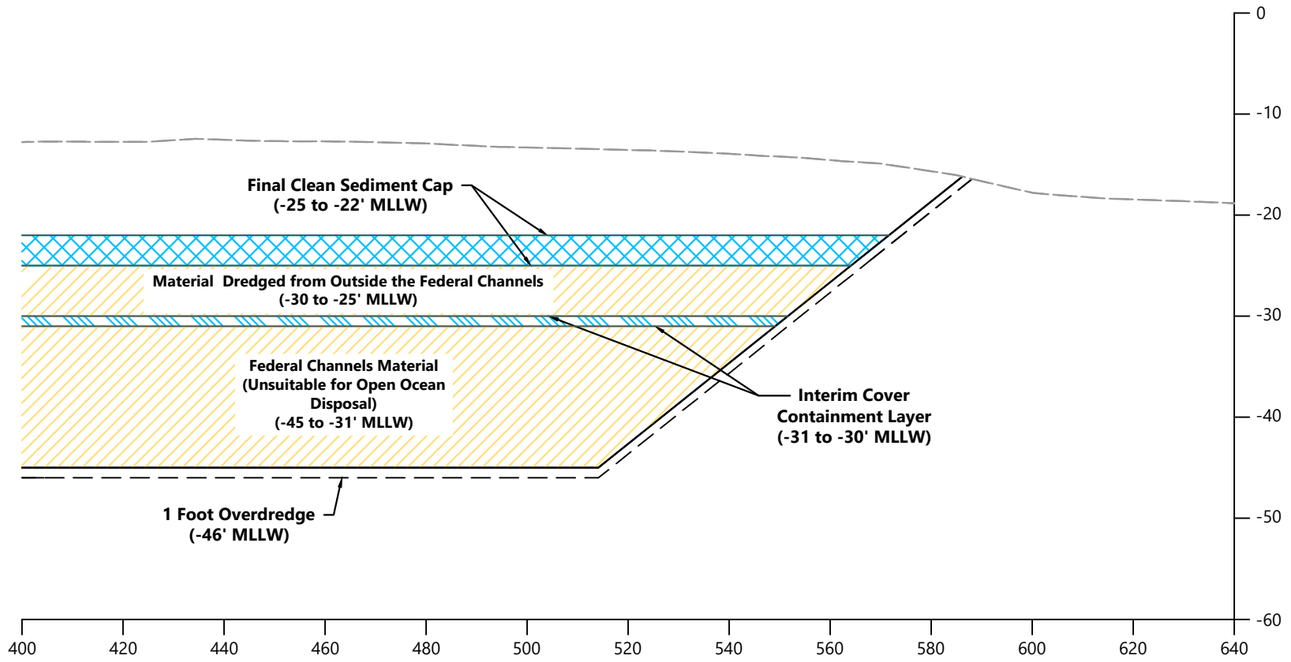
The basic concept for the CAD facility is that it be excavated to a selected depth and size and then be filled with sediments that are unsuitable for open-water placement. These sediments would be overlain by a cap layer that consists of clean material that is intended to permanently isolate the underlying sediments from the waters of Newport Bay and the environment.

The City is currently pursuing development of a CAD facility for management of sediments from the Federal Channels that are unsuitable for open-water placement. The use of CAD sites to manage contaminated sediments has been proven successful with the development of the North Energy Island Borrow Pit and Port Hueneme sites. In order to increase the benefits of the CAD facility for the Newport Beach community, the City also intends to provide additional capacity for subsequent placement of materials dredged from other locations within Lower Newport Bay and the southern section of the Upper Bay, which are also unsuitable for open ocean or nearshore disposal. The CAD facility would thereby accommodate additional fill volume from future maintenance dredging projects conducted as part of the City's RGP 54 program, along with sediment that is not covered as part of the program (e.g., Balboa Yacht Basin, Promontory Bay) and thus requires an alternative disposal option. Details on the proposed CAD facility, including engineering analyses to evaluate the overall technical feasibility and details associated with the proposed work, are presented in the Basis of Design Report (BODR; Anchor QEA 2020). Figure 9 depicts a cross section of the proposed CAD facility concept. The final elevation of the CAD facility infill would be restricted to an elevation that is at or below the water depths necessary for water use, mooring, and navigation within the harbor. Figure 10 shows a plan view of the proposed location and its relation to surrounding harbor features.

SOURCE: Aerial from Bing Maps, 2018.
HORIZONTAL DATUM: California State Plane, Zone 6, North American Datum of 1983 (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- Required Dredge Elevation
- Allowable Overdepth Elevation
- Existing Mudline



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Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-029 SMP CAD SEC.dwg Figure 9

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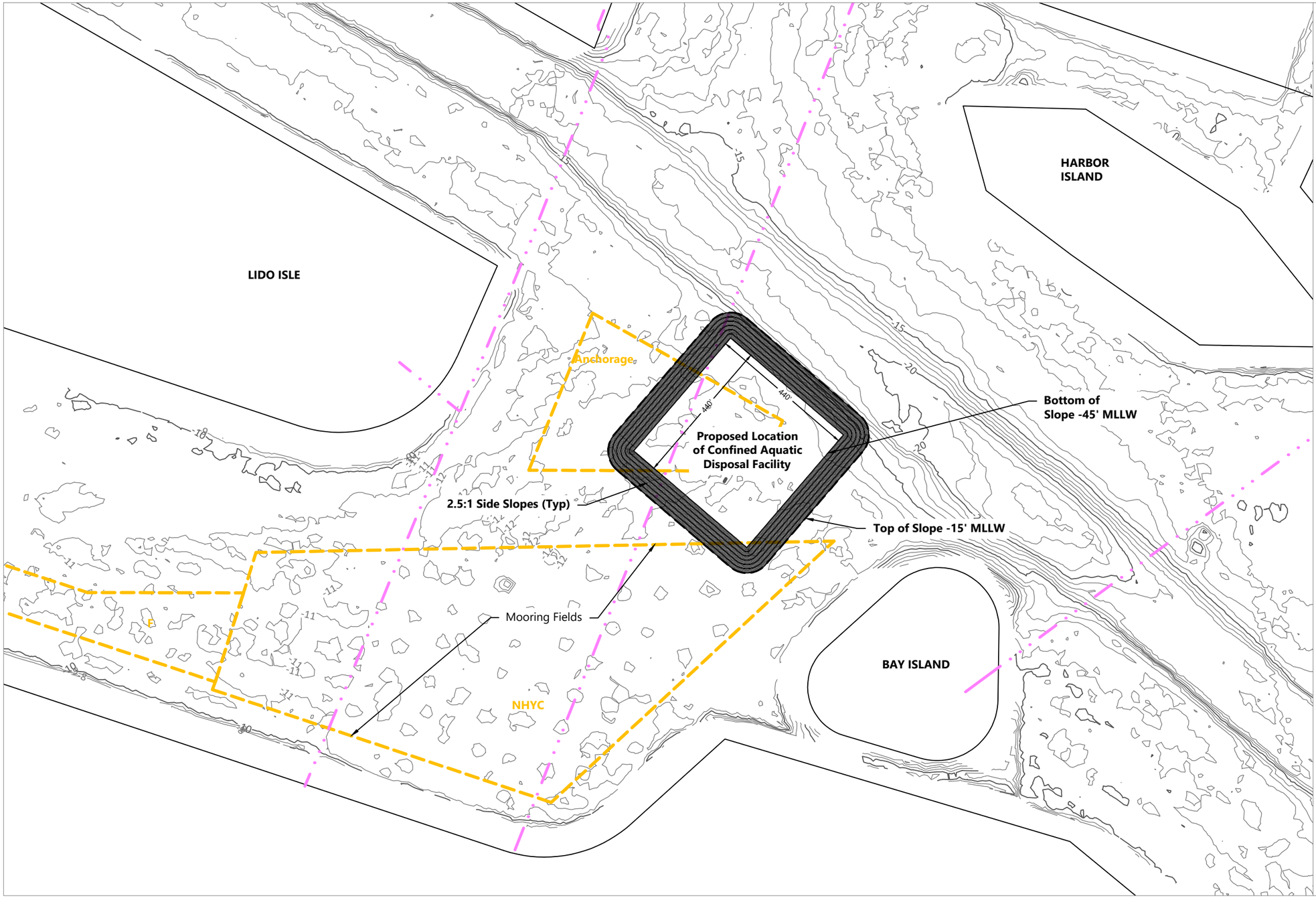
Figure 9
Cross Section of CAD Facility
Sediment Management Plan
Lower Newport Bay



SOURCE: Drawing prepared from Bing Maps. Bathymetric contours from U.S. Army Corps of Engineers survey dated June 2018. Dredge units from U.S. Army Corps of Engineers.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- City of Newport Beach Mooring Fields
- Approximate Existing Utilities
- Dredge Footprint

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Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-030 SMP BAY ISLAND CAD.dwg Figure 10

ANCHOR QEA

Figure 10
Plan View of CAD Facility

Sediment Management Plan
Lower Newport Bay

Design of a permanent cap layer for a CAD facility must physically contain and chemically isolate sediments unsuitable for open-water placement. A properly designed capping layer to provide long-term isolation of underlying chemically impacted sediments requires consideration of several factors and must follow established national standards for CAD facility design and use (Palermo et al. 1998a, 1998b). The studies examine physical disturbance of the cap (i.e., propeller wash, anchoring), bioturbation, and chemical breakthrough. For the proposed CAD facility in Lower Newport Bay, results of these studies are presented in the BODR (Anchor QEA 2020). Based on the results of these studies, the final cap of the proposed CAD facility would be designed to a thickness of 3 feet.

Placement within a CAD facility is not currently approved under RGP 54; however, the City is proposing this alternative in the latest permit renewal. Regulations governing dredging and discharge of marine sediments and subsequent capping associated with a CAD facility include the following:

1. NEPA Compliance
2. CEQA Compliance
3. CWA Section 404 and Rivers and Harbors Act Section 10 under the jurisdiction of USACE
4. California Coastal Act under the jurisdiction of CCC
5. CWA Section 401 and Porter-Cologne WDRs under the jurisdiction of RWQCB
6. ESA consultations for federally listed species under the authority of the U.S. Fish and Wildlife Service and NMFS
7. Magnuson-Stevens Fishery Conservation and Management Act consultations for Essential Fish Habitat under the jurisdiction of NMFS
8. Surface Lease Agreement under the jurisdiction of the State Lands Commission

Regulatory and permitting agencies will require BMPs and operational controls and short-term monitoring during placement within the CAD facility of sediments that are unsuitable for open-water disposal and during capping operations. The LTMS provides a BMP toolbox that can be used to satisfy federal and state water quality requirements. An Operations, Management, and Monitoring Plan (OMMP) also must be developed to describe the plan for managing the CAD facility and detail the long-term monitoring program to evaluate potential environmental impacts. Long-term monitoring may include bathymetric surveys, sediment cap coring, porewater sampling, and/or benthic infauna analyses. The OMMP for the proposed CAD in Lower Newport Bay is presented in Appendix H of the BODR (Anchor QEA 2020).

5.2.3 Upland Landfill Disposal

As described in Section 3.2.3, upland landfill disposal is the costliest disposal option and should only be used for small volumes of sediment when other options are unavailable or not viable. Transporting and disposing of this material to an upland landfill is expensive and would cause

impacts to air quality, traffic, noise, and other aspects associated with hauling the material via trucks on the local roads and highways. Factors affecting cost include dewatering methods, transport distance, and quantity of material, which is subjected to a landfill tipping fee. Although not a preferred management option, landfill disposal is one of the disposal options currently approved by all agencies under RGP 54.

Testing for landfill disposal is landfill specific but includes chemical analysis and leachate testing. For landfill disposal, results of bulk sediment chemical analyses should be compared to total threshold limit concentrations, which indicate the level above which material must be managed as hazardous waste upon removal in accordance with 22 CCR. Results should also be compared to toxicity characteristic leaching procedure (TCLP) and soluble threshold limit concentration (STLC) trigger levels. It is necessary to perform actual leachate tests (TCLP and/or Waste Extraction Test [WET]) for samples in which analytes exceed these criteria. If leachate testing is performed, results of TCLP should be compared to TCLP regulatory values presented in 40 Code of Federal Regulations (CFR) 261. Results of the WET should be compared to the STLCs presented in 22 CCR, Division 4.5, Chapter 11, Article 3. In addition, sediment disposed at a landfill typically needs to pass the "paint filter" test, which requires that the sediment be sufficiently dewatered after dredging to prevent drainage during transport and to minimize excess infiltration during disposal.

The acceptability of material at a landfill is dependent on the site-specific permit conditions that indicate the volume and type of material that can be accepted by the landfill, and material suitability based upon analytical test results (may be different for each landfill). For contaminated sediments that exceed landfill analytical requirements (e.g., STLC and/or TCLP), the material must be disposed of as hazardous waste at a facility permitted to accept such material. A Class I landfill is permitted to accept hazardous waste (as defined in 40 CFR 261.20 and 22 CCR Article 9), including contaminated sediments that exceed the hazardous waste characterization threshold values. Class I landfills consist of several layers of natural and synthetic impervious material to prevent leachate from the landfill from reaching the underlying groundwater. As stated previously, the RWQCB has expressed concerns related to landfill placement of marine sediment due to salt leaching from the material and potentially impacting groundwater resources. This, combined with limited capacity within the nearby landfills and the elevated regional impacts associated with landfill disposal, make this alternative not ideal.

6 Next Steps

Managing sediment in Newport Harbor is complex and requires considering many factors. Nearly all of the properties along the harbor are privately owned, and dredging those properties is the sole responsibility of the landowners based on individual need. While the City cannot force these property owners to dredge under their private slips or marinas, the City can encourage dredging by offering innovative and creative programs such as the RGP 54 and potential CAD facility disposal opportunities. Because some areas of the harbor do not currently have viable alternatives for sediment disposal, the City feels these options will be well received by the harbor public as well as the regulatory and resource agencies. This SMP highlights the benefits of those opportunities.

The City commits to promoting the benefits of each of the options listed herein and to continually seeking ways to improve and streamline the dredging application and disposal process, which further encourages private party dredging especially within the impacted areas of Newport Harbor. Because parts of the harbor retain legacy contamination from historical watershed inputs, the more dredging that occurs the better the surface sediments will be from a chemical concentration standpoint. The City's goal for improving Lower Newport Bay's water quality conditions is to provide a cost-effective and streamlined approach that allows for City-managed and private residential properties to be dredged and to have the resulting materials managed in the most environmentally protective and feasible manner.

The next steps are as follows:

1. **RGP 54**: Continue the RGP 54 renewal process with USACE, CCC, and RWQCB. Because of sediment management limitations with the existing RGP 54, the City is proposing to include a new management option (nearshore placement). As previously described, the City maintains and renews the sediment suitability every 5 years. The next bay-wide sediment investigation will be conducted in 2023. The City is currently evaluating the option to construct a CAD facility in Newport Harbor. If the City certifies the CEQA document, then the RGP 54 would be amended to include the CAD facility as an alternate disposal option.

2. **Additional Sediment Characterization**: Sediment testing data within Balboa Yacht Basin and Promontory Bay is limited, with the most recent testing performed in 2013 (Section 2.3). Prior to dredging, sediments from within Balboa Yacht Basin and Promontory Bay would be characterized to delineate material that is suitable or unsuitable for open-water disposal. In addition, updated bathymetric surveys would be required. This testing, as well as other testing within Newport Harbor, will assist with defining and prioritizing areas for management within the proposed CAD facility.

3. **Federal Channels Dredging and Construction of Proposed CAD Facility**: A Draft Environmental Impact Report is currently being prepared and will be distributed for public input. The City will then respond to and incorporate public input before considering certification of the Final Environmental Impact Report. If the Final Environmental Impact Report is certified by the City, permit applications would then be submitted to regulatory agencies, and the design for dredging and construction of the proposed CAD facility will be completed. Federal channel dredging is anticipated to begin in late 2020 with an initial, small-quantity project focusing in the Entrance Channel area. Construction of the CAD facility, if approved, is anticipated to begin in late 2021 or 2022.

4. **Public Outreach**: During the 2-year period following construction of the proposed CAD facility, public outreach meetings will be held with the City and its residents to promote the proposed CAD facility and provide information for residents who may want to take advantage of the additional disposal capacity for unsuitable material which may be present within their slips or marinas. This would allow sufficient time for City and residential applicants to obtain permits for their respective projects prior to reopening of the CAD facility for additional placement after the Federal Channels project is complete.

5. **Port Fill**: Continue to track potential port fill opportunities in the region that may provide capacity for third-party material.

6. **LA-3 ODMDS Monitoring**: The City will contribute to USEPA monitoring at the LA-3 ODMDS with respect to mercury to meet sediment suitability conditions set by USEPA for the Federal Channels project.

7. **Update SMP**: This SMP is intended to be a living document and will be updated as needed to reflect changes in policy, availability of new technology to treat contaminated sediment, new disposal options, or changes in conditions.

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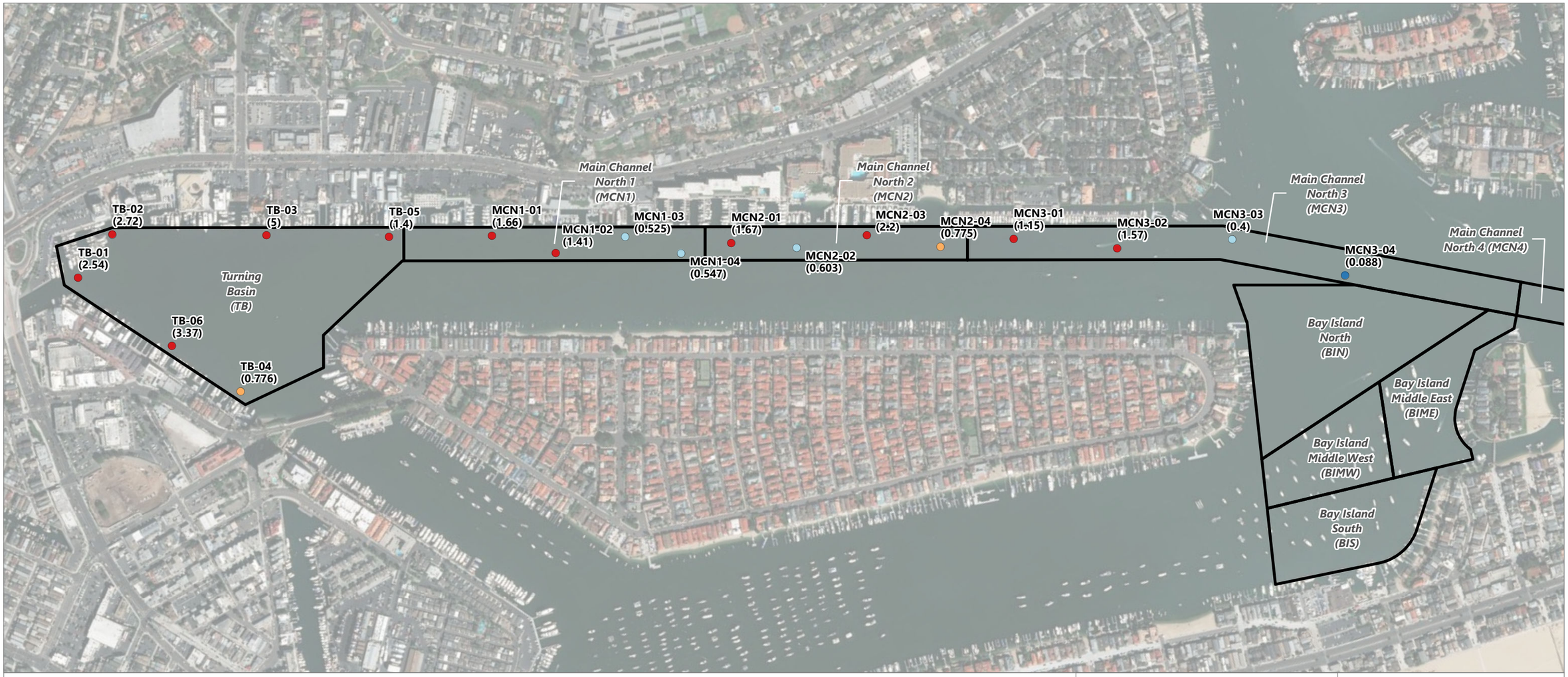
Appendix A
Contaminant Maps for Lower Newport Bay



LEGEND:

Mercury (mg/kg)

- 0.088 - 0.15 (< ERL)
- 0.151 - 0.71 (< ERM)
- 0.711 - 1 (< USEPA Recommended Threshold)
- 1.01 - 5 (> USEPA Recommended Threshold)

Dredge Units

NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI

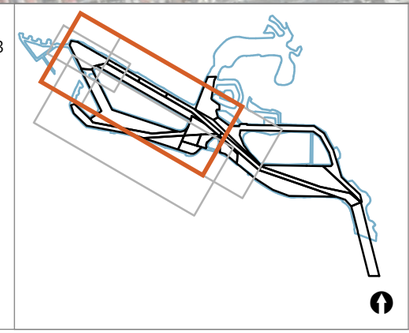


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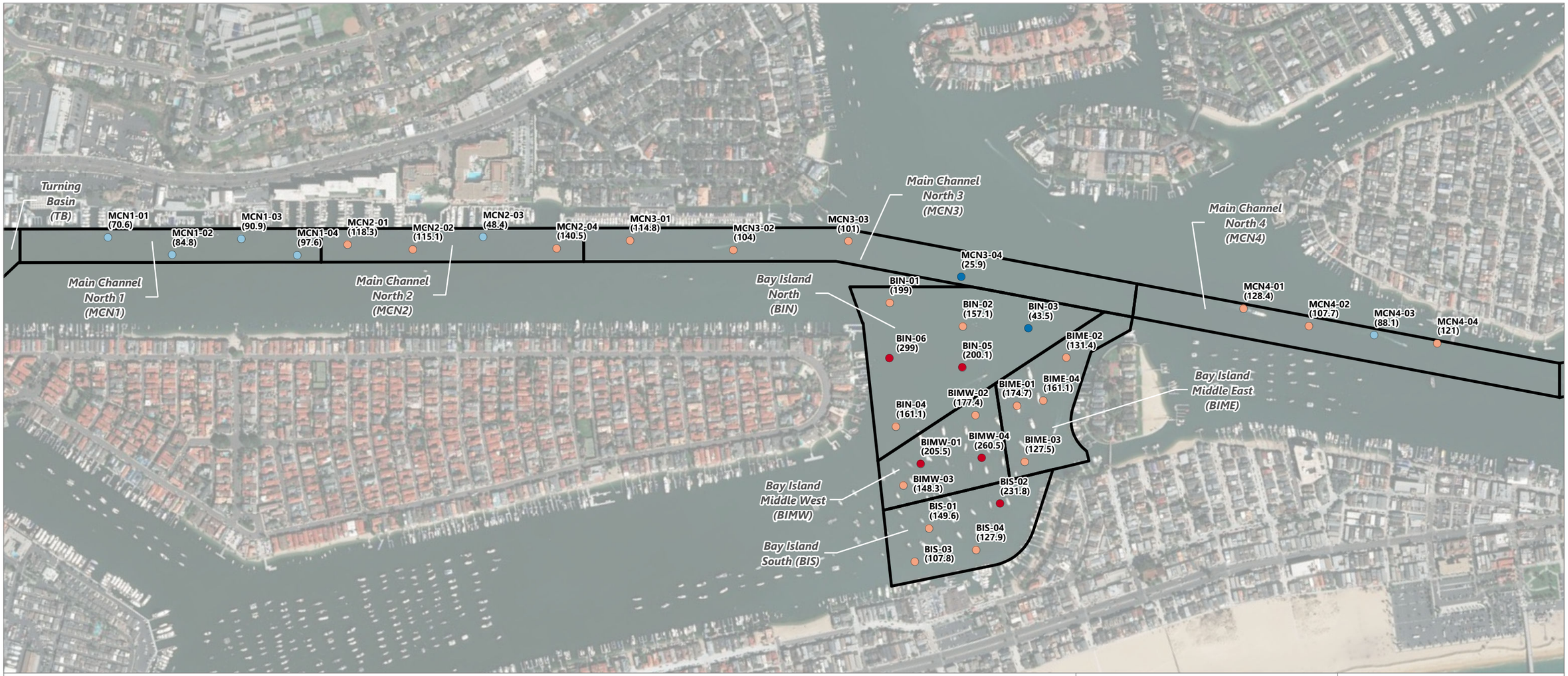
Figure 18
Mercury Concentrations for Individual Stations within Turning Basin and Main Channel North 1, 2, and 3
Lower Newport Sediment Characterization



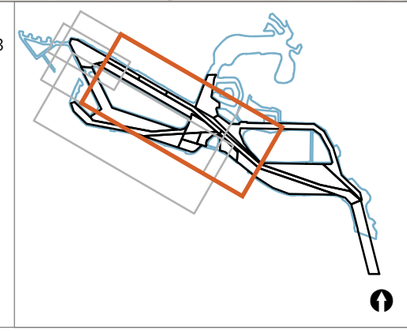
LEGEND:

Total DDTs (µg/kg)

- 25.9 - 46.1 (< ERM)
- 46.2 - 100 (> ERM)
- 101 - 200
- 201 - 299

Dredge Units

NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI



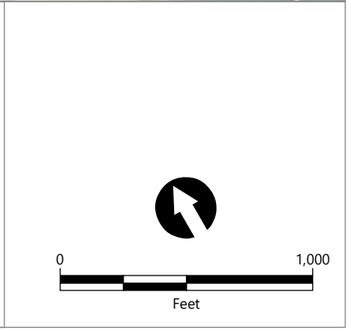


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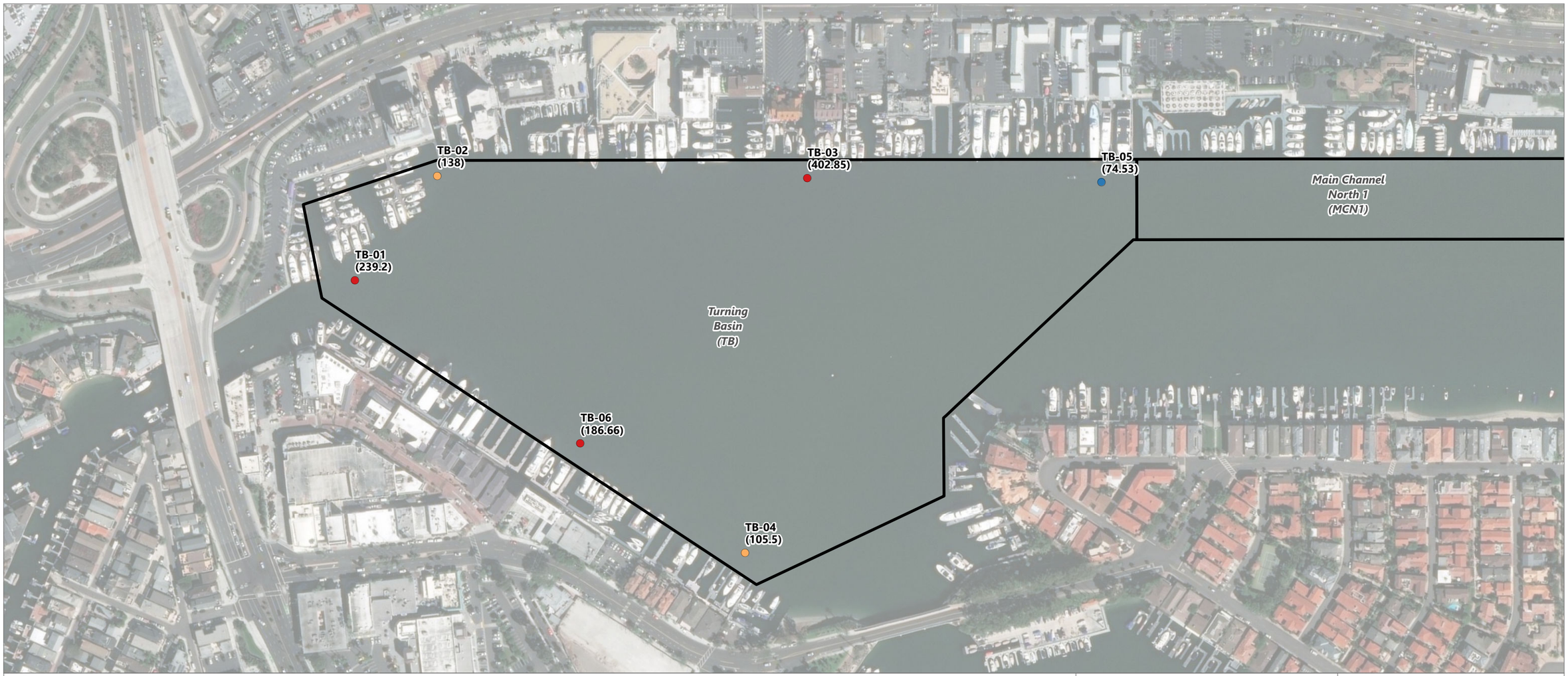
Figure 19
Total DDT Concentrations for Individual Stations within Main Channel North 1, 2, 3, and 4, and Bay Island
Lower Newport Sediment Characterization



LEGEND:

Total PCBs (µg/kg)

- 74.5 - 100
- 101 - 180 (< ERM)
- 181 - 403 (> ERM)

Dredge Units

NOTES:
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Aerial photo: ESRI

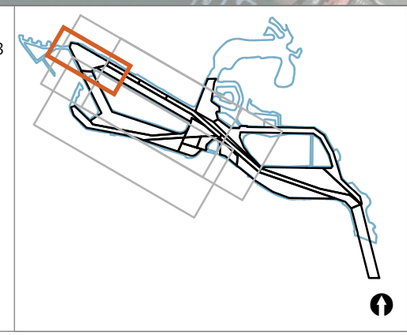

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Figure 20
Total PCB Concentrations for Individual Stations within the Turning Basin
Lower Newport Sediment Characterization



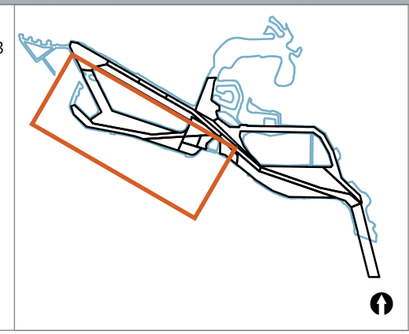
LEGEND:

Mercury (mg/kg)

- 0.088 - 0.15 (< ERL)
- 0.151 - 0.71 (ERL - ERM)
- 0.711 - 1
- 1.01 - 5
- 2019 Stations
- 2018 Exploratory Stations

Dredge Units

NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI



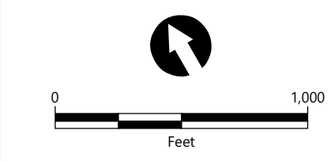


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Figure 21
Mercury Concentrations for Individual Stations within Newport Channel
Lower Newport Sediment Characterization

Appendix B
Contaminant Maps for RGP 54



LEGEND:

Mercury (mg/kg)

- 0.056 - 0.15 (< ERL)
- 0.16 - 0.71 (< ERM)
- 0.72 - 1 (< USEPA Recommended Threshold)
- 1.01 - 9.5 (> USEPA Recommended Threshold)

Area 1

NOTE:
1. Horizontal datum: California State Plane Zone 6, NAD83. Aerial photo: ESRI.

