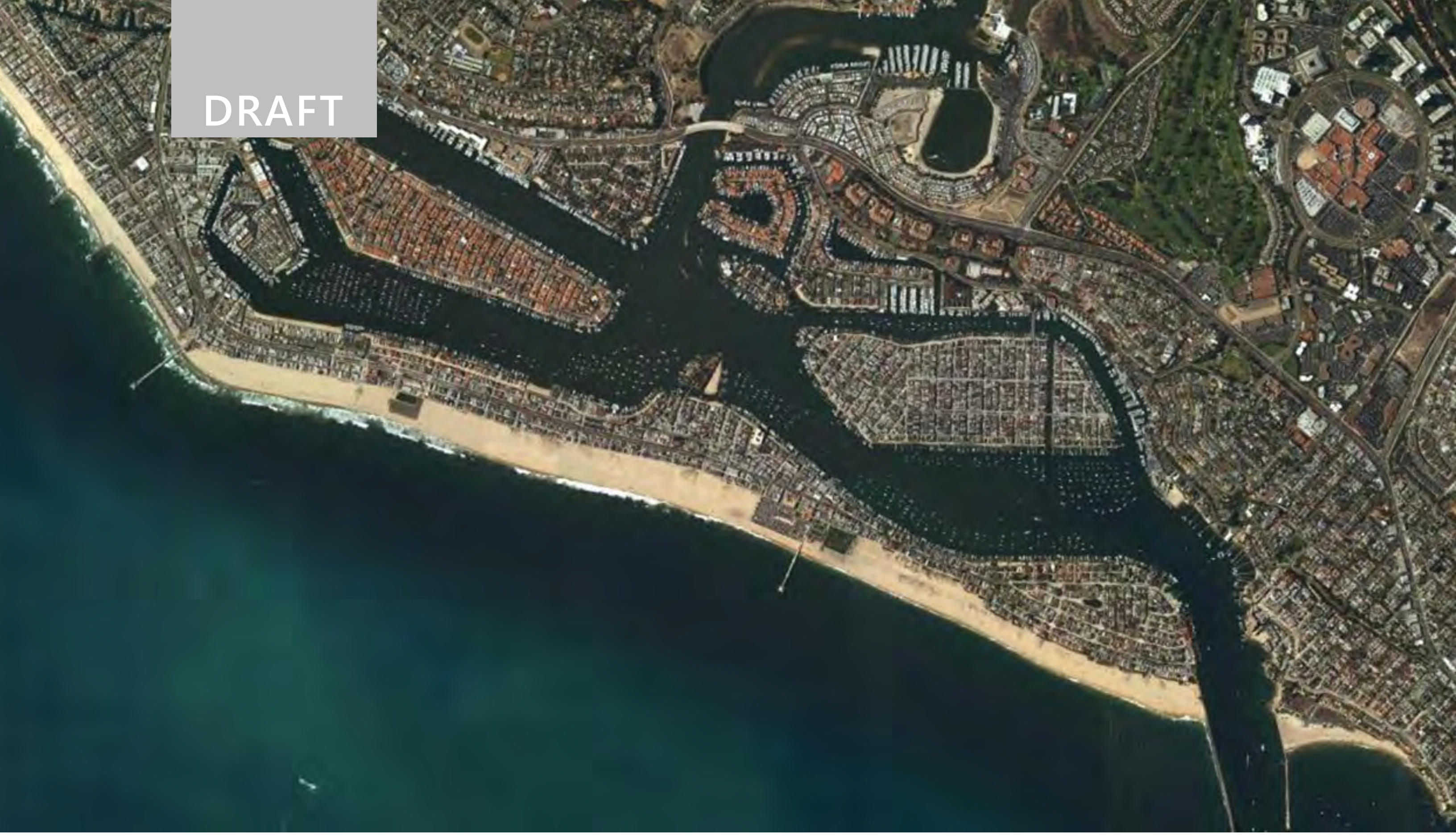
Appendix C

Basis of Design Report



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

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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

DRAFT

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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)

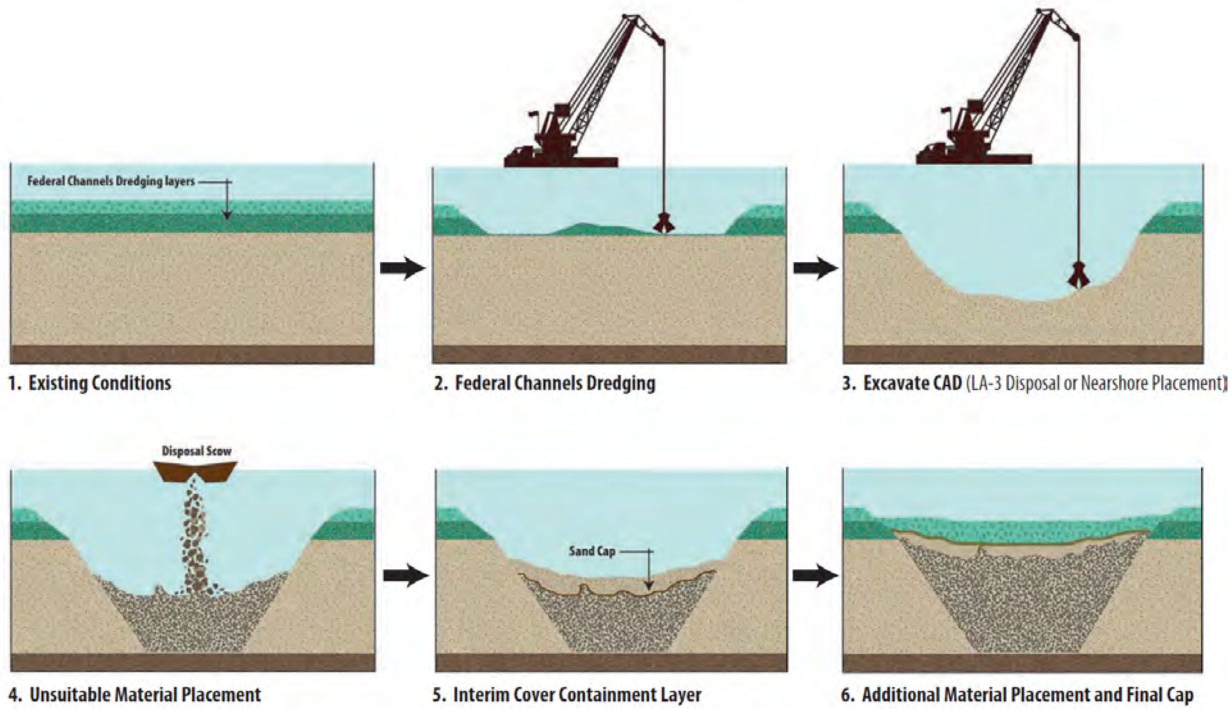
In addition, multiple CAD facilities have been constructed across the country—including harbors in Boston, Massachusetts; Providence, Rhode Island; the Puget Sound Naval Shipyard in Bremerton, Washington; the St. Louis River–Duluth Tar Site, Duluth, Minnesota—and internationally (e.g., a Hong Kong airport;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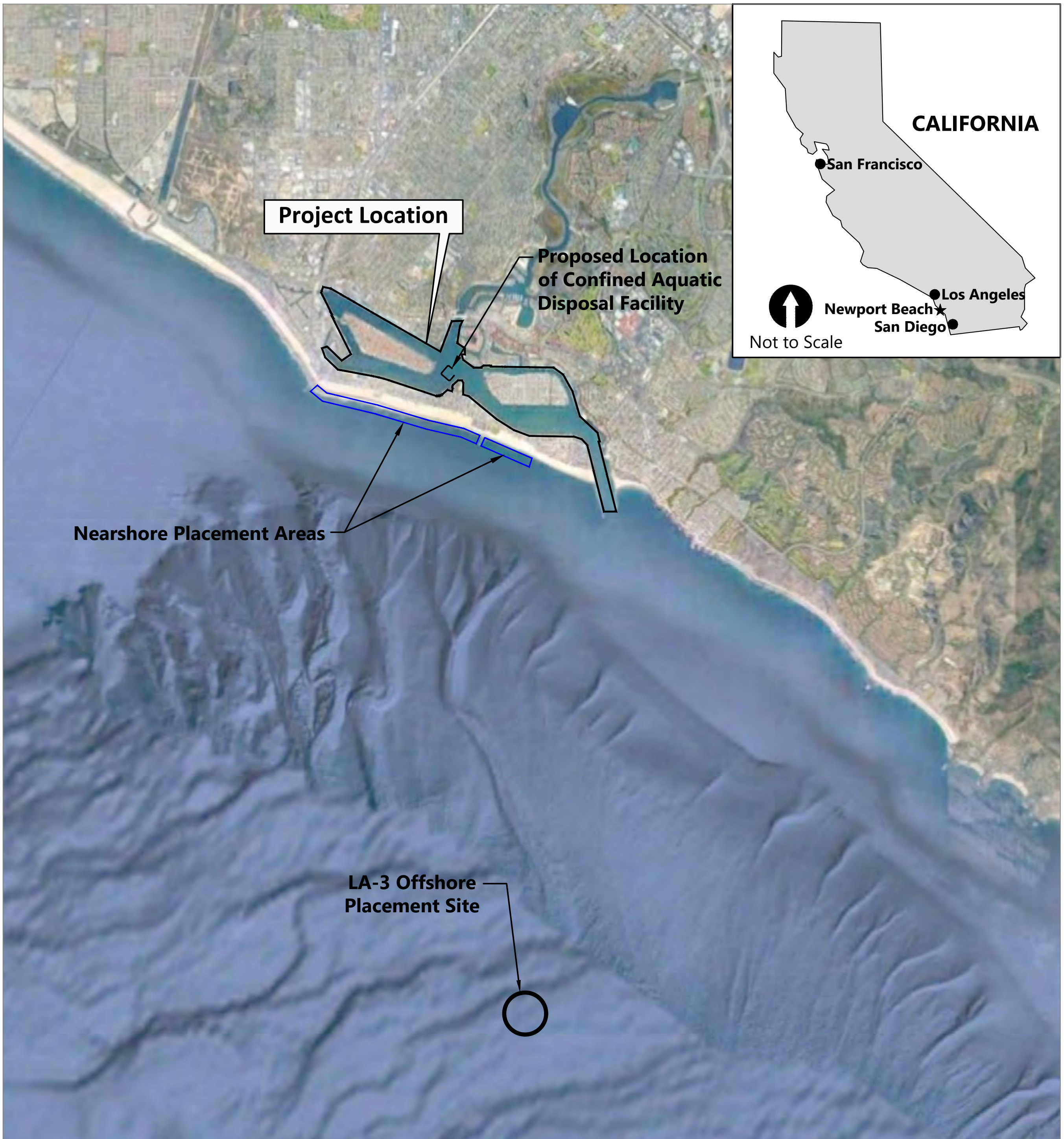
Figures

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'

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

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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

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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

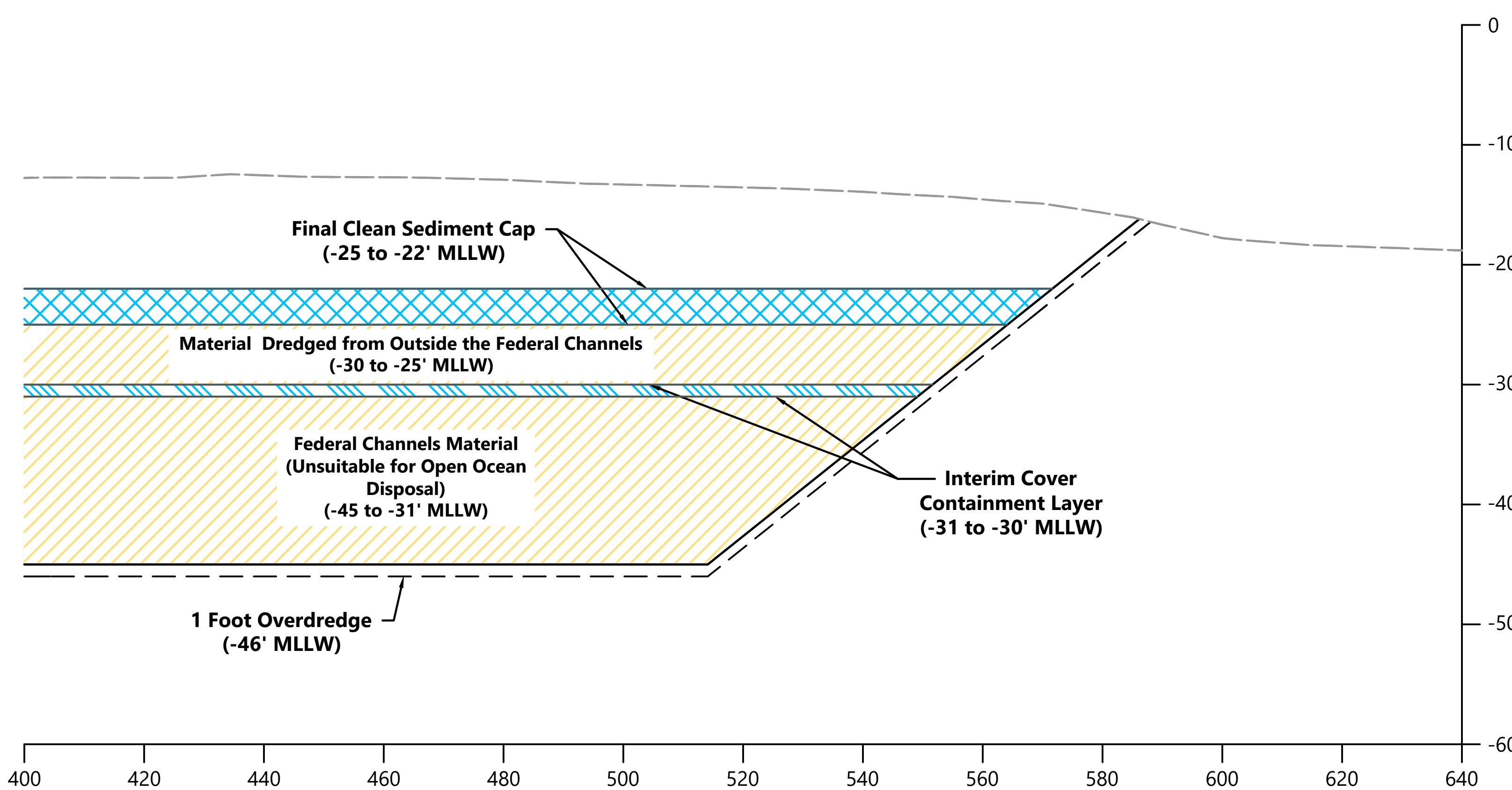
SOURCE: Ariel from Bing Maps, 2018.
HORIZONTAL DATUM: California State Plane, Zone 6, North American Datum of 1983 (NAD83), U.S. Survey Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

Required Dredge Elevation

Allowable Overdepth Elevation

Existing Mudline



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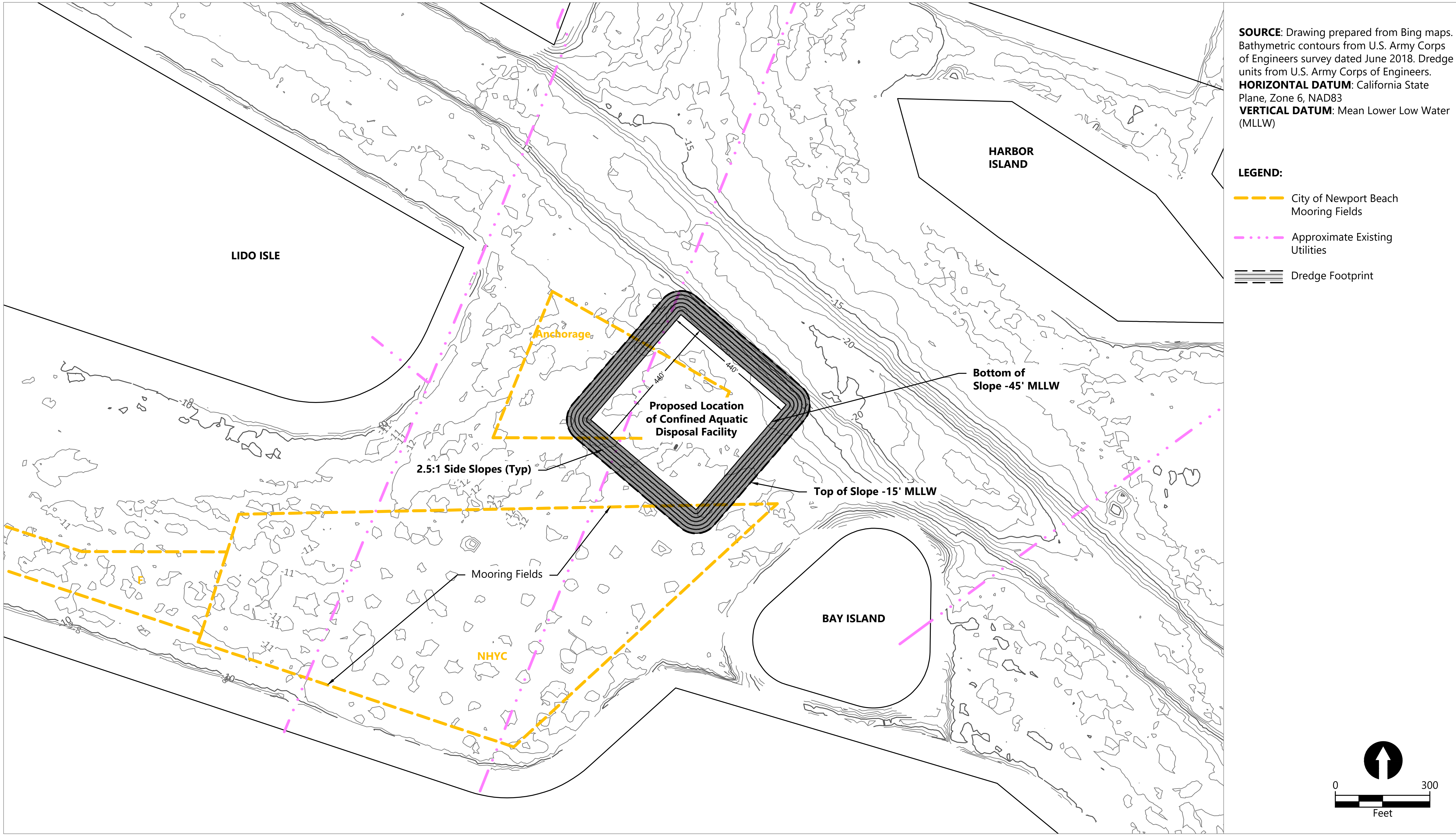
Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-016 BODR CAD SEC.dwg Figure 4-1

ANCHOR QEA

Figure 4-1
Cross Section of CAD Facility



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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

