

**DRAFT
ENVIRONMENTAL ASSESSMENT**

FOR

**LOWER NEWPORT BAY MAINTENANCE DREDGING
PROJECT
Orange County, California**

PREPARED BY

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

June 2020

FINDING OF NO SIGNIFICANT IMPACT

LOWER NEWPORT BAY MAINTENANCE DREDGING PROJECT ORANGE COUNTY, CALIFORNIA

DRAFT

The U.S. Army Corps of Engineers, Los Angeles District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Environmental Assessment (EA), dated DATE OF Final EA, for the Lower Newport Bay Maintenance Dredging Project addresses the need to remove shoals in the Entrance Channel and Main Channel Balboa Reach of the Lower Newport Bay federal navigation channels. The removal of shoals will provide continued safe and reliable commercial and recreational navigation in the Orange County, California.

The Final EA, incorporated herein by reference, evaluates three alternatives: The No Action Alternative, under which no maintenance dredging or nearshore placement would occur; Alternative 1 (Proposed Action), in which dredging would occur using a either clamshell and scow or barge-mounted excavator and scow with nearshore placement of all dredged materials from the Entrance Channel in the Newport Beach Nearshore Placement Site and ocean disposal for all dredged materials from the Main Channel Balboa Reach at the LA-3 Ocean Dredged Material Disposal Site (ODMDS); and Alternative 2, in which dredging would occur using either a clamshell and scow or barge-mounted excavator and scow with ocean disposal of all dredged materials at the LA-3 ODMDS. Alternative 1 is the recommended plan and includes:

- Mechanically dredge (clamshell and scow or barge-mounted excavator and scow) approximately 70,000 cubic yards from the Entrance Channel with nearshore placement at Newport Beach Nearshore Placement Site.
- Mechanically dredge (clamshell and scow or barge-mounted excavator and scow) approximately 90,000 cubic yards from the Main Channel Balboa Reach with ocean disposal at the LA-3 ODMDS.

In addition to a “no action” plan, one other alternative was evaluated. The alternatives included the proposed action and the same dredging with ocean disposal of all dredged materials at the LA-3 ODMDS.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table S-1:

Table S-1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Air quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic resources/wetlands	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Invasive species	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish and wildlife habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Threatened/Endangered species/critical habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Historic properties	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other cultural resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Floodplains	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hazardous, toxic & radioactive waste	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hydrology	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land use	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Navigation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise levels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Socio-economics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental justice	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tribal trust resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Water quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs), as detailed in the EA, will be implemented, if appropriate, to minimize impacts.

No compensatory mitigation is required as part of the recommended plan.

Public review of the draft EA and FONSI was completed on DATE DRAFT EA AND FONSI REVIEW PERIOD ENDED. All comments submitted during the public review period were responded to in the Final EA and FONSI.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan will have no effect on federally listed species or their designated critical habitat.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the recommended plan has no potential to effect historic properties.

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in Appendix G of the EA.

A water quality certification pursuant to section 401 of the Clean Water Act will be obtained from the Santa Ana Regional Water Quality Control Board. All conditions of the water quality certification shall be implemented in order to minimize adverse impacts to water quality.

A negative determination of consistency with the California Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 was obtained from the California Coastal Commission. All

conditions of the negative determination shall be implemented in order to minimize adverse impacts to the coastal zone.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and economic criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

DATE

Aaron C. Barta
Colonel, Corps of Engineers
District Commander

TABLE OF CONTENTS

1.0	INTRODUCTION	
1.1	Proposed Project	1
1.2	Environmental Assessment Process	2
1.3	Relationship to Environmental Protection Statutes, Plans, and Other Requirements	2
2.0	HISTORY AND PURPOSE	
2.1	Summary of Proposed Benefits	4
2.2	Project Purpose	4
3.0	PROJECT ALTERNATIVES	
3.1	Proposed Project Criteria Requirements	5
3.2	Alternatives Considered.....	5
4.0	ENVIRONMENTAL INVENTORY AND CONSEQUENCES	
4.1	Oceanography and Water Quality.....	7
4.2	Marine Resources.....	10
4.3	Air Quality and Greenhouse Gases.....	13
4.4	Noise	18
4.5	Cultural Resources	19
4.6	Vessel Transportation and Safety	20
4.7	Recreation Uses	21
4.8	Aesthetics.....	22
4.9	Land/Water Uses.....	23
4.10	Ground Transportation.....	24
4.11	Utilities	24
4.12	Environmental Justice.....	25
5.0	CUMULATIVE IMPACT ANALYSIS	28
6.0	ENVIRONMENTAL COMPLIANCE AND COMMITMENTS	
6.1	Compliance	29
6.2	Commitments.....	31
6.3	Public Involvement	33
6.4	Coordination	34
6.5	Summary	35
7.0	REFERENCES	36
8.0	DISTRIBUTION LIST	37
9.0	ACRONYMS	38
10.0	PREPARERS/REVIEWERS	
10.1	Preparers	39
10.2	Reviewers.....	39

APPENDICES

- A. Mailing List
- B. Sampling and Analysis Plan Report
- C. Cultural Resources Coordination Correspondence
- D. Air Emissions Calculations
- E. 404(b)(1) Evaluation
- F. Environmental Justice Screen Results

LIST OF FIGURES

1	Project Location	40
2	Entrance Channel/ Main Channel Balboa Reach	41
3	Newport Beach Nearshore Placement Site	42
4.	Entrance Channel SCE Cable and No Dredge Area	43
5.	Location of Eelgrass Beds	44

LIST OF TABLES

1.	Summary of Environmental Compliance	3
2.	Water Quality Characteristics	7
3.	National Ambient Air Quality Standards (NAAQS) Attainment Status for South Coast Air Basin	15
4.	General Conformity Applicability Rates	16
5.	Estimated Emissions from Construction Activities	17
6.	Total GHG Emissions	17
7	Study Area Demographics	26

SECTION 1 - INTRODUCTION

1.1 PROPOSED PROJECT

1.1.1 Location. The proposed project is located in Orange County, California (Figure 1) and consists of maintenance dredging the Entrance Channel and Main Channel Balboa Reach portions of the federal navigation channels in Lower Newport Bay.

1.1.2 Proposed Action. Material would be dredged from the Entrance Channel to maintain authorized navigational depths (Figure 2) of -20 ft MLLW. The proposed project consisted of maintenance dredging of approximately 70,000 cubic yards. Dredged materials are expected to be put in the Newport Beach Nearshore Placement Site (Figure 3). An abandoned SCE (Southern California Edison) underwater power line is located in the Entrance Channel (Figure 4). A small section of the Entrance Channel would be identified as a no dredge area in order to avoid impacts to this line. Should the line be removed prior to the completion of dredging, dredging in the no dredge area would be added back into the project (Section 4.1.1).

Material would be dredged from the Main Channel Balboa Reach (MCN5) to maintain authorized navigational depths (Figure 2) of -20 ft MLLW. The proposed project consisted of maintenance dredging of approximately 90,000 cubic yards. Dredged materials are expected to be disposed of at the LA-3 Ocean Dredged Material Disposal Site (ODMDS).

Sediments were sampled and tested in 2018 (Anchor QEA, 2019) to determine suitability for ocean disposal at the LA-3 Ocean Dredged Material Disposal Site (ODMDS) and/or nearshore placement. Determinations were made by the U.S. Army Corps of Engineers (Corps) and presented to the Southern California Dredged Material Management Team (SC-DMMT) for review and concurrence. The approximately 70,000 cubic yards of sediments from the Entrance Channel were determined to be suitable for disposal at the LA-3 ODMDS. These sediments were also determined to be suitable for nearshore placement. The approximately 90,000 cubic yards of sediments from the Main Channel Balboa Reach (MCN5) were determined to be suitable for disposal at the LA-3 ODMDS. Main Channel Balboa Reach (MCN5) sediments are not considered to be suitable for nearshore placement.

1.1.3 Project Authorization. The project was authorized by the Rivers and Harbors Act of 1937 (maintenance) and 1945 (Doc. 138, 78th Congress, 1st session), modified by the Water Resources Development Act of 1986 (Public Law 99-662).

1.1.4 Timing of Project. Construction is scheduled to begin in October 2020. Dredging would be conducted on the basis of six days per week as detailed in Section 3.2.2. Construction activities associated with dredging in Lower Newport Bay would take approximately 3 months for a clamshell dredge and approximately 4 months for a barge-mounted excavator.

1.1.5 Staging Areas. The area normally used for staging is located in the Upper Newport Bay just north of the Pacific Coast Highway Bridge at Dover Drive.

1.1.6 Construction Equipment. Dredging would be performed by clamshell dredge or a barge-mounted excavator. Nearshore placement would be from a split-hull scow.

Clamshell Dredge. This method consists of a derrick mounted on a barge outfitted with a clamshell bucket. Dredged materials are placed on a scow for transport to the placement/disposal site. This method can remove an average of approximately 2,500 cubic yards per day.

Excavator. This method consists of a barge-mounted excavator outfitted with a back hoe. Dredged materials are placed on a scow for transport to the placement/disposal site. This method can remove an average of approximately 1,500 cubic yards per day.

1.2 ENVIRONMENTAL ASSESSMENT PROCESS

This Environmental Assessment (EA) addresses potential impacts associated with implementing its discretionary actions as they relate to U.S. Army Corps of Engineers (USACE), Los Angeles District (LAD), policies, and those of other entities.

The USACE is the lead agency for this project. This EA is in compliance with the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321, as amended. The NEPA requires federal agencies to consider the environmental effects of their actions. When those actions significantly affect the quality of the human environment, an agency must prepare environmental documentation that provides full and fair discussion of impacts.

The EA process follows a series of prescribed steps. The first, scoping, has been completed with the purpose to solicit comments from other federal and state agencies, primarily during meetings of the Southern California Dredged Material Management Team (SC-DMMT). The Draft EA, the second step, is being sent out for a 30-day public review period; during which written and verbal comments on the adequacy of the Draft EA will be received. The next step requires preparation of a Final EA that incorporates and responds to comments received. The Final EA will be furnished to all who commented on the Draft and will be made available upon request. The final step is preparing a Finding of No Significant Impact (FONSI). This is a concise summary of the decision made by the USACE from among the alternatives presented in the Final EA. The District Engineer will sign the FONSI indicating his determination that the proposed project would not result in any significant, adverse impacts to the existing environment or to the quality of the human environment. A Draft FONSI is included for circulation with the Draft EA.

1.3 RELATIONSHIP TO ENVIRONMENTAL PROTECTION STATUTES, PLANS, AND OTHER REQUIREMENTS

The USACE is required to comply with all pertinent federal and state policies; project compliance is summarized in Table 1. The proposed project will comply with federal and state policies, and the determination of the level of inconsistency between these policies and the proposed project is not considered significant.

Table 1. Summary of Environmental Compliance

Statute	Status of Compliance
National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321, et seq., as amended; Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1500-1508); and USACE NEPA implementing regulations at 33 CFR Part 230 and associated guidance	The EA will be completed and submitted for public review. Public comments will be incorporated into the Final EA. Upon review of the Final EA, the District Engineer will issue a FONSI or require preparation of an EIS and a ROD will be issued for this project.
Clean Air Act, 42 U.S.C. 740B 40 CFR 93.152, et seq.	A permit to construct will be obtained by contractor, if necessary. The general conformity regulations do not apply to maintenance dredging and disposal where no new depths are required and disposal will be at an approved disposal site per 40 CFR 93.153(c)(2)(ix). Therefore, a conformity determination is not required for the proposed project.
Section 404 of the Clean Water Act, 33 U.S.C. 1344; USACE regulations at 33 CFR Part 336, and USEPA's 404(b)(1) Guidelines at 40 CFR Part 230 Section 401 of the Clean Water Act, 33 U.S.C. 1341 Rivers and Harbors Act of 1899, 33 U.S.C. 403 Section 103 of the Marine Protection, Research and Sanctuaries Act, 33 U.S.C. 1413	A section 404(b)(1) analysis (Appendix G) was prepared for the recommended placement of dredged or fill material within waters of the U.S. A Section 401 Water Quality Certification will be requested from the Santa Ana California Regional Water Quality Control Board (Appendix F) Not applicable. USEPA initially concurred with use of LA-3, but this is not the preferred disposal site for the Entrance channel, USEPA has initially concurred with disposal of sediments from the Main Channel Balboa Reach at LA-3.
Coastal Zone Management Act of 1972, 16 U.S.C. 1456, et seq., and National Oceanic and Atmospheric Administration Federal Consistency Regulation With Approved Coastal Management Program Regulations at 15 CFR Part 930	This Draft EA serves as a Negative Determination for concurrence by the California Coastal Commission prior to preparation of a Finding of No Significant Impacts (FONSI).
Section 7 of the Endangered Species Act of 1973, 16 U.S.C. 1536, and implementing regulations at 50 CFR Part 402 Fish and Wildlife Coordination Act, 16 U.S.C. 661-666c Migratory Bird Treaty Act, 16 U.S.C. 703-711 Marine Mammal Protection Act, 16 U.S.C. 1361 et seq	The USACE has determined that consultation pursuant to section 7 of the Endangered Species Act is not required as the project would have no effect on any listed species or their designated critical habitat. An analysis of potential effects has been conducted and coordination efforts are underway with the U. S. Fish and Wildlife Service. The USACE has determined that no species protected by the Migratory Bird Treaty Act will be impacted. The USACE has determined that no species of marine mammal would be impacted.
Section 106 of the National Historic Preservation Act, 54 U.S.C. 306108 and its implementing regulations at 36 CFR Part 800 Executive Order 11593: Protection and Enhancement of the Cultural Environment, May 13, 1971 Executive Order 12898, Environmental Justice (EJ) in Minority and Low-Income Populations	Per 36 CFR 800.3(a)(1), the proposed project has no potential to cause effects, and therefore the agency official has no further obligations under Section 106 of the Act. Not applicable The aggregate population percentage in the affected area does not exceed 50% minority and low income population. Therefore, the federal action would not result in disproportionately high and adverse impacts to minority or low income populations.

SECTION 2 – HISTORY AND PURPOSE

2.1 SUMMARY OF PROPOSED BENEFITS

The project area encompasses approximately 35 acres in the Entrance Channel of Lower Newport Bay. Lower Newport Bay is a small craft harbor located in Orange County, California. Lower Newport Bay represents a significant recreational resource offering a wide range of boating recreation ranging from single person rowboats to large sailing and motor vessels capable of trans-ocean navigation. Local beachfront communities support water-use recreational services. Maintenance dredging is necessary in order to remove approximately 70,000 cubic yards of sediment that have accumulated in the federal channels for navigational safety and to allow continued use of the bay for recreational activities. Failure to remove these sediments could result in adverse impacts to navigational safety resulting in loss of recreational boating opportunities.

Prior Maintenance Dredging. The last federal maintenance dredging in Lower Newport Bay occurred from May 2012 to February 2013. Approximately 490,350 cubic yards of sediment dredged from the federal channels were disposed of at the LA-3 Ocean Dredged Material Disposal Site (ODMDS). An additional 112,196 cy of unsuitable sediments were placed in the Middle Harbor Slip 1 Fill Site at the Port of Long Beach (POLB).

2.2 PROJECT PURPOSE

The purpose of the proposed project is to dredge the Entrance Channel and Main Channel Balboa Reach to allow for continued, safe navigation for recreational and commercial boats in Lower Newport Bay.

SECTION 3 – PROJECT ALTERNATIVES

3.1 PROPOSED PROJECT CRITERIA REQUIREMENTS

Legislation authorizes maintenance dredging at Lower Newport Bay to assure continued safe navigability within this harbor. Evaluation criteria have been established to evaluate potential alternatives. The criteria are: 1) timing; 2) technical feasibility and effectiveness; 3) environmental impacts; 4) acceptability by the general public; and 5) economic justification in accordance with current guidelines, policies, and legislation.

3.2 ALTERNATIVES CONSIDERED

Alternatives Eliminated from Further Consideration. Because navigational safety requires the entire channel to be at its authorized depth, alternative dredge footprints are generally not considered. Disposal alternatives assessed are the no-project alternative, nearshore placement in the Newport Beach Nearshore Placement Site, and ocean disposal. Other disposal/placement sites are not available within the time frame required for this project. Therefore, no other alternative sites are analyzed in detail.

3.2.1 No Action Alternative

The No Action Alternative is no maintenance dredging within Lower Newport Bay. The No Action Alternative would allow the channels to shoal, which would eventually result in unsafe or impossible navigation conditions. This would result in a loss to recreation and commercial operations. There is also potential for danger to life and property if the channels are not maintained at authorized depths. Eventual harbor closures could result. Loss of use would result in serious economic losses to the local community.

3.2.2 Action Alternatives Considered

Alternative 1: Proposed Project. Material would be dredged from the Entrance Channel and Main Channel Balboa Reach to maintain authorized navigational depths of -20 ft MLLW (Figure 2). The proposed project includes maintenance dredging of approximately 70,000 cubic yards (cy) from the Entrance Channel. Placement of these dredged sediments would occur at the Newport Beach Nearshore Placement Site. The proposed project includes maintenance dredging of approximately 90,000 cy from the Main Channel Balboa Reach. Disposal of these dredged sediments would occur at the LA-3 Ocean Dredged Material Disposal Site (ODMDS). Dredging activities for Alternative 1 would take approximately 3 months with a clamshell and 4 months with an excavator.

Alternative 2: Ocean Disposal. The volume of dredged material as well as the dredge depth would remain the same as Alternative 1, but disposal of all 160,000 cy would occur at the LA-3 ODMDS (Figure 1). Dredging activities Alternative 2 would take approximately 3 months with a clamshell and 4 months with an excavator.

Construction activities associated with dredging in Lower Newport Bay would take approximately 3 months for a clamshell dredge and approximately 4 months for a barge-mounted excavator for both action alternatives.

Dredging activities shall be restricted to the hours of:

Monday thru Friday 7:00 a.m. to 6:30 p.m.

Saturday 8:00 a.m. to 6:00 p.m.

Sunday/Holidays Not permitted.

Towing of scows is allowed 24-hours per day, 7 days per week. This is likely to only affect operations when a scow is filled at the end of a work day and could be towed for placement/disposal outside the dredge's working hours.

Newport Beach Nearshore Placement Site: The proposed Newport Beach Nearshore Placement Site is a subset of the site approved for use in placing suitable dredged sediments from Lower Newport Bay by the Corps' Regional General Permit 54. The site protects and nourishes Newport Beach and placement here is considered a beneficial reuse of dredged materials. The location of the site is shown on Figure 3. The site is approximately 35 acres in size with depths ranging from -25 ft MLLW to -40 ft MLLW. Placement of dredged material at this site is regulated by Section 404 of the Clean Water Act, , 33 U.S.C. 1344; USACE regulations at 33 CFR Part 336, and USEPA's 404(b)(1) Guidelines at 40 CFR Part 230.

LA-3 ODMDS: LA-3 disposal site is located on the continental slope of Newport Submarine Canyon at a depth of about 490 meters (m; 1,600 feet [ft]), approximately 8 kilometers (km; 4.3 nautical miles [nmi]) southwest of the entrance of Newport Harbor (Figure 1). The circular boundary of the permanently designated LA-3 site is centered at 33°31'00" N and 117°53'30" W and has a 915-meter (3,000-foot) radius. However, disposal vessels must be fully within the smaller 1,000 ft (305 m) radius Surface Disposal Zone (SDZ), centered at the same coordinates, when discharging dredged material. The LA-3 site was officially designated as a permanent disposal site by the U.S. EPA Region IX in 2005. The transportation of dredged material for disposal at LA-2 is regulated under section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), 33 U.S.C. § 1413.

SECTION 4 - ENVIRONMENTAL INVENTORY AND CONSEQUENCES

This section provides an assessment of potential impacts for the proposed project. If analyses show significant adverse impacts, then mitigation measures have been included to avoid the impact or reduce the level to insignificance.

Affected environment and potential impacts at the LA-3 ODMDS were addressed separately as part of the site designation process (USEPA/USACE, 2005). Those affected environment descriptions and potential impact assessments are hereby incorporated herein by reference and will not be repeated.

4.1 Oceanography and Water Quality

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

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

The mean tidal range for the project site is 5.4 feet at the harbor entrance. The extreme range is about 9.5 feet. Tidal conditions are slightly muted in the interior bay, but not sufficiently to cause significant effects.

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

Table 2 Water Quality Characteristics	
Parameters	Project Site
Salinity (ppt)	32.9 to 34.4
Surface Temperature (F)	55.8 to 62.5
pH	7.4 to 7.6
Clarity (ft.)	13 to 15
D.O. (mg/l)	8.9

Lower Newport Bay is on the 303(d) list of water quality limited waterbodies for chlordane, copper, DDT, indicator bacteria, nutrients, PCB's, pesticides, chlorpyrifos, and sediment toxicity. Total Maximum Daily Loads (TMDLs) have been implemented by the Santa Ana Regional Water Quality Control Board for nutrients, fecal coliform, organochlorine compounds,

and siltation. US Environmental Protection Agency (US EPA) established a “technical” TMDL for copper.

4.1.2 Environmental Consequences.

Criteria

An impact to Oceanography and Water Quality will be considered significant if: the project results in the release of toxic substances that would be deleterious to human, fish, or plant life; the project results in substantial impairment of beneficial recreational use of the project site; or discharges create a pollution, contamination, or nuisance as defined in Section 13050 of the California Water Code.

Dredge Impacts.

Water quality would be temporarily affected during the dredging process. Decreases in DO; increases in nutrients, suspended and dissolved contaminants, and turbidity could occur. Turbidity from dredging has the potential to decrease DO in the immediate vicinity (within about 100 feet) of the dredge. The dredging would occur in Lower Newport Bay, a coastal lagoon over six kilometers (four miles) in length. Dredging impacts would be the same for all action alternatives. Water quality impacts are expected to be confined to the immediate vicinity of the dredge and are not expected to significantly impact Lower Newport Bay. Sediments were tested and determined to contain less than trace amounts of contaminants. A release of toxic substances would not be expected to occur during dredging, there would be no impairment of recreational use at the project site, and there would be no discharge creating a pollution, contamination, or nuisance as a result of dredging activities. The spill prevention and clean up measures discussed below also pertain to the dredging operations.

Water quality monitoring will be performed during dredging for all action alternatives. Weekly monitoring will be done for salinity, pH, temperature, dissolved oxygen, turbidity and light transmissivity. Monthly water samples will be taken and analyzed for total dissolved solids and TRPH with a minimum of one sample per event. Dredging will be controlled to keep water quality impacts to within acceptable levels for clarity and dissolved oxygen. Controls include modifying the dredging operation and the use of silt curtains (if warranted). Turbidity will be limited to a 40% decrease in light transmittance, dissolved oxygen will be maintained at a minimum of 5 mg/l.

Construction activities associated with dredging in Lower Newport Bay would take approximately 3 months for a clamshell dredge and approximately 4 months for a barge-mounted excavator.

Disposal /Placement Impacts

Nearshore Placement (Alternative 1 Entrance Channel)

Water quality would be temporarily affected during the placement process. Decreases in DO; increases in nutrients, suspended and dissolved contaminants, and turbidity could occur. Water quality impacts are expected to be confined to the immediate vicinity of the placement site and are not expected to significantly impact the coastal waters off of Newport Beach. Sediments were tested and determined to contain less than trace amounts of contaminants. A release of toxic substances would not be expected to occur during placement, there would be no impairment of recreational use at the Newport Beach Nearshore Placement Site, and there would be no discharge creating a pollution, contamination, or nuisance as a result of placement activities. The spill prevention and clean up measures discussed below also pertain to the nearshore placement operations.

Water quality monitoring will be performed during placement at the Newport Beach Nearshore Placement Site. Weekly monitoring will be done for salinity, pH, temperature, dissolved oxygen, turbidity and light transmissivity. Monthly water samples will be taken and analyzed for total dissolved solids and TRPH. Placement will be controlled to keep water quality impacts to within acceptable levels for clarity and dissolved oxygen. Turbidity will be limited to a 40% decrease in light transmittance, dissolved oxygen will be maintained at a minimum of 5 mg/l.

Ocean Disposal (Alternative 1 Main Channel Balboa Reach; Alternative 2)

The disposal of dredged material at LA-2 would create direct local turbidity impacts during disposal operations. Turbidity plumes would be expected to migrate up to 500 ft down current. As the sediments have been found to be clean, contaminants would not be introduced or biologically available for consumption. Impacts of ocean disposal of dredge materials on water quality would be similar to impacts discussed in the USEPA authorization of the LA-2. Per the Environmental Commitments in Section 6.2, disposal limitations and control measures specified in the USEPA LA-3 Site Use Conditions would be adhered to during disposal operations. Vessels would be operated in compliance with all applicable regulations related to the prevention of water pollution by fuel, harmful substances, and accidental discharges. For mechanical dredging, the dredged material would be secured during transport, with precautions in place to minimize any risk of spills. The spill prevention and clean up measures discussed below also pertain to the LA-3 ocean disposal operations.

Accidents resulting in spills of fuel, lubricants, or hydraulic fluid from the equipment used during dredging and placement/disposal could occur during the project and adversely affect water quality. Impacts would depend on the amount and type of material spilled as well as specific conditions (i.e. currents, wind, temperature, waves, tidal stage, and vessel activity). In such cases, spills would be cleaned up immediately, causing less than significant impacts. Standard dredge specifications include a Spill Prevention Plan, employee training, and the staging of materials on site to clean up accidental spills. A larger spill that could have significant impacts on water quality is not expected to occur, even under reasonable worst-case conditions.

No action alternative. Construction impacts would not occur. The Entrance Channel and Main Channel Balboa Reach would continue to fill with sediments eventually resulting in impacts to recreational and commercial boating and the creation of unsafe conditions that could lead to boat groundings.

Oceanographic and water quality impacts are considered insignificant, therefore, mitigation measures are not required.

4.2 Marine Resources

4.2.1 Affected Environment. Marine life in the dredging areas is expected to consist of sandy benthic communities. This habitat is dominated by polychaetous annelids. Annelids are numerically dominant with crustaceans, molluscs, minor phyla, and echinoderms following in decreasing order of abundance. Benthic marine organisms are also important food sources for fish, crabs, and other benthic organisms.

The only marine mammals expected in the dredging area would be California sea lions (*Zalophus californianus*) and harbor seals (*Phoca vitulina*). Harbor seals and sea lions are expected to forage in the harbor and rest on the breakwater jetties, and navigational buoys.

Marine resources at the LA-3 ODMDS are discussed in the USEPA authorization of the LA-3 ODMDS and are hereby incorporated by reference (EPA and USACE 2005). Marine resources at the Newport Beach Nearshore Placement Site are typical open coast, sandy bottom habitat.

Special Aquatic Sites. The city of Newport Beach completed surveys in 2016, 2018 (shallow water only), and 2020 of Lower Newport Bay. The 2016 surveys were used to map the extent of eelgrass (*Zostera marina* and *Zostera pacifica*) beds in the bay (see Figure 5); results of the 2020 surveys are not yet available. Eelgrass beds were shown to be located in the Entrance Channel to Lower Newport Bay. There are no eelgrass beds located within the Main Channel Balboa Reach.

The area immediately south of the entrance is designated as a State Marine Conservation Area (SMCA). It is the Crystal Cove SMCA. None of the activities would take place within the SMCA and the presence of the jetties will serve to eliminate any indirect impacts to the SMCA from the proposed dredging.

Threatened and endangered species which may occur at the project site is the California least tern (*Sternula antillarum browni*).

The California least tern is present in small numbers from mid-April to mid-September. The California least tern forage throughout the Upper Bay, primarily on surface fishes such as topsmelt and anchovies, occasionally entering the Lower Bay. A nesting colony is located in the Upper Newport Bay Ecological Reserve approximately 3-1/2 miles from the dredging areas.

4.2.2 Essential Fish Habitat (EFH). In accordance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act, an assessment of Essential Fish

Habitat (EFH) has been conducted for the proposed project. The project is located within an area designated as EFH for two Fishery Management Plans (FMPs): Coastal Pelagics Plan and Pacific Groundfish Management Plan. Many of the 86 species federally managed under these plans are known to occur in the area and could be affected by the proposed project.

4.2.3 Environmental Consequences

Criteria.

An impact to Marine Resources will be considered significant if: the population of a threatened, endangered, or candidate species is directly affected or its habitat lost or disturbed; if there is a net loss in value of a sensitive biological habitat including a marine mammal haul out site or breeding area, seabird rookery, or Area of Special Biological Significance (ASBS); if the movement or migration of fish is impeded; and/or if there is a substantial loss in the population or habitat of any native fish, wildlife, or vegetation (a substantial loss is defined as any change in a population which is detectable over natural variability for a period of 5 years or longer).

Dredge Impacts.

Temporary increase in turbidity and suspended solids may decrease the amount of dissolved oxygen near the dredge site, thus affecting fish and other marine life within the area. Mobile species are expected to relocate out of the area until dredging activities are finished. Some marine populations, particularly benthic organisms, will be destroyed by dredging, but are expected to recolonize the area once dredging has ceased. Dredging impacts would be the same for all action alternatives. Impacts to eelgrass beds (considered to be an ASBS) would be avoided to the maximum extent practicable commensurate with the maintenance of safe navigation. Unavoidable impacts to eelgrass in the Entrance Channel would be mitigated in consultation with the NMFS using guidance from the California Eelgrass Mitigation Policy (CEMP, NMFS 2014). Impacts to eelgrass would be temporary and there would be no net loss of any ASBS. Movement of fish would be temporarily impacted and there would be minor, short-term impacts to benthic populations that are expected to recover fully within one year.

Noise from operations may also impact marine life. The noise associated with dredging activities may disturb fishes, seabirds, and marine mammals. Although data on effects of noise on fishes are limited, the data suggest that fish would be more likely to be startled by sudden staccato noises than by steady noises (i.e., engine noise). Moreover, the noise of the proposed operations would occur against a background area with large amounts of vessel traffic. The sudden staccato noises of the bucket coming into contact with the sediment would likely temporarily deter many organisms from entering the dredging areas, although, not impede the movement or migration of fish species given the size of the dredge template in relation to the surrounding harbor and available area for the fish species to utilize.

The only marine mammals expected to occur in the dredge areas are California sea lions and harbor seals. These species are highly mobile and would be able to avoid the dredge areas. The noise generated by the dredge is unlikely to impact these species given the noisy background resulting from existing commercial, recreational, and safety vessels. Dredging activities would

not adversely affect marine mammals. Furthermore, the dredge areas would represent a small percentage of available resources, and project activities are considered short-term and localized. No marine mammal haul out sites or breeding area, seabird rookery, or ASBS are located within the immediate vicinity of the dredging areas. Dredging would not cause a net loss in value of a sensitive biological habitat including a marine mammal haul out site or breeding area, seabird rookery, or ASBS.

Dredging activities would take approximately 3 months with a clamshell and 4 months with an excavator.

Nearshore Placement (Alternative 1 Entrance Channel)

Temporary increase in turbidity and suspended solids may decrease the amount of dissolved oxygen near the Newport Beach Nearshore Placement Site, thus affecting fish and other marine life within the area. Mobile species are expected to relocate out of the area until placement activities are finished. Some marine populations, particularly benthic organisms, will be destroyed by placement activities, but are expected to recolonize the area once placement has ceased. Marine mammals may occur at the Newport Beach Nearshore Placement Site (although due to the short durations of disposal events this is considered to be improbable), however, they are likely to deviate their migratory course just enough to avoid ships at the site so that disposal activities would not affect marine mammals or cause a net loss in value of a sensitive biological habitat.

Ocean Disposal (Alternative 1 Main Channel Balboa Reach; Alternative 2)

The material discharged at LA-3 would remain in suspension longer than at the dredge sites and some may drift as far as 1,000 yards from the disposal site. As discussed above, there may be some minor turbidity impacts from disposal on planktonic organisms, benthic organisms, and fishes. These impacts would be localized to the area and are expected to be adverse but not significant. The proposed disposal at LA-3 ODMDS would not cause a substantial loss in population or habitat of any native fish or wildlife. Marine mammals may occur at the LA-3 ODMDS (although due to the short durations of disposal events this is considered to be improbable), however, they are likely to deviate their migratory course just enough to avoid ships at the site so that disposal activities would not affect marine mammals or cause a net loss in value of a sensitive biological habitat.

Threatened and endangered species.

The USACE has determined that the proposed project will not have an affect nor jeopardize the continued existence of any federal listed threatened or endangered species. The dredging project is not expected to start until October 2020. California least terns will have migrated south and will not be present during dredging operations. Should dredging occur during the nesting season (April 15 – September 15) California least terns may be present in the harbor. Dredge impacts will be confined to a relatively small area in the immediate vicinity of the dredge. Loss of this area is considered negligible compared to the remaining areas that will still be available for foraging. Dredge areas are also outside the primary foraging areas for the nest sites located in

the upper bay. Dredge areas are approximately 3-1/2 miles from the nearest nest site, a site that has had no nesting to date since its creation as part of the Upper Newport Bay Ecosystem Restoration Project in 2007.

California least terns will have migrated south and will not be present during placement/disposal operations. If the project is delayed until after the start of the California least tern nesting season, there would also be no effect at the dredge site or either the Newport Beach Nearshore Placement Site or the LA-3 ODMDS due to distance from the nearest nest site and the un-impacted areas still available for foraging.

Formal consultation pursuant to Section 7 of the Endangered Species Act is not required for project implementation.

Essential Fish Habitat (EFH).

The USACE has determined that the proposed action will not have a substantial, adverse impact to any species on the Fishery Management Plan or to their habitat. Impacts, such as turbidity associated with dredging and disposal of dredged materials would be temporary and insignificant. In accordance with the Environmental Commitments in section 6, pre-construction surveys for *Caulerpa taxifolia* would be conducted at the LARE dredge site. Dredging shall not begin should *Caulerpa taxifolia* be identified until cleared to do so by the NMFS.

No action alternative.

Construction impacts would not occur. Neither would there be any of the expected beneficial impacts to recreational and commercial boating resulting from dredging of navigational channels.

Marine resource impacts are considered insignificant; therefore, mitigation measures are not required.

4.3 Air Quality and Greenhouse Gases

4.3.1 Affected Environment. Newport Bay is located on the Pacific Ocean about 45 miles south of Los Angeles. Newport Bay is located in the southwestern coastal area of the South Coast Air Basin (SCAB). The climate of the SCAB is classified as Mediterranean, characterized by cool, dry summers and mild, wet winters. The project area is protected from the worst of the SCAB's air pollution problems by the daily sea breeze that brings in clean air and blows pollutants inland, but recirculation of polluted air and incomplete ventilation of the SCAB can cause smog alerts even in coastal communities. With on-going emissions reduction programs, air quality has improved markedly within the last two decades.

Air quality at a given location can be described by the concentrations of criteria air pollutants in the atmosphere near ground level. The significance of a pollutant concentration is determined by comparing it to an appropriate national and/or state ambient air quality standard. These standards represent the allowable atmospheric concentrations at which the public health and welfare are

protected and include a reasonable margin of safety to protect the more sensitive individuals in the population.

The Clean Air Act requires the USEPA to set NAAQS for six common air pollutants (also known as "criteria air pollutants. The criteria pollutants are ozone (O₃), carbon monoxide (CO), suspended particulate matter (PM), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and lead (Pb). PM emissions are regulated in two size classes: Particulates up to 10 microns in diameter (PM₁₀) and particulates up to 2.5 microns in diameter (PM_{2.5}). O₃ is unique among the criteria pollutants because it is not directly emitted from No Action and action alternative sources. Rather, O₃ is a secondary pollutant, formed from precursor pollutants volatile organic compounds (VOC) and nitrogen oxides (NO_x) which photochemically react to form O₃ in the presence of sunlight. As a result, unlike inert pollutants, O₃ levels usually peak several hours after the precursors are emitted and many miles downwind of the source.