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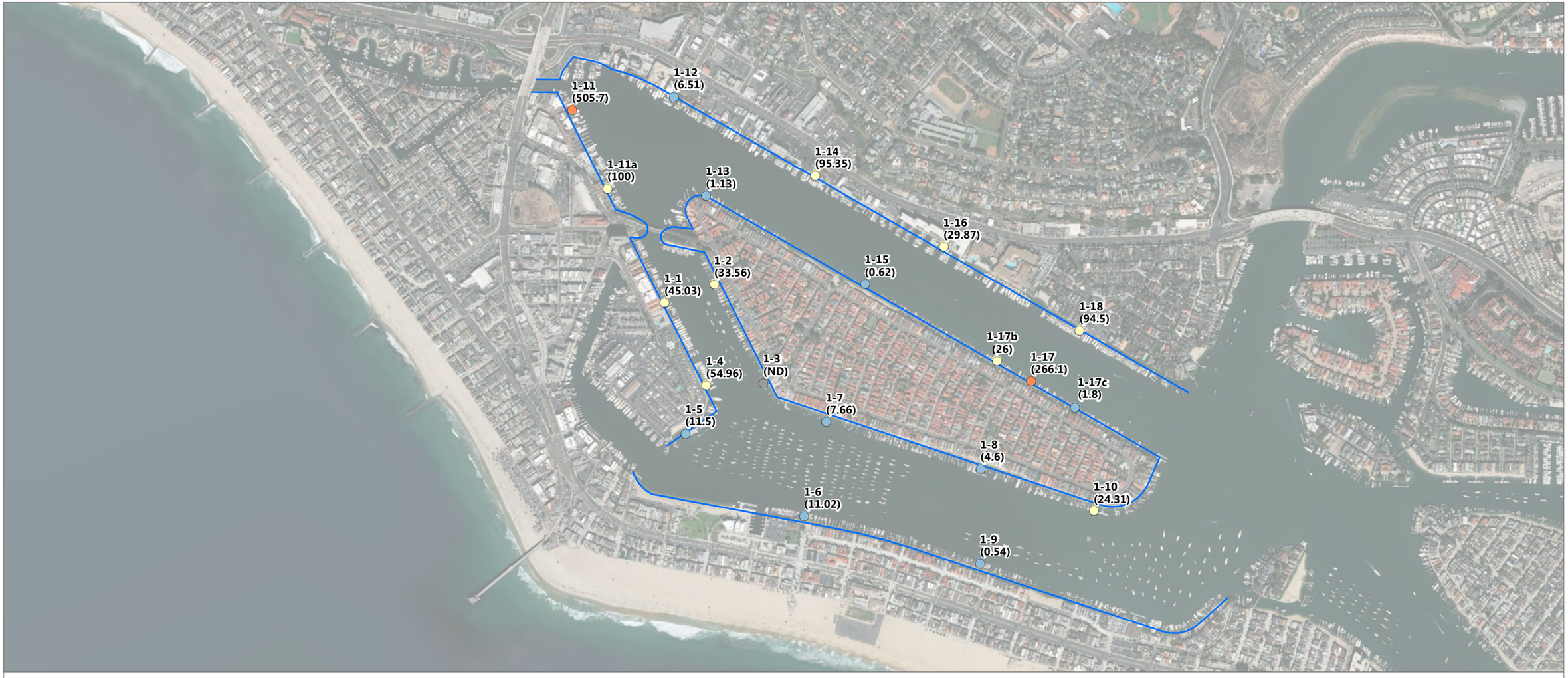
Figure 12
Mercury Concentrations for Individual Stations Within Area 1
RGP 54 Sediment Characterization



LEGEND:

Total PCBs (µg/kg)

- Non-detect
- 0.540 - 22.7 (< ERL)
- 22.8 - 180 (< ERM)
- 181 - 506 (> ERM)

Area 1

NOTE:
1. Horizontal datum: California State Plane Zone 6, NAD83. Aerial photo: ESRI.

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ANCHOR QEA

Figure 13
Total PCB Concentrations for Individual Stations Within Area 1
RGP 54 Sediment Characterization



LEGEND:

Mercury (mg/kg)

- 0.15 (< ERL)
- 0.16 - 0.71 (< ERM)
- 0.72 - 1 (< USEPA Recommended Threshold)
- 1.01 - 2.4 (> USEPA Recommended Threshold)

Area 5

NOTE:
1. Horizontal datum: California State Plane Zone 6, NAD83. Aerial photo: ESRI.

0 500
Feet

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ANCHOR QEA

Figure 14
Mercury Concentrations for Individual Stations Within Area 5
RGP 54 Sediment Characterization

Appendix C
Contaminant Maps for Balboa Yacht Basin and Promontory Bay



Publish Date: 2020/05/11, 5:31 PM | User: jquinley
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Figure 1.1
Copper Concentrations at Individual Stations within Promontory Bay and Balboa Yacht Basin
Sediment Management Plan
Lower Newport Bay



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Figure 1.2
Mercury Concentrations at Individual Stations within Promontory Bay and Balboa Yacht Basin
Sediment Management Plan
Lower Newport Bay



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ANCHOR QEA

Figure 1.3
Zinc Concentrations at Individual Stations within Promontory Bay and Balboa Yacht Basin
Sediment Management Plan
Lower Newport Bay



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ANCHOR QEA

Figure 2.1
Copper Concentrations within Promontory Bay and Balboa Yacht Basin
Sediment Management Plan
Lower Newport Bay

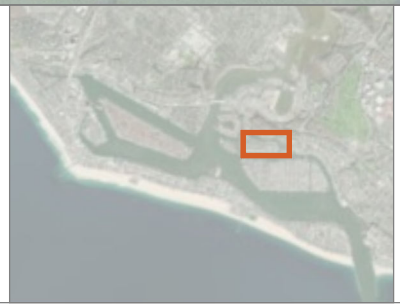


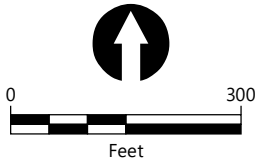
LEGEND:

- Sampling Locations
- < USEPA Threshold
- > USEPA Threshold

NOTES:

1. The ERL threshold for Mercury is 0.15 mg/kg.
2. The ERM threshold for Mercury is 0.71 mg/kg.
3. The USEPA threshold for Mercury is 1 mg/kg.
4. mg/kg: milligrams per kilogram
5. Horizontal Datum: California State Plane, Zone 6, NAD 83.
6. SG: Surface Grab
7. Concentration surfaces were interpolated using the maximum result value.





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ANCHOR QEA

Figure 2.2
Mercury Concentrations within Promontory Bay and Balboa Yacht Basin
Sediment Management Plan
Lower Newport Bay

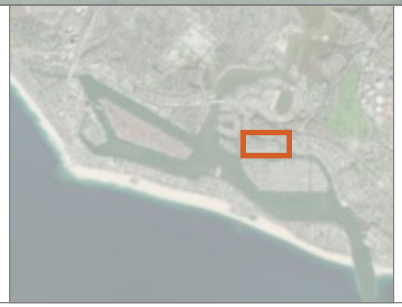


LEGEND:

- Sampling Locations
- < ERM
- > ERM

NOTES:

1. The ERL threshold for Zinc is 150 mg/kg.
2. The ERM threshold for Zinc is 410 mg/kg.
3. The USEPA threshold for Zinc is not applicable.
4. mg/kg: milligrams per kilogram
5. Horizontal Datum: California State Plane, Zone 6, NAD 83.
6. SG: Surface Grab
7. Concentration surfaces were interpolated using the maximum result value.



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ANCHOR QEA

Figure 2.3
Zinc Concentrations within Promontory Bay and Balboa Yacht Basin
Sediment Management Plan
Lower Newport Bay

Appendix E
Harbor-Wide Eelgrass Survey

MARINE TAXONOMIC SERVICES, LTD

2018 Monitoring of Eelgrass Resources in Newport Bay Newport Beach, California

Prepared For:
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December 20, 2018

Contract: C-7487-1: 2018 Newport Harbor Shallow Water Eelgrass Survey

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Abbreviations

ac	Acre
Bay	Newport Bay
CEQA	State of California Environmental Quality Act
CEMP	California Eelgrass Mitigation Policy
City	City of Newport Beach
CRM	Coastal Resources Management Inc.
dGPS	Differential Global Positioning System
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ft	Feet/Foot
°F	Degrees Fahrenheit
GPS	Global Positioning System
HAMP	City of Newport Beach Harbor Area Management Plan
HPAC	Habitat Areas of Particular Concern
MLLW	Mean Lower Low Water
m	Meter(s)
MTS	Marine Taxonomic Services, Ltd.
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
OTS	Ocean Technology Systems
RGP	Regional General Permit
sq	Square
SAV	Submerged Aquatic Vegetation
SWEH	Shallow Water Eelgrass Habitat
The Plan	Eelgrass Protection and Mitigation Plan for Shallow Waters in Lower Newport Bay: An Ecosystem Based Management Program
USACE	U.S. Army Corps of Engineers

Introduction

Marine Taxonomic Services, Ltd. (MTS) and its sub-contractor, Coastal Resources Management, Inc, (CRM) was contracted by the City of Newport Beach (City) to provide eelgrass-mapping services in Newport Bay as part of the 2018 shallow-water eelgrass assessment. The survey consisted of mapping shallow-water eelgrass habitat (SWEH) in support of the City's Eelgrass Protection and Mitigation Plan for Shallow Waters in Lower Newport Bay: An Ecosystem Based Management Program (The Plan; City of Newport Beach 2015) and the City of Newport Beach Harbor Area Management Plan (HAMP; City of Newport Beach 2010). MTS was responsible for surveying the SWEH, data analysis, and report composition. CRM was responsible for providing MTS with survey results from SWEH using sonar based methods beyond 20 feet (ft) bayward of all dock structures and in areas where it was not safe to perform diver based surveys. This was the sixth SWEH survey since the program was initiated in 2003. Previous eelgrass habitat assessments were conducted in 2003-2004 (CRM 2005), 2006-2008 (CRM 2010), 2009-2010 (CRM 2012), 2012-2014 (CRM 2015), and 2016 (CRM 2017).

Project Purpose

The purpose of this assessment is to provide the City with detailed information on the distribution and abundance of eelgrass within Newport Harbor; including Lower and Upper Newport Bay (Bay) (Figure 1). Monitoring and maintaining a database of the Bay's eelgrass resources is essential for the City to manage these resources and understand where proposed projects might have impacts. The City has committed to monitor these resources as noted in the HAMP and The Plan. Additionally, data provided in this report will be used by the City in support of their Regional General Permit (RGP) 54 issued collectively by the U.S. Army Corps of Engineers (USACE 2015), the California Coastal Commission and the Water Board. Additionally, this database is valuable as it helps to inform the City and the public of environmental constraints regarding infrastructure improvement projects such as construction, repair, and maintenance for bulkheads, docks, and piers, as well as activities involving beach nourishment and harbor dredging.



Figure 1. Regional map of Newport Bay in Newport Beach, California.

Background

Historical surveys of eelgrass resources have occurred since 2003. These surveys were conducted by CRM. Summaries of the previous eelgrass mapping results in Newport Bay are provided below.

2003-2004 Survey Summary

A total of 30.4 acres (ac) of eelgrass were mapped in shallow water at depths between 0-ft and -12-feet (ft) Mean Lower Low Water (MLLW). Mean station density averaged 212.8 turions per square (sq) meter (m) and ranged between 94 and 273.8 per sq m across 15 stations (CRM 2005).

2006-2008 Survey Summary

A total of 23.1 ac of eelgrass were mapped at depths less than 10 feet MLLW. Turion density averaged 130.7 turions per sq m and varied between 67.1 and 221.9 turions per sq m across 10 stations (CRM 2010).

2009-2010 Survey Summary

A total of 19.92 ac of SWEH was mapped between 2009 and 2010. Turion density averaged 123.5 and ranged between 14.3 and 629 turions per sq m (CRM 2012).

2012-2014 Survey Summary

This survey encompassed both deep and shallow water eelgrass habitats within the Bay. A total of 88.27 ac of bottom habitat was covered by eelgrass between the low tide zone and -28.5-ft MLLW. Of this a total of 42.35 ac of vegetated SWEH was mapped between 0.0-ft and -15-ft MLLW. Turion density averaged 117 turions and ranged between 39.1 and 259.3 turions per sq m (CRM 2015).

As a result of the surveys performed between 2003 and 2014, three eelgrass stability zones were identified in the Bay. The first zone is the stable eelgrass zone, where eelgrass distribution and density have been relatively constant and underwater light levels were highest. The second zone is the transitional eelgrass zone where eelgrass acreage has been highly variable and underwater light levels appeared to have had higher variation. The unvegetated eelgrass zone represents areas where eelgrass was not documented between 2003 and 2014 (CRM 2015).

2016 Survey Summary

This survey encompassed both deep and shallow water eelgrass habitats within the Bay. A total of 104.5 ac of bottom habitat was covered by eelgrass between +0.5-ft and -29.5-ft MLLW. Of this a total of 53.0 ac of vegetated SWEH was mapped between +0.5-ft and -15-ft MLLW. Eelgrass turion density averaged 163.5 turions per sq m and ranged between 86.8 and 287.7 turions per sq m (CRM 2017).

Project Setting

Newport Bay is located within the city limits of Newport Beach, California (Figure 1). The City is bordered by three coastal cities, Huntington Beach to the northwest, Costa Mesa to the north, and Laguna Beach to the southeast. Newport Bay is generally divided into two regions, Lower Newport Bay and Upper Newport Bay. Prior to major development, Lower Newport Bay was a coastal lagoon. The lagoon was initially formed between 1824 and 1862 as a consequence of down current sand deposition from the Santa Ana River that formed a sand spit across the mouth of Upper Newport bay. The sand spit eventually developed into present-day Balboa Peninsula (Stevenson and Emery 1958). Lower Newport Bay is a four-mile long body of water orientated in a northwest-to-southeast direction, parallel to the coastline. Currently, the Bay is a multi-user system with both recreational and commercial uses. Functioning as a major navigational harbor and anchorage for approximately 5,000 small boats and larger vessels as well as a business center for marine-related activities and tourism. The Bay is also utilized as a transitional corridor where wildlife can move between the tidally influenced channel and more protected marsh ecosystem of Upper Newport Bay or gain access to the open coastal marine environment.

Periodic dredging within the Bay is necessary to maintain a working corridor for vessel traffic, particularly in active portions of the Bay (Anchor QEA 2009). The Federal Navigation Channel (FNC) in the Bay is maintained by the USACE. While dredging for the FNC may occur at -12-ft MLLW it generally occurs at depths deeper than -15-ft MLLW. Thus, the majority of dredging activities for the FNC are largely outside of SWEH areas. On occasion, dredging for the FNC may have the ability to impact eelgrass habitat that occurs at deeper depths (not discussed in this report) (CRM 2017). There have been 50 dredging events within SWEH since the 2016 survey was conducted. It is possible that some of these dredge events had impacts to SWEH.

Lower Newport Bay supports numerous marine habitats ranging in depth, substrate composition, and tidal movements. Of these habitats, eelgrass habitat is of special importance. Growing along sea walls, in areas of open water, along and in between dock structures, eelgrass habitat is a vital resource present within many areas of Lower Newport Bay. The Newport Bay watershed (~ 154 square miles), bounded by the Newport Mesa bluffs to the west and the San Joaquin Terrace to the east, drains towards the Pacific Ocean via Upper Newport Bay. The watershed is a major contributor of suspended sediments, nutrients, and other pollutants into the Bay ecosystem (EPA 2017).

Eelgrass Biology

Eelgrass*, Zostera,* is a marine angiosperm (Kuo et al. 2006; Hemminga and Duarte 2000). This marine plant is one of 13 genera within 5 families of seagrasses (Les et al. 1997). Seagrasses are considered productive and valuable resources. Seagrass beds absorb large quantities of the greenhouse gas, carbon dioxide, from the atmosphere and store it resulting in carbon sequestration and storage (Kuwae and Hori 2019). Economically important, eelgrass provides habitat to sustain commercially important fisheries further supporting the recreational and commercial fishing industry and associated tourism industries (Phillips 1985; Dewsbury et al. 2016). In Southern California, eelgrass grows at depths ranging from the mid-to-low intertidal extending to -30-m MLLW at some protected offshore areas of the eastern Pacific Ocean (Phillips and Mendez 1988; Phillips and Echeverria 1990; Mason 1957; Coyer et al. 2007).

Zostera japonica, dwarf eelgrass, is an introduced seagrass found along the west-coast, originally from Asia (Posey, 1988). *Z. japonica* has been known to inhabit the waters of the Pacific Northwest since the early 1900s (Phillips, 1985). Its presence in California has only been known for a short time (Shafer et al. 2008). Two types of eelgrass are found offshore in the Channel Islands and along the coast of Santa Barbara County, *Z. pacifica* and *Z. marina* (Coyer et al. 2007). Because eelgrass varies greatly given different environmental parameters, species of *Zostera* can be challenging to identify in situ (Olesen and Sand-Jensen 1993). *Zostera* species observed during the majority of this 2018 survey were believed to be *Z. marina*. However, *Z. pacifica* was likely observed near the entrance to the channel. Hybridization of *Z. marina* and *Z. pacifica* has been observed in other settings (Olsen et al. 2014). If hybridization is occurring within Newport Bay, identification of these two species in situ may not be possible and further genetic testing may be required.

Eelgrass is a photosynthetic organism that sustains fish and other marine life through nutrient transformation and by releasing oxygen into the marine environment (Yarbro and Carlson 2008). These plants can support a diversity of life by creating structure over otherwise featureless soft bottom habitats. Eelgrasses can form extensive beds in shallow, protected, estuarine, or other near shore environments. These grasses host a variety of marine species including microbes, algae, invertebrates (including; lobsters, crabs, worms, snail, clams, sea stars, and octopus), and fishes (Thresher et al. 1992; Valentine and Heck 1999). Some fish species are present throughout their life stages while other fishes utilize eelgrass beds during periods of juvenile development. Other vertebrates including fishes, seabirds, and sea lions utilize eelgrass beds as foraging grounds. Green sea turtles also utilize eelgrass beds, however they are rarely spotted in Newport Bay.

In addition to sustaining many forms of marine life, eelgrass reduces erosion processes and increases seafloor stability (de Boer 2007). Other marine plants, sessile organisms, and sediments are secured to the seafloor by the dense rhizome mats that penetrate these areas. Additionally, the three-dimensional blade structure of eelgrass acts as a wave dampener and softens the impacts of wave action. In some areas of extreme reduction in wave action, sediments and organic matter may begin to be deposited.

In Newport Bay, *Z. japonica* is not known to occur. *Z. marina* has historically grown in both Lower Newport Bay and Upper Newport Bay. However, the distribution and abundance of eelgrass in this area has varied greatly over time (CRM 2002, 2005, 2008, 2010, 2012, 2015, 2017). The importance of this habitat for marine life can sometimes conflict with the need for the City of Newport Beach to maintain and sustain a viable commercial and recreational harbor and for residents to maintain the integrity of their boat docks and piers. Consequently, there is a need for the City to document the distribution and abundance of eelgrass, spatially and temporally as noted in the The Plan.

Eelgrass Regulatory Setting

General Eelgrass Regulations

The federal government designated eelgrass as an Essential Fish Habitat (EFH) and a Habitat of Particular Concern (HPAC) under the Magnuson-Stevens Fishery Conservation and Management Act in 1996 (FR 62, 244, December 19, 1997; Pacific Fishery Management Council, 2008). Eelgrass habitat is considered an EFH and a HPAC as it is a key foundation to a healthy marine habitat and provides necessary ecosystem functions to sustain populations of marine organisms. The designation as an EFH requires federal agencies to consult with the National Oceanic and Atmospheric Association (NOAA) Fisheries on ways to avoid or minimize the adverse effects of their actions on eelgrass.

NOAA provides guidelines for eelgrass management under the California Eelgrass Mitigation Policy and Implementing Guidelines (CEMP) (NOAA Fisheries, West Coast Region, 2014). These guidelines provide comprehensive and consistent information to ensure the actions taken by federal agencies result in "no net loss" of eelgrass habitat or function. Under the new policy biologists will assist federal agencies to mitigate for unavoidable impacts.

Eelgrass does not have a formal listing as a state or federal endangered, rare, or sensitive species. However, the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and NOAA Fisheries understand the importance of protecting this resource. Additionally, eelgrass is protected under the Clean Water Act, 1972, as it is considered vegetated shallow water habitat.

Environmental legislation under the National Environmental Policy Act (NEPA) and State of California Environmental Quality Act (CEQA) dictates that project designs for coastal projects should;

- Make all possible attempts to avoid impacts to eelgrass.
- Minimize the degree or magnitude of impacts to eelgrass.
- Rectify or compensate for unavoidable eelgrass habitat loss by restoring soft-bottom habitat with eelgrass using transplant techniques.
- Reduce or eliminate impacts to eelgrass over time by preservation and maintaining eelgrass over the life of the project.

The 2018 Department of Fish and Wildlife Ocean Fishing Regulations include regulations on the collection of marine plants;

- There is no closed season, closed hours or minimum size limit for any species of marine aquatic plant that are allowed to be collected.
- The daily bag limit on all marine aquatic plants for which the take is authorized is 10 pounds wet weight in the aggregate.
- Marine aquatic plants may not be cut or harvested in state marine reserves.
- No eelgrass (*Zostera*), surf grass (*Phyllospadix*), or sea palm (*Postelsia*) may be cut or disturbed at any time.

The California Code of Regulations, Title 14, 650. Natural Resources, Division 1. Fish and Game Commission-Department of Fish and Wildlife. Subdivision 3, General Regulations. Chapter 1, Collecting Permits states;

- General. Except as otherwise provided, it is unlawful to take or possess marine plants, live or dead birds, mammals, fishes, amphibians, or reptiles for scientific, educational, or propagation purposes except as authorized by a permit issues by the department.

Newport Beach Eelgrass Regulations

Additional protection is afforded under both State and local City of Newport Beach codes and plans. The City of Newport Beach Policies state that the City of Newport Beach, within its adopted Land Use Plan (City of Newport Beach 2009), acknowledges the importance of eelgrass in Newport Harbor, as well as, the "*need to maintain and develop coastal-development uses in Newport Harbor that may result in impacts to eelgrass*" and "*Avoid impacts to eelgrass (Zostera marina) to the greatest extent possible. Mitigate losses of eelgrass at 1.2 to 1 mitigation ratio and in accordance with the Southern California Eelgrass Mitigation Policy. Encourage the restoration of eelgrass throughout Newport Harbor where feasible*: (LUP 4.2.5-1). The Southern California Eelgrass Mitigation Policy was superseded by the CEMP in 2014.

The City of Newport Beach adopted a Newport Bay specific eelgrass mitigation plan in 2015. The plan was entitled "*Eelgrass Protection and Mitigation Plan for Shallow Waters in Lower Newport Bay: An Ecosystem Based Management Program*" (The Plan) (City of Newport Beach, 2015). The Plan is an outcome of the City of Newport Beach Harbor Area Management Plan (HAMP), as issued in April 2010 and approved by City Council in November 2010 (Weston Solutions Inc. et al. 2010). The HAMP was established to set goals and best management practices (BMPs) in order to ensure a healthy eelgrass population within Lower Newport Bay. The Plan seeks to protect and promote a long-term sustainable eelgrass population while serving Lower Newport Bay's navigational and recreational beneficial uses. The goal of the Plan is an ecosystem-based approach that works by protecting a sustainable eelgrass population in the Lower Newport Bay and enforcing BMPs that will promote eelgrass growth.

Particular attention is placed on maintenance dredging activity associated with minor maintenance dredging under and adjacent to private, public, and commercial docks, floats, and piers currently authorized under the City's RGP 54 from the USACE, Regional Water Quality

Control Board and the California Coastal Commission. The Plan is an integral component of the authorized RGP 54. Exceptions include; demolition, repair, and in-kind replacement of docks (including piers, gangways, floats, and piles), bulkheads, and piles with similar structures that are excluded from the current approved RGP 54 program. Eelgrass impacts as a result of beach replenishment or disposal of dredged material in front of an existing bulkhead are not covered. The California Eelgrass Mitigation Policy governs all other activities that affect eelgrass.

Methods

Project Staff

This report relies on a combination of previously collected data by CRM and results from this year's, 2018, survey efforts conducted by MTS. Integral staff for this survey included Dr. Robert Mooney (Principal Investigator), Grace Teller (Biologist, M.Sc.), and Hannah Joss (Dive Technician, B.Sc.). Dr. Mooney contributed to project oversight, client communication, and report review. Grace and Hannah acted as the primary field team biologists with additional support from MTS personnel, Melissa Hoffman, and CRM personnel, Nicholas DaSilva. Melissa assisted as topside staff and Nick assisted as a diver. Additionally, Grace was responsible for daily project management and drafting the 2018 report summary. CRM staff, Rick Ware, Nick DaSilva, and Tom Gerlinger, supported the 2018 survey through collection of sonar data, mapping support, and review of deliverables.

Project Location

The surveys were conducted in Newport Bay, located within Newport Beach, Orange County, California. Observations and mapping occurred between July 2nd and October 3rd, 2018. Density measurements were taken across the Bay on October 3rd and 4th, 2018. The survey area included intertidal and subtidal soft bottom habitats of Newport Bay. Many of these areas paralleled rip-rap shorelines and/or headwalls. Shallow water eelgrass habitat is defined as the area extending from the intertidal zone to a depth of -15-ft MLLW. For comparison to previous surveys administered by CRM and to allow for simplified acreage accounting, the Bay was divided into 22 SWEH mapping regions (Figure 2).

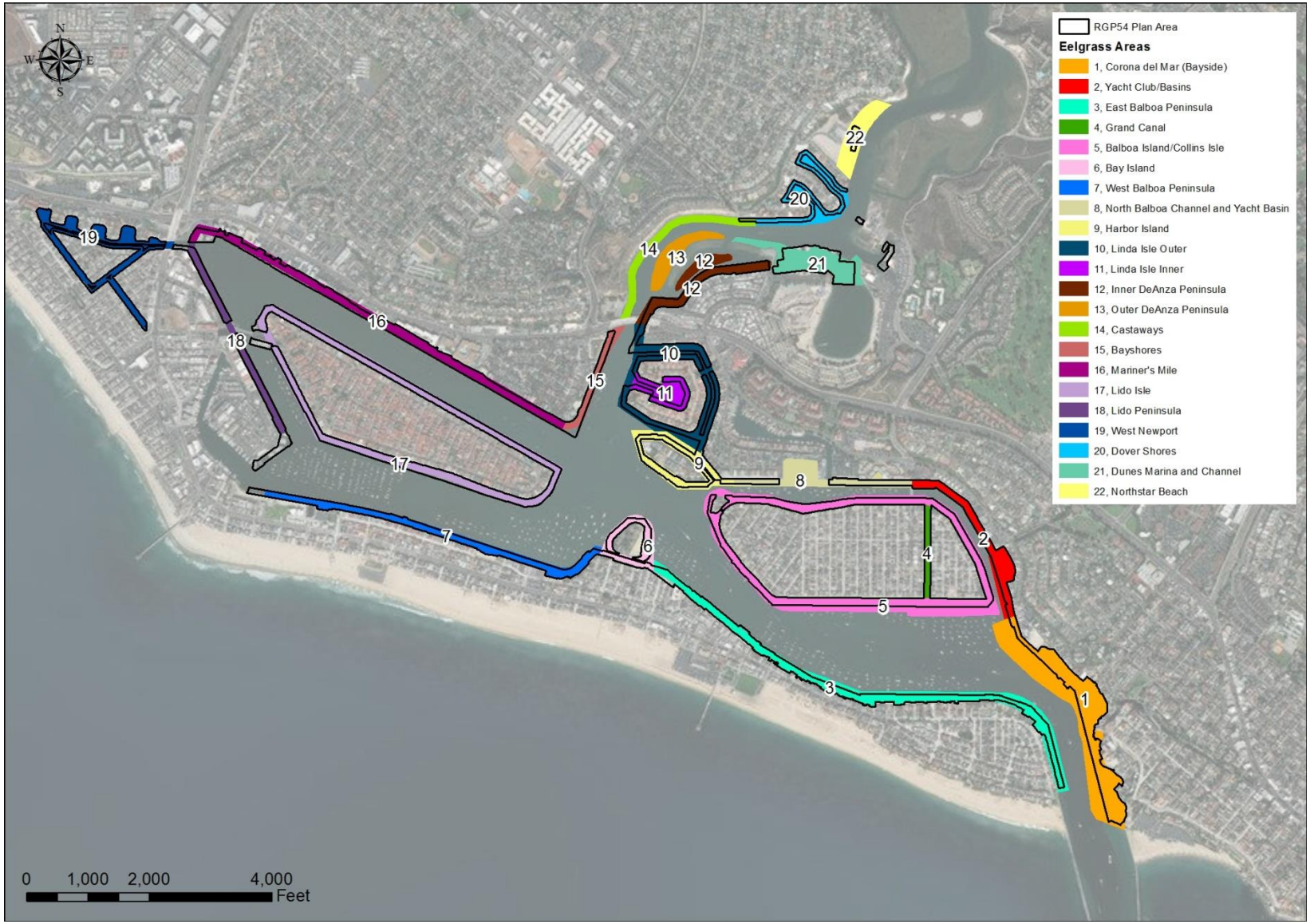

Figure 2. Map of Newport Bay showing 22 shallow water eelgrass habitat mapping regions.

Eelgrass Survey Methods

SCUBA Diver Survey

The survey involved visual SCUBA diver surveys generally within all SWEH extending from the intertidal zone to 20-ft in-bay beyond the end of all channels and dock structures within Upper and Lower Newport Bay as proposed by the City. In eelgrass beds where low visibility and poor bed outlines were present the SCUBA surveys would occasionally extend beyond the 20-ft in-bay line.

The diver was outfitted with a full-face-mask compatible with an Ocean Technology Systems (OTS) surface-to-diver communication system. In addition to the OTS underwater communication system, the topside personnel was outfitted with a differential global positioning system (dGPS) and computer tablet for mapping eelgrass polygons and patches, marking waypoints, and taking notes. A Geneq SXBlue II dGPS was used for the majority of the survey and a Juniper Systems Geode dGPS was used for the last three weeks of the survey. The estimated global positioning system (GPS) error of the SXBlue II GPS and Geode GPS is less than 1 m and half-meter accuracy, respectively. The error is based on how the GPS functions in clear open skies without any interference from structures. However, on some occasions the error was higher because the survey area occurred near bulkheads, underneath piers, and between docks where open skies were not always possible. In these instances, error was estimated to be a max of 2 m and 1 m, respectively. In cases where GPS error produced obviously erroneous results, edits were made manually using landmarks. The dGPS in use was connected to the tablet via Bluetooth. Once the tablet and dGPS were connected an application, mapitGIS, was opened on the tablet and used to collect waypoints from the dGPS and map the extent of eelgrass within the survey area.