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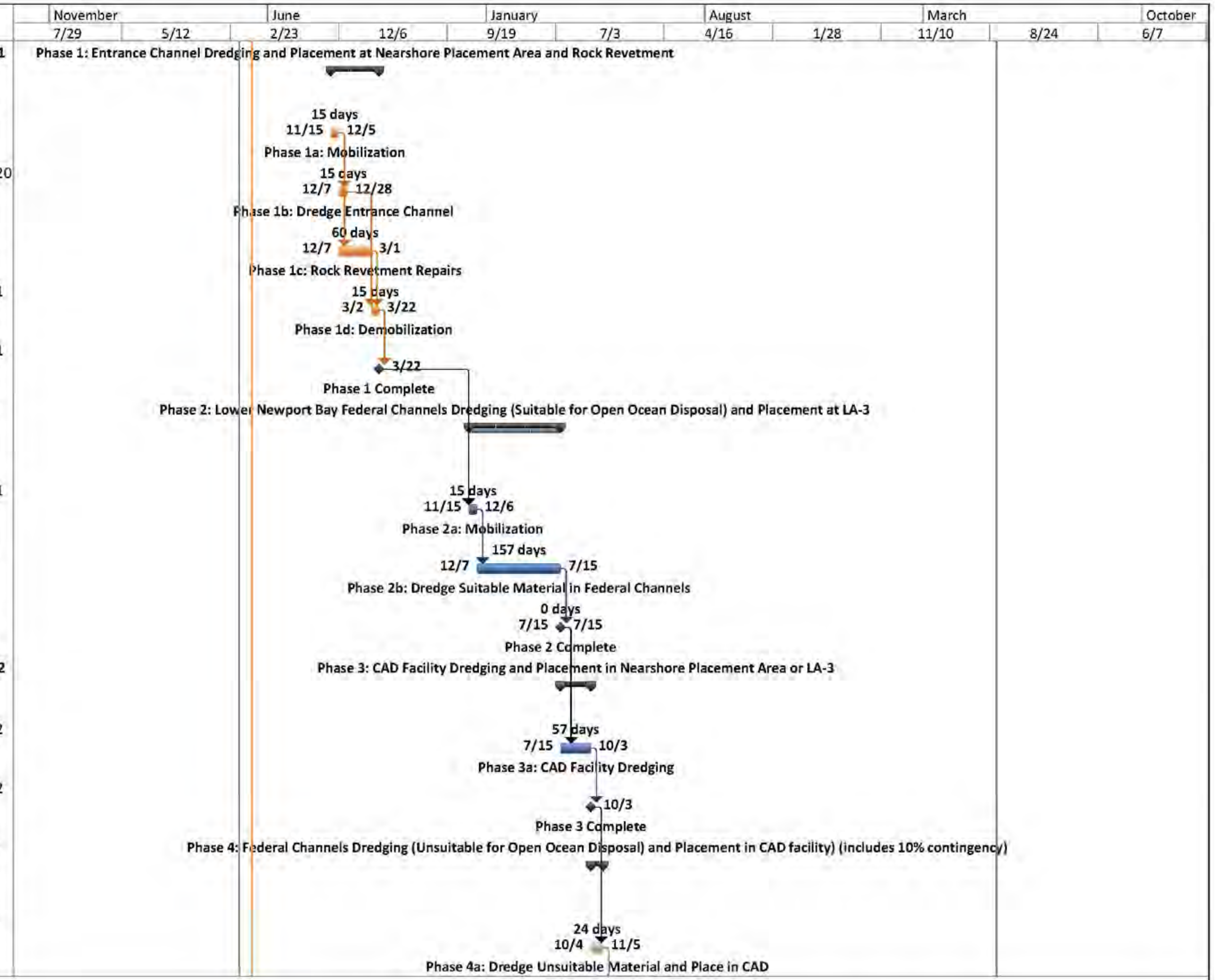
Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-021 BODR BAY ISLAND.dwg Figure 6-1

ANCHOR QEA

Figure 6-1
Subsurface Sediment and Geotechnical Sampling

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

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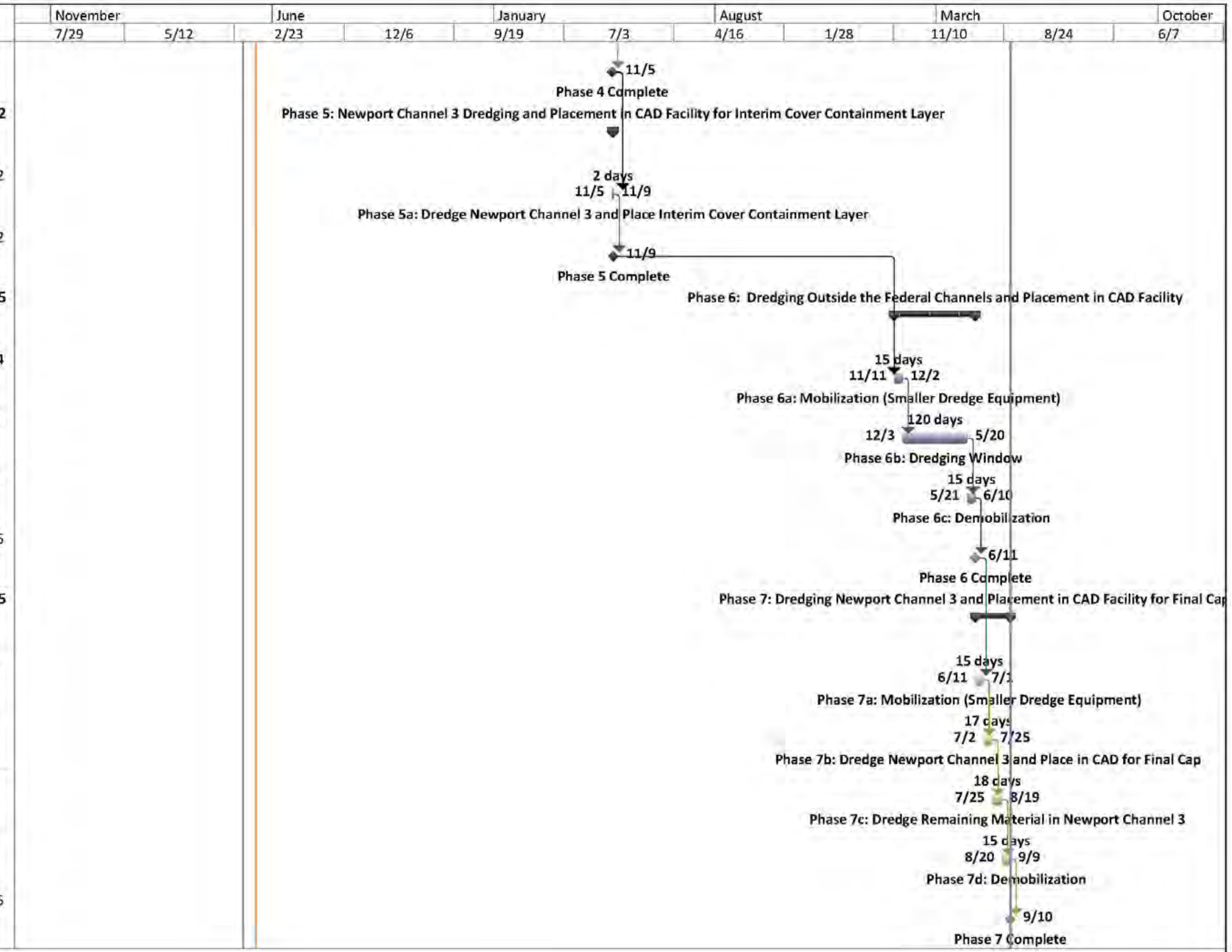
ANCHOR QEA

Figure 9-1
Draft Construction Schedule

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

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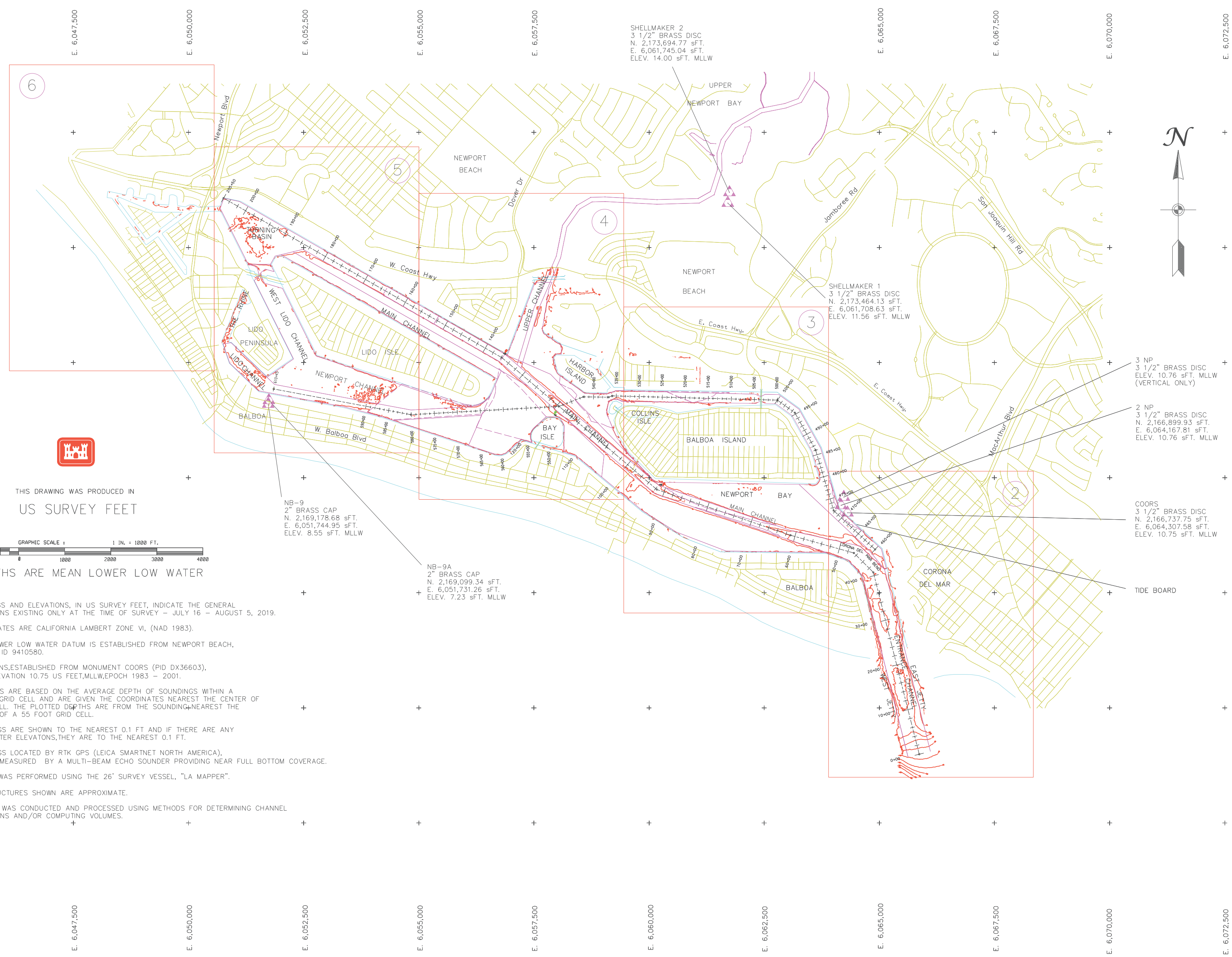
Figure 9-1
Draft Construction Schedule

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).
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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

DRAWN BY: OVERMIRE.TYLER.T.1393620990 Digitally signed by OVERMIRE.TYLER.T.1393620990 Date: 2019.11.13 11:05:32 -08'00' TYLER T. OVERMIRE

CHECKED BY: AMICK.CAMERON.JAY.1264743385 Digitally signed by AMICK.CAMERON.JAY.1264743385 Date: 2019.11.13 11:00:27 -08'00' CAMERON J. AMICK

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

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

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

NAVIGATION IMPROVEMENT
ORANGE COUNTY, CALIFORNIA
HYDROGRAPHIC SURVEY

SURVEYED BY: MR. OVERMIRE, MR. UMUKORO

PLOT DATE: NOVEMBER 8, 2019

DISTRICT FILE NO: I-813

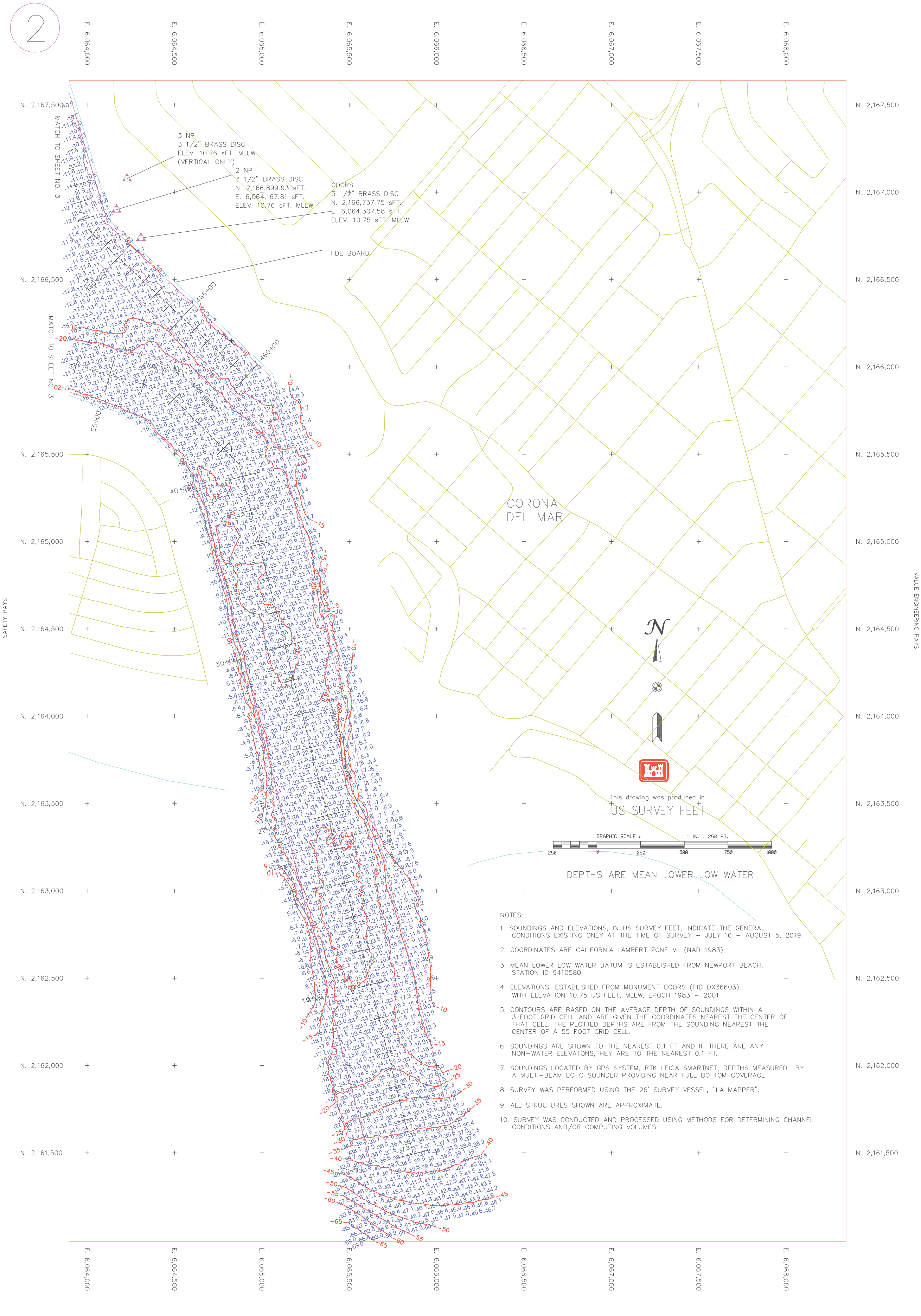
PLOT SCALE: 1 IN. = 1000 FT.

DISTRICT FILE NAME: NB2019_07_cond_I.dgn

LOWER NEWPORT BAY
CONDITION SURVEY
JULY-AUGUST 2019

SHEET REFERENCE NUMBER: I

SHEET 1 OF 6



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SHEET REFERENCE NUMBER :
2
SHEET 2 of 6

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
PLOT SCALE:
1 IN. = 250 FT.

DISTRICT FILE NAME:
NB2019_07_cond_2.dgn

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OVERMIRE.TYLER.T.1393620990
TYLER T. OVERMIRE

CHECKED BY:
AMICK.CAMERON.JAY.1264743385
CAMERON J. AMICK

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

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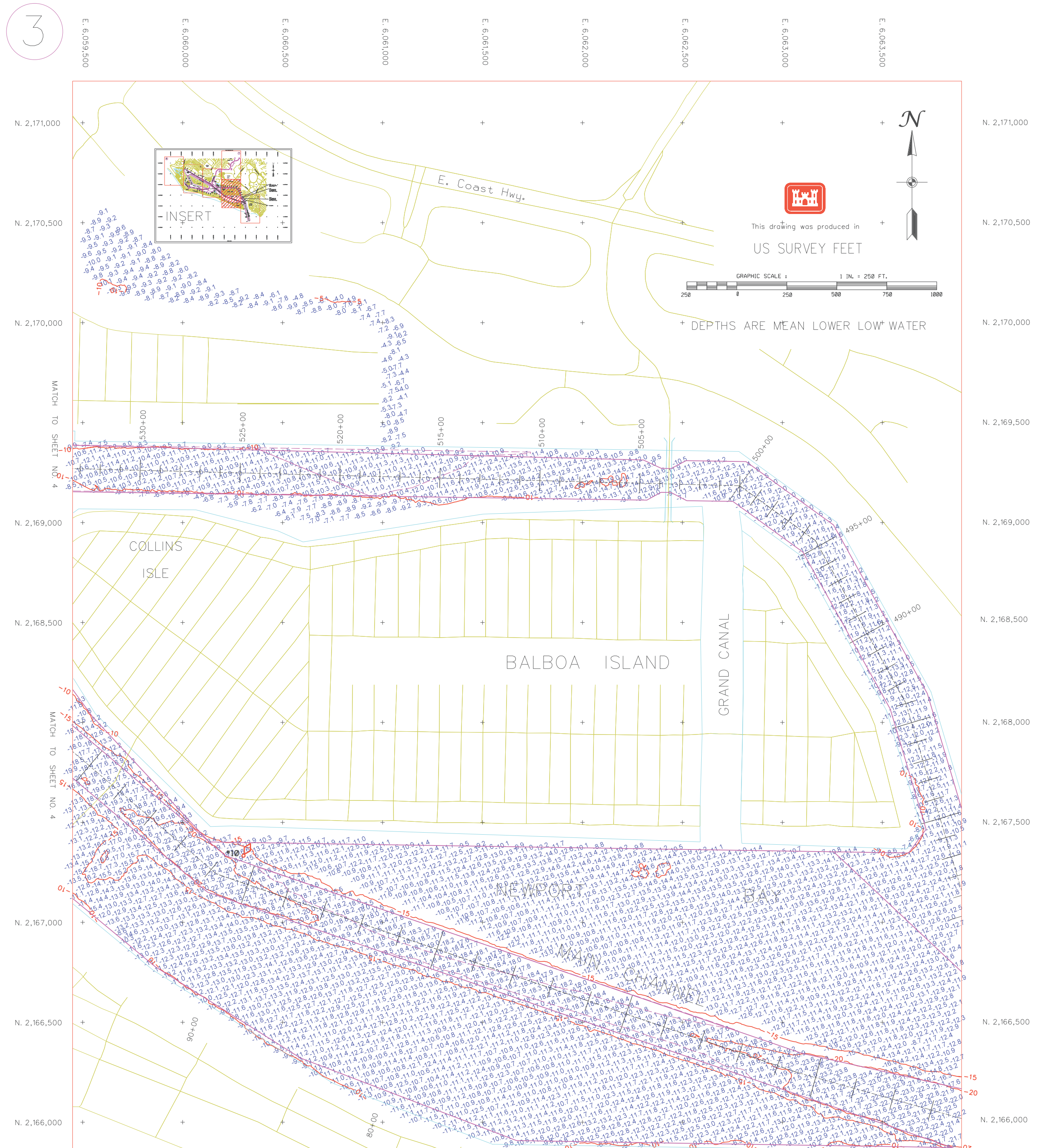