The USEPA, CARB, and local air districts classify an area as attainment, unclassified, or nonattainment depending on whether the monitored ambient air quality data show compliance, lack of data, or noncompliance with the ambient air quality standards, respectively. The national ambient air quality standards (NAAQS) relevant to the project are provided in Table 3. Table 4 summarizes the federal attainment status of criteria pollutants in the SCAB based on the NAAQS.

The National Ambient Air Quality Standards state that lead is not a pollutant of concern for typical Port projects and is certainly not a pollutant of concern for this maintenance dredging project. Lead is typically a concern for battery recyclers or manufacturers, lead smelters, ore/metal processing, some aircraft operations, waste incinerators.

General Conformity. Section 176(c) of the CAA states that a federal agency cannot issue a permit for or support an activity unless the agency determines it will conform to the most recent USEPA approved SIP. General conformity requires that all federal actions conform to the SIP as approved or promulgated by the USEPA by determining that the action is either exempt from the General Conformity Rule requirements or subject to a formal conformity determination. In accordance with 40 CFR § 93.153(c)(2)(ix), USACE has determined the proposed agency action is exempt from the requirement to prepare a conformity determination because the project consists of maintenance dredging, no new depths are required, and placement would be at an approved placement site.

Table 3. National Ambient Air Quality Standards (NAAQS) Attainment Status for South Coast Air Basin

Criteria Pollutant		AVERAGING TIME	DESIGNATION ^{a)}	ATTAINMENT DATE ^{b)}
1-Hour Ozone		1979 1-Hour (0.12 ppm)	Nonattainment (Extreme)	2/6/2023 Originally 11/15/2010 (not attained) ^{c)}
8-hour Ozone ^{d)}		1997 8-Hour (0.08 ppm)	Nonattainment (Extreme)	6/15/2024
		2008 8-Hour (0.075 ppm)	Nonattainment (Extreme)	7/20/2032
		2015 8-Hour (0.070 ppm)	Nonattainment (Extreme)	8/3/2038
CO		1-Hour (35 ppm) 8-Hour (9 ppm)	Attainment (Maintenance)	6/11/2007 (attained)
NO ₂ ^{e)}		1-Hour (0.10 ppm)	Unclassified/Attainment	N/A (attained)
		Annual (0.053 ppm)	Attainment (Maintenance)	9/22/1998 (attained)
SO ₂ ^{f)}		1-Hour (75 ppb)	Designations Pending (expect Uncl/Attainment)	N/A (attained)
		24-Hour (0.14 ppm) Annual (0.03 ppm)	Unclassified/Attainment	3/19/1979 (attained)
PM ₁₀		1987 24-Hour (150 µg/m ³)	Attainment (Maintenance) ^{g)}	7/26/2013 (attained)
PM _{2.5} ^{h)}		2006 24-Hour (35 µg/m ³)	Nonattainment (Serious)	12/31/2019
		1997 Annual (15.0 µg/m ³)	Nonattainment (Moderate)	8/24/2016
		2012 Annual (12.0 µg/m ³)	Nonattainment (Moderate)	12/31/2025
Lead		3 Months Rolling (0.15 µg/m ³)	Nonattainment (Partial)	12/31/2015

a) U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for attainment demonstration

- c) 1-hour O₃ standard (0.12 ppm) was revoked, effective June 15, 2005 ; however, the Basin has not attained this standard based on 2008-2010 data and is still subject to anti-backsliding requirements
- d) 1997 8-hour O₃ standard (0.08 ppm) was reduced (0.075 ppm), effective May 27, 2008; the revoked 1997 O₃ standard is still subject to anti-backsliding requirements
- e) New NO₂ 1-hour standard, effective August 2, 2010; attainment designations January 20, 2012; annual NO₂ standard retained
- f) The 1971 annual and 24-hour SO₂ standards were revoked, effective August 23, 2010; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO₂ 1-hour standard. Area designations are still pending, with Basin expected to be designated Unclassifiable /Attainment.
- g) Annual PM₁₀ standard was revoked, effective December 18, 2006; 24-hour PM₁₀ NAAQS deadline was 12/31/2006; SCAQMD request for attainment redesignation and PM₁₀ maintenance plan was approved by U.S. EPA on June 26, 2013, effective July 26, 2013.
- h) Attainment deadline for the 2006 24-Hour PM_{2.5} NAAQS (designation effective December 14, 2009) is December 31, 2019 (end of the 10th calendar year after effective date of designations for Serious nonattainment areas). Annual PM_{2.5} standard was revised on January 15, 2013, effective March 18, 2013, from 15 to 12 µg/m³. Designations effective April 15, 2015, so Serious area attainment deadline is December 31, 2025. The LA county portion of the SCAB is in serious nonattainment for the 24 hour standard (2006 standard).
- i) Partial Nonattainment designation – Los Angeles County portion of Basin only for near-source monitors. Expect redesignation to attainment based on current monitoring data.

4.3.2 Environmental Consequences

Criteria

An impact to Air Quality would be considered significant if the project meets or exceeds the applicability rates for the SCAB provided in Table 4 with the exception of lead as discussed above.

Table 4. General Conformity Applicability Rates

Pollutant	Attainment Status	Applicability Rate (tons/year)
O ₃ (VOC or NO _x precursors)	Extreme Nonattainment	10
CO	Maintenance	100
NO ₂	Maintenance	100
PM _{2.5}	Serious Nonattainment	70
PM ₁₀	Maintenance	100
Pb	Nonattainment (Partial)	25

Source: USEPA green book and 40 CFR 93.153

Dredge Impacts.

Dredging activities shall be restricted to the hours of:

Monday thru Friday 7:00 a.m. to 6:30 p.m.

Saturday 8:00 a.m. to 6:00 p.m.

Sunday/Holidays Not permitted.

Emissions associated with the proposed dredging activities will come mainly from the dredge motor drive. This operation will result in insignificant air quality impacts (Table 7, Appendix D). The motor drive on a clamshell dredge and a barge-mounted excavator are approximately the same size. Emissions estimates were made for the clamshell dredge that are approximately the same for both pieces of equipment. Emissions estimates were made based on emissions

factors for diesel fuel usage.

Alternative 1: Nearshore Placement/Ocean Disposal

Distance from the dredge site to the Newport Beach Nearshore Placement Site is approximately 1-1/2 miles. The number of trips to the placement area is limited to the capacity of the dredge, which is assumed to be 2,500 cy per day for the clamshell and 1,500 cy per day for the excavator. Distance from the dredge site to the LA-3 ODMDS is approximately 5 miles. The number of trips to the disposal area is limited to the capacity of the dredge.

Alternative 2: Ocean Disposal

Distance from the dredge site to the LA-3 ODMDS is approximately 5 miles. The number of trips to the disposal area is limited to the capacity of the dredge, which is assumed to be 2,500 cy per day for the clamshell and 1,500 cy per day for the excavator.

Table 5. Estimated Emissions from Construction Activities

	Tons per Year					
	VOC	CO	NO _x	NO ₂	PM ₁₀	PM _{2.5}
Clamshell Dredge						
Alternative 1	0.5	0.4	2.1	0.6	0.3	0.2
Alternative 2	0.5	0.4	2.4	0.7	0.3	0.2
Excavator Dredge						
Alternative 1	0.7	0.6	3.1	1.0	0.5	0.4
Alternative 2	0.7	0.6	3.3	1.0	0.4	0.4
Applicability Rates	10	100	100	100	100	70

In accordance with the Environmental Commitments in section 6.2, the contractor would be required to obtain all necessary air quality permits, construction equipment would be properly maintained to reduce emissions, retarding injection timing of diesel-powered equipment for nitrogen oxide (NO_x) control, and using reformulated diesel fuel to reduce reactive organic compounds and SO₂.

GHG Emissions. Greenhouse Gas (GHG) emissions were estimated for the project. GHG emissions are provided in Table 6. Calculations are shown in Appendix D.

Table 6. Total GHG Emissions

	Total Equivalent CO ₂	
	Alternative 1	Alternative 2
Total project emissions (tons)	0.8	1.3

No action alternative. Construction emissions associated with the project would not occur. However, the project's beneficial effects to the navigational channels would be lost.

Air quality impacts are considered insignificant, emissions do not exceed any applicability rate, therefore, impacts to air quality would be less than significant, and no mitigation measures would be required.

4.4 Noise

4.4.1 Affected Environment. Dominant noise sources include waves, beach recreation activities, commercial and recreational vessels, and vehicle noise on adjacent roads. The sound of wave action will vary with factors including wave height, period, frequency, angle of attack, season, and wind conditions.

4.4.2 Environmental Consequences

Criteria

Project noise impacts would be considered significant if noise resulting from the project results in an increase of 10 dBA above background during the day or a night-time increase of 5 dBA above background. This is a short-term project and a perceived daytime doubling of noise levels is considered to be significant. A lower threshold is used for nighttime noise to reflect the increased sensitivity of people to nighttime sources of noise.

Dredge Impacts.

Dredging activities shall be restricted to the hours of:

Monday thru Friday 7:00 a.m. to 6:30 p.m.

Saturday 8:00 a.m. to 6:00 p.m.

Sunday/Holidays Not permitted.

Project noise sources are limited to the dredge and its supporting vessels. The type of dredge that would most likely be used generates a Leq of 71.5 dBA at 50 feet. The closest residence along the Entrance Channel is approximately 50 feet from the dredge in the inside portion of the Entrance Channel that does not require a substantial volume of dredging. Most areas are considerably farther away and would likely experience noise levels closer to approximately 65.5 dBA or less. Dredging within 100 feet of a residence is expected to be short term, on the nature of a single day at this proximity. Based on similar close coastal cities such as Marina del Rey, ambient noise levels in harbors have been measured at between Leq 56.5 and 75.5 dBA depending on the time of day and day of the week. Because of the temporary nature of the dredging and the daytime only operation, it is not expected to exceed the 10 dBA limitation on background noise during the day and is not expected to have a significant impact on the area.

Nearshore Placement (Alternative 1 Entrance Channel)

The Newport Beach Nearshore Placement Site is located ¼ mile from the nearest residence. The only noise generated would be the tug's propulsion plant, which is not expected to be audible at this distance.

Ocean Disposal (Alternative 1 Main Channel Balboa Reach; Alternative 2)

Impacts were addressed in the USEPA authorization of the LA-3 ODMDS and are hereby incorporated by reference (EPA and USACE 2005).

No action alternative. Construction activities associated with the project would not occur. However, the project's beneficial effects would be lost.

Noise impacts are considered insignificant; therefore, mitigation measures are not required.

4.5 Cultural Resources

Cultural resources are locations of past human activities on the landscape. The term generally includes any material remains that are at least 50 years old and are of archaeological or historical interest. Examples include archaeological sites such as lithic scatters, villages, procurement areas, resource extractions sites, rock shelters, rock art, shell middens; and historic era sites such as trash scatters, homesteads, railroads, ranches, and any structures that are over 50 years old. Under Section 106 of the National Historic Preservation Act, federal agencies must consider the effects of federal undertakings on cultural resources that are listed or eligible for listing in the National Register of Historic Places (NRHP). Cultural resources that are listed or eligible for listing in the NRHP are referred to as historic properties.

4.5.1 Affected Environment. The project area is limited to the confines of the federal navigation channel, an area that has been periodically dredged since 1937, and the two possible sediment disposal sites, LA-5 or the Newport Beach Nearshore Placement Site. The navigation channel was last dredged in 2012/2013. Ground disturbance in the channel is limited to soils that have deposited in the channel in the past seven years. No historic properties are known to exist in the federal navigation channel, LA-5, or the Newport Beach Nearshore Placement Site.

4.5.2 Environmental Consequences

Criteria.

The project would have a significant effect on cultural resources if it would result in a substantial adverse effect to a historic property such that the implementation of the alternative would result in the destruction of a historic property or the loss of a property's eligibility.

Dredge Impacts

The Corps has determined that the maintenance dredging is the type of activity that does not have the potential to cause effects to historic properties. The undertaking is routine maintenance that has occurred on a semi regular basis since it was authorized in 1937. The undertaking does not constitute a change in the setting or use of the harbor. The undertaking would not alter the current setting or integrity of any historic properties that may be located within the Newport Navigation Channel, assuming them to be present (36 C.F.R. 800.3(1)). Ground disturbance

associated with this undertaking would be limited to soils deposited in the last seven years with no potential to contain historic properties. (see Appendix C).

Nearshore Placement

The Newport Beach Nearshore Placement Site was separately evaluated and authorized for local dredging projects under a Corps issued Regional General Permit (RGP) 54 in 2019 which included a separate analysis under Section 106. The continued use of a designated nearshore placement site does not have the potential to cause effects to historic properties.

Ocean Disposal

LA-3 is one of the USEPA's designated and managed regional ODMDS. It is a major disposal area for the region and its impacts to historic properties have previously been analyzed (USEPA/USACE 2005). The continued use of a designated ODMDS does not have the potential to cause effects to historic properties.

No action alternative. No historic properties are present in the APE. Therefore, no effects will result from continued deposition of sediments. However, the project's beneficial effects would be lost.

4.6 Vessel Transportation and Safety

4.6.1 Affected Environment. Lower Newport Bay is a heavily used recreational and small commercial vessel waterbody. Boat traffic, including commercial vessels, fishing vessels, and recreational vessels, often traverse the proposed project site. Safe navigation is maintained by well-marked channels and the presence and activity of various law enforcement agencies (i.e. County Lifeguards, U.S. Coast Guard, California Department of Fish and Game).

4.6.2 Environmental Consequences

Criteria.

A significant impact would occur if the proposed project results in a substantial reduction of current safety levels for vessels in the Bay. Safety impacts would be considered significant if activities present a navigational hazard to boat traffic or interfere with any emergency response or evacuation plans.

Construction activities.

Given the general background vessel traffic levels, project impacts are not expected to significantly increase vessel traffic levels. The proposed project will be taking place near the end of the tourist season. All vessels will be marked and lighted in accordance with U.S. Coast Guard regulations and notices will be published in Local Notice to Mariners warning boat users about times, durations, and locations of construction activities. Vessel traffic should be able to easily navigate around any short-term obstacles created by construction traffic. Construction

will not impede access to any channels or entranceways. Therefore, impacts to vessel traffic are considered insignificant. Differences between action alternatives will be limited to the duration of dredging.

Transport of dredged material to the Newport Beach Nearshore Placement Site would add vessel movement within the placement area; however, this increase would be negligible considering the existing volume of vessel movement in the project area. Transport of dredged material to the LA-3 ODMDS would add vessel movement within the disposal area; however, this increase would be negligible considering the existing volume of vessel movement in the project area.

No action alternative. Additional construction vessel traffic associated with the project would not occur. However, the project's beneficial effects in terms of improved navigation safety would be lost.

4.7 Recreation Uses

4.7.1 Affected Environment. The project area is a mix of public and private recreational boating and commercial uses. The coastal waters provide for recreational boating and fishing. Water contact recreation (swimming/wading) occurs at small, pocket beaches located in the Lower Bay. Recreational use of LA-3 would be limited to boating traffic transiting through the area, there is no hard substrate or reef structure at LA-3 to support fishing and it is unlikely to be utilized as a fishing spot given the soft bottom substrate, depth and level of disturbance to the site.

4.7.2 Environmental Consequences

Criteria.

Impacts will be considered significant if the project results in a permanent loss of existing recreational uses.

Dredge Impacts.

Impacts to recreational boaters will be negligible (see Section 4.6 above). Long-term impacts will be beneficial. The dredging will maintain, sustain, and support recreational and commercial boating by keeping the approaches and entrance channels open and free of navigational hazards. Dredging activities will be physically separated from the water contact recreational uses. These activities take place primarily along the edges and remain outside the federal navigational channels. Dredging at any single location will be of short duration enabling waders to move to nearby locations should the dredge be a discouraging factor in waders/swimmers decision. Differences between action alternatives will be in duration of dredging.

Placement/Disposal Impacts

Traffic to the Newport Beach Nearshore Placement Site would average 1-2 barges per day, which is a negligible impact on local recreational vessels. No material would be placed directly

on to the beach, so there would be no impacts to beach from the proposed project. Recreational activities are not expected to occur at the LA-3 ODMDS, therefore there would be no impacts to recreational use at LA-3.

No action alternative. The additional recreational benefits to boating and beach use would not occur.

Overall, the proposed project will substantially and beneficially increase the recreational opportunities currently afforded to the area. The proposed project will not result in any permanent closures. Therefore, recreational impacts are considered insignificant.

4.8 Aesthetics

4.8.1 Affected Environment. The overall aesthetic character of the project area is composed of a mix of residential and water-oriented facilities. The beaches further add to the overall impression of a recreational-oriented visual setting. The area is well maintained. The natural resources in the area provide a visually attractive setting and relaxing atmosphere for residents and tourists. LA-3 is located 4.8 miles offshore, thus it is not visible from shore.

4.8.2 Environmental Consequences

Criteria.

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

Dredge Impacts

The presence of dredging will result in mixed impacts depending on the opinion of the viewer. Many viewers will consider the presence of the dredge to be an adverse impact, interrupting viewpoints from local land points and from boats. Many other viewers will consider the presence of the dredge to be a beneficial impact providing an interesting feature to the existing view. Given that the dredge will be a short-term impact, aesthetic impacts will be insignificant. Differences between action alternatives will be in duration of dredging.

Nearshore Placement (Alternative 1 Entrance Channel)

Traffic to the Newport Beach Nearshore Placement Site would average 1-2 barges per day with the barge being on site for approximately 15-30 minutes, which is a negligible impact on aesthetics.

Ocean Disposal (Alternative 1 Main Channel Balboa Reach; Alternative 2)

Traffic to the Newport Beach Nearshore Placement Site would average 1-2 barges per day with the barge being on site for approximately 15-30 minutes at a site far enough out to sea to not be visible from the shore, which is a negligible impact on aesthetics.

No action alternative. Beneficial impacts discussed above would be not be attained. Aesthetics of the area would remain unchanged.

Given that the dredging activities will be a short-term impact, aesthetic impacts will be insignificant. The landscape will not be changed in a manner that permanently and significantly degrades an existing viewshed or alters the character of a viewshed by adding incompatible structures.

4.9 Land/Water Uses

4.9.1 Affected Environment. Lower Newport Bay is primarily characterized by the marina catering to recreational boaters and sports fishing operations. Boat rentals, a public launch ramp, and a U.S. Coast Guard Station are located in the Bay.

4.9.2 Environmental Consequences

Criteria.

Impacts would be considered significant if: access to existing uses is substantially restricted or is eliminated.

Dredge Impacts.

The presence of the dredge and its supporting vessels will restrict vessel traffic during dredging in the immediate 25 feet from the dredge. Boat access will be maintained throughout all stages of construction. Therefore, the proposed project is expected to result in adverse, but insignificant impacts. Differences between action alternatives will be in duration of dredging.

Placement/Disposal Impacts

Placement of sediments at the Newport Beach Nearshore Placement Site or ODMDS would have no impact on land uses/water uses.

No action alternative. Beneficial impacts discussed above would be not be attained.

Access to existing uses would not be substantially restricted or eliminated. Project impacts would therefore, be less than significant.

4.10 Ground Transportation

4.10.1 Affected Environment. Lower Newport Bay and Newport beach are accessed by several major routes. Seasonal variations can result in large differences in road use. Summer is the peak season and it is the basis for design of road capacity.

4.10.2 Environmental Consequences

Criteria.

A significant impact would occur if the proposed project results in: 1) inadequate parking facilities, 2) an inadequate access or on-site circulation system, or 3) the creation of hazardous traffic conditions.

Construction Impacts.

Construction will require the use of heavy equipment that requires manpower. A total construction crew of 15 people is anticipated for the proposed project. The proposed project therefore, is expected to have minor adverse impacts that are not considered significant. Differences between action alternatives will be in duration of dredging.

No action alternative. Beneficial impacts discussed above to recreational vessels would be not be attained.

The proposed project would have minor, short-term impacts to parking due to crew parking near the site. It would not create hazardous traffic conditions as the majority of the equipment would arrive via ships and would not require large trucks impacting local surface streets.

4.11 Utilities

4.11.1 Affected Environment.

At the northern end of the entrance channel, an abandoned Southern California Edison (SCE) utility cable (Figure 4) runs underground and across the entrance channel.

4.11.2 Environmental Consequences

Criteria.

Significant impacts to public utilities would occur if any of the alternatives result in:

- Substantial and long term interruption of utility service;
- Substantial alteration to existing public utilities; and/or
- An increased need for additional capacity of existing facilities, including water, sewer, stormwater drainage, solid waste, natural gas, electric power, and telephone service

Because an increase in service demand would not occur with the proposed action, this analysis focuses on displacement or disruption of services and utilities.

Construction Impacts.

The only public utility located in the project area is an abandoned SCE power line located in the Main Channel. Dredging activities would be restricted in this area, with the area designated as a no dredge area for the contractor. Should the cable be removed prior to or during dredging, the no dredge area would be added back in to the project and the area would be dredged.. The project would not result in any interruptions of utility services, alteration to public utilities, or increased need for public utilities for any of the alternatives.

No action alternative. The no action alternative would not result in any interruptions of utility services, alteration to public utilities, or increased need for public utilities.

The project would not result in any interruptions of utility services, alteration to public utilities, or increased need for public utilities for any of the alternatives. Project impacts would therefore, be less than significant.

4.12 Environmental Justice

4.12.1 Affected Environment.

Executive Order 12898 focuses Federal attention on the environment and human health conditions of minority and low-income communities and calls on agencies to achieve environmental justice as part of its mission. The order requires the USEPA and all other Federal agencies (as well as state agencies receiving Federal funds) to develop strategies to address this issue as part of the NEPA process. The agencies are required to identify and address, as appropriate, any disproportionately high and adverse human health or environmental impacts of their programs, policies, and activities on minority and low-income populations. The order makes clear that its provisions apply fully to programs involving Native Americans. The CEQ has oversight responsibility for the Federal government's compliance with E.O. 12898 and NEPA. The CEQ, in consultation with the USEPA and other agencies, has developed guidance to assist Federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. According to the CEQ's Environmental Justice Guidance Under the National Environmental Policy Act, agencies should consider the composition of the affected area to determine whether minority populations or low-income populations are present in the area affected by the proposed action, and if so whether there may be disproportionately high and adverse human health or environmental impacts (CEQ 1997).

An analysis of demographic data was conducted to derive information on the approximate locations of low-income and minority populations in the community of concern. Since the analysis considers disproportionate impacts, two areas must be defined to facilitate comparison between the area actually affected and a larger regional area that serves as a basis for comparison and includes the area actually affected. The larger regional area is defined as the smallest political unit that includes the affected area and is called the community of comparison. For

purposes of this analysis, the affected area is a one-mile radius around the project area, and the city of Newport Beach is the community of comparison.

Minority populations: EO 12898 defines a minority as an individual belonging to one of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population, for the purposes of this environmental justice analysis, is identified when the minority population of the potentially affected area is greater than 50% or the minority population is meaningfully greater than the general population or other appropriate unit of geographic analysis. USEPA's EJScreen tool was used to obtain the study area demographics. Table 7 provides a summary of the study area demographics, complete EJScreen Reports can be found in Appendix F.

Poverty Rates: The EO does not provide criteria to determine if an affected area consists of a low-income population. For purposes of this assessment, the CEQ criterion for defining low-income population has been adapted to identify whether or not the population in an affected area constitutes a low-income population. An affected geographic area is considered to consist of a low-income population (i.e., below the poverty level, for purposes of this analysis) where the percentage of low-income persons: 1) is greater than 50%, or 2) is meaningfully greater than the low-income population percentage in the general population or other appropriate unit of geographic analysis. The United States Census Bureau poverty assessment weighs income before taxes and excludes capital gains and non-cash benefits (such as public housing, Medicaid, and food stamps). Table 7 provides a summary of the income and poverty status for the study area.

Table 7 Study Area Demographics

Demographic Affected	Area	State	City
Minority Population	15%	62%	19%
Low-income Population	12%	34%	14%

As shown in the table above, the aggregate population percentage in the affected area does not exceed 50%. Therefore, the affected area does not contain a minority population.

As shown in the table above, 12% of the individuals in the affected area are considered below the poverty level. This percentage in the affected area does not exceed 50%. In addition, the affected area low-income population percentage is not greater than the low income population in the city, which is 14%, the affected area is not greater, than the state of California which is 34%. Therefore, the affected area does not contain a high concentration of a low-income population.

4.12.2 Environmental Consequences

Criteria.

An impact to environmental justice would be considered significant if the proposed project results in a disproportionately high and adverse human health or environmental impacts to minority populations.

Construction Impacts.

The project area does not constitute an EJ community. Therefore, there would be no impacts resulting from the proposed project that would result in disproportionately high and adverse impacts to minority and low-income communities.

No Action Alternative: The No Action Alternative would consist of no federal maintenance dredging. Therefore, there would be no impacts to environmental justice from dredging or placement operations.

Impacts to environmental justice would be less than significant; therefore, mitigation measures are not required.

SECTION 5 - CUMULATIVE IMPACT ANALYSIS

NEPA requires that cumulative impacts of the proposed action be analyzed and disclosed. Cumulative impacts are impacts on the environment that will result from the incremental effect of the proposed action when combined with other past, present, and reasonably foreseeable planned and proposed actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

The Corps anticipates future funding to complete maintenance dredging at Lower Newport Bay. When that funding has been secured, this EA will be amended, if necessary, to reflect the selected disposal method.

Minor maintenance dredging of individual boat docks has been permitted in China Cove and around Balboa Island. This work was authorized by the regional dredging permit issued by the Corps for Newport Bay. Disposal would be at the LA-3 ODMDS. Total dredging for these projects is not expected to exceed 5,000 cubic yards.

Past activities, such as dredging, placement of fill material, and construction of Harbor and marina facilities, have reduced the physical and biological aquatic resource functions present in this area, as compared to natural undisturbed areas. Elevated noise levels and vessel traffic cause ongoing disturbances in the project vicinity. Past impacts within and adjacent to the Harbor also include negative impacts to air quality. Thus, the project area has been affected by past marina activities and continues to be similarly disturbed.

Jetty repairs would be taking place on the East Jetty in the Entrance Channel to Lower Newport Bay at approximately the same time as the dredging is currently planned to occur. Repair activities are categorically exempt from NEPA and are covered by Nationwide Permit 3. Environmental impacts are therefore insignificant taken alone or cumulatively with the proposed project.

The Corps has concluded that the cumulative impacts of projects, including maintenance, reconstruction, and upgrades, from current project and forecasted (i.e., future) actions in the proximity of the Lower Newport Bay federal navigational channels will be highly localized and will not significantly affect the quality of the existing natural or built environments. Cumulatively, the dredging and disposal of contaminated and clean sediments will be a beneficial impact to the environment.

SECTION 6 - ENVIRONMENTAL COMPLIANCE AND COMMITMENTS

6.1 COMPLIANCE

6.1.1 National Environmental Compliance Act of 1969 (Public Law (PL) 91-190); National Environmental Policy Act (NEPA) of 1969 (42USC4321 et seq., PL 91-190); Council on Environmental Quality Regulations for Implementing NEPA, 40 CFR Parts 1500 to 1508; USACE Regulations for Implementing NEPA, 33 CFR Part 220.

Under the National Environmental Policy Act (NEPA), federal agencies must consider the environmental consequences of proposed federal actions. The spirit and intent of NEPA is to protect and enhance the environment through well-informed federal decisions, based on sound science. When it is determined that a proposed action could result in significant environmental effects, an EIS is prepared. NEPA is premised on the assumption that providing timely information to the decision maker and the public about the potential environmental consequences of proposed actions would improve the quality of federal decisions.

This Draft EA has been prepared to address impacts associated with the proposed project. The Draft EA will be circulated for public review and to appropriate resource agencies, environmental groups, and other interested parties. Comments received during the public review period will be responded to in the Final EA.

6.1.2 Clean Water Act Of 1972 (33 USC 1251 et seq.)

The Clean Water Act (CWA) was passed to restore and maintain chemical, physical, and biological integrity of the Nation's waters. Specific sections of the CWA control the discharge of pollutants and wastes into aquatic and marine environments. The major section of the CWA that applies to the proposed project is Section 401, which requires certification that the permitted project complies with the State Water Quality Standards for actions within state waters; and Section 404(b)(1), which establishes guidelines for discharge of dredged or fill materials into an aquatic ecosystem. Although Sections 401 and 404(b)(1) of the CWA apply, by their own terms, only to applications for Federal permits, the USACE has made a policy decision to apply them to their own projects. This policy is set out in USACE regulations at 33 CFR Part 336. Section 336.1(a) of that regulation states, "Although the USACE does not process and issue permits for its own activities, the USACE authorizes its own discharges of dredge or fill material by applying all applicable substantive legal requirements, including public notice, opportunity for public hearing, and application of the Section 404(b)(1) guidelines." The LAD has requested a Section 401 Water Quality Certification for proposed nearshore placement operations. Ocean disposal at the LA-3 ODMDS (alternative 2) is not subject to the CWA.

6.1.3 Section 103 of the Marine Protection, Research and Sanctuaries Act (33 U.S.C. 1413)

Section 103 of the MPRSA of 1972, or Ocean Dumping Act, regulates the transportation of dredged material for the purpose of dumping it into ocean waters, where the USACE determines that the dumping will not unreasonably degrade or endanger human health, welfare, or amenities,

or the marine environment, ecological systems, or economic potentialities. Ocean disposal of dredged material associated with Alternatives 1 & 2 would be at LA-3. Pursuant to 33 CFR 336.2(d)(3), the USEPA advised the USACE by email dated 6 June 2019 that the proposed disposal at LA-3 would comply with the ocean dumping criteria at 40 CFR 225.2(b-e) provided the USACE complies with site use conditions for LA-3 for the Main Channel Balboa Reach. This was considered an initial concurrence for this portion of the Lower Bay. Formal concurrence would be sought and obtained prior to preparation of the Final EA.

6.1.4 Endangered Species Act of 1973 (16 USC 1531 et seq.)

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

Under the proposed action, construction impacts would not affect the Federally-listed California least tern. The project would not affect any designated critical habitat. The project would, therefore, not affect any listed species or their designated critical habitat. Consultation under section 7 of the ESA is not required.

6.1.5 Section 307(c) of the Coastal Zone Management Act of 1976 (16 USC 1456 et seq.)

Section 307 of the CZMA [Title 16, U.S. Code Section 1456(c)] states that Federal activities within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs. The California Coastal Act is this state's approved coastal management program applicable to the proposed Federal action. If a Federal agency determines there will not be coastal effects, the Federal agency shall provide the CCC with a negative determination.

The Los Angeles District has determined that the proposed project is consistent, to the maximum extent practicable with the Coastal Zone Management Act of 1972 and with enforceable policies of the California Coastal Management Plan. The Coastal Commission has been requested to concur with this Negative Determination.

6.1.6 Clean Air Act (42 USC 7401 et seq.); General Conformity Regulations at 40 CFR 93.152, et seq.

The general conformity rule implements the CAA conformity provision, which requires federal agencies to identify, analyze, and quantify emission impacts of an action and mandates that the federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to an approved CAA implementation plan.

The general conformity regulations do not apply to maintenance dredging and disposal where no new depths are required and disposal will be at an approved disposal site per 40 CFR 93.153(c)(2)(ix). Therefore, a conformity determination is not required for the proposed project.

6.1.7 Section 106 of the National Historic Preservation Act (54 U.S.C. 306108)

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertaking on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment with regard to the undertaking. The Section 106 implementing regulations are codified in 36 CFR Part 800, which describe the procedures that federal agencies follow to consult with the State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation, Native American tribes, and interested parties.

In accordance with Section 106 of the NHPA, the Corps has determined that the proposed maintenance dredging of the Lower Newport Bay Navigation Channel meets the definition of an undertaking as defined at 36 CFR 800.16(y). The Corps has further determined that it is the type of activity that does not have the potential to cause effects to historic properties (See Appendix C of the EA). Pursuant to 36 CFR 800.3(a)(1), the Corps has satisfied its responsibilities to take into account the effects of this undertaking on historic properties and has no further obligations under Section 106 of the NHPA. The proposed project is in compliance with this Act.

6.1.7 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) requires the USACE to consult with the U. S. Fish and Wildlife Service whenever the waters of any stream or other body of water are proposed to be impounded, diverted, or otherwise modified.

Specific comments are being sought from the California Department of Fish and Wildlife (CDFW), California Coastal Commission, Santa Ana Regional Water Quality Control Board (RWQCB), U. S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) as part of the agency review process for this Draft EA.

6.1.8 Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 U.S.C. 1855(b))

This EA assesses EFH as required by the Magnuson-Stevens Act. Although construction would occur within Essential Fish Habitat, the USACE has determined that the proposed project would not result in a substantial, adverse impact. In compliance with the coordination and consultation requirements of the Magnuson-Stevens Act, this EA includes the USACE's EFH Assessment.

The Draft EA will be sent to the NMFS for their review and comment. The Final EA will include a written response to any comments and/or recommendations received from the NMFS.

6.2 COMMITMENTS

Following is a proposed summary of future commitments:

1. It is the Contractor's responsibility to obtain all applicable air permits and comply with federal, state, and local air and noise regulations.
2. The Contractor shall use ARB reformulated diesel fuel in off-road equipment during construction.
3. Retarding injection timing of diesel-powered equipment to reduce NOx emissions will be implemented where practicable. Use reformulated diesel fuel to reduce reactive organic compounds and SO2.
4. The Contractor shall properly maintain all construction equipment.
5. In the event that previously unknown cultural resources are discovered during the project, all ground disturbing activities shall immediately cease within 100 feet of the discovery until the USACE has met the requirement of 36 CFR 800.13 regarding post-review discoveries. The USACE shall evaluate the eligibility of such resources for listing on the National Register of Historic Places and propose actions to resolve any anticipated adverse effects. Work shall not resume in the area surrounding the potential historic property until the USACE re-authorizes project construction.
6. The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters.
7. The Contractor shall prepare and implement a Water Quality Monitoring Plan at the dredge and Newport Beach Nearshore Placement Sites. The Water Quality Monitoring Plan will include weekly monitoring at the dredge and Newport Beach Nearshore Placement Sites for pH, temperature, dissolved oxygen, and turbidity. Dredging will be controlled to keep water quality impacts to acceptable levels, controls will include modifying the dredging operation and the use of silt curtains (if feasible). Light transmittance will be limited to a 40% maximum decrease between the control station and a reference station located 300 ft downstream. Dissolved oxygen will be maintained at a minimum of 5 mg/l.
8. The Contractor shall implement a Spill Prevention Plan including employee training and the staging of materials on site to clean up accidental spills.
9. All dredging and fill activities will remain within the boundaries specified in the plans. There will be no dumping of fill or material outside of the project area or within any adjacent aquatic community.
10. The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife.
11. The contractor shall mark the dredge and all associated equipment in accordance with U.S. Coast Guard regulations. The contractor must contact the U.S. Coast Guard two weeks prior to the commencement of dredging. The following information shall be provided: the size and type of equipment to be used; names and radio call signs for all working vessels; telephone

number for on-site contact with the project engineer; the schedule for completing the project; and any hazards to navigation. Notices shall be published in Local Notice to Mariners warning boat users about times, durations, and locations of construction activities.

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

13. Dredging activities shall avoid all existing eelgrass vegetated areas within the area of the Entrance Channel. Dredging shall not occur closer than 50 feet to any existing eelgrass beds.