At a survey site, the diver would enter the water and be followed by the topside person on a kayak until eelgrass was found. If eelgrass was not readily observed upon entry to the survey site the topside person would then use compass navigation to direct the diver in the direction to continue searching. Once the diver, using underwater communications, signaled to the topside person that they were on the edge of an eelgrass bed, the diver would set a surface buoy and the topside person would ready the mapitGIS application to begin mapping a new polygon. GPS signals were collected every 2 seconds via the mapitGIS application as the topside kayaker followed the diver's bubbles. Once the diver got back to the surface buoy and the entirety of the eelgrass bed was outlined, the polygon was ended. The diver then relayed details about the eelgrass bed to the topside kayaker. This information included scaled high-low density, blade height, sediment, and other marine life present. The topside kayaker would then take water depth measurements using a weighted tape measure on both the inshore and offshore edge of the polygon. If the area of eelgrass was less than 2 sq m it was marked as a single patch waypoint and the dimensions were recorded in the mapitGIS App. At the end of each survey day all polygons, patches, waypoints, and notes were exported as ESRI shapefiles (SHP) and in Google Earth (KML) file formats for validation and post processing.

Data validation consisted of importing the KML files into Google Earth Pro to review the polygon shapes. The surveyed area was segmented into close up sections and converted to PDF format for document annotation. Areas where outlier signals were detected, locations where merger of two or more polygons or cut outs of polygons were needed, and segments of polygons where they were mapped more than once were redlined on the PDF document. These revisions guided post processing eelgrass survey efforts. Post processing of data used exported SHP files and referenced the redlined PDF documents to construction of the finalized eelgrass bed using ArcMap. This combination of formats allowed the biologists who performed the survey to view and annotate data which were then processed in ArcMap by a GIS Specialist.

The survey methods described herein are consistent with the methodologies described and approved as part of The Plan.

Sonar Survey

CRM used remote sensing techniques, (traditional sonar and down-looking sonar) to supplement the diver eelgrass survey. The traditional sonar and down-looking sonar systems were used to survey areas within -6-ft to -15-ft contours where diver survey areas were either extremely large and/or where dive conditions were considered hazardous due to currents or vessel traffic.

Sonar methods were used to augment the diver mapping surveys in the larger SWEH areas and/or in SWEH navigational areas considered a risk to divers (Regions 1, 2, 5, 8, 11, 12, 13, 21). CRM's Lowrance HDS-12 Gen2 Touch Chartplotter/Ecosounder was used to acoustically collect data on bottom depth and plant height from the unit's 200-kilohertz (kHz) transducer acoustic signal associated with a Wide Area Augmentation System-corrected GPS position. In addition, a 455/800 kHz transducer and power module with dual channels (Structure scan and down-looking) provide a 180 degree view and a down-looking view of the seafloor (data were logged on the 800-kHz channel).

Acoustic beam angle for the 200-kHz signal on the 83/200-kHz dual frequency transducer (standard transducer on HDS units) was 20 degrees; the beam coverage for the 455/800 dual frequency transducer was 180 degrees with side lobe angles of 0.9 degree and the down-looking lobe of 1.1 degrees. This narrow elliptical beam essentially "scans" seafloor bottoms. Ping rates were set at 15 per second. Pulse width was dynamic and varied depending on depth, which varied between 2-ft and 30-ft. Acoustic data were collected at the Lowrance default of 3,200 bytes per second. The range window on the unit was set to Auto, which maximized the resolution of the acoustic envelope at the full range of depths sampled (approximately 2-ft and 30-ft).

GPS positions were recorded every one second, and bottom features from pings that elapsed between positional reports were averaged for each coordinate/data point. Therefore, the attribute value (e.g., depth and plant height) of each data point along a traveled path comprised a summary of 5 to 30 pings. Each ping went through a quality test to determine whether features could be extracted and, if so, was sent on to feature detection algorithms. Those failing quality assurance tests were removed from the set considered for summarization.

Vegetation detection using down-looking sonar methods were analyzed using cloud-based software models and statistical algorithms incorporated into Navico BioBase software developed by Contour Innovations, LLC, St. Paul, Minnesota (Contour Innovations LLC 2013).

Acoustic signals from HDS 200-kHz transducers travel through submerged aquatic vegetation (SAV) on their way to the bottom. Seafloor typically registers a sharper echo return than the vegetation above. The distance between the seafloor acoustic signature and top of the plant canopy was recorded as the plant height for each ping. In the study area, depth profile and vegetation information were collected on soft-bottom features. On sandy and mud bottom habitats, both echo returns may register eelgrass (*Zostera* spp.) and red algae such as *Gracilariopsis* spp. Thus, the need to verify, via remote camera, whether the sonar return eelgrass or other types of vegetation.

Plant height data included for analysis was limited to a minimum detection limit of 1% of bottom depth. Thus, at a three-foot depth, minimum plant height detection was 0.4 inches whereas along the offshore track lines at 20-ft depths, minimum plant height was the approximate range of 2.4 inches. Any vegetation detections within this range were considered "present" in vegetation calculations and modeling.

Processed acoustical signal depth and vegetation point features were uploaded to the BioBase ordinary point kriging algorithm that predicted values in unsampled locations based on the geostatistical relationship of the input points. The kriging algorithm is an "exact" interpolator in locations where sample points are close in proximity and do not vary widely. Kriging smoothes bottom feature values where the variability of neighborhood points is high. Using this technique, a kriging-generated map was produced to provide an eelgrass map of vegetation probability distribution based on detected acoustical SAV height returns. Eelgrass polygons were then traced around the perimeter of the eelgrass map and exported from the BioBase Program into ArcMap to illustrate the distribution of eelgrass quantified by these acoustical data collection methods.

Eelgrass Density

Turions are eelgrass units consisting of the above-sediment portion of the eelgrass consisting of a single shoot and "blades" (leaves) that sprout from each shoot. To assess eelgrass habitat vegetation cover 20 quadrats were counted for eelgrass turions at 19 stations throughout the study area. The diver counted the number of live, green shoots "turions" at the sediment/shoot interface, within replicated $1/16^{th}$ sq m quadrats, at each station. These counts were conducted along the shallow and deep edges of an eelgrass bed at each sampling site. Ten quadrats were taken along both the deep and shallow edge of the eelgrass bed. All biologists taking density measurements of eelgrass were trained previously on how to appropriately assess the number of living eelgrass turions per quadrat. The diver was instructed to randomly place the quadrat within the eelgrass bed while swimming along the edge of the bed. Additional densities were taken while swimming across the surveyed bed. Coordinates of the 19 surveyed sites are listed in Appendix A.

Field-collected density counts were entered into an Excel spreadsheet by station and by shallow or deep location, and converted into density per sq m. Summary statistics where then calculated (mean, standard deviation, and 95% confidence intervals) for each station and location. This information was summarized in tabular and graphic format.

Environmental Parameters

Horizontal and vertical visibility observations were recorded daily. After completing a continuous section of survey area, where the visibility underwent no noticeable change, horizontal visibility observations were approximated at depth. Vertical visibility was taken at the beginning of each survey day and on occasion, at the end of the survey day. This measurement was taken by using a fiberglass measuring tape to slowly lower a Secchi disk into the water. Once the Secchi disk was no longer visible in the water column an MTS personnel would record the reading at water level.

Surface water temperature was taken at the start and end of most survey days. A digital probe style thermometer was held at the surface of the water for 30 seconds, until reaching equilibrium, and then the temperature was recorded.

Eelgrass Habitat Mapping Survey Results

Underwater Visibility and Temperature Measurements

Underwater Visibility

The range of horizontal and vertical visibility was dependent on environmental conditions and distance from the mouth. In cloudy sky conditions less light penetration occurred at depth resulting in overall lower visibility conditions. Vertical visibility did not display any trend. Vertical visibility was higher away from the Bay-mouth in areas of relatively calm water and in areas of close proximity to the mouth. Vertical visibility ranged between 8.2-ft to 1.4-ft (Figure 3). Horizontal visibility was greatest near the mouth of the harbor and extended Bay-ward to the southeast corner of Balboa Island and just around the bend along Channel Road. Horizontal visibility was largely impacted by tidal conditions. Two parameters, direction of tidal flow and rate of tidal exchange, influenced horizontal visibility. The best visibility was observed during periods of rising tides with moderate to low tidal exchange. Tidal influence was reduced north of the Highway 1 bridge and in protected areas around Linda Isle. In these areas visibility was generally low and the water was somewhat stagnant. Horizontal visibility was between 15-ft and 2-ft (Figure 4). However, on occasion less than 1-ft of horizontal visibility was observed for short periods of time. Average horizontal visibility is comparable to historical averages and is about 1-ft less than the average reported in the prior 2016 survey (Figure 5).

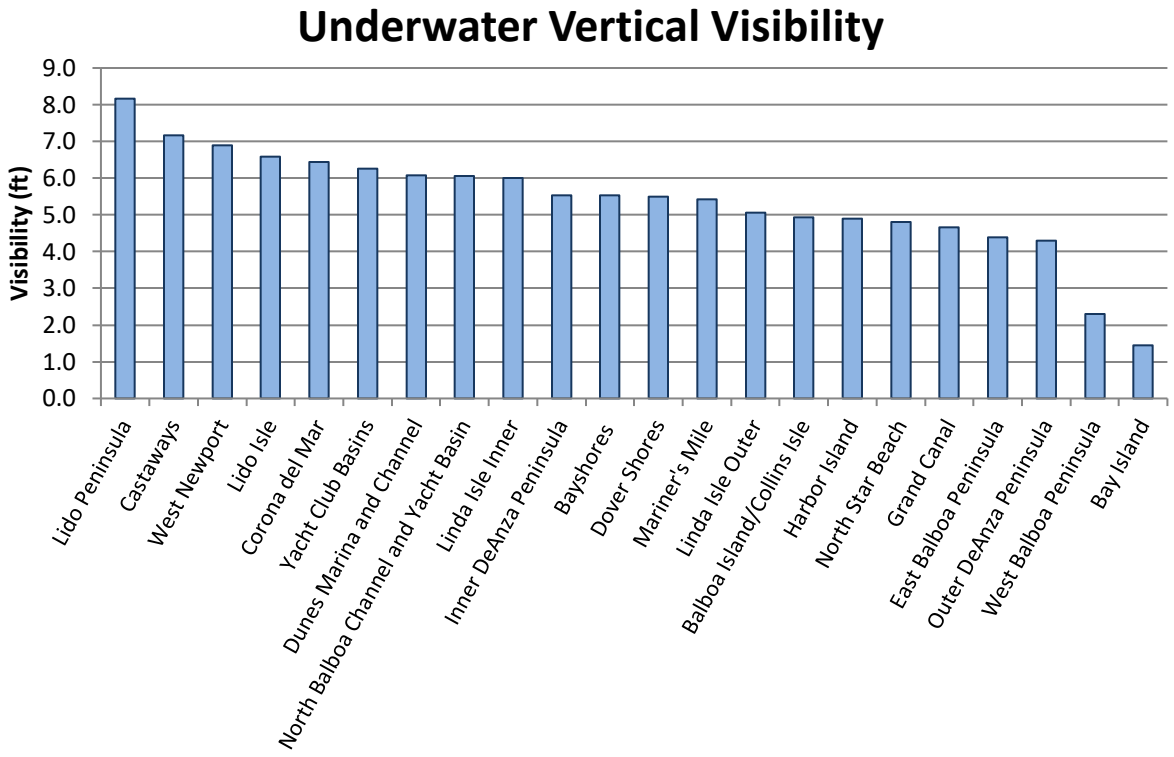

Figure 3. Underwater vertical visibility in feet at survey areas throughout Newport Bay in 2018.

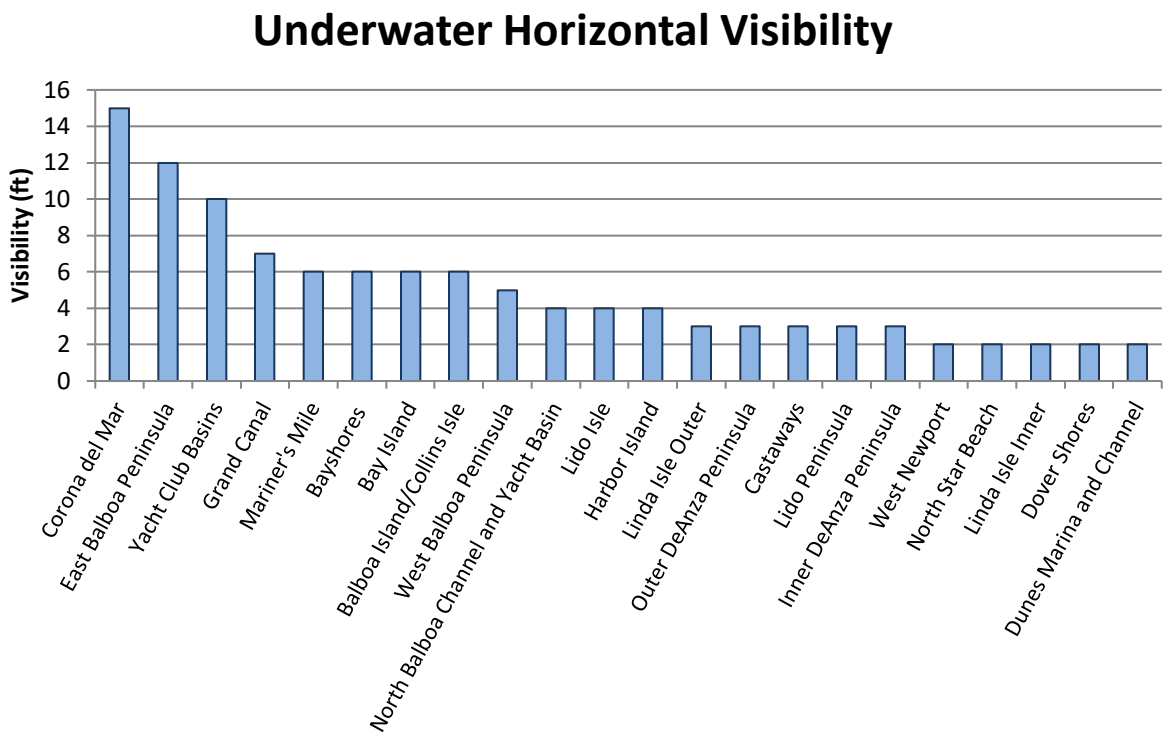

Figure 4. Underwater horizontal visibility in feet at survey areas throughout Newport Bay in 2018.

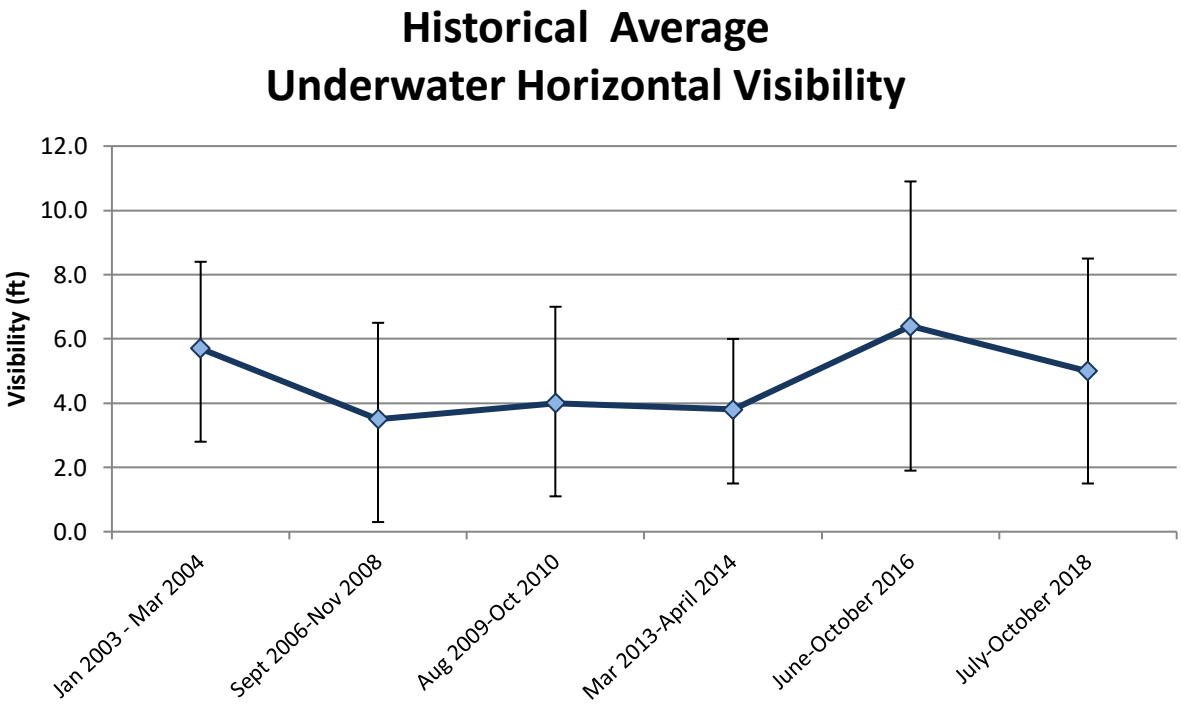

Figure 5. Historical averages of underwater horizontal visibility from 2003 through 2018. Error bars represent one standard deviation of the mean.

Water Temperature

Location within the bay and time of year affect the surface temperature readings collected. Surface water temperature ranged from a low of 66.1 degrees Fahrenheit (°F) in Region 7, West Balboa Peninsula, during late September, to a high of 80.8 °F in Region 21, Dunes Marina and Channel, during late August (Figure 6). Overall, average surface water temperature was greatest in Region 21, Dunes Marina and Channel, and lowest in Region 7, West Balboa Peninsula. Surface water temperature was consistent in July and August and began to noticeably decrease in September (Figure 7).

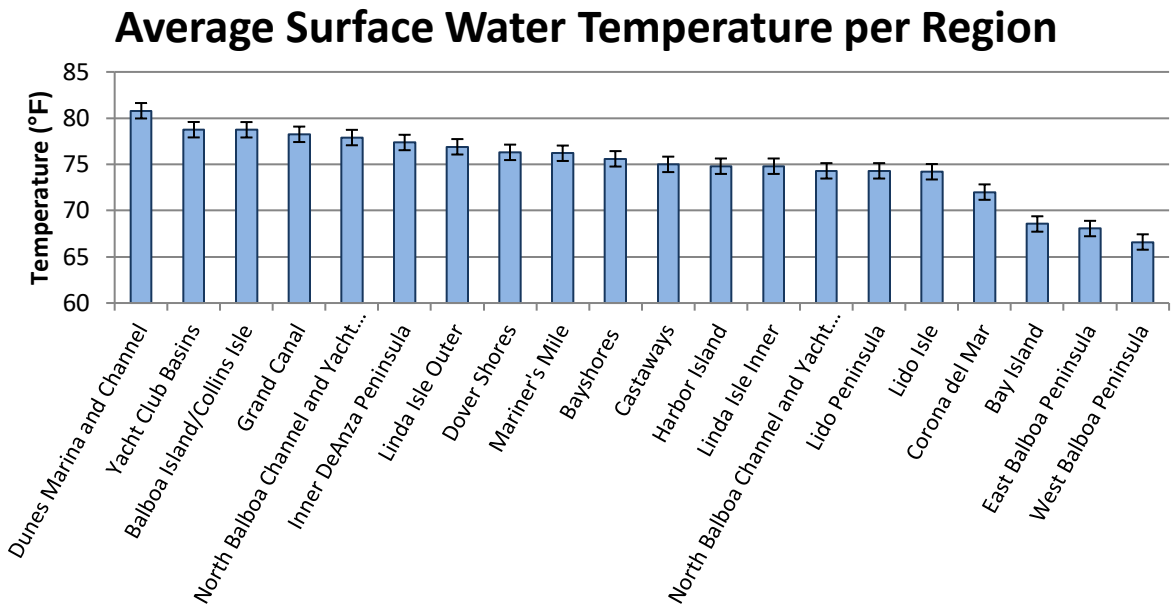

Figure 6. Average surface water temperature by region during the 2018 eelgrass mapping survey. Error bars represent one standard error of the mean.

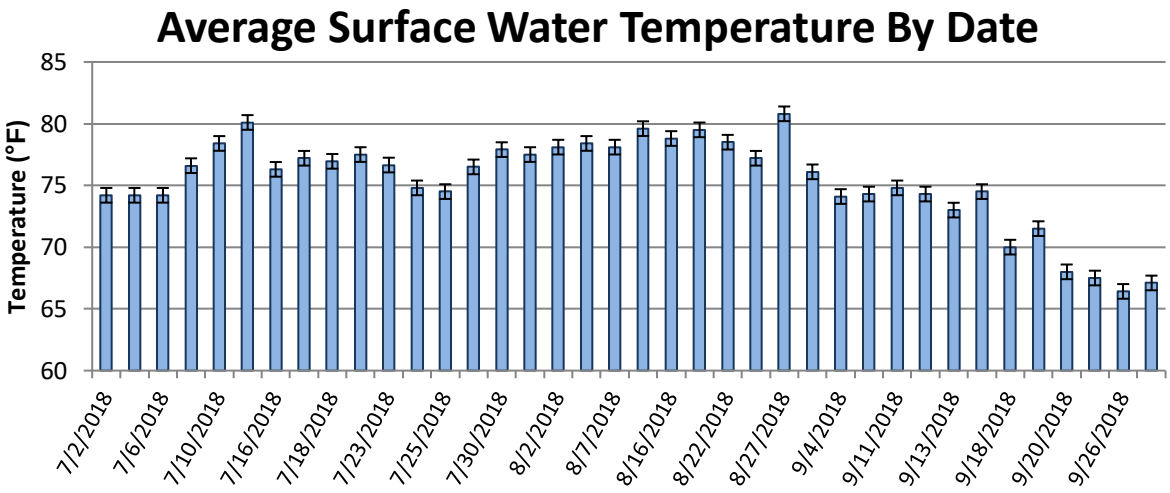

Figure 7. Average surface water temperature by date during the 2018 eelgrass mapping survey. Error bars represent one standard error of the mean.

Eelgrass Distribution and Abundance

Eelgrass was mapped at depths between +0.5 and -15-feet MLLW. The -15-feet MLLW limit was a survey limit for the SWEH and not an eelgrass depth limit. To compile this information the survey team used a combination of Diver/GPS tracking methods and down looking sonar survey methods. Total acreage and percent of total reported eelgrass acreage by Region are provided in Table 1. A summary of eelgrass polygons and patches mapped within SWEH are provided in Figure 8 and Figure 9, respectively.

Zostera marina was the most widespread species of eelgrass within the Bay. MTS corroborates CRM 2016 findings that a second species of eelgrass was also present. *Zostera pacifica* was likely present and inhabited cooler areas in the Bay such as the entrance channel and along Corona del Mar. There was no indication that *Z. pacifica* was localized to certain depth ranges.

A total of 58.18 ac of eelgrass were mapped during the 2018 survey. Of the total mapped eelgrass, 49.89 ac of eelgrass occurred within described SWEH. The largest eelgrass coverage was in Region 1, Corona del Mar (Bayside). Here eelgrass covered 14.47 ac and covered a total of 24.88% of total reported eelgrass.

Three regions accounted for 52.45% of total eelgrass mapped;

- Corona del Mar (Bayside) (14.47 ac)
- Balboa Island/Collins Isle (8.29 ac)
- DeAnza Peninsula - Outer (7.75 ac)

Table 1. Table summarizing eelgrass acreage and percent of total reported eelgrass within the 22 shallow water regions.

Region	Description	Acres	% Total
1	Corona del Mar (Bayside)	14.47	24.88%
5	Balboa Island/Collins Isle	8.29	14.25%
13	Outer DeAnza Peninsula	7.75	13.33%
12	Inner DeAnza Peninsula	6.32	10.86%
11	Linda Isle Inner	3.09	5.31%
3	East Balboa Peninsula	3.07	5.28%
2	Yacht Club/Basins	2.67	4.59%
10	Dunes Marina and Channel	2.23	3.83%
9	Linda Isle Outer	2.23	3.83%
4	Harbor Island	1.78	3.06%
21	Grand Canal	1.13	1.94%
16	Mariner's Mile	0.97	1.67%
15	Bayshores	0.91	1.56%
14	Castaways	0.84	1.44%
6	Bay Island	0.80	1.38%
8	North Balboa Channel and Yacht Basin	0.55	0.95%
7	Lido Isle	0.41	0.70%
17	West Balboa Peninsula	0.35	0.59%
20	Dover Shores	0.32	0.55%
18	Lido Peninsula	0.00	0.00%
19	West Newport	0.00	0.00%
22	Northstar Beach	0.00	0.00%



Figure 8. Map of eelgrass polygon coverage collected during the 2018 survey.

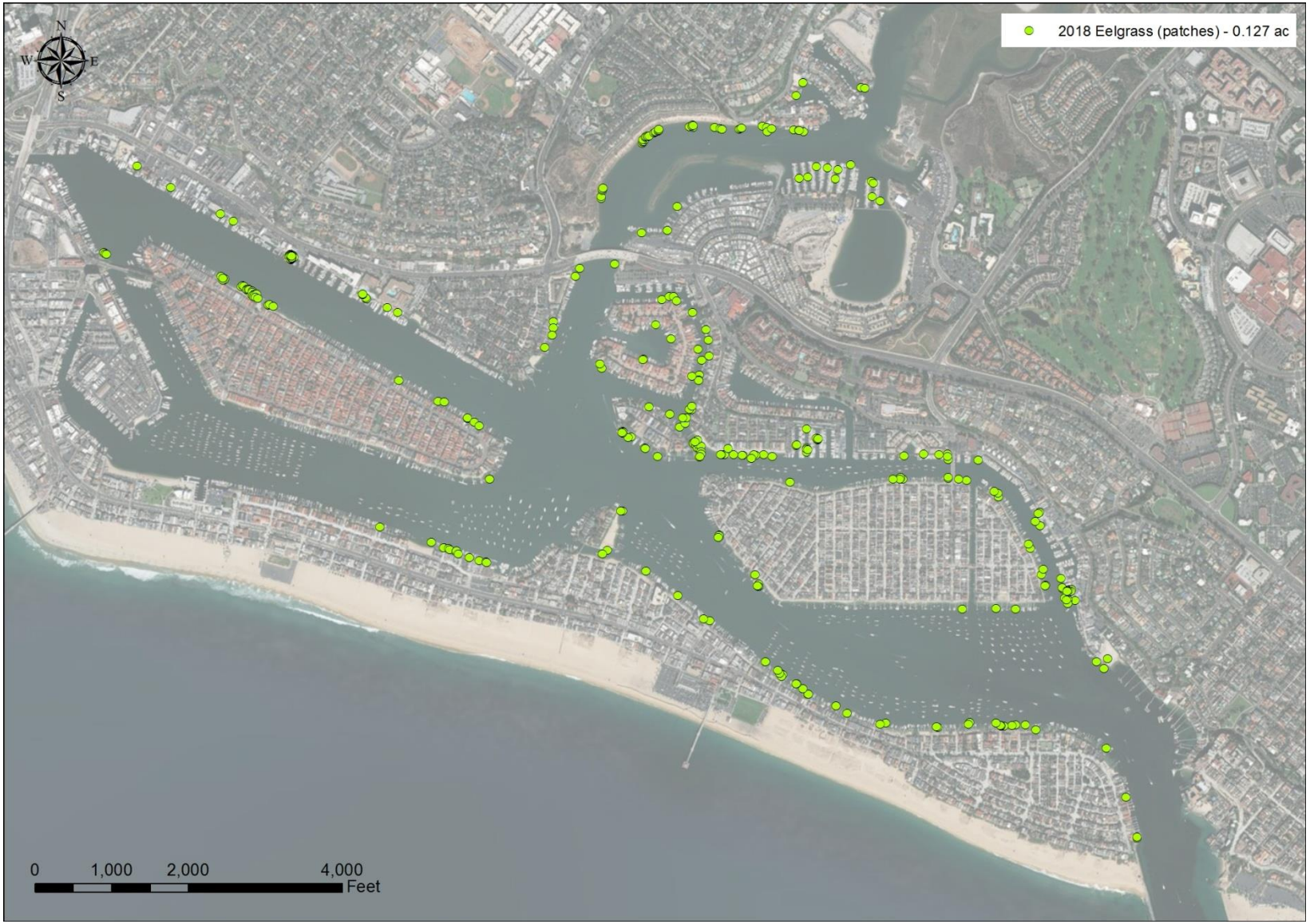

Figure 9. Map of eelgrass patch coverage collected during the 2018 survey.

Region 1. Corona del Mar (14.47 ac)

The most expansive eelgrass beds were mapped in Region 1 (Figure 10).

The 2018 mapping results indicate a continued decline in eelgrass since the 2013-2014 CRM survey (CRM 2015). A total of 7.9 ac decrease over the past four years. The amount of eelgrass within Region 1 declined from 21.65 ac in 2016 to 14.47 ac in 2018. The depth range of eelgrass generally extended between the low intertidal and the -15-ft MLLW survey limit.

The majority of eelgrass decline occurred along the entirety of the bay-front side of Region 1. Many of the polygons beyond the RGP 54 Plan Area have become patchier and less of a continuous bed as noted in CRM 2017. The RGP 54 Plan Area within the harbor is defined as bulkhead to pierhead line plus 20 feet bayward, including only those exceptions for structures that extend beyond this boundary in conformance with harbor development regulations defined by Chapter 17.35 of the Newport Beach Municipal Code. Eelgrass meadows covered a large continuous area within the dockside areas of this Region. Due to the height of the dock gangways in this area, sunlight is able to penetrate areas underneath these dock features; promoting eelgrass growth and bed connectivity.