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SHEET REFERENCE NUMBER 3
SHEET 3 of 6

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 13, 2019
DISTRICT FILE NO: I-815
PLOT SCALE: 1 IN. = 250 FT.
DISTRICT FILE NAME: NB2019_07_cond_3.dgn

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TYLER T. OVERMIRE

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CAMERON J. AMICK

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

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

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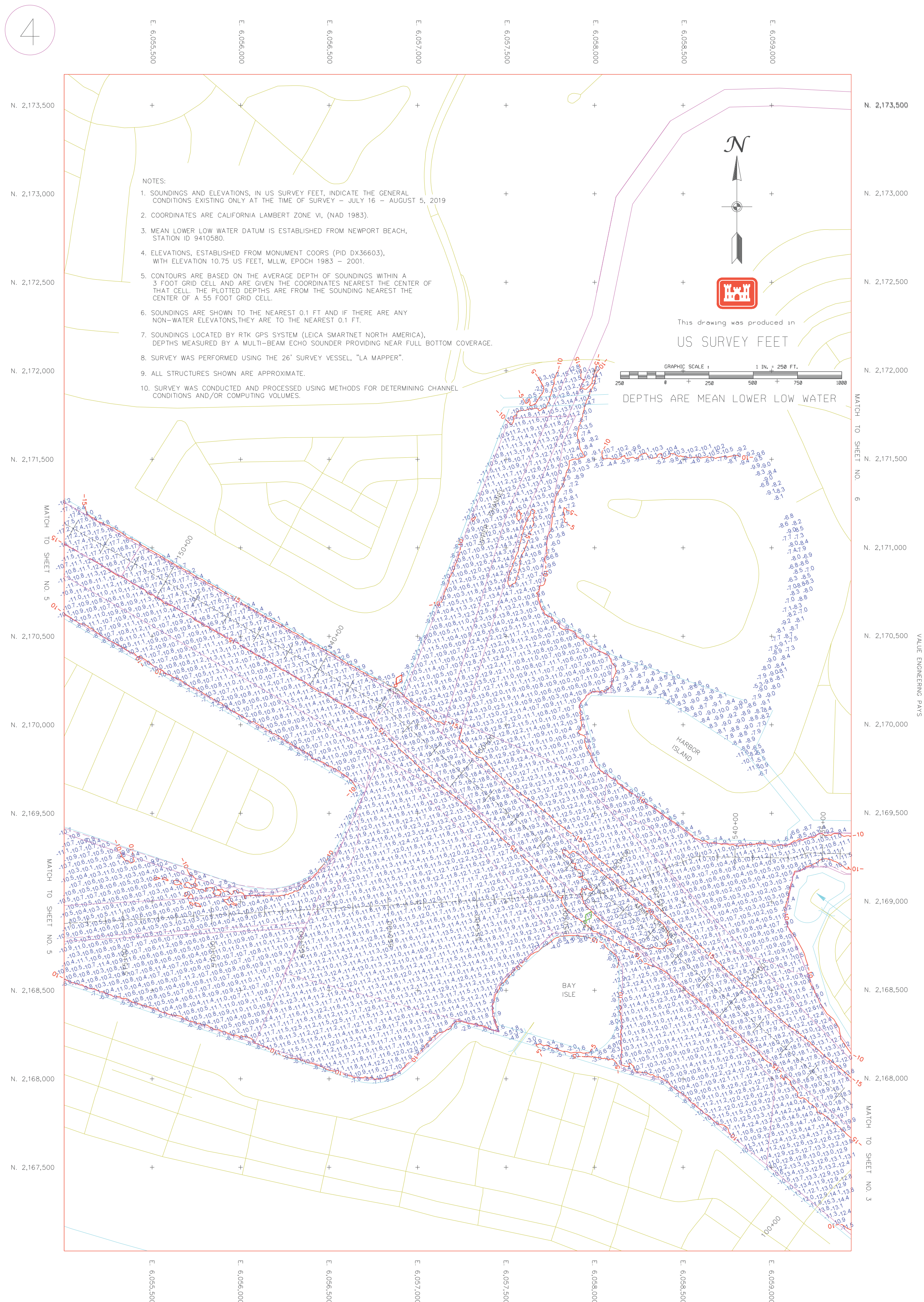
LOS ANGELES DISTRICT



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SHEET REFERENCE NUMBER 4 SHEET 4 of 6	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 DISTRICT FILE NAME: NB2019_07_cond_4.dgn	PLOT DATE: NOVEMBER 13, 2019 DISTRICT FILE NO: I-816 PLOT SCALE: 1 IN. = 250 FT.

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OVERMIRE.TYLER.T.1393620990 Digitally signed by OVERMIRE.TYLER.T.1393620990 Date: 2019.11.13 10:48:37 -08'00' TYLER T. OVERMIRE	AMICK.CAMERON.JAY.1264743385 Digitally signed by AMICK.CAMERON.JAY.1264743385 Date: 2019.11.13 10:58:40 -08'00' CAMERON J. AMICK	ALAN A. NICHOLS, P.L.S. CHIEF, SURVEY & MAPPING SEC.

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

US ARMY
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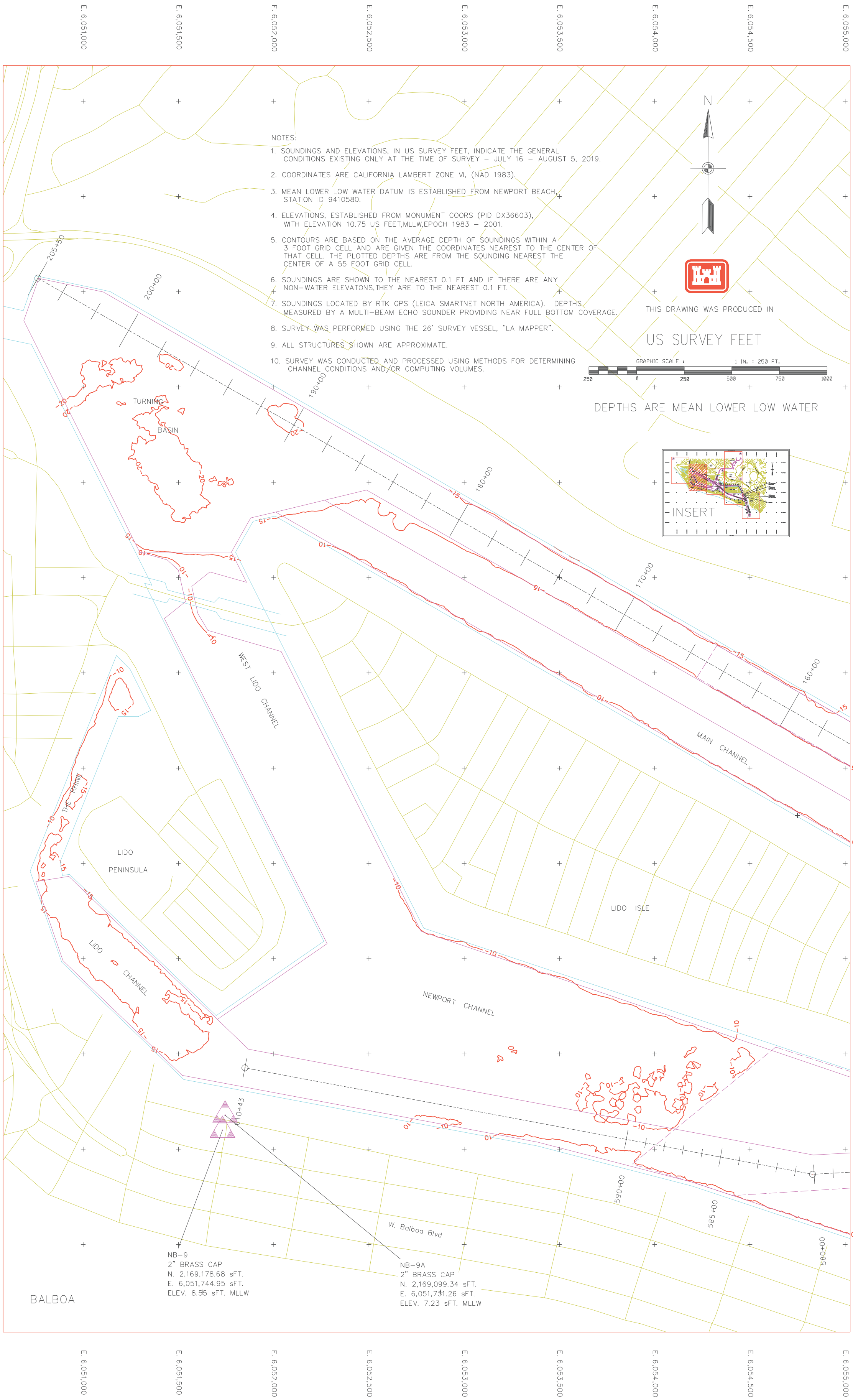
LOS ANGELES DISTRICT

5



SAFETY PAYS

VALUE ENGINEERING PAYS

SHEET REFERENCE NUMBER: 5

SHEET 5 of 6

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:	PLOT DATE:
MR. UMUKORO MR. OVERMIRE	NOVEMBER 13, 2019
	DISTRICT FILE NO: I-817
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DISTRICT FILE NAME: NB2019_07_cond_5.dgn	

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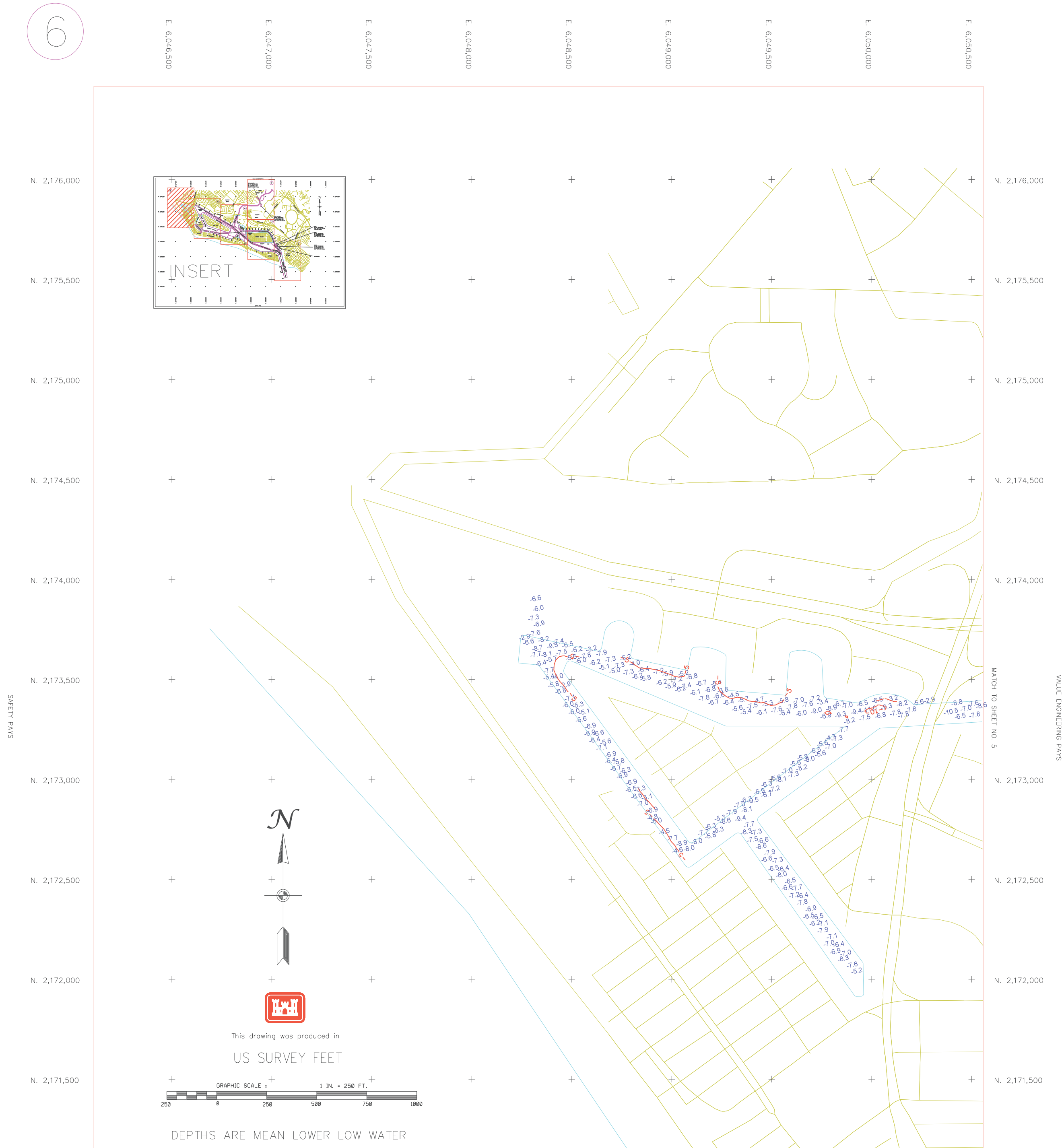
TYLER T. OVERMIRE	CAMERON J. AMICK	ALAN A. NICHOLS, P.L.S. CHIEF, SURVEY & MAPPING SEC.

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

US ARMY
Corps of Engineers
Los Angeles District

6



DEPTHS ARE MEAN LOWER LOW WATER

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N. 2,171,000 — N. 2,170,500 — N. 2,170,000

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SHEET REFERENCE NUMBER : 6

SHEET 6 of 6

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 13, 2019

DISTRICT FILE NO: I-818

PLOT SCALE: 1 IN. = 250 FT.

DISTRICT FILE NAME: NB2019_07_cond_6.dgn

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CHECKED BY: AMICK.CAMERON.JAY.1264743385 (Digitally signed by AMICK.CAMERON.JAY.1264743385 Date: 2019.11.13 10:59:36 -08'00') CAMERON J. AMICK

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

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

US ARMY
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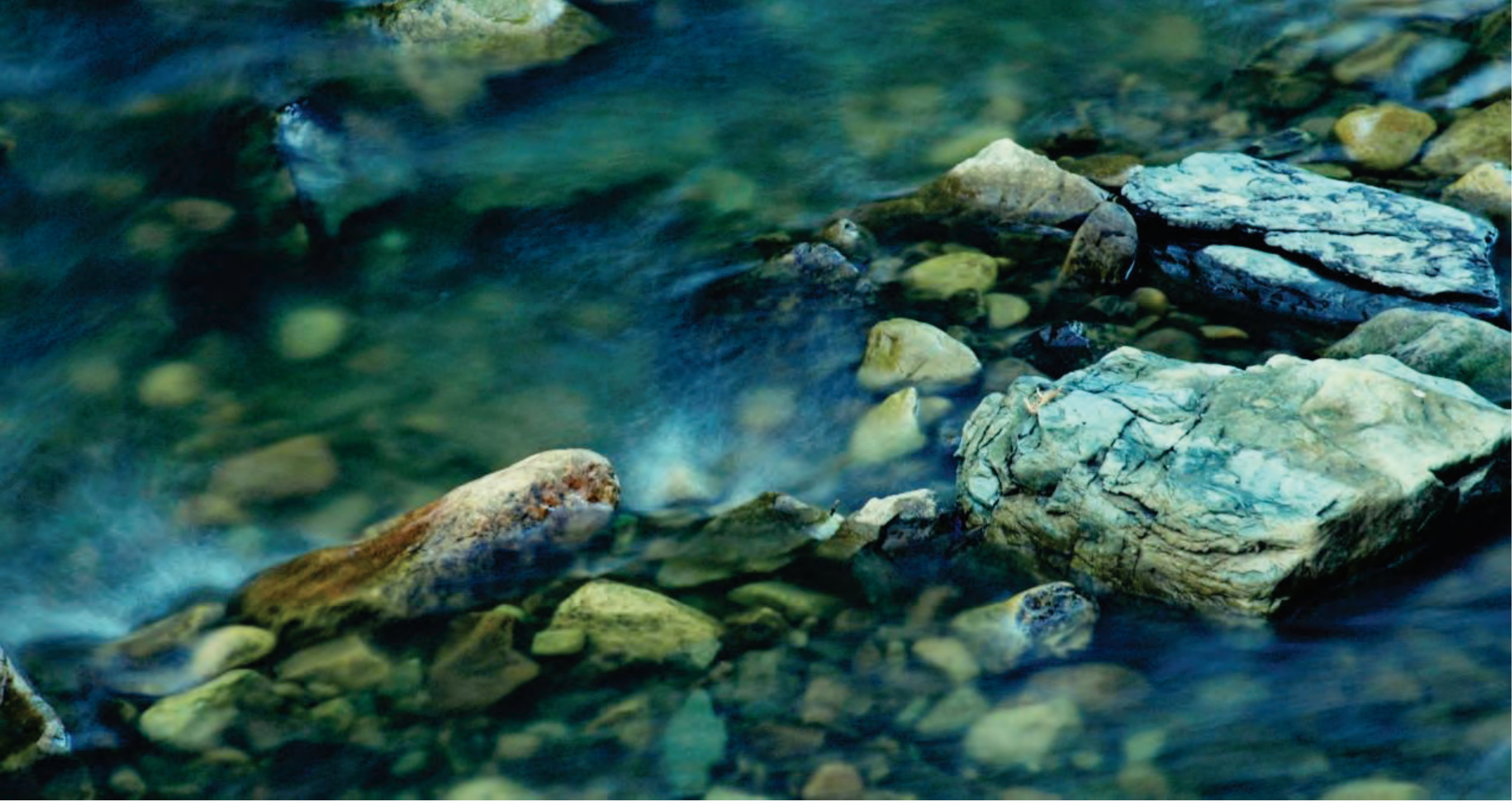
Appendix B
Sampling and Analysis Program Report



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
100 Civic Center Drive
Newport Beach, California 92660

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

Project Number: 180243-02.01

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

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
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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	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
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	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
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	ERL	ERM	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
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	ERL	ERM	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
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