14. Not earlier than 90 days and not later than 30 days prior to the start of construction, the project area shall be surveyed and all occurrences of eelgrass shall be mapped. Additionally, within 30 days of completion of the Work, the project area shall be resurveyed and all occurrences of eelgrass mapped should the preliminary survey show eelgrass within 50 feet of any dredging activities. Any losses will be mitigated in accordance with the "California Eelgrass Mitigation Policy" published by the National Marine Fisheries Service.

15. Prior to dredging at the Entrance Channel dredge site, the USACE would conduct Surveillance Level surveys for *Caulerpa taxifolia*. Surveys shall be completed not earlier than 90 days prior to the commencement of dredging and not later than 30 days prior to the onset of work. Surveys would systematically sample at least 20% of the bottom of the entire area to be dredged to assure that widespread occurrences of *Caulerpa taxifolia* would be identified if present. Surveys would be accomplished using diver transects, remote cameras, or acoustic surveys with visual ground truthing. The USACE would submit survey results in standard format to NMFS/CDFW within 15 days of completion. If *Caulerpa* is identified during the surveys, the USACE would contact NMFS/CDFW within 24 hours of first noting the occurrence. In the event that *Caulerpa* is detected, maintenance dredging would be delayed until such time as the infestation has been isolated, treated and the risk of spread from the proposed action eliminated. In the event that NMFS/CDFW determines that the risk of *Caulerpa taxifolia* infestation has been eliminated or substantially reduced, the requirement for *Caulerpa taxifolia* surveys may be rescinded, or the frequency or level of detail of surveys may be decreased.

16. Dredging activities shall be restricted to the hours of: Monday thru Friday 7:00 a.m. to 6:30 p.m.; Saturday 8:00 a.m. to 6:00 p.m.. Dredging activities on Sunday and Holidays are not permitted.

17. Should ocean disposal (Alternative 2) become the selected project, USEPA LA-3 site use conditions would be adhered to.

18. Comply with site use conditions for the LA-3 ODMDS for the Main Channel Balboa Reach.

6.3 Public Involvement

This Draft EA will be distributed for a 30-day public and agency review. The draft EA will also be posted on the USACE's public notice webpage during the 30-day public review period. In

addition, hard copies will be mailed to the recipients on our mailing list provided in Appendix A. All comments will be documented and addressed in the Final EA.

6.4 Coordination

The principle agencies with which this project has been, and will continue to be coordinated, include: SC-DMMT, USEPA, the Santa Ana Regional Water Quality Control Board (SA RWQCB), and the CCC.

Southern California Dredged Material Management Team. The SC-DMMT is a multi-agency management team set up jointly by the USACE and the USEPA. The SCDMMT initially consisted of the USACE and USEPA, but has expanded to include participation by the various Regional Water Quality Control Boards and the CCC, as well as by staff from the National Marine Fisheries Service and California Department of Fish and Wildlife. The SC-DMMT currently meets monthly.

The Sampling and Analysis Plan (SAP) was discussed at a joint meeting of the SC-DMMT/CSTF held on December 2017. Initial test results were presented at the SC-DMMT in February 2019. The Corps' suitability determination and the full Sampling and Analysis Plan Report (SAPR, Appendix B; Anchor QEA, 2019) were submitted to the SC-DMMT in May 2019. Member agencies of the SC-DMMT concurred that sediments in the Entrance Channel are suitable for nearshore placement and that Main Channel Balboa Reach are suitable for ocean disposal at the LA-3 ODMDS.

U.S. Environmental Protection Agency. The USEPA, in consultation with the USACE, reviewed and approved the SAP used in 2018-2019 to conduct sediment sampling and analysis from the federal channels, including the Entrance Channel. Results were provided to them for review. The USEPA provided a partial concurrence that included concurrence for the Entrance Channel for nearshore placement and ocean disposal; and for ocean disposal of the Main Channel Balboa Reach (MCN5) in an email dated June 6, 2019. A copy of this initial concurrence is included in Appendix B. Formal concurrence will be sought during the 30-day public review period from USEPA.

Santa Ana Regional Water Quality Control Board. A copy of the draft EA will be provided to the SA RWQCB during the 30-day review period. In addition, the SA RWQCB is a member agency in the SC-DMMT and participated in meetings at which the proposed project was discussed. Please refer to Section 6.1 of this EA for a discussion of project compliance with the Clean Water Act. An application for Water Quality Certification has been sent under separate cover to the SA RWQCB.

California Coastal Commission. A copy of the draft EA will be provided to the CCC staff during the 30-day review period. Please refer to Section 6.1 of this EA for a discussion of project compliance with the Coastal Zone Management Act.

6.5 Summary

The proposed project is a maintenance-dredging project designed and scheduled to avoid and/or minimize probable effects on the environment while maximizing benefits. It is determined the proposed project will not have a significant impact upon the existing environment or the quality of the human environment, as documented in this EA. As a result, preparation of an EIS is not required.

SECTION 7 REFERENCES

Anchor QEA, LLC. Lower Newport Bay Sampling and Analysis Report. Prepared for the city of Newport Beach. May.

NMFS. 2008 Caulerpa Control Protocol. (Version 4 - February 25, 2008)

NMFS. 2014. California Eelgrass Mitigation Policy and Implementing Guidelines. October 2014

USACE (U. S. Army Corps of Engineers). 2003. Lower Newport Bay Maintenance Dredging Project, Orange County, California. September 2003.

USEPA/USACE (U. S. Environmental Protection Agency & U. S. Army Corps of Engineers). 1991. Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual. EPA 503/8-91/001.

USEPA/USACE. (U. S. Environmental Protection Agency & U. S. Army Corps of Engineers). 2005. Final Environmental Impact Statement for the Site Designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay Orange County, California. July.

SECTION 8 - DISTRIBUTION LIST

Federal Agencies:

U.S. Environmental Protection Agency, Region IX
U.S. Fish and Wildlife Service
National Marine Fisheries Service
U.S. Coast Guard

State Agencies:

Coastal Commission
California Department of Fish and Wildlife
Regional Water Quality Control Board, Santa Ana Region
Clearinghouse/Association of Governments
Department of Boating and Waterways
Resources Agency
South Coast Air Quality Management District

SECTION 9 - ACRONYMS

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effects
ARB	Air Resources Board
ASBS	Area of Special Biological Significance
CAA	Clean Air Act
CDF&G	California Department of Fish and Game
CEQ	Council on Environmental Quality
CO	Carbon monoxide
CWA	Clean Water Act
DO	Dissolved oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEA	Final Environmental Assessment
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
LAD	Los Angeles District
MLLW	Mean Lower Low Water
MPRSA	Marine Protection Research and Sanctuaries Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO2	Nitrogen dioxide
ODMDS	Ocean Dredged Material Disposal Site
PL	Public Law
RWQCB	Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

SECTION 10 - PREPARERS/REVIEWERS

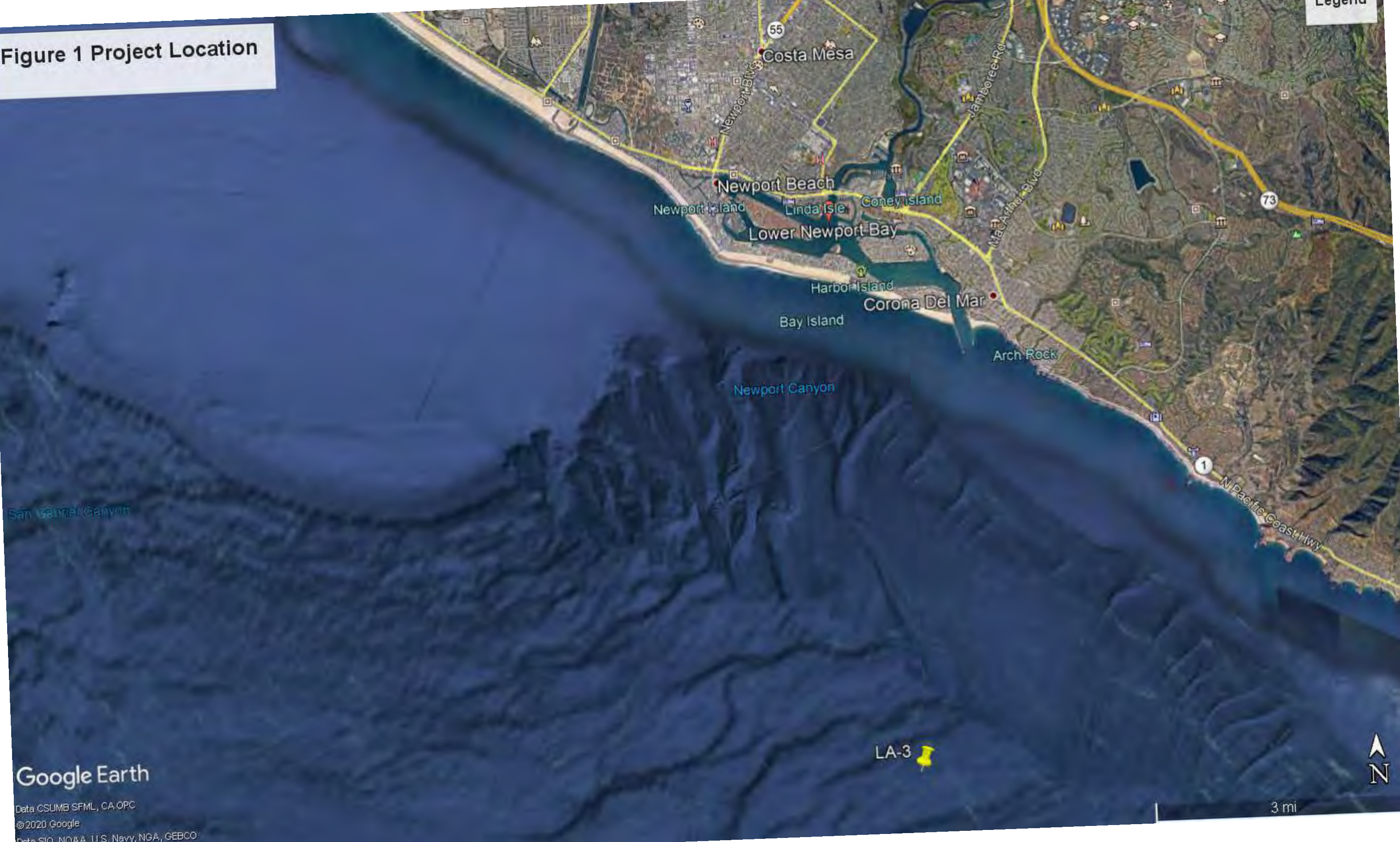
10.1 Preparers

Larry Smith USACE LAD, Ecologist, Environmental Policy Group

10.2 Reviewers

Hayley Lovan	USACE LAD, Acting Chief, Environmental Resources Branch
Christopher Hayward	Coastal Engineering
Jim Fields	Programs and Project Management Division
Gabrielle Dodson	DQC, Ecosystem Planning Section
Jacob Booher	OC, Legal Consistency

Figure 1 Project Location



Legend

San Gabriel Canyon

Google Earth

Data CSUMB SFML, CA OPC
©2020 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

LA-3

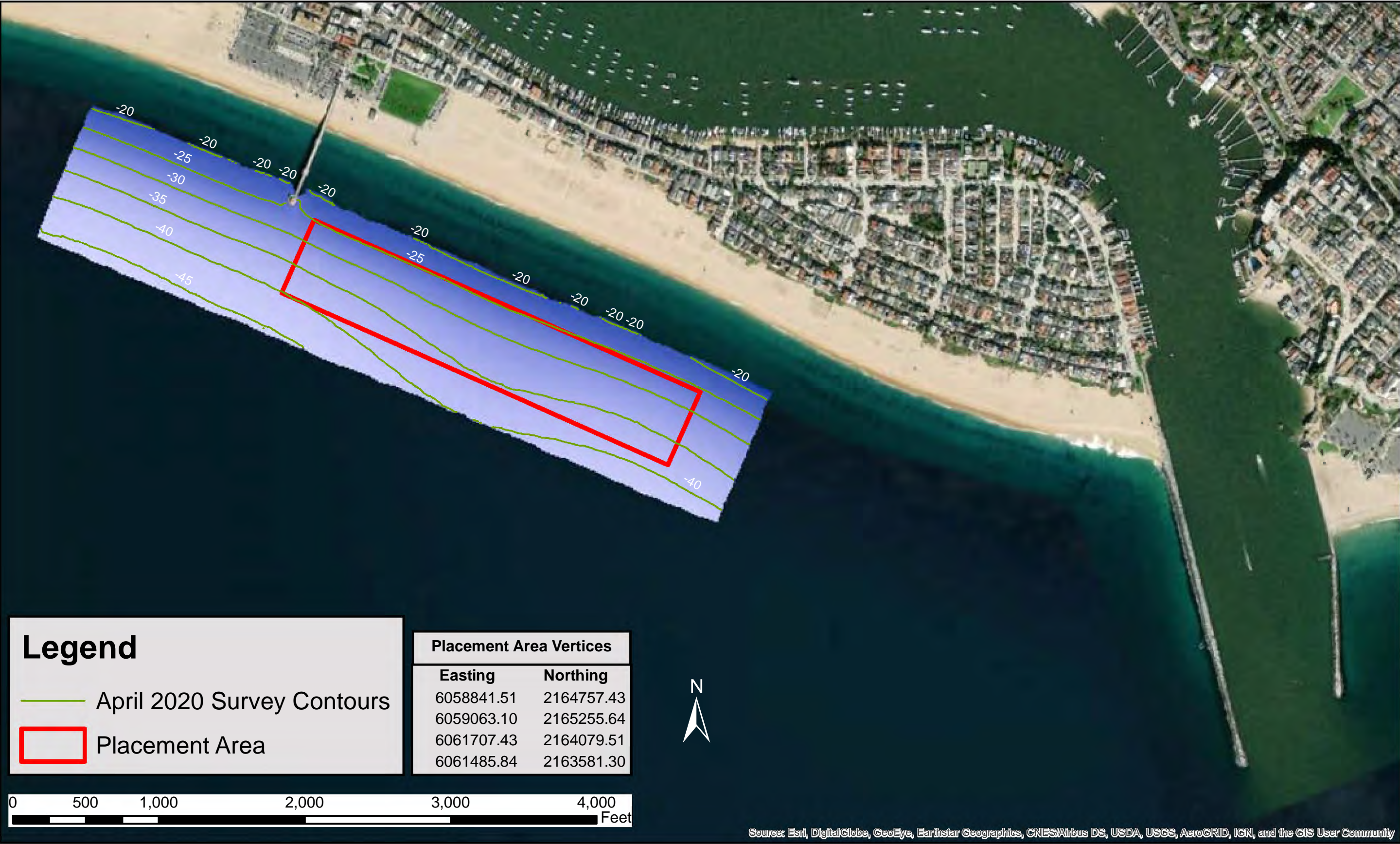
N

3 mi

Figure 2. Entrance Channel/Main Channel Balboa Reach



Figure 3. Newport Beach Nearshore Placement Site





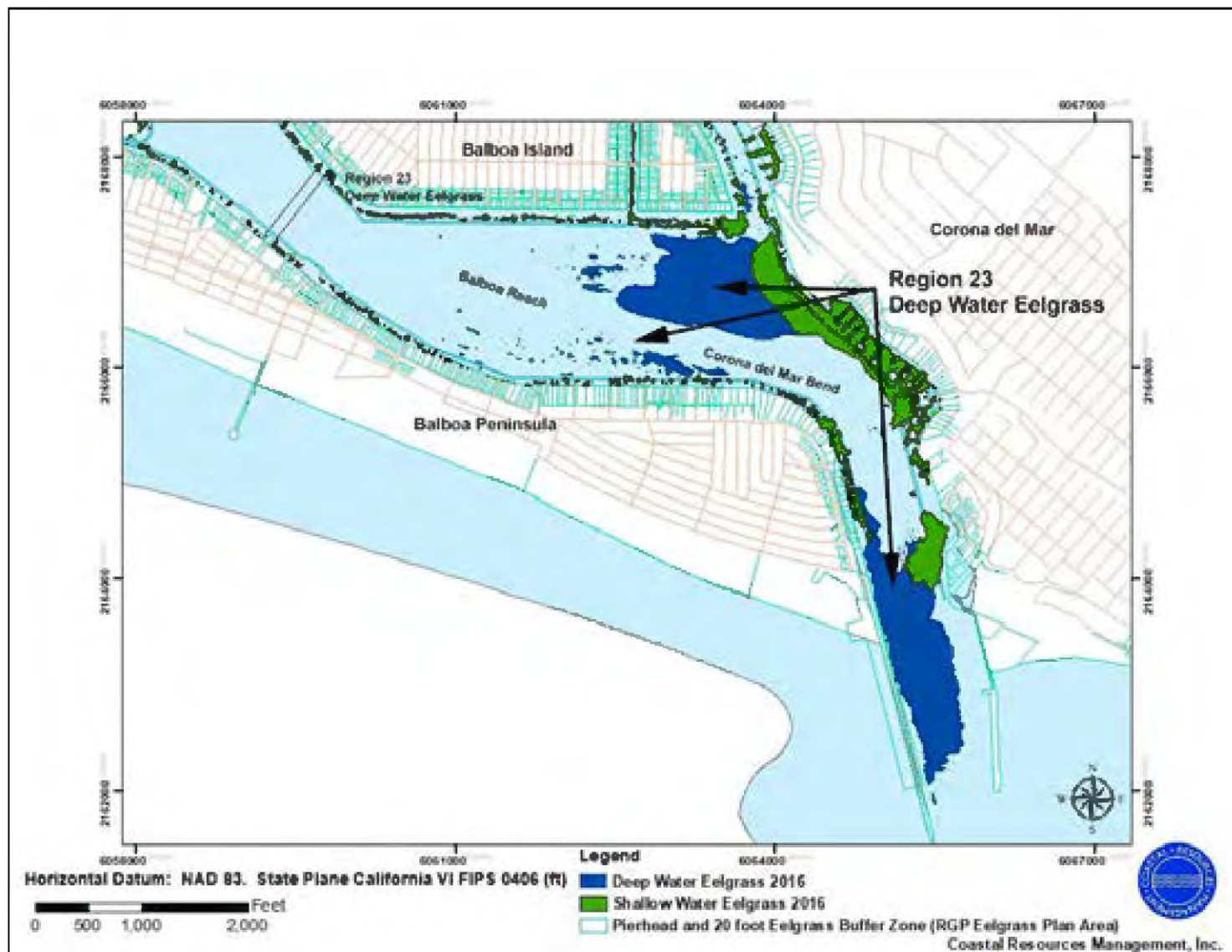


Figure 5. Location of Eelgrass Beds

APPENDIX A

MAILING LIST

California Department of Boating &
Waterways
2000 Evergreen Street, Suite 100
Sacramento, CA 94615-3888

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

The Resources Agency of California
1416 Ninth Street
Sacramento, CA 95814

South Coast Air Quality Management
District
21865 E. Copley Drive
Diamond Bar, CA 91765

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

State Lands Commission
100 Howe Avenue, #100S
Sacramento, CA 95852-8202

State of California Department of
Transportation
120 S. Spring Street
Los Angeles, CA 90012

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

John Ainsworth
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Loni Adams
CA Dept of Fish & Game
3883 Ruffin Road
San Diego, CA 92123

Jon Avery
U.S. Fish & Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

Melissa Scianni
U.S. Environmental Protection
Agency
600 Wilshire Boulevard, Suite 1460
Los Angeles, CA 90017

Hope Smythe
Executive Officer
Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, CA 92501-3348

Eric Chavez
National Marine Fisheries Service
501 W. Ocean Blvd., Suite 4200
Long Beach, CA 92802

U.S. Coast Guard
Marine Safety Office Group
1001 South Seaside Avenue, #20
San Pedro, CA 90731-7350

Chris Miller
Marine Environmental Division
City of Newport Beach
3300 Newport Boulevard
Newport Beach, CA 92658-8915

County of Orange
34551 Puerto Place
Dana Point, CA 92629

APPENDIX B

SAMPLING AND ANALYSIS PLAN REPORT



Updated May 2019
Lower Newport Bay Federal Channels Dredging



Sampling and Analysis Program Report

Prepared for City of Newport Beach

Updated May 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

TABLE OF CONTENTS

1	Introduction	1
1.1	Project Summary	1
1.2	Objectives.....	3
2	Methods	4
2.1	Sample Collection and Handling.....	4
2.1.1	Sediment Core Sampling.....	4
2.1.2	Reference and Site Water Sampling	14
2.1.3	Nearshore Receiver Site Grab Sampling.....	15
2.2	Physical and Chemical Analyses of Sediment	16
2.3	Biological Testing	17
2.4	Chemical Analysis of Tissue Residues	18
3	Results.....	21
3.1	Physical and Chemical Analyses of Sediment	21
3.1.1	Reference and Composite Sediment from January 2018 Sampling Event.....	21
3.1.2	Individual Core Archive Samples from January 2018 Sampling Event.....	27
3.1.3	Individual Core Samples from January 2019 Sampling Event.....	31
3.1.4	Reference and Composite Sediment from January 2019 Sampling Event.....	36
3.1.5	Grain Size Compatibility for Nearshore Placement.....	40
3.2	Biological Testing	42
3.2.1	Solid Phase Testing.....	42
3.2.2	Suspended Particulate Phase Testing.....	45
3.2.3	Bioaccumulation Potential Testing	52
3.3	Prediction of Water Column Toxicity During Disposal	54
3.4	Chemical Analysis of Tissue Residues	57
3.4.1	Comparison of Tissue Burdens to U.S. Food and Drug Administration Action Levels.....	72
3.4.2	Comparison of Tissue Burdens to Reference Sediment Tissue Burdens.....	72
3.4.3	Comparison of Tissue Burdens to Environmental Residue Effects Database.....	73
4	Quality Assurance/Quality Control.....	86
4.1	Physical and Chemical Analyses of Sediment	86
4.2	Biological Testing	88
4.3	Chemical Analysis of Tissue Residues	89

5	Discussion	91
5.1	Evaluation for Nearshore Placement	91
5.2	Evaluation for Ocean Disposal	91
5.2.1	Turning Basin, Main Channel North, Bay Island, and the Entrance Channel.....	91
5.2.2	Newport Channel.....	93
6	Conclusions	94
7	References	95

TABLES

Table 1	Proposed Dredging Volumes.....	2
Table 2	Station Coordinates, Mudline Elevations, Estimated Penetration, Retrieved Core Lengths, and Sample Intervals for Each Station	6
Table 3	Sediment Sample Compositing Scheme and Testing Strategy for Sediment Cores from January 2018 Sampling Event.....	12
Table 4	Sediment Sample Compositing Scheme and Testing Strategy for Sediment Cores from January 2019 Sampling Event.....	14
Table 5	Station Coordinates and Mudline Elevations for Each Station from Nearshore Receiver Site.....	15
Table 6	Summary of Analysis Performed on Individual Core Archive Samples.....	17
Table 7	Summary of Biological Testing Performed on Composite Sediment Samples	18
Table 8	Summary of Analysis Performed on Tissue Samples	19
Table 9	Results of Physical and Chemical Analyses for Composite Samples from January 2018 Sampling Event.....	23
Table 10	Results of Mercury, DDT, and PCB Analysis for Individual Core Archive Samples from January 2018 Sampling Event.....	28
Table 11	Results of Physical and Chemical Analyses for Individual Core Samples from January 2019 Sampling Event.....	32
Table 12	Results of Physical and Chemical Analyses for Composite Samples from January 2019 Sampling Event.....	36
Table 13	Grain Size Results for Entrance Channel	41
Table 14	Grain Size Results for Receiver Site	41
Table 15	Summary of Solid Phase Test Results Using <i>Ampelisca abdita</i>	43
Table 16	Summary of Solid Phase Test Results Using <i>Neanthes arenaceodentata</i>	44
Table 17	Summary of Suspended Particulate Phase Test Results Using <i>Mytilus galloprovincialis</i>	46
Table 18	Summary of Suspended Particulate Phase Test Results Using <i>Americamysis bahia</i> ..	49

Table 19	Summary of Suspended Particulate Phase Test Results Using <i>Menidia beryllina</i>	51
Table 20	Summary of Bioaccumulation Potential Test Results Using <i>Macoma nasuta</i>	53
Table 21	Summary of Bioaccumulation Potential Test Results Using <i>Nereis virens</i>	54
Table 22	STFATE Model Input Parameters.....	55
Table 23	Results of Chemical Analyses of <i>Macoma nasuta</i> Tissue Residues for January 2018 Sampling Event.....	58
Table 24	Results of Chemical Analyses of <i>Nereis virens</i> Tissue Residues for January 2018 Sampling Event.....	64
Table 25	Results of Chemical Analyses of <i>Macoma nasuta</i> Tissue Residues for January 2019 Sampling Event.....	70
Table 26	Results of Chemical Analyses of <i>Nereis virens</i> Tissue Residues for January 2019 Sampling Event.....	71
Table 27	Summary of Statistically Elevated <i>Macoma nasuta</i> Tissue Residues.....	74
Table 28	Summary of Statistically Elevated <i>Nereis virens</i> Tissue Residues.....	79
Table 29	Summary of Rationale for Selection of Toxicity Reference Values	84

FIGURES

Figure 1	Vicinity Map
Figure 2	Federal Channels and Authorized Design Depths
Figure 3	Comparison of 2017 Harborwide Bathymetric Survey to Authorized Design Depths
Figure 4	Overview of Dredge Units and Bathymetry
Figure 5	Dredge Unit, Bathymetry, and Actual Sampling Locations – Turning Basin
Figure 6	Dredge Unit, Bathymetry, and Actual Sampling Locations – Main Channel North 1
Figure 7	Dredge Unit, Bathymetry, and Actual Sampling Locations – Main Channel North 2
Figure 8	Dredge Unit, Bathymetry, and Actual Sampling Locations – Main Channel North 3
Figure 9	Dredge Unit, Bathymetry, and Actual Sampling Locations – Main Channel North 4
Figure 10	Dredge Unit, Bathymetry, and Actual Sampling Locations – Main Channel North 5
Figure 11	Dredge Unit, Bathymetry, and Actual Sampling Locations – Bay Island North
Figure 12	Dredge Unit, Bathymetry, and Actual Sampling Locations – Bay Island Middle East
Figure 13	Dredge Unit, Bathymetry, and Actual Sampling Locations – Bay Island Middle West
Figure 14	Dredge Unit, Bathymetry, and Actual Sampling Locations – Bay Island South
Figure 15	Dredge Unit, Bathymetry, and Actual Sampling Locations – Entrance Channel
Figure 16	Dredge Unit, Bathymetry, and Actual Sampling Locations – Newport Channel
Figure 17	Newport Beach Transects with Actual Sampling Locations
Figure 18	Mercury Concentrations for Individual Stations within Turning Basin and Main Channel North 1, 2, and 3

Figure 19	Total DDT Concentrations for Individual Stations within Main Channel North 1, 2, 3, and 4, and Bay Island
Figure 20	Total PCB Concentrations for Individual Stations within the Turning Basin
Figure 21	Mercury Concentrations for Individual Stations within Newport Channel
Figure 22	Grain Size Envelope for Newport Beach
Figure 23	Comparison of Grain Size from the Entrance Channel to Grain Size Envelope

APPENDICES

Appendix A	Field Logs and Photographs
Appendix B	USEPA Communication
Appendix C	Chemistry and Grain Size Laboratory Reports
Appendix D	Biological Laboratory Reports
Appendix E	STFATE Output
Appendix F	Statistical Analyses of Tissue Concentrations
Appendix G	Data Validation Reports
Appendix H	Lower Newport Bay Data Compilation
Appendix I	Mass Loading Calculations

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	<i>Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual</i>
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	<i>Evaluation for Dredged Material Proposed for Ocean Disposal – Testing Manual</i>
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.

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 federal 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
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

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)
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	
									BIME-01-T-011018	0 to 3.0	Upper composite	N/A
	4	33° 36.461'	117° 54.409'	-11.3	-17	7.2	6.9	-17.0	BIME-01-M-011018	3.0 to 5.7	Lower composite	
									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	
									BIME-02-T-011018	0 to 3.0	Upper composite	N/A
	5	33° 36.479'	117° 54.331'	-12.0	-17	6.5	6.0	-17.0	BIME-02-0M-011018	3.0 to 5.0	Lower composite	
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	
									BIME-03-T-011118	0 to 3.0	Upper composite	N/A
	4	33° 36.409'	117° 54.434'	-11.5	-17	7.0	6.6	-17.0	BIME-03-M-011118	3.0 to 5.5	Lower composite	
									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	
									BIME-04-T-011118	0 to 3.0	Upper composite	N/A
	4	33° 36.453'	117° 54.375'	-11.5	-17	7.0	6.6	-17.0	BIME-04-M-011118	3.0 to 5.5	Lower composite	
									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	
									BIMW-02-T-010918	0 to 3.0	Upper composite	
	2	33° 36.473'	117° 54.458'	-11.6	-17	7.0	5.0	-16.6	BIMW-02-M-010918	3.0 to 5.0	Lower composite	
									BIMW-02-T-010918	0 to 3.0	Upper composite	N/A
	3	33° 36.473'	117° 54.458'	-11.6	-17	6.4	6.2	-17.0	BIMW-02-M-010918	3.0 to 5.4	Lower composite	
									BIMW-02-T-010918	0 to 3.0	Upper composite	N/A
	4	33° 36.473'	117° 54.458'	-11.6	-17	6.4	5.3	-16.9	BIMW-02-M-010918	3.0 to 5.3	Lower composite	
									BIMW-02-T-010918	0 to 3.0	Upper 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	
									BIMW-03-T-011018	0 to 3.0	Upper composite	
	2	33° 36.447'	117° 54.567'	-11.9	-17	6.1	5.9	-17.0	BIMW-03-M-011018	3.0 to 5.1	Lower composite	
									BIMW-03-T-011018	0 to 3.0	Upper composite	N/A
	3	33° 36.447'	117° 54.567'	-11.9	-17	6.1	5.9	-17.0	BIMW-03-M-011018	3.0 to 5.1	Lower composite	
									BIMW-03-T-011018	0 to 3.0	Upper composite	N/A
	4	33° 36.447'	117° 54.567'	-11.9	-17	6.1	4.9	-16.8	BIMW-03-M-011018	3.0 to 4.9	Lower composite	
									BIMW-03-T-011018	0 to 3.0	Upper 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	
									BIMW-04-T-011018	0 to 3.0	Upper composite	
	2	33° 36.433'	117° 54.471'	-12.1	-17	8.1	6.9	-17.0	BIMW-04-M-011018	3.0 to 4.9	Lower composite	
									BIMW-04-T-011018	0 to 3.0	Upper composite	N/A
	3	33° 36.433'	117° 54.471'	-12.1	-17	6.5	5.7	-17.0	BIMW-04-M-011018	3.0 to 4.9	Lower composite	
									BIMW-04-T-011018	0 to 3.0	Upper composite	N/A
	4	33° 36.433'	117° 54.471'	-12.1	-17	6.4	5.5	-17.0	BIMW-04-M-011018	3.0 to 4.9	Lower composite	
									BIMW-04-T-011018	0 to 3.0	Upper composite	
BIS-01	1	33° 36.398'	117° 54.568'	-11.8	-17	6.7	6.0	-17.0	BIS-01-011118	0 to 5.2	Archive, composite	Refusal
									BIS-01-Z-011118	5.2 to 5.7	Z layer archive	
	2	33° 36.398'	117° 54.568'	-11.8	-17	6.2	5.8	-17.0	BIS-01-011118	0 to 5.2	Composite	N/A
BIS-02	1	33° 36.385'	117° 54.481'	-11.9	-17	7.1	6.9	-17.0	BIS-02-011118	0 to 5.1	Archive, composite	N/A
									BIS-02-Z-011118	5.1 to 5.6	Z layer archive	
	2	33° 36.385'	117° 54.481'	-11.9	-17	6.6	5.1	-17.0	BIS-02-011118	0 to 5.1	Composite	N/A
BIS-03	1	33° 36.376'	117° 54.602'	-11.6	-17	7.4	6.6	-17.0	BIS-03-011118	0 to 5.4	Archive, composite	N/A
									BIS-03-Z-011118	5.4 to 5.9	Z layer archive	
	2	33° 36.376'	117° 54.602'	-11.6	-17	6.9	6.1	-17.0	BIS-03-011118	0 to 5.4	Composite	N/A
BIS-04	1	33° 36.357'	117° 54.532'	-11.8	-17	7.2	6.8	-17.0	BIS-04-011118	0 to 5.2	Archive, composite	N/A
									BIS-04-Z-011118	5.2 to 5.7	Z layer archive	
	2	33° 36.357'	117° 54.532'	-11.8	-17	6.7	5.4	-17.0	BIS-04-011118	0 to 5.2	Composite	N/A
EC-01	1	33° 35.737'	117° 52.786'	-18.0	-22	3.0	2.7	-20.7	EC-01-011718	0 to 2.7	Archive, grain size, composite	Refusal
	2	33° 35.737'	117° 52.786'	-18.0	-22	3.7	3.3	-21.3	EC-01-011718	0 to 3.3	Composite	Refusal
	3	33° 35.737'	117° 52.786'	-18.0	-22	4.3	3.3	-21.3	EC-01-011718	0 to 3.3	Composite	Refusal

Station ID	Attempt	Latitude (Degrees, Decimal Minutes) ¹	Longitude (Degrees Decimal Minutes) ¹	Mudline Elevation (feet MLLW)	Project Depth Plus Allowable Overdepth (feet MLLW)	Estimated Penetration (feet)	Retrieved Core Length (feet)	Depth Analyzed in Composite (feet MLLW)	Sample ID	Sample Interval (feet)	Analysis	Notes
EC-02	1	33° 35.638'	117° 52.752'	-10.1	-22	1.0	0.0	N/A	N/A	N/A	N/A	Refusal; sample washed out
	2	33° 35.638'	117° 52.752'	-10.1	-22	2.0	1.8	-11.9	EC-02-011718	0 to 1.8	Composite	Refusal
	3	33° 35.638'	117° 52.752'	-10.1	-22	2.0	1.6	-11.7	EC-02-011718	0 to 1.6	Composite	Refusal
	4	33° 35.638'	117° 52.752'	-10.1	-22	2.5	2.2	-12.3	EC-02-011718	0 to 2.2	Archive, grain size, composite	Refusal
EC-03	1	33° 35.535'	117° 52.715'	-14.9	-22	3.5	2.5	-17.4	EC-03-11718	0 to 2.5	Archive, grain size, composite	Refusal; core tube bent
	2	33° 35.535'	117° 52.715'	-14.9	-22	2.5	1.6	-16.5	EC-03-11718	0 to 1.6	Composite	Refusal; core tube cracked (liner intact)
	3	33° 35.535'	117° 52.715'	-14.9	-22	2.5	1.6	-16.5	EC-03-11718	0 to 1.6	Composite	Refusal
EC-04	1	33° 35.430'	117° 52.687'	-16.6	-22	NR	6.1	-22.0	EC-04-011718	0 to 5.4	Archive, grain size, composite	Refusal; core tube bent
									EC-04-Z-011718	5.4 to 5.9	Z layer archive	
	2	33° 35.430'	117° 52.687'	-16.6	-22	3.0	1.5	-18.1	EC-04-011718	0 to 1.5	Composite	Refusal
	3	33° 35.430'	117° 52.687'	-16.6	-22	3.0	1.6	-18.2	EC-04-011718	0 to 1.6	Composite	Refusal
January 2019 Sampling Event												
NC1-01	1	33° 36.547'	117° 55.450'	-12.3	-17	3.3	2.2	N/A	N/A	N/A	N/A	Refusal; core tube bent; sample discarded
	2	33° 36.550'	117° 55.458'	-12.3	-17	2.8	2.4	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.549'	117° 55.451'	-12.7	-17	10.0	3.2	-15.9	NC1-01-012319	0 to 3.2	Chemistry	Refusal
NC1-01-Z-012319									2.6 to 3.2	Archive of bottom 0.5 feet ²		
NC1-02	1	33° 36.537'	117° 55.371'	-12.4	-17	10.0	6.6	-17.5 ³	NC1-02-012319	0 to 5.1 ³	Chemistry	N/A
									NC1-02-Z-012319	5.1 to 5.6 ⁴	Z layer archive	
	2	33° 36.548'	117° 55.371'	-12.9	-17	10.0	4.8	N/A	N/A	N/A	N/A	Sample discarded
NC1-03	1	33° 36.526'	117° 55.277'	-11.4	-17	5.0	3.4	-14.8	NC1-03-012319	0 to 3.4	Composite	Refusal
	2	33° 36.527'	117° 55.277'	-11.2	-17	5.0	2.6	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.527'	117° 55.278'	-11.2	-17	5.0	3.6	-14.8	NC1-03-012319	0 to 3.6	Chemistry, composite	Refusal
NC1-03-Z-012319									3.1 to 3.6	Archive of bottom 0.5 feet ²		
NC1-04	1	33° 36.512'	117° 55.171'	-11.2	-17	6.0	3.8	-15.0	NC1-04-012319	0 to 3.8	Chemistry, composite	Refusal
									NC1-04-Z-012319	3.3 to 3.8	Archive of bottom 0.5 feet ²	
	2	33° 36.513'	117° 55.173'	-11.3	-17	6.0	3.6	-14.9	NC1-04-012319	0 to 3.6	Composite	N/A
NC2-01	1	33° 36.496'	117° 55.076'	-10.0	-17	4.9	2.6	-12.6	NC2-01-012419	0 to 2.6	Composite	Refusal
	2	33° 36.496'	117° 55.077'	-10.4	-17	5.3	2.5	-12.9	NC2-01-012419	0 to 2.5	Chemistry, composite	Refusal; core tube bent
									NC2-01-Z-012419	2.0 to 2.5	Archive of bottom 0.5 feet ²	
	3	33° 36.495'	117° 55.078'	-10.3	-17	4.4	2.3	N/A	N/A	N/A	N/A	Refusal; core tube bent; sample discarded
NC2-02	1	33° 36.490'	117° 55.013'	-11.1	-17	6.6	3.7	-14.8	NC2-02-012419	0 to 3.7	Composite	Refusal
	2	33° 36.490'	117° 55.013'	-11.0	-17	7.8	3.7	-14.7	NC2-02-012419	0 to 3.7	Chemistry, composite	Refusal
									NC2-02-Z-012419	3.2 to 3.7	Archive of bottom 0.5 feet ²	
	3	33° 36.491'	117° 55.014'	-11.0	-17	7.2	3.0	N/A	N/A	N/A	N/A	Refusal; sample discarded
NC2-03	1	33° 36.473'	117° 54.972'	-11.6	-17	6.7	3.3	-14.9	NC2-03-012419	0 to 3.3	Composite	Refusal
	2	33° 36.474'	117° 54.972'	-11.4	-17	8.6	3.0	N/A	N/A	N/A	N/A	Refusal; sample discarded
	3	33° 36.474'	117° 54.972'	-11.2	-17	7.3	4.7	-15.9	NC2-03-012419	0 to 4.7	Chemistry, composite	Refusal
NC2-03-Z-012419									4.2 to 4.7	Archive of bottom 0.5 feet ²		
NC2-04	1	33° 36.480'	117° 54.904'	-10.7	-17	7.2	4.5	-15.2	NC2-04-012219	0 to 4.5	Chemistry, composite	Refusal; slightly moved due to vessel
									NC2-04-Z-012219	4.0 to 4.5	Archive of bottom 0.5 feet ²	
		2	33° 36.481'	117° 54.904'	-10.6	-17	8.0	4.0	N/A	N/A	N/A	N/A
	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 Limits¹	Sediment Chemistry	Tier III Biological Testing²
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 Limits¹	Sediment Chemistry	Tier III Biological Testing²
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 Testing¹
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-Emerly 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 ODMS. 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	<i>Ampelisca abdita</i>	LA-3 ODMDS	Native or clean sediment	Cadmium chloride and ammonium chloride
	Polychaete	<i>Neanthes arenaceodentata</i>	LA-3 ODMDS	Native or clean sediment	Cadmium chloride
SPP	Bivalve larvae	<i>Mytilus galloprovincialis</i>	N/A	Filtered seawater	Ammonium chloride
	Inland silverside fish	<i>Menidia beryllina</i>	N/A	Filtered seawater	Copper chloride
	Mysid shrimp	<i>Americamysis bahia</i>	N/A	Filtered seawater	Copper chloride
BP	Clam	<i>Macoma nasuta</i>	LA-3 ODMDS	Native or clean sediment	N/A
	Polychaete	<i>Nereis virens</i>	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 toxicity reference values (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.