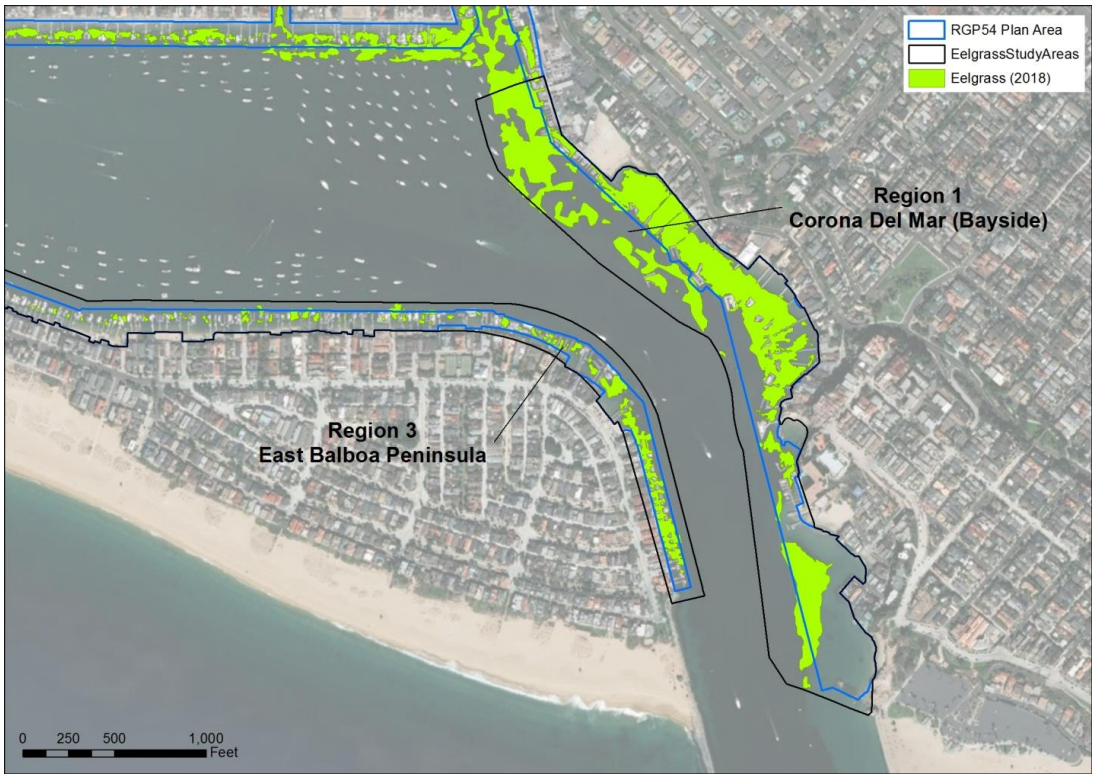

Figure 10. 2018 Eelgrass Habitat Map. Region 1 (Corona del Mar/Bayside) and Region 3 (Balboa Peninsula-East of Bay Island, Partial). See Figure 12 for remainder of Region 3. The study area is delineated by the black line and the RGP 54 Plan area is delineated by the blue line.

Any eelgrass mapped within SWEH and falls outside the Region boundary is included within the total acreage for the nearest associated Region.

Region 2. Yacht Club Basins and Marinas (2.67 ac)

Region 2 supported eelgrass throughout much of the area, extending from the Balboa Yacht Club to the Balboa Island Bridge (Figure 11). Eelgrass in this area occurred at depths extending from -0.52-ft to -11.3-ft MLLW. Region 2 was ranked 7th for eelgrass acreage, containing 2.67 ac. Eelgrass in this area covers 4.59% of total eelgrass reported. Much of Region 2 eelgrass was contained within The Bahia Corinthian Yacht Club boat basin, the Balboa Yacht Club basin, and the Bayside Marina. Eelgrass in this area has continued to increase since the 2009-2010 survey (CRM 2011) and is 0.65 ac greater than reported during the previous 2016 survey (CRM2017).

Region 3. Balboa Peninsula - East (3.07 ac)

Region 3 includes SWEH between the bulkhead and the seaward ends of docks from the Entrance Channel to Bay Island (not including Bay Island) (Figure 11 and Figure 12). Region 3 was ranked 6th for eelgrass acreage, containing 3.07 ac. Eelgrass in this region occurred at depth between 0.04-ft and -15-ft MLLW. Eelgrass here constitutes 5.28% of total reported eelgrass. Eelgrass coverage in Region 3 has decreased by 0.71 ac since the 2016 survey (CRM 2017). However, eelgrass coverage in this area is greater than all mapping efforts before 2016.

Region 4. Grand Canal (1.13 ac)

The Grand Canal, Region 4, separating "Little Balboa" and "Balboa Island" was almost completely covered by eelgrass (Figure 11). Eelgrass beds extended between depths of 1.36-ft to -7.8-ft MLLW. Region 4 was ranked 11th for eelgrass coverage and accounted for 1.94% of total eelgrass reported. Eelgrass here has been consistent and showed little fluctuation throughout the survey years. The 1.13 ac of eelgrass mapped here represent an increase of 0.24 ac since the 2016 survey (CRM 2017). Eelgrass between Park Avenue and Balboa Avenue appears to show a more dramatic increase in coverage than the beds north or south of it.

Region 5. Balboa Island and Collins Isle (8.29 ac)

Region 5 extends around the perimeter of Balboa Island and Collins Isle (Figure 11). Eelgrass in this area ranked 2nd, covering 8.29 acres and accounted for 14.25% of total eelgrass reported. Eelgrass beds extend between depths of 1.86-ft to -13.4-ft MLLW. Eelgrass has continued to increase since the 2009-2010 survey (CRM 2011, CRM 2015, CRM 2017). Since the 2016 survey, eelgrass has increased by 2.55 ac. Overall eelgrass coverage underwent bed expansion and growth of eelgrass patches into eelgrass beds.



Figure 11. 2018 Eelgrass Habitat Map. Regions 2 (East Balboa Channel Yacht Clubs/Basins), 4 (Grand Canal), and 5 (Balboa and Collins Islands). The study area is delineated by the black line and the RGP 54 Plan area is delineated by the blue line.



Figure 12. 2018 Eelgrass Habitat Map. Region 3 (Balboa Peninsula-East of Bay Island, Partial). The study area is delineated by the black line and the RGP 54 Plan area is delineated by the blue line.

Region 6. Bay Island (0.80 ac)

Bay Island, Region 6, accounts for a small amount of eelgrass habitat, 0.80 ac (Figure 13). This region is ranked 15th and accounts for 1.38% of total eelgrass reported. Eelgrass beds in this area extend from 0.86-ft to -7.7-ft MLLW. Eelgrass around Bay Island has continued to increase since the 2013-2014 survey (CRM 2015). Since the 2016 survey, eelgrass has increased by 0.31 ac (CRM 2017). The new acreage emerged around the southern and northwestern extent of the island.

Region 7. Balboa Peninsula – West (0.35 ac)

Region 7 eelgrass extended from the Bay Island Bridge to 11th street, covering 0.35 ac (Figure 13). Region 7 was ranked 18th for eelgrass coverage and accounts for 0.59% of total eelgrass reported. Eelgrass extends from 0.77-ft to -8.9-ft MLLW in the region. Eelgrass here has continued to increase since the 2013-2014 survey (CRM 2015). Since 2016 survey eelgrass coverage has increased by 0.13 ac (CRM 2017).

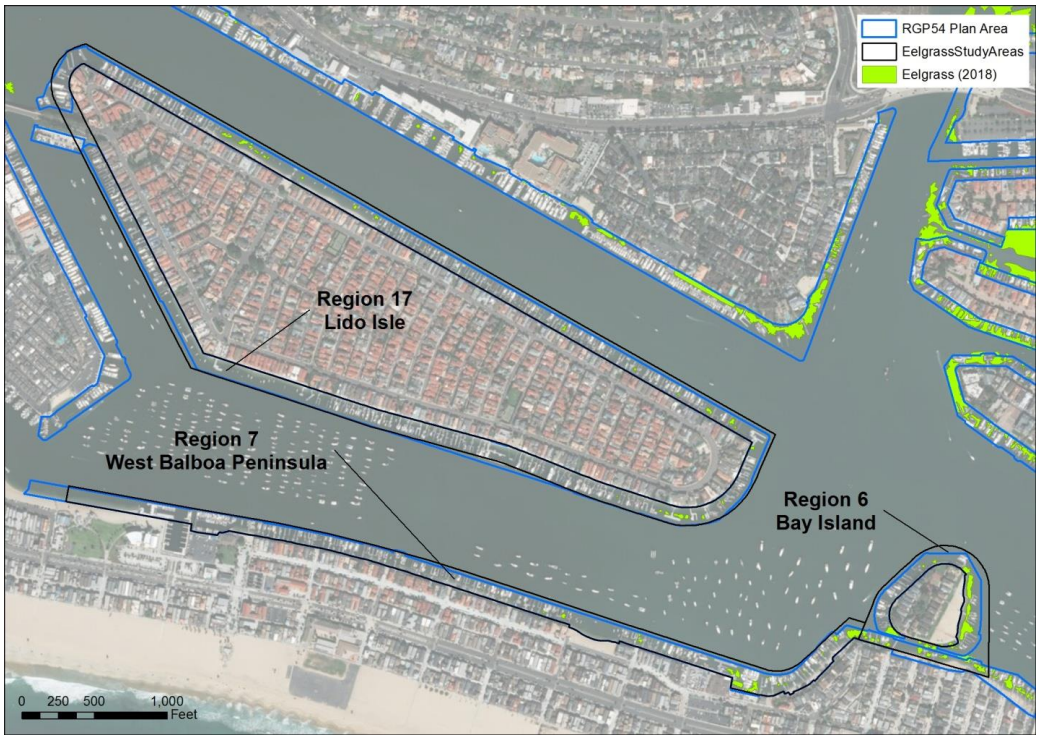

Figure 13. 2018 Eelgrass Habitat Map. West Balboa Peninsula. Region 6 (Bay Island) and Region 7 (Balboa Peninsula-West, Partial). The study area is delineated by the black line and the RGP 54 Plan area is delineated by the blue line.

Region 8. North Balboa Channel and Yacht Basin (0.55 ac)

Region 8 includes eelgrass from the north side of the North Balboa Channel between the Balboa Island Bridge and Beacon Bay, covering 0.55 ac (Figure 14). Eelgrass occurred between 0.49-ft and -10.8-ft MLLW between the bulkhead and dock head walk, and fairways of the marina. Eelgrass here contributed to 0.95% of total reported eelgrass. Since the previous 2016 survey eelgrass coverage has expanded by 0.31 ac (CRM 2017). Much of the eelgrass growth appears to have occurred in the shallows of Bayside Cove, behind the Belcourt Marina, and within the marina fairways.

Region 9. Harbor Island (1.78 ac)

Eelgrass around Harbor Island, Region 9, accounted for 1.78 ac of mapped eelgrass (Figure 14). Eelgrass extended from 0.89-ft to -8.95-ft MLLW and contributed to 3.06% of total eelgrass reported. Total eelgrass coverage here has continued to increase since the second survey in 2006-2007 (CRM 2008). Since the 2016 survey, eelgrass has increased by 0.43 ac (CRM 2017). Dramatic increases in bed coverage appear to have occurred along the northern and southern sections of Harbor Island.

Region 10. Linda Isle - Outer (2.23 ac)

Eelgrass in Region 10, Linda Isle - Outer, covered 2.23 ac (Figure 14). Region 10 was ranked 9th and account for 3.83% of total eelgrass reported. Eelgrass in this region occurs at depths from 1.25-ft to -9.8-ft MLLW. Eelgrass coverage has fluctuated since the first survey in 2003-2004 (CRM 2005), however, coverage has continuously increased since the 2013-2014 survey (CRM 2015). Since the 2016 survey, eelgrass coverage in Region 10 has increased by 1.07 ac (CRM 2017).

Region 11. Linda Isle - Inner (3.09 ac)

Region 11, Linda Isle - Inner, eelgrass covers 3.09 ac and accounts for 5.31% of total eelgrass reported (Figure 14). Eelgrass occurs from -2.0-ft to -5.2-ft MLLW. Since the 2016 survey, dredge activities have impacted Region 11 and likely contributed to the observed decrease in mapped eelgrass. In 2016, 5.08 ac of eelgrass were mapped in Region 11 which represents a reduction of 1.99 ac of eelgrass in this region

Region 12. DeAnza Peninsula - Inner (6.32 ac)

Region 12, DeAnza Peninsula - Inner, eelgrass covers 6.32 ac (Figure 15). Eelgrass beds occurred from 1.07-ft to -6.15-ft MLLW and account for 10.86% of total reported eelgrass. Prior to 2016, eelgrass coverage in Region 12 was at least three times lower than coverage reported in 2016 and summarized here. Since the most recent survey in 2016, eelgrass has increased by 2.48 ac (CRM 2017).

Region 13. DeAnza Peninsula - Outer (7.75 ac)

Ranked 3rd, Region 13, DeAnza Peninsula - Outer, has 7.75 ac of eelgrass coverage (Figure 15). Eelgrass here accounts for 13.33% of total eelgrass reported. Depth data is not available as Region 13 was a sonar only area. A dramatic increase in eelgrass coverage has occurred since the first survey in 2003-2004 (CRM 2005). Eelgrass currently covers approximately six times the area since it was first mapped. Since the 2016 survey, eelgrass coverage has increased by 3.75 ac (CRM 2017).

Region 14. Castaways (0.84 ac)

Region 14, Castaways, contributes a small portion of acreage to total eelgrass coverage. Eelgrass here covers 0.84 ac, accounting for 1.44% of total eelgrass reported, and occurs at depths extending from 0.26-ft to -6.3-ft MLLW. The majority of previous year's survey efforts performed here resulted in less than 0.15 ac. Since the 2016 survey where 0.50 ac were mapped, eelgrass has more than doubled (CRM 2017).



Figure 14. 2018 Eelgrass Habitat Map. Regions 8 (North Balboa Channel and Yacht Basins), 9 (Harbor Island), 10 (Linda Isle, Outer), and 11 (Linda Isle, Inner). The study area is delineated by the black line and the RGP 54 Plan area is delineated by the blue line.

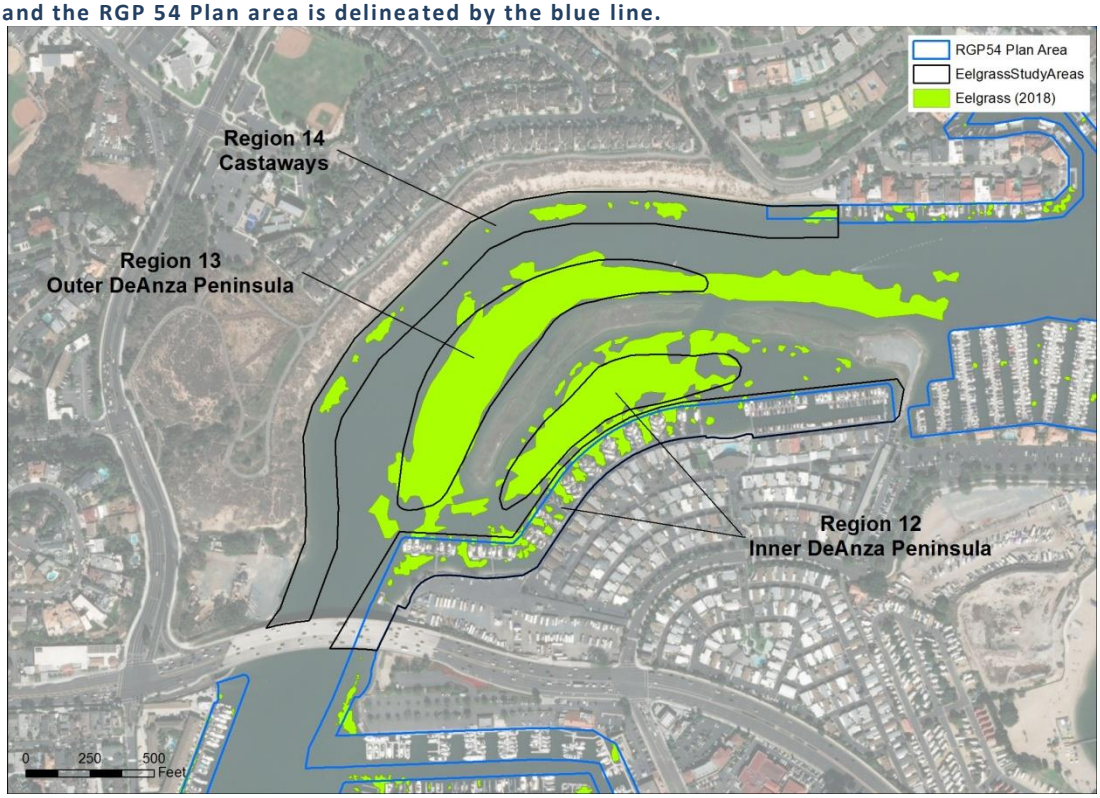

Figure 15. 2018 Eelgrass Habitat Map. Regions 12 (DeAnza/Bayside Peninsula, East-Inner), 13 (DeAnza/Bayside Peninsula, West-Outer), and 14 (Castaways to Dover Shores). The study area is delineated by the black line and the RGP 54 Plan area is delineated by the blue line.

Region 15. Bayshores (0.91 ac)

Region 15 extends from the Coast Highway Bridge to the junction of the Lido reach (Figure 16). The eelgrass in Region 15 covered 0.91 ac and accounted for 1.56% of total eelgrass reported. Eelgrass occurs between 0.62-ft and -10.5-ft MLLW within the Bayshores area. Eelgrass in this area has generally fluctuated, but remained less than 1.00 ac, since the initial survey in 2003-2004 (CRM 2005). Since the 2016 survey, eelgrass has increased by 0.15 ac. Eelgrass within this area generally occurs as small patches between the head wall and dock structures, and in marina fairways.

Region 16. Mariner's Mile (0.97 ac)

Along the southern portion of Bayshores and Mariner's Mile, Region 16, eelgrass covered 0.97 ac and accounted for 1.67% total eelgrass reported (Figure 16). Eelgrass here extended from 0.49-ft to -9.1-ft MLLW. In past survey efforts, eelgrass was less than 0.69 ac (CRM 2005, 2008, 2011, 2017). Since the recent 2016 survey eelgrass increased by 0.26 ac.

Region 17. Lido Isle (0.41 ac)

Region 17, Lido Isle, eelgrass cover was most noticeable extending from the northwest to the southeast portion of the island (Figure 16). Eelgrass here covered 0.41 ac, accounted for 0.70% of total reported eelgrass, and extended from a depth of 0.63-ft to -6.4-ft MLLW. Much of the southwestern and western portion of the island was unvegetated. Eelgrass mapped during this survey represents the greatest amount of eelgrass mapped in recent surveys around Lido Isle. Since the 2016 survey, eelgrass had increased by 0.33 ac.

Region 18. Lido Peninsula (0.0 ac)

No eelgrass has been reported in Region 18, Lido Peninsula, during any survey performed by CRM. While no eelgrass acreage was included for this region, 0.13 ac of eelgrass was discovered for the first time between Lido Peninsula and Lido Isle. Acreage for this eelgrass was included in the total eelgrass reported for Region 17, Lido Isle.

Region 19. West Newport (0.0 ac)

Eelgrass surveys were last conducted in Region 19 in April 2014 (CRM 2017). No eelgrass was reported during that survey, nor has been reported here in this summary. Region 19 continues to be absent of eelgrass presence (Figure 17).



Figure 16. 2018 Eelgrass Habitat Map. Regions 7 (Balboa Peninsula-West of Bay Island, Partial), 15 (Bayshores), 16 (Mariner's Mile), 17 (Lido Isle), and 18 (Lido Peninsula). The study area is delineated by the black line and the RGP 54 Plan area is delineated by the blue line.



Figure 17. 2018 Eelgrass Habitat Map. Region 19 (West Newport). Within region 9 the RGP 54 Plan area extends to the bulkhead. Due to the overlap of RGP 54 Plan area and the eelgrass study area the in-shore delineation if the RGP 54 Plan area cannot be viewed. The study area is delineated by the black line and the RGP 54 Plan area is delineated by the blue line.

Region 20. Dover Shores (0.32 ac)

Region 20, Dover shores, was first surveyed in 2013-2014 (Figure 18; CRM 2015). Since this survey eelgrass has continued to increase. Much of the eelgrass contributing to this acreage occurs within the western portion of this region. Eelgrass covers 0.32 ac, accounting for 0.55% of total reported eelgrass, and occurs at depth of 0.35-ft to -8.33-ft MLLW. Since the 2016 survey eelgrass has increased by 0.14 ac.

Region 21. Dunes Marina and Channel (2.23 ac)

Dunes Marina, Region 21, was first surveyed in 2013-2014 (Figure 18; CRM 2015). Since that survey, eelgrass has continued to increase. While instances of small eelgrass beds are present within the marina's fairways, much of the total acreage for Region 21 is attributed to eelgrass extending from Region 13 into Region 21. Eelgrass here covers 2.23 ac and accounts for 3.83% of total reported eelgrass, and extends from 0.42-ft to -7.7-ft MLLW.

Region 22. Northstar Beach (0.0 ac)

Northstar Beach, Region 22, was first surveyed in 2016 (Figure 18; CRM 2017). During the first survey 0.003 ac of eelgrass were reported. During this, 2018 survey, no eelgrass was discovered in Region 22.

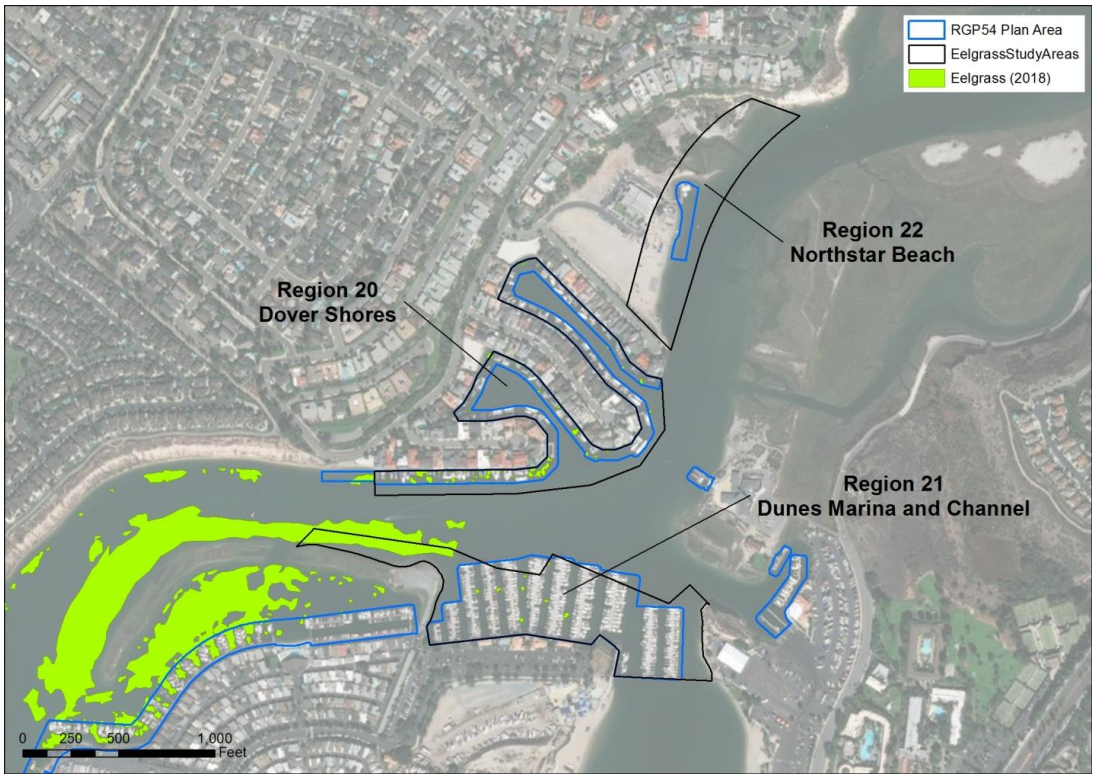

Figure 18. 2018 Eelgrass Habitat Map. Regions 20 (Dover Shores), 21 (Dunes Marina and Channel), and 22 (Northstar Beach Area).The study area is indicated by the black outline and the RGP 54 Plan area is indicated by the blue outline. Any eelgrass that falls outside the study area boundary within SWEH is accounted for within the nearest associated Region.

Historical Eelgrass Coverage

In general, eelgrass in the Bay has undergone periods of decrease and increase (Figure 21). For all survey periods, Corona de Mar, Region 1, accounted for most of the eelgrass cover reported (Table 2). From 2003 to 2010 the Bay's eelgrass was declining. However, coverage in Region 1 remained consistent with little fluctuation in eelgrass cover, indicating that other areas of the Bay were undergoing eelgrass declines and contributing to the overall reduction in eelgrass coverage. Conversely, since the 2009-2010 survey, eelgrass has increased considerably. This dramatic increase can be attributed to Region 1, where large increases in eelgrass coverage were reported. Substantially higher acreages along the Corona del Mar shoreline since 2014 were in part, due to surveying an expanded area outside of the pierhead line using traditional and down-looking sonar techniques (CRM 2015). The most recent survey, summarized here, indicates that eelgrass acreage, again, has substantial acreage contributions from Region 1, however the overall increase in Newport Bay shallow water eelgrass can be attributed to eelgrass bed expansion in other areas of the bay. Eelgrass expansion is most notable in Region 5, Balboa Island and Collins Isle, and Region 13, DeAnza Peninsula-Outer. This indicates that conditions in the Bay are suitable for eelgrass growth and expansion. Future surveys will provide additional insight as to the progression and regression of eelgrass coverage within the Bay.

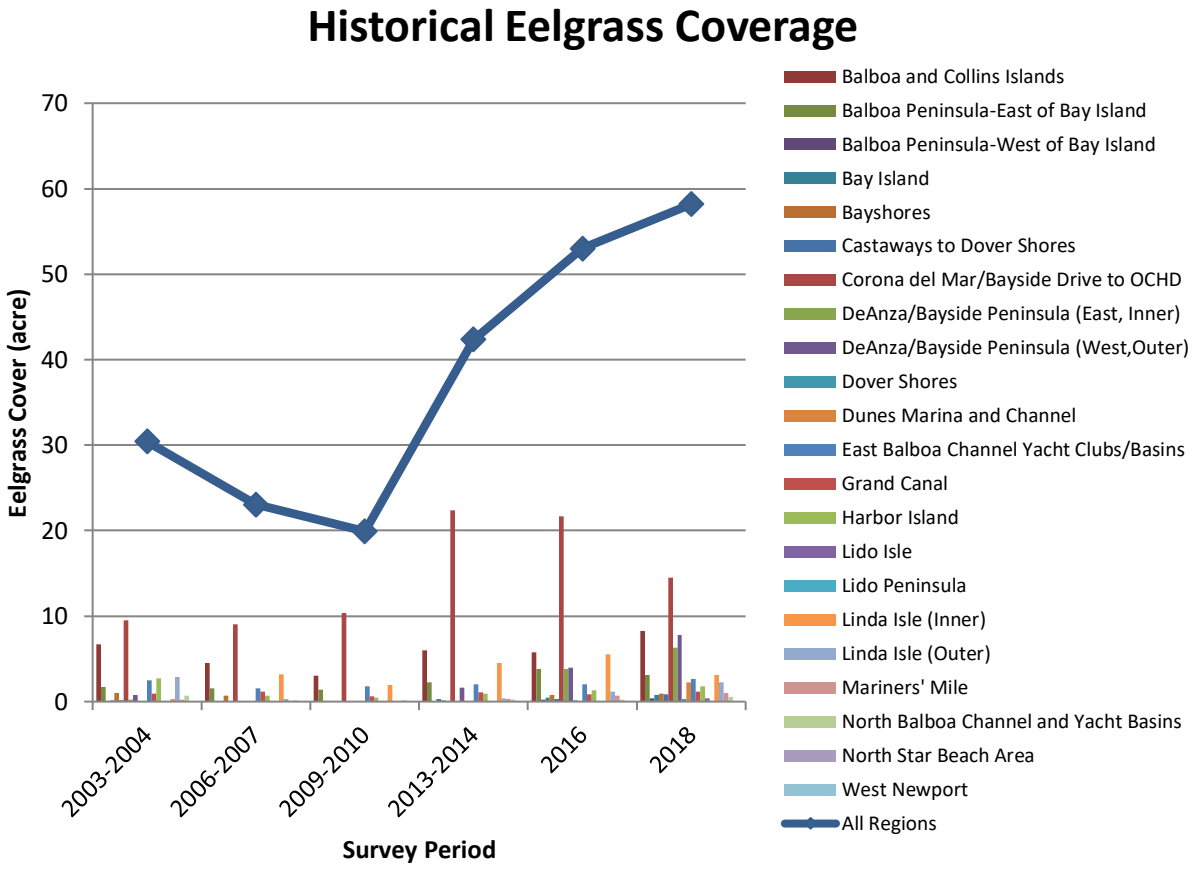

Figure 19. Historical coverage of eelgrass by region and survey period within Newport Bay. The "All Regions" line indicates the sum of eelgrass cover in all Regions surveyed during each time period. Individual regions values and all Region totals can be found in Table 2.

Region	Description	Historical Eelgrass Acreage						
		2003 - 2004	2006 - 2007	2009 - 2010	2013 - 2014	2016	2018	Mean
1	Corona del Mar/Bayside Drive to OCHD	9.521	9.075	10.363	22.372	21.651	14.474	14.576
5	Balboa and Collins Islands	6.686	4.554	3.052	5.978	5.736	8.298	5.717
11	Linda Isle (Inner)	0.281	3.218	1.974	4.495	5.548	3.091	3.101
3	Balboa Peninsula-East of Bay Island	1.672	1.557	1.391	2.267	3.782	3.075	2.291
2	East Balboa Channel Yacht Clubs/Basins	2.469	1.539	1.758	2.056	2.018	2.670	2.085
13	DeAnza/Bayside Peninsula (West,Outer)	0.792	0	0.001	1.596	4.006	7.754	2.358
9	Harbor Island	2.721	0.712	0.446	0.911	1.352	1.782	1.321
10	Linda Isle (Outer)	2.916	0.328	0.068	0.393	1.156	2.227	1.181
4	Grand Canal	0.898	1.143	0.623	1.062	0.889	1.127	0.957
12	DeAnza/Bayside Peninsula (East, Inner)	0.209	0.009	0	0.077	3.834	6.318	1.741
15	Bayshores	0.991	0.664	0	0.156	0.760	0.906	0.580
8	North Balboa Channel and Yacht Basins	0.698	0.115	0.119	0.242	0.245	0.554	0.329
16	Mariners' Mile	0.234	0.066	0.070	0.305	0.710	0.974	0.393
6	Bay Island	0.132	0.051	0.041	0.298	0.496	0.804	0.304
14	Castaways to Dover Shores	0.132	0	0	0.010	0.340	0.838	0.220
20	Dover Shores	No Data	No Data	No Data	0.009	0.176	0.318	0.168
7	Balboa Peninsula-West of Bay Island	0.034	0.030	0.014	0.102	0.212	0.346	0.123
17	Lido Isle	0.025	0.004	0	0.023	0.074	0.405	0.089
21	Dunes Marina and Channel	No Data	No Data	No Data	0.002	0.026	2.228	0.752
22	North Star Beach Area	No Data	No Data	No Data	No Data	0.003	0	0.002
18	Lido Peninsula	No Data	0	0	0	0	0	0
19	West Newport	No Data	No Data	No Data	0	No Data	0	0
	All Regions	30.411	23.065	19.920	42.353	53.015	58.181	37.824

Table 2. Table of historical eelgrass coverage by region per survey period in Newport Bay.

Dover shores, Dunes marina and channel, North star beach, Lido Peninsula, and West Newport are the only areas that have not been surveyed consistently since 2003.