Sample ID / Sample Date / Matrix			TB-01-011218	TB-02-011218	TB-03-011218	TB-04-011218	TB-05-011218	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
			1/12/2018	1/12/2018	1/12/2018	1/12/2018	1/12/2018	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
			SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Chemical	**ERL**	**ERM**																					
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**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

		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
Chemical	**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	ERL	ERM	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
Sample Date			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
Matrix			SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	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	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
		Sample ID Sample Date Matrix												
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	ERL	ERM	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
		Sample Date	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
		Matrix	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	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	ERL	ERM	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
		Sample ID	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
		Sample Date	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
		Matrix	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	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

Chemical	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
	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		LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
	ERL	ERM			
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		LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
	ERL	ERM			
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		LA3-REF-021219 2/12/2019 SE	NC2-COMP 2/25/2019 SE	NC3-COMP 2/25/2019 SE
	ERL	**ERM**			
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	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	TB	TB	TB	TB	TB	MCN1	MCN1	MCN1	MCN1	MCN1	MCN2	MCN2	MCN2
	Sample ID	T0-A-MACOMA-012418	LA3-REF-A-MACOMA-022218	LA3-REF-B-MACOMA-022218	LA3-REF-C-MACOMA-022218	LA3-REF-D-MACOMA-022218	LA3-REF-E-MACOMA-022218	TB-COMP-A-MACOMA-022218	TB-COMP-B-MACOMA-022218	TB-COMP-C-MACOMA-022218	TB-COMP-D-MACOMA-022218	TB-COMP-E-MACOMA-022218	MCN1-COMP-T-A-MACOMA-022218	MCN1-COMP-T-B-MACOMA-022218	MCN1-COMP-T-C-MACOMA-022218	MCN1-COMP-T-D-MACOMA-022218	MCN1-COMP-T-E-MACOMA-022218	MCN2-COMP-T-A-MACOMA-022218	MCN2-COMP-T-B-MACOMA-022218	MCN2-COMP-T-C-MACOMA-022218
	Sample Date	1/24/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	FDA Action Level																			
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

Location ID		Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	TB	TB	TB	TB	TB	MCN1	MCN1	MCN1	MCN1	MCN1	MCN2	MCN2	MCN2
Sample ID		T0-A-MACOMA-012418	LA3-REF-A-MACOMA-022218	LA3-REF-B-MACOMA-022218	LA3-REF-C-MACOMA-022218	LA3-REF-D-MACOMA-022218	LA3-REF-E-MACOMA-022218	TB-COMP-A-MACOMA-022218	TB-COMP-B-MACOMA-022218	TB-COMP-C-MACOMA-022218	TB-COMP-D-MACOMA-022218	TB-COMP-E-MACOMA-022218	MCN1-COMP-T-A-MACOMA-022218	MCN1-COMP-T-B-MACOMA-022218	MCN1-COMP-T-C-MACOMA-022218	MCN1-COMP-T-D-MACOMA-022218	MCN1-COMP-T-E-MACOMA-022218	MCN2-COMP-T-A-MACOMA-022218	MCN2-COMP-T-B-MACOMA-022218	MCN2-COMP-T-C-MACOMA-022218
Sample Date		1/24/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
Matrix		TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	**FDA Action Level**																			
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	0.098 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

	Location ID	MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
	Sample ID	MCN2-COMP-T-D-MACOMA-022218	MCN2-COMP-T-E-MACOMA-022218	MCN3-COMP-A-MACOMA-022218	MCN3-COMP-B-MACOMA-022218	MCN3-COMP-C-MACOMA-022218	MCN3-COMP-D-MACOMA-022218	MCN3-COMP-E-MACOMA-022218	MCN4-COMP-A-MACOMA-022218	MCN4-COMP-B-MACOMA-022218	MCN4-COMP-C-MACOMA-022218	MCN4-COMP-D-MACOMA-022218	MCN4-COMP-E-MACOMA-022218	MCN5-COMP-A-MACOMA-022218	MCN5-COMP-B-MACOMA-022218	MCN5-COMP-C-MACOMA-022218	MCN5-COMP-D-MACOMA-022218	MCN5-COMP-E-MACOMA-022218	BIN-COMP-T-A-MACOMA-022218	BIN-COMP-T-B-MACOMA-022218
	Sample Date	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	FDA Action Level																			
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

	Location ID	MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
	Sample ID	MCN2-COMP-T-D-MACOMA-022218	MCN2-COMP-T-E-MACOMA-022218	MCN3-COMP-A-MACOMA-022218	MCN3-COMP-B-MACOMA-022218	MCN3-COMP-C-MACOMA-022218	MCN3-COMP-D-MACOMA-022218	MCN3-COMP-E-MACOMA-022218	MCN4-COMP-A-MACOMA-022218	MCN4-COMP-B-MACOMA-022218	MCN4-COMP-C-MACOMA-022218	MCN4-COMP-D-MACOMA-022218	MCN4-COMP-E-MACOMA-022218	MCN5-COMP-A-MACOMA-022218	MCN5-COMP-B-MACOMA-022218	MCN5-COMP-C-MACOMA-022218	MCN5-COMP-D-MACOMA-022218	MCN5-COMP-E-MACOMA-022218	BIN-COMP-T-A-MACOMA-022218	BIN-COMP-T-B-MACOMA-022218
	Sample Date	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	**FDA Action Level**																			
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

	Location ID	BIN	BIN	BIN	BIME	BIME	BIME	BIME	BIME	BIMW	BIMW	BIMW	BIMW	BIMW	BIS	BIS	BIS	BIS	BIS
	Sample ID	**BIN-COMP-T-C-MACOMA-022218**	**BIN-COMP-T-D-MACOMA-022218**	**BIN-COMP-T-E-MACOMA-022218**	**BIME-COMP-T-M-A-MACOMA-022218**	**BIME-COMP-T-M-B-MACOMA-022218**	**BIME-COMP-T-M-C-MACOMA-022218**	**BIME-COMP-T-M-D-MACOMA-022218**	**BIME-COMP-T-M-E-MACOMA-022218**	**BIMW-COMP-T-M-A-MACOMA-022218**	**BIMW-COMP-T-M-B-MACOMA-022218**	**BIMW-COMP-T-M-C-MACOMA-022218**	**BIMW-COMP-T-M-D-MACOMA-022218**	**BIMW-COMP-T-M-E-MACOMA-022218**	**BIS-COMP-A-MACOMA-022218**	**BIS-COMP-B-MACOMA-022218**	**BIS-COMP-C-MACOMA-022218**	**BIS-COMP-D-MACOMA-022218**	**BIS-COMP-E-MACOMA-022218**
	Sample Date	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**	**2/22/2018**
	Matrix	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**	**TBIO**
Chemical	**FDA Action Level**																		
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	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	TB	TB	TB	TB	TB	MCN1	MCN1	MCN1	MCN1	MCN1	MCN2	MCN2	MCN2
	Sample ID	T0-A-NEREIS-012418	LA3-REF-A-NEREIS-022218	LA3-REF-B-NEREIS-022218	LA3-REF-C-NEREIS-022218	LA3-REF-D-NEREIS-022218	LA3-REF-E-NEREIS-022218	TB-COMP-A-NEREIS-022218	TB-COMP-B-NEREIS-022218	TB-COMP-C-NEREIS-022218	TB-COMP-D-NEREIS-022218	TB-COMP-E-NEREIS-022218	MCN1-COMP-T-A-NEREIS-022218	MCN1-COMP-T-B-NEREIS-022218	MCN1-COMP-T-C-NEREIS-022218	MCN1-COMP-T-D-NEREIS-022218	MCN1-COMP-T-E-NEREIS-022218	MCN2-COMP-T-A-NEREIS-022218	MCN2-COMP-T-B-NEREIS-022218	MCN2-COMP-T-C-NEREIS-022218
	Sample Date	1/24/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	**FDA Action Level**																			
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

Location ID		Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	TB	TB	TB	TB	TB	MCN1	MCN1	MCN1	MCN1	MCN1	MCN2	MCN2	MCN2
Sample ID		T0-A-NEREIS-012418	LA3-REF-A-NEREIS-022218	LA3-REF-B-NEREIS-022218	LA3-REF-C-NEREIS-022218	LA3-REF-D-NEREIS-022218	LA3-REF-E-NEREIS-022218	TB-COMP-A-NEREIS-022218	TB-COMP-B-NEREIS-022218	TB-COMP-C-NEREIS-022218	TB-COMP-D-NEREIS-022218	TB-COMP-E-NEREIS-022218	MCN1-COMP-T-A-NEREIS-022218	MCN1-COMP-T-B-NEREIS-022218	MCN1-COMP-T-C-NEREIS-022218	MCN1-COMP-T-D-NEREIS-022218	MCN1-COMP-T-E-NEREIS-022218	MCN2-COMP-T-A-NEREIS-022218	MCN2-COMP-T-B-NEREIS-022218	MCN2-COMP-T-C-NEREIS-022218
Sample Date		1/24/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
Matrix		TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	FDA Action Level																			
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	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

Location ID		MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
Sample ID		MCN2-COMP-T-D-NEREIS-022218	MCN2-COMP-T-E-NEREIS-022218	MCN3-COMP-A-NEREIS-022218	MCN3-COMP-B-NEREIS-022218	MCN3-COMP-C-NEREIS-022218	MCN3-COMP-D-NEREIS-022218	MCN3-COMP-E-NEREIS-022218	MCN4-COMP-A-NEREIS-022218	MCN4-COMP-B-NEREIS-022218	MCN4-COMP-C-NEREIS-022218	MCN4-COMP-D-NEREIS-022218	MCN4-COMP-E-NEREIS-022218	MCN5-COMP-A-NEREIS-022218	MCN5-COMP-B-NEREIS-022218	MCN5-COMP-C-NEREIS-022218	MCN5-COMP-D-NEREIS-022218	MCN5-COMP-E-NEREIS-022218	BIN-COMP-T-A-NEREIS-022218	BIN-COMP-T-B-NEREIS-022218
Sample Date		2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
Matrix		TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	FDA Action Level																			
Conventional Parameters (%)																				
Lipids	--	**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**
Metals (mg/kg)																				
Mercury	1[1]	**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**
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	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
2,4'-DDE (o,p'-DDE)	5,000[2]	**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**
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	0.31 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
4,4'-DDD (p,p'-DDD)	--	**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**
4,4'-DDE (p,p'-DDE)	5,000[2]	**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**
4,4'-DDT (p,p'-DDT)	5,000[2]	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
Total DDx (U = 0)	5,000[2]	**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**
PCB Congeners (µg/kg)																				
PCB-018	--	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
PCB-028	--	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
PCB-037	--	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
PCB-044	--	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
PCB-049	--	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
PCB-052	--	**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**
PCB-066	--	**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
PCB-070	--	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
PCB-074	--	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
PCB-077	--	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
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	0.11 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	--	**0.45**	**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**
PCB-101	--	**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**
PCB-105	--	**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
PCB-110	--	**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**
PCB-114	--	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
PCB-118	--	**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**
PCB-119	--	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
PCB-123	--	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
PCB-126	--	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
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	--	**1.7**	**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**
PCB-138/158	--	**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**
PCB-149	--	**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**
PCB-151	--	**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
PCB-156	--	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
PCB-157	--	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
PCB-167	--	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
PCB-168	--	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
PCB-169	--	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
PCB-170	--	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**
PCB-177	--	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
PCB-180	--	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
PCB-183	--	**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
PCB-187	--	**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**
PCB-189	--	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	BIN	BIME	BIME	BIME	BIME	BIME	BIMW	BIMW	BIMW	BIMW	BIMW	BIS	BIS	BIS	BIS	BIS
	Sample ID	BIN-COMP-T-C-NEREIS-022218	BIN-COMP-T-D-NEREIS-022218	BIN-COMP-T-E-NEREIS-022218	BIME-COMP-T-M-A-NEREIS-022218	BIME-COMP-T-M-B-NEREIS-022218	BIME-COMP-T-M-C-NEREIS-022218	BIME-COMP-T-M-D-NEREIS-022218	BIME-COMP-T-M-E-NEREIS-022218	BIMW-COMP-T-M-A-NEREIS-022218	BIMW-COMP-T-M-B-NEREIS-022218	BIMW-COMP-T-M-C-NEREIS-022218	BIMW-COMP-T-M-D-NEREIS-022218	BIMW-COMP-T-M-E-NEREIS-022218	BIS-COMP-A-NEREIS-022218	BIS-COMP-B-NEREIS-022218	BIS-COMP-C-NEREIS-022218	BIS-COMP-D-NEREIS-022218	BIS-COMP-E-NEREIS-022218
	Sample Date	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	FDA Action Level																		
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

	Location ID	BIN	BIN	BIN	BIME	BIME	BIME	BIME	BIME	BIMW	BIMW	BIMW	BIMW	BIMW	BIS	BIS	BIS	BIS	BIS
	Sample ID	BIN-COMP-T-C-NEREIS-022218	BIN-COMP-T-D-NEREIS-022218	BIN-COMP-T-E-NEREIS-022218	BIME-COMP-T-M-A-NEREIS-022218	BIME-COMP-T-M-B-NEREIS-022218	BIME-COMP-T-M-C-NEREIS-022218	BIME-COMP-T-M-D-NEREIS-022218	BIME-COMP-T-M-E-NEREIS-022218	BIMW-COMP-T-M-A-NEREIS-022218	BIMW-COMP-T-M-B-NEREIS-022218	BIMW-COMP-T-M-C-NEREIS-022218	BIMW-COMP-T-M-D-NEREIS-022218	BIMW-COMP-T-M-E-NEREIS-022218	BIS-COMP-A-NEREIS-022218	BIS-COMP-B-NEREIS-022218	BIS-COMP-C-NEREIS-022218	BIS-COMP-D-NEREIS-022218	BIS-COMP-E-NEREIS-022218
	Sample Date	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018	2/22/2018
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemical	**FDA Action Level**																		
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

	Location ID	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	NC2	NC2	NC2	NC2	NC2	NC3	NC3	NC3	NC3	NC3
	Sample ID	T0-A-MACOMA-022619	LA3-REF-A-MACOMA-032719	LA3-REF-B-MACOMA-032719	LA3-REF-C-MACOMA-032719	LA3-REF-D-MACOMA-032719	LA3-REF-E-MACOMA-032719	NC2-COMP-A-MACOMA-032719	NC2-COMP-B-MACOMA-032719	NC2-COMP-C-MACOMA-032719	NC2-COMP-D-MACOMA-032719	NC2-COMP-E-MACOMA-032719	NC3-COMP-A-MACOMA-032719	NC3-COMP-B-MACOMA-032719	NC3-COMP-C-MACOMA-032719	NC3-COMP-D-MACOMA-032719	NC3-COMP-E-MACOMA-032719
	Sample Date	2/26/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemicals	**FDA Action Level**																
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

	Location ID	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	NC2	NC2	NC2	NC2	NC2	NC3	NC3	NC3	NC3	NC3
	Sample ID	T0-A-NEREIS-022619	LA3-REF-A-NEREIS-032719	LA3-REF-B-NEREIS-032719	LA3-REF-C-NEREIS-032719	LA3-REF-D-NEREIS-032719	LA3-REF-E-NEREIS-032719	NC2-COMP-A-NEREIS-032719	NC2-COMP-B-NEREIS-032719	NC2-COMP-C-NEREIS-032719	NC2-COMP-D-NEREIS-032719	NC2-COMP-E-NEREIS-032719	NC3-COMP-A-NEREIS-032719	NC3-COMP-B-NEREIS-032719	NC3-COMP-C-NEREIS-032719	NC3-COMP-D-NEREIS-032719	NC3-COMP-E-NEREIS-032719
	Sample Date	2/26/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019	3/27/2019
	Matrix	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Chemicals	**FDA Action Level**																
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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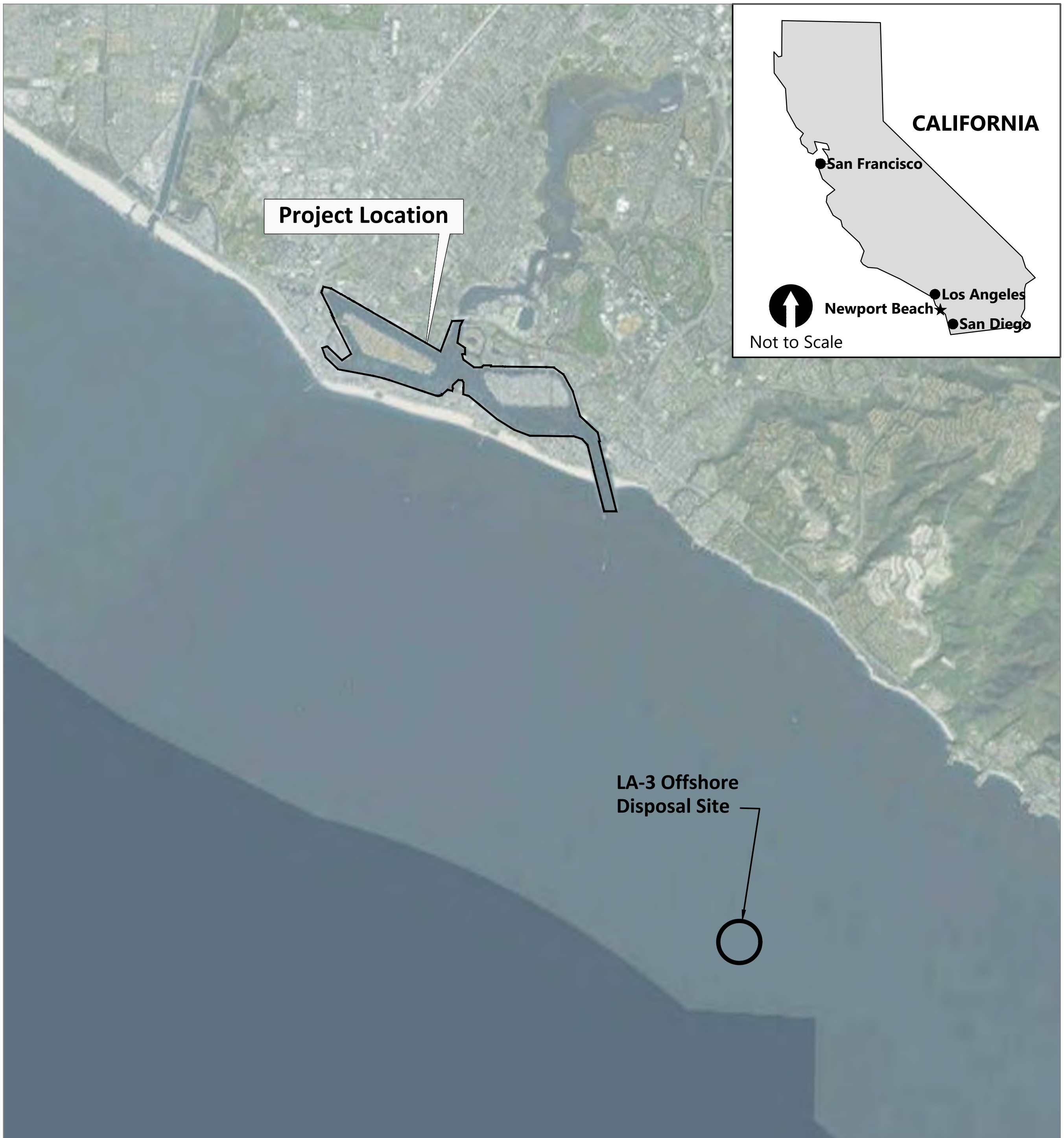
Figures