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 ($\mu\text{g}/\text{kg}$), with the highest concentration measured in the Turning Basin. Tributyltin concentrations were lower, ranging from non-detect to 6.8 $\mu\text{g}/\text{kg}$. 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	Sample ID		LA3-REF-010618	TB-COMP-011218	MCN1-COMP-T-011518	MCN2-COMP-T-011618	MCN3-COMP-011918	MCN4-COMP-011918	MCN5-COMP-011818	BIN-COMP-T-011718	BIME-COMP-T-011218	BIME-COMP-M-011218	BIMW-COMP-T-011018	BIMW-COMP-M-011018	BIS-COMP-011218	EC-COMP-011718
	Sample Date		1/6/2018	1/12/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/18/2018	1/17/2018	1/12/2018	1/12/2018	1/10/2018	1/10/2018	1/12/2018	1/18/2018
	Matrix		SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
ERL	ERM															
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	Sample ID		LA3-REF-010618	TB-COMP-011218	MCN1-COMP-T-011518	MCN2-COMP-T-011618	MCN3-COMP-011918	MCN4-COMP-011918	MCN5-COMP-011818	BIN-COMP-T-011718	BIME-COMP-T-011218	BIME-COMP-M-011218	BIMW-COMP-T-011018	BIMW-COMP-M-011018	BIS-COMP-011218	EC-COMP-011718
	Sample Date		1/6/2018	1/12/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/18/2018	1/17/2018	1/12/2018	1/12/2018	1/10/2018	1/10/2018	1/12/2018	1/18/2018
	Matrix		SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
	ERL	ERM														
Indeno(1,2,3-c,d)pyrene	--	--	7.7 J	96	29	25	18 J	21	24	23	25	18 J	26	24	30	1.9 U
Naphthalene	160	2,100	6.6 U	7.7 U	7.6 U	7.1 U	6.6 U	6.3 U	6.3 U	6.6 U	7 U	6.4 U	7.1 U	6.5 U	7.3 U	4.2 U
Phenanthrene	240	1,500	6.7 J	30	9.7 J	9.7 J	7.7 J	11 J	11 J	9.7 J	9 J	7.9 J	9.8 J	12 J	12 J	2.7 U
Pyrene	665	2,600	16 J	95	36	34	34	42	46	40	41	45	48	54	61	2.7 U
Total HPAH (9 of 17) (U = 0)	1,700	9,600	86.3 J	994	286 J	258.7 J	214.1 J	260 J	278.4 J	245.7 J	251.2 J	209.6 J	263.1 J	269.7 J	337 J	3.3 U
Total LPAH (8 of 17) (U = 0)	552	3,160	6.7 J	57.1 J	9.7 J	17.3 J	7.7 J	11 J	11 J	9.7 J	9 J	7.9 J	9.8 J	12 J	12 J	4.2 U
Total PAH (17) (U = 0)	4,022	44,792	93 J	1,051 J	295.7 J	276 J	221.8 J	271 J	289.4 J	255.4 J	260.2 J	217.5 J	272.9 J	281.7 J	349 J	4.2 U
Pesticides (µg/kg)																
2,4'-DDD (o,p'-DDD)	--	--	0.54 U	0.63 U	5.8	6.4	5.4	4.9	2.5	5.3	3.3	12	4.6	6.9	3.6	0.34 U
2,4'-DDE (o,p'-DDE)	--	--	2.7 J	5.2	7.8	9.5	7.3	7.9	6	7.1	5.3	12	6	9.9	7.4	1.2 U
2,4'-DDT (o,p'-DDT)	--	--	0.6 U	0.69 U	0.68 U	0.64 U	0.59 U	0.57 U	0.57 U	0.6 U	0.63 U	0.58 U	0.64 U	0.59 U	0.71 J	0.38 U
4,4'-DDD (p,p'-DDD)	2	20	1.2 J	12	32	37	36	30	14	27 J	20 J	100	31	51	27	0.6 U
4,4'-DDE (p,p'-DDE)	2.2	27	9.3	37	54	66	52	75	70	76	90	79	120	90	110	0.88 J
4,4'-DDT (p,p'-DDT)	1	7	0.83 UJ	5.6	3	2.2	2.3	3.4	4.3	5.4	6.6	4.6	3.5	1.9	6.5	0.53 U
Aldrin	--	--	0.83 U	0.96 U	0.95 U	0.9 U	0.83 U	0.79 U	0.8 U	0.84 U	0.88 U	0.81 U	0.89 U	0.83 U	0.91 U	0.53 U
Chlordane, alpha- (Chlordane, cis-)	--	--	0.77 U	1.4 J	1.1 J	1.4 J	2.2	1.9	1.3 J	2.3	3.1	2	2.8	1.6 J	1.5 J	0.49 U
Chlordane, gamma- (Chlordane, trans-)	--	--	1.7 U	2.1 J	1.9 U	2.2 J	2.1 J	4.5	3.4 J	3.9	4.9	6.9	4.8	5.7	2.8 J	1.1 U
Dieldrin	0.02	8	0.83 U	1.9 J	1.1 J	1.3 J	0.97 J	2	0.8 U	1.4 J	1.1 J	1.8 J	0.95 J	1.2 J	0.91 U	0.53 U
Endosulfan sulfate	--	--	0.99 U	1.1 U	1.1 U	1.1 U	0.98 U	0.94 U	0.95 U	1 U	1 U	0.96 U	1.1 U	0.99 U	1.1 U	0.63 U
Endosulfan, alpha- (I)	--	--	0.75 U	0.87 U	0.86 U	0.81 U	0.75 U	0.72 U	0.72 U	0.76 U	0.79 U	0.73 U	0.81 U	0.75 U	0.83 U	0.48 U
Endosulfan, beta (II)	--	--	0.9 U	1 U	1 U	0.96 U	0.89 U	0.85 U	0.86 U	0.9 U	0.94 U	0.87 U	0.96 U	0.89 U	0.98 U	0.57 U
Endrin	--	--	0.92 U	1.1 U	1 U	0.99 U	0.91 U	0.87 U	0.88 U	0.92 U	0.96 U	0.89 U	0.98 U	0.91 U	1 U	0.58 U
Endrin aldehyde	--	--	1.2 U	1.3 U	1.3 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.1 U	1.2 U	1.1 U	-- R	0.73 U
Endrin ketone	--	--	0.96 U	1.1 U	1.1 U	1 U	0.95 U	0.91 U	0.91 U	0.96 U	1 U	0.93 U	1 U	0.95 U	1 U	0.6 U
Heptachlor	--	--	0.82 U	0.95 U	0.94 U	0.89 U	0.81 U	0.78 U	0.79 U	0.82 U	0.87 U	0.8 U	0.88 U	0.82 U	0.9 U	0.52 U
Heptachlor epoxide	--	--	1.9 J	3.6 J	1.7 J	1.8 J	1.4 U	1.3 U	1.3 U	1.4 U	1.5 U	1.4 U	1.5 U	1.4 U	1.5 U	0.89 U
Hexachlorocyclohexane (BHC), alpha-	--	--	1.4 U	1.6 U	1.6 U	1.5 U	1.4 U	1.3 U	1.3 U	1.4 U	1.5 U	1.4 U	1.5 U	1.4 U	1.5 U	0.89 U
Hexachlorocyclohexane (BHC), beta-	--	--	0.95 U	1.1 U	1.1 U	1 U	0.94 U	0.9 U	0.9 U	0.95 U	0.99 U	0.92 U	1 U	0.94 U	1 U	0.6 U
Hexachlorocyclohexane (BHC), delta-	--	--	1.7 U	1.9 U	1.9 U	1.8 U	1.7 U	1.6 U	1.6 U	1.7 U	1.8 U	1.6 U	1.8 U	1.7 U	1.8 U	1.1 U
Hexachlorocyclohexane (BHC), gamma- (Lindane)	--	--	0.85 U	0.98 U	0.97 U	0.91 U	0.84 U	0.81 U	0.81 U	0.85 U	0.89 U	0.82 U	0.91 U	0.84 U	0.93 U	0.54 U
Methoxychlor	--	--	1.1 UJ	1.2 U	1.2 U	1.1 U	1 U	1 U	1 U	1.1 U	1.1 U	1 U	1.1 U	1.1 U	1.2 U	0.67 U
Nonachlor, cis-	--	--	0.49 U	0.57 U	0.56 U	0.53 U	0.49 U	0.47 U	1.2 J	0.49 U	1.4 J	0.48 U	2.3	2.1	1.3 J	0.31 U
Nonachlor, trans-	--	--	0.52 U	2.8	2.1 J	2.5	2.1	3.1	2.4	4.7	3.6	3.7	4.7	3.4	3.4	0.33 U
Oxychlordane	--	--	0.51 U	0.59 U	0.59 U	0.55 U	0.51 U	0.49 U	0.49 U	0.51 U	0.54 U	0.5 U	0.55 U	0.51 U	0.56 U	0.32 U
Total Chlordane (U = 0)	0.5	6	1.7 U	6.3 J	3.2 J	6.1 J	6.4 J	9.5	8.3 J	10.9	13 J	12.6	14.6	12.8 J	9 J	1.1 U
Total DDx (U = 0)	1.58	46.1	13.2 J	59.8	103	121	103	121	96.8	121 J	125 J	208	165	160	155 J	0.88 J
Toxaphene	--	--	17 U	20 U	20 U	18 U	17 U	16 U	16 U	17 U	18 U	17 U	18 U	17 U	19 U	11 U
Pyrethroids (µg/kg)																
Allethrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Bifenthrin	--	--	0.57 U	2.6	3.1	2.2	2.7	0.55 U	0.54 U	0.57 UJ	4.5	0.56 U	0.61 U	0.56 U	0.63 U	0.36 U
Cyfluthrin	--	--	0.48 U	1.4	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.63 J	0.3 U
Cypermethrin	--	--	0.48 U	1 J	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Deltamethrin/Tralomethrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Fenpropathrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Fenvalerate	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U

Chemical	Sample ID		LA3-REF-010618	TB-COMP-011218	MCN1-COMP-T-011518	MCN2-COMP-T-011618	MCN3-COMP-011918	MCN4-COMP-011918	MCN5-COMP-011818	BIN-COMP-T-011718	BIME-COMP-T-011218	BIME-COMP-M-011218	BIMW-COMP-T-011018	BIMW-COMP-M-011018	BIS-COMP-011218	EC-COMP-011718
	Sample Date		1/6/2018	1/12/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/18/2018	1/17/2018	1/12/2018	1/12/2018	1/10/2018	1/10/2018	1/12/2018	1/18/2018
	Matrix		SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
	ERL	ERM														
Fluvalinate	--	--	0.48 U	1.2	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.82 J	0.3 UJ
Lambda-cyhalothrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Permethrin	--	--	0.96 U	1.5 J	1.1 U	1 U	0.95 U	0.91 U	0.9 U	0.95 UJ	1 U	0.93 U	1 U	0.94 U	1.1 U	0.94 J
Phenothrin	--	--	0.48 U	0.55 U	0.55 U	0.51 U	0.48 U	0.46 U	0.45 U	0.48 UJ	0.51 U	0.47 U	0.51 U	0.47 U	0.53 U	0.3 U
Resmethrin/Bioresmethrin	--	--	0.81 U	0.94 U	0.93 U	0.87 U	0.81 U	0.78 U	0.77 U	0.81 UJ	0.86 U	0.79 U	0.86 U	0.8 U	0.89 U	0.51 U
Tetramethrin	--	--	0.57 U	0.67 U	0.66 U	0.61 U	0.57 U	0.55 U	0.54 U	0.57 UJ	0.61 U	0.56 U	0.61 U	0.56 U	0.63 U	0.36 U
PCB Congeners (µg/kg)																
PCB-018	--	--	0.12 U	6.8	0.14 U	0.13 U	0.75	0.12 U	0.12 U	0.12 U	0.13 U	0.12 U	0.13 U	0.12 U	0.14 U	0.078 U
PCB-028	--	--	0.13 U	8.2	0.15 U	0.14 U	1.5	0.13 U	0.13 U	0.13 U	0.14 U	1.1	0.14 U	1.2	0.15 U	0.083 U
PCB-037	--	--	0.11 U	0.13 U	0.13 U	0.12 U	0.12 U	0.11 U	0.11 U	0.12 U	0.12 U	0.11 U	0.12 U	0.11 U	0.13 U	0.072 U
PCB-044	--	--	0.29 U	8	2.1	1.5	1.3	0.27 U	1.2	0.29 U	0.73	1.8	0.31 U	1.4	1.1	0.18 U
PCB-049	--	--	0.094 U	7.9	1.5	1.5	1.2	0.63	0.98	0.66	0.49	1.3	0.1 U	1.1	0.69	0.059 U
PCB-052	--	--	0.36 U	10	1.8	2	1.7	1.2	1.2	1.1	0.89	1.7	0.8	1.5	1.3	0.23 U
PCB-066	--	--	0.23 U	14	2.5	2.7	2.3	1.4	1.3	1.5	0.94	2.2	0.95	2	0.91	0.15 U
PCB-070	--	--	0.14 U	10	1.6	2	1.8	1.3	1	1.2	0.61	1.7	0.54	1.2	0.84	0.086 U
PCB-074	--	--	0.17 U	5.3	0.99	1.3	1	0.54	0.16 U	0.96	0.18 U	1.1	0.18 U	1.1	0.19 U	0.11 U
PCB-077	--	--	0.22 U	2.6	0.25 U	0.24 U	0.22 U	0.21 U	0.21 U	0.22 U	0.23 U	0.48	0.24 U	0.22 U	0.24 U	0.14 U
PCB-081	--	--	0.17 U	0.2 U	0.2 U	0.18 U	0.17 U	0.16 U	0.16 U	0.17 U	0.18 U	0.17 U	0.18 U	0.17 U	0.19 U	0.11 U
PCB-087	--	--	0.21 U	3.9	0.24 U	0.23 U	1.8	1.4	2.2	2.2	1.8	1.8	2.3	1.7	1.6	0.13 U
PCB-099	--	--	0.09 U	8.2	2.2	2.3	1.7	1	1.5	1.7	0.84	1.6	1.1	1.4	0.95	0.057 U
PCB-101	--	--	0.084 U	13	3.2	3.6	3	2.1	2.2	2.2	1.7	2.7	1.6	2.6	1.7	0.053 U
PCB-105	--	--	0.1 U	5.1	0.12 U	0.11 U	0.1 U	0.097 U	0.097 U	0.1 U	0.11 U	2.1	0.11 U	1.7	0.11 U	0.064 U
PCB-110	--	--	0.064 U	12	2.7	3.4	2.8	2.1	2.2	1.9	1.5	2.5	1.7	2.8	1.8	0.04 U
PCB-114	--	--	0.14 U	0.16 U	0.16 U	0.15 U	0.14 U	0.13 U	0.13 U	0.14 U	0.15 U	0.14 U	0.15 U	0.14 U	0.16 U	0.089 U
PCB-118	--	--	0.65	12	3.1	3.7	3	1.7	1.7	1.7	1.3	2	1.2	2.4	1.1	0.041 U
PCB-119	--	--	0.12 U	0.14 U	0.14 U	0.13 U	0.12 U	0.11 U	0.11 U	0.12 U	0.13 U	0.12 U	0.13 U	0.12 U	0.13 U	0.075 U
PCB-123	--	--	0.14 U	0.16 U	0.16 U	0.15 U	0.14 U	0.13 U	0.13 U	0.14 U	0.15 U	0.13 U	1.2	0.14 U	0.15 U	0.087 U
PCB-126	--	--	0.1 U	0.12 U	0.12 U	0.11 U	0.1 U	0.099 U	0.099 U	0.1 U	0.11 U	0.1 U	0.11 U	0.1 U	0.12 U	0.066 U
PCB-128	--	--	0.23 U	0.27 U	0.26 U	0.24 U	0.23 U	0.22 U	0.22 U	0.23 U	0.24 U	0.22 U	0.25 U	0.23 U	0.25 U	0.14 U
PCB-132/153	--	--	0.62 J	14	4.9	6.2	4.6	3.4	3.4	3.6	2.3	3.7	2.8	3.8	2.6	0.19 U
PCB-138/158	--	--	0.67 U	12	4.6	5.2	3.9	3.2	3.2	3.4	2.7	3.3	2.5	3.6	2.6	0.42 U
PCB-149	--	--	0.46	8.2	3.3	4.1	3.1	2.1	2.2	2.2	1.7	2.9	1.6	2.5	1.9	0.14 U
PCB-151	--	--	0.17 U	3.2	0.19 U	2	0.92	1	0.66	0.85	0.74	0.93	0.57	0.84	0.18 U	0.1 U
PCB-156	--	--	0.15 U	0.17 U	0.17 U	0.16 U	0.15 U	0.14 U	0.14 U	0.15 U	0.16 U	0.14 U	0.16 U	0.15 U	0.16 U	0.092 U
PCB-157	--	--	0.16 U	0.19 U	0.19 U	0.17 U	0.16 U	0.15 U	0.15 U	0.16 U	0.17 U	0.16 U	0.17 U	0.16 U	0.18 U	0.1 U
PCB-167	--	--	0.25 U	0.29 U	0.29 U	0.27 U	0.25 U	0.24 U	0.24 U	0.25 U	0.27 U	0.25 U	0.27 U	0.25 U	0.28 U	0.16 U
PCB-168	--	--	0.27 U	0.32 U	0.31 U	0.29 U	0.27 U	0.26 U	0.26 U	0.27 U	0.29 U	0.26 U	0.29 U	0.27 U	0.3 U	0.17 U
PCB-169	--	--	0.12 U	0.61	0.14 U	0.13 U	0.12 U	0.12 U	0.12 U	0.12 U	0.13 U	0.12 U	0.13 U	0.12 U	0.14 U	0.078 U
PCB-170	--	--	0.21 U	3.8	0.24 U	2.4	1.5	1.3	1	0.21 U	0.92	0.2 U	0.91	1.3	0.23 U	0.13 U
PCB-177	--	--	0.22 U	2.5	0.26 U	1.1	1.1	0.61	0.89	0.7	0.48	0.65	0.41	0.78	0.25 U	0.14 U
PCB-180	--	--	0.17 U	9.2	3.6	4.5	2.8	2.1	1.9	2.5	1.8	2.6	2	2.7	1.7	0.11 U
PCB-183	--	--	0.18 U	2.3	1.2	1.2	0.86	0.52	0.63	0.62	0.59	0.73	0.49	0.78	0.63	0.11 U
PCB-187	--	--	0.19 U	5.8	2.4	2.7	1.5	1.4	1.2	1.4	0.94	1.5	1.4	1.5	1.3	0.12 U
PCB-189	--	--	0.12 U	0.14 U	0.14 U	0.13 U	0.12 U	0.12 U	0.12 U	0.12 U	0.13 U	0.12 U	0.13 U	0.12 U	0.14 U	0.077 U
PCB-194	--	--	0.14 U	3	0.16 U	0.15 U	0.14 U	0.13 U	0.13 U	0.14 U	0.15 U	0.14 U	0.15 U	1.1	0.16 U	0.088 U

Chemical	Sample ID		LA3-REF-010618	TB-COMP-011218	MCN1-COMP-T-011518	MCN2-COMP-T-011618	MCN3-COMP-011918	MCN4-COMP-011918	MCN5-COMP-011818	BIN-COMP-T-011718	BIME-COMP-T-011218	BIME-COMP-M-011218	BIMW-COMP-T-011018	BIMW-COMP-M-011018	BIS-COMP-011218	EC-COMP-011718
	Sample Date		1/6/2018	1/12/2018	1/15/2018	1/16/2018	1/19/2018	1/19/2018	1/18/2018	1/17/2018	1/12/2018	1/12/2018	1/10/2018	1/10/2018	1/12/2018	1/18/2018
	Matrix		SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
	ERL	ERM														
PCB-201	--	--	0.064 U	0.64	0.074 U	0.069 U	0.065 U	0.061 U	0.062 U	0.065 U	0.069 U	0.063 U	0.07 U	0.064 U	0.072 U	0.041 U
PCB-206	--	--	0.22 U	2.6	0.25 U	0.24 U	0.22 U	0.21 U	0.21 U	0.22 U	0.23 U	0.21 U	0.24 U	0.22 U	0.24 U	0.14 U
Total PCB Congener (U = 0)	22.7	180	1.73 J	195	41.7	53.4	44.1	29	30.6	30.4	23.0	40.4	24.1	41	22.7	0.42 U

Notes:

All non-detect results are reported at the MDL.

Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.

Gamma chlordane and trans-chlordane are synonymous and refer to CAS RN 5103-74-2.

Total chlordane is the sum of cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor, and oxychlordane.

Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.

Total HPAH (9 of 17) is the sum of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthenes, benzo(k)fluoranthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene (if analyzed).

Total LPAH (8 of 17) is the sum of 1-methylnaphthalene, 2-methylnapthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene (if analyzed).

Total PCB congeners is the sum of all PCB congeners listed in this table.

Detected concentration is greater than ERL screening level

Detected concentration is greater than ERM screening level

Bold: detected result

Italicized: non-detected concentration is above one or more identified screening levels

J: estimated value

R: rejected

U: compound analyzed but not detected above detection limit

3.1.2 Individual Core Archive Samples from January 2018 Sampling Event

Based on composite sample results, individual core samples were analyzed for mercury, PCBs, and DDTs, as requested by USEPA (Table 6). Mercury, PCB, and DDT results for individual core samples are presented in Table 10. All results are expressed in dry weight unless otherwise indicated.

Within individual core samples, mercury ranged from 0.088 to 5 mg/kg. Mercury exceeded the ERM value in 13 samples. Total PCBs ranged from 74.5 to 403 µg/kg. Total PCBs exceeded the ERM value in three samples. Total DDTs ranged from 25.9 to 299 µg/kg. Total DDTs exceeded the ERM value in all samples, except two (MCN3-04 and BIN-03). Mercury, total DDT, and total PCB concentrations for individual core samples are shown in Figures 18, 19, and 20, respectively.


Table 10
Results of Mercury, DDT, and PCB Analysis for Individual Core Archive Samples from January 2018 Sampling Event


Chemical	Sample ID		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	
	Sample Date Matrix		1/12/2018 SE	1/12/2018 SE	1/12/2018 SE	1/12/2018 SE	1/12/2018 SE	1/12/2018 SE	1/15/2018 SE	1/15/2018 SE	1/15/2018 SE	1/15/2018 SE	1/15/2018 SE	1/15/2018 SE	1/15/2018 SE	1/16/2018 SE	1/19/2018 SE	1/19/2018 SE	1/19/2018 SE	1/19/2018 SE	1/19/2018 SE	1/18/2018 SE	1/18/2018 SE	
	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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Chemical	Sample ID		MCN4-04-011818	BIME-01-TM-030518	BIME-02-TM-030518	BIME-03-TM-030518	BIME-04-TM-030518	BIMW-01-TM-030518	BIMW-02-TM-030518	BIMW-03-TM-030518	BIMW-04-TM-030518	BIN-01-T-011618	BIN-02-T-011618	BIN-03-T-011618	BIN-04-T-011618	BIN-05-T-011618	BIN-06-T-011618	BIS-01-011118	BIS-02-011118	BIS-03-011118	BIS-04-011118
	Sample Date		1/18/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018	3/5/2018	1/16/2018	1/16/2018	1/16/2018	1/16/2018	1/16/2018	1/17/2018	1/11/2018	1/11/2018	1/11/2018	1/11/2018
	ERL	ERM	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Conventional Parameters (%)																					
Total solids	--	--	53.7	50	52.2	49.4	49.6	49.7	52	48	48.1	53.1	57.3	57.7	49.8	49.3	58.6	52.2	48.1	46.6	47.5
Metals (mg/kg)																					
Mercury	0.15	0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																					
2,4'-DDD (o,p'-DDD)	--	--	4	3.9	4.7	3.5	3.7	5.3	8.6	3.9	5.2	11	3.4	1.1 J	4.6	5.3	5	4.5	9.5	2.6	2.6
2,4'-DDE (o,p'-DDE)	--	--	6	4.9	5	7.1	4.6	12	7.3	5.4	2 U	12	5.3	1.7 J	6.6	8.6	6.8	5.4	7.8	2.7 J	3.6 J
2,4'-DDT (o,p'-DDT)	--	--	0.59 U	0.62 U	0.6 U	0.64 U	0.64 U	0.63 U	0.6 U	0.65 U	0.65 U	0.59 U	0.55 U	0.55 U	0.63 U	0.63 U	0.53 U	0.61 U	0.65 U	0.67 U	0.66 U
4,4'-DDD (p,p'-DDD)	2	20	20	32 J	35	21	29	41	56	24	41	80	24	5.8	33	41	31	33	77	14	17 J
4,4'-DDE (p,p'-DDE)	2.2	27	87	130	83	91	120	140	100	110	210	91	120	33	110	140	250	100	130	84	100
4,4'-DDT (p,p'-DDT)	1	7	4	3.9	3.7	4.9	3.8	7.2	5.5	5	4.3	5	4.4	1.9	6.9	5.2	6.2	6.7	7.5	4.5 J	4.7
Total DDx (U = 0)	1.58	46.1	121	174.7 J	131	128	161	206	177	148	261	199	157	43.5 J	161	200	299	150	232	107.8 J	127.9 J
PCB Congeners (µg/kg)																					
PCB-018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-028	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-037	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-044	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-049	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-052	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-066	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-070	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-074	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-077	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-081	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-087	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-099	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-101	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-105	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-114	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-118	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-119	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-123	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-126	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-132/153	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-138/158	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-149	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-151	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-157	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-167	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-168	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-169	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-177	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-183	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-187	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-189	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-194	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-201	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-206	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total PCB Congener (U = 0)	22.7	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
All non-detect results are reported at the MDL.

Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum. Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT. Total PCB congeners is the sum of all PCB congeners listed in this table.

 Detected concentration is greater than ERL screening level

 Detected concentration is greater than ERM screening level

Bold: detected result

J: estimated value

U: compound analyzed but not detected above detection limit

3.1.3 Individual Core Samples from January 2019 Sampling Event

Results of physical and chemical analyses of individual core samples from Newport Channel are presented in Table 11. All results are expressed in dry weight unless otherwise indicated.

Metals, organotins, pyrethroids, PAHs, pesticides, and PCBs were detected in individual core samples from Newport Channel. Mercury exceeded the ERM value in five samples. Butyltin, dibutyltin, and/or tributyltin were detected in all samples. Several PAHs were detected at low concentrations (total PAHs less than the ERL value in all samples). Total DDTs exceeded the ERM value in one sample (NC2-02). Total chlordane was less than the ERM value in all samples. Total PCBs were less than the ERM in all samples.

Based on individual core sample results, potential contaminants of concern within Newport Channel included mercury. Mercury ranged from 0.0905 to 2.49 mg/kg. Highest concentrations were measured at stations NC1-01 and NC1-02, in the western portion of Newport Channel near Rhine Channel. This is consistent with the exploratory sampling performed in January 2018. Mercury concentrations for individual core samples within Newport Channel are shown in Figure 21.

Based on individual core sample results, composite samples were created in coordination with USEPA for ocean disposal testing. The compositing scheme is presented in Table 4. Stations NC1-01 and NC1-02 were eliminated from further testing due to elevated mercury concentrations. Composite sediment chemistry results for Newport Channel are presented in Section 3.1.4.