Eelgrass Distributional Zones In Newport Bay

Previous CRM surveys developed a second grouping for summarizing eelgrass coverage (CRM 2017). The zones were developed using an eelgrass distributional model predicated upon knowledge gathered during the 2003-2004 and 2006-2007 bay-wide eelgrass surveys (CRM 2005 & CRM 2008). This included the modeled tidal residence time periods in the bay (Everest International, 2009) and the 2008-2009 Newport Bay oceanographic survey results (CRM 2010). The model identified three distributional zones (Figure 20), which describe stable, transitional, and unvegetated sections of the Bay.

The Stable Eelgrass Zone, describes locations where eelgrass distribution appears relatively stable from year-to-year. This zone encompasses the Lower Bay, including the entrance channel, southern and eastern portions of Balboa Island and Grand Canal, Corona del Mar, and the eastern portion of the Balboa Peninsula. This zone is characterized by a tidal flushing time of less than six days. The short flushing time is thought to contribute to higher water clarity and near-bottom underwater light levels that promote eelgrass growth. Linda Isle inner is also grouped into this zone because of the long-term presence and large amount of eelgrass present between 2006 and 2016.

The Transitional Eelgrass Zone, describes areas where eelgrass is susceptible to year-to-year variation in coverage and density. This zone encompasses much of the central part of the Lower Bay including Harbor Island, Linda Isle, northern and western portions of Balboa Island, and the northern side of Lido Channel. This zone is characterized by flushing times of 7 to 14 days. Influenced by the San Diego Creek discharges during the winter months, turbidity impacts this zone by lowering water clarity and lowering near-bottom light levels. This area will expand or contract depending on environmental conditions and other influences on eelgrass growth. The change in eelgrass growth within the transitional zone is determined by evaluating changes in overall coverage and bed density.

The Unvegetated Zone, describes areas where eelgrass has historically not been found or is only incidentally found. This zone is located within the western portion of Lower Newport Bay and in Upper Newport Bay above the DeAnza Bayside Peninsula and north of Castaways Park and the Dunes Marina. These areas are characterized by tidal flushing greater than 14 days.

During this survey a total of 58.18 ac of eelgrass was mapped within the three eelgrass zones. In the Stable Eelgrass Zone 29.95 ac of eelgrass was mapped. The Transitional Eelgrass Zone was close in acreage to the Stable Eelgrass Zone, with 28.10 ac of eelgrass mapped. Lastly, the Unvegetated Zone had only 0.13 ac.

Since the 2016 survey, eelgrass has remained about the same in the Stable Zone, decreasing by 7.09 ac and increasing in the Transitional Zone by 12.22 ac (Figure 21). Eelgrass had not been mapped in the Unvegetated Zone during previous survey efforts. This survey mapped 0.13 ac of eelgrass and provides evidence that areas within the Unvegetated Zone may function to promote minor amounts of eelgrass habitat (Figure 21).

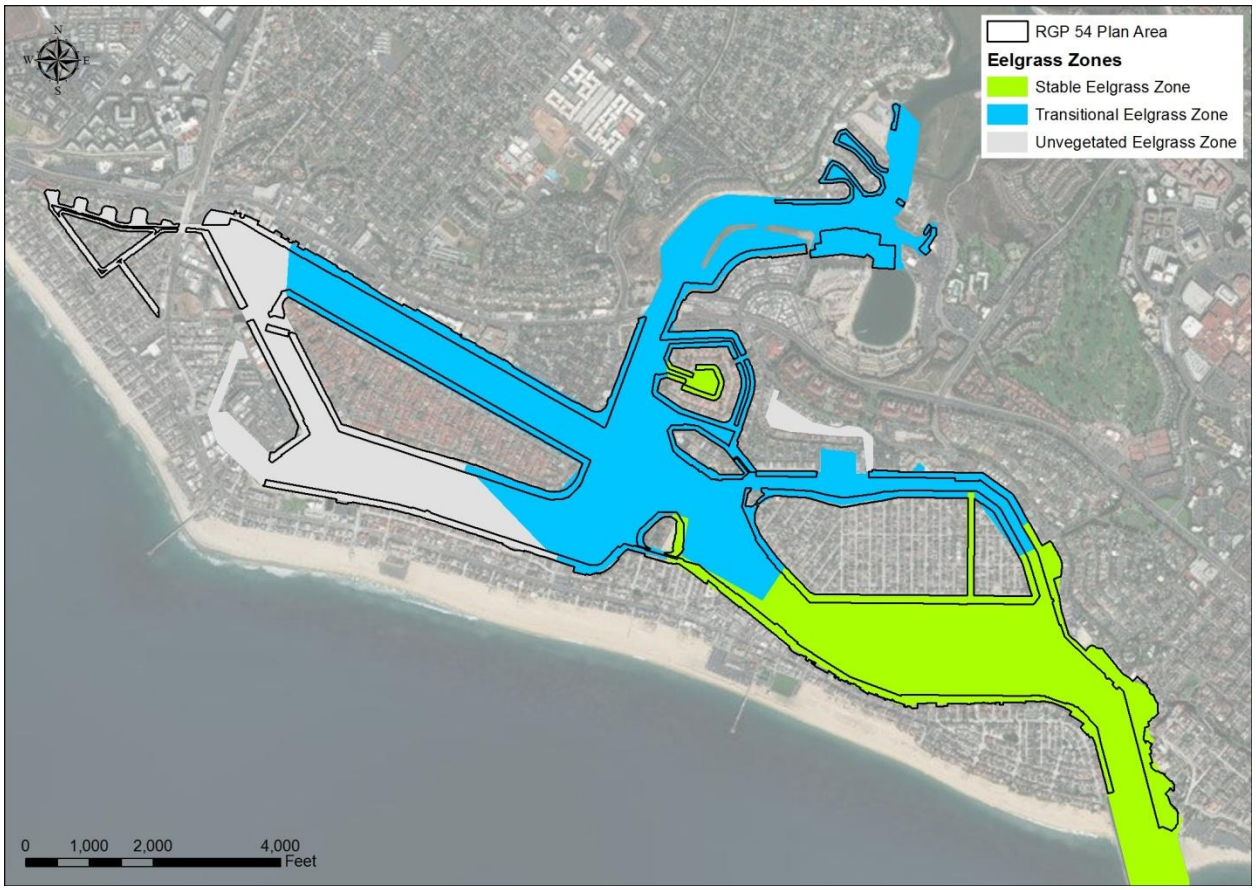

Figure 20. Map of three distributional zones within Newport Bay.

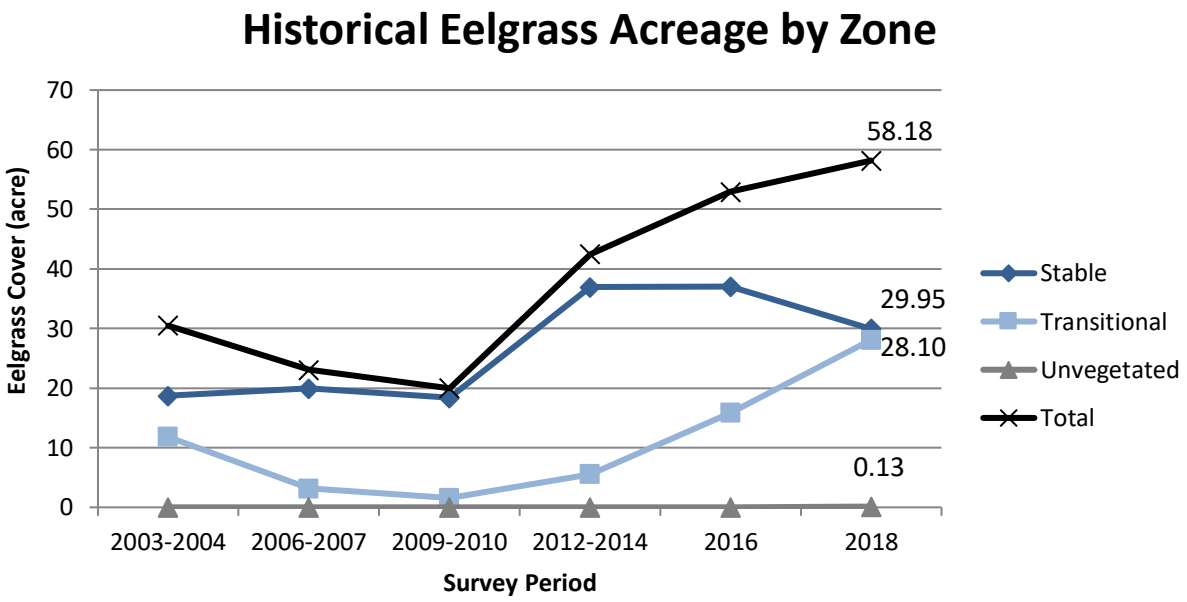

Figure 21. Historical eelgrass coverage by zone in Newport Bay.

Density

Density measurements were taken at 19 stations throughout the Bay (**Error! Reference source not found.**, Figure 22). Eelgrass density was measured by randomly placing a 1/16 m^2 quadrat within the eelgrass bed at each station and counting the number of eelgrass turions within the quadrat. Station locations were selected on a premise of proximity to the mouth of the Bay, position relative to sun angle, and visibility observed during the survey.

Table 3. Table of 19 stations where eelgrass density measurements occurred.

Station	Coordinates (dd.dddddd°)	
	Latitude	Longitude
1	33.600914	-117.881666
2	33.59912	-117.882715
3	33.606123	-117.899502
4	33.604443	-117.885488
5	33.605803	-117.888946
6	33.608659	-117.894818
7	33.60798	-117.900566
8	33.61106	-117.904465
9	33.6114644	-117.9028836
10	33.6138596	-117.9050629
11	33.6175518	-117.9022305
12	33.6188476	-117.9048604
13	33.6213332	-117.8983731
14	33.6144152	-117.9068982
15	33.611964	-117.908589
16	33.610543	-117.909402
17	33.60871	-117.911016
18	33.605942	-117.904052
19	33.60955	-117.889416

The average density for all 19 stations was 159.8 turions/m^2 and ranged between 246.1 and 73.5 turions/m^2. Density averages by station and region consistently agree that eelgrass density throughout the bay is higher in areas where eelgrass polygons are shallow/inshore when compared to deeper/offshore areas of eelgrass polygons.

Per station, average inshore density was 223.9 turions/m^2 and average offshore density was 95.7 turions/m^2 (Figure 23). Station 16 had the highest reported inshore density at 470.4 turions/m^2, followed by stations 1 and 4 where eelgrass density was 374.4 turions/ m^2 and 371.2 turions/ m^2, respectively. Offshore eelgrass density was greatest for station 4, 276.8 turions/ m^2 followed by stations 1 and 9, 134.4 turions/ m^2 and 136.0 turions/ m^2, respectively. Stations where eelgrass density was greater occurred within Stable and Transitional Eelgrass Zones.

The 19 density stations represent 15 Regions within the Bay (Figure 24). Of these Regions, Region 16, Mariner's Mile, had the highest reported inshore density, 470.4 turions/ m^2. Followed by Region 1, Corona del Mar, and Region 4, Grand Canal, 374.4 turions/ m^2 and 371.2 turions/ m^2. Offshore eelgrass density is greatest within Region 4, the Grand Canal, 276.8 turions/ m^2. However, due to the environmental conditions in this protected area, offshore eelgrass is not under the same environmental pressures as other offshore eelgrass locations. The next greatest offshore eelgrass density is Region 1, Corona del Mar, 134.4 turions/ m^2.

Over time, eelgrass density has fluctuated (Figure 25). The initial survey performed in 2004 reported the highest average density of 231.2 turions/ m^2. Eelgrass density displayed a dramatic decrease between the 2004 and 2008 survey periods, and continued to show signs of decay through 2014. The 2016 survey marked the first instance of eelgrass average density

increase from 117.6 turions/ m^2 in 2013-2014 to 161.8 turions/ m^2 in 2016. Eelgrass density is currently stable and was reported at values very close to what was reported the previous survey, 159.8 turions/ m^2.



Figure 22. Map of locations where density measurements were taken in Newport Bay during the 2018 survey.

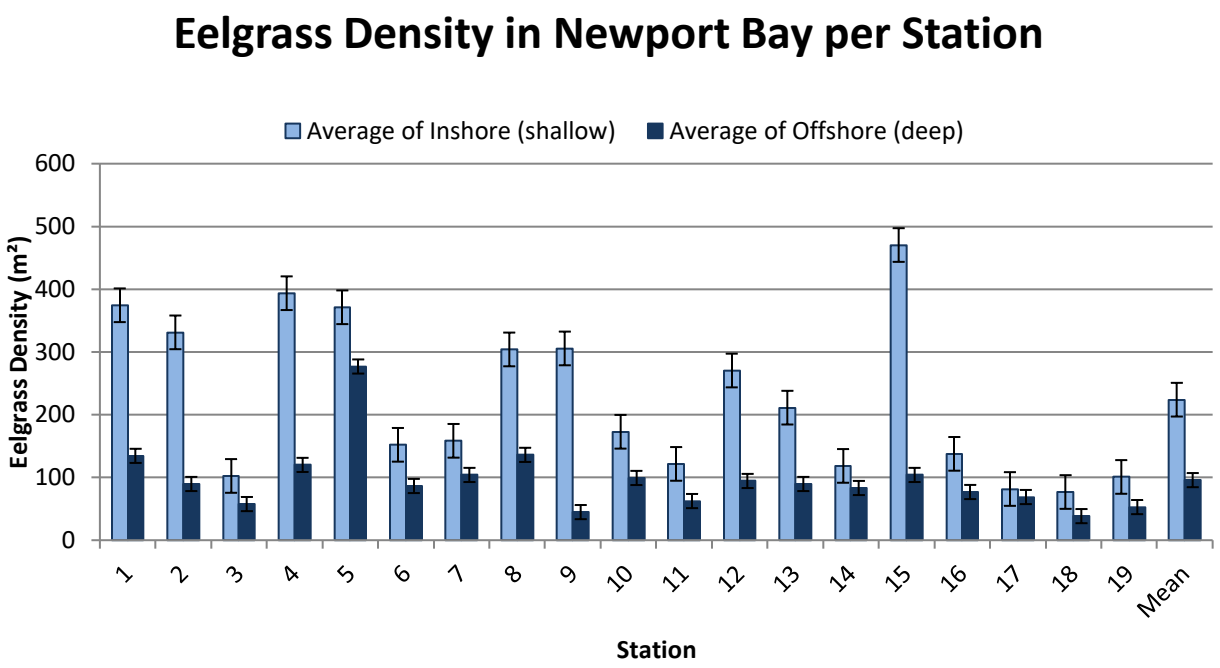

Figure 23. Average eelgrass density per station in Newport Bay. Error bars represent one standard error of the mean.

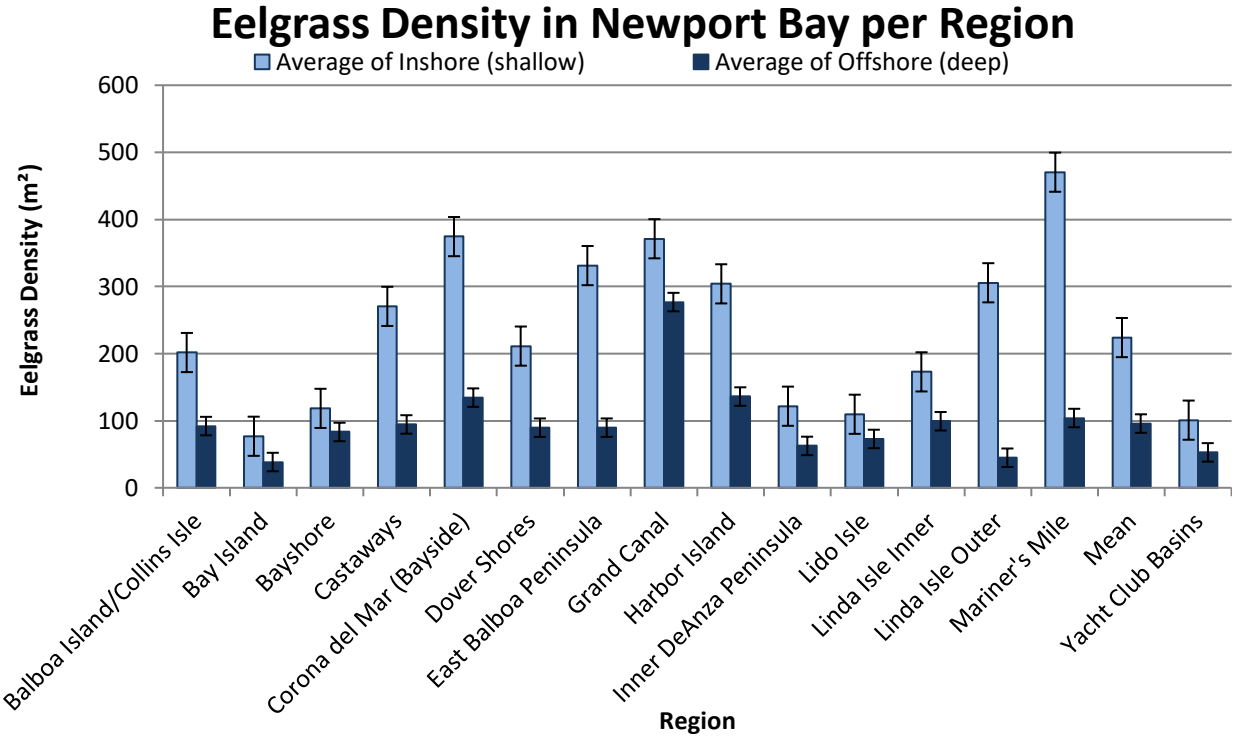

Figure 24. Average eelgrass density per Region in Newport Bay. Error bars represent one standard error of the mean.

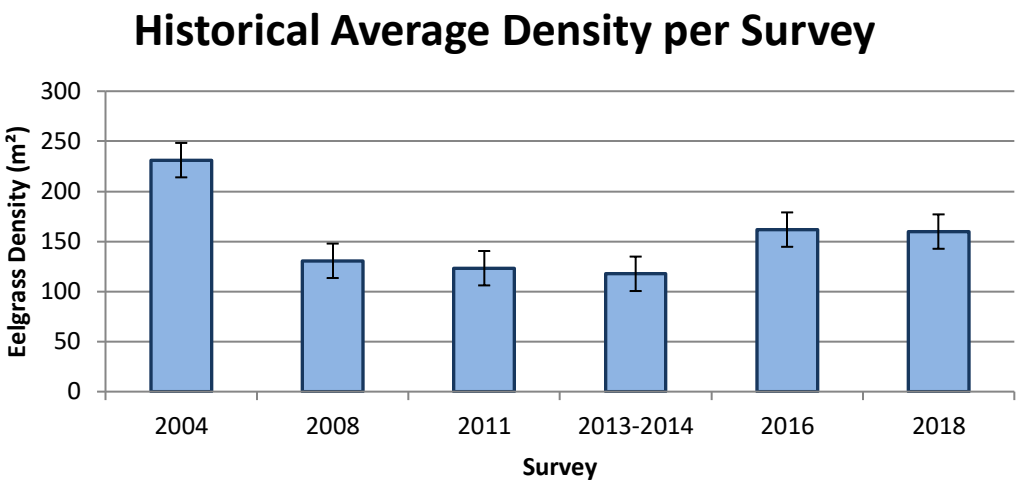

Figure 25. Historical average eelgrass density per survey in Newport Bay. Error bars represent one standard error from the mean.

Other Marine Life Observed

Numerous marine species were observed during the 2018 eelgrass habitat mapping survey (Table 4). Species presence varied with distance and direction from the mouth of the Bay. However, many species were present throughout most surveyed areas in the Bay. Most species observed were associated to either hard substrate including, dock structures, seawalls, and riprap, or soft bottom habitat including both vegetated and unvegetated habitats. Images of select species captured by an underwater camera during the survey are included in Appendix A.

A few species were only observed within Zone 1 at the entrance to the Bay. These species include the California garibaldi (*Hypsypops rubicundus*), rock wrasse (*Halichoeres semicinctus*), eelgrass (*Zostera pacifica*), and the chestnut cowrie (*Cypraea spadicea*). The entrance to the Bay is the only area where two species of eelgrass (*Z. marina* and *Z. pacifica*) were observed together.

When moving farther away from the mouth of the Bay the biodiversity appeared to decrease. When moving farther away from the entrance channel fewer fish species were observed. However, some invertebrate and vertebrate species remained present when moving from Zone 2 to Zone 3. Organisms present in abundance away from the entrance channel included round rays (*Urobatis halleri*), California aglaja (*Navanax inermis*), and anemones (*Diadumene* sp. and *Pachycerianthis fimbriatus*).

Two species were only observed along bayward portions of eelgrass beds where water depth was greater than 11-ft MLLW. The sea whip (*Balticina* sp.) and the golden phoronid (*Phoronopsis californica*) were not observed in the previous years' survey effort and are considered to be a unique sighting. In rocky habitats, as found along Bayshores and western Balboa Island/Collins Isle, East Pacific red octopus (*Octopus rubenscens*) and California two spot octopus (*Octopus bimaculatus*) were common.

A California seahorse was observed on two survey days in July along the south side of inner Linda Isle. On two occasions flat worms (*Platyhelmethes*) were observed in Inner DeAnza Peninsula and along the stretch of survey area between Lido Isle and Lido Peninsula. Bat stars were observed twice, once along the southwestern portion of outer Linda Isle and once along the southeastern portion of region 16, Mariner's Mile.

On multiple occasions California sea lion (*Zalopphus californicus*) and sea birds, surf scoter (*Melanitta perspicillata*), western grebe (*Aechmophorus occidentalis*), California brown pelican (*Pelecanus occidentalis californicus*), Brant's cormorant (*Phalacrocorax penicillatus*), double crested cormorant (*Phalacrocorax auritus),* California gull (*Larus californicus*), Heermann's gull (*Larus heermanni*), Western gull (*Larus occidentalis*), glaucous-winged gull (*Larus glaucescens*), great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), and black crowned night heron (*Nycticorax nycticorax*) were observed.

One observation of concern was the presence of sand stars throughout the bay. This species was clearly in distress as many individuals observed were showing signs of withering. Only individuals observed within the entrance channel appeared to be healthy.

Caulerpa taxifolia is a noxious species of marine algae. This species was eradicated from nearby Huntington Harbor (Anderson et al. 2005). This species of marine algae was not observed at any time within the bounds of the area surveyed in Newport Bay. In accordance with the Caulerpa Survey Protocol, reporting forms have been submitted to the NMFS and CDFW.

Table 4. Table of species observed during the 2018 Newport bay shallow water eelgrass survey. (table continued on next page)

Phyla	Genera	Species	All Zones (hard substrate)	All Zones (soft substrate)	Zone 1	Zone 2	Zone 3
Bacteria							
	red/rust bacteria, unID	rust bacteria, unID				X	X
	white sulfur bacteria, unID	sulfur bacteria, unID				X	X
Brown Algae-Phaeophyta							
	brown algae	*Codium fragile spp. tomentosoides*	X				
	brown algae	*Colpomenia sinuosa*	X				
	brown algae	*Cystoseira osmundacea*	X				
	brown algae	*Dictyopteris undulata*	X				
	brown algae	*Dictyota flabellata*	X				
	sargassum weed	*Sargassum muticum*	X				
Crustacean-Arthropoda							
	Aorid amphipod	*Grandidierella japonica*	X				
	barnacle	*Balanus glandula*	X				
	buckshot barnacle	*Chthamalus fissus/dalli*	X				
	California spiny lobster	*Panulirus interruptus*			X	X	
	cancer crab	*Cancer* sp.	X				
	lined shore crab	*Pachygrapsus crassipes*	X				
	Mysid shrimp	Mysidacea unID	X				
Fish-Pisces							
	barred sand bass	*Paralabrax nebulifer*		X			
	barred surfperch	*Amphistichus argenteus*			X	X	
	black croaker	*Cheilotrema saturnum*			X	X	
	black surfperch	*Embiotoca jacksoni*			X	X	
	blacksmith	*Chromis punctipinnis*			X	X	
	blenny	*Parablennius* spp.	X				
	California garibaldi	*Hypsypops rubicundus*			X		
	California halibut	*Paralichthys californicus*			X	X	
	California lizardfish	Synodus lucioceps			X	X	
	California salema	Xenistius californiensis			X	X	
	California sargo	*Anisotremus davidsonii*			X	X	
	kelp bass	*Paralabrax clathratus*			X	X	
	kelp surfperch	*Brachyistius frenatus*			X	X	
	mullet	*Mugil cephalus*		X			
	Opaleye	*Girella nigricans*	X				
	Pacific sea horse	*Hippocampus ingens*			X	X	
	pile surfperch	*Domalichthys vacca*			X	X	
	rock wrasse	*Halichoeres semicinctus*			X		
	Rockfish, unID	*Scorpaenidaw,* unID	X				
	round stingray	*Urobatis halleri*		X			
	rubberlip surfperch	*Rhacochilus toxotes*			X	X	
	senorita	*Oxyjulis californica*			X	X	
	speckled sanddab	*Citharichthys stigmaeus*		X			
	spotted sand bass	*Paralabrax maculatofasciatus*			X	X	
	topsmelt	*Atherinops affinis*			X	X	
	Diamond turbot	*Hypsopsetta guttalata*		X			
	yellowfin croaker	*Umbrina roncador*			X	X	
Flatworms-Platyhelminthes							
	Polyclad worm	*Prostheceraeus bellostriatus*				X	X
	Polyclad worm, unID	Platyhelminthes, unID				X	X
Gorgonians-Cnidaria							

brown gorgonian	*Muricea fruticosa*	X				
California golden gorgonian	*Muricea californica*	X				
Green Algae-Chlorophyta						
green algae	*Ulva intestinalis*	X				
green algae	*Ulva lactuca*	X				
green algae	*Bryopsis corticulans*	X				
green algae	*Chaetomorpha aerea*				X	X
Jellyfish and Anemones-Cnidaria						
anemone	*Diadumene* sp.	X				
burrowing anemone	*Pachycerianthis fimbriatus*		X			
fairy palm hydroid	*Corymorpha palma*			X	X	
hydroid	*Aglaophenia dispar*	X				
sea pen	*Styalatula elongata* (> 11ft MLLW only)			X	X	
sea whip	*Balticina* sp. (>11ft MLLW only)			X		
Marine Worms-Phoronid						
golden phoronid	*Phoronopsis californica* (>11ft MLLW only)				X	X
Moss Animals-Bryozoa/Ectoprocta						
bryozoan	*Thalamoporella californica*	X				
red"= "chip" bryozoan	*Watersipora subtorquata*	X				
stoloniferan bryozoan and arborescent bryozoans	*Zoobotryon verticillatum, Bulgula neritina, Bulgula californica*	X				
stoloniferan bryozoan and arborescent bryozoans	*Zoobotryon verticillatum, Bulgula neritina, Bulgula californica*		X			
Red Algae-Rhodophyta						
red algae	*Gelidium* sp.	X		X	X	
red algae	*Grateloupia* sp.	X				
red algae	*Microcladia* sp.	X		X	X	
red algae	*Polysiphonia* sp.	X		X	X	
red algae	*Gracilariopsis sjoestedtii*			X	X	
red algae	*Gracilaria* sp.			X	X	
red coralline algae	*Corallina* sp.	X		X	X	
Seagrasses-Zosteracea						
ditchgrass	*Ruppia maritima*		X			
eelgrass	*Zostera pacifica*			X		
eelgrass	*Zostera marina*		X			
surf grass	*Phyllospadix torreyi*		X			
Sea stars, urchins, and cucumbers						
bat star	Asterina miniata			X	X	
giant California sea cucumber	*Apostichopus californicus*					
sand star	*Astropecten armatus*			X	X	
urchin (juv.)	*Stringylocentrotus* sp.					
Snails and Octopus-Mollusca						
Asian date mussel	*Musculista senhousia*	X				
bay mussel	*Mytilus galloprovincialis*	X				
calcarious tube snail	*Serpulorbis squamigerus*			X	X	
California horn snail	*Cerithidea californica*		X			
California two-spot octopus	*Octopus bimaculatus*			X	X	
carinate gastropod	*Alia carinata*		X			
chestnut cowrie	*Cypraea spadicea*			X		
dorid nudibranch	*Doriopsilla albopunctata*		X			
East Pacific red octopus	*Octopus rubescens*			X	X	
giant keyhole limpet	*Megathura crenulata*			X		
giant Pacific oyster	*Crassostrea gigas*	X				
giant rock scallop	*Crassadoma gigantea*	X				
Gould's bubble snail	*Bulla gouldiana*		X			
hermit crab	*Pagurus* sp.		X			
Kellet's whelk	*Kelletia kelletii*			X	X	
kelp scallop	*Leptopecten latiatauratus*		X			
Lewis' moon snail	*Polinices lewisii*			X	X	
mossy chiton	*Mopalia muscosa*		X			
native oyster	*Ostrea lurida*	X				
predatory sea slug	*navanax inermis*		X			
rock jingle	*Chama* sp.	X				

rough limpet	*Lottia limatula*		X			
speckled scallop	*Argopecten ventricosa*		X			
wavy chione	*Chione undatella*	X				
wavy top snail	*Lithopoma undosa*			X	X	
Sponges-Porifera						
Porifera, unID	Sponge, unID	X		X	X	X
yellow sponge	*Cliona* sp.	X		X	X	X
yellow sponge	*Haliclona* sp.	X		X	X	X
Tunicates-Urochordata						
colonial sea squirt, unID	colonial Ascidiacea, unID	X				
colonial tunicate	*Botryllus/Botrylloides* complex	X				
sea squirt, unID	Ascidiacea unID	X				
solitary tunicate	*Styela montereyensis*	X				
solitary tunicate	*Styela plicata*	X	X			

Conclusions

Eelgrass plays an important role for many organisms and environmental processes in bays and near shore estuaries. Some of the most important roles of eelgrass are;

- providing habitat for marine fish and invertebrate species
- providing protective cover and refuge for its inhabitants
- provides spawning areas for many species, including commercially important California halibut and barred sand bass
- provides foraging center for sea birds, sea turtles, and marine mammals
- contributes to decaying organic material as part of marine/estuary food web
- filters pollutants from the water, sequesters carbon dioxide gas
- protects shorelines from erosion by dampening wave energy

Shallow water eelgrass surveys were conducted in Newport bay in support of the City of Newport Beach Harbor Area management Plan between July and October 2018. This was the sixth survey conducted in a series of surveys conducted since 2003.

The bay was divided into three zones enveloping 22 shallow water-mapping regions. The results of this survey indicate that eelgrass is present in many parts of Newport Bay and covers 58.18 ac within the SWEH regions. Eelgrass was found to extend from intertidal areas to -15-ft MLLW, however, eelgrass was occasionally present at deeper depths occurring outside the designated survey area. Eelgrass occupied sediment ranging from fine-silt to coarse sand and shell hash.

SWEH eelgrass was abundant in Zone 1 near the entrance channel between Corona del Mar and Balboa Island extending to Bay Island at depths between low intertidal to -15-ft MLLW. Significant amounts of eelgrass were also reported in Linda Isle-Inner and DeAnza Peninsula-Inner and Outer. Of the majority of eelgrass reported, 52.45%, was found in Corona del Mar (Region 1), Balboa Island/Collins Isle (Region 5), and DeAnza Peninsula (Regions 12 & 13).