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'

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

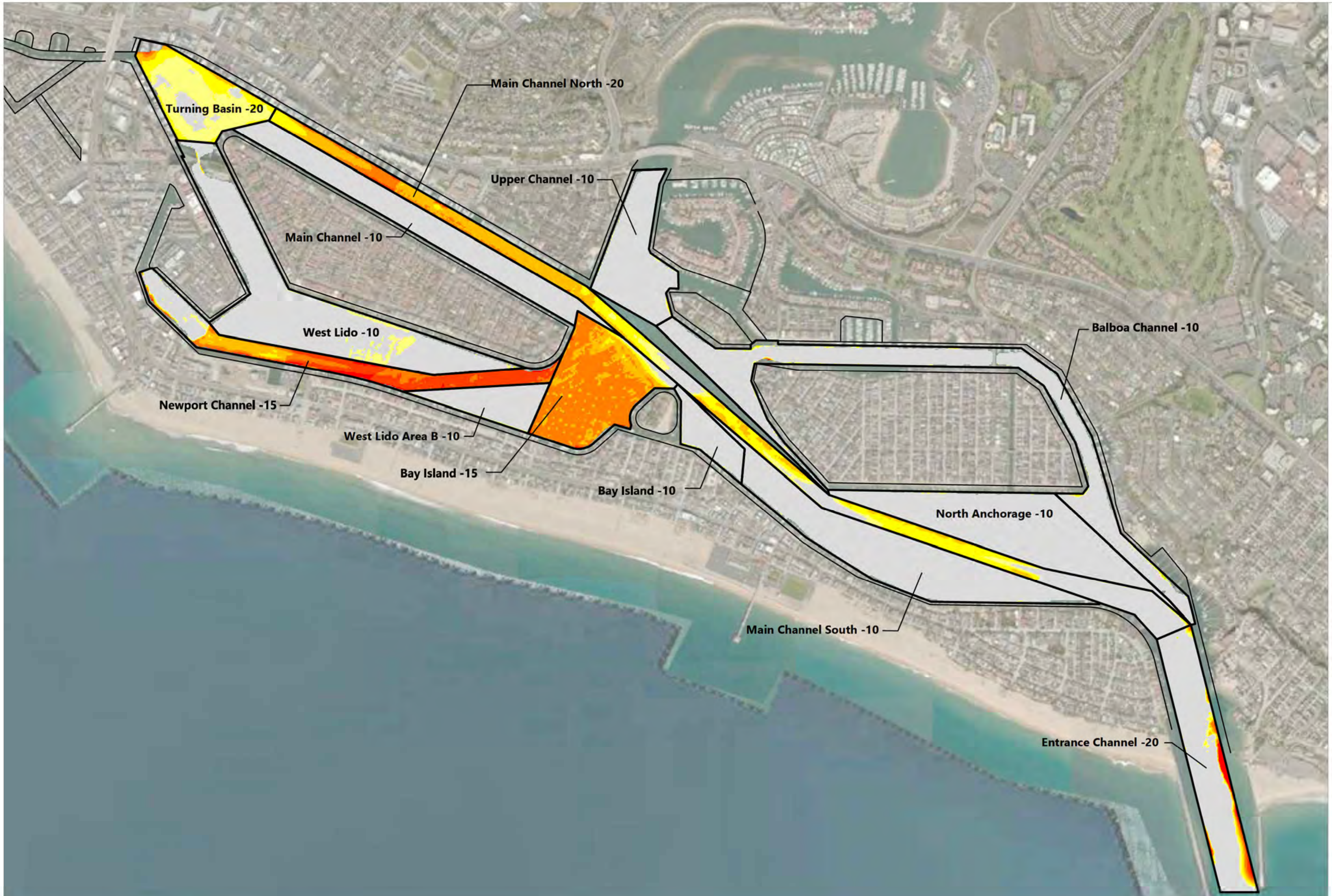
Figure 1
Vicinity Map
Lower Newport Bay Federal Channels Dredging

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).

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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

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

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

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

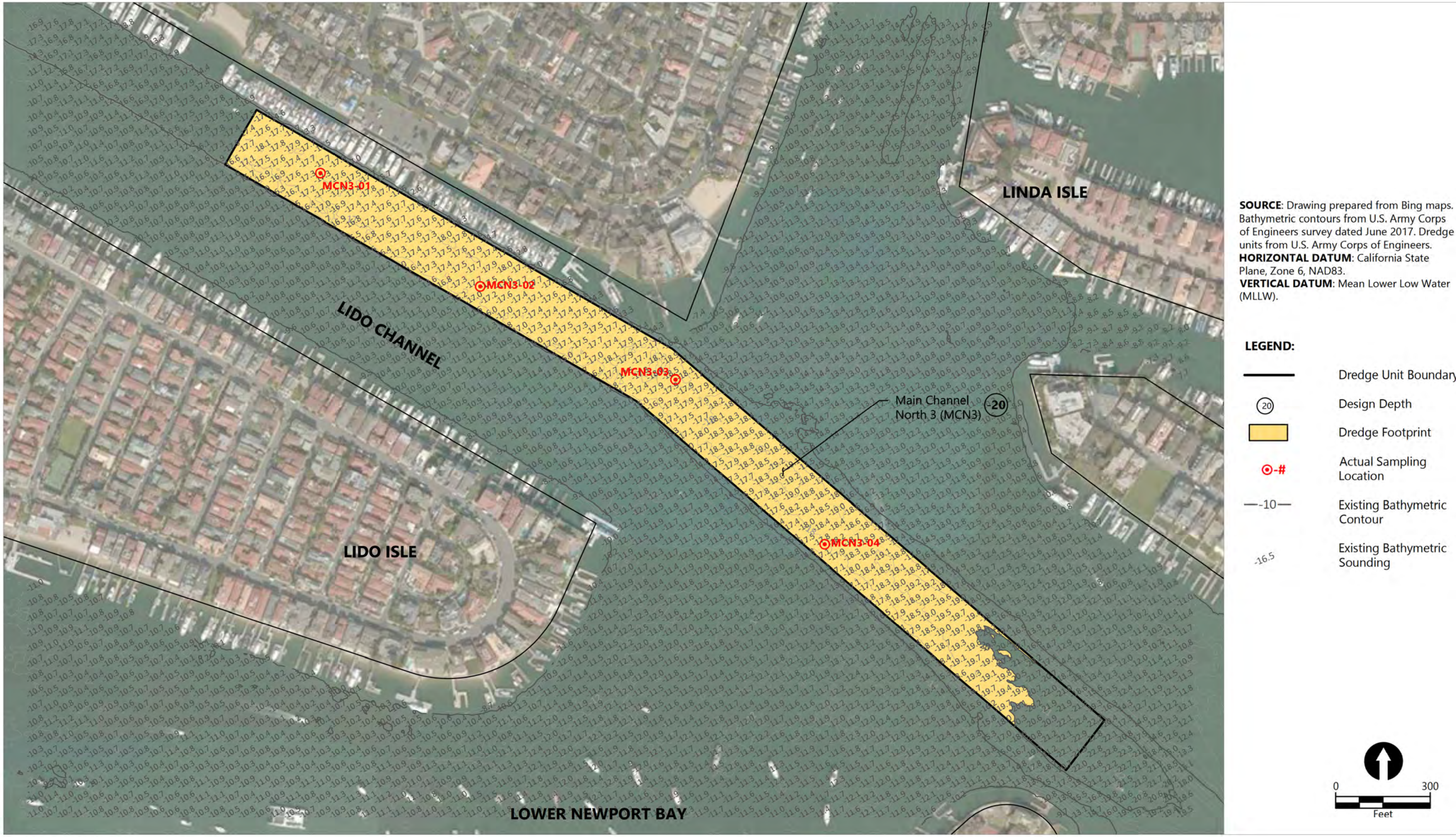
Figure 6
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 1

Lower Newport Bay Federal Channels Dredging

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



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

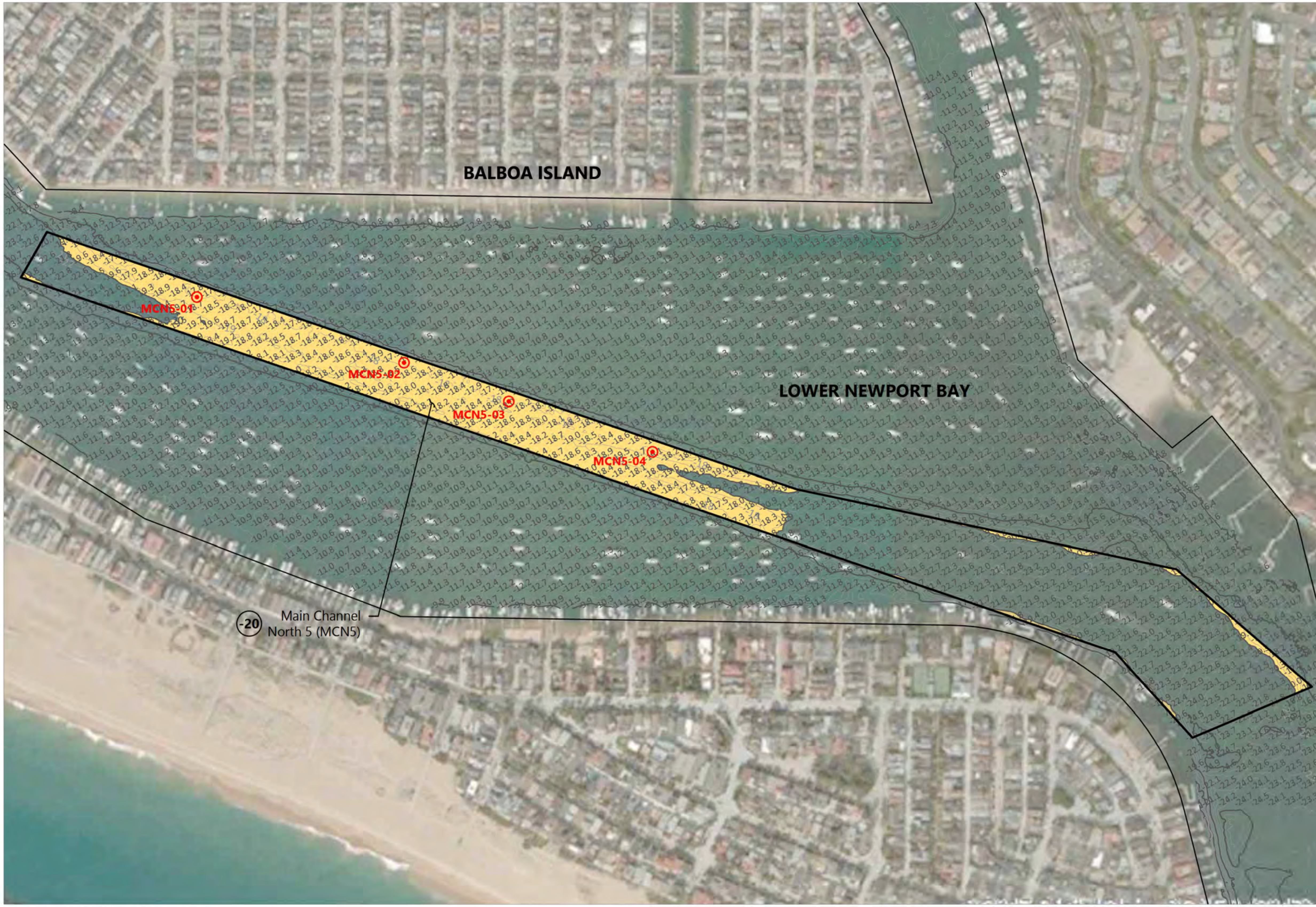
ANCHOR QEA

Figure 8
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 3
Lower Newport Bay Federal Channels Dredging

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:

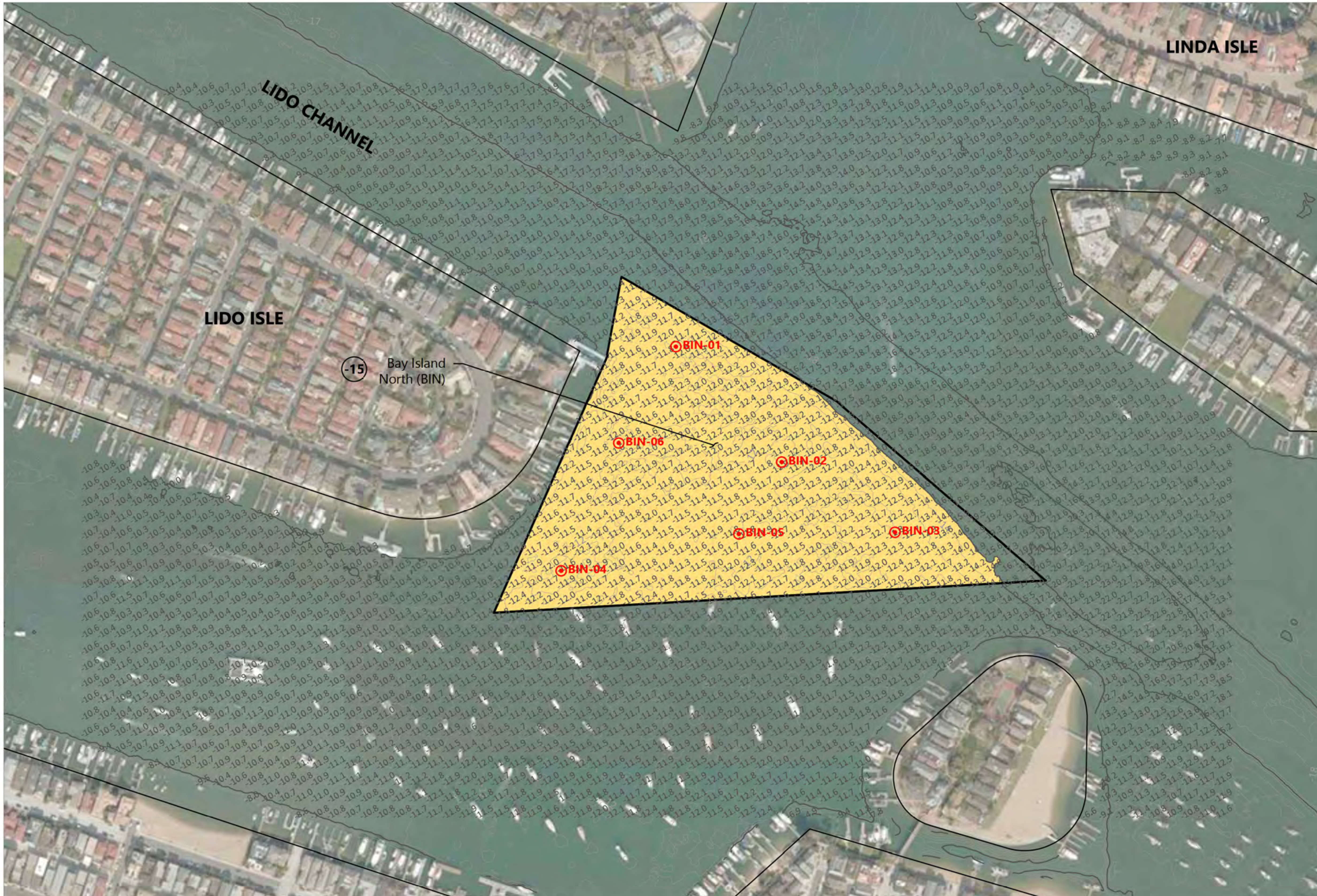
- Dredge Unit Boundary
- (20) Design Depth
- Dredge Footprint
- ⊙-# Actual Sampling Location
- —10— Existing Bathymetric Contour
- -16.5 Existing Bathymetric Sounding

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
- Design Depth
- Dredge Footprint
- Actual Sampling Location
- Existing Bathymetric Contour
- 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

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: 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

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

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

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

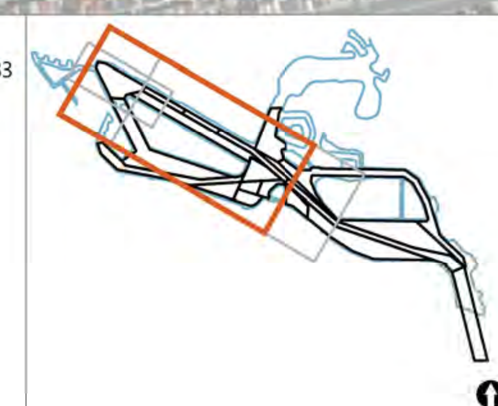
LEGEND:

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

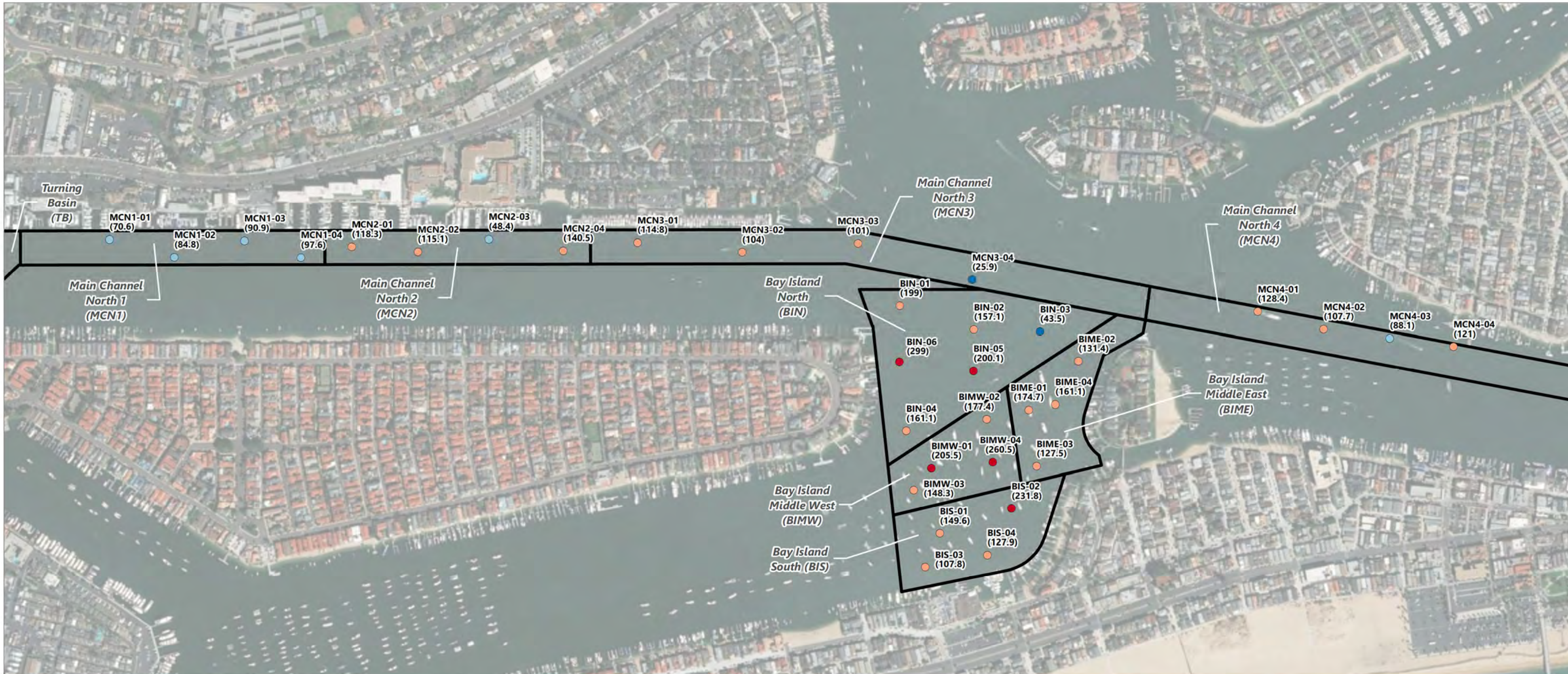


0 1,000
Feet

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 18
Mercury Concentrations for Individual Stations within Turning Basin and Main Channel North 1, 2, and 3
Lower Newport Bay Federal Channels Dredging