Table 11
Results of Physical and Chemical Analyses for Individual Core Samples from January 2019 Sampling Event

Chemical	Sample ID Sample Date Matrix		NC1-01- 012319 1/23/2019 SE	NC1-02- 012319 1/23/2019 SE	NC1-03- 012319 1/23/2019 SE	NC1-04- 012319 1/23/2019 SE	NC2-01- 012419 1/24/2019 SE	NC2-02- 012419 1/24/2019 SE	NC2-03- 012419 1/24/2019 SE	NC2-04- 012219 1/22/2019 SE	NC3-01- 012219 1/22/2019 SE	NC3-02- 012219 1/22/2019 SE	NC3-03- 012219 1/22/2019 SE	NC3-04- 012319 1/23/2019 SE
	ERL	ERM												
Conventional Parameters (%)														
Total organic carbon	--	--	0.75	0.91	0.41	0.42	0.42	0.84	0.27	0.5	0.3	0.39	0.025 J	0.63
Total solids	--	--	56.3	58.9	65.2	59.8	62.4	57.8	70.1	58.3	68.5	62.7	76.8	78.7
Grain Size (%)														
Gravel (>2 mm)	--	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	2.23
Sand (2.00 mm - 1.00 mm)	--	--	0.01 U	0.01 U	2.24	0.01 U	1.63	0.01 U	1.59	0.01 U	4.53	2.63	2.77	15.7
Sand, coarse	--	--	9.47	0.01 U	6.08	0.68	13.89	1.87	25.1	0.94	18.09	12.92	14.98	32.3
Sand, medium	--	--	19.59	1.36	17.24	10.44	26.95	4.74	24.21	13.11	33.79	35.17	31.61	31.67
Sand, fine	--	--	8.2	10.96	23.84	29.24	12.24	17.59	8.73	31.85	11.68	18.14	18.29	14.09
Sand, very fine	--	--	1.91	3.13	5.72	7.06	2.36	7.98	2.3	5.84	2.14	2.98	2.78	1.65
Silt	--	--	40.19	55.79	29.78	36.68	29.81	46.71	27.23	34.01	21.03	19.43	20.59	1.68
Clay (<4 micron)	--	--	20.62	28.76	15.11	15.91	13.12	21.1	10.84	14.25	8.74	8.73	8.98	0.69
Metals (mg/kg)														
Arsenic	8.2	70	8.11	9.72	5.84	6.26	5.7	7.29	3.46	6.03	4.33	4.08	3.01	2.75
Cadmium	1.2	9.6	0.515	0.568	0.309	0.461	0.444	0.884	0.324	0.487	0.387	0.423	0.179	0.148
Chromium	81	370	23.3	26.7	14.6	18.3	13.7	22	8.91	19.2	11.4	11.8	6.74	6.33
Copper	34	270	130	85.4	47.6	50.5	56.5	47.7	25.7	42.4	23.3	16.8	8.88	9.01
Lead	46.7	218	38.4	36.5	19.2	20.8	19.9	29.4	11.8	15.6	12.4	12.5	6.38	5.77
Mercury	0.15	0.71	2	2.49	0.708	0.81	0.402	1.52	1.26	0.267	0.245	0.19	0.144	0.0905
Nickel	20.9	51.6	13.7	16.6	9.18	11.8	9.48	16	5.94	12.3	7.44	7.68	4.24	3.87
Selenium	--	--	5.78	4.02	2.34	2.41	2.87	2.74	1.36	2.02	0.931	1.03	0.429	0.559
Silver	1	3.7	0.398	0.359	0.26	0.315	0.783	1.39	0.624	0.364	0.206	0.234	0.116 J	0.114 J
Zinc	150	410	151 J	130 J	95.8 J	92.3 J	87.4 J	102 J	48.2 J	100 J	59.8 J	49.5 J	25.3 J	23.5 J
Organometallic Compounds (µg/kg)														
Butyltin (n-Butyltin)	--	--	2.4 U	2.3 U	3.7 J	2.2 U	2.2 U	2.3 U	2 U	2.3 U	2 U	2.1 U	1.7 U	1.8 U
Dibutyltin	--	--	44	20	34	24	33	27	15	9	6.8	14	7.6	11
Tetrabutyltin	--	--	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.3 U	1 U	1.2 U	1.1 U	1.2 U	0.94 U	0.94 U
Tributyltin	--	--	3.8 J	2.5 UJ	2.8 J	3.9 J	7 J	2.5 UJ	2.1 UJ	2.5 UJ	2.1 UJ	2.3 UJ	1.9 UJ	1.9 UJ
PAHs (µg/kg)														
1-Methylnaphthalene	--	--	4.1 UJ	3.9 UJ	3.5 UJ	81 J	3.7 UJ	4 UJ	3.3 UJ	3.9 U	3.4 U	3.7 U	3 U	2.9 UJ
2-Methylnaphthalene	70	670	4.1 U	3.9 U	3.5 U	92	3.7 U	4 U	3.3 U	3.9 U	3.4 U	3.7 U	3 U	2.9 UJ
Acenaphthene	16	500	4.2 U	3.9 U	42	86	3.7 U	4.1 U	3.3 U	4 U	3.4 U	3.8 U	3 U	2.9 U
Acenaphthylene	44	640	3.2 U	3 U	2.7 U	91	2.8 U	3.1 U	2.5 U	3 U	2.6 U	2.8 U	2.3 U	2.2 U
Anthracene	85.3	1,100	6.2 U	5.8 U	5.2 U	88	5.5 U	6 U	4.9 U	5.9 U	5 U	5.6 U	4.5 U	4.3 U
Benzo(a)anthracene	261	1,600	8.7 J	11 J	4.5 J	98	7.5 J	3.7 U	3.8 J	8.1 J	6.9 J	3.4 U	2.8 U	5.3 J
Benzo(a)pyrene	430	1,600	18 J	24	2.8 U	110	2.9 U	3.2 U	2.6 U	14 J	10 J	6.7 J	4.2 J	5.5 J
Benzo(b)fluoranthene	--	--	4.8 U	27	4.1 U	97	4.3 U	4.7 U	3.9 U	8.7 J	8.5 J	6.1 J	3.5 U	5.2 J
Benzo(g,h,i)perylene	--	--	7.8 J	12 J	2.3 U	110	7.8 J	2.7 U	2.2 U	15 J	10 J	7.8 J	3.9 J	3.9 J
Benzo(k)fluoranthene	--	--	15 J	20 J	4.2 UJ	89 J	4.4 UJ	4.8 UJ	3.9 UJ	9.5 J	11 J	5 J	3.6 U	4.8 J

Chemical	Sample ID Sample Date Matrix		NC1-01- 012319 1/23/2019 SE	NC1-02- 012319 1/23/2019 SE	NC1-03- 012319 1/23/2019 SE	NC1-04- 012319 1/23/2019 SE	NC2-01- 012419 1/24/2019 SE	NC2-02- 012419 1/24/2019 SE	NC2-03- 012419 1/24/2019 SE	NC2-04- 012219 1/22/2019 SE	NC3-01- 012219 1/22/2019 SE	NC3-02- 012219 1/22/2019 SE	NC3-03- 012219 1/22/2019 SE	NC3-04- 012319 1/23/2019 SE
	ERL	ERM												
Chrysene	384	2,800	11 J	14 J	3.9 J	93	8.8 J	4.4 J	5 J	12 J	9 J	5.2 J	2.9 U	4.4 J
Dibenzo(a,h)anthracene	63.4	260	3.4 U	3.3 U	2.9 U	110	3.1 U	3.4 U	2.8 U	3.3 U	2.8 U	3.1 U	2.5 U	2.4 UJ
Fluoranthene	600	5,100	14 J	21	6.5 J	87	10 J	6.5 J	5.9 J	11 J	8.8 J	5.3 J	2.7 J	5.9 J
Fluorene	19	540	5.5 U	5.2 U	4.7 U	97	4.9 U	5.4 U	4.4 U	5.3 U	4.5 U	5 U	4 U	3.9 U
Indeno(1,2,3-c,d)pyrene	--	--	7.1 J	10 J	2.4 U	100	6.7 J	2.7 U	2.2 U	12 J	7.1 J	4.1 J	2.7 J	3.5 J
Naphthalene	160	2,100	6.1 U	5.8 U	5.2 U	86	5.5 U	6 U	4.9 U	5.9 UJ	5 U	5.5 U	4.5 U	4.3 UJ
Phenanthrene	240	1,500	6.3 J	8.4 J	4.3 J	90	3.9 J	3.8 U	3.1 U	3.8 U	3.5 J	3.6 U	2.9 U	3.3 J
Pyrene	665	2,600	15 J	25 J	11 J	87 J	13 J	7.4 J	6.4 J	16 J	12 J	9.2 J	3.5 J	6.4 J
Total HPAH (9 of 17) (U = 0)	1,700	9,600	96.6 J	164 J	25.9 J	981 J	53.8 J	18.3 J	21.1 J	106.3 J	83.3 J	49.4 J	17 J	44.9 J
Total LPAH (8 of 17) (U = 0)	552	3,160	6.3 J	8.4 J	46.3 J	630	3.9 J	6 U	4.9 U	5.9 UJ	3.5 J	5.6 U	4.5 U	3.3 J
Total PAH (17) (U = 0)	4,022	44,792	102.9 J	172.4 J	72.2 J	1611 J	57.7 J	18.3 J	21.1 J	106.3 J	86.8 J	49.4 J	17 J	48.2 J
Pesticides (µg/kg)														
2,4'-DDD (o,p'-DDD)	--	--	0.5 U	0.48 U	0.43 U	0.47 U	0.46 U	0.49 U	0.41 U	0.48 U	0.41 U	0.45 U	0.36 U	0.36 U
2,4'-DDE (o,p'-DDE)	--	--	1.7 U	1.6 U	1.5 U	1.6 U	1.6 U	3.5	1.5 J	1.7 U	1.4 U	2.4 J	1.3 U	1.2 U
2,4'-DDT (o,p'-DDT)	--	--	0.55 U	0.52 U	0.47 U	0.52 U	0.5 U	0.54 U	0.45 U	0.53 U	0.45 U	0.49 U	0.4 U	0.4 U
4,4'-DDD (p,p'-DDD)	2	20	0.88 U	0.83 U	0.76 U	5.5	1.3 J	19	8	2.2	6.3	11	2	0.63 U
4,4'-DDE (p,p'-DDE)	2.2	27	14	8.8	11	13	17	30	12	19	12	22	10	6.4 J
4,4'-DDT (p,p'-DDT)	1	7	0.77 U	0.73 U	0.66 U	0.72 U	0.7 U	0.75 U	0.62 U	0.74 U	0.63 U	0.69 U	0.56 U	0.55 U
Aldrin	--	--	0.77 U	0.73 U	0.66 U	0.72 U	0.7 U	0.75 U	0.62 U	0.74 U	0.63 U	0.69 U	0.56 U	0.55 UJ
Chlordane, alpha- (Chlordane, cis-)	--	--	0.71 U	0.67 U	0.61 U	0.67 U	0.65 U	0.69 U	0.58 U	0.69 U	0.59 U	0.64 U	0.52 U	0.51 U
Chlordane, gamma- (Chlordane, trans-)	--	--	1.6 U	1.5 U	1.7 J	2 J	2.3 J	2.2 J	2.3 J	2.2 J	1.5 J	2.6 J	1.7 J	1.1 U
Dieldrin	0.02	8	0.77 U	0.73 U	0.66 U	0.72 U	0.7 U	0.75 U	0.62 U	0.74 U	0.63 U	0.69 U	0.56 U	0.55 U
Endosulfan sulfate	--	--	0.92 U	0.87 U	0.79 U	0.86 U	0.84 U	0.89 U	0.74 U	0.88 U	0.75 U	0.82 U	0.67 U	0.66 U
Endosulfan, alpha- (I)	--	--	0.7 U	0.66 U	0.6 U	0.65 U	0.64 U	0.68 U	0.56 U	0.67 U	0.57 U	0.62 U	0.51 U	0.5 U
Endosulfan, beta (II)	--	--	0.83 U	0.78 U	0.71 U	0.78 U	0.75 U	0.8 U	0.67 U	0.8 U	0.68 U	0.74 U	0.6 U	0.59 U
Endrin	--	--	0.85 U	0.8 U	0.73 U	0.79 U	0.77 U	0.82 U	0.68 U	0.81 U	0.7 U	0.76 U	0.61 U	0.61 U
Endrin aldehyde	--	--	1.1 U	1 U	0.91 U	1 U	0.97 U	1 U	0.86 U	1 U	0.87 U	0.95 U	0.77 U	0.76 U
Endrin ketone	--	--	0.88 U	0.84 U	0.76 U	0.83 U	0.81 U	0.86 U	0.71 U	0.85 U	0.73 U	0.79 U	0.64 U	0.63 U
Heptachlor	--	--	0.76 U	0.72 U	0.65 U	0.71 U	0.69 U	0.74 U	0.61 U	0.73 U	0.62 U	0.68 U	0.55 U	0.54 U
Heptachlor epoxide	--	--	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.3 U	1 U	1.2 U	1.1 U	1.2 U	0.94 U	0.93 U
Hexachlorocyclohexane (BHC), alpha-	--	--	1.3 U	1.2 U	1.1 U	1.2 U	1.2 U	1.3 U	1.1 U	1.3 U	1.1 U	1.2 U	0.94 U	0.93 U
Hexachlorocyclohexane (BHC), beta-	--	--	0.87 U	0.83 U	0.75 U	0.82 U	0.8 U	0.85 U	0.71 U	0.84 U	0.72 U	0.78 U	0.63 U	0.62 U
Hexachlorocyclohexane (BHC), delta-	--	--	1.5 U	1.5 U	1.3 U	1.4 U	1.4 U	1.5 U	1.2 U	1.5 U	1.3 U	1.4 U	1.1 U	1.1 U
Hexachlorocyclohexane (BHC), gamma- (Lindane)	--	--	0.78 U	0.74 U	0.67 U	0.73 U	0.71 U	0.76 U	0.63 U	0.75 U	0.64 U	0.7 U	0.57 U	0.56 U
Methoxychlor	--	--	0.98 U	0.93 U	0.84 U	0.92 U	0.89 U	0.95 U	0.79 U	0.94 U	0.81 U	0.88 U	0.71 U	0.7 U
Nonachlor, cis-	--	--	0.46 U	0.43 U	0.39 U	0.43 U	0.42 U	0.44 U	0.37 U	0.44 U	0.37 U	0.41 U	0.33 U	0.33 U
Nonachlor, trans-	--	--	0.48 U	0.45 U	0.41 U	0.45 U	0.43 U	0.46 U	0.38 U	0.46 U	0.39 U	0.43 U	0.35 U	0.34 U
Oxychlordane	--	--	0.47 U	0.45 U	0.41 U	0.44 U	0.43 U	0.46 U	0.38 U	0.46 U	0.39 U	0.42 U	0.34 U	0.34 U
Toxaphene	--	--	16 U	15 U	14 U	15 U	14 U	15 U	13 U	15 U	13 U	14 U	11 U	11 U
Total Chlordane (U = 0)	0.5	6	1.6 U	1.5 U	1.7 J	2 J	2.3 J	2.2 J	2.3 J	2.2 J	1.5 J	2.6 J	1.7 J	1.1 U
Total DDx (U = 0)	1.58	46.1	14	8.8	11	18.5	18.3 J	52.5	21.5 J	21.2	18.3	35.4 J	12	6.4 J
Pyrethroids (µg/kg)														

Chemical	Sample ID Sample Date Matrix		NC1-01- 012319 1/23/2019 SE	NC1-02- 012319 1/23/2019 SE	NC1-03- 012319 1/23/2019 SE	NC1-04- 012319 1/23/2019 SE	NC2-01- 012419 1/24/2019 SE	NC2-02- 012419 1/24/2019 SE	NC2-03- 012419 1/24/2019 SE	NC2-04- 012219 1/22/2019 SE	NC3-01- 012219 1/22/2019 SE	NC3-02- 012219 1/22/2019 SE	NC3-03- 012219 1/22/2019 SE	NC3-04- 012319 1/23/2019 SE
	ERL	ERM												
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
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

Chemical	Sample ID Sample Date Matrix		NC1-01- 012319 1/23/2019 SE	NC1-02- 012319 1/23/2019 SE	NC1-03- 012319 1/23/2019 SE	NC1-04- 012319 1/23/2019 SE	NC2-01- 012419 1/24/2019 SE	NC2-02- 012419 1/24/2019 SE	NC2-03- 012419 1/24/2019 SE	NC2-04- 012219 1/22/2019 SE	NC3-01- 012219 1/22/2019 SE	NC3-02- 012219 1/22/2019 SE	NC3-03- 012219 1/22/2019 SE	NC3-04- 012319 1/23/2019 SE
	ERL	ERM												
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-methylnaphthalene, 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

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			
Sand, fine	--	--	4.97	0.24	4.75
Sand, very fine	--	--	12.15	17.82	10.01
Silt	--	--	71.71	53.65	58.46
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

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			
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
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 U	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

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			
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
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

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-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-methylnaphthalene, 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 (EC₅₀) ranged from 73.4% to greater than 100%, and the median lethal concentration (LC₅₀) 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 EC₅₀ and LC₅₀ 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 LC₅₀ 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 LC₅₀ 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 LC₅₀ 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 LC₅₀ 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 LC₅₀ or EC₅₀ 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 EC₅₀ 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 LC₅₀ or EC₅₀ 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 ODMS 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 EC₅₀ (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 Sample Date Matrix	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
		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
	FDA Action Level	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Conventional Parameters (%)																				
Lipids	--	0.32	0.38	0.4	0.44	0.38	0.31	0.33	0.37	0.43	0.44	0.31	0.44	0.66	0.49	0.32	0.37	0.36	0.47	0.34
Metals (mg/kg)																				
Mercury	1 ¹	0.00698 J	0.00612 J	0.00432 J	0.00357 J	0.00375 J	0.00501 J	0.0482	0.0391	0.0464	0.0372	0.0362	0.0156	0.0194	0.0181	0.0111	0.0227	0.012	0.0206	0.0192
Organometallic Compounds (µg/kg)																				
Dibutyltin	--	0.72 U	0.72 U	0.72 U	0.74 U	0.75 U	0.74 U	4.5	3.9	5.2	3.1	0.75 U	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																				
2,4'-DDD (o,p'-DDD)	--	0.29 U	0.29 U	0.28 U	0.29 U	0.28 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.28 U	0.29 U	0.58 J	0.43 J	0.28 U	0.53 J	0.78 J	0.78 J	0.38 J
2,4'-DDE (o,p'-DDE)	5,000 ²	0.99 U	1 U	1.4 J	0.99 U	0.99 U	0.99 U	1 U	0.98 U	0.99 U	1 U	0.99 U	1 U	1.1 J	1.2 J	0.98 U	1 U	1.3 J	1.7 J	1 U
2,4'-DDT (o,p'-DDT)	5,000 ²	0.31 U	0.32 U	0.31 U	0.31 U	0.31 U	0.31 U	0.32 U	0.31 U	0.31 U	0.32 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U
4,4'-DDD (p,p'-DDD)	--	0.5 U	0.51 U	0.5 U	0.5 U	0.54 J	0.5 U	0.76 J	2.7	1.7	2.3	1.9	8.1	12	9.6	1.8	7.4	13	18	7.4
4,4'-DDE (p,p'-DDE)	5,000 ²	0.44 U	5.1	4.1	5.1	4.3	2.9	4.3	9.5	6.3	10	7.8	16	23	18	4.8	14	25	29	17
4,4'-DDT (p,p'-DDT)	5,000 ²	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.43 U	0.44 U	0.44 U	0.44 U	0.44 U
Total DDx (U = 0)	5,000 ²	0.99 U	5.1	5.5 J	5.1	4.84 J	2.9	5.06 J	12.2	8	12.3	9.7	24.1	36.68 J	29.23 J	6.6	21.93 J	40.08 J	49.48 J	24.78 J
PCB Congeners (µg/kg)																				
PCB-018	--	0.071 U	0.072 U	0.07 U	0.071 U	0.071 U	0.071 U	0.59	0.37	0.81	0.33	0.63	0.072 U	0.43	0.07 U	0.07 U	0.072 U	0.072 U	0.071 U	0.071 U
PCB-028	--	0.034 U	0.034 U	0.033 U	0.034 U	0.033 U	0.034 U	1.9	1.6	2.2	1.6	1.6	0.48	0.71	0.94	0.68	0.75	0.76	0.57	0.69
PCB-037	--	0.06 U	0.061 U	0.06 U	0.06 U	0.06 U	0.06 U	0.061 U	0.06 U	0.06 U	0.061 U	0.06 U	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.06 U	0.061 U
PCB-044	--	0.087 U	0.088 U	0.086 U	0.087 U	0.086 U	0.087 U	0.088 U	0.086 U	0.66	0.087 U	0.086 U	0.088 U	0.087 U	0.086 U	0.086 U	0.088 U	0.088 U	0.086 U	0.087 U
PCB-049	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.68	1.2	1	1.3	1.1	0.43	0.73	0.6	0.11 U	0.37	0.43	0.4	0.39
PCB-052	--	0.063 U	0.063 U	0.062 U	0.063 U	0.062 U	0.063 U	1.8	1.5	2.3	1.9	1.5	0.59	0.95	0.78	0.59	0.55	0.65	0.54	0.71
PCB-066	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	2.6	2.5	3.4	2.7	2.5	0.86	1.2	1.1	0.83	0.86	0.95	0.7	0.68
PCB-070	--	0.06 U	0.06 U	0.059 U	0.06 U	0.059 U	0.06 U	1.9	1.8	2.5	1.8	1.8	0.49	0.72	0.65	0.44	0.46	0.62	0.45	0.51
PCB-074	--	0.087 U	0.088 U	0.086 U	0.087 U	0.086 U	0.087 U	1.2	1.1	1.5	1.1	1.1	0.35	0.52	0.43	0.35	0.38	0.39	0.29	0.34
PCB-077	--	0.078 U	0.078 U	0.077 U	0.078 U	0.077 U	0.078 U	0.078 U	0.077 U	0.077 U	0.3	0.29	0.079 U	0.078 U	0.077 U	0.077 U	0.078 U	0.078 U	0.077 U	0.078 U
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.51	0.6	0.8	0.66	0.63	0.42	0.57	0.52	0.29	0.39	0.43	0.39	0.39
PCB-099	--	0.061 U	0.061 U	0.06 U	0.061 U	0.06 U	0.061 U	1.4	1.2	1.8	1.5	1.2	0.67	0.9	0.74	0.53	0.54	0.69	0.58	0.62
PCB-101	--	0.098 U	0.099 U	0.097 U	0.098 U	0.097 U	0.098 U	2	2.1	2.7	2	2	0.93	1.2	1.1	0.82	0.96	1.2	0.87	0.84
PCB-105	--	0.055 U	0.055 U	0.054 U	0.055 U	0.054 U	0.055 U	0.65	0.61	0.88	0.67	0.66	0.38	0.43	0.35	0.35	0.28	0.31	0.25	0.21
PCB-110	--	0.046 U	0.046 U	0.045 U	0.046 U	0.046 U	0.046 U	1.8	1.9	2.5	1.9	1.8	0.82	1.1	0.92	0.8	0.77	0.98	0.75	0.85
PCB-114	--	0.082 U	0.083 U	0.081 U	0.082 U	0.082 U	0.082 U	0.083 U	0.081 U	0.082 U	0.082 U	0.082 U	0.083 U	0.082 U	0.081 U	0.081 U	0.083 U	0.083 U	0.082 U	0.082 U
PCB-118	--	0.084 U	0.085 U	0.19 J	0.084 U	0.21	0.084 U	1.6	1.7	2.2	1.8	1.6	0.62	0.9	0.88	0.66	0.64	0.8	0.62	0.65
PCB-119	--	0.094 U	0.095 U	0.094 U	0.094 U	0.094 U	0.094 U	0.095 U	0.094 U	0.094 U	0.095 U	0.094 U	0.096 U	0.095 U	0.094 U	0.094 U	0.095 U	0.095 U	0.094 U	0.095 U
PCB-123	--	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U
PCB-126	--	0.08 U	0.081 U	0.079 U	0.08 U	0.08 U	0.08 U	0.081 U	0.079 U	0.08 U	0.08 U	0.08 U	0.081 U	0.08 U	0.079 U	0.079 U	0.081 U	0.081 U	0.08 U	0.08 U
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.28	0.1 U	0.36	0.25	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB-132/153	--	0.17 U	0.3 J	0.25 J	0.33 J	0.42	0.21 J	1.6	1.5	2.1	1.7	1.6	1	1.4	1.2	0.97	0.98	1.4	1	1.1
PCB-138/158	--	0.094 U	0.095 U	0.26 J	0.094 U	0.2 J	0.094 U	1.2	1.2	1.7	1.3	1.2	0.8	1.2	1	0.66	0.84	1	0.86	0.9
PCB-149	--	0.098 U	0.099 U	0.097 U	0.098 U	0.097 U	0.098 U	1	1	1.4	1	0.92	0.81	0.91	0.82	0.72	0.68	0.79	0.69	0.74
PCB-151	--	0.067 U	0.068 U	0.067 U	0.067 U	0.067 U	0.067 U	0.32	0.28	0.4	0.3	0.4	0.23	0.37	0.2	0.067 U	0.22	0.3	0.23	0.22
PCB-156	--	0.058 U	0.058 U	0.057 U	0.058 U	0.057 U	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	0.057 U	0.058 U	0.058 U	0.057 U	0.057 U	0.058 U	0.058 U	0.057 U	0.058 U
PCB-157	--	0.052 U	0.053 U	0.052 U	0.052 U	0.052 U	0.052 U	0.053 U	0.052 U	0.052 U	0.053 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.052 U	0.053 U
PCB-167	--	0.062 U	0.062 U	0.061 U	0.062 U	0.061 U	0.062 U	0.062 U	0.061 U	0.061 U	0.062 U	0.061 U	0.063 U	0.062 U	0.061 U	0.061 U	0.062 U	0.062 U	0.061 U	0.062 U
PCB-168	--	0.049 U	0.049 U	0.048 U	0.049 U	0.048 U	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	0.048 U	0.049 U	0.049 U	0.048 U	0.048 U	0.049 U	0.049 U	0.048 U	0.049 U

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 Sample Date Matrix	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
		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
		FDA Action Level	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
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	0.06 U	0.062 U	0.062 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	0.06 U	0.062 U	0.062 U	0.061 U
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

Chemical	Location ID	MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
	Sample ID Sample Date Matrix	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	
		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	
		FDA Action Level	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Conventional Parameters (%)																					
Lipids	--	0.61	0.7	0.4	0.4	0.56	0.43	0.36	0.44	0.54	0.35	0.36	0.36	0.34	0.53	0.5	0.35	0.33	0.29	0.61	
Metals (mg/kg)																					
Mercury	1 ¹	0.0147	0.0165	0.00713 J	0.00996	0.0107	0.0125	0.00927 J	0.00352 U	0.00367 U	0.00469 J	0.00336 U	0.00357 J	0.00542 J	0.00369 J	0.00498 J	0.00405 J	0.00446 J	0.00367 U	0.00342 U	
Organometallic Compounds (µg/kg)																					
Dibutyltin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Pesticides (µg/kg)																					
2,4'-DDD (o,p'-DDD)	--	1.3	1.3	1.9	2.1	1.5	0.73 J	0.9 J	0.78 J	1.5	0.77 J	0.77 J	1.7	0.76 J	0.93 J	0.68 J	0.42 J	0.29 U	0.29 U	1.4	
2,4'-DDE (o,p'-DDE)	5,000 ²	2.2	3.3	1.3 J	2.4	2.2	0.99 U	1.2 J	1.2 J	2.1	1.1 J	1.2 J	1.6 J	1 U	1.6 J	1.7 J	1.6 J	1 U	1 U	5.6	
2,4'-DDT (o,p'-DDT)	5,000 ²	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.36 J	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.32 U	
4,4'-DDD (p,p'-DDD)	--	21	28	16	23	21	12	10	11	15 J	11	10	16 J	5.9	9.2	8.8	6.2	3.9	4.9	20	
4,4'-DDE (p,p'-DDE)	5,000 ²	37	53	22	34	35	19	20	35	50	32	30	31	25	39	36	25	15	23	68	
4,4'-DDT (p,p'-DDT)	5,000 ²	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	
Total DDx (U = 0)	5,000 ²	61.5	85.6	41.2 J	61.5	59.7	31.73 J	32.46 J	47.98 J	68.6 J	44.87 J	41.97 J	50.3 J	31.66 J	50.73 J	47.18 J	33.22 J	18.9	27.9	95	
PCB Congeners (µg/kg)																					
PCB-018	--	0.071 U	0.071 U	0.071 U	0.072 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.072 U	0.072 U	0.071 U	0.072 U	0.072 U	0.071 U	0.071 U	0.071 U	0.072 U	
PCB-028	--	0.66	0.98	0.034 U	0.38	0.47	0.034 U	0.36	0.034 U	0.033 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	0.034 U	
PCB-037	--	0.06 U	0.06 U	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.06 U	0.061 U	0.061 U	0.061 U	
PCB-044	--	0.087 U	0.087 U	0.087 U	0.088 U	0.087 U	0.087 U	0.087 U	0.087 U	0.086 U	0.087 U	0.088 U	0.088 U	0.087 U	0.088 U	0.088 U	0.087 U	0.087 U	0.087 U	0.088 U	
PCB-049	--	0.68	0.88	0.33	0.44	0.44	0.27	0.23	0.26	0.3	0.25	0.2 J	0.25	0.11 U	0.27	0.21	0.19 J	0.11 U	0.11 U	0.31	
PCB-052	--	0.93	1	0.55	0.5	0.62	0.59	0.47	0.51	0.51	0.4	0.46	0.41	0.27	0.26	0.32	0.3	0.3	0.31	0.42	
PCB-066	--	0.98	1.3	0.56	0.75	0.72	0.71	0.56	0.35	0.41	0.47	0.42	0.44	0.38	0.45	0.35	0.49	0.31	0.42	0.52	
PCB-070	--	0.62	0.9	0.45	0.39	0.45	0.45	0.44	0.38	0.35	0.38	0.33	0.25	0.27	0.27	0.35	0.21	0.24	0.27	0.32	
PCB-074	--	0.45	0.54	0.28	0.29	0.31	0.38	0.24	0.26	0.25	0.21	0.25	0.088 U	0.087 U	0.28	0.088 U	0.23	0.22	0.087 U	0.088 U	
PCB-077	--	0.078 U	0.078 U	0.078 U	0.079 U	0.078 U	0.078 U	0.078 U	0.078 U	0.077 U	0.078 U	0.079 U	0.079 U	0.078 U	0.079 U	0.078 U	0.078 U	0.078 U	0.078 U	0.079 U	
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	
PCB-087	--	0.57	0.92	0.46	0.49	0.46	0.49	0.35	0.63	0.54	0.45	0.36	0.46	0.53	0.49	0.43	0.44	0.31	0.28	0.79	
PCB-099	--	0.76	1.1	0.53	0.5	0.6	0.59	0.46	0.4	0.41	0.38	0.21	0.29	0.43	0.38	0.31	0.3	0.29	0.28	0.46	
PCB-101	--	1.2	1.6	0.71	0.97	0.86	0.9	0.76	0.53	0.63	0.64	0.51	0.66	0.45	0.59	0.61	0.5	0.47	0.5	0.73	
PCB-105	--	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.054 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	
PCB-110	--	1	1.5	0.76	0.73	0.72	0.74	0.63	0.63	0.61	0.58	0.5	0.51	0.49	0.54	0.55	0.49	0.42	0.45	0.67	
PCB-114	--	0.082 U	0.082 U	0.082 U	0.083 U	0.082 U	0.082 U	0.082 U	0.082 U	0.082 U	0.082 U	0.083 U	0.083 U	0.082 U	0.083 U	0.083 U	0.082 U	0.082 U	0.082 U	0.083 U	
PCB-118	--	0.87	1.2	0.62	0.65	0.63	0.72	0.6	0.47	0.39	0.51	0.45	0.48	0.38	0.49	0.38	0.44	0.36	0.34	0.58	
PCB-119	--	0.094 U	0.094 U	0.095 U	0.096 U	0.094 U	0.094 U	0.095 U	0.094 U	0.094 U	0.095 U	0.096 U	0.096 U	0.095 U	0.096 U	0.095 U	0.094 U	0.095 U	0.095 U	0.096 U	
PCB-123	--	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U	0.1 U	0.1 U	0.1 U	0.11 U	
PCB-126	--	0.08 U	0.08 U	0.08 U	0.081 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.081 U	0.081 U	0.08 U	0.081 U	0.081 U	0.08 U	0.08 U	0.08 U	0.081 U	
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	
PCB-132/153	--	1.3	1.9	1	1.1	1.2	1.1	0.86	0.89	0.76	0.79	0.73	0.76	0.73	0.87	0.74	0.59	0.72	0.58	0.92	
PCB-138/158	--	1.1	1.4	0.73	0.86	0.91	0.85	0.71	0.74	0.7	0.72	0.6	0.65	0.62	0.83	0.62	0.57	0.53	0.62	0.74	
PCB-149	--	1	1.4	0.72	0.6	0.75	0.83	0.6	0.59	0.57	0.62	0.48	0.7	0.64	0.63	0.47	0.51	0.48	0.58	0.65	
PCB-151	--	0.27	0.37	0.26	0.068 U	0.22	0.24	0.22	0.067 U	0.25	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.067 U	0.068 U	0.068 U	0.068 U	
PCB-156	--	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.057 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	
PCB-157	--	0.052 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	0.053 U	0.052 U	0.052 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.053 U	0.052 U	0.053 U	0.053 U	0.053 U	
PCB-167	--	0.062 U	0.062 U	0.062 U	0.063 U	0.062 U	0.062 U	0.062 U	0.062 U	0.061 U	0.062 U	0.063 U	0.063 U	0.062 U	0.063 U	0.062 U	0.062 U	0.062 U	0.062 U	0.063 U	
PCB-168	--	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.048 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	

Table 23
Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2018

Chemical	Location ID	MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN
	Sample ID Sample Date Matrix	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	MCN5-COMP-A-MACOMA-022218	MCN5-COMP-B-MACOMA-022218	
		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	
		FDA Action Level	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
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	
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	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
FDA Action Level	FDA Action Level																		
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	--	--	--	--	--

Table 23
Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2018

Chemical	Location ID	BIN	BIN	BIN	BIME	BIME	BIME	BIME	BIME	BIMW	BIMW	BIMW	BIMW	BIMW	BIS	BIS	BIS	BIS	BIS
	Sample ID Sample Date Matrix	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
		TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
	FDA Action Level																		
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	--	--	--	--	--
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	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 Sample Date Matrix FDA Action Level	T0-A- NEREIS- 012418 1/24/2018 TBIO	LA3-REF-A- NEREIS- 022218 2/22/2018 TBIO	LA3-REF-B- NEREIS- 022218 2/22/2018 TBIO	LA3-REF-C- NEREIS- 022218 2/22/2018 TBIO	LA3-REF-D- NEREIS- 022218 2/22/2018 TBIO	LA3-REF-E- NEREIS- 022218 2/22/2018 TBIO	TB-COMP-A- NEREIS- 022218 2/22/2018 TBIO	TB-COMP-B- NEREIS- 022218 2/22/2018 TBIO	TB-COMP-C- NEREIS- 022218 2/22/2018 TBIO	TB-COMP-D- NEREIS- 022218 2/22/2018 TBIO	TB-COMP-E- NEREIS- 022218 2/22/2018 TBIO	MCN1-COMP- T-A-NEREIS- 022218 2/22/2018 TBIO	MCN1-COMP- T-B-NEREIS- 022218 2/22/2018 TBIO	MCN1-COMP- T-C-NEREIS- 022218 2/22/2018 TBIO	MCN1-COMP- T-D-NEREIS- 022218 2/22/2018 TBIO	MCN1-COMP- T-E-NEREIS- 022218 2/22/2018 TBIO	MCN2-COMP- T-A-NEREIS- 022218 2/22/2018 TBIO	MCN2-COMP- T-B-NEREIS- 022218 2/22/2018 TBIO	MCN2-COMP- T-C-NEREIS- 022218 2/22/2018 TBIO	
Conventional Parameters (%)																					
Lipids	--	0.61	1.1	0.74	1.1	0.92	0.75	0.46	0.52	0.55	0.71	0.71	0.79	0.69	0.93	0.82	0.62	0.72	0.9	0.81	
Metals (mg/kg)																					
Mercury	1 ¹	0.0218	0.0121	0.00973	0.00562 J	0.0374	0.0186	0.0164 J	0.0187	0.0163	0.0149	0.0124	0.012	0.0143	0.0215	0.0301	0.0118	0.027	0.0263	0.0242	
Organometallic Compounds (µg/kg)																					
Dibutyltin	--	0.73 U	0.72 U	0.74 U	0.72 U	0.72 U	0.72 U	0.74 U	0.72 U	0.74 U	0.72 U	0.73 U	--	--	--	--	--	--	--	--	
Pesticides (µg/kg)																					
2,4'-DDD (o,p'-DDD)	--	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.29 U	0.34 U	0.28 U	0.28 U	0.29 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	
2,4'-DDE (o,p'-DDE)	5,000 ²	2 J	1 U	0.98 U	1.9 J	1 U	1.2 J	1.2 U	0.98 U	0.97 U	0.99 U	1 U	1.3 J	1 J	0.98 U	1.5 J	1.1 J	2.7	1.6 J	2.7	
2,4'-DDT (o,p'-DDT)	5,000 ²	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.37 U	0.31 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.31 U	
4,4'-DDD (p,p'-DDD)	--	0.51 U	0.51 U	0.5 U	0.5 U	0.51 U	1.7	5.1	4.3	5.7	6	5.4	5.9	9.6	5.7	9.5	10	15	23	20	
4,4'-DDE (p,p'-DDE)	5,000 ²	1.8	0.98 J	1.6	1.2	1.2	2.6	3.7	3.5	4.2	4.2	2.5	5.8	6.4	4.5	6.8	4.4	6.6	9.8	8.7	
4,4'-DDT (p,p'-DDT)	5,000 ²	0.44 U	0.44 U	0.43 U	0.43 U	0.78 J	0.44 U	0.51 U	0.43 U	0.43 U	0.44 U	0.44 U	0.45 U	0.43 U	0.43 U	0.44 U	0.45 U	0.43 U	0.43 U	0.44 U	
Total DDx (U = 0)	5,000 ²	3.8 J	0.98 J	1.6	3.1 J	1.98 J	5.5 J	8.8	7.8	9.9	10.2	7.9	13 J	17 J	10.2	17.8 J	15.5 J	24.3	34.4 J	31.4	
PCB Congeners (µg/kg)																					
PCB-018	--	0.072 U	0.072 U	0.07 U	0.07 U	0.072 U	0.072 U	0.64	0.74	0.82	0.61	0.77	0.22	0.25	0.07 U	0.23	0.24	0.07 U	0.07 U	0.071 U	
PCB-028	--	0.034 U	0.034 U	0.033 U	0.033 U	0.034 U	0.034 U	0.75	0.89	1.2	0.73	0.91	0.034 U	0.033 U	0.28	0.034 U	0.034 U	0.23	0.033 U	0.034 U	
PCB-037	--	0.061 U	0.061 U	0.06 U	0.06 U	0.061 U	0.061 U	0.071 U	0.06 U	0.059 U	0.06 U	0.061 U	0.062 U	0.06 U	0.06 U	0.061 U	0.062 U	0.059 U	0.06 U	0.06 U	
PCB-044	--	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	0.69	0.75	0.74	0.74	0.81	0.089 U	0.33	0.086 U	0.088 U	0.089 U	0.085 U	0.27	0.087 U	
PCB-049	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.66	0.68	0.83	0.71	0.86	0.23	0.44	0.35	0.33	0.37	0.33	0.28	0.25	
PCB-052	--	0.063 U	0.063 U	0.062 U	0.062 U	0.063 U	0.063 U	1.8	2	2.6	2.2	2.5	0.85	1.2	0.7	0.72	0.67	0.86	0.97	0.77	
PCB-066	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	1.2	1.3	1.5	1.4	1.7	0.5	0.83	0.64	0.43	0.89	0.54	0.78	0.49	
PCB-070	--	0.06 U	0.06 U	0.059 U	0.059 U	0.06 U	0.06 U	0.43	0.3	0.55	0.37	0.5	0.061 U	0.26	0.059 U	0.06 U	0.061 U	0.058 U	0.059 U	0.06 U	
PCB-074	--	0.088 U	0.088 U	0.086 U	0.086 U	0.088 U	0.088 U	0.38	0.46	0.48	0.45	0.53	0.21	0.3	0.086 U	0.22	0.21	0.21	0.26	0.087 U	
PCB-077	--	0.078 U	0.078 U	0.077 U	0.077 U	0.078 U	0.078 U	0.24	0.077 U	0.076 U	0.078 U	0.32	0.079 U	0.077 U	0.077 U	0.078 U	0.079 U	0.076 U	0.077 U	0.078 U	
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.14 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U	0.11 U	0.11 U	0.11 U	0.26	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	--	0.24	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																	