Reductions in eelgrass cover were reported for Regions 1, 3, 11, and 22. All other Regions reported eelgrass coverage greater than values reported in the previous 2016 CRM survey. Many of the Regions where eelgrass increased occurred within Zone 2, whereas noticeable losses to eelgrass cover occurred in Zone 1, largely within Region 1, Corona del Mar. For the first time, since the 2003 CRM survey, eelgrass was reported in Zone 3, the unvegetated zone.

Eelgrass density collected at 19 stations indicates that density has remained relatively constant when compared to the previous 2016 survey (CRM 2017). Generally, density was greatest along the shallower portions of mapped eelgrass polygons. While density was greatest in these shallow areas, no single Region displayed density values far above the other Regions.

Many species were observed throughout the survey effort. Species diversity generally decreased moving away from the entrance channel. Uncommon species observed included the

Pacific sea horse (*Hippocampus californicus*) and the golden phoronid (*Phoronopsis californica*). Noxious algae (*Caulerpa taxifolia*) was not found in Newport Bay.

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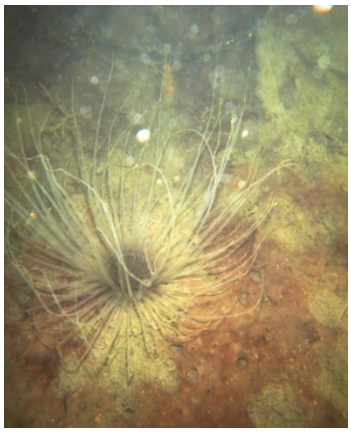
Appendix A



Colonial Anemone surrounding Eelgrass
(*Diadumene* sp.) (*Zostera marina)*



Predatory Sea Slug
(Navanax inermis)



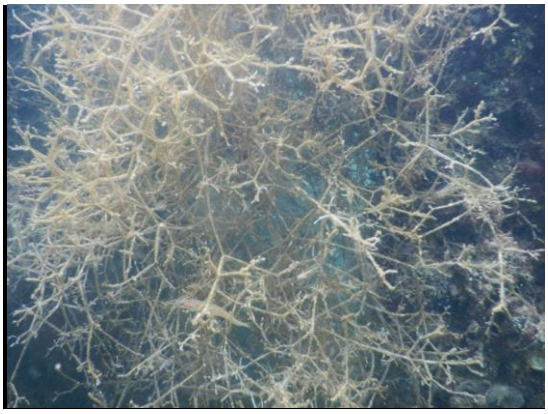
Burrowing Anemone
(*Pachycerianthis fimbriatus*)



Gould's Bubble Snail
(*Bulla gouldiana*)



Bat Star
(*Asterina miniata*)



Bryozoan
(*Zoobotryon verticillatum*)



Mossy Chiton and Red Corralline Algae
(*Mopalia muscosa*) and (*Corralina* sp.)



Sea Whip
(*Balticina* sp.)



Hermit Crab
(*Pagurus* sp.)



Golden Phoronid
(*Phoronopsis californica*)



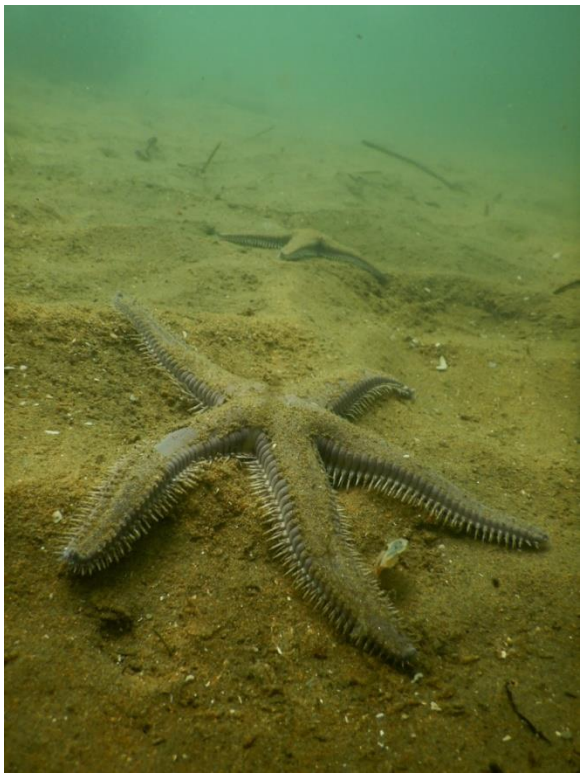
Solitary Tunicate
(*Styela plicata*)



Giant Keyhole Limpet
(*Megathura crenulata*)









Dead and Decaying Sand Stars - present beyond zone 1 (left)

Healthy and Living Sand Stars - present in eelgrass beds near entrance to bay (right)

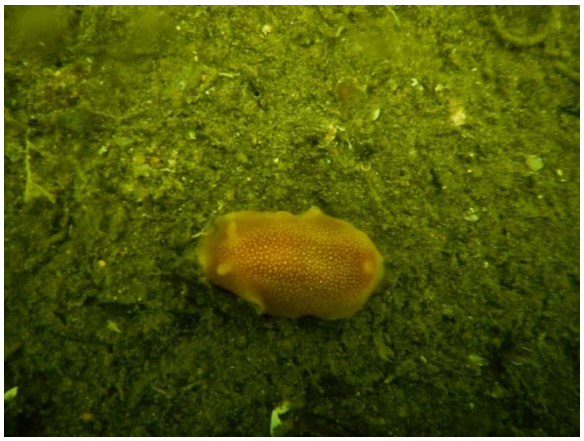
(*Astropecten armatus*)



Round Stingray
(*Urobatis Halleri*)



Juvenile Urchin Living on Eelgrass (*Stringylocentrotus* sp.) (*Zostera marina*)



Dorid Nudibranch - White-Spotted Sea Goddess (*Doriopsilla albopunctata*)



East Pacific Red Octopus (*Octopus rubescens*)



Polyclad Worm, unID (Platyhelmenthes)



California Two-Spot Octopus (*Octopus bimaculatus*)



Polyclad Worm (*Prostheceraeus bellostriatus*)



California Golden Gorgonian
(*Muricea californica*)



California Spiny Lobster
(*Panulirus interruptus*)





California Sargo and Opaleye
(*Anisotremus davidsonii*) (*Girella nigricans*)



Giant California Sea Cucumber
(*Apostichopus californicus*)



Juvenile California Sargo
(*Anisotremus davidsonii*)



Pacific Seahorse
(*Hippocampus ingens*)







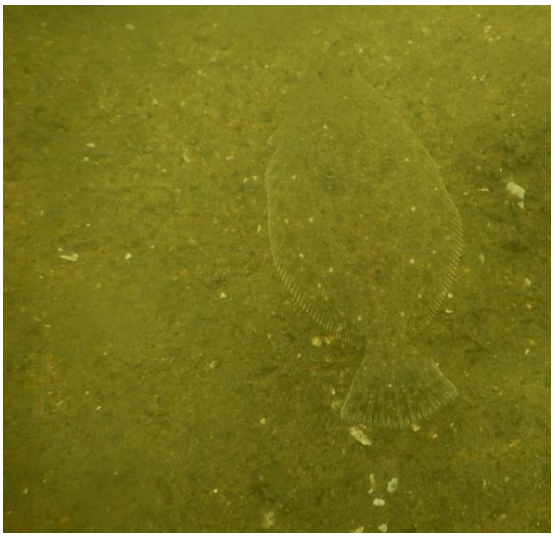
Kelp Bass in Eelgrass
(*Paralabrax clathratus*) (*Zostera Marina*)



Barred Surfperch in Eelgrass
(*Amphistichus argenteus*) (*Zostera marina*)



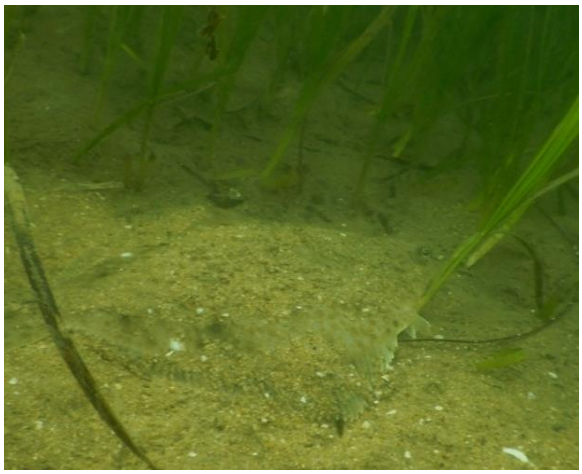
Multiple Species of Blenny
(*Parablennius* spp.)



California Halibut
(*Paralichthys californicus*)



California Garibaldi and Kelp Bass
(*Hypsypops rubicundus*) (*Paralax clathratus*)





Barred Sand Bass in Eelgrass
(*Paralabrax nebulifer*) (*Zostera marina*)



Diamond Turbot
(*Hypsopsetta guttata*)



Black Surfperch and Sargassum Weed
(*Embiotoca jacksoni*) (*Sargassum muticum*)

Appendix F
Air Quality and Greenhouse Gas Report

Newport Harbor Dredging (CEQA Projects) - Air Pollutant Emission Inventory - CO

Year 2022

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	CO Fac	Jul 2022 1st	Jul 2022 2nd	Jul 2022 3rd	Jul 2022 4th	Aug 2022 1st	Aug 2022 2nd	Aug 2022 3rd	Aug 2022 4th	Sep 2022 1st	Sep 2022 2nd	Sep 2022 3rd	Sep 2022 4th	Oct 2022 1st	Oct 2022 2nd	Oct 2022 3rd	Oct 2022 4th	Nov 2022 1st	Nov 2022 2nd	Nov 2022 3rd	Nov 2022 4th
Phase 1: Excavate CAD																										
Subphase 1a: Excavate CAD																										
Crew/Work Boat	2	100	5	59	0.38	3.73			3.1																	
Mechanical Dredger	1	2500	10	59	0.29	1.02			16.2																	
Split Hull Barge	2	350	3	59	0.38	3.73			6.6																	
Tugboat	1	2000	8	59	0.31	3.73			40.8																	
Phase 2: Dredge Unsuitable Material and Place in CAD																										
Subphase 2a: Dredge Unsuitable Material and Place in CAD																										
Mechanical Dredger	1	2500	10	13	0.29	1.02														16.2						
Tugboat	1	2000	5	13	0.31	3.73														25.5						
Crew/Work Boat	2	100	5	13	0.38	3.73														3.1						
Split Hull Barge	2	350	3	13	0.38	3.73														6.6						
Phase 3: Dredge Newport Channel 3 for Interim Cover																										
Subphase 3a: Dredge Newport Channel 3 for Interim Cap																										
Mechanical Dredger	1	2500	10	2	0.29	1.02																		16.2		
Tugboat	1	2000	5	2	0.31	3.73																		25.5		
Crew/Work Boat	2	100	5	2	0.38	3.73																		3.1		
Split Hull Barge	2	350	3	2	0.38	3.73																		6.6		
Phase 4: Dredge Non-Federal Channel Material																										
Subphase 4a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	1.02																				
Tugboat	1	2000	5	15	0.31	3.73																				
Crew/Work Boat	2	100	5	15	0.38	3.73																				
Split Hull Barge	2	350	3	15	0.38	3.73																				
Subphase 4b: Dredging Window																										
Crew/Work Boat	2	100	5	25	0.38	3.73																				
Mechanical Dredger	1	1400	10	25	0.29	1.02																				
Split Hull Barge	2	350	3	25	0.38	3.73																				
Tugboat	1	2000	5	25	0.31	3.73																				
Phase 4c: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	3.73																				
Mechanical Dredger	1	1400	2	15	0.29	1.02																				
Split Hull Barge	2	350	3	15	0.38	3.73																				
Tugboat	1	2000	2	15	0.31	3.73																				
Phase 5: Dredge Channel 3 and Place Final CAP																										
Subphase 5a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	1.02																				
Tugboat	1	2000	5	15	0.31	3.73																				
Crew/Work Boat	2	100	5	15	0.38	3.73																				
Split Hull Barge	2	350	3	15	0.38	3.73																				
Subphase 5b: Dredge Channel 3 and Place in CAD for Final Cap																										
Mechanical Dredger	1	1400	10	17	0.29	1.02																				
Tugboat	1	2000	5	17	0.31	3.73																				
Crew/Work Boat	2	100	5	17	0.38	3.73																				
Split Hull Barge	2	350	3	17	0.38	3.73																				
Subphase 5c: Dredge Remaining Material in Newport Channel 3																										
Mechanical Dredger	1	1400	10	18	0.29	1.02																				
Tugboat	1	2000	5	18	0.31	3.73																				
Crew/Work Boat	2	100	5	18	0.38	3.73																				
Split Hull Barge	2	350	3	18	0.38	3.73																				
Phase 5d: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	3.73																				
Mechanical Dredger	1	1400	2	15	0.29	1.02																				
Split Hull Barge	2	350	2	15	0.38	3.73																				
Tugboat	1	2000	2	15	0.31	3.73																				
CO Daily Average Emission (lbs/workday)													66.7							51.4				51.4		
CO Annual Emission (tons/year)									Year 2022: Total CO				2.35 tons													

Dec 2022				Jun 2024				Jul 2024				Aug 2024				Sep 2024				Oct 2024				Nov 2024				Dec 2024				Jan	
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd

2025		Feb				2025				Mar				2025				Apr				2025				May				2025				Jun				2025				Jul				2025				Aug				2025				Sept				2025			
3rd	4th	1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th				

Newport Harbor Dredging (CEQA Projects) - Air Pollutant Emission Inventory - CO2

Year 2022

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	CO2 Fac	Jul 2022 1st	Jul 2022 2nd	Jul 2022 3rd	Jul 2022 4th	Aug 2022 1st	Aug 2022 2nd	Aug 2022 3rd	Aug 2022 4th	Sep 2022 1st	Sep 2022 2nd	Sep 2022 3rd	Sep 2022 4th	Oct 2022 1st	Oct 2022 2nd	Oct 2022 3rd	Oct 2022 4th	Nov 2022 1st	Nov 2022 2nd	Nov 2022 3rd	Nov 2022 4th
Phase 1: Excavate CAD																										
Subphase 1a: Excavate CAD																										
Crew/Work Boat	2	100	5	59	0.38	486.00			407.2																	
Mechanical Dredger	1	2500	10	59	0.29	472.05			7546.4																	
Split Hull Barge	2	350	3	59	0.38	486.00			855.2																	
Tugboat	1	2000	8	59	0.31	486.00			5315.3																	
Phase 2: Dredge Unsuitable Material and Place in CAD																										
Subphase 2a: Dredge Unsuitable Material and Place in CAD																										
Mechanical Dredger	1	2500	10	13	0.29	472.05														7546.4						
Tugboat	1	2000	5	13	0.31	486.00														3322.1						
Crew/Work Boat	2	100	5	13	0.38	486.00														407.2						
Split Hull Barge	2	350	3	13	0.38	486.00														855.2						
Phase 3: Dredge Newport Channel 3 for Interim Cover																										
Subphase 3a: Dredge Newport Channel 3 for Interim Cap																										
Mechanical Dredger	1	2500	10	2	0.29	472.05																		7546.4		
Tugboat	1	2000	5	2	0.31	486.00																		3322.1		
Crew/Work Boat	2	100	5	2	0.38	486.00																		407.2		
Split Hull Barge	2	350	3	2	0.38	486.00																		855.2		
Phase 4: Dredge Non-Federal Channel Material																										
Subphase 4a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	472.05																				
Tugboat	1	2000	5	15	0.31	486.00																				
Crew/Work Boat	2	100	5	15	0.38	486.00																				
Split Hull Barge	2	350	3	15	0.38	486.00																				
Subphase 4b: Dredging Window																										
Crew/Work Boat	2	100	5	25	0.38	486.00																				
Mechanical Dredger	1	1400	10	25	0.29	472.05																				
Split Hull Barge	2	350	3	25	0.38	486.00																				
Tugboat	1	2000	5	25	0.31	486.00																				
Phase 4c: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	486.00																				
Mechanical Dredger	1	1400	2	15	0.29	472.05																				
Split Hull Barge	2	350	3	15	0.38	486.00																				
Tugboat	1	2000	2	15	0.31	486.00																				
Phase 5: Dredge Channel 3 and Place Final CAP																										
Subphase 5a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	472.05																				
Tugboat	1	2000	5	15	0.31	486.00																				
Crew/Work Boat	2	100	5	15	0.38	486.00																				
Split Hull Barge	2	350	3	15	0.38	486.00																				
Subphase 5b: Dredge Channel 3 and Place in CAD for Final Cap																										
Mechanical Dredger	1	1400	10	17	0.29	472.05																				
Tugboat	1	2000	5	17	0.31	486.00																				
Crew/Work Boat	2	100	5	17	0.38	486.00																				
Split Hull Barge	2	350	3	17	0.38	486.00																				
Subphase 5c: Dredge Remaining Material in Newport Channel 3																										
Mechanical Dredger	1	1400	10	18	0.29	472.05																				
Tugboat	1	2000	5	18	0.31	486.00																				
Crew/Work Boat	2	100	5	18	0.38	486.00																				
Split Hull Barge	2	350	3	18	0.38	486.00																				
Phase 5d: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	486.00																				
Mechanical Dredger	1	1400	2	15	0.29	472.05																				
Split Hull Barge	2	350	2	15	0.38	486.00																				
Tugboat	1	2000	2	15	0.31	486.00																				
CO2 Daily Average Emission (lbs/workday)									14124.0											12130.8				12130.8		
CO2 Annual Emission (tons/year)									Year 2022: Total CO2											507.6 tons						
																				460.4 MT						

Dec 2022				Jun 2024				Jul 2024				Aug 2024				Sep 2024				Oct 2024				Nov 2024				Dec 2024				Jan	
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd

2025		Feb		2025		Mar		2025		Apr		2025		May		2025		Jun		2025		Jul		2025		Aug		2025		Sept		2025	
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th

Newport Harbor Dredging (CEQA Projects) - Air Pollutant Emission Inventory - NOx

Year 2022

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	NOx Fac	Jul 2022 1st	Jul 2022 2nd	Jul 2022 3rd	Jul 2022 4th	Aug 2022 1st	Aug 2022 2nd	Aug 2022 3rd	Aug 2022 4th	Sep 2022 1st	Sep 2022 2nd	Sep 2022 3rd	Sep 2022 4th	Oct 2022 1st	Oct 2022 2nd	Oct 2022 3rd	Oct 2022 4th	Nov 2022 1st	Nov 2022 2nd	Nov 2022 3rd	Nov 2022 4th
Phase 1: Excavate CAD																										
Subphase 1a: Excavate CAD																										
Crew/Work Boat	2	100	5	59	0.38	5.50			4.6																	
Mechanical Dredger	1	2500	10	59	0.29	2.39			38.1																	
Split Hull Barge	2	350	3	59	0.38	5.50			9.7																	
Tugboat	1	2000	8	59	0.31	5.50			60.2																	
Phase 2: Dredge Unsuitable Material and Place in CAD																										
Subphase 2a: Dredge Unsuitable Material and Place in CAD																										
Mechanical Dredger	1	2500	10	13	0.29	2.39															38.1					
Tugboat	1	2000	5	13	0.31	5.50															37.6					
Crew/Work Boat	2	100	5	13	0.38	5.50															4.6					
Split Hull Barge	2	350	3	13	0.38	5.50															9.7					
Phase 3: Dredge Newport Channel 3 for Interim Cover																										
Subphase 3a: Dredge Newport Channel 3 for Interim Cap																										
Mechanical Dredger	1	2500	10	2	0.29	2.39																		38.1		
Tugboat	1	2000	5	2	0.31	5.50																		37.6		
Crew/Work Boat	2	100	5	2	0.38	5.50																		4.6		
Split Hull Barge	2	350	3	2	0.38	5.50																		9.7		
Phase 4: Dredge Non-Federal Channel Material																										
Subphase 4a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	2.39																				
Tugboat	1	2000	5	15	0.31	5.50																				
Crew/Work Boat	2	100	5	15	0.38	5.50																				
Split Hull Barge	2	350	3	15	0.38	5.50																				
Subphase 4b: Dredging Window																										
Crew/Work Boat	2	100	5	25	0.38	5.50																				
Mechanical Dredger	1	1400	10	25	0.29	2.39																				
Split Hull Barge	2	350	3	25	0.38	5.50																				
Tugboat	1	2000	5	25	0.31	5.50																				
Phase 4c: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	5.50																				
Mechanical Dredger	1	1400	2	15	0.29	2.39																				
Split Hull Barge	2	350	3	15	0.38	5.50																				
Tugboat	1	2000	2	15	0.31	5.50																				
Phase 5: Dredge Channel 3 and Place Final CAP																										
Subphase 5a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	2.39																				
Tugboat	1	2000	5	15	0.31	5.50																				
Crew/Work Boat	2	100	5	15	0.38	5.50																				
Split Hull Barge	2	350	3	15	0.38	5.50																				
Subphase 5b: Dredge Channel 3 and Place in CAD for Final Cap																										
Mechanical Dredger	1	1400	10	17	0.29	5.50																				
Tugboat	1	2000	5	17	0.31	2.39																				
Crew/Work Boat	2	100	5	17	0.38	5.50																				
Split Hull Barge	2	350	3	17	0.38	5.50																				
Subphase 5c: Dredge Remaining Material in Newport Channel 3																										
Mechanical Dredger	1	1400	10	18	0.29	5.50																				
Tugboat	1	2000	5	18	0.31	2.39																				
Crew/Work Boat	2	100	5	18	0.38	5.50																				
Split Hull Barge	2	350	3	18	0.38	5.50																				
Phase 5d: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	5.50																				
Mechanical Dredger	1	1400	2	15	0.29	2.39																				
Split Hull Barge	2	350	2	15	0.38	5.50																				
Tugboat	1	2000	2	15	0.31	5.50																				
NOx Daily Average Emission (lbs/workday)									112.6												90.0				90.0	
NOx Annual Emission (tons/year)									Year 2022: Total NOx						4.00 tons											

Dec 2022				Jun 2024				Jul 2024				Aug 2024				Sep 2024				Oct 2024				Nov 2024				Dec 2024				Jan	
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd

2025		Feb				2025				Mar				2025				Apr				2025				May				2025				Jun				2025				Jul				2025				Aug				2025				Sept				2025			
3rd	4th	1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th				

Newport Harbor Dredging (CEQA Projects) - Air Pollutant Emission Inventory - PM10

Year 2022

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	PM10 Fac	Jul 2022 1st	Jul 2022 2nd	Jul 2022 3rd	Jul 2022 4th	Aug 2022 1st	Aug 2022 2nd	Aug 2022 3rd	Aug 2022 4th	Sep 2022 1st	Sep 2022 2nd	Sep 2022 3rd	Sep 2022 4th	Oct 2022 1st	Oct 2022 2nd	Oct 2022 3rd	Oct 2022 4th	Nov 2022 1st	Nov 2022 2nd	Nov 2022 3rd	Nov 2022 4th
Phase 1: Excavate CAD																										
Subphase 1a: Excavate CAD																										
Crew/Work Boat	2	100	5	59	0.38	0.20			0.2																	
Mechanical Dredger	1	2500	10	59	0.29	0.06			1.0																	
Split Hull Barge	2	350	3	59	0.38	0.20			0.4																	
Tugboat	1	2000	8	59	0.31	0.20			2.2																	
Phase 2: Dredge Unsuitable Material and Place in CAD																										
Subphase 2a: Dredge Unsuitable Material and Place in CAD																										
Mechanical Dredger	1	2500	10	13	0.29	0.06															1.0					
Tugboat	1	2000	5	13	0.31	0.20															1.4					
Crew/Work Boat	2	100	5	13	0.38	0.20															0.2					
Split Hull Barge	2	350	3	13	0.38	0.20															0.4					
Phase 3: Dredge Newport Channel 3 for Interim Cover																										
Subphase 3a: Dredge Newport Channel 3 for Interim Cap																										
Mechanical Dredger	1	2500	10	2	0.29	0.06																		1.0		
Tugboat	1	2000	5	2	0.31	0.20																		1.4		
Crew/Work Boat	2	100	5	2	0.38	0.20																		0.2		
Split Hull Barge	2	350	3	2	0.38	0.20																		0.4		
Phase 4: Dredge Non-Federal Channel Material																										
Subphase 4a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	0.06																				
Tugboat	1	2000	5	15	0.31	0.20																				
Crew/Work Boat	2	100	5	15	0.38	0.20																				
Split Hull Barge	2	350	3	15	0.38	0.20																				
Subphase 4b: Dredging Window																										
Crew/Work Boat	2	100	5	25	0.38	0.20																				
Mechanical Dredger	1	1400	10	25	0.29	0.06																				
Split Hull Barge	2	350	3	25	0.38	0.20																				
Tugboat	1	2000	5	25	0.31	0.20																				
Phase 4c: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	0.20																				
Mechanical Dredger	1	1400	2	15	0.29	0.06																				
Split Hull Barge	2	350	3	15	0.38	0.20																				
Tugboat	1	2000	2	15	0.31	0.20																				
Phase 5: Dredge Channel 3 and Place Final CAP																										
Subphase 5a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	0.06																				
Tugboat	1	2000	5	15	0.31	0.20																				
Crew/Work Boat	2	100	5	15	0.38	0.20																				
Split Hull Barge	2	350	3	15	0.38	0.20																				
Subphase 5b: Dredge Channel 3 and Place in CAD for Final Cap																										
Mechanical Dredger	1	1400	10	17	0.29	0.06																				
Tugboat	1	2000	5	17	0.31	0.20																				
Crew/Work Boat	2	100	5	17	0.38	0.20																				
Split Hull Barge	2	350	3	17	0.38	0.20																				
Subphase 5c: Dredge Remaining Material in Newport Channel 3																										
Mechanical Dredger	1	1400	10	18	0.29	0.06																				
Tugboat	1	2000	5	18	0.31	0.20																				
Crew/Work Boat	2	100	5	18	0.38	0.20																				
Split Hull Barge	2	350	3	18	0.38	0.20																				
Phase 5d: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	0.20																				
Mechanical Dredger	1	1400	2	15	0.29	0.06																				
Split Hull Barge	2	350	2	15	0.38	0.20																				
Tugboat	1	2000	2	15	0.31	0.20																				
PM10 Daily Average Emission (lbs/workday)									3.7												2.9				2.9	
PM10 Annual Emission (tons/year)									Year 2022: Total PM10				0.13 tons													

Dec 2022				Jun 2024				Jul 2024				Aug 2024				Sep 2024				Oct 2024				Nov 2024				Dec 2024				Jan	
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd

2025		Feb				2025				Mar				2025				Apr				2025				May				2025				Jun				2025				Jul				2025				Aug				2025				Sept				2025			
3rd	4th	1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th				

Newport Harbor Dredging (CEQA Projects) - Air Pollutant Emission Inventory - PM25

Year 2022

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	PM25 Fac	Jul 2022 1st	Jul 2022 2nd	Jul 2022 3rd	Jul 2022 4th	Aug 2022 1st	Aug 2022 2nd	Aug 2022 3rd	Aug 2022 4th	Sep 2022 1st	Sep 2022 2nd	Sep 2022 3rd	Sep 2022 4th	Oct 2022 1st	Oct 2022 2nd	Oct 2022 3rd	Oct 2022 4th	Nov 2022 1st	Nov 2022 2nd	Nov 2022 3rd	Nov 2022 4th
Phase 1: Excavate CAD																										
Subphase 1a: Excavate CAD																										
Crew/Work Boat	2	100	5	59	0.38	0.18			0.2																	
Mechanical Dredger	1	2500	10	59	0.29	0.06			0.9																	
Split Hull Barge	2	350	3	59	0.38	0.18			0.3																	
Tugboat	1	2000	8	59	0.31	0.18			2.0																	
Phase 2: Dredge Unsuitable Material and Place in CAD																										
Subphase 2a: Dredge Unsuitable Material and Place in CAD																										
Mechanical Dredger	1	2500	10	13	0.29	0.06														0.9						
Tugboat	1	2000	5	13	0.31	0.18														1.2						
Crew/Work Boat	2	100	5	13	0.38	0.18														0.2						
Split Hull Barge	2	350	3	13	0.38	0.18														0.3						
Phase 3: Dredge Newport Channel 3 for Interim Cover																										
Subphase 3a: Dredge Newport Channel 3 for Interim Cap																										
Mechanical Dredger	1	2500	10	2	0.29	0.06																		0.9		
Tugboat	1	2000	5	2	0.31	0.18																		1.2		
Crew/Work Boat	2	100	5	2	0.38	0.18																		0.2		
Split Hull Barge	2	350	3	2	0.38	0.18																		0.3		
Phase 4: Dredge Non-Federal Channel Material																										
Subphase 4a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	0.06																				
Tugboat	1	2000	5	15	0.31	0.18																				
Crew/Work Boat	2	100	5	15	0.38	0.18																				
Split Hull Barge	2	350	3	15	0.38	0.18																				
Subphase 4b: Dredging Window																										
Crew/Work Boat	2	100	5	25	0.38	0.18																				
Mechanical Dredger	1	1400	10	25	0.29	0.06																				
Split Hull Barge	2	350	3	25	0.38	0.18																				
Tugboat	1	2000	5	25	0.31	0.18																				
Phase 4c: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	0.18																				
Mechanical Dredger	1	1400	2	15	0.29	0.06																				
Split Hull Barge	2	350	3	15	0.38	0.18																				
Tugboat	1	2000	2	15	0.31	0.18																				
Phase 5: Dredge Channel 3 and Place Final CAP																										
Subphase 5a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	0.06																				
Tugboat	1	2000	5	15	0.31	0.18																				
Crew/Work Boat	2	100	5	15	0.38	0.18																				
Split Hull Barge	2	350	3	15	0.38	0.18																				
Subphase 5b: Dredge Channel 3 and Place in CAD for Final Cap																										
Mechanical Dredger	1	1400	10	17	0.29	0.06																				
Tugboat	1	2000	5	17	0.31	0.18																				
Crew/Work Boat	2	100	5	17	0.38	0.18																				
Split Hull Barge	2	350	3	17	0.38	0.18																				
Subphase 5c: Dredge Remaining Material in Newport Channel 3																										
Mechanical Dredger	1	1400	10	18	0.29	0.06																				
Tugboat	1	2000	5	18	0.31	0.18																				
Crew/Work Boat	2	100	5	18	0.38	0.18																				
Split Hull Barge	2	350	3	18	0.38	0.18																				
Phase 5d: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	0.18																				
Mechanical Dredger	1	1400	2	15	0.29	0.06																				
Split Hull Barge	2	350	2	15	0.38	0.18																				
Tugboat	1	2000	2	15	0.31	0.18																				
PM25 Daily Average Emission (lbs/workday)									3.3											2.6				2.6		
PM25 Annual Emission (tons/year)									**Year 2022: Total PM25**											**0.12 tons**						