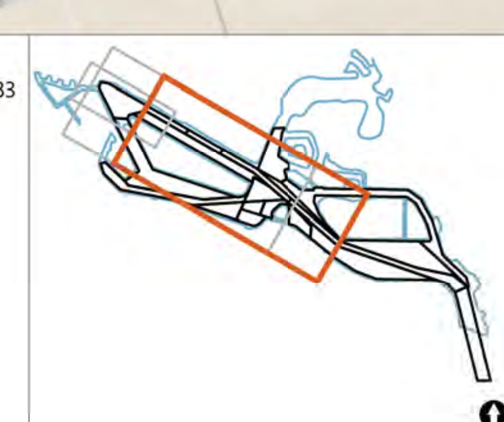
LEGEND:

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



0 1,000
Feet

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

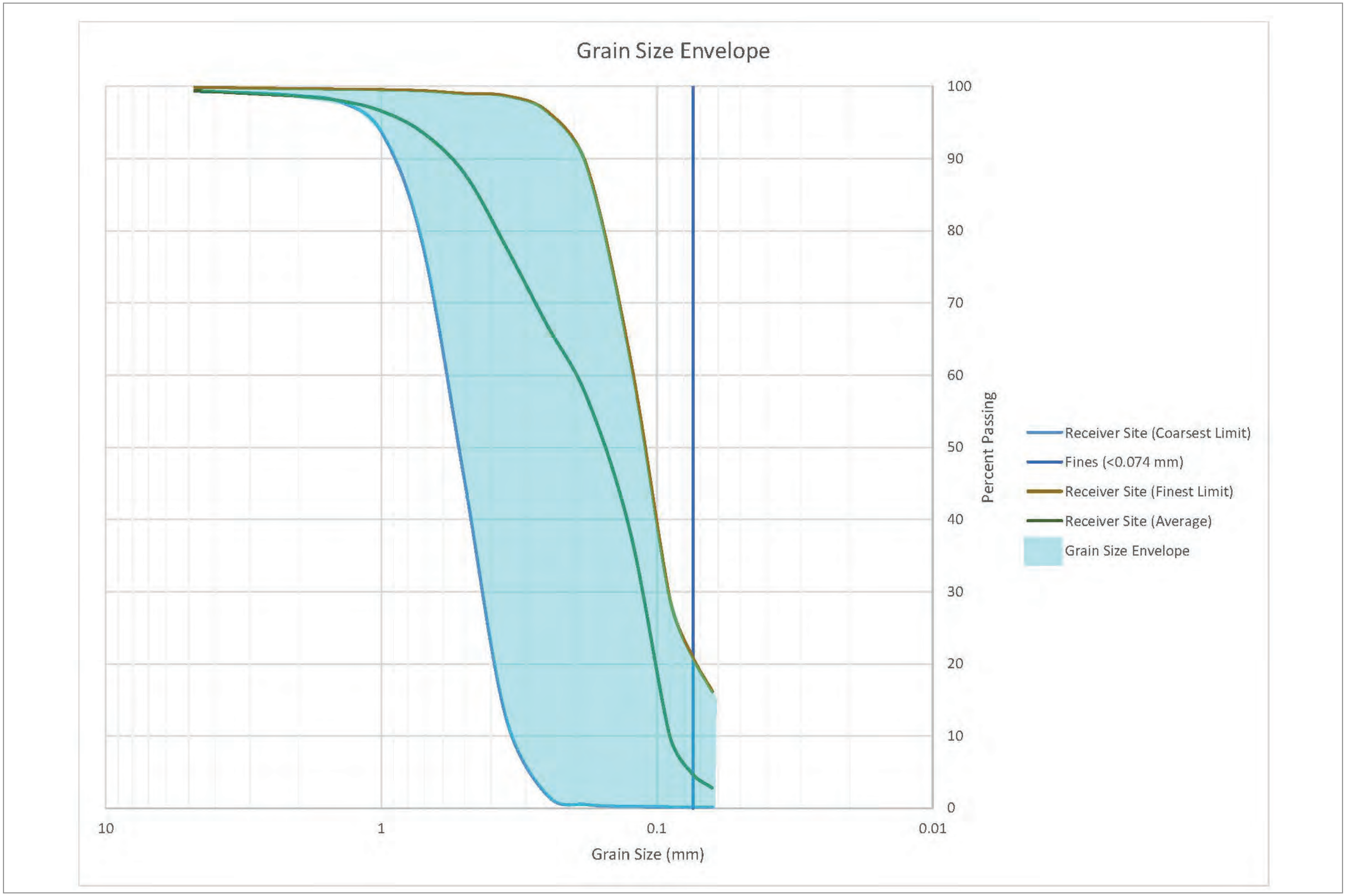
ANCHOR QEA

Figure 20
Total PCB Concentrations for Individual Stations within the Turning Basin
Lower Newport Bay Federal Channels Dredging

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

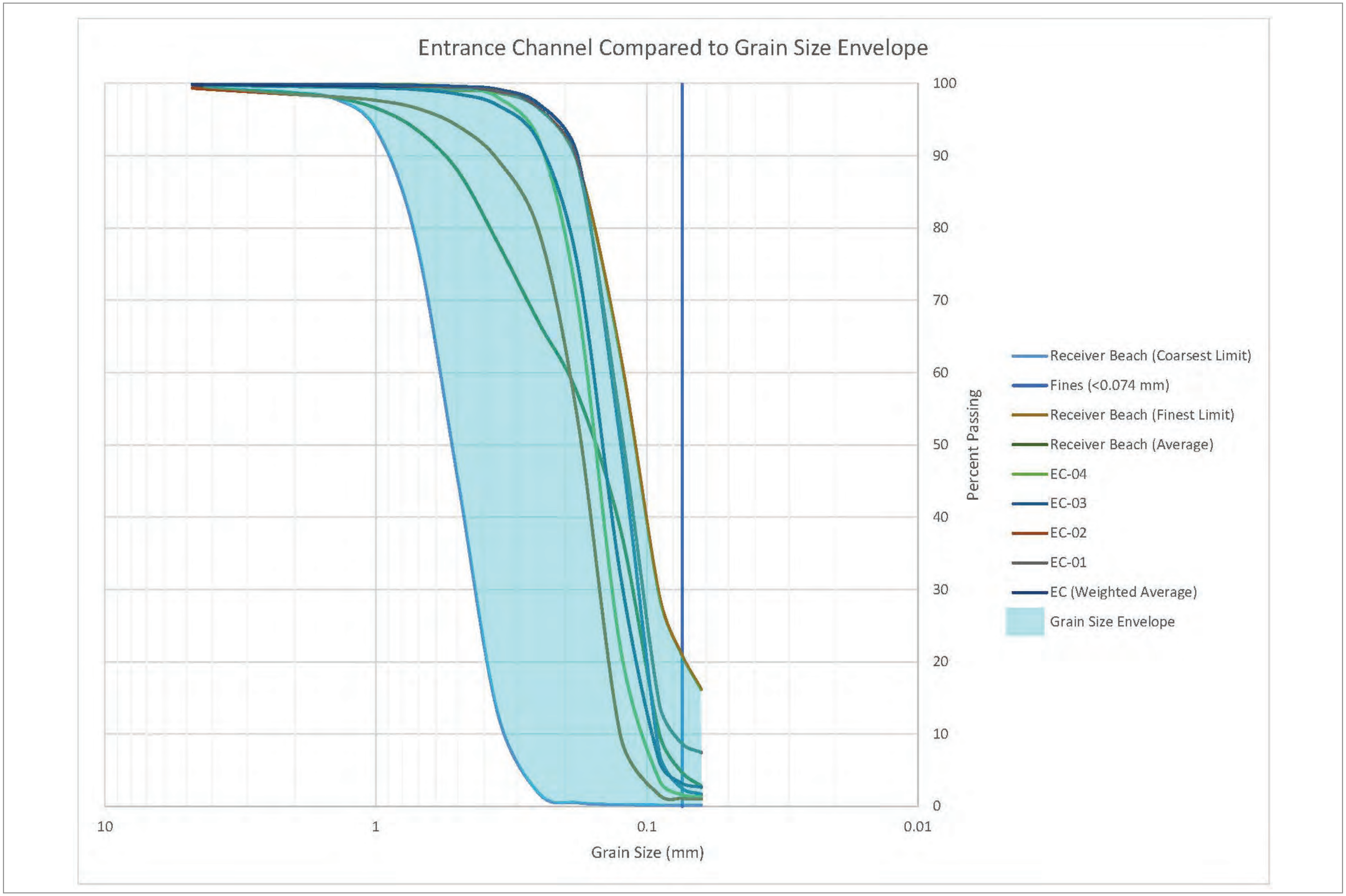
ANCHOR QEA

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



Entrance Channel Compared to Grain Size Envelope
100
90
80
70
60
50
40
30
20
10
0
10
1
0.1
0.01
Grain Size (mm)
Percent Passing
Receiver Beach (Coarsest Limit)
Fines (<0.074 mm)
Receiver Beach (Finest Limit)
Receiver Beach (Average)
EC-04
EC-03
EC-02
EC-01
EC (Weighted Average)
Grain Size Envelope

Appendix A
Field Logs and Photographs

Field Logs for Newport Channel

Sediment Core Collection Form

ANCHOR QEA

Project	Lowe Newport	Date	1/23/19 Time 1115
Station ID	NC1-01	Latitude 33.609171	Longitude -117.924296
Type of Core	Vibracore	Water Depth (ft) 18.1	Tide (ft) 5.8
Mudline Elevation (ft MLLW)	12.3	Target Core Length (ft) ~~8.5~~ 5.2	
Project Depth+Overdepth (ft MLLW)	-17 + 0.5	Penetration Length (ft) 3.3	Core Recovery (ft) 2.2

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	NC1-01-012319	gray, soft, moist, silt
1–2		very dense, damp, fine to med SAND w/ trace shells
2		end @ 2.2
3		
4		
5	Sample discarded ~~after chemical analysis, not composited~~ NC1 composite -CDolphin 5/2/19	
6		
7		
8		hit refusal, core tube bent @ 3.3 ft
9		

1 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 1 of 3

Sediment Core Collection Form

ANCHOR QEA

Project Lower Newport
Date 1/23/19 Time 12:00
Station ID NC1-01
Latitude 33. 609171 Longitude -117. 924296
Type of Core Vibracore
Water Depth (ft) 18.0 Tide (ft) 5.6
Mudline Elevation (ft MLLW)
Target Core Length (ft) 5.2
Project Depth+Overdepth (ft MLLW) -17 ~~+0.5~~ = -17.5
Penetration Length (ft) 2.8 Core Recovery (ft) 2.4

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		gray loose moist silt
1	NC1-01-012319	1.6 very dense damp f to m SAND
2		end @ 2.4
3		
4		Hit refusal @ 28
5	sample discarded, no NC1 composite - C. Dolphin 5/2/19	
6		
7		
8		
9		

1 No. Photos Taken
Recorded By: C. Dolphin
Attempt No. 2 of 3

A-16

Sediment Core Collection Form

ANCHOR QEA

Project: Lower Newport	Date: 1/23/19 Time: 1220
Station ID: NC1-01	Latitude: 33.6091328 Longitude: 117.9241828
Type of Core: Vibracore	Water Depth (ft): 17.3 Tide (ft): 4.6
Mudline Elevation (ft MLLW): -12.7	Target Core Length (ft): 4.8
Project Depth+Overdepth (ft MLLW): -17-10.5-17.5	Penetration Length (ft): ~~12.4~~ 10.0 Core Recovery (ft): 3.2

22

Depth In (ft.) Core Sections	Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–2		NC-01-012319	gray ~~stiff~~ loose moist silt
2–3	2.6	NC1-01-Z-012319	dense / 2.6 very dense, damp, f to m SAND, trace shells
3	3.2		end @ 3.2
4–5			Hit refusal @ 10.0 Z-layer not achieved, bottom 0.5 ft archived
6			
7			
8			
9			

3 No. Photos Taken Recorded By: C. Dolphin Attempt No. 3 of 3

A-19

Sediment Core Collection Form

ANCHOR QEA

Project: Lower Newport
Station ID: NC1-02
Type of Core: Vibracore
Mudline Elevation (ft MLLW): -12.4
Project Depth+Overdepth (ft MLLW): -17.5

Date: 1/23/19
Time: 1345
Latitude: 33.6084648
Longitude: -117.9228653
Water Depth (ft): 15.9
Tide (ft): 2.8
Target Core Length (ft): 5.1
Penetration Length (ft): ~~14.5~~ 13
Core Recovery (ft): ~~6.7~~ 6.6

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–0.8		gray, soft, moist, silt
0.8		med stiff, damp
3–4	NC1-02-012319	
4.9		very dense, fine SAND
5.1 / 5.6	NC1-02-2-012319	
5.7		med to coarse SAND, trace shell hash
	NC1-02-2-~~012319~~ (crossed out)	
6.6		end @ 6.6

3 No. Photos Taken
Recorded By: C. Dolphin
Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project Lower Newport

Station ID NC1-02

Type of Core Vibracore

Mudline Elevation (ft MLLW) -12.9

Project Depth+Overdepth (ft MLLW) -17.0

Date 1/23/19 Time 1400

Latitude 33.608974 Longitude -117.922871

Water Depth (ft) 14.9 Tide (ft) 2.0

Target Core Length (ft) 5.1

Penetration Length (ft) 10.0 Core Recovery (ft) 4.8

Depth In (ft.) / Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–0.4	NC102-012319	gray, soft, wet, silt
0.4–1		med ~~soft~~ dense, ~~moist~~ damp
1		
2		
3		very dense
4		
4.2		very stiff; fine sand
5		end @ 4.8
6	Sample discarded not composited ~~for analysis~~	~~hit refusal @~~
7	no NC1 composite C. Dophin 5/2/19	
8		
9		

2 No. Photos Taken

Recorded By: A. Dolphin

Attempt No. 2 of 2

A-21

Sediment Core Collection Form

ANCHOR QEA

Project Lower Newport

Station ID NC1-03

Type of Core Vibracore

Mudline Elevation (ft MLLW) ~~-10.~~ ~~-10.0~~ 11.4

Project Depth+Overdepth (ft MLLW) -17.5

Date 1/~~24~~31/19 Time 1530

Latitude 33.60876483 Longitude -117.9212872

Water Depth (ft) 11.0 Tide (ft) 0.04

Target Core Length (ft) 6.9

Penetration Length (ft) 5.0 Core Recovery (ft) ~~2.4~~ 3.4

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	NC1-03-012319	gray; soft; moist; silt; slight H_2S
1–2		0.6: stiff; ~~damp~~ damp
2–3		2.4: very dense; 2.4: fine SAND
3–4		end@ 3.4
4–5		
5–6		
6–7		refusal at ~~7.0~~ 5.0 ft
7–8		
8–9		
9–10		

2 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 1 of 3

Sediment Core Collection Form

A-22

ANCHOR QEA

Project: Lower Newport
Station ID: NC1-03
Type of Core: Vibracore
Mudline Elevation (ft MLLW): -11.2
Project Depth+Overdepth (ft MLLW): -17.5

Date: 1/23/19 Time: 1545
Latitude: 33.60876483 Longitude: -117.9212 ~~872~~
Water Depth (ft): 10.9 Tide (ft): +0.25
Target Core Length (ft): 6.3
Penetration Length (ft): ~~4~~5.0 Core Recovery (ft): 2.6

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	NCI-03-012319	gray loose moi~~wet~~ist 0.4 silt; med-stiff ~~med-stiff~~ damp
2		~~very stiff~~ 1.6 ~~very stiff~~ 1.6; 2.0 2.0; very dense; fine SAND w/trace shells
3		end @ 2.6
5	sample discarded after chemical analysis, not composited -C. Dolphin 5/2/19	Hit refusal at 5.0 ft
6–9		

1 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 2 of 3

Sediment Core Collection Form

A-23

ANCHOR QEA

Project: Lower Newport
Station ID: NC1-03
Type of Core: Vibracore
Mudline Elevation (ft MLLW): -11.2
Project Depth+Overdepth (ft MLLW): -17.5

Date: 1/23/19
Time: 1600
Latitude: 33.
Longitude: -117
Water Depth (ft): 10.9
Tide (ft): -0.25
Target Core Length (ft): 6.3
Penetration Length (ft): 5.0
Core Recovery (ft): 3.6

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		gray; soft; ~~moist~~ moist; silt; Slight H_2S odor. 0.4: med-stiff; ~~moist~~ damp
1–3	NC1-03-012319	1.6: stiff; very dense; fine to med ~~sand~~ sand w/ trace shells
3.1–3.6	NC1-03-2-012319	
4		end @ 3.6
5		Refusal @ 5.0 ft. Z-layer not achieved. bottom 0.5 ft archived
6		
7		
8		
9		

2 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 3 of 3

A-24

Sediment Core Collection Form

ANCHOR QEA

Project Lower Newport	Date 1/23/19 Time 1300
Station ID NC1-04	Latitude 33.60853700 Longitude -117.9195315
Type of Core Vibracore	Water Depth (ft) 10.1 Tide (ft) -1.1
Mudline Elevation (ft MLLW) -11.2	Target Core Length (ft) 6.3
Project Depth+Overdepth (ft MLLW) -17.5	Penetration Length (ft) 6.0 Core Recovery (ft) 3.8

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–0.4	NC1-04-012319	gray soft moist silt
0.4–1		med-stiff Damp
2.2		very dense; 2.2 fine sand
3.2–3.3	NC1-04-2-012319	light brown
3.8		end @ 3.8
4		
5		
6		
7		hit refusal at 6.0
8		Z layer ~~not~~ achieved, archived bottom 0.5 foot
9		

2 No. Photos Taken   Recorded By: C. Dolphin   Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project ~~NC-04~~ Lower Newport

Station ID NC1-04

Type of Core Vibracore

Mudline Elevation (ft MLLW) -11.3

Project Depth+Overdepth (ft MLLW) -17.5

Date 1/23/19 Time 1510

Latitude 33.

Longitude -117.