Table 24
Results of Chemical Analyses of *Nereis virens* 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- NEREIS-	LA3-REF-A- NEREIS-	LA3-REF-B- NEREIS-	LA3-REF-C- NEREIS-	LA3-REF-D- NEREIS-	LA3-REF-E- NEREIS-	TB-COMP-A- NEREIS-	TB-COMP-B- NEREIS-	TB-COMP-C- NEREIS-	TB-COMP-D- NEREIS-	TB-COMP-E- NEREIS-	MCN1-COMP- T-A-NEREIS-	MCN1-COMP- T-B-NEREIS-	MCN1-COMP- T-C-NEREIS-	MCN1-COMP- T-D-NEREIS-	MCN1-COMP- T-E-NEREIS-	MCN2-COMP- T-A-NEREIS-	MCN2-COMP- T-B-NEREIS-	MCN2-COMP- T-C-NEREIS-
	Sample Date	012418	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218
	Matrix	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
Chemical	FDA Action	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
	Level																			
Total PCB Congener (U = 0)	2,000 ³	4.25	3.54	1.92	2.04	1.47	3.08	18.48	19.09	22.78	20.59	23.13	10.26	14.33	11.55	10.87	12.57	10.43	13.64	9.65 J

Table 24
Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

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

Table 24
Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

Chemical	Location ID	MCN2	MCN2	MCN3	MCN3	MCN3	MCN3	MCN3	MCN4	MCN4	MCN4	MCN4	MCN4	MCN5	MCN5	MCN5	MCN5	MCN5	BIN	BIN	
	Sample ID Sample Date Matrix	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	
		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	2/22/2018
		TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
	FDA Action Level																				
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	BIN	BIN	BIN	BIME	BIME	BIME	BIME	BIME	BIMW	BIMW	BIMW	BIMW	BIMW	BIS	BIS	BIS	BIS	BIS
	Sample ID Sample Date Matrix FDA Action Level	BIN-COMP-T- C-NEREIS- 022218 2/22/2018 TBIO	BIN-COMP-T- D-NEREIS- 022218 2/22/2018 TBIO	BIN-COMP-T- E-NEREIS- 022218 2/22/2018 TBIO	BIME-COMP- T-M-A- NEREIS- 022218 2/22/2018 TBIO	BIME-COMP- T-M-B- NEREIS- 022218 2/22/2018 TBIO	BIME-COMP- T-M-C- NEREIS- 022218 2/22/2018 TBIO	BIME-COMP- T-M-D- NEREIS- 022218 2/22/2018 TBIO	BIME-COMP- T-M-E- NEREIS- 022218 2/22/2018 TBIO	BIMW-COMP- T-M-A- NEREIS- 022218 2/22/2018 TBIO	BIMW-COMP- T-M-B- NEREIS- 022218 2/22/2018 TBIO	BIMW-COMP- T-M-C- NEREIS- 022218 2/22/2018 TBIO	BIMW-COMP- T-M-D- NEREIS- 022218 2/22/2018 TBIO	BIMW-COMP- T-M-E- NEREIS- 022218 2/22/2018 TBIO	BIS-COMP-A- NEREIS- 022218 2/22/2018 TBIO	BIS-COMP-B- NEREIS- 022218 2/22/2018 TBIO	BIS-COMP-C- NEREIS- 022218 2/22/2018 TBIO	BIS-COMP-D- NEREIS- 022218 2/22/2018 TBIO	BIS-COMP-E- NEREIS- 022218 2/22/2018 TBIO
Conventional Parameters (%)																			
Lipids	--	1.2	1.2	0.84	0.89	0.81	0.59	1.2	0.9	0.73	0.74	0.96	0.94	1.1	0.65	0.87	1.1	0.86	0.86
Metals (mg/kg)																			
Mercury	1 ¹	0.0247 J	0.0273 J	0.0173 J	0.00336 UJ	0.00349 UJ	0.00356 UJ	0.00637 J	0.00345 UJ	0.00434 J	0.00746 J	0.0118 J	0.0228 J	0.0238 J	0.0125 J	0.0214 J	0.0227 J	0.026 J	0.0144 J
Organometallic Compounds (µg/kg)																			
Dibutyltin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pesticides (µg/kg)																			
2,4'-DDD (o,p'-DDD)	--	0.28 U	0.28 U	0.29 U	0.28 U	0.29 U	0.29 U	0.29 U	0.29 U	0.28 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
2,4'-DDE (o,p'-DDE)	5,000 ²	2.4	2.5	1.9 J	2.7	1.7 J	3.5	3.7	2.4	1.7 J	2.9	5	1.6 J	4.8	1.8 J	1.1 J	2.9	2	1.4 J
2,4'-DDT (o,p'-DDT)	5,000 ²	0.31 U	0.31 U	0.31 U	0.31 U	0.31 U	0.32 U	0.32 U	0.32 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U	0.32 U	0.31 U	0.31 U	0.32 U
4,4'-DDD (p,p'-DDD)	--	16	10	16	34	30	32	24	30	18	19	31	14	23	16	8.5	18	12	15
4,4'-DDE (p,p'-DDE)	5,000 ²	11	5.7	11	16	14	15	15	15	10	10	11	6.7	14	12	6.4	17	8	8.5
4,4'-DDT (p,p'-DDT)	5,000 ²	0.43 U	0.43 U	0.44 U	0.43 U	0.44 U	0.45 U	0.44 U	0.45 U	0.43 U	0.44 U	0.45 U	0.44 U	0.44 U	0.45 U	0.45 U	0.44 U	0.44 U	0.44 U
Total DDx (U = 0)	5,000 ²	29.4	18.2	28.9 J	52.7	45.7 J	50.5	42.7	47.4	29.7 J	31.9	47	22.3 J	41.8	29.8 J	16 J	37.9	22	24.9 J
PCB Congeners (µg/kg)																			
PCB-018	--	0.19 J	0.07 U	0.071 U	0.28	0.22	0.21	0.23	0.073 U	0.07 U	0.072 U	0.073 U	0.071 U	0.071 U	--	--	--	--	--
PCB-028	--	0.033 U	0.033 U	0.034 U	0.26	0.28	0.035 U	0.034 U	0.23	0.033 U	0.034 U	0.034 U	0.034 U	0.034 U	--	--	--	--	--
PCB-037	--	0.059 U	0.059 U	0.06 U	0.059 U	0.06 U	0.062 U	0.061 U	0.062 U	0.06 U	0.061 U	0.062 U	0.06 U	0.06 U	--	--	--	--	--
PCB-044	--	0.085 U	0.085 U	0.087 U	0.085 U	0.087 U	0.09 U	0.25	0.089 U	0.086 U	0.088 U	0.089 U	0.087 U	0.087 U	--	--	--	--	--
PCB-049	--	0.22	0.11 U	0.11 U	0.33	0.33	0.25	0.24	0.28	0.11 U	0.11 U	0.11 U	0.11 U	0.21	--	--	--	--	--
PCB-052	--	0.73	0.4	0.52	0.72	0.77	0.59	0.59	0.54	0.54	0.6	0.62	0.54	0.73	--	--	--	--	--
PCB-066	--	0.36	0.34	0.34	0.45	0.45	0.4	0.46	0.37	0.24	0.32	0.32	0.1 U	0.39	--	--	--	--	--
PCB-070	--	0.058 U	0.058 U	0.06 U	0.058 U	0.06 U	0.061 U	0.06 U	0.061 U	0.059 U	0.06 U	0.061 U	0.06 U	0.21	--	--	--	--	--
PCB-074	--	0.085 U	0.085 U	0.087 U	0.085 U	0.087 U	0.09 U	0.088 U	0.089 U	0.086 U	0.088 U	0.089 U	0.087 U	0.087 U	--	--	--	--	--
PCB-077	--	0.076 U	0.076 U	0.078 U	0.076 U	0.078 U	0.08 U	0.078 U	0.079 U	0.077 U	0.078 U	0.079 U	0.078 U	0.078 U	--	--	--	--	--
PCB-081	--	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	--	--	--	--	--
PCB-087	--	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	--	--	--	--	--
PCB-099	--	0.37	0.27	0.32	0.44	0.48	0.48	0.4	0.33	0.27	0.26	0.37	0.32	0.45	--	--	--	--	--
PCB-101	--	0.69	0.65	0.66	0.94	0.87	0.91	0.84	0.73	0.58	0.64	0.71	0.66	0.86	--	--	--	--	--
PCB-105	--	0.054 U	0.24	0.055 U	0.4	0.055 U	0.31	0.055 U	0.46	0.054 U	0.24	0.21	0.055 U	0.055 U	--	--	--	--	--
PCB-110	--	0.59	0.53	0.51	0.65	0.65	0.047 U	0.56	0.52	0.43	0.49	0.6	0.45	0.61	--	--	--	--	--
PCB-114	--	0.08 U	0.08 U	0.082 U	0.08 U	0.082 U	0.085 U	0.083 U	0.084 U	0.081 U	0.083 U	0.084 U	0.082 U	0.082 U	--	--	--	--	--
PCB-118	--	0.32	0.57	0.31	0.49	0.61	0.52	0.89	0.086 U	0.28	0.33	0.43	0.4	0.48	--	--	--	--	--
PCB-119	--	0.093 U	0.093 U	0.094 U	0.093 U	0.094 U	0.097 U	0.095 U	0.096 U	0.094 U	0.095 U	0.096 U	0.094 U	0.094 U	--	--	--	--	--
PCB-123	--	0.1 U	1.6	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U	0.26	0.1 U	--	--	--	--	--
PCB-126	--	0.078 U	0.078 U	0.08 U	0.078 U	0.08 U	0.082 U	0.081 U	0.082 U	0.079 U	0.081 U	0.082 U	0.08 U	0.08 U	--	--	--	--	--
PCB-128	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	--	--	--	--	--
PCB-132/153	--	1.9	1.6	1.5	2	1.7	1.6	1.7	1.7	1.5	1.4	1.6	1.4	1.8	--	--	--	--	--
PCB-138/158	--	1.4	1.4	1	1.4	1.4	1.3	1.3	1.3	0.98	1	1.3	0.99	1.3	--	--	--	--	--
PCB-149	--	1.1	0.83	0.84	1.1	1.2	1	0.93	0.92	0.81	0.79	0.91	0.69	0.98	--	--	--	--	--
PCB-151	--	0.24	0.41	0.22	0.066 U	0.31	0.069 U	0.068 U	0.069 U	0.067 U	0.068 U	0.29	0.067 U	0.29	--	--	--	--	--
PCB-156	--	0.056 U	0.056 U	0.058 U	0.056 U	0.058 U	0.059 U	0.058 U	0.059 U	0.057 U	0.058 U	0.059 U	0.058 U	0.058 U	--	--	--	--	--
PCB-157	--	0.051 U	0.051 U	0.052 U	0.051 U	0.052 U	0.054 U	0.053 U	0.053 U	0.052 U	0.053 U	0.053 U	0.052 U	0.052 U	--	--	--	--	--
PCB-167	--	0.06 U	0.06 U	0.062 U	0.06 U	0.062 U	0.064 U	0.062 U	0.063 U	0.061 U	0.062 U	0.063 U	0.062 U	0.062 U	--	--	--	--	--
PCB-168	--	0.048 U	0.048 U	0.049 U	0.048 U	0.049 U	0.05 U	0.049 U	0.05 U	0.048 U	0.049 U	0.05 U	0.049 U	0.049 U	--	--	--	--	--
PCB-169	--	0.06 U	0.06 U	0.061 U	0.06 U	0.061 U	0.063 U	0.062 U	0.062 U	0.06 U	0.062 U	0.062 U	0.061 U	0.061 U	--	--	--	--	--
PCB-170	--	0.51	0.37	0.063 U	0.4	0.47	0.36	0.3	0.38	0.37	0.29	0.35	0.21	0.36	--	--	--	--	--
PCB-177	--	0.085 U	0.085 U	0.087 U	0.085 U	0.087 U	0.09 U	0.088 U	0.089 U	0.086 U	0.088 U	0.089 U	0.087 U	0.087 U	--	--	--	--	--
PCB-180	--	0.041 U	0.041 U	0.042 U	0.76	0.78	0.9	0.6	0.75	0.72	0.45	0.59	0.5	0.042 U	--	--	--	--	--
PCB-183	--	0.29	0.31	0.29	0.26	0.26	0.29	0.28	0.28	0.11 U	0.21	0.26	0.23	0.31	--	--	--	--	--
PCB-187	--	0.81	0.72	0.52	0.7	0.69	0.52	0.69	0.74	0.71	0.55	0.66	0.56	0.74	--	--	--	--	--
PCB-189	--	0.06 U	0.06 U	0.061 U	0.06 U	0.061 U	0.063 U	0.062 U	0.062 U	0.06 U	0.062 U	0.062 U	0.061 U	0.061 U	--	--	--	--	--
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	--	--	--	--	--

Table 24
Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2018

Chemical	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-	BIN-COMP-T-	BIN-COMP-T-	BIME	BIME	BIME	BIME	BIME	BIMW	BIMW	BIMW	BIMW	BIMW	BIS	BIS	BIS	BIS	BIS
	Sample Date	C-NEREIS-	D-NEREIS-	E-NEREIS-	T-M-A-	T-M-B-	T-M-C-	T-M-D-	T-M-E-	T-M-A-	T-M-B-	T-M-C-	T-M-D-	T-M-E-	BIS-COMP-A-	BIS-COMP-B-	BIS-COMP-C-	BIS-COMP-D-	BIS-COMP-E-
	Matrix	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218	022218
Chemical	FDA Action	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
	Level																		
Total PCB Congener (U = 0)	2,000 ³	9.72 J	10.24	7.03	11.58	11.47	9.64	10.26	9.53	7.43	7.57	9.22	7.21	9.72	--	--	--	--	--

Notes:
All non-detect results are reported at the method detection limit.
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest limit value is reported as the sum.
Total DDx is the sum of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT 2,4'-DDD, 2,4'-DDE, and 2,4'-DDT.
Total PCB congeners is the sum of all PCB congeners listed in this table.
USEPA Stage 2A data validation was completed by Anchor QEA.
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
N: normal environmental sample
U: compound analyzed but not detected above detection limit
1. Action level for methyl mercury.
2. Action level for DDT and DDE (individually or in combination).
3. Tolerance level for PCBs. No action level.

Table 25
Results of Chemical Analyses of *Macoma nasuta* Tissue Residues for January 2019 Sampling Event

Chemicals	Location ID	Time Zero	LA3-REF LA3-REF-A-	LA3-REF LA3-REF-B-	LA3-REF LA3-REF-C-	LA3-REF LA3-REF-D-	LA3-REF LA3-REF-E-	NC2 NC2-COMP-A-	NC2 NC2-COMP-B-	NC2 NC2-COMP-C-	NC2 NC2-COMP-D-	NC2 NC2-COMP-E-	NC3 NC3-COMP-A-	NC3 NC3-COMP-B-	NC3 NC3-COMP-C-	NC3 NC3-COMP-D-	NC3 NC3-COMP-E-
	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	2/26/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201	3/27/201
	Matrix	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
FDA Action Level		TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO	TBIO
Conventional Parameters (%)																	
Lipids	--	0.72	0.63	0.32	0.39	0.53	0.38	0.34	0.32	0.38	0.34	0.49	0.25	0.54	0.38	0.44	0.48
Metals (mg/kg)																	
Mercury	1 ¹	0.00535 J	0.00721 J	0.00707 J	0.0175 J	0.00919 J	0.0143 J	0.0197 J	0.0155 J	0.0224 J	0.0137 J	0.0228 J	0.0122 J	0.0127 J	0.015 J	0.0124 J	0.0144 J

Notes:
All non-detect results are reported at the MDL.
USEPA Stage 2A data validation was completed by Anchor QEA.
Bold: detected result
Italicized: non-detected concentration is above one or more identified screening levels
J: estimated value
U: compound analyzed but not detected above detection limit
1. Action level for methyl mercury.

Table 26
Results of Chemical Analyses of *Nereis virens* Tissue Residues for January 2019 Sampling Event

Chemicals	Location ID	Time Zero	LA3-REF	LA3-REF	LA3-REF	LA3-REF	LA3-REF	NC2 NC2-	NC2 NC2-	NC2 NC2-	NC2 NC2-	NC2 NC2-	NC3 NC3-	NC3 NC3-	NC3 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 NC2- COMP-A- NEREIS- 032719	NC2 NC2- COMP-B- NEREIS- 032719	NC2 NC2- COMP-C- NEREIS- 032719	NC2 NC2- COMP-D- NEREIS- 032719	NC2 NC2- COMP-E- NEREIS- 032719	NC3 NC3- COMP-A- NEREIS- 032719	NC3 NC3- COMP-B- NEREIS- 032719	NC3 NC3- COMP-C- NEREIS- 032719	NC3 NC3- COMP-D- NEREIS- 032719	NC3 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
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 <i>Nucella lapillus</i> (controlled laboratory study: single chemical exposure).	48	No
	Mercury	mg/kg	0.00371	0.00698	0.0046	0.0414	<.0001	9.10	0.0344	LOED: 8.0 mg/kg for development of the common slipper shell <i>Crepidula fornicata</i> .	8.0	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 <i>Asterias rubens</i> .	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	LOED: 8.0 mg/kg for development of the common slipper shell <i>C. fornicata</i> .	8	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.	--	--
	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.	--	--

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 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 <i>A. rubens</i> .	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	LOED: 8.0 mg/kg for development of the common slipper shell <i>C. fornicata</i> .	8.0	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 <i>Leptocheirus plumulosus</i> .	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 <i>A. rubens</i> .	162 ⁴	No
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	LOED: 8.0 mg/kg for development of the common slipper shell <i>C. fornicata</i> .	8.0	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.	--	--

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	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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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.	--	--
	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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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.	--	--

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 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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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 <i>L. plumulosus</i> .	134 ³	No
	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 <i>A. rubens</i> .	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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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.	--	--

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?
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.	--	--
	PCB149	µg/kg	0.099	0.049 U	0.0489 U	0.606	<.0001	12.4	0.606	No relevant effects in ERED.	--	--
Bay Island South	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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	162 ⁴	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 <i>Asterias rubens</i> .	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 <i>A. rubens</i> .	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 <i>Leptocheirus plumulosus</i> .	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 <i>A. rubens</i> .	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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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 <i>A. rubens</i> .	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.	--	--
	PCB099	µg/kg	0.062	0.24	0.0303 U	0.304	0.0122	10.0	0.064	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?
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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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.	--	--
	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.	--	--

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?
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 <i>L. plumulosus</i> .	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 <i>A. rubens</i> .	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 <i>L. plumulosus</i> .	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 <i>Leptocheirus plumulosus</i>	134 µg/kg ²	TRV selected by Lin and Davis (2018) for San Francisco Bay
Dibutyltin	LOED: 18 µg/kg for imposex in gastropod <i>Hexaplex trunculus</i> (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 <i>Nucella lapillus</i> (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	LOED: 8.0 mg/kg for development of the common slipper shell <i>Crepidula fornicata</i> .	8.0 mg/kg	Selected based on lowest LOED in ERED for marine invertebrate with an ecologically relevant effect (i.e., growth, development survival, reproduction); whole body measurement
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
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

Table 29
Summary of Rationale for Selection of Toxicity Reference Values

Analyte	ERED ¹	TRV	Rationale
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., <i>Asteria rubens</i>)
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., <i>A. rubens</i>)
PCB138/158	No relevant effects in ERED	--	PCB138: Only marine invertebrate species in ERED was mussel (<i>Mytilus galloprovincialis</i>); 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 <i>A. rubens</i>	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 LC₅₀ 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 LC₅₀ and/or EC₅₀ values were within two standard deviations of the laboratory mean, with two exceptions. The LC₅₀ 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 LC₅₀ 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 LC₅₀ and/or EC₅₀ 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

- Anchor QEA (Anchor QEA, LLC), 2017a. *Lower Newport Bay Federal Channels Dredging Sampling and Analysis Plan*. Prepared for the City of Newport Beach. Revised December 20, 2017.
- Anchor QEA, 2017b. *Sampling and Analysis Report: Port of Hueneme Deepening: Berths 1, 2, and 3*. Prepared for Oxnard Harbor District. May 2017.
- Anchor QEA, 2018a. *Newport Channel Sampling and Analysis Approach*. Newport Beach, California. Presentation to the SC-DMMT. June 27, 2018.
- Anchor QEA, 2018b. *RGP 54 Sediment Characterization Sampling and Analysis Report*. Prepared for the City of Newport Beach. June 2018.
- Lin, D. and J.A. Davis, 2018. *Support for Sediment Bioaccumulation Evaluation: Toxicity Reference Values for San Francisco Bay*. SFEI Contribution No. 916. Richmond, California: San Francisco Estuary Institute.
- Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder, 1995. "Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments." *Environmental Management* 19:81–97.
- Moffatt & Nichol, 2006. *Final Sand Compatibility and Opportunistic Use Program Plan*. Prepared for SANDAG and the California Coastal Sediments Management Workgroup. March 2006.
- Newfields (Newfields Northwest, LLC), 2009. *Dredged Material Evaluation of Lower Newport Bay, Newport Beach, California*. November 2009.
- Pellizzato, F., E. Centanni, M.G. Marin, V. Moschino, and B. Pavoni, 2004. "Concentrations of organotin compounds and imposex in the gastropod *Hexaplex trunculus* from the Lagoon of Venice." *Science of the Total Environment* 332:89–100.
- SWRCB (State Water Resources Control Board), 2017. Measurement Quality Objectives Table 2. Surface Water Ambient Monitoring Program Quality Assurance Program Plan. Final Draft. May 2017.
- USACE (U.S. Army Corps of Engineers), 2018. Environmental Residue Effects Database. Environmental Laboratory, USACE Research and Development Center. Updated December 7, 2018. Accessed April 25, 2019. Available at: <http://el.erdc.usace.army.mil/ered/>.
- USACE, 1989. *Requirements for Sampling, Testing and Data Analysis of Dredged Material*. USACE Los Angeles District, Los Angeles.

USACE, USEPA (U.S. Environmental Protection Agency), San Francisco Bay Conservation and Development Commission, Regional Water Quality Control Board, and California State Lands Commission, 2001. *Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region*. Public Notice 01-01.

USACHPPM (U.S. Army Center for Health Promotion and Preventive Medicine), 2000. *Standard Practice for Wildlife Toxicity Reference Values*. Technical Guide No. 254. October 2000.

USEPA/USACE, 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual*. USEPA 503/8-91/001. USEPA Office of Water (4504F). February 1991.

USEPA/USACE, 1998. *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual: Inland Testing Manual*. USEPA-823-B-94-004. USEPA Office of Water (4305). February 1998.

USEPA/USACE, 2005. Final Environmental Impact Statement: Proposed Site Designation of the LA-3 Ocean Dredged Material Disposal Site off Newport Bay, Orange County, California. July 2005.

Weston Solutions, Inc., 2007. *Tier IV Evaluation of the Lower Newport Bay Federal Newport Beach, California*. February 2007.

Figures



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



Figure 1
Vicinity Map
 Lower Newport Bay Federal Channels Dredging



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



Figure 2
Federal Channels and Authorized Design Depths
 Lower Newport Bay Federal Channels Dredging



Publish Date: 2017/12/18 4:38 PM | User: mpratschner
 Filepath: K:\Projects\0243-City of Newport Beach\Dredging Options\0243-RP-008 2017 ISOPACH.dwg FIG-3



Figure 3
Comparison of 2017 Harborwide Bathymetric Survey to Authorized Design Depths
 Lower Newport Bay Federal Channels Dredging



Publish Date: 2019/05/10 3:31 PM | User: mpratschner
 Filepath: K:\Projects\0243-City of Newport Beach\Federal Channel\0243-RP-010 DREDGING.dwg FIG 4



Figure 4
Overview of Dredge Units and Bathymetry
 Lower Newport Bay Federal Channels Dredging



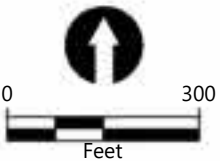
Figure 5
 Dredge Unit, Bathymetry, and Actual Sampling Locations - Turning Basin
 Lower Newport Bay Federal Channels Dredging



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
- ⓪ -20 Design Depth
- Dredge Footprint
- ⓪-# Actual Sampling Location
- -10 — Existing Bathymetric Contour
- 16.5 Existing Bathymetric Sounding



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



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

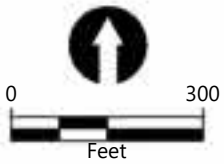


Figure 7
Dredge Unit, Bathymetry and Actual Sampling Locations - Main Channel North 2
 Lower Newport Bay Federal Channels Dredging



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

- LEGEND:**
- Dredge Unit Boundary
 - Design Depth
 - Dredge Footprint
 - Actual Sampling Location
 - Existing Bathymetric Contour
 - Existing Bathymetric Sounding



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

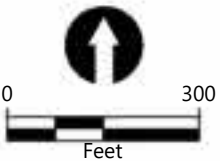


Figure 8
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 3
Lower Newport Bay Federal Channels Dredging



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

- LEGEND:**
- Dredge Unit Boundary
 - Design Depth
 - Dredge Footprint
 - Actual Sampling Location
 - Existing Bathymetric Contour
 - Existing Bathymetric Sounding



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

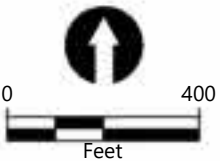


Figure 9
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 4
Lower Newport Bay Federal Channels Dredging



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).

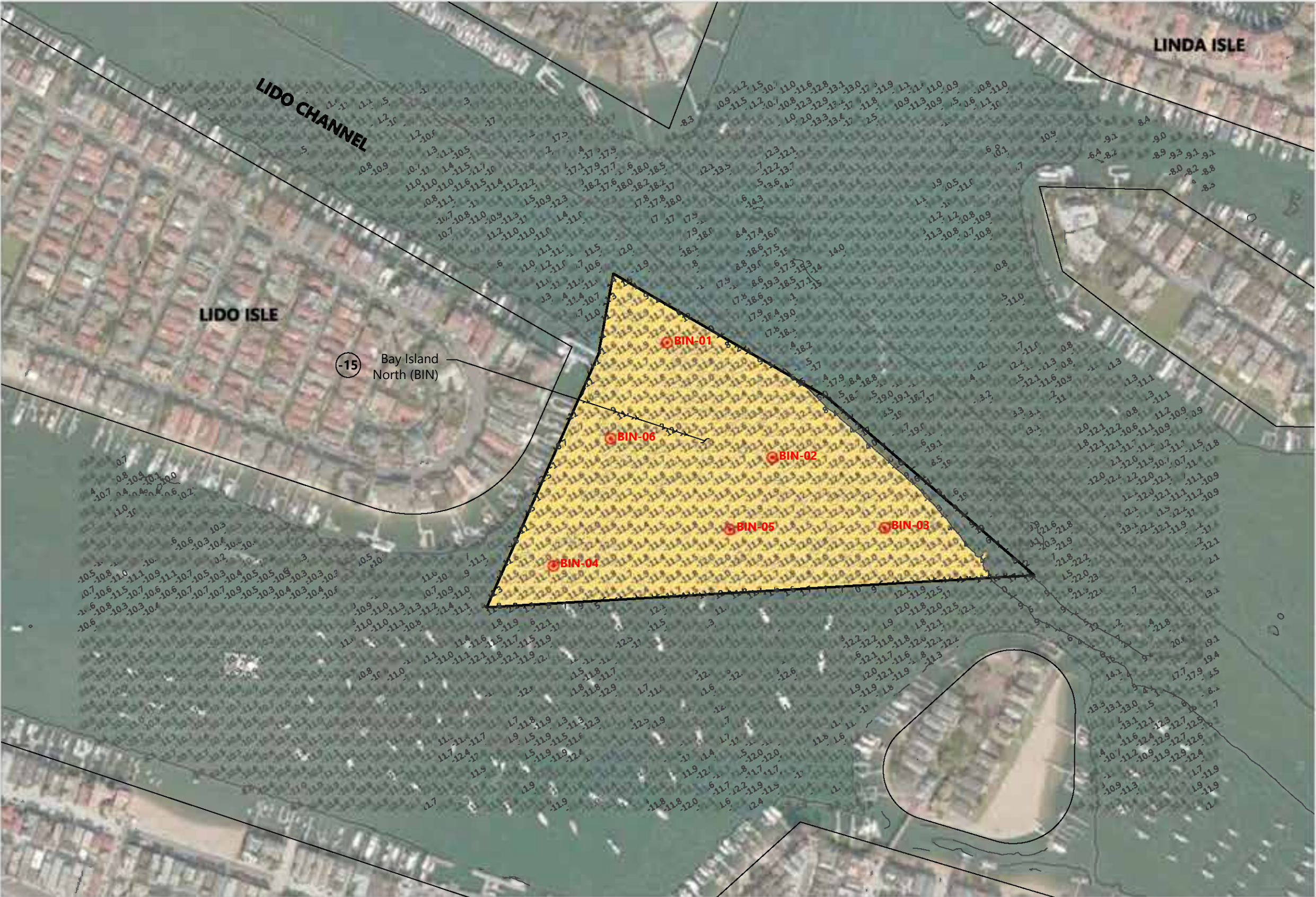
- LEGEND:**
- Dredge Unit Boundary
 - Design Depth
 - Dredge Footprint
 - Actual Sampling Location
 - Existing Bathymetric Contour
 - Existing Bathymetric Sounding



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

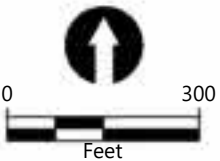


Figure 10
Dredge Unit, Bathymetry, and Actual Sampling Locations - Main Channel North 5
Lower Newport Bay Federal Channels Dredging



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).