Dec 2022				Jun 2024				Jul 2024				Aug 2024				Sep 2024				Oct 2024				Nov 2024				Dec 2024				Jan	
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd

2025		Feb			2025			Mar			2025			Apr			2025			May			2025			Jun			2025			Jul			2025			Aug			2025			Sept			2025
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th

Newport Harbor Dredging (CEQA Projects) - Air Pollutant Emission Inventory - ROG

Year 2022

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	ROG Fac	Jul 2022 1st	Jul 2022 2nd	Jul 2022 3rd	Jul 2022 4th	Aug 2022 1st	Aug 2022 2nd	Aug 2022 3rd	Aug 2022 4th	Sep 2022 1st	Sep 2022 2nd	Sep 2022 3rd	Sep 2022 4th	Oct 2022 1st	Oct 2022 2nd	Oct 2022 3rd	Oct 2022 4th	Nov 2022 1st	Nov 2022 2nd	Nov 2022 3rd	Nov 2022 4th
Phase 1: Excavate CAD																										
Subphase 1a: Excavate CAD																										
Crew/Work Boat	2	100	5	59	0.38	0.31			0.3																	
Mechanical Dredger	1	2500	10	59	0.29	0.20			3.2																	
Split Hull Barge	2	350	3	59	0.38	0.31			0.5																	
Tugboat	1	2000	8	59	0.31	0.31			3.3																	
Phase 2: Dredge Unsuitable Material and Place in CAD																										
Subphase 2a: Dredge Unsuitable Material and Place in CAD																										
Mechanical Dredger	1	2500	10	13	0.29	0.20														3.2						
Tugboat	1	2000	5	13	0.31	0.31														2.1						
Crew/Work Boat	2	100	5	13	0.38	0.31														0.3						
Split Hull Barge	2	350	3	13	0.38	0.31														0.5						
Phase 3: Dredge Newport Channel 3 for Interim Cover																										
Subphase 3a: Dredge Newport Channel 3 for Interim Cap																										
Mechanical Dredger	1	2500	10	2	0.29	0.20																		3.2		
Tugboat	1	2000	5	2	0.31	0.31																		2.1		
Crew/Work Boat	2	100	5	2	0.38	0.31																		0.3		
Split Hull Barge	2	350	3	2	0.38	0.31																		0.5		
Phase 4: Dredge Non-Federal Channel Material																										
Subphase 4a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	0.20																				
Tugboat	1	2000	5	15	0.31	0.31																				
Crew/Work Boat	2	100	5	15	0.38	0.31																				
Split Hull Barge	2	350	3	15	0.38	0.31																				
Subphase 4b: Dredging Window																										
Crew/Work Boat	2	100	5	25	0.38	0.31																				
Mechanical Dredger	1	1400	10	25	0.29	0.20																				
Split Hull Barge	2	350	3	25	0.38	0.31																				
Tugboat	1	2000	5	25	0.31	0.31																				
Phase 4c: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	0.31																				
Mechanical Dredger	1	1400	2	15	0.29	0.20																				
Split Hull Barge	2	350	3	15	0.38	0.31																				
Tugboat	1	2000	2	15	0.31	0.31																				
Phase 5: Dredge Channel 3 and Place Final CAP																										
Subphase 5a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	0.20																				
Tugboat	1	2000	5	15	0.31	0.31																				
Crew/Work Boat	2	100	5	15	0.38	0.31																				
Split Hull Barge	2	350	3	15	0.38	0.31																				
Subphase 5b: Dredge Channel 3 and Place in CAD for Final Cap																										
Mechanical Dredger	1	1400	10	17	0.29	0.20																				
Tugboat	1	2000	5	17	0.31	0.20																				
Crew/Work Boat	2	100	5	17	0.38	0.31																				
Split Hull Barge	2	350	3	17	0.38	0.31																				
Subphase 5c: Dredge Remaining Material in Newport Channel 3																										
Mechanical Dredger	1	1400	10	18	0.29	0.20																				
Tugboat	1	2000	5	18	0.31	0.20																				
Crew/Work Boat	2	100	5	18	0.38	0.31																				
Split Hull Barge	2	350	3	18	0.38	0.31																				
Phase 5d: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	0.31																				
Mechanical Dredger	1	1400	2	15	0.29	0.20																				
Split Hull Barge	2	350	2	15	0.38	0.31																				
Tugboat	1	2000	2	15	0.31	0.31																				
ROG Daily Average Emission (lbs/workday)									7.4											6.1				6.1		
ROG Annual Emission (tons/year)							Year 2022: Total ROG				0.26 tons															

Dec 2022				Jun 2024				Jul 2024				Aug 2024				Sep 2024				Oct 2024				Nov 2024				Dec 2024				Jan	
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd

2025		Feb				2025				Mar				2025				Apr				2025				May				2025				Jun				2025				Jul				2025				Aug				2025				Sept				2025			
3rd	4th	1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th				

Newport Harbor Dredging (CEQA Projects) - Air Pollutant Emission Inventory - SO2

Year 2022

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	SO2 Fac	Jul 2022 1st	Jul 2022 2nd	Jul 2022 3rd	Jul 2022 4th	Aug 2022 1st	Aug 2022 2nd	Aug 2022 3rd	Aug 2022 4th	Sep 2022 1st	Sep 2022 2nd	Sep 2022 3rd	Sep 2022 4th	Oct 2022 1st	Oct 2022 2nd	Oct 2022 3rd	Oct 2022 4th	Nov 2022 1st	Nov 2022 2nd	Nov 2022 3rd	Nov 2022 4th
Phase 1: Excavate CAD																										
Subphase 1a: Excavate CAD																										
Crew/Work Boat	2	100	5	59	0.38	0.00			0.0																	
Mechanical Dredger	1	2500	10	59	0.29	0.01			0.1																	
Split Hull Barge	2	350	3	59	0.38	0.00			0.0																	
Tugboat	1	2000	8	59	0.31	0.00			0.0																	
Phase 2: Dredge Unsuitable Material and Place in CAD																										
Subphase 2a: Dredge Unsuitable Material and Place in CAD																										
Mechanical Dredger	1	2500	10	13	0.29	0.01														0.1						
Tugboat	1	2000	5	13	0.31	0.00														0.0						
Crew/Work Boat	2	100	5	13	0.38	0.00														0.0						
Split Hull Barge	2	350	3	13	0.38	0.00														0.0						
Phase 3: Dredge Newport Channel 3 for Interim Cover																										
Subphase 3a: Dredge Newport Channel 3 for Interim Cap																										
Mechanical Dredger	1	2500	10	2	0.29	0.01																		0.1		
Tugboat	1	2000	5	2	0.31	0.00																		0.0		
Crew/Work Boat	2	100	5	2	0.38	0.00																		0.0		
Split Hull Barge	2	350	3	2	0.38	0.00																		0.0		
Phase 4: Dredge Non-Federal Channel Material																										
Subphase 4a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	0.01																				
Tugboat	1	2000	5	15	0.31	0.00																				
Crew/Work Boat	2	100	5	15	0.38	0.00																				
Split Hull Barge	2	350	3	15	0.38	0.00																				
Subphase 4b: Dredging Window																										
Crew/Work Boat	2	100	5	25	0.38	0.00																				
Mechanical Dredger	1	1400	10	25	0.29	0.01																				
Split Hull Barge	2	350	3	25	0.38	0.00																				
Tugboat	1	2000	5	25	0.31	0.00																				
Phase 4c: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	0.00																				
Mechanical Dredger	1	1400	2	15	0.29	0.01																				
Split Hull Barge	2	350	3	15	0.38	0.00																				
Tugboat	1	2000	2	15	0.31	0.00																				
Phase 5: Dredge Channel 3 and Place Final CAP																										
Subphase 5a: Mobilization (Smaller Dredge Equipment)																										
Mechanical Dredger	1	1400	2	15	0.29	0.01																				
Tugboat	1	2000	5	15	0.31	0.00																				
Crew/Work Boat	2	100	5	15	0.38	0.00																				
Split Hull Barge	2	350	3	15	0.38	0.00																				
Subphase 5b: Dredge Channel 3 and Place in CAD for Final Cap																										
Mechanical Dredger	1	1400	10	17	0.29	0.01																				
Tugboat	1	2000	5	17	0.31	0.00																				
Crew/Work Boat	2	100	5	17	0.38	0.00																				
Split Hull Barge	2	350	3	17	0.38	0.00																				
Subphase 5c: Dredge Remaining Material in Newport Channel 3																										
Mechanical Dredger	1	1400	10	18	0.29	0.01																				
Tugboat	1	2000	5	18	0.31	0.00																				
Crew/Work Boat	2	100	5	18	0.38	0.00																				
Split Hull Barge	2	350	3	18	0.38	0.00																				
Phase 5d: Demobilization																										
Crew/Work Boat	2	100	5	15	0.38	0.00																				
Mechanical Dredger	1	1400	2	15	0.29	0.01																				
Split Hull Barge	2	350	2	15	0.38	0.00																				
Tugboat	1	2000	2	15	0.31	0.00																				
SO2 Daily Average Emission (lbs/workday)									0.1											0.1				0.1		
SO2 Annual Emission (tons/year)							Year 2022: Total SO2		0.00 tons																	

Dec 2022				Jun 2024				Jul 2024				Aug 2024				Sep 2024				Oct 2024				Nov 2024				Dec 2024				Jan	
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd

2025		Feb			2025	Mar			2025	Apr			2025	May			2025	Jun			2025	Jul			2025	Aug			2025	Sept			2025
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th

Newport Harbor Dredging (NEPA Projects) - Air Pollutant Emission Inventory - CO

Year 2020

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	CO Fac	Nov 2020 1st	Nov 2020 2nd	Nov 2020 3rd	Nov 2020 4th	Dec 2020 1st	Dec 2020 2nd	Dec 2020 3rd	Dec 2020 4th	Jan 1st	Jan 2nd
Phase 1: Entrance Channel Dredging and Rock Revetment																
Subphase 1a - Mobilization (Larger Dredge Equipment)																
Crew/Work Boat	2	100	5	15	0.38	3.73				3.1						
Mechanical Dredger	1	2500	2	15	0.29	1.00				3.2						
Split Hull Barge	2	350	3	15	0.38	3.73				6.6						
Tugboat	1	2000	2	15	0.31	3.73				10.2						
Subphase 1b: Dredge Entrance Channel																
Mechanical Dredger	1	2500	10	16	0.29	1.00						16.0				
Tugboat	1	2000	5	16	0.31	3.73						25.5				
Crew/work Boat	2	100	5	16	0.38	3.73						3.1				
Split Hull Barge	2	350	3	16	0.38	3.73						6.6				
Subphase 1c: Rock Revetment Repairs																
Dozer	1	215	10	60	0.40	2.37						4.5				
Crane	1	170	10	60	0.29	3.56						3.9				
Haul Truck	1	485	10	60	0.38	1.41						5.7				
Front Loader	1	48	10	60	0.36	6.77						2.6				
Subphase 1d: Demobilization																
Crew/work Boat	2	100	5	15	0.38	3.73										
Mechanical Dredger	1	2500	2	15	0.29	1.00										
Split Hull Barge	2	350	12	15	0.38	3.73										
Tugboat	1	2000	2	15	0.31	3.73										
Phase 2: Dredge Suitable Material in Federal Channels																
Subphase 2a: Mobilization																
Crew/work boat	2	100	5	15	0.38	3.73										
Mechanical Dredger	1	2500	2	15	0.29	1.00										
Split Hull Barge	2	350	3	15	0.38	3.73										
Tugboat	1	2000	2	15	0.31	3.73										
Phase 2b: Dredge Suitable Material in Federal Channels																
Crew/work boat	2	100	5	157	0.38	3.73										
Mechanical Dredger	1	2500	10	157	0.29	1.00										
Split Hull Barge	2	350	3	157	0.38	3.73										
Tugboat	1	2000	8	157	0.31	3.73										
CO Daily Average Emission (lbs/workday)									23.1			67.8				
CO Annual Emission (tons/year)							Year 2020: Total CO					0.83 tons			Year 2021: Total CO	

2021		Feb			2021	Mar			2021	Nov			2021	Dec			2021	Jan			2022	Feb	
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
4.4																							
3.8																							
5.4																							
2.5																							
						3.1																	
						3.2																	
						26.2																	
						10.2																	
												3.1											
												3.2											
												6.6											
												10.2											
															3.1								
															16.1								
															6.6								
															40.8								
16.1						42.8						23.1			66.6								
0.74 tons																		Year 2022: Total CO			5.23		

2022		Mar			2022	Apr			2022	May			2022	Jun			2022	Jul			2022
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th

Newport Harbor Dredging (NEPA Projects) - Air Pollutant Emission Inventory - CO2

Year 2020

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	CO2 Fac	Nov 1st	Nov 2nd	Nov 3rd	Nov 4th	Dec 1st	Dec 2nd	Dec 3rd	Dec 4th	Jan 1st
									2020				2020		
Phase 1: Entrance Channel Dredging and Rock Revetment															
Subphase 1a - Mobilization (Larger Dredge Equipment)															
Crew/Work Boat	2	100	5	15	0.38	468.00				392.1					
Mechanical Dredger	1	2500	2	15	0.29	472.05				1509.3					
Split Hull Barge	2	350	3	15	0.38	468.00				823.5					
Tugboat	1	2000	2	15	0.31	468.00				1279.6					
Subphase 1b: Dredge Entrance Channel															
Mechanical Dredger	1	2500	10	16	0.29	472.05						7,546.4			
Tugboat	1	2000	5	16	0.31	468.00						3,199.0			
Crew/work Boat	2	100	5	16	0.38	468.00						392.1			
Split Hull Barge	2	350	3	16	0.38	468.00						823.5			
Subphase 1c: Rock Revetment Repairs															
Dozer	1	215	10	60	0.40	474.79						900.3			
Crane	1	170	10	60	0.29	474.59						515.9			
Haul Truck	1	485	10	60	0.38	474.58						1928.6			
Front Loader	1	48	10	60	0.36	524.70						199.9			
Subphase 1d: Demobilization															
Crew/work Boat	2	100	5	15	0.38	468.00									
Mechanical Dredger	1	2500	2	15	0.29	472.05									
Split Hull Barge	2	350	12	15	0.38	468.00									
Tugboat	1	2000	2	15	0.31	468.00									
Phase 2: Dredge Suitable Material in Federal Channels															
Subphase 2a: Mobilization															
Crew/work boat	2	100	5	15	0.38	468.00									
Mechanical Dredger	1	2500	2	15	0.29	472.05									
Split Hull Barge	2	350	3	15	0.38	468.00									
Tugboat	1	2000	2	15	0.31	468.00									
Phase 2b: Dredge Suitable Material in Federal Channels															
Crew/work boat	2	100	5	157	0.38	468.00									
Mechanical Dredger	1	2500	10	157	0.29	472.05									
Split Hull Barge	2	350	3	157	0.38	468.00									
Tugboat	1	2000	8	157	0.31	468.00									
CO2 Daily Average Emission (lbs/workday)										4004.5			15,505.8		
CO2 Annual Emission (tons/year)							Year 2020: Total CO2						178.9 tons		Year 2021
													162.3 MT		

2021			Feb 2021				Mar 2021				Nov 2021				Dec 2021				Jan 2022				Feb
2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
900.4																							
515.9																							
1928.5																							
199.9																							
							392.1																
							1509.3																
							3294.0																
							1279.6																
													392.1										
													1509.3										
													823.5										
													1279.6										
																392.1							
																7546.4							
																823.5							
																5118.4							
3,544.5							6475.0						4004.5			13880.4							

: Total CO2 131.8 tons

119.5 MT

Year 2022: Total CO2

		2022	Mar			2022	Apr			2022	May			2022	Jun			2022	Jul			2022
2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th

Newport Harbor Dredging (NEPA Projects) - Air Pollutant Emission Inventory - NOx

Year 2020

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	NOx Fac	Nov 2020 1st	Nov 2020 2nd	Nov 2020 3rd	Nov 2020 4th	Dec 2020 1st	Dec 2020 2nd	Dec 2020 3rd	Dec 2020 4th	Jan 1st	Jan 2nd
Phase 1: Entrance Channel Dredging and Rock Revetment																
Subphase 1a - Mobilization (Larger Dredge Equipment)																
Crew/Work Boat	2	100	5	15	0.38	5.50				4.6						
Mechanical Dredger	1	2500	2	15	0.29	2.36				7.5						
Split Hull Barge	2	350	3	15	0.38	5.50				9.7						
Tugboat	1	2000	2	15	0.31	5.50				15.0						
Subphase 1b: Dredge Entrance Channel																
Mechanical Dredger	1	2500	10	16	0.29	2.36						37.7				
Tugboat	1	2000	5	16	0.31	5.50						37.6				
Crew/work Boat	2	100	5	16	0.38	5.50						4.6				
Split Hull Barge	2	350	3	16	0.38	5.50						9.7				
Subphase 1c: Rock Revetment Repairs																
Dozer	1	215	10	60	0.40	6.50						12.3				
Crane	1	170	10	60	0.29	5.57						6.1				
Haul Truck	1	485	10	60	0.38	2.35						9.5				
Front Loader	1	48	10	60	0.36	5.25						2.0				
Subphase 1d: Demobilization																
Crew/work Boat	2	100	5	15	0.38	5.50										
Mechanical Dredger	1	2500	2	15	0.29	2.36										
Split Hull Barge	2	350	12	15	0.38	5.50										
Tugboat	1	2000	2	15	0.31	5.50										
Phase 2: Dredge Suitable Material in Federal Channels																
Subphase 2a: Mobilization																
Crew/work boat	2	100	5	15	0.38	5.50										
Mechanical Dredger	1	2500	2	15	0.29	2.36										
Split Hull Barge	2	350	3	15	0.38	5.50										
Tugboat	1	2000	2	15	0.31	5.50										
Phase 2b: Dredge Suitable Material in Federal Channels																
Crew/work boat	2	100	5	157	0.38	5.50										
Mechanical Dredger	1	2500	10	157	0.29	2.36										
Split Hull Barge	2	350	3	157	0.38	5.50										
Tugboat	1	2000	8	157	0.31	5.50										
NOx Daily Average Emission (lbs/workday)										36.9			1.0			
NOx Annual Emission (tons/year)							Year 2020: Total NOx						1.44 tons		Year 2021: Total NO	

2021		Feb			2021	Mar			2021	Nov			2021	Dec			2021	Jan			2022	Feb	
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
11.9																							
5.6																							
7.9																							
1.9																							
						4.6																	
						7.6																	
						38.7																	
						15.0																	
												4.6											
												7.6											
												9.7											
												15.0											
															4.6								
															38.0								
															9.7								
															60.2								
27.3						65.9						36.9			112.4								

Ox 1.18 tons

Year 2022: Total NOx 8.82

2022		Mar			2022	Apr			2022	May			2022	Jun			2022	Jul			2022
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th

Newport Harbor Dredging (NEPA Projects) - Air Pollutant Emission Inventory - PM10

Year 2020

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	PM10 Fac	Nov 2020 1st	Nov 2020 2nd	Nov 2020 3rd	Nov 2020 4th	Dec 2020 1st	Dec 2020 2nd	Dec 2020 3rd	Dec 2020 4th	Jan 1st	Jan 2nd
Phase 1: Entrance Channel Dredging and Rock Revetment																
Subphase 1a - Mobilization (Larger Dredge Equipment)																
Crew/Work Boat	2	100	5	15	0.38	0.20				0.2						
Mechanical Dredger	1	2500	2	15	0.29	0.06				0.2						
Split Hull Barge	2	350	3	15	0.38	0.20				0.4						
Tugboat	1	2000	2	15	0.31	0.20				0.6						
Subphase 1b: Dredge Entrance Channel																
Mechanical Dredger	1	2500	10	16	0.29	0.06						1.0				
Tugboat	1	2000	5	16	0.31	0.20						1.4				
Crew/work Boat	2	100	5	16	0.38	0.20						0.2				
Split Hull Barge	2	350	3	16	0.38	0.20						0.4				
Subphase 1c: Rock Revetment Repairs																
Dozer	1	215	10	60	0.40	0.32						0.6				
Crane	1	170	10	60	0.29	0.30						0.3				
Haul Truck	1	485	10	60	0.38	0.09						0.3				
Front Loader	1	48	10	60	0.36	0.47						0.2				
Subphase 1d: Demobilization																
Crew/work Boat	2	100	5	15	0.38	0.20										
Mechanical Dredger	1	2500	2	15	0.29	0.06										
Split Hull Barge	2	350	12	15	0.38	0.20										
Tugboat	1	2000	2	15	0.31	0.20										
Phase 2: Dredge Suitable Material in Federal Channels																
Subphase 2a: Mobilization																
Crew/work boat	2	100	5	15	0.38	0.20										
Mechanical Dredger	1	2500	2	15	0.29	0.06										
Split Hull Barge	2	350	3	15	0.38	0.20										
Tugboat	1	2000	2	15	0.31	0.20										
Phase 2b: Dredge Suitable Material in Federal Channels																
Crew/work boat	2	100	5	157	0.38	0.20										
Mechanical Dredger	1	2500	10	157	0.29	0.06										
Split Hull Barge	2	350	3	157	0.38	0.20										
Tugboat	1	2000	8	157	0.31	0.20										
PM10 Daily Average Emission (lbs/workday)									1.3			4.3				
PM10 Annual Emission (tons/year)							Year 2020: Total PM10					0.05 tons			Year 2021: Total PM	

2021		Feb			2021	Mar			2021	Nov			2021	Dec			2021	Jan			2022	Feb	
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
0.6																							
0.3																							
0.3																							
0.2																							
						0.2																	
						0.2																	
						1.4																	
						0.6																	
												0.2											
												0.2											
												0.4											
												0.6											
															0.2								
															1.0								
															0.4								
															2.2								
1.3						2.3						1.3			3.7								
M10				0.05 tons														Year 2022: Total PM10			0.29		

2022		Mar			2022	Apr			2022	May			2022	Jun			2022	Jul			2022
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th

Newport Harbor Dredging (NEPA Projects) - Air Pollutant Emission Inventory - PM25

Year 2020

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	PM25 Fac	Nov 2020 1st	Nov 2020 2nd	Nov 2020 3rd	Nov 2020 4th	Dec 2020 1st	Dec 2020 2nd	Dec 2020 3rd	Dec 2020 4th	Jan 1st	Jan 2nd
Phase 1: Entrance Channel Dredging and Rock Revetment																
Subphase 1a - Mobilization (Larger Dredge Equipment)																
Crew/Work Boat	2	100	5	15	0.38	0.18				0.2						
Mechanical Dredger	1	2500	2	15	0.29	0.06				0.2						
Split Hull Barge	2	350	3	15	0.38	0.18				0.3						
Tugboat	1	2000	2	15	0.31	0.18				0.5						
Subphase 1b: Dredge Entrance Channel																
Mechanical Dredger	1	2500	10	16	0.29	0.06						0.9				
Tugboat	1	2000	5	16	0.31	0.18						1.2				
Crew/work Boat	2	100	5	16	0.38	0.18						0.2				
Split Hull Barge	2	350	3	16	0.38	0.18						0.3				
Subphase 1c: Rock Revetment Repairs																
Dozer	1	215	10	60	0.40	0.29						0.6				
Crane	1	170	10	60	0.29	0.27						0.3				
Haul Truck	1	485	10	60	0.38	0.08						0.3				
Front Loader	1	48	10	60	0.36	0.44						0.2				
Subphase 1d: Demobilization																
Crew/work Boat	2	100	5	15	0.38	0.18										
Mechanical Dredger	1	2500	2	15	0.29	0.06										
Split Hull Barge	2	350	12	15	0.38	0.18										
Tugboat	1	2000	2	15	0.31	0.18										
Phase 2: Dredge Suitable Material in Federal Channels																
Subphase 2a: Mobilization																
Crew/work boat	2	100	5	15	0.38	0.18										
Mechanical Dredger	1	2500	2	15	0.29	0.06										
Split Hull Barge	2	350	3	15	0.38	0.18										
Tugboat	1	2000	2	15	0.31	0.18										
Phase 2b: Dredge Suitable Material in Federal Channels																
Crew/work boat	2	100	5	157	0.38	0.18										
Mechanical Dredger	1	2500	10	157	0.29	0.06										
Split Hull Barge	2	350	3	157	0.38	0.18										
Tugboat	1	2000	8	157	0.31	0.18										
PM25 Daily Average Emission (lbs/workday)									1.1			3.9				
PM25 Annual Emission (tons/year)							Year 2020: Total PM25					0.05 tons			Year 2021: Total PM	

2021		Feb		2021		Mar		2021		Nov		2021		Dec		2021		Jan		2022		Feb	
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
0.5																							
0.3																							
0.3																							
0.1																							
						0.2																	
						0.2																	
						1.3																	
						0.5																	
												0.2											
												0.2											
												0.3											
												0.5											
															0.2								
															0.9								
															0.3								
															2.0								
1.2						2.1						1.1			3.3								
M25				0.04 tons														Year 2022: Total PM25				0.26	

2022		Mar				2022				Apr				2022				May				2022				Jun				2022				Jul				2022	
3rd	4th	1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th		

Newport Harbor Dredging (NEPA Projects) - Air Pollutant Emission Inventory - ROG

Year 2020

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	ROG Fac	Nov 2020 1st	Nov 2020 2nd	Nov 2020 3rd	Nov 2020 4th	Dec 2020 1st	Dec 2020 2nd	Dec 2020 3rd	Dec 2020 4th	Jan 1st	Jan 2nd
Phase 1: Entrance Channel Dredging and Rock Revetment																
Subphase 1a - Mobilization (Larger Dredge Equipment)																
Crew/Work Boat	2	100	5	15	0.38	0.31			0.3							
Mechanical Dredger	1	2500	2	15	0.29	0.18			0.6							
Split Hull Barge	2	350	3	15	0.38	0.31			0.5							
Tugboat	1	2000	2	15	0.31	0.31			0.8							
Subphase 1b: Dredge Entrance Channel																
Mechanical Dredger	1	2500	10	16	0.29	0.18						2.9				
Tugboat	1	2000	5	16	0.31	0.31						2.1				
Crew/work Boat	2	100	5	16	0.38	0.31						0.3				
Split Hull Barge	2	350	3	16	0.38	0.31						0.5				
Subphase 1c: Rock Revetment Repairs																
Dozer	1	215	10	60	0.40	0.62						1.2				
Crane	1	170	10	60	0.29	0.54						0.6				
Haul Truck	1	485	10	60	0.38	0.25						1.0				
Front Loader	1	48	10	60	0.36	1.48						0.6				
Subphase 1d: Demobilization																
Crew/work Boat	2	100	5	15	0.38	0.31										
Mechanical Dredger	1	2500	2	15	0.29	0.18										
Split Hull Barge	2	350	12	15	0.38	0.31										
Tugboat	1	2000	2	15	0.31	0.31										
Phase 2: Dredge Suitable Material in Federal Channels																
Subphase 2a: Mobilization																
Crew/work boat	2	100	5	15	0.38	0.31										
Mechanical Dredger	1	2500	2	15	0.29	0.18										
Split Hull Barge	2	350	3	15	0.38	0.31										
Tugboat	1	2000	2	15	0.31	0.31										
Phase 2b: Dredge Suitable Material in Federal Channels																
Crew/work boat	2	100	5	157	0.38	0.31										
Mechanical Dredger	1	2500	10	157	0.29	0.18										
Split Hull Barge	2	350	3	157	0.38	0.31										
Tugboat	1	2000	8	157	0.31	0.31										
ROG Daily Average Emission (lbs/workday)									2.2			9.1				
ROG Annual Emission (tons/year)							Year 2020: Total ROG					0.11 tons			Year 2021: Total RO	

2021		Feb 2021				Mar 2021				Nov 2021				Dec 2021				Jan 2022				Feb	
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
1.1																							
0.5																							
0.9																							
0.5																							
						0.3																	
						0.6																	
						2.2																	
						0.8																	
												0.3											
												0.6											
												0.5											
												0.8											
															0.3								
															3.1								
															0.5								
															3.3								
3.1						3.9						2.2			7.2								
0.09 tons																		Year 2022: Total ROG				0.57	

2022		Mar				2022				Apr				2022				May				2022				Jun				2022				Jul				2022	
3rd	4th	1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th					1st	2nd	3rd	4th		

Newport Harbor Dredging (NEPA Projects) - Air Pollutant Emission Inventory - SO2

Year 2020

Phase/Subphase/Equipment	# Equip	Equip Hp	Hours/ Day	Work Days	Load Fac	SO2 Fac	Nov 2020 1st	Nov 2020 2nd	Nov 2020 3rd	Nov 2020 4th	Dec 2020 1st	Dec 2020 2nd	Dec 2020 3rd	Dec 2020 4th	Jan 1st	Jan 2nd
Phase 1: Entrance Channel Dredging and Rock Revetment																
Subphase 1a - Mobilization (Larger Dredge Equipment)																
Crew/Work Boat	2	100	5	15	0.38	0.01				0.0						
Mechanical Dredger	1	2500	2	15	0.29	0.01				0.0						
Split Hull Barge	2	350	3	15	0.38	0.01				0.0						
Tugboat	1	2000	2	15	0.31	0.01				0.0						
Subphase 1b: Dredge Entrance Channel																
Mechanical Dredger	1	2500	10	16	0.29	0.01						0.1				
Tugboat	1	2000	5	16	0.31	0.01						0.0				
Crew/work Boat	2	100	5	16	0.38	0.01						0.0				
Split Hull Barge	2	350	3	16	0.38	0.01						0.0				
Subphase 1c: Rock Revetment Repairs																
Dozer	1	215	10	60	0.40	0.01						0.0				
Crane	1	170	10	60	0.29	0.01						0.0				
Haul Truck	1	485	10	60	0.38	0.01						0.0				
Front Loader	1	48	10	60	0.36	0.01						0.0				
Subphase 1d: Demobilization																
Crew/work Boat	2	100	5	15	0.38	0.01										
Mechanical Dredger	1	2500	2	15	0.29	0.01										
Split Hull Barge	2	350	12	15	0.38	0.01										
Tugboat	1	2000	2	15	0.31	0.01										
Phase 2: Dredge Suitable Material in Federal Channels																
Subphase 2a: Mobilization																
Crew/work boat	2	100	5	15	0.38	0.01										
Mechanical Dredger	1	2500	2	15	0.29	0.01										
Split Hull Barge	2	350	3	15	0.38	0.01										
Tugboat	1	2000	2	15	0.31	0.01										
Phase 2b: Dredge Suitable Material in Federal Channels																
Crew/work boat	2	100	5	157	0.38	0.01										
Mechanical Dredger	1	2500	10	157	0.29	0.01										
Split Hull Barge	2	350	3	157	0.38	0.01										
Tugboat	1	2000	8	157	0.31	0.01										
SO2 Daily Average Emission (lbs/workday)										0.0			0.2			
SO2 Annual Emission (tons/year)							Year 2020: Total SO2					0.00 tons			Year 2021: Total SO	