Water Depth (ft) ~~10.7~~ 10.1

Tide (ft) -1.2

Target Core Length (ft) 10.2

Penetration Length (ft) 6.0

Core Recovery (ft) 3.6

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
		gray soft moist silt
		0.4
1		med-stiff damp
2	NC1-04-012319	
		2.4 very dense
		2 fine SAND
3	3.2 – 3.4 light brown	
		end @ 3.6
4		
5		
6		
7		
8		
9		

2 No. Photos Taken

Recorded By: C Dolphin

Attempt No. 2 of 2

Sediment Core Collection Form

A-2c

ANCHOR QEA

Project	Lower Newport	Date	1/24/19 Time 0810
Station ID	NC2-01	Latitude	33.60824700 Longitude -117.91793603
Type of Core	Vibracore	Water Depth (ft)	13.4 Tide (ft) 3.4
Mudline Elevation (ft MLLW)	-10.0	Target Core Length (ft)	7.5
Project Depth+Overdepth (ft MLLW)	-17.5	Penetration Length (ft)	4.9 Core Recovery (ft) 2.6

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	NC2-01-012419	gray-brown; wet very soft 0.6; silt
1–2		moist soft 1.2; med-stiff 1.6; 1.6
2–3		gray 1.9; damp; Dense to very dense; f. to med SAND w/ trace shells
3		end @ 2.6
6		refusal at 4.9 ft
8		Core #1 & 2 bagged together
9		

2 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 1 of 3

A-27

Sediment Core Collection Form

ANCHOR QEA

Project: Newport Channel
Station ID: NC2-01
Type of Core: Vibracore
Mudline Elevation (ft MLLW): -10.4
Project Depth+Overdepth (ft MLLW): 17.5

Date: 1/24/19
Time: 0830
Latitude: 33.6082703
Longitude: 117.9179491
Water Depth (ft): 14.3
Tide (ft): 3.9
Target Core Length (ft): 7.1
Penetration Length (ft): 5.3
Core Recovery (ft): ~~2.6~~ 2.5

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1.5	NC2-01-012419	gray-brown, soft, wet, silt
1.0		~~1.0~~
1.5–2.2	NC2-01-012419	gray 1.5, med stiff 1.5 very dense, moist, fine SAND 1.5
2.2–2.5	NC2-01-2 012419 (2.2–2.5)	light brown-gray 2.2, damp, medium to coarse SAND 2.2, w/ trace shells
3		
4		
5		
6		
7		Refusal @ 5.3 ft
8		slightly bent core tube; archive bottom ½ foot; Z-layer not achieved
9		

— No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 2 of 3

A-28

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport Sediment Sampling
Station ID	NC2-01
Type of Core	Vibracore
Mudline Elevation (ft MLLW)	-10.3
Project Depth+Overdepth (ft MLLW)	-17.5

Date	1/29/19	Time	0850
Latitude	33.	Longitude	-117.
Water Depth (ft)	14.6	Tide (ft)	4.3
Target Core Length (ft)	7.2		
Penetration Length (ft)	4.4	Core Recovery (ft)	2.3

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1.0	NC2-01-012419	brown gray, V. soft to soft, wet, Silt
1.0–1.4		med-stiff, moist
1.4–2.3		gray, dense to V. dense, damp, f to m SAND
2.3		end @ 2.3
6	sample discarded, not composited for analysis -C. Dolphin 5/2/19	Refusal @ 4.4 ft Core tube bent
7		Core #3 bagged separately + marked 'Core #3'

— No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 3 of 3

A-29

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport Sediment Sampling	Date	1/24/19
		Time	1045
Station ID	NC2-02	Latitude	33.60817123
		Longitude	-117.91691892
Type of Core	Vibracore	Water Depth (ft)	16.5
		Tide (ft)	5.4
Mudline Elevation (ft MLLW)	-11.1	Target Core Length (ft)	6.4
Project Depth+Overdepth (ft MLLW)	-17.5	Penetration Length (ft)	6.6
		Core Recovery (ft)	3.7

23

Depth In (ft.) Actual Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–0.4	NC2-02-012419	brown gray; very soft; wet
0.4–1.2		soft; moist
1.2–3.1		med-stiff
3.1–3.6		light brown gray; very dense; damp; f sand
3.6–3.7		m to coarse sand w/ trace shells
3.7		end @ 3.7
		refusal at 6.6 ft
		(new core tube)
		Attempt #1 ~~1&2~~ #1 &2 bagged together

— No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 1 of 3

A.30

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport Sediment Sampling	Date 1/24/19	Time 1100
Station ID	NC2-02	Latitude 33.6081730	Longitude -117.9168917
Type of Core	Vibracore	Water Depth (ft) 16.5	Tide (ft) 5.5
Mudline Elevation (ft MLLW)	-11.0	Target Core Length (ft) 6.5	
Project Depth+Overdepth (ft MLLW)	-17.5	Penetration Length (ft) 7.8	Core Recovery (ft) 3.7

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–0.4	NC2-02-012419	Brown-gray very soft wet silt
0.4–~1.5		soft moist
~1.5–3.3		med-stiff
3.3–3.7	NC2-02-2-012419	3.3 light brown gray very dense damp f-m-c SAND w/ trace shells & gravel 3.7 (f SAND 3.4; 3.6)
		end @ 3.7
7.8		hit refusal @ 7.8 ft.
		(Chemistry here) 2-layer not achieved bottom 0.5 ft archived

2 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 2 of 3

A-31

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport Sediment Sampling	Date 4/24/19	Time 1120
Station ID	NC2-02	Latitude 33.60818	Longitude -117.916894
Type of Core	Vibracore	Water Depth (ft) 16.5	Tide (ft) 5.5
Mudline Elevation (ft MLLW)	-11.0	Target Core Length (ft) 6.5	
Project Depth+Overdepth (ft MLLW)	-17.5	Penetration Length (ft) ~~8.2~~ 7.2	Core Recovery (ft) 3.0

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		gray-brown soft wet ~~moist~~ silt
1		1.0
1–3		med-stiff moist
3		light gray brown very dense damp SAND 2.9
		end @ 3.0
5–6	sample discarded, not composited for analysis -C. Dolphin 5/2/19	
7		refusal @ ~~8~~7.2
8		
9		

No. Photos Taken —

Recorded By: C. Dolphin

Attempt No. 3 of 3

Sediment Core Collection Form

Project	Lower Newport Sediment Sampling	Date 1/24/19	Time 1235
Station ID	NC2-03	Latitude 33.60789786	Longitude -117.91618902
Type of Core	Vibracore	Water Depth (ft) 11.4	Tide (ft) 4.8
Mudline Elevation (ft MLLW)	-11.6	Target Core Length (ft) 5.9	
Project Depth+Overdepth (ft MLLW)	-17.3	Penetration Length (ft) 6.7	Core Recovery (ft) 3.3

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0		brownish-gray very soft wet silt
0.7		soft moist
1	NC2-03-012419	1.1 med-stiff
2.5		gray dense moist f sand 2.6
2.6–3.3		light brown-gray very dense damp m to c SAND w/ trace shells
3.3		end @ 3.3
6.7		hit refusal @ 6.7 ft

3 No. Photos Taken   Recorded By: C Dolphin   Attempt No. 1 of 3

A-33

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport Sediment Sampling	Date	4/24/19
Time	1300		
Station ID	NC2-03	Latitude	33.60789350
Longitude	-117.91162000		
Type of Core	Vibracore	Water Depth (ft)	15.9
Tide (ft)	4.5		
Mudline Elevation (ft MLLW)	-11.4	Target Core Length (ft)	6.1
Project Depth+Overdepth (ft MLLW)	-17.5	Penetration Length (ft)	8.6
Core Recovery (ft)	3.0		

23.
15.
8

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		brown-gray; very soft; wet; silt — 0.6
1–2	NC2-03-042419	soft; moist; med-stiff
2–3		gray; very dense; damp; f SAND — 2.3 (23); light brown gray — 2.5; M to C SAND w/ trace shells
3		end @ 3.0
4–5	sample discarded not used in composite -C. Dolphin 5/2/19	
6		
7		
8		
9		

1 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 2 of 3

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport Sediment Sampling	Date 1/24/19	Time 1310
Station ID	NC2-03	Latitude 33.	Longitude -117.
Type of Core	Vibracore	Water Depth (ft) 15.3	Tide (ft) 4.1
Mudline Elevation (ft MLLW)	-11.2	Target Core Length (ft) 6.3	
Project Depth+Overdepth (ft MLLW)	-17.5	Penetration Length (ft) 7.3	Core Recovery (ft) ~~3.7~~ 4.7

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–2	NC2-03-012419	brown-gray, soft, wet, silt; 0.7 med stiff, moist
2–4.7	3.2 ~~NC-03-Z-012419~~ ; 4.7 NC-03-Z-012419	light brown-gray, dense to very dense, damp, m-c SAND w/trace shells; ~~end @ 3.7 ft~~; cobble @ 4.7
		end @ 4.7
		refusal @ 7.3
		Z-layer not achieved bottom 0.5 ft archived

22.0
5.3

3 No. Photos Taken

Recorded By: C. Dobbin

Attempt No. 3 of 3

Sediment Core Collection Form

ANCHOR QEA

Project	Newport Channel	Date	1/22/19 Time 1552
Station ID	NC2-04	Latitude	33.60800200 Longitude -117.91507783
Type of Core	Vibracore	Water Depth (ft)	9.3 Tide (ft) -1.4
Mudline Elevation (ft MLLW)	-10.7	Target Core Length (ft)	6.8
Project Depth+Overdepth (ft MLLW)	-17 + 0.5	Penetration Length (ft)	7.2 Core Recovery (ft) 4.5

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0	NC2-04-012219	brownish gray very soft wet SILT
1.4		medium stiff moist
2.8		gray dense damp f-SAND w/ trace shells; sandy SILT
4.0	NC2-04-Z	light gray m-C SAND
4.5		
6		Z-layer depth not achieved; archived bottom 0.5'
8		moved station 15 m north (into channel) due to moored vessel.
9		Refusal @ 7.2

3 No. Photos Taken Recorded By: C. Osuch Attempt No. 1 of 3

Sediment Core Collection Form

ANCHOR QEA

Project Newport Channel		Date 1/22/19	Time 16:10
Station ID NC2-04-012219		Latitude 33.60801733	Longitude -117.91506050
Type of Core Vibracore		Water Depth (ft) 9.1	Tide (ft) -1.5
Mudline Elevation (ft MLLW) -10.6		Target Core Length (ft) 6.9	
Project Depth+Overdepth (ft MLLW) -17+0.5		Penetration Length (ft) 8.0	Core Recovery (ft) 4.0

Depth In (ft.) Actual Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1		
2		
3		
4		
5		some bottom sample washed out upon recovery
6		
7		Low recovery; sample discarded
8		
9		

✓ No. Photos Taken

Recorded By: C. Osuch

Attempt No. 2 of 3

Sediment Core Collection Form

ANCHOR QEA

Project: Newport channel
Station ID: NC2-04-012219
Type of Core: Vibracore
Mudline Elevation (ft MLLW): 10.5
Project Depth+Overdepth (ft MLLW): -17 + 0.5

Date: 1/22/19 Time: 1655
Latitude: 33.60802317 Longitude: 117.9150606
Water Depth (ft): 9.0 Tide (ft): -1.5
Target Core Length (ft): 7.0
Penetration Length (ft): 8.0 Core Recovery (ft): 4.3

Depth In (ft.) Core Sections	Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0		NC2-04	Brownish gray very soft wet SILT
1			~soft moist
2			medium stiff sandy SILT
			2.5
3			gray dense damp f-SAND
			3.2 light gray f-m SAND w/ trace shells
4	4.3		very dense
5			
6			
7			
8			Refusal @ 8'
9			Extra volume for biological testing

— No. Photos Taken

Recorded By: C Osuch

Attempt No. 3 of 3

Sediment Core Collection Form

ANCHOR QEA

Project Newport Channel	Date 1/22/19 Time 1353
Station ID NC3-01	Latitude 33.60807517 Longitude -117.91392733
Type of Core Vibracore	Water Depth (ft) 11.8 Tide (ft) 1.1
Mudline Elevation (ft MLLW) -10.7	Target Core Length (ft) 6.8
Project Depth+Overdepth (ft MLLW) -17+0.5	Penetration Length (ft) 7.8 Core Recovery (ft) 3.4

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1		
2		
3		Low recovery sample discarded
4		
5		
6		
7		refusal @ 7.8'
8		
9		

— No. Photos Taken Recorded By: C. Osuch Attempt No. 1 of 3

Sediment Core Collection Form

ANCHOR QEA

Project: Newport Channel	Date: 1/22/19 Time: 1415
Station ID: NC3-01	Latitude: 33.60808533 Longitude: -117.91392900
Type of Core: Vibracore	Water Depth (ft): 11.2 Tide (ft): 0.4
Mudline Elevation (ft MLLW): -10.8	Target Core Length (ft): 6.7
Project Depth+Overdepth (ft MLLW): -17+0.5 Z	Penetration Length (ft): 7.6 Core Recovery (ft): 4.9

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–2.1	NC3-01	brownish gray very soft wet SILT; medium stiff moist
2.1		gray red dense damp f-SAND w/ trace shells; dense
3.6		light gray very dense m-c SAND
4.9	NC3-01-Z	
7		Refusal @ 7.6
8		Z-layer depth not achieved; archived bottom 0.5'

3 No. Photos Taken Recorded By: C. Osuch Attempt No. 2 of 3

Sediment Core Collection Form

ANCHOR QEA

Project	Newport Channel	Date	1/22/19 Time 1440
Station ID	NCB-01	Latitude	33.60809250 Longitude -117.91392100
Type of Core	Vibracore	Water Depth (ft)	10.6 Tide (ft) -0.2
Mudline Elevation (ft MLLW)	-10.8	Target Core Length (ft)	6.7
Project Depth+Overdepth (ft MLLW)	-7+0.5	Penetration Length (ft)	8.0 Core Recovery (ft) 4.1

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0	NCB-01	Brownish gray very soft wet SILT — soft moist — medium stiff
2.5		gray damp dense f-SAND w/ trace shells — light gray — very dense — f-m SAND
4.1		
8		refusal @ 8.0'
		Extra volume for biological testing

— No. Photos Taken

Recorded By: C. Osuch

Attempt No. 3 of 3

Sediment Core Collection Form

ANCHOR QEA

Project	Newport Channel	Date	1/22/19 Time 1134
Station ID	NC3-02	Latitude	33.60798083 Longitude -117.91272633
Type of Core	Vibracore	Water Depth (ft)	16.0 Tide (ft) 5.1
Mudline Elevation (ft MLLW)	-10.9	Target Core Length (ft)	6.6
Project Depth+Overdepth (ft MLLW)	-17 + 0.5	Penetration Length (ft)	8.6 Core Recovery (ft) 6.3

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	NC3-02	Brownish gray very soft wet, SILT
1–2		medium stiff moist
2–3		2.4 gray dense damp f-SAND
3–4		3.4 f-m SAND w/ trace shells
4–5		4.2 light gray m-c SAND
6 / 6.3	NC3-02-Z	w/ moderate shells 5.8-6.3'
7		
8		
9		

3 No. Photos Taken Recorded By: C. Osuch Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	Newport Channel	Date 1/22/19	Time 1204
Station ID	NC3-02	Latitude 33.60798083	Longitude -117.91272633
Type of Core	Vibracore	Water Depth (ft) 15.1	Tide (ft) 4.2
Mudline Elevation (ft MLLW)	-10.9	Target Core Length (ft) 6.81	
Project Depth+Overdepth (ft MLLW)	-17	Penetration Length (ft) 9.0	Core Recovery (ft) 6.1

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	NC3-02	Brownish gray, very soft, wet, SILT
1–2.5		soft / medium stiff, moist
2.5–4		gray, medium dense, f-SAND
4–6.1		light gray, dense, damp, m-c SAND w/ trace shells
6.1		
7–9		Extra volume for biological testing

— No. Photos Taken

Recorded By: C. Osuch

Attempt No. 2 of 2

Sediment Core Collection Form

ANCHOR QEA

Project Newport Channel

Station ID NC3-043

Type of Core Vibracore

Mudline Elevation (ft MLLW) -10.1

Project Depth+Overdepth (ft MLLW) -17 + 0.5

Date 1/22/19 Time 0910

Latitude 33.608241 Longitude -117.9114317

Water Depth (ft) 16.9 Tide (ft) 6.8

Target Core Length (ft) 7.4

Penetration Length (ft) 7.6 Core Recovery (ft) 2.8

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1		
2		
3		
4		
5		
6		
7		Refusal @ 7.6'
8		Low recovery; sample discarded
9		

– No. Photos Taken Recorded By: C. Osuch Attempt No. 1 of 3

Sediment Core Collection Form

ANCHOR QEA

Project	Newport Channel	Date	1/22/19
		Time	0947
Station ID	NC3-03	Latitude	33.60823467
		Longitude	-117.91141900
Type of Core	Vibracore	Water Depth (ft)	16.9
		Tide (ft)	6.8
Mudline Elevation (ft MLLW)	-10.1	Target Core Length (ft)	7.4
Project Depth+Overdepth (ft MLLW)	-17 + 0.5 Z	Penetration Length (ft)	7.6
		Core Recovery (ft)	5.6

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–0.7	NC3-03	Brownish gray very soft wet SILT
0.7–1.8		medium stiff moist
1.8–3.3		gray medium dense damp f-SAND w/ occasional shells 2-2.5'
3.3–5.1		light gray dense f-m SAND
5.1–5.6	5.1 NC3-03-Z	very dense m-c SAND w/ abundant shells 5-5.6'
5.6		

Refusal @ 7.6'

Z-layer depth not achieved; archived bottom 0.5'

3 No. Photos Taken

Recorded By: C. Osuch

Attempt No. 2 of 3

Sediment Core Collection Form

ANCHOR QEA

Project	Newport Channel	Date	1/22/19 Time 1018
Station ID	NC3-03	Latitude	33.60823233 Longitude -117.91143417
Type of Core	Vibracore	Water Depth (ft)	16.6 Tide (ft) 6.5
Mudline Elevation (ft MLLW)	-10.1	Target Core Length (ft)	7.4
Project Depth+Overdepth (ft MLLW)	-17 +0.5	Penetration Length (ft)	7.8 Core Recovery (ft) 4.4

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0	NC3-03	Brownish gray very soft wet SILT
0.8		medium stiff moist
2.0		gray dense damp f-SAND
3.4		light gray very dense f-m SAND
4.4		
7		Refusal @ 7.8'
8		Extra volume for biological testing

No. Photos Taken: —

Recorded By: C. Osuch

Attempt No. 3 of 3

A-12

Sediment Core Collection Form

ANCHOR QEA

Project Lower Newport

Station ID NC3-04

Type of Core Vibracore

Mudline Elevation (ft MLLW) -10.6

Project Depth+Overdepth (ft MLLW) -17+0.5

Date 1/23/19 Time 0815

Latitude 33.6083768 Longitude -117.9099605

Water Depth (ft) 15.7 Tide (ft) 5.1

Target Core Length (ft) ~~6.7~~ 6.9

Penetration Length (ft) 4.9 Core Recovery (ft) 0

Depth In (ft.) Core Sections	Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1			
2			
3			
4			
5			
6			
7			
8			
9			~4.9 ft penetration, core tube bent no recovery