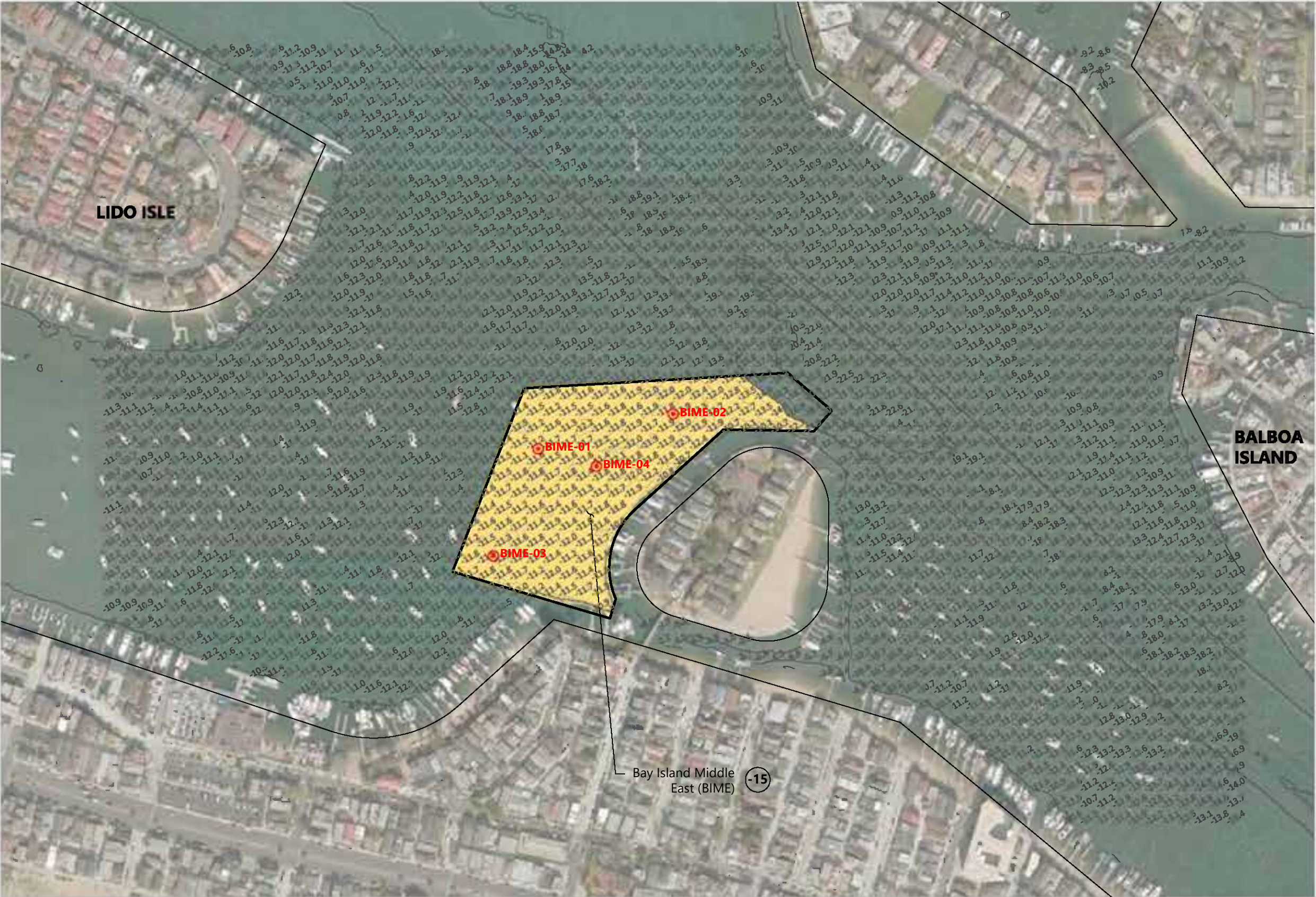
- LEGEND:**
- Dredge Unit Boundary
 - Design Depth
 - Dredge Footprint
 - Actual Sampling Location
 - Existing Bathymetric Contour
 - Existing Bathymetric Sounding



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

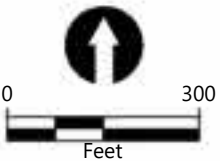


Figure 11
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island North
Lower Newport Bay Federal Channels Dredging



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

- LEGEND:**
- Dredge Unit Boundary
 - Design Depth
 - Dredge Footprint
 - Actual Sampling Location
 - Existing Bathymetric Contour
 - Existing Bathymetric Sounding



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

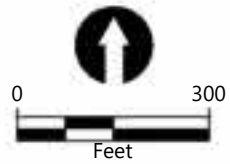


Figure 12
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island Middle East
Lower Newport Bay Federal Channels Dredging



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



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



Figure 13
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island Middle West
Lower Newport Bay Federal Channels Dredging



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



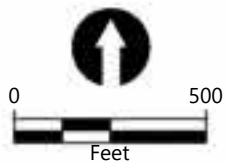
Figure 14
Dredge Unit, Bathymetry, and Actual Sampling Locations - Bay Island South
Lower Newport Bay Federal Channels Dredging



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:

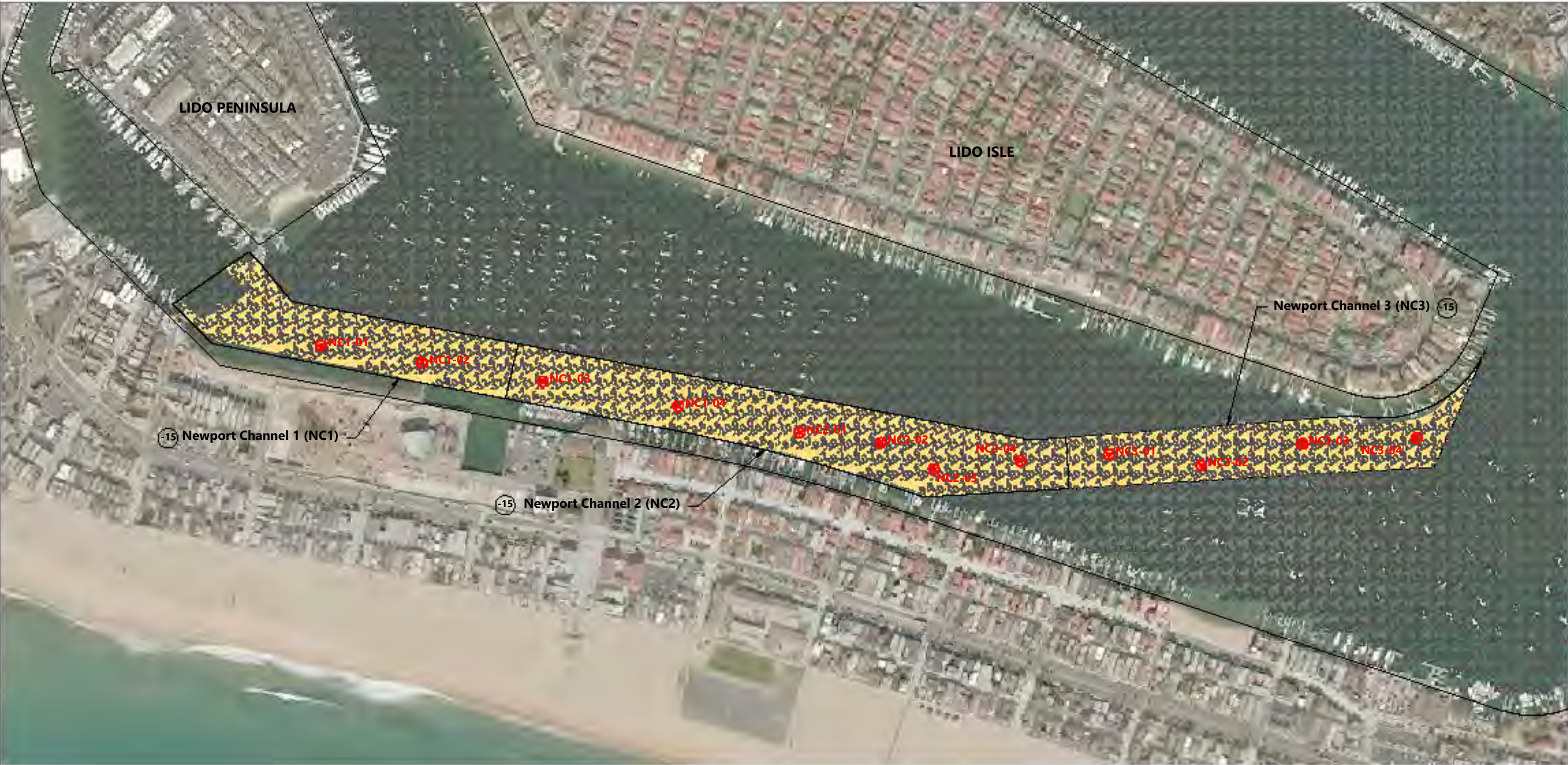
- Dredge Unit Boundary
- (-20) Design Depth
- Yellow Dredge Footprint
- Red circle with # Actual Sampling Location
- -10 — Existing Bathymetric Contour
- 16.5 Existing Bathymetric Sounding



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

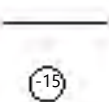


Figure 15
Dredge Unit, Bathymetry, and Actual Sampling Locations - Entrance Channel
Lower Newport Bay Federal Channels Dredging



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
Design Depth



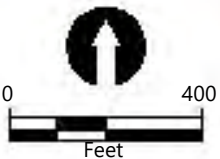
Dredge Footprint



Existing Bathymetry



Actual Sampling Location



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



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



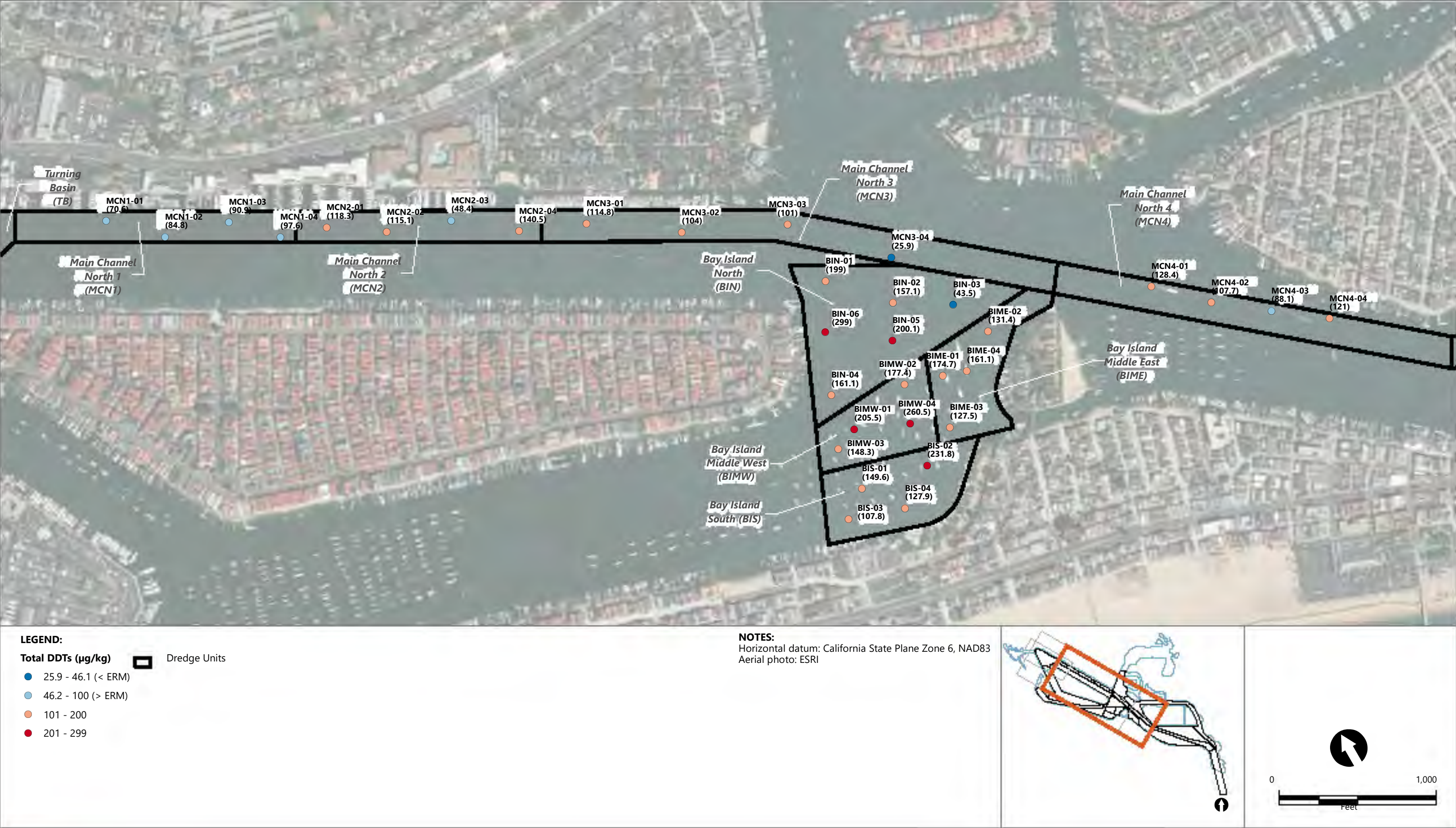
Figure 17
Newport Beach Transects with Actual Sampling Locations
 Lower Newport Bay Federal Channels Dredging



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



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



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



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



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



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




LEGEND:

Mercury (mg/kg)

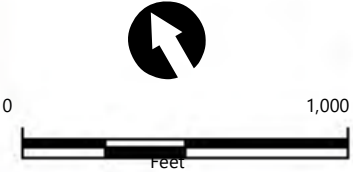
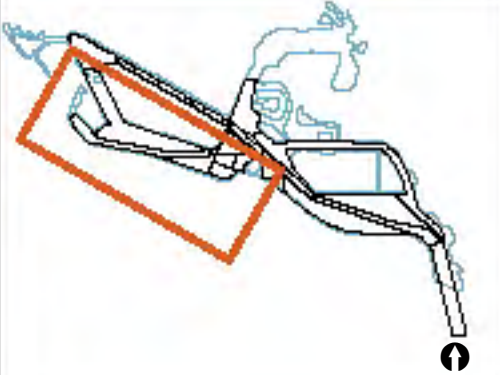
- 0.088 - 0.15 (< ERL)
- 0.151 - 0.71 (ERL - ERM)
- 0.711 - 1
- 1.01 - 5

☐ 2019 Stations

☐ 2018 Exploratory Stations

 Dredge Units

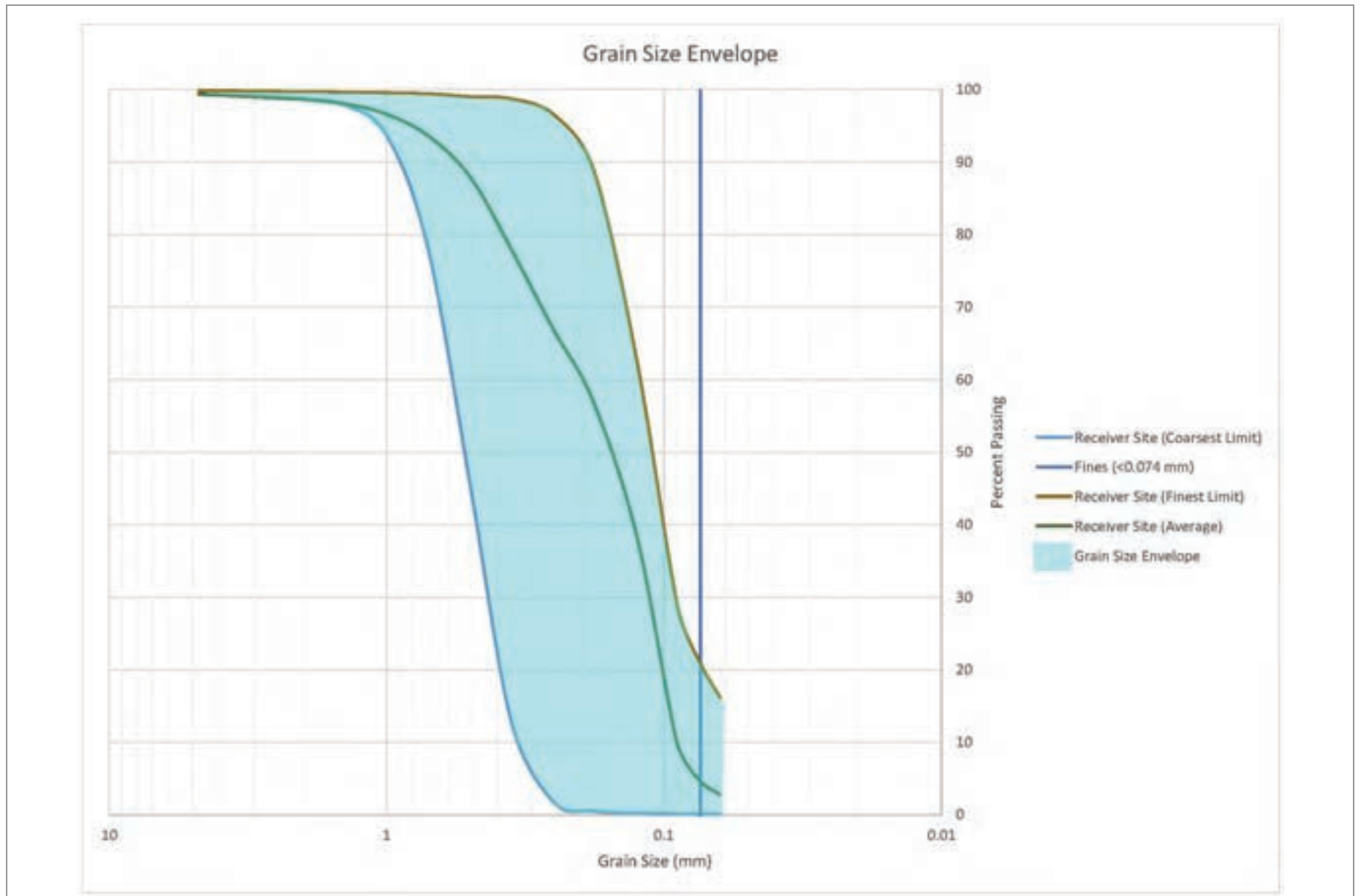
NOTES:
Horizontal datum: California State Plane Zone 6, NAD83
Aerial photo: ESRI

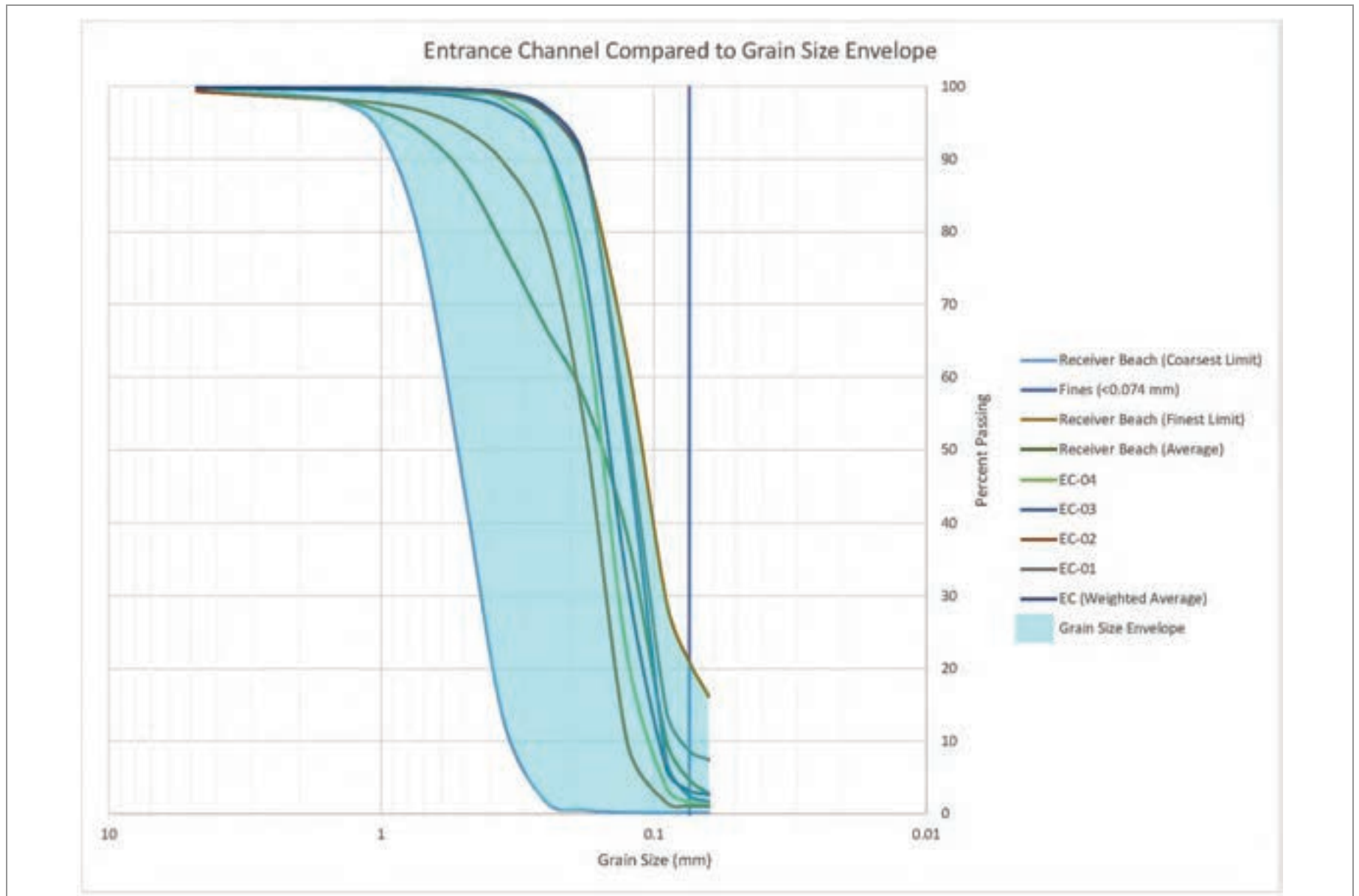


Publish Date: 2019/05/15, 12:39 PM | User: ckiblinger
Filepath: \\orcas\GIS\Jobs\City_of_Newport_Beach_0243\RGP_54_SedimentSampling\Maps\Core_Sediment\Core_Sed_Hg_Lower_Newport_201902_SAR.mxd



Figure 21
Mercury Concentrations for Individual Stations within Newport Channel
Lower Newport Bay Federal Channels Dredging





Appendices available upon request.

From: [Scianni, Melissa](#)
To: [Smith, Lawrence J Jr CIV USARMY CESPL \(US\)](#)
Cc: [Ross, Brian](#); [Regulatory, SPL SCDMMT@usace.army.mil](#); [Ziegler, Sam](#); [Siu, Jennifer](#)
Subject: [Non-DoD Source] EPA Ocean Disposal Suitability Determination Newport Federal Channels
Date: Thursday, June 6, 2019 9:31:13 AM

Larry,

As a follow up to the DMMT meeting last month I am sending EPA's suitability determination for the Newport Bay Federal Channels dredged material. Our determination is based on our review of the May 15, 2019 Sediment Analysis Report and April 12, 2019 "Data Compilation Report" memo both prepared by Anchor QEA, and on discussions about the data at a meeting held at EPA's offices on April 30, 2019. This suitability determination does not constitute final concurrence for use of the LA-3 site. We will transmit our final concurrence with the current site use conditions once we have reviewed the draft decision document. Please coordinate that review with either me or Allan Ota when the draft decision document is ready.

EPA finds that the results of the physical, chemical, and biological testing show Composite Areas EC, BIS, BIMW, BIME, BIN, MCN5, MCN4, MCN3 (cores 03 and 04 only), NC3, and NC2 (cores NC1-03, NC1-04, NC2-01, NC2-04 only) are suitable for unconfined aquatic disposal at the LA-3 ocean disposal site. These suitable sediments represent approximately 850,000 cy, or just over 79% of the 1.1 million cy project. EPA's determination is based on the sediments in these areas passing the Ocean Testing Manual (OTM) suspended and solid phase toxicity bioassays, the sediment mercury (Hg) concentrations being below 1 ppm (a contaminant threshold that has been applied regionally for some time), and the tissue results showing Hg, DDT, and PCBs did not bioaccumulate to levels of concern. EPA also concurs that the sediments from Composite Area EC are suitable for nearshore placement for beach nourishment based on the above criteria as well as the grain size compatibility analysis for potential receiver sites.

At this time, for the reasons summarized below, EPA finds the sediments from Composite Areas TB, MCN1, MCN2, MCN3 (cores 01 and 02 only), NC1, and NC2 (cores NC2-02 and NC2-03 only) not suitable for unconfined aquatic disposal at the LA-3 ocean disposal site. These unsuitable sediments represent 262,558 cy, or less than 21% of the total project volume.

The Composite Area NC1 sediment was not subjected to the required biological testing and is therefore not eligible for ocean disposal at this time. EPA's determination for the other Composite Areas listed here is based on elevated sediment Hg concentrations substantially exceeding 1 ppm, the large Hg and PCB mass loading associated with the large sediment volume in these Composite Areas, and the possibility for methylation of this large Hg mass, which the standard Tier III tests do not address. While these Composite Areas passed toxicity testing, individual core Hg concentrations exceeded 1 ppm with many exceeding 2 ppm and one being as high as 5 ppm. Many of these areas also have elevated PCB concentrations. Combined these areas contain over 725 pounds of Hg (approximately 65% of the Hg mass from the project) and approximately 30 pounds of PCBs (50% of the project's PCB mass). In addition, while the Hg and PCBs did not accumulate above relevant TRV concentrations, the tissue concentrations for both were statistically significantly higher than the control tissues (mean up to 9.1x higher for Hg, and up to 65.2x higher for PCBs). The cumulative effect of placing this large volume of sediment with a large mass of Hg at the ocean disposal site may result in degradation of the site and its environs, which currently have ambient Hg concentrations around 0.16 ppm, and 0.01 ppm, respectively. Finally, sediments in Newport Bay with Hg concentrations above 1 ppm have not routinely undergone biological testing for ocean disposal. Therefore, we do not have a robust testing history regarding the biological effects of these sediments. In this situation, the standard

tier III testing does not provide the necessary information to adequately evaluate the impacts of placing this highly contaminated material in the ocean.

During our April 30, 2019 meeting at EPA, we discussed options for managing the areas with elevated Hg, including the construction of a confined disposal site in the Bay and conducting additional monitoring at the ocean disposal site. Specifically, EPA is willing to consider placement of sediment with Hg concentrations somewhat above 1 ppm, if a contaminated sediment management plan were in development and if the Corps or City conducts additional confirmatory monitoring at the disposal site to evaluate the effects of these sediments following disposal. For example, if sediment composite areas with Hg concentrations as high as 1.5. ppm were ocean disposed, that would represent approximately 120,000 cy of additional material, or approximately 11 % more of the overall project volume. This would still exclude the highest Hg and PCB concentration areas, including 50% of the Hg mass and 38% of the PCB mass. The additional confirmatory monitoring would focus mainly on whether methylation is occurring and could be conducted in conjunction with EPA's standard site monitoring survey (tentatively planned for no later than 2024, but this date could be advanced depending on how the Newport Bay channels project proceeds). At your convenience, we are available to discuss these and other options for the material determined to be unsuitable for ocean disposal based on the current tier III testing.

Please contact me or Allan Ota if there are any questions about EPA's determination.

Regards,

Melissa

Melissa Scianni

Wetlands Office

US EPA, Region IX, Southern CA Field Office

600 Wilshire Blvd, Suite 940

Los Angeles, CA 90017

(213) 244-1817

scianni.melissa@epa.gov <<mailto:scianni.melissa@epa.gov>>

APPENDIX C

CULTURAL RESOURCES COORDINATION CORRESPONDENCE

MEMORANDUM FOR RECORD

SUBJECT: 2020 Lower Newport Bay Navigation Channel Maintenance Dredging Section 106
(National Historic Preservation Act) Review

1. This memorandum documents the Corps' determinations for Section 106 of the NHPA as required at 36 CFR 800.11(a). Pursuant to 36 CFR 800.3(a)(1), this Corps has satisfied its responsibilities to take into account the effects of this undertaking on historic properties and has no further obligations under Section 106 of the NHPA.
2. As part of the periodic maintenance program for the Lower Newport Bay Navigation Channel, the U.S. Army Corps of Engineers, Los Angeles District (Corps), proposes to perform maintenance dredging of the navigation channel to authorized depths. Specifically, the Corps proposes to remove approximately 70,000 cubic yards of sediment that have accumulated in the federal channel in order to maintain navigational safety and to allow continued use of the bay for recreational activities. The dredged materials would be discharged into either LA-3 Ocean Dredged Material Disposal Site (ODMDS), which was designated in 2005 by the U.S. Environmental Protection Agency as a permanent ocean dredged material disposal site. The designation of LA-3 was separately analyzed under Section 106 of the National Historic Preservation Act by the EPA. Dredged materials may also be placed at the Newport Beach Nearshore Placement Site which was separately evaluated and authorized for local dredge material placement under a Corps issued Regional General Permit (RGP) 54 in 2019.
3. The last federal maintenance dredging in Lower Newport Bay occurred from May 2012 to February 2013. At that time, approximately 490,350 cubic yards of sediment was dredged from the federal channels. Prior to that in 2003, the Corps removed approximately 981,750 cubic yards from the federal channels in Lower Newport Bay, and in 1998-1999, approximately 270,000 cubic yards of sediment were removed from the Main Channel and the Upper Bay Channel. Accumulated sediments within the navigation channel are less than seven years old.
4. In accordance with Section 106 of the National Historic Preservation Act (NHPA), the Corps has determined that the periodic maintenance of the Lower Newport Bay Navigation Channel meets the definition of an undertaking as defined at 36 CFR 800.16(y). The Corps has further determined that it is the type of activity that does not have the potential to cause effects to historic properties. The undertaking is routine maintenance that has occurred on a semi regular basis since it was authorized in 1937. The undertaking does not constitute a change in the setting or use of the harbor. The undertaking would not alter the current setting or integrity of any historic properties that may be located within the Newport Navigation Channel, assuming them to be present (36 C.F.R. 800.3(1)). Dredge material placement is limited to pre-existing sediment disposal areas which have separately been analyzed/permitted. Ground disturbance associated with this undertaking would be limited to soils deposited in the last seven years with no potential to contain historic properties.

Danielle Storey
Archaeologist
Ecosystem Planning Section

APPENDIX D

AIR EMISSIONS CALCULATIONS

Maintenance Dredging-Priority Pollutants

Emission Source Data for Maintenance Dredging

Construction Activity/Equipment Type	Power Rating	Load Factor	# Active	Hourly Hp-Hrs	Fuel Use GPH	Hrs per Day ⁽¹⁾	Total Work Days ⁽²⁾	DailyTotal Hp-Hrs (1)
Clamshell dredge	N/A	N/A	N/A	N/A	N/A	10	64/107	N/A
Tug boat-clamshell dredge	800	0.20	1	160	8.0	10	64/107	80

Tug boat propulsion factor 0.20 for idling; 0.50 for towing; and 0.4 for dredge barge movement (fuel use for 0.5 is 20 GPH, for 0.4 is 16 GPH)

(1) Assume 10 hours per day dredging; 1-1/2 hours per day shift change and maintenance weekdays

(2) 64 days for clamshell; 107 days for excavator

Emission Factors for Construction Equipment

Equipment Type	ROG	CO	NOx	SOx	PM10	PM2.5
Clamshell dredge (lb/hr)	1.1	0.3	1.1	1.0	0.7	0.6
Tugboat (lbs/1,000 Gal)	18.2	57.0	419.0	75.0	9.0	8.1

Daily Emissions from Construction Activities Clamshell Dredge

Construction Activity/Equipment Type	Pounds per day					
	ROG	CO	NOx	SOx	PM10	PM2.5
Clamshell dredge	10.8	3.0	10.9	9.5	6.9	6.0
Tug boat-nearshore placement						
Idling	1.0	3.2	23.5	4.2	0.5	0.5
Towing sediment barge	0.4	1.1	8.4	1.5	0.2	0.2
Shifting dredge barge	0.3	0.9	6.7	1.2	0.1	0.1
Subtotal Tug Boat Nearshore	1.7	5.2	38.5	6.9	0.8	0.7
Tug boat-ocean disposal						
Idling	0.6	1.8	13.4	2.4	0.3	0.3
Towing sediment barge	1.8	5.7	41.9	7.5	0.9	0.8
Shifting dredge barge	0.3	0.9	6.7	1.2	0.1	0.1
Subtotal Tug Boat Ocean Disposal	2.7	8.4	62.0	11.1	1.3	1.2
Crew boat ⁽³⁾	0.9	0.4	0.8	0.1	0.1	0.1
Worker Vehicles ⁽³⁾	0.1	1.2	0.9	0.1	0.1	0.1
Peak Daily Emissions						
Nearshore	13.5	9.8	51.2	16.6	7.9	6.9
Ocean Disposal	14.5	13.0	74.6	20.8	8.4	7.4

Daily Emissions from Construction Activities Excavator Dredge

Construction Activity/Equipment Type	Pounds per day					
	ROG	CO	NOx	SOx	PM10	PM2.5
Excavator dredge	10.8	3.0	10.9	9.5	6.9	6.0
Tug boat-nearshore placement						
Idling	1.2	3.9	28.5	5.1	4.2	0.6
Towing sediment barge	0.4	1.1	8.4	1.5	0.2	0.2
Shifting dredge barge	0.1	0.5	3.4	0.6	0.1	0.1
Subtotal Tug Boat Nearshore	1.7	5.5	40.2	7.2	4.5	0.8
Tug boat-ocean disposal						
Idling	0.9	3.0	21.8	3.9	0.5	0.4
Towing sediment barge	0.9	2.9	21.0	3.8	0.5	0.4
Shifting dredge barge	0.3	0.9	6.7	1.2	0.1	0.1
Subtotal Tug Boat Ocean Disposal	2.1	6.7	49.4	8.9	1.1	1.0
Crew boat ⁽³⁾	0.9	0.4	0.8	0.1	0.1	0.1
Worker Vehicles ⁽³⁾	0.1	1.2	0.9	0.1	0.1	0.1
Peak Daily Emissions						
Nearshore	13.6	10.0	52.8	16.9	11.6	7.0
Ocean Disposal	14.0	11.2	62.1	18.5	8.2	7.2

Entrance Channel: Assume dredge volume of 70,000 cubic yards, maximum expected based on funding limitations

28 days clamshell, 47 days excavator; nearshore placement or ocean disposal

MCN5: Assume dredge volume of 90,000 cubic yards, maximum based on available volume

36 days clamshell, 60 days excavator; ocean disposal only

Emissions factors for Maintenance Dredging for tugboat taken from the Port of Los Angeles Channel Deepening Project Final Supplemental

Environmental Impact Statement/Environmental Impact Report, September 2000.

Emissions factors for Maintenance Dredging for the Clamshell Dredge provided by Justice and Associates for a Manson clamshell dredge.

Nearshore Placement

Tug speed towing loaded barge 6 knots

Tug speed towing unloaded barge 8 knots

Distance to placement site 1-1/2 mile

Transit time loaded = 15 minutes

Transit time unloaded = 10 minutes

Clamshell 2,500 cubic yards per day, 28-day project duration to dredge 70,000 cubic yards

Excavator 1,500 cubic yards per day, 47-day project duration to dredge 70,000 cubic yards

Tug operations, clamshell: 10 hours per day total, 2 trips per day to disposal site

1 hour moving barge

1 hours towing barge

1 hour at placement site

7 hour idling

2 disposal events per day

Tug operations, excavator: 10 hours per day total, 1 trips per day to disposal site

1/2 hour moving barge

1/2 hours towing barge

1/2 hour at placement site

8-1/2 hour idling

1 disposal events per day

Ocean Disposal

Distance to disposal site 5 miles

Transit outside 3 miles is outside SCAQMD and is not included in calculations
Tug operations, clamshell: 10 hours per day total, 2 trips per day to disposal site
1 hour moving barge
2 hour towing barge inside south coast air basin (approximately 1 hour per trip)
3 hour towing barge outside south coast air basin (not included), includes 30 minutes at disposal site and 60 minutes transit)
4 hour idling
Tug speed towing loaded barge 6 knots
Tug speed towing unloaded barge 8 knots
2 disposal events per day
Tug operations, excavator: 10 hours per day total, 1 trips per day to disposal site
1 hour moving barge
1 hour towing barge inside south coast air basin (approximately 1 hour per trip)
1-1/2 hour towing barge outside south coast air basin (not included), includes 30 minutes at disposal site and 60 minutes transit)
6-1/2 hour idling
Tug speed towing loaded barge 6 knots
Tug speed towing unloaded barge 8 knots
1 disposal event per day

Total Project Construction Emissions

	Tons					
Clamshell	ROG	CO	NOx	SOx	PM10	PM2.5
Project Emissions						
Alternative 1 Nearshore Placement ¹	0.5	0.4	2.1	0.6	0.3	0.2
Alternative 2 Ocean Disposal ²	0.5	0.4	2.4	0.7	0.3	0.2
de minimis Thresholds	10	100	100	100	70	70

¹ Nearshore placement Entrance Channel only, LA-3 for MCN5

² LA-3 for Entrance Channel and MCN5

Total Project Construction Emissions

	Tons					
Excavator	ROG	CO	NOx	SOx	PM10	PM2.5
Project Emissions						
Alternative 1 Nearshore Placement ¹	0.7	0.6	3.1	1.0	0.5	0.4
Alternative 2 Ocean Disposal ²	0.7	0.6	3.3	1.0	0.4	0.4
de minimis Thresholds	10	100	100	100	70	70

¹ Nearshore placement Entrance Channel only, LA-3 for MCN5

² LA-3 for Entrance Channel and MCN5

Maintenance Dredging-Greenhouse Gases

Emission Source Data for Maintenance Dredging

Construction Activity/Equipment Type	Power Rating	Load Factor	# Active	Hourly Hp-Hrs	Fuel Use GPH	Hrs per Day	Total Work Days(3)	DailyTotal Hp-Hrs (1)
Clamshell dredge	1,890	1.0	1	1,890	N/A	10	28	18,900
Tug boat-clamshell dredge	800	0.20	1	160	8.0	10	28	80
Crew Boat	50	NA	1	NA	NA	4	28	NA
Tug boat-hydraulic dredge	1,600	NA	1	NA	NA	2	28	NA
Worker vehicles	NA	NA	18	NA	NA	2	28	NA
Hopper Dredge	2,000					22	28	22,000

64 days for clamshell; 107 days for excavator

Emission Factors for Construction Equipment

	Grams per HP-HR
Equipment Type	CO2
Clamshell dredge	568
Tugboat	509
Crew Boat	75
Worker vehicles	1.1

Estimated Emissions from Construction Equipment

	CO2	
Equipment Type	lbs/day	tons total
Clamshell dredge	12.5	0.4
Tugboat	11.2	0.4
Crew Boat	0.7	0.0
Worker vehicles	0.1	0.0
Total	24.5	0.8
Total Equivalent CO2		
Clamshell dredge	24.7	0.8

CO2 Equivalent = CO2*1.008

	CO2	
Equipment Type	lbs/day	tons total
Excavator dredge	12.5	0.7
Tugboat	11.2	0.6
Crew Boat	0.7	0.0
Worker vehicles	0.1	0.0
Total	24.5	1.3
Total Equivalent CO2		
Excavator dredge	24.7	1.3

CO2 Equivalent = CO2*1.008

Emission Factors for Dredges

Source	CO	NOx	VOC/RO G ⁷	PM ₁₀ / SOx ⁶
Traditional AP-42 Large-Bore Diesel Emission Factors				
Uncontrolled diesel emission factors (Lb/hp-hr) ¹	0.0055	0.024	0.0006	0.0007/ .00809
Controlled diesel emission factors (Lb/hp-hr) ²	0.0055	0.013	0.0006	0.0007/ 0.00809
Caterpillar 3516B Emission Factors ³				
Lb/hp-hr	0.0008	0.18	0.0003	0.0002/ 0.0004
H.R. Morris Emission Factors				
Lb/hp-hr	0.0001	0.0004	0.0002 ⁴	0.0002 ³ / 0.0002
Traditional AP-42 Emissions for a 2,600 Horsepower Diesel ⁵				
Uncontrolled diesel emission factors (Lb/hr)	7.2	31.2	0.8	0.9/ 10.5
Controlled diesel emission factors (Lb/hr) ²	7.2	16.9	0.8	0.9/ 10.5
Caterpillar 3516B Emissions for a 2,600 Horsepower Diesel ⁵				
Lb/hr	1.0	23.8	0.4	0.2/ 0.5
H.R. Morris Emission Factors ³				
Lb/hr	0.1	0.5	0.2	0.2/ 0.3

¹ Based on Table 3.4-1 of USEPA AP-42, A Compilation of Air Pollutant Emission Factors.