2021		Feb			2021	Mar			2021	Nov			2021	Dec			2021	Jan			2022	Feb	
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
0.0																							
0.0																							
0.0																							
0.0																							
						0.0																	
						0.0																	
						0.0																	
						0.0																	
												0.0											
												0.0											
												0.0											
												0.0											
															0.0								
															0.1								
															0.0								
															0.1								
0.0						0.1						0.0			0.1								
2			0.00 tons															Year 2022: Total SO2				0.01	

2022		Mar			2022	Apr			2022	May			2022	Jun			2022	Jul			2022
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th

Appendix G
Special-Status Species Potentially Present in Project Area

Appendix G: Species List

Lower Newport Harbor Confined Aquatic Disposal (CAD) Construction Project

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	Quadrangle
Agelaius tricolor	tricolored blackbird	None	Threatened	SSC	T, LB
Ammodramus savannarum	grasshopper sparrow	None	None	SSC	T, LB
Anniella stebbinsi	southern California legless lizard	None	None	SSC	NB, LB
Antigone canadensis canadensis	lesser sandhill crane	None	None	SSC	NB
Antrozous pallidus	pallid bat	None	None	SSC	LB
Aquila chrysaetos	golden eagle	None	None	FP; WL	LB
Asio flammeus	short-eared owl	None	None	SSC	NB
Asio otus	long-eared owl	None	None	SSC	T
Aspidoscelis tigris stejnegeri	coastal whiptail	None	None	SSC	T, LB
Athene cunicularia	burrowing owl	None	None	SSC	NB, T
Aythya americana	redhead	None	None	SSC	T
Bombus crotchii	Crotch bumble bee	None	Candidate Endangered	-	T, LB
Bucephala islandica	Barrow's goldeneye	None	None	SSC	NB
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	None	None	SSC	NB, T, LB
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	None	None	SSC	LB
Chaetura vauxi	Vaux's swift	None	None	SSC	T, LB
Charadrius alexandrinus nivosus	western snowy plover	Threatened	None	SSC	NB, LB
Charadrius montanus	mountain plover	None	None	SSC	NB, T
Choeronycteris mexicana	Mexican long-tongued bat	None	None	SSC	T

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	Quadrangle
Circus hudsonius	northern harrier	None	None	SSC	NB, T, LB
Cistothorus palustris clarkae	Clark's marsh wren	None	None	SSC	T
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Threatened	Endangered	-	T
Contopus cooperi	olive-sided flycatcher	None	None	SSC	LB
Coturnicops noveboracensis	yellow rail	None	None	SSC	NB, T, LB
Crotalus ruber	red-diamond rattlesnake	None	None	SSC	T, LB
Dudleya stolonifera	Laguna Beach dudleya	Threatened	Threatened	-	LB
Elanus leucurus	white-tailed kite	None	None	FP	T, LB
Empidonax traillii	willow flycatcher	None	Endangered	-	T
Empidonax traillii extimus	southwestern willow flycatcher	Endangered	Endangered	-	LB
Emys marmorata	western pond turtle	None	None	SSC	NB, T, LB
Eucyclogobius newberryi	tidewater goby	Endangered	None	SSC	NB, LB
Eumops perotis californicus	western mastiff bat	None	None	SSC	NB, T, LB
Euphydryas editha quino	quino checkerspot butterfly	Endangered	None	-	LB
Falco peregrinus anatum	American peregrine falcon	Delisted	Delisted	FP	T, LB
Gavia immer	common loon	None	None	SSC	NB
Icteria virens	yellow-breasted chat	None	None	SSC	NB, T, LB
Ixobrychus exilis	least bittern	None	None	SSC	T, LB
Lanius ludovicianus	loggerhead shrike	None	None	SSC	T, LB
Laterallus jamaicensis coturniculus	California black rail	None	Threatened	FP	NB, T
Nasturtium gambelii	Gambel's water cress	Endangered	Threatened	-	T
Neotoma lepida intermedia	San Diego desert woodrat	None	None	SSC	LB
Nyctinomops femorosaccus	pocketed free-tailed bat	None	None	SSC	LB

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	Quadrangle
Nyctinomops macrotis	big free-tailed bat	None	None	SSC	NB, LB
Oncorhynchus mykiss irideus	steelhead - southern California DPS	Endangered	None	-	LB
Oreothlypis luciae	Lucy's warbler	None	None	SSC	T
Passerculus sandwichensis beldingi	Belding's savannah sparrow	None	Endangered	-	T, LB
Pelecanus erythrorhynchos	American white pelican	None	None	SSC	T
Pelecanus occidentalis californicus	California brown pelican	Delisted	Delisted	FP	T, LB
Perognathus longimembris pacificus	Pacific pocket mouse	Endangered	None	SSC	T, LB
Phoebastria albatrus	short-tailed albatross	Endangered	None	SSC	NB
Phrynosoma blainvillii	coast horned lizard	None	None	SSC	NB, T, LB
Piranga rubra	summer tanager	None	None	SSC	T
Polioptila californica californica	coastal California gnatcatcher	Threatened	None	SSC	NB, T, LB
Progne subis	purple martin	None	None	SSC	NB
Pyrocephalus rubinus	vermilion flycatcher	None	None	SSC	NB
Rallus obsoletus levipes	light-footed Ridgway's rail	Endangered	Endangered	FP	NB, T
Rana draytonii	California red-legged frog	Threatened	None	SSC	LB
Rynchops niger	black skimmer	None	None	SSC	T
Salvadora hexalepis virgultea	coast patch-nosed snake	None	None	SSC	LB
Setophaga petechia	yellow warbler	None	None	SSC	NB, T, LB
Sorex ornatus salicornicus	southern California saltmarsh shrew	None	None	SSC	NB, T
Spea hammondii	western spadefoot	None	None	SSC	LB
Sternula antillarum browni	California least tern	Endangered	Endangered	FP	NB, T
Taricha torosa	Coast Range newt	None	None	SSC	T
Taxidea taxus	American badger	None	None	SSC	NB, LB

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	Quadrangle
Verbesina dissita	big-leaved crownbeard	Threatened	Threatened	-	LB
Vireo bellii pusillus	least Bell's vireo	Endangered	Endangered	-	T, LB
Vireo huttoni unitti	Catalina Hutton's vireo	None	None	SSC	LB
Xanthocephalus xanthocephalus	yellow-headed blackbird	None	None	SSC	NB

Notes:
DPS: distinct population segment
FP: Federally Protected
LB: Laguna Beach Quadrangle
NB: Newport Beach Quadrangle
SCC: Species of Special Concern
T: Tustin Quadrangle
WL: Watch List

Appendix H
Marina Park Project Grunion Monitoring Plan

ANCHOR QEA

27201 Puerta Real, Suite 350
Mission Viejo, California 92691
Phone 949.347.2780
www.anchorqea.com

MEMORANDUM

To:	Iris Lee, City of Newport Beach	**Date:**	June 13, 2014
From:	Adam Gale, Anchor QEA,LLC	**Project:**	130243-02.01
Cc:	Steve Cappellino, Anchor QEA,LLC		
Re:	Grunion Monitoring Plan for the Marina Park Project		

BACKGROUND

A new bayfront public park and marina is being developed in the Marina Park area of Balboa Peninsula in Newport Bay, California. In-water activities for the Marina Park Project include demolishing an existing groin wall, dredging approximately 53,000 cubic yards of sediment, and constructing new perimeter bulkhead walls, groin, and a marina. The new marina will be composed of concrete floating docks for 23 slips, gangways, and a dinghy storage area. In addition, dredged material will be used for beach nourishment at approved locations in Newport Harbor and on coastal beaches south of Newport Pier. On-shore construction started in early 2014; dredging is scheduled for mid- to late June 2014.

Prior to initiating sediment placement on beaches in Newport Beach, potential impacts to California grunion (*Leuresthes tenuis*) spawning activity must be evaluated in accordance with Special Condition 5C of the Coastal Development Permit (CDP; No. 5-10-229). Specifically, the receiving beach must be surveyed to determine whether California grunion are present and spawning during predicted run and egg incubation periods identified by the California Department of Fish and Wildlife (CDFW 2014). If grunion are present at a receiving beach, placement activities that would affect grunion spawning must cease until the next predicted run period in which no grunion are observed at the receiving beach.

This memorandum provides additional detail about receiving beaches, and areas within those beaches, that require grunion monitoring in accordance with the CDP. Information is also provided on when and how the California grunion surveys will be conducted, based on the predicted spawning and egg incubation periods identified by CDFW.

CALIFORNIA GRUNION MONITORING

Construction of the marina will require dredging using an excavator and bottom-dump barge. Dredged material will be placed at receiving sites by bottom-dump barge (nearshore disposal) or truck (dry sand beach placement). Material placed directly on the beach will be spread by a small bulldozer or front-end loader. Receiving sites are shown in Figure 1 and include:

- Beach adjacent to Marina Park project site (within Newport Harbor)
- China Cove (southeast portion of Newport Harbor)
- Marine Center (south side of Newport Pier, ocean beach)
- Nearshore Marine Environment (south side of Newport Pier)

Grunion spawning is not expected at all receiving sites, as described below.

Monitoring Locations

Grunion spawning events occur on sandy beaches along the Pacific Coast from Southern California to Northern Baja California (CDFW 2013). Limited wave action within the harbor does not facilitate beach access for grunion spawning or returning to the water after hatching. Thus, California grunion spawning is not known to occur on beaches with very little wave influence, such as China Cove or the beach adjacent to the Marina Park project site.

Sediment placed within the nearshore marine environment will be placed at a safe distance from the shoreline and with sufficient depth for a tugboat and bottom-dump scow to operate. In discussion with the U.S. Army Corps of Engineers, grunion spawning activities are not monitored during its nearshore disposal operations as the material replenishes the beaches through the natural seasonal movement of sand on to the beach through wave action and does not affect grunion spawning (Smith 2014).

Based on guidance provided from the City of Newport Beach (City) resulting from City staff experience with grunion runs in the area, and consistent with other projects of similar magnitude and geography, it is our opinion that the Marine Center placement location is the

only receiving site that requires grunion monitoring prior to placement activities (CDFW 2014; Love 2011; USACE 2012; CCC 2011).

Basis for Monitoring Timing

The timing and frequency of recommended monitoring is based on the predicted spawning and egg incubation periods of California grunion, which are in turn related to the lunar cycle and tides. Specifically, grunion beach themselves and spawn only during the 4 nights after the highest tide associated with each full or new moon. The fertilized eggs are later agitated by ocean waves prompting the eggs to hatch as they are swept to the ocean during the next high tide, approximately 10 days later (David 1939; Moffatt and Thomson 1978; Darken et al. 1998; Griem and Martin 2000). Due to the unique nature of these events, large disturbance of the beach as a result of sediment placement has the potential to greatly reduce grunion egg survival if eggs are present on the beach. The predictable spawning and hatching of the grunion are the basis for the required grunion survey described in the CDP.

Monitoring Methods

Grunion monitoring will occur at the receiving site during the applicable predicted grunion run time periods listed by CDFW for 2014, if sediment placement is planned for the receiving site. Predicted grunion runs occur from June through the end of August (Table 1). Monitoring will be initiated at the receiving site 30 minutes prior to each expected grunion period that could be affected by sediment placement. Qualified scientists will monitor the receiving site for the presence of grunion and grunion spawning behavior. The spawning behavior will serve as an indication of grunion eggs on the receiving beach over the next 10 days, because sampling the sediment to determine the presence of grunion eggs is difficult due to their extremely small size (diameter 1.5 to 1.6 millimeters) (David 1939). Monitoring will occur during the entire time period predicted by CDFW as the expected grunion run time.

Table 1
CDFW Expected Grunion Runs

Month	Date	Expected Run Times
June	13	10:00 p.m. - midnight
	14	10:40 p.m. - 12:40 a.m.
	15	11:30 p.m. - 1:30 a.m.
	16	12:25 a.m. - 2:25 a.m.*
	27	9:50 p.m. - 11:50 p.m.
	28	10:20 p.m. - 12:20 a.m.
	29	10:55 p.m. - 12:55 a.m.
	30	11:30 p.m. - 1:30 a.m.
July	12	9:45 p.m. - 11:45 p.m.
	13	10:35 p.m. - 12:35 a.m.
	14	11:25 p.m. - 1:25 a.m.
	15	12:15 a.m. - 2:15 a.m.
	26	9:35 p.m. - 11:35 p.m.
	27	10:05 p.m. - 12:05 a.m.
	28	10:40 p.m. - 12:40 a.m.
	29	11:10 p.m. - 1:10 a.m.
August	10	9:35 p.m. - 11:35 p.m.
	11	10:25 p.m. - 12:25 a.m.
	12	11:15 p.m. - 1:15 a.m.
	13	12:05 a.m. - 2:05 a.m.
	25	9:50 p.m. - 11:50 p.m.
	26	10:20 p.m. - 12:20 a.m.
	27	10:55 p.m. - 12:55 a.m.

Note:
Times listed are in reference to grunion runs on Cabrillo Beach near Los Angeles Harbor. Grunion run time vary along the coast and may be 5 minutes earlier in San Diego and 25 minutes earlier in Santa Barbara.

If grunion are observed, photographs will be taken for documentation and GPS coordinates will be logged to delineate the area in which grunion eggs are likely to be present as a result of the spawning activity. Photographs will also be taken to document the absence of grunion on the beach during the required monitoring time period. If grunion are present and spawning during the monitoring period, the City will be notified that dredged material cannot be placed within 150 feet of the high water line within the receiving site, which is the area in which grunion eggs are predicted to be developing until the next highest tide (approximately 10 days later), at which time the eggs will have presumably hatched. During the 10 day egg incubation period following observed grunion spawning, the contractor may continue to place dredged material in the portion of the receiving site that is at least 150 feet above the high water line.

All field activities will be recorded on field forms logged by qualified scientists. These forms will provide a description of the monitoring time period and activities, GPS coordinates of the area monitored and location of observed grunion (if applicable), monitoring personnel, weather conditions, and a record of any communication with the City.

Reporting

Inspection reports will be prepared following each California grunion monitoring event. The report will include a cover letter summarizing field monitoring efforts, any grunion spawning observed, and recommendations for dredged material placement changes if appropriate. Following the City's review, inspection reports will be submitted to the California Coastal Commission Executive Director and to the CDFW.

REFERENCES

CCC (California Coastal Commission), 2011. Staff Report: Regular Calendar. Coastal Development Permit No. 5-11-006-[OC Parks]. Exhibit 6: Grunion Protection Plan for Necessary Maintenance During the Grunion Spawning Season of March through September. Document dated September 7, 2006.

CDFW (California Department of Fish and Wildlife), 2014. California Grunion Facts and Runs. Accessed on: June 3, 2014. Available online from: https://www.dfg.ca.gov/marine/grunionschedule.asp.

Smith, L., 2014. Personal communication between Larry Smith, U.S. Army Corps of Engineers Los Angeles District and Steve Cappellino, Anchor QEA. May 23, 2014.

Darken, R.S., K.L. Martin, and M.C. Fisher, 1998. Metabolism during delayed hatching in terrestrial eggs of a marine fish, the grunion *Leuresthes tenuis*. *Physiological and Biochemical Zoology*, 71: 400-406.

David, L.R., 1939. Embryonic and early larval stages of the grunion, *Leuresthes tenuis*, and of the sculpin, *Scorpaena guttata*. *Copeia*, *1939*: 75-81.

Griem, J.N. and K.L.M. Martin, 2000. Wave action: the environmental trigger for hatching in the California grunion *Leuresthes tenuis* (*Teleostei: Atherinopsidae*). *Marine Biology*, *137*: 177-181.

Love, M.S., 2011. *Certainly More Than You Want To Know About the Fishes of the Pacific Coast*. Santa Barbara: Really Big Press.

Moffatt, N.M. and D.A. Thomson, 1978. Tidal influence on the evolution of egg size in the grunions (*Leuresthes*, *Atherinidae*). *Environmental Biology of Fishes*, 3: 267-273.

USACE (U.S. Army Corps of Engineers Los Angeles District), 2012. Public Notice. Application for Regional General Permit (RGP). Public Notice/Application No. SPL-2010-00868-SME. Orange County Public Works Ocean Outlet Maintenance Program.



CHINA COVE SAND RECEIVER SITE

NOTE: CHINA COVE SHALL RECEIVE APPROXIMATELY 5,000 CY OF CLEAN BEACH COMPATIBLE SANDY MATERIAL TO BE PLACED AT LEAST 15 FEET AWAY FROM EXISTING EELGRASS BEDS.

MARINA PARK SAND DISPOSAL LOCATIONS

PROJECT SITE, 17TH TO 18TH STREETS

1. 16TH TO 19TH STREETS (1,500 CY)
2. CHINA COVE (5,000 CY)
3. MARINE CENTER TO 19TH STREET, ABOVE HIGH TIDE LINE (+7' MLLW) (10,000 CY)
4. NEAR SHORE DISPOSAL, 6TH TO 16TH STREETS (ALTERNATE UPON APPROVAL BY CITY)
5. NEAR SHORE DISPOSAL, 40TH TO 52ND STREETS (REMAINING QUANTITY)
6. DISPOSAL AT LA-3 (ALTERNATE UPON APPROVAL BY CITY)

NOTE: ANY DREDGE DEPOSIT / BEACH NOURISHMENT ACTIVITY MUST AVOID SENSITIVE AQUATIC OR TERRESTRIAL HABITAT PER THE PROJECT PERMIT SPECIAL CONDITIONS.

1/8 0' 1/8 1/4

SCALE: 1"=1/8 MILE

Rabben/Herman design office
Landscape Architecture Master Planning Urban Design
833 Dover Drive
Newport Beach, CA 92663
(949) 548-3456
www.rhdo.com

moffatt & nichol
3780 Kilroy Airport Way
Suite 600
Long Beach, CA 90806
(562) 426-9551

Marina Park

City of Newport Beach

REVISIONS DATE

PACKAGE 2 - BASIN

JOB NO.:	2005.14
DRAWN BY:	CF / TM / RS / SS
DATE:	1/18/13
CITY PROJECT NO.	C-3697

TITLE:

DREDGED SAND RECEIVING SITES

SHEET:

DR1.03

REF:
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Appendix I
Navigation Study Memorandum

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Memorandum

October 16, 2020

To: Chris Miller, City of Newport Beach

From: Fred Massabki, PE, and Adam Gale, Anchor QEA, LLC

Re: Navigation Study for the Proposed West Anchorage in the Turning Basin - Update

The Newport Harbor Main Navigation Channel stretches from the Entrance Channel at the jetty to the Turning Basin adjacent to the Newport Boulevard bridge between Lido Village and Mariners' Mile. The 200-foot-wide Main Navigation Channel and Turning Basin are maintained at a depth of -20 feet mean lower low water (MLLW, Epoch 83-01). Large vessels up to 250 feet in length with up to 40-foot beams and up to 14-foot drafts—such as the 216-foot-long *M/V Invictus* with a 13-foot draft and 40-foot beam—may safely navigate the Main Navigation Channel and turn around at the Turning Basin. In addition, charter vessels in the 100 to 140-foot range are also currently berthed in the Turning Basin area and rely on this area for navigation as do the multitude of other vessels in the harbor.

The purpose of this study is to demonstrate that the Main Navigation Channel provides sufficient room for vessel navigation for boats of all sizes. In addition, with the proposed west anchorage in place, there is sufficient room for vessel turnaround while maintaining safe back-up distance from all surrounding existing docks and berthed vessels.

Design Criteria

The following design parameters were used to perform calculations provided in the next section:

Newport Harbor Main Navigation Channel

$Width, W_{Channel} = 200\ feet$
$Depth, D_{Channel} = -20\ feet\ mean\ lower\ low\ water\ (MLLW, Epoch\ 83-01)$

Largest Berthed Design Vessel
Based on Hornblower and Electra event cruise vessels berthed at Lido Village and Mariners' Mile marinas

$Length, L_{OA,Berthed} = 140\ feet$
$Beam, B_{Berthed} = 33\ feet$
$Draft, d_{Berthed} = 8\ feet$

Maximum Design Vessel
Visiting vessel to use proposed mooring field

$Length, L_{OA,Max} = 250\ feet$
$Beam, B_{Max} = 40\ feet$
$Draft, d_{Max} = 14\ feet$

M/V Invictus

$Length, L_{OA,Invictus} = 216\ feet$
$Beam, B_{Invictus} = 40\ feet$
$Draft, d_{Invictus} = 13\ feet$

Design Calculations

Channel Width

Section 4-2.2 of UFC-4-152-07 states that the minimum channel width for two-way traffic should be 100 feet or $5B_{Max}$, whichever is greater. *M/V Invictus* has a beam of 40 feet, which means the navigation channel is equal to $5B_{Invictus}$ or 200 feet wide. The Main Navigation Channel meets this criterion. The 200-foot channel width limits the size of vessels within the harbor. Based on mega yacht design (as needed for *M/V Invictus*), 250 feet is the theoretical length limit of vessels with beams ($B_{Max} = 40\ feet$) that conform to the channel width design criterion.

Based on the American Society of Civil Engineers' Planning and Design Guidelines for Small Craft Harbors (ASCE 2012; herein USACE MOP 50) and PIANC's Harbour Approach Channels Design Guidelines (PIANC 2014; herein MarCom 212), navigation lanes within Newport Harbor should be $1.5B_{Berthed}$. More than 4,000 vessels are berthed within Newport Harbor, with the largest vessel (an

event cruise boat) having a beam of 33 feet ($B_{Berthed}$). Using the ASCE MOP 50 and MarCom 121 design criteria, the channel width calculation is provided below.

$$Lane\ Width, W_{Lane} = 1.5B_{Berthed} = 1.5(33) = 50\ feet$$

Therefore, a 50-foot-wide lane is required to accommodate the largest vessel permanently berthed in Newport Harbor. This 50-foot lane width results in ten lanes at the 500-foot-wide Entrance Channel and four lanes at the 200-foot-wide Main Navigation Channel.

Vessel Traffic

The 500-foot-wide, 20-foot-deep Entrance Channel splits at Peninsula Point, at a navigational feature known as the Corona del Mar Bend, into the 200-foot-wide, 10-foot-deep Balboa Island Channel and the 200-foot-wide, 20-foot-deep Main Navigation Channel, which extends to the Turning Basin at the Newport Boulevard bridge. Most of the more than 4,000 vessels berthed in Newport Harbor will use the Main Navigation Channel to access berths and mooring fields. If the 200-foot-wide Main Navigation Channel is of sufficient width to serve more than 2,500 vessels along its entire length, then it should be of sufficient width to serve the more than 700 vessels along Mariners' Mile, Lido Isle, and West Newport including the Balboa Coves. Furthermore, using an average vessel length, $L_{average} = 35\ feet$ and four boat lengths between vessels, 120 vessels can use the Main Navigation Channel between Mariners' Mile and Lido Isle, which is approximately 15% of the total number of vessels berthed in this area. This percentage is high even for a summer weekend. The vessel traffic calculation is provided below.

$$L_{Average} = 35\ feet$$

$$L_{Spacing} = 4L_{Average} = 140\ feet$$

$$L_{Total} = L_{Average} + L_{Spacing} = 175\ feet$$

$$L_{Channel} = 5{,}280\ feet, No.\ of\ Lanes = 4$$

$$L_{Channel,Total} = 4 \times 5{,}280\ feet = 21{,}120\ feet$$

$$Vessels = \frac{21{,}120\ feet}{175\ feet'} = 120$$

Although the 20-foot-deep Main Navigation Channel is 200 feet wide with four 50-foot-wide design lanes, the channel between Mariners' Mile and Lido Isle, known as the Lido Isle Reach, is *600 feet wide between pierhead lines*. Therefore, shallower draft vessels, particularly the Duffy electric boats and most of the power boats in Newport Harbor, can make full use of the channel, which is critical when a wide-beam vessel, including event cruise vessels, require a navigation lane 45 to 60 feet wide.

Turning Basin

According to ASCE MOP 50, different turning circle design guidelines are used depending on whether a vessel has bow thrusters or not. For vessels without bow thrusters, the diameter of a turning circle should be $3.5L_{OA}$. For vessels with bow thrusters, the turning circle diameter can be reduced to a minimum size of $1.3L_{OA}$, with a preferable diameter of $2L_{OA}$. Most mega yachts, which are typically defined as vessels with lengths 100 feet or more, have bow thrusters. However, for these calculations, vessels permanently berthed in Newport Harbor are assumed to not have bow thrusters, while visiting large vessels are assumed have bow thrusters. The turning circle diameter is calculated below using both equations to determine the greater dimension.

$$Turning\ Circle\ Diameter, \emptyset_{TC,1} = 3.5L_{OA,Berthed} = 3.5\ \times 140 = 490\ feet$$

$$Turning\ Circle\ Diameter, \emptyset_{TC,2} = 2L_{OA,Max} = 2\ \times 250 = 500\ feet$$

Based on these calculations, a turning circle diameter of 500 feet should be used and can accommodate vessels with bow thrusters up to 250 feet in length and vessels without bow thrusters up to 140 feet in length.

Conclusion

As demonstrated in the references and equations provided, the existing Turning Basin in Newport Harbor can accommodate the proposed west anchorage shown in Figure 1 and provide a 500-foot-diameter turning circle. Furthermore, creation of the proposed west anchorage would not impact vessel navigation in Newport Harbor, particularly the Main Navigation Channel.

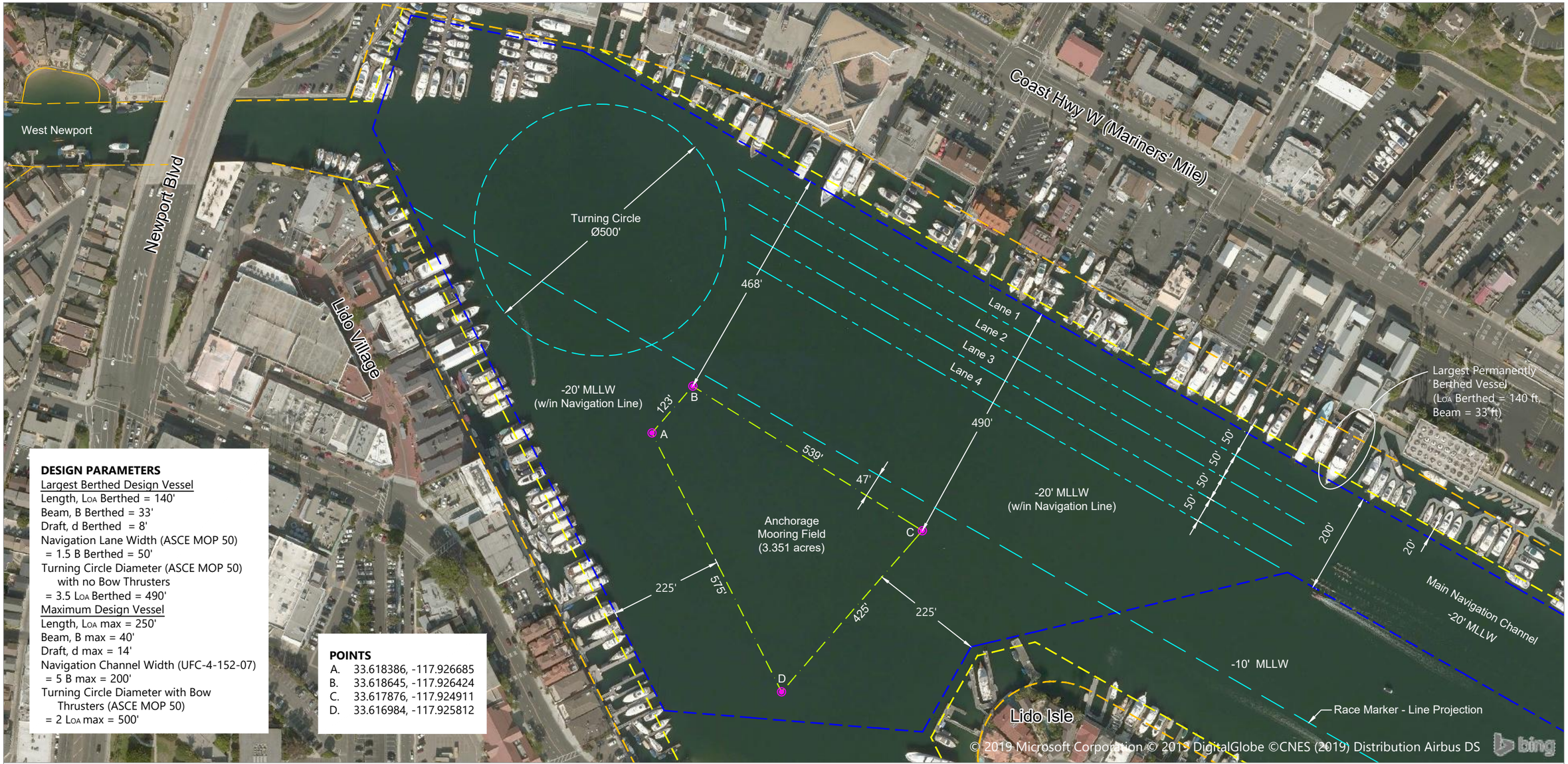
References

ASCE (American Society of Civil Engineers), 2012. *Planning and Design Guidelines for Small Craft Harbors*. ASCE Manuals and Reports on Engineering Practice No. 50.

PIANC, 2014. *Harbour Approach Channels Design Guidelines.* PIANC Maritime Navigation Commission Report No. 121.

USDOD (U.S. Department of Defense), 2012. *Unified Facilities Criteria for Design: Small Craft Berthing Facilities*. UFC-4-152-07. September 2012.

Figure



DESIGN PARAMETERS
Largest Berthed Design Vessel
Length, LOA Berthed = 140'
Beam, B Berthed = 33'
Draft, d Berthed = 8'
Navigation Lane Width (ASCE MOP 50)
= 1.5 B Berthed = 50'
Turning Circle Diameter (ASCE MOP 50)
with no Bow Thrusters
= 3.5 LOA Berthed = 490'
Maximum Design Vessel
Length, LOA max = 250'
Beam, B max = 40'
Draft, d max = 14'
Navigation Channel Width (UFC-4-152-07)
= 5 B max = 200'
Turning Circle Diameter with Bow
Thrusters (ASCE MOP 50)
= 2 LOA max = 500'

POINTS

A.	33.618386, -117.926685
B.	33.618645, -117.926424
C.	33.617876, -117.924911
D.	33.616984, -117.925812

SOURCE: Aerial map by Bing. Pierhead, bulkhead, and navigational lines from City of Newport Beach Data Catalog.
HORIZONTAL DATUM: California State Plane, Zone VI, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW) (83-01).

LEGEND:
- Bulkhead Line
- Pierhead Line
- Navigation Line

ABBREVIATIONS:

ASCE MOP 50	ASCE Manual of Practice 50: Planning and Guidelines for Small Craft Harbors
UFC-4-152-07	United Facilities Criteria for Design: Small Craft Berthing Facilities

0 200
Feet

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ANCHOR QEA

Figure 1
Newport Harbor Turning Basin Anchorage Pilot Study