— No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 1 of 4

A

Sediment Core Collection Form

ANCHOR QEA

Project Lower Newport

Station ID NC3-04

Type of Core Vibracore

Mudline Elevation (ft MLLW) -11.1

Project Depth+Overdepth (ft MLLW) -17+0.5=17.5

Date 1/23/19 Time 905

Latitude 33.6083 ~~5515~~ Longitude -117.9099 ~~1833~~

Water Depth (ft) 16.9 Tide (ft) 5.8

Target Core Length (ft) 6.4

Penetration Length (ft) ~~14.5~~ 7.6 Core Recovery (ft) ~~4~~ 4.5 ft (30%)

24

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	NC3-04-012319	gray, soft, moist; 0.4 damp; silt
1–2		1.2 gray-brown, med-dense, f. sand
2–3		2.2 brown, very dense, med to coarse sand
3–4		3.2 f. sand; 3.4
4–4.5 (MO / US)	NC3-04-2 012319	med to coarse SAND w/ moderate shells
5		end @ 4.5
6		Hit refusal; Z-layer not achieved; bottom 0.5 ft archived
7		
8		
9		

3 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 2 of 4

A-14

Sediment Core Collection Form

ANCHOR QEA

Project Lower Newport	Date 1/23/19 Time 930
Station ID NC3-04	Latitude 33.60832133 Longitude -117.9099455
Type of Core Vibracore	Water Depth (ft) 17.2 Tide (ft) 6.0
Mudline Elevation (ft MLLW) -11.2	Target Core Length (ft) 6.3
Project Depth+Overdepth (ft MLLW) ~~17+0.5~~ 17.5	Penetration Length (ft) ~~5.2~~ 8.0 Core Recovery (ft) 3.6

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		gray; soft; wet; silt; --- 0.4 ---; med-stiff; damp
1–2		1.0; ~~1.4~~; 1.8; 1.0 Slightly Sandy SILT
2–3	NC3-0401231.9	very dense; 1.8 f to med SAND; 1.8–2.0 pocket of clay; --- 2.2 brown
3–4		end @ 3.6
4		
5		
6		
7		
8		Hit refusal
9		Coarse sand, large shell hash

2 No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 3 of 4

A-15

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport	Date 1/23/19	Time 950
Station ID	N3-04	Latitude 33.60832017	Longitude -117.90994600
Type of Core	Vibracore	Water Depth (ft) 17.2	Tide (ft) 6.1
Mudline Elevation (ft MLLW)	11.1	Target Core Length (ft) 6.4	
Project Depth+Overdepth (ft MLLW)	-17.5	Penetration Length (ft) ~~15.6~~ 7.8	Core Recovery (ft) 3.4

25'

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1		
2		
3		
4		
5		low recovery, sample discarded
6		
7		
8		
9		

— No. Photos Taken

Recorded By: C. Dolphin

Attempt No. 4 of 4

Sediment Core Collection Form

ANCHOR QEA

Project LOWER NEWPORT BAY	Date 1/12/18 Time 8:45
Station ID TB-01	Latitude 33° 37.201' Longitude 117° ~~55.9~~ 55.694'
Type of Core VIBRACORE	Water Depth (ft) -21.6 Tide (ft) +3.8
Mudline Elevation (ft MLLW) -17.8	Target Core Length (ft) 4.2' + 0.5' = 4.7'
Project Depth+Overdepth (ft MLLW) -22	Penetration Length (ft) 6.2 Core Recovery (ft) 5.8

Depth In (ft.) Actual Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	TB-01-011218	OLIVE GREY SILT SOFT MOIST NO SHEEN OR ODOR
1–2		COARSE SAND 1.2-1.3 MED. ~~STIFF~~ DENSE; SILT MEDIUM STIFF DAMP
2–4		
4–5	TB-01-Z-011218	4.6; ~~SANDY~~ FINE SANDY SILT
5–6		
7–8		core number 1, TB-01
8–9		

2 No. Photos Taken Recorded By: MARTIN Attempt No. 1 of 2

Field Logs for Lower Newport Bay

Sediment Core Collection Form

ANCHOR QEA

Project	LOWER NEWPORT BAY	Date	1/12/18 Time 09:20
Station ID	TB-01	Latitude	33° 37.201' Longitude 117° 55.694'
Type of Core	VIBRACORE	Water Depth (ft)	-21.0 Tide (ft) +3.2'
Mudline Elevation (ft MLLW)	~~-22~~ -17.8'	Target Core Length (ft)	4.2'
Project Depth+Overdepth (ft MLLW)	-22	Penetration Length (ft)	6.2 Core Recovery (ft) 4.5

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		OLIVE GREY; SILT; SOFT; MOIST; NO ODORS, NO SHEEN
1–2	TB-01-011218	MED. STIFF; DAMP
2–3		SANDY SILT; SILT
3–4		
4–5		SANDY SILT; SOFT; — 4.2; MED. STIFF; SILT — 4.4; FINE SAND W/ TR. SHELL FRAGMENTS, DENSE,
5–6		
6–7		core number 2, TB-01
7–8		
8–9		
9–10		

0 No. Photos Taken

Recorded By: MARTIN

Attempt No. 2 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	LOWER NEWPORT BAY ~~RGP 54~~ Sediment sampling	Date 1/12/18	Time 12:10
Station ID	TB-02	Latitude 33° 37.227'	Longitude -117° 55.634'
Type of Core	Vibracore	Water Depth (ft) -18.3'	Tide (ft) +0.3'
Mudline Elevation (ft MLLW)	-18.0'	Target Core Length (ft) 4.0' + 0.5' Z = 4.5'	
Project Depth+Overdepth (ft MLLW)	-22.0	Penetration Length (ft) 6.0'	Core Recovery (ft) 5.7'

Depth In (ft.) Actual Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	TB-02-011218	OLIVE GREY; SILT; SOFT; MED. STIFF; MOIST; NO ODOR; NO SHEEN
1–2		DAMP
2–3		SANDY SILT
3–4		STIFF
4–4.5	TB-02-Z-011218	SILT
5.7		
6–10		core #1, TB-02

3 No. Photos Taken

Recorded By: MARTIN

Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project LOWER NEWPORT BAY ~~[illegible]~~ Sediment sampling	Date 1/12/18 Time 12:30
Station ID TB-02	Latitude 33° 37.221' Longitude 117° 55.631'
Type of Core Vibracore	Water Depth (ft) ~18.2' Tide (ft) +0.2'
Mudline Elevation (ft MLLW) -18.0'	Target Core Length (ft) 4.0'
Project Depth+Overdepth (ft MLLW) -22.0	Penetration Length (ft) 5.8' Core Recovery (ft) 4.9'

Depth In (ft.) Actual Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		OLIVE GREY; SILT; MOIST; SOFT; NO ODOR; NO SHEEN
1		DAMP; MED. STIFF
2	TB-02-011218	
3		
4		SILTY SAND W/ TR. SHELL FRAGMENTS; SILT; MED DENSE; MED STIFF
5		
6		
7		core #2, TB-02
8		
9		

0 No. Photos Taken Recorded By: MARTIN Attempt No. 2 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	LOWER NEWPORT BAY [redacted]Sediment sampling	Date	1/12/18	Time	13:10
Station ID	TB-03	Latitude	33° 37.148'	Longitude	-117° 55.476'
Type of Core	Vibracore	Water Depth (ft)	-18.4	Tide (ft)	+0.0'
Mudline Elevation (ft MLLW)	-18.4	Target Core Length (ft)	3.6' + 0.5' z = 4.1'		
Project Depth+Overdepth (ft MLLW)	-22	Penetration Length (ft)	5.6'	Core Recovery (ft)	5.1

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0		OLIVE GREY; SILT; SOFT; MOIST; NO ODOR; NO SHEEN
1	TB-03-011218	MED. STIFF; DAMP
2		
3		
4	TB-03-Z-011218	FINE SAND; MED. DENSE
5		
6		CORE #1, TB-03
7		
8		
9		

3 No. Photos Taken   Recorded By: MARTIN   Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	LOWER NEWPORT BAY [redacted] Sediment sampling	Date 1/12/18	Time 1335
Station ID	TB-03	Latitude 33° 37.148'	Longitude -118° 55.776'
Type of Core	Vibracore	Water Depth (ft) -18.4	Tide (ft) 0.0
Mudline Elevation (ft MLLW)	-18.4	Target Core Length (ft) 3.0	
Project Depth+Overdepth (ft MLLW)	-22	Penetration Length (ft) 5.0	Core Recovery (ft) 3.6

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–3.6	TB-03-011218	OLIVE GRAY, SILT, SOFT → MED. STIFF, DAMP, NO ODOR, NO SHEEN
1		
2		
3		
4		
5		core #2, TB-03
6		
7		
8		
9		

0 No. Photos Taken   Recorded By: MARTIN   Attempt No. 2 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport Bay ~~RGP-54~~ Sediment sampling	Date 1/12/18	Time 11:00
Station ID	TB-04	Latitude 33° 37.026'	Longitude -117 55.592'
Type of Core	Vibracore	Water Depth (ft) -20.2	Tide (ft) +1.3
Mudline Elevation (ft MLLW)	-18.9'	Target Core Length (ft) 3.1' + 0.5' = 3.6'	
Project Depth+Overdepth (ft MLLW)	-22.0'	Penetration Length (ft) 5.1'	Core Recovery (ft) 4.6'

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0		OLIVE GREY; SILT; SOFT; WET; NO SHEEN; NO ODOR
1	TB-04-011218	MOIST
		MED STIFF
2		DAMP
3	TB-04-Z-011218	FINE SAND; DENSE
4		
5		
6		Core number 1, TB-04
7		
8		
9		

2 No. Photos Taken

Recorded By: MARTIN

Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	LOWER NEWPORT BAY ~~RGP 54~~ Sediment sampling	Date 1/12/18	Time 11:25
Station ID	TB-04	Latitude 33° 37.020'	Longitude -117° 55.592'
Type of Core	Vibracore	Water Depth (ft) -19.8' ~~20.8~~	Tide (ft) +0.9
Mudline Elevation (ft MLLW)	-18.9'	Target Core Length (ft) 3.1'	
Project Depth+Overdepth (ft MLLW)	~22.0'	Penetration Length (ft) 5.1	Core Recovery (ft) 4.2'

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		OLIVE GREY; SILT; WET → MOIST; SOFT → SOFT; NO ODOR; NO SHEEN
1–2	TB-04-011218	DAMP; MEDIUM STIFF
2–3		SILTY SAND ~~FINE SAND~~; MEDIUM ~~STIFF~~ DENSE
3–4.2	4.2→	OLIVE GREY; ~~STIFF~~ DENSE
5		
6		
7		
8		
9		

Ø No. Photos Taken Recorded By: MARTIN Attempt No. 2 of 2

Sediment Core Collection Form

ANCHOR QEA

Project: LOWER NEWPORT BAY [redacted] Sediment sampling

Station ID: TB-05

Type of Core: Vibracore

Mudline Elevation (ft MLLW): -19.2'

Project Depth+Overdepth (ft MLLW): ~22.0

Date: 1/12/18 Time: 14:40

Latitude: 33° 37.088' Longitude: -117° 55.351

Water Depth (ft): ~19.6' Tide (ft): +0.4'

Target Core Length (ft): 2.8' + 0.5' => 3.3'

Penetration Length (ft): 4.8' Core Recovery (ft): 4.2'

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0		OLIVE GREY; SILT; SOFT – MEDIUM STIFF; WET – DAMP; NO ODOR; NO SHEEN
1	TB-05-011218	
2		
3	TB-05-Z-011218	
4		SILTY SAND; MED. DENSE
5		
6		Core #1, TB-05
7		
8		
9		

2 No. Photos Taken Recorded By: MARTIN Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport Bay [redacted] Sediment Sampling	Date 1/12/18	Time 15:00
Station ID	TB-05	Latitude 33° 37.089′	Longitude 117° 55.350′
Type of Core	Vibracore	Water Depth (ft) -19.6′	Tide (ft) +0.6′
Mudline Elevation (ft MLLW)	-19.0	Target Core Length (ft) 3.0	
Project Depth+Overdepth (ft MLLW)	-22.0	Penetration Length (ft) 4.5′	Core Recovery (ft) 4.0′

Depth In (ft.) Actual / Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1	TB-05-011218	OLIVE GREY, SILT, SOFT, DAMP, NO ODOR, NO SHEEN
1–2		MEDIUM STIFF
2–3		
3–4		SANDY SILT
4		
5		
6		CORE #2, TB-05
7		
8		
9		

Ø No. Photos Taken

Recorded By: MARTIN

Attempt No. 2 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	LOWER NEWPORT BAY ~~RGP 54~~ Sediment sampling	Date	1/12/18 Time 09:50
Station ID	TB-06	Latitude	33° 37.098' Longitude -117° 55.636'
Type of Core	Vibracore	Water Depth (ft)	-21.9 Tide (ft) +2.6
Mudline Elevation (ft MLLW)	-19.3	Target Core Length (ft)	2.7' + 0.5' = 3.2'
Project Depth+Overdepth (ft MLLW)	-22.0	Penetration Length (ft)	4.8' Core Recovery (ft) 4.0

Depth In (ft.) Actual Core Sections	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		OLIVE GREY; SILT; SOFT → MEDIUM STIFF; ~~WET~~ MOIST → DAMP; NO SHEEN; NO ODOR
1–2	TB-06-011218	
2–3	TB-06 Z-011218	
3–4		FINE SAND W/ TRACE SHELL FRAG.; DENSE
4–5		
5–6		
6–7		core #1, TB-06
7–8		
8–9		
9–10		

2 No. Photos Taken Recorded By: MARTIN Attempt No. 1 of 3

Sediment Core Collection Form

ANCHOR QEA

Project Lower Newport Bay ~~RGP 54~~ Sediment sampling
Date 01/12/18 Time 10:20
Station ID TB-06
Latitude 33° 37.098' Longitude -117° 55.636'
Type of Core Vibracore
Water Depth (ft) -21.3 Tide (ft) +2.0'
Mudline Elevation (ft MLLW) -19.3
Target Core Length (ft) 2.7'
Project Depth+Overdepth (ft MLLW) -22.0
Penetration Length (ft) 2.0 Core Recovery (ft) 1.7

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
1		
2		refusal @ 2.0'. recovery to 1.7
3		moving station slightly
4		
5		
6		
7		
8		
9		

-- No. Photos Taken Recorded By: MARTIN Attempt No. 2 of 3

Sediment Core Collection Form

ANCHOR QEA

Project	LOWER NEWPORT BAY	Date 1/12/18	Time 10:30
Station ID	~~TB-06~~ TB-06	Latitude 33° 37.098'	Longitude -117° 55.437'
Type of Core	VIBRACORE	Water Depth (ft) -21.9'	Tide (ft) +1.8'
Mudline Elevation (ft MLLW)	-20.1'	Target Core Length (ft) 1.9'	
Project Depth+Overdepth (ft MLLW)	-22.0'	Penetration Length (ft) 4.1'	Core Recovery (ft) 3.3

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		OLIVE GREY; SILT; SOFT; WET – MOIST; NO ODOR; NO SHEEN
1	TB-06-011218	MOD. STIFF; DAMP
2		
2.5–3		SANDY SILT; FINE SAND; MOD DENSE
3		
4		
5		
6		core number 2, TB-06
7		
8		
9		

0 No. Photos Taken

Recorded By: MARTIN

Attempt No. 3 of 3

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport	Date	1/15/18 Time 0801
Station ID	MCN1-01	Latitude	33°57.040' Longitude 117°55.245'
Type of Core	Vibracore	Water Depth (ft)	23.8 Tide (ft) 5.8
Mudline Elevation (ft MLLW)	-18.0	Target Core Length (ft)	6.0
Project Depth+Overdepth (ft MLLW)	-22 +2 = -24	Penetration Length (ft)	7.5 Core Recovery (ft) 6.2

Depth In (ft.) Core Sections	Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
			Gray soft wet SILT
1		MCN1-01-T	medium stiff moist
2			
3			
			3.6 - SILT w/ trace f-sand w/ shells @ 3.8
4	4.0	MCN1-01-Z	
	4.5		
5		MCN1-01-B	SILT
			medium dense damp f-SAND
6	6.0	Discard	
	6.2		
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 1/15/18	Time 0822
Station ID	MCN1-01	Latitude 33°37.040'	Longitude 117°55.245'
Type of Core	Vibracore	Water Depth (ft) 23.7	Tide (ft) 5.7
Mudline Elevation (ft MLLW)	-18.0	Target Core Length (ft) 4.0	
Project Depth+Overdepth (ft MLLW)	-22	Penetration Length (ft) 6.0	Core Recovery (ft) 4.1

Depth In (ft.) Core Sections	Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		MCN1-01-T	Gray soft wet SILT
1			0.8 moist; 1.2 medium stiff
2			
3			3.4 SILT w/ trace sand; w/shells @ 3.2
4	4.0 / 4.1	Discard	
5			
6			
7			
8			
9			

___ No. Photos Taken

Recorded By: C. Osuch

Attempt No. 2 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport	Date	1/15/18 Time 0856
Station ID	MCN1-02	Latitude	33°36.994' Longitude 117°55.189'
Type of Core	Vibracore	Water Depth (ft)	22.8 Tide (ft) 5.4
Mudline Elevation (ft MLLW)	-17.4	Target Core Length (ft)	6.6
Project Depth+Overdepth (ft MLLW)	-22+2=-24	Penetration Length (ft)	6.1 Core Recovery (ft) 5.1

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0		Gray soft ~~sa~~ sr wet SILT
0.6		0.6 — medium stiff — moist
1	MCN1-02-1	
2		
3		
4		
4.4		4.4 medium dense silty f-SAND w/ trace shell fragments
4.6	MCN1-02-2	
5		
5.1		
6		
7		Refusal @ 6.1.
8		
9		

3 No. Photos Taken

Recorded By: C. Osuch

Attempt No. 1 of 2

Sediment Core Collection Form

ANCHOR QEA

Project	Lower Newport	Date	1/15/18 Time 0948
Station ID	MCN1-02	Latitude	33°36.994' Longitude 117°55.189'
Type of Core	Vibracore	Water Depth (ft)	22.0 Tide (ft) 4.6
Mudline Elevation (ft MLLW)	-17.4	Target Core Length (ft)	6.6
Project Depth+Overdepth (ft MLLW)	-22+2=-24	Penetration Length (ft)	6.1 Core Recovery (ft) 5.1

Depth In (ft.) Core Sections / Actual	Sample Interval	Classification and Remarks (Color, Consistency, Moisture, Grain Size, Sheen, Odor)
0–1		Gray soft wet SILT; 0.8 – medium stiff – moist
1	MCN1-02-T	
4.0		4.0 medium dense silty f-SAND w/ ~~[illegible]~~ moderate shells @ bottom
4.6	MCN1-02-B	
5.1		

Refusal @ 6.1. shells in catcher. Only portion of bottom interval collected due to refusal on 2 attempts

— No. Photos Taken

Recorded By: C. Osuch

Attempt No. 2 of 2