² NOx controlled by injection timing retard.

³ Based on data provided by Caterpillar for this engine.

⁴ Assumes 50 percent control efficiency for use of selective catalytic reduction (SCR).

⁵ A 50 percent load factor used for this engine per discussion with Caterpillar Diesel.

⁶ SOx values are separate emission factors from PM10.

⁷ VOC and ROG are used interchangeably.

Ancillary Equipment Operations and Horsepower Ratings			
Emission Source	Number	Horsepower	Total Hours per Day
Tugboat	1	1,600	2
Crew Boats	2	50	4

Tug Boat Fuel Data	
Fuel Type	Diesel
Fuel Density, lb/gal	7.12
Specific Fuel Consumption, lb/hp/hr	0.40
Idle Load Factor	0.20
Maneuver Load Factor	0.50
Cruise Load Factor	0.80

Estimating Fugitive emissions for Vehicle Miles Traveled (VMT) for construction laborers (SCAQMD CEQA Quality Handbook Table A9-9-A with updates through 2010). It is assumed that 18 personnel would work and 18 Vehicles used. Personnel would commute from approximately 6.25 miles one-way on-road. Note: No off-road work.

$V = W \times (X/Y) \times Z$; Where V =VMT, W =Distance, X =number of vehicles, Y =1 hour, Z =estimated travel time

$VMT = 12.5 \text{ miles/day} \times (18 \text{ vehicles/hr}) \times 0.5 \text{ hr} = 112.5 \text{ miles per day}$

Estimating fugitive emissions from passenger (commuter) Vehicle Travel on Paved Roads (SCAQMD CEQA Quality Handbook Table A9-9-B with updates through 2010).

$E = V \times G$ (with street cleaning and is dependent on type of road); where E = emissions for passenger vehicles; V = VMT; and $G = 0.00065$ for freeways (SCAQMD CEQA Quality Handbook Table A9-9-B-1 with updates through 2010).

$E = 112.5 \text{ miles/day} \times 0.00065 \text{ lbs/mile} = 0.08 \text{ lbs/day}$

Note: No off-road work = no off-road fugitive emissions/day

Total Fugitive Emissions (Vehicles) = 0.15 lb/day

TYPE OF VEHICLE	NUMBER OF VEHICLES	VMT/DAY (on-road)	VMT/DAY (off-road)	EMISSIONS (on-road) (lbs/day)	EMISSIONS (off-road) (lbs/day)
Passenger (commuter)	18	112.5	0	0.08	0
Total on-road fugitive emissions	Na	na	Na	0.08	na

"na" means "Not Applicable"

On-Road Emission (lb/day): 40 mph

Travel emission formula = [(emission factors (Exhaust+Tire wear)) x (Distance traveled(VMT))]/(454 grams/lbs)

PM10 = [0.195 grams/mile x 112.5 miles/day]/454 grams/lb = [21.94 grams/day]/454 grams/lb = 0.05 lbs/day PM10

CO = [4.72 grams/mile x 112.5 miles/day]/454 grams/lb = [531 grams/day]/454 grams/lb = 1.17 lbs/day CO

ROC = [0.55 grams/mile x 112.5 miles/day]/454 grams/lb = [61.88 grams/day]/454 grams/lb = 0.14 lbs/day ROC

NOx = [3.73 grams/mile x 112.5 miles/day]/454 grams/lb = [419.63 grams/day]/454 grams/lb = 0.92 lbs/day NOx

SOx = [0.29 grams/mile x 112.5 miles/day]/454 grams/lb = [32.63 grams/day]/454 grams/lb = 0.07 lbs/day SOx

APPENDIX E

404(b)(1) EVALUATION

**THE EVALUATION OF THE EFFECTS OF THE DISCHARGE OF
DREDGED OR FILL MATERIAL INTO THE WATERS OF THE
UNITED STATES
IN SUPPORT OF THE ENVIRONMENTAL ASSESSMENT FOR
LOWER NEWPORT BAY MAINTENANCE DREDGING PROJECT
ORANGE COUNTY, CALIFORNIA**

INTRODUCTION. The following evaluation is provided in accordance with Section 404(b)(1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) as amended by the Clean Water Act of 1977 (Public Law 95-217). Its intent is to succinctly state and evaluate information regarding the effects of discharge of dredged or fill material into the waters of the U.S. As such, it is not meant to stand-alone and relies heavily upon information provided in the environmental document to which it is attached. Citation in brackets [] refer to expanded discussion found in the Draft Environmental Assessment (Draft EA), to which the reader should refer for details.

I. Project Description [1.1]

- a. Location: [1.1.1] The proposed project is located in Orange County and consists of maintenance dredging the Entrance Channel portion of the federal navigation channels in Lower Newport Bay.
- b. General Description: [1.1.2; 3.2.2] The proposed project is maintenance dredging to maintain authorized channel depths in the Entrance Channel to allow for continued, safe navigation for recreational and commercial boats in Lower Newport Bay. Dredged sediments would be beneficially reused for beach nourishment purposes by placing them in the Newport Beach Nearshore Placement Site identified for this purpose for sediments dredged from Lower Newport Bay. Approximately 70,000 cubic yards (cy) of sediments would be dredged by either a clamshell dredge or a barge-mounted excavator discharging into scows. Full scows would be towed to the Newport Beach Nearshore Placement Site and the sediments placed into the Newport Beach Nearshore Placement Site.

Dredging would take place in the Main Channel Balboa Reach with approximately 90,000 cy of sediment disposed of at the LA-3 Ocean Dredged Material Disposal Site (ODMDS). Sediments in the Main Channel Balboa Reach are not considered suitable for nearshore placement. Ocean disposal is not addressed in this Evaluation as it is not under the jurisdiction of the Clean Water Act.

- c. Basic and Overall Purpose. [2.2] The purpose of the proposed project is to maintain authorized channel depths in the federal channels to allow for continued, safe navigation for recreational and commercial boats in Lower Newport Bay.
- d. General Description of Dredged or Fill Material: [4.1, Appendix B]
 - (1) General Characteristics of Material (grain size, soil type): A sediment sampling program was conducted in 2018-2019 to support maintenance dredging in the Entrance Channel. Sediment from the Entrance Channel consisted primarily of sand (98.1%). TOC ranged from non-detect to 1.9%. Composite sediment chemistry results indicated that sediment from the Entrance Channel is clean, with all concentrations less than the NOAA ERL values. Solid Phase and Suspended Particulate Phase bioassay testing indicated that sediment from the Entrance Channel is not acutely toxic to marine organisms. Due to the high percentage of sand (98.1%) and low concentrations of contaminants, tissue analysis for bioaccumulation evaluation was not required. Based on the results of testing, sediment from the Entrance Channel is considered suitable for

nearshore placement. It is also considered suitable for ocean disposal, however, Corps/USEPA policy is to beneficially reuse dredged sediments wherever possible, so ocean disposal is considered suitable, but not acceptable given the presence of the beneficial reuse at the Newport Beach Nearshore Placement Site.

(2) Quantity of Material: Approximately 70,000 cy of sediments dredged from the project area would be placed in the Newport Beach Nearshore Placement Site.

(3) Source Material: Entrance Channel of Lower Newport Bay.

e. Description of the Proposed Discharge Site:

(1) Suitable dredged material would be placed in the nearshore area of the Newport Beach Nearshore Placement Site. The characteristic habitat type subject to impact by dredge material discharge is open-coast sandy beach. 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).

(2) Size (acres): Suitable dredged material would be placed in an approximately 35 acre site.

(3) Type of Site (confined, unconfined, open water): Unconfined, open water.

Types of Habitat: Newport Beach Nearshore Placement Site is offshore of a typical southern California sandy beach. Bottom type is poorly graded, fine to medium sands. Bottom depths range from -25 ft MLLW to -40 ft MLLW.

f. Description of Disposal Method: [9.1] Material would be dredged by either a clamshell dredge or a barge-mounted excavator and dredged sediments transported via split hull dredge scow to the Newport Beach Nearshore Placement Site.

II. Factual Determinations.

a. Physical Substrate Determinations:

(1) Substrate Elevation and Slope:

Current bottom elevations in the Newport Beach Nearshore Placement Site range from -25' to -40' MLLW. The area is relatively flat.

(2) Sediment Type.

Geotechnical studies indicate that the sediment consists primarily of poorly graded sand (SP), poorly graded sand with silt (SP-SM), or silty sand (SM). Sediments are compatible with existing Newport Beach Nearshore Placement Site materials.

(3) Dredged Material Movement.

Suitable dredged material would be placed into the Newport Beach Nearshore Placement Site. The area experiences moderate levels of sand movement protecting and nourishing adjacent beaches.

(4) Physical Effects on Benthos (burial, changes in sediment type, etc.).

Temporary, short-term adverse impacts would occur. The placement of sediments would bury benthic organisms. Recolonization would be expected to occur quickly. No long-term adverse effects are expected.

(5) Other Effects. None.

(6) Actions Taken to Minimize Impacts (Subpart H).

Needed: X YES NO

Weekly monitoring of water quality to control turbidity and to monitor dissolved oxygen levels during placement would occur. If turbidity exceeds set standards and/or dissolved oxygen fall below a set standard of 5 mg/l, placement would be evaluated and modifications would be made to get back into compliance.

If needed, Taken: X YES NO

A water quality monitoring plan will be part of the construction contract and will be coordinated with the Regional Water Quality Control Board, Santa Ana Region.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water (refer to sections 230.11(b), 230.22 Water, and 230.25 Salinity Gradients; test specified in Subpart G may be required). Consider effects on salinity, water chemistry, clarity, odor, taste, dissolved gas levels, nutrients, eutrophication, others.

The proposed federal action is not expected to significantly affect water circulation, fluctuation, and/or salinity. Only clean, compatible sands from the project will be used for the nearshore placement. These sands are not a source of contaminants. Minor turbidity levels may exist in the immediate vicinity of the placement operations that may result in minor, temporary reductions in dissolved oxygen. Sands will not be a source of nutrients, thus eutrophication is not expected to result. Water used to entrain sands will be sea water as is water adjacent to nearshore placement, thus there will be no effect on salinity levels.

(2) Current Patterns and Circulation (consider items in sections 230.11(b), and 230.23), Current Flow, and Water Circulation.

The proposed federal action is not expected to significantly affect current patterns or circulation. Circulation and current patterns in the harbor are determined by a combination of tide, wind, thermal structure, and local bathymetry. Placement of material at the Newport Beach Nearshore Placement Site would result in negligible, localized changes to circulation patterns within the area.

(3) Normal Water Level Fluctuations (tides, river stage, etc.) (consider items in sections 230.11(b) and 230.24)

The proposed federal action is not expected to have a significant impact on normal water level fluctuations. There would no change to tidal elevations, which is determined by access to the open ocean, which would not be changed.

(4) Salinity Gradients (consider items in sections 230.11(b) and 230.25)

The proposed federal action is not expected to have any impact on normal water salinity nor is it expected to create salinity gradients. Water placed in the scow as part of the dredging process would be sea water as is water adjacent to the Newport Beach Nearshore Placement Site, thus there will be no creation of salinity gradients.

(5) Actions That Will Be Taken to Minimize Impacts (refer to Subpart H)

Needed: X YES NO
If needed, Taken: X YES NO

All placement operations would be monitored for effects on water quality, including turbidity, temperature, salinity, dissolved oxygen, and pH; monthly water samples will be taken and analyzed for total dissolved solids and TRPH. Best management practices would be implemented if turbidity and/or dissolved oxygen exceeds water quality criteria.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site (consider items in sections 230.11(c) and 230.21)

Placement of sediments generally results in minor impacts to water quality from turbidity. Impacts would be temporary and adverse, but not significant. This is expected to be highly localized and visually indistinguishable from normal turbidity levels. The area is expected to return to background after placement ceases. Water quality monitoring during placement will allow USACE to modify operations (such as by slowing rate of discharge) until any water quality problems abate.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column (consider environmental values in section 230.21, as appropriate)

Placement of clean sandy sediments generally results in minor impacts to water quality due to resuspension of chemical contaminants in the sediments. Sediments are free of contaminants and impacts are expected to be negligible and be temporary, but not significant.

(3) Effects on Biota (consider environmental values in sections 230.21, as appropriate).

Biota buried during placement are expected to recolonize over the short term. Impacts will be temporary and adverse, but not significant.

(4) Actions taken to Minimize Impacts (Subpart H)

Needed: X YES NO
If needed, Taken: X YES NO

Monitoring of water quality to control turbidity and to monitor for possible resuspension of contaminants during placement would occur. If turbidity exceeds set standards and/or dissolved oxygen exceeds water quality criteria, disposal would be evaluated and modifications made to get back into compliance.

A water quality monitoring plan will be part of the construction contract and will be coordinated with the Regional Water Quality Control Board, Santa Ana Region.

- d. Contaminant Determinations (consider requirements in section 230.11(d)): The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)

(1) Physical characteristics X

(2) Hydrography in relation to known or anticipated sources of contaminants X

(3) Results from previous testing of the material or similar material in the vicinity of the proposed project X

(4) Known, significant sources of contaminants (e.g. pesticides) from land runoff or percolation X

(5) Spill records for petroleum products or designated (Section 311 of the CWA) hazardous substances
-

(6) Other public records of significant introduction of contaminants from industries, municipalities, or other sources
—

(7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man- induced discharge activities

(8) Other sources (specify) X _____

An evaluation of sediment testing indicates that the proposed dredged material is not a carrier of contaminants and that levels of contaminants are substantively similar in the extraction and placement sites and are not likely to be constraints.

- e. Aquatic Ecosystem and Organism Determinations (use evaluation and testing procedures in Subpart G, as appropriate).

(1) Plankton, Benthos and Nekton

Placement operations would result in short-term turbidity impacts that could affect plankton in the area. Organisms could stifle in the immediate vicinity as these small organisms are impacted by turbidity. However, these effects would be small in both area and time and the plankton would be expected to recover quickly once disposal is completed. Benthic organisms would be buried by placement, but the areas would be minor in area and would quickly recolonize. Larger organisms in the nekton would be expected to avoid disposal operations and would not be impacted.

(2) Food Web

Impacts to the bottom of the food chain (plankton and nekton) would be short term and occur in a small area. Recovery would be quick once placement operations are concluded.

(3) Special Aquatic Sites

There are no special aquatic sites in the project area.

(4) Threatened & Endangered Species

There would be no affect to any listed threatened or endangered species or to their designated critical habitat. The federally listed endangered California least tern (*Sternula antillarum browni*) is a migratory bird. California least terns predominately nest on coastal foredunes and other sites with gravelly or sandy substrate and sparse vegetation. Because terns would abandon nests if disturbed, they require nest areas relatively free of human disturbance and predators. The historical habitat of the California least tern has been significantly reduced and modified by human activities including marine and industrial development and residential development along beaches. This loss of habitat has resulted in small isolated breeding colonies that are vulnerable to local extirpation. Primary threats to California least tern populations include increased predation and recreation-related disturbances. California least terns arrive and move through the harbor area in late April and utilize nest areas in Orange County from mid-May through August. Although nesting does not occur at Newport Beach, other areas in the region provide suitable habitat. These areas include Upper Newport Bay to the 4 miles to the northeast. California least terns have been observed foraging in the bay and may forage in waters offshore during the breeding season. Beaches within the harbor are not an important resting area for the species due to the presence of extensive human activity. Because the project area is routinely subject to elevated noise and activity of workers and equipment associated with common commercial and recreational practices, short-term project-related disturbances are not expected to affect the foraging and resting of least terns.

(5) Other fish and wildlife:

Marine mammals would not be affected by placement activities. Birds would generally avoid the placement site, although placement could attract birds to the placement site.

(6) Actions to Minimize Impacts (refer to Subpart H)

Needed: X YES NO

Monitor and control turbidity to minimize impacts to plankton and nekton.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination (consider factors in section 230.11(f)(2))

Is the mixing zone for each disposal site confined to the smallest practicable zone?

 X YES NO

The sediments do not require a mixing zone in order to remain in compliance with water quality standards. As such, the mixing zone is considered to be the smallest practicable.

(2) Determination of Compliance with Applicable Water Quality Standards (present the standards and rationale for compliance or non-compliance with each standard)

The project will be in compliance with state water quality standards. Placement of material at the receiver site would result in short-term elevated turbidity levels and suspended sediment concentrations, but no appreciable long-term changes in other water quality parameters, including dissolved oxygen, pH, nutrients, or chemical contaminants. Factors considered in this assessment include the relatively localized nature of the expected turbidity plumes for the majority of the disposal/placement period and rapid diluting capacity of the receiving environment and the clean nature of re sediments to be dredged and placed at the Newport Beach Nearshore Placement Site. Water quality monitoring would be required as part of the overall project. If monitoring indicated that suspended particulate concentrations outside the zone of initial dilution exceeded permissible limits, disposal/placement operations would be modified to reduce turbidity to permissible levels. Therefore, impacts to water quality from disposal/placement of material at the receiver site would not violate water quality objectives or compromise beneficial uses listed in the Basin Plan. USACE will continue to coordinate with the Santa Ana Regional Water Quality Control Board during construction to minimize impacts to water quality.

(3) Potential Effects on Human Use Characteristic

(a) Municipal and Private Water Supply (refer to section 230.50)

There are no municipal or private water supply resources (i.e. aquifers, pipelines) in the project area. The proposed project would have no effect on municipal or private water supplies or water conservation.

(b) Recreational and Commercial Fisheries (refer to section 230.51)

The harbor and nearshore areas are not subject to commercial fishing. Recreational fishing would move to avoid the placement activities and to follow fish out of these areas.

(c) Water Related Recreation (refer to section 230.52)

Construction equipment would be required to maintain ocean access for all uses. During placement activities, proper advanced notice to mariners would occur and navigational traffic would not be allowed within the nearshore placement discharge area. The displacement of recreational boating would be temporary and short-term. However, the proposed project would not significantly impact surfing conditions or other water sports once completed. The currents are not expected to change in magnitude or direction. Therefore, the federal action is not expected to measurably change currents or change surfing in any discernible way. To minimize navigation impacts and threats to vessel safety, all floating equipment would be equipped with markings and lightings in accordance with the U.S. Coast Guard regulations. The location and schedule of the work would be published in the U.S. Coast Guard Local Notice to Mariners

(d) Aesthetics (refer to section 230.53)

Minor, short term effects during placement are anticipated. The federal action would not result in any visible changes to the nearshore area.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves (refer to section 230.54)

The federal action would not have any effect on national and historic monuments, national seashores, wild and scenic rivers, wilderness areas or research sites.

(f) Determination of Cumulative Effects on the Aquatic Ecosystem (consider requirements in section 230.11(g))

Cumulative effects were determined to be insignificant, refer to section 5 of the Environmental Assessment.

(g) Determination of Secondary Effects on the Aquatic Ecosystem (consider requirements in section 230.11(h))

Secondary effects of the discharge of dredged or fill would be negligible. Areas outside the direct impact would have only negligible turbidity effects from disposal. Turbidity levels would be low and in the immediate vicinity of the disposal operations. Impacts of the federal action are all temporary construction impacts. Movement of sand downcoast would be indistinguishable from natural sand movement resulting in lowered erosion rates due to the increased volume of sand.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation

No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem:

All practicable alternatives for dredging/placement were evaluated. This included differing alternative dredge depths. The recommended plan is the least environmentally damaging practicable alternative.

c. Compliance with Applicable State Water Quality Standards.

The proposed project meets State of California water quality standards.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act.

No toxic materials/wastes are expected to be produced or introduced into the environment by this project.

e. Compliance with Endangered Species Act of 1973.

As discussed in the attached Environmental Assessment, the USACE has determined the placement of dredged/fill material will not have an effect on any species Federally-listed as threatened or endangered nor any designated critical habitat. Consultation pursuant to Section 7 of this Act is not required for this project.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972.

No sanctuaries as designated by the Marine Protection, Research and Sanctuaries Act of 1972 will be affected by the proposed project. Sediments would be disposed of at a designated ocean dredged material disposal site (ODMDS) LA-3 only if nearshore placement was no longer feasible.

g. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects on Human Health and Welfare

(a) Municipal and Private Water Supplies

The proposed project will have no significant adverse effects on municipal and private water supplies.

(b) Recreation and Commercial Fisheries

The proposed project will have minor, short-term impacts, but no significant adverse effects on recreation fisheries. The harbor and nearshore areas are not subject to commercial fishing. Recreational fishing would move to avoid the disposal activities and to follow fish out of these areas. To minimize navigation impacts and threats to vessel safety, all floating equipment would be equipped with markings and lightings in accordance with the U.S. Coast Guard regulations. The location and schedule of the work would be published in the U.S. Coast Guard Local Notice to Mariners.

(c) Plankton

Disposal operations would result in short-term turbidity impacts that would affect plankton in the area. Organisms could stifle in the immediate vicinity as these small organisms are impacted by turbidity. However, these effects would be small in both area and time and the plankton would be expected to recover quickly once placement is completed.

(d) Fish

Larger organisms in the nekton would be expected to avoid placement operations and would not be impacted.

(e) Shellfish

Benthic organisms, including shellfish, would be buried by disposal, but the areas would be minor in area and would quickly recolonize.

(f) Wildlife

Marine mammals would not be affected by placement. Birds would generally avoid the placement, although nearshore placement could attract birds to the benthic organisms coming out of the dredge pipe as an alternate food source.

(g) Special Aquatic Sites

There are no special aquatic sites in the project area.

- (2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems: Any adverse effects would be short-term and insignificant. Refer to section 4 of this Environmental Assessment.
- (3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity and Stability: Any adverse effects would be short-term and insignificant. Refer to section 4 of this Environmental Assessment.
- (4) Significant Adverse Effects on Recreational, Aesthetic, and Economic Values: Any adverse effects would be short-term and insignificant. Refer to section 4 of this Environmental Assessment.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

Specific environmental commitments are outlined in the analysis above and in the attached Environmental Assessment. All appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

i. On the Basis of the Guidelines, the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material (specify which) is:

___ (1) Specified as complying with the requirements of these guidelines; or,

___ (2) Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem; or,

___ (3) Specified as failing to comply with the requirements of these guidelines.

Prepared by: Larry Smith Date: DRAFT

APPENDIX F

**ENVIRONMENTAL JUSTICE
SCREEN RESULTS**



EJSCREEN Report (Version 2019)



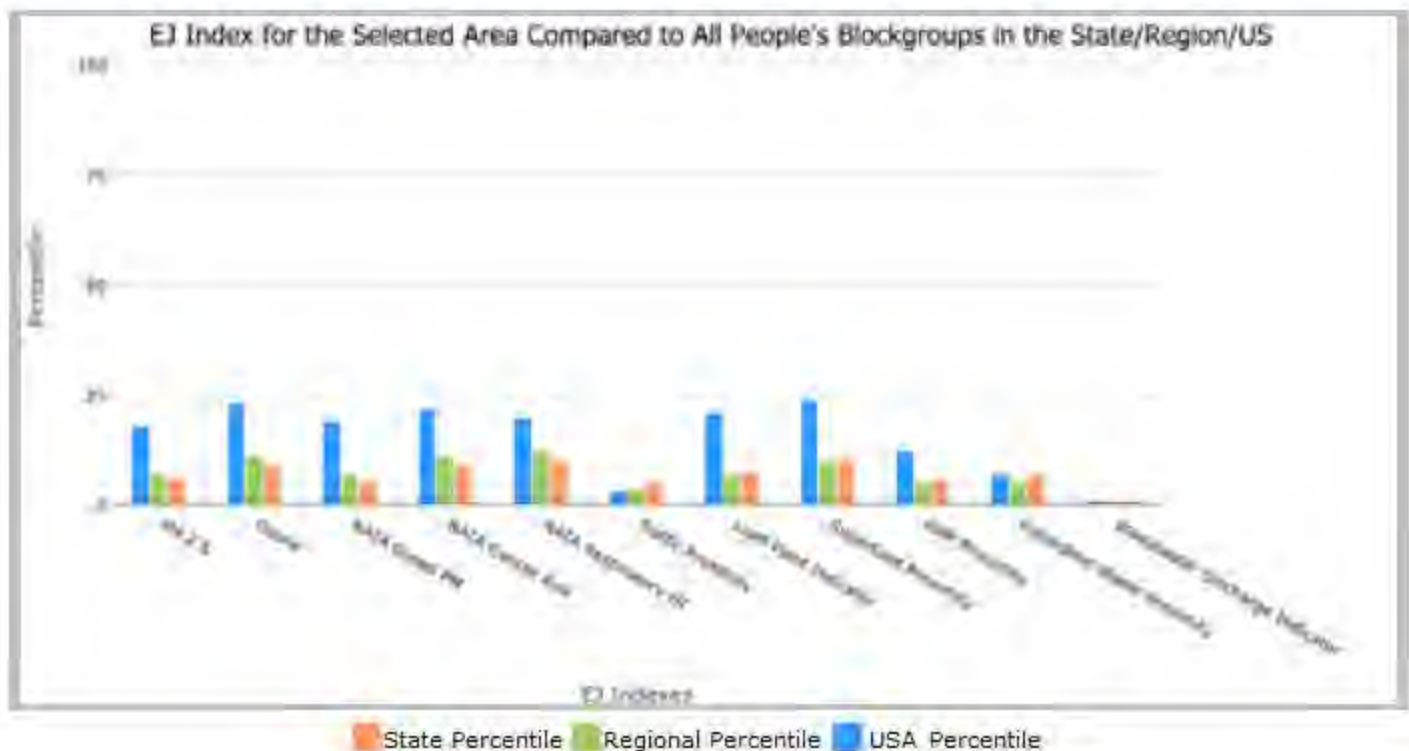
City: Newport Beach, CALIFORNIA, EPA Region 9

Approximate Population: 86,729

Input Area (sq. miles): 52.95

City of Newport Beach (The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	6	7	18
EJ Index for Ozone	9	11	23
EJ Index for NATA* Diesel PM	5	7	19
EJ Index for NATA* Air Toxics Cancer Risk	9	11	22
EJ Index for NATA* Respiratory Hazard Index	10	12	20
EJ Index for Traffic Proximity and Volume	5	4	3
EJ Index for Lead Paint Indicator	8	7	21
EJ Index for Superfund Proximity	10	10	24
EJ Index for RMP Proximity	6	5	12
EJ Index for Hazardous Waste Proximity	7	5	7
EJ Index for Wastewater Discharge Indicator	1	1	1



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJSCREEN Report (Version 2019)



City: Newport Beach, CALIFORNIA, EPA Region 9

Approximate Population: 86,729

Input Area (sq. miles): 52.95

City of Newport Beach (The study area contains 1 blockgroup(s) with zero population.)



Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	5



EJSCREEN Report (Version 2019)

City: Newport Beach, CALIFORNIA, EPA Region 9

Approximate Population: 86,729

Input Area (sq. miles): 52.95

City of Newport Beach (The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	10	9.78	53	9.21	62	8.3	90
Ozone (ppb)	44.5	48.2	36	48.9	29	43	57
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.442	0.468	55	0.479	50-60th	0.479	50-60th
NATA* Cancer Risk (lifetime risk per million)	30	36	26	35	<50th	32	<50th
NATA* Respiratory Hazard Index	0.44	0.55	20	0.53	<50th	0.44	50-60th
Traffic Proximity and Volume (daily traffic count/distance to road)	1400	2000	59	1700	66	750	86
Lead Paint Indicator (% Pre-1960 Housing)	0.21	0.29	50	0.24	58	0.28	53
Superfund Proximity (site count/km distance)	0.061	0.18	37	0.15	43	0.13	49
RMP Proximity (facility count/km distance)	0.6	1.1	50	0.99	56	0.74	64
Hazardous Waste Proximity (facility count/km distance)	2.2	3.4	53	2.9	61	4	79
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	1.6	17	92	31	92	14	96
Demographic Indicators							
Demographic Index	16%	48%	5	47%	6	36%	21
Minority Population	19%	62%	6	59%	8	39%	36
Low Income Population	14%	34%	20	34%	20	33%	20
Linguistically Isolated Population	2%	9%	21	8%	26	4%	52
Population With Less Than High School Education	2%	18%	10	17%	10	13%	12
Population Under 5 years of age	4%	6%	27	6%	27	6%	29
Population over 64 years of age	22%	13%	87	14%	85	15%	82

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.



EJSCREEN Report (Version 2019)



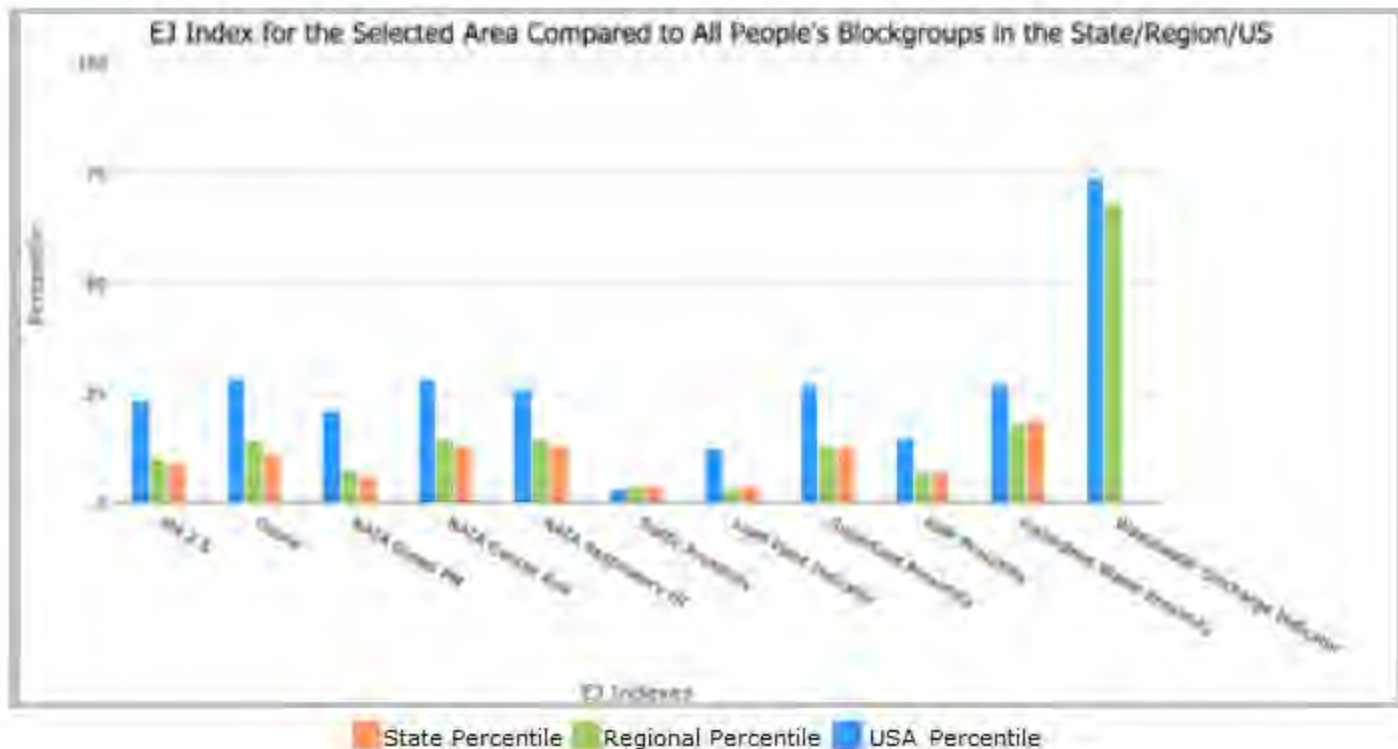
1 miles Ring around the Area, CALIFORNIA, EPA Region 9

Approximate Population: 9,355

Input Area (sq. miles): 4.27

Newport Bay Entrance Channel (The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	9	10	23
EJ Index for Ozone	11	14	28
EJ Index for NATA* Diesel PM	6	8	21
EJ Index for NATA* Air Toxics Cancer Risk	13	15	28
EJ Index for NATA* Respiratory Hazard Index	13	15	26
EJ Index for Traffic Proximity and Volume	4	4	3
EJ Index for Lead Paint Indicator	4	3	12
EJ Index for Superfund Proximity	13	13	27
EJ Index for RMP Proximity	7	7	15
EJ Index for Hazardous Waste Proximity	19	18	27
EJ Index for Wastewater Discharge Indicator	N/A	68	74



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

1 miles Ring around the Area, CALIFORNIA, EPA Region 9

Approximate Population: 9,355

Input Area (sq. miles): 4.27

Newport Bay Entrance Channel (The study area contains 1 blockgroup(s) with zero population.)



Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0



EJSCREEN Report (Version 2019)



1 miles Ring around the Area, CALIFORNIA, EPA Region 9

Approximate Population: 9,355

Input Area (sq. miles): 4.27

Newport Bay Entrance Channel (The study area contains 1 blockgroup(s) with zero population.)

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	9.87	9.78	51	9.21	61	8.3	87
Ozone (ppb)	44.3	48.2	35	48.9	29	43	55
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.461	0.468	58	0.479	50-60th	0.479	50-60th
NATA* Cancer Risk (lifetime risk per million)	29	36	22	35	<50th	32	<50th
NATA* Respiratory Hazard Index	0.43	0.55	18	0.53	<50th	0.44	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	1800	2000	67	1700	73	750	89
Lead Paint Indicator (% Pre-1960 Housing)	0.39	0.29	66	0.24	71	0.28	69
Superfund Proximity (site count/km distance)	0.059	0.18	36	0.15	42	0.13	48
RMP Proximity (facility count/km distance)	0.57	1.1	49	0.99	54	0.74	63
Hazardous Waste Proximity (facility count/km distance)	0.3	3.4	20	2.9	27	4	43
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0	17	N/A	31	54	14	37
Demographic Indicators							
Demographic Index	13%	48%	3	47%	3	36%	15
Minority Population	15%	62%	4	59%	5	39%	30
Low Income Population	12%	34%	16	34%	15	33%	16
Linguistically Isolated Population	1%	9%	17	8%	20	4%	46
Population With Less Than High School Education	2%	18%	9	17%	9	13%	10
Population Under 5 years of age	4%	6%	25	6%	25	6%	27
Population over 64 years of age	31%	13%	96	14%	94	15%	94

